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March 24, 2023

VIA ELECTRONIC FILING

Public Utility Commission of Oregon
Filing Center
P.O. Box 1088
201 High Street SE, Suite 100
Salem, Oregon 97308-1088

Re: UM 2255 - In the Matter of Idaho Power Company, Application for Approval of 2026 All-Source Request for Proposals to Meet 2026 Capacity Resource Need.

Attention Filing Center:

Attached for filing in the above-captioned docket are Idaho Power Company's Reply Comments.

Please contact this office with any questions.

Sincerely,

Alisha Till
Paralegal

Attachment

BEFORE THE PUBLIC UTILITY COMMISSION OF OREGON

UM 2255

In the Matter of IDAHO POWER COMPANY, Application for Approval of 2026 All-Source Request for Proposals to Meet 2026 Capacity Resource Need.	**IDAHO POWER COMPANY'S REPLY COMMENTS**

I. INTRODUCTION

In accordance with the schedule filed by Staff on February 24, 2023, as subsequently amended on March 23, 2023, Idaho Power Company ("Idaho Power" or "Company") hereby submits these comments responding to the comments submitted by London Economics International ("LEI," the Independent Evaluator ("IE")) on March 2, 2023, and the comments submitted by Public Utility Commission of Oregon ("Commission") Staff ("Staff") and the Northwest and Intermountain Power Producers Coalition ("NIPPC") on March 17, 2023, addressing the Company's draft 2026 All-Source Request for Proposals ("2026 AS RFP" or "RFP") and Scoring and Modeling Methodology.

Idaho Power appreciates the robust stakeholder feedback and is engaged in ongoing discussions with Staff and LEI and will work with NIPPC to address their comments and suggestions. The Company anticipates resolving most issues and modifying the 2026 AS RFP document as necessary.

II. DISCUSSION

A. Response to LEI

Preferred Resources

LEI requested that the RFP include additional information regarding the Company's preferred resource portfolio. To address this request, Idaho Power will add a link to the

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Company's most recently acknowledged Integrated Resource Plan ("IRP"), the 2021 IRP, to the body of the RFP so that readers can go directly to the preferred portfolio from the 2021 IRP. This will eliminate possible discrepancies between the two separate documents.

In addition, to ensure accuracy and avoid discrepancies as the 2023 IRP is being drafted, Idaho Power will provide a link to the published 2023 IRP when available. Idaho Power has articulated the changing capacity and energy need in the body of the RFP and will use the most current information to select the preferred portfolio based on the bids received from the RFP solicitation. Particularly, the RFP will seek bids for a combination of capacity and energy resources that provide a minimum of approximately 350 megawatts ("MW") of peak capacity and up to 1,100 MW of variable energy resources. Idaho Power will be accepting bids for energy or capacity incremental to its system beginning in the summer 2026 timeframe and beyond from Resource Based Products and Market Purchase Products.

Benchmark Bids

LEI requested additional information about the quantity of and resources associated with benchmark bids.

Pursuant to Idaho Power's established separation of functions, the RFP evaluation team does not have transparency into potential benchmark bids and cannot provide a separate exhibit identifying the benchmark bids that may be submitted. Generally, the evaluation team expects the benchmark bids to be similar in nature and structure to those utility-ownership bids in previous Idaho Power RFPs, which consisted of battery energy storage resources. In prior Idaho Power RFPs the maximum number of utility submitted bids was between two and four. The increased scale and nature of this RFP compared to prior RFPs may result in different benchmark bids. The separate bid team advises that they intend to submit up to two battery energy storage bids, all of which would be located at existing Idaho Power substation locations, with their own separately queued interconnection requests. It is not anticipated that there would be the opportunity to offer portions of these types of bids/developments (such as project

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location, interconnection, etc.) to be utilized by third party bidders. The separate internal bid team also may partner with a third-party to submit a bid but any such details are unknown at this time. However, the very nature of this RFP seeks bids that would utilize utility transmission capacity from B2H. The benchmark bids will be submitted and evaluated using the same criteria as any other developer or respondent bid in a similar manner as if they were affiliate bids, submitted from the separate Idaho Power bid team under the separation of functions.

RFP Schedule

LEI, Staff and Idaho Power held additional meetings to discuss the RFP schedule and have collaboratively made several adjustments to the schedule to address LEI's concerns and improve the process. The changes allow more time for bidders to submit their bids and more time for the IE to assess the affiliate bids and file its Benchmark Bids Report. None of these adjustments have impacted the targeted approval of the RFP by the Commission on May 16, 2023.

LEI also notes that OAR 860-089-0450(6) requires the IE to evaluate the unique risks and advantages of the Company-owned resource(s) based on a listed set of issues. It is Idaho Power's understanding that OAR 860-089-0450(6) does not require this evaluation to be complete as it relates to the IE's Benchmark Bids Report, and it can be deferred to the IE's Final Report.

Bid Evaluation Process

Non-Price Score

The RFP includes the minimum bid requirements as an element of the bid's self-scoring. LEI is concerned that some of the minimum bid requirement questions were too broad and, combined with the binary structure of the non-price score ("yes/no" answers that correspond with scores of "1/0," respectively) would entice bidders to score themselves favorably. LEI recommended that the Company provide greater specificity in drafting the questions or criteria.

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In response to feedback from LEI and stakeholders at the Company's February 21, 2023, workshop, Idaho Power has been working to refine the non-price scoring and provided a new iteration of the non-price scoring Bid Entry Form ("BEF") to LEI on February 24, 2023. In its comments, LEI noted the Company's efforts to address the concerns raised by both parties and explained that the Company's descriptions for both the criteria and the scales were also improved upon, as requested by both LEI and stakeholders. LEI, however, suggested additional clarifications to the non-price scoring methodology.

The Company has made additional modifications to the non-price scoring matrix to address LEI's concerns and has included the updated matrix in the revised RFP attached to these reply comments.

Price Scoring Model

LEI recommended that the RFP include a more detailed description of the price scoring methodology, including the following:

- a brief description of the methodology of the scoring model;
- inputs used in the model and model outputs;
- clarity on how the energy and capacity components of bids will be valued/calculated and compared across bids;
- clarity on how balancing flexibility is valued/calculated, if applicable; and
- an example of scores produced for five hypothetical bids of different product types/technologies.

Idaho Power has clarified and added additional details to the RFP in response to LEI's recommended changes and continues to coordinate with LEI to establish a consistent application of the financial model. Furthermore, throughout these reply comments, the Company has provided additional detail regarding how the scoring methodology will replicate the methodology established in the IRP.

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Contract Term Normalization

To encourage a robust market response to the RFP, Idaho Power provided the option for bidders to submit power purchase agreement ("PPA") bids with a term up to 35 years. To account for PPAs with different terms and allow for a fair comparison of bids, Idaho Power will use a normalization process that will calculate an annualized (levelized) cost for each PPA, similar to what the Company does in its IRP. LEI recommended that the RFP include greater details into how the Company will evaluate PPAs with different terms, including a step-by-step description of the normalization methodology and an example. As suggested by LEI, Idaho Power has added additional clarifications to the RFP to explain the Company's contract term normalization process and levelization process.

Shortlist Selection:

LEI recommends that the Company include in the final RFP an additional exhibit describing in detail how the AURORA model will evaluate and select bids. LEI requests the following, at a minimum, in the description of the price scoring model:

- the ultimate cost metric input to the AURORA model (will it be the levelized cost of capacity, levelized cost of energy, or a combination of both? If a combination, how do they interact?);
- all inputs to the AURORA model, distinguishing the inputs that must be provided by the bidder and the ones that will be calculated by Idaho Power;
    - a description of the inputs calculated by Idaho Power, including how they are calculated and the internal assumptions by product type/technology;
    - a description of assumptions to be made by Idaho Power for data inputs not provided/available in the bid (e.g., cost of interconnection).
- the ultimate output from the AURORA model;
- the inputs/outputs of the model provided in graphical form; and

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- the expected stochastic iterations that will be performed as part of the final shortlist selection (or refer to the latest acknowledged IRP, if it is already described there).

The Company is concerned about the level of detail the IE recommends including in the RFP. Rather than including duplicative information in the RFP, Idaho Power will rely on the established and acknowledged IRP methodology to select economic portfolios and points stakeholders to that information directly. Inputs into Idaho Power's long-term capacity expansion model (AURORA) vary depending on the technology submitted by the bidder, as the BEF outlines. Please note the ultimate cost metric for a PPA is levelized cost of capacity ("LCOC") or levelized cost of energy ("LCOE"). Idaho Power inputs the project assumptions provided by the bidders and the levelized costs into AURORA, including interconnection costs, as an example. The output from AURORA is a list of the most economical resources that will meet Idaho Power's operational need.

Imputed Debt

LEI, Staff and NIPPC all recommend not allowing Idaho Power to add the cost of imputed debt to any of the non-utility bids for the purposes of bid evaluation. To respond to these comments, Idaho Power first provides an overview of the treatment of imputed debt in its bid evaluations and then follows with specific responses to LEI's imputed debt comments.

Imputed Debt Overview

In seeking to access capital, one of the major factors banks, investors, investment analysts, and lenders consider is the Company's overall financial profile, including the strength of its balance sheet. The credit rating agencies, such as Moody's and Standard & Poor's ("S&P"), assess the financial strength of companies like Idaho Power and provide ratings that act as a barometer to balance sheet strength, among other things. While Moody's and S&P look at imputed debt differently, both agencies evaluate future contractual obligations related to long-term PPAs as they consider future debt obligations of issuers during their ongoing

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monitoring of credit quality. That imputation is understandable as the third-party supplier is ultimately leveraging Idaho Power's balance sheet to develop its project, by using the PPA and underlying long-term debt-like obligation and payment stream from Idaho Power as collateral, while at the same time diminishing Idaho Power's credit profile and financial strength. Imputing debt is a credit rating agency's way of transferring the project risk from the developer to the utility because the contractual obligation of the utility is essentially providing cash flow and credit support to the developer. Credit rating agencies account for this transferred risk as a fixed debt obligation of the utility and impute this risk to the utility's balance sheet. While such costs are generally not visible when PPA contracts are entered into, customers will eventually bear the higher costs of capital unless the imputed debt is mitigated with additional equity.

During their most recent evaluations, both Moody's and S&P discussed with the Company the pressure on Idaho Power's financial risk profile related to the significant level of contractual obligations and highlighted the rising levels of these obligations in recent years. They also expressed their ongoing concerns related to the projected need for future resources to serve customers as a result of customer growth and other drivers, and the potential for additional PPAs versus higher capital spending to acquire these needed resources. In fact, the risk analysis associated with Idaho Power's large long-term contractual obligations was a key discussion point with Moody's and S&P in April 2022, given the Company's significant long-term Public Utilities Regulatory Policies Act of 1978 ("PURPA") and non-PURPA power purchase obligations. As of December 31, 2022, Idaho Power had contractual obligations related to cogeneration and power production contracts of over $4 billion. This compares with long-term debt obligations of approximately $2 billion at that same date. Over the past decade, the Company has been resource sufficient as PURPA PPAs came online, compelling Idaho Power to urge rating agencies to consider that those circumstances warrant a lower level of imputed debt. Because the Company has been resource sufficient and the addition of these projects was not based on a resource need, the Company argued that the level of imputed debt, or risk,

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associated with these projects was relatively low, because if these PURPA projects failed to materialize, minimal action would be required to procure replacement energy. Presently, however, the Company is in a near-term resource deficient position, and the Company would be required to take additional action if these needed projects failed to materialize. Consequently, the Company believes this resource replacement risk will result in a greater impact of imputed debt with regard to how it is applied by ratings agencies going forward.

The imputed debt relating to contractual obligations contributed to the financial risk score of 'Significant' at Idaho Power in S&P's most recent credit report and contributed to the factors considered by Moody's during its most recent downgrade of the Company's credit. Idaho Power believes that further increases in its contractual obligations related to PPAs will put additional pressure on its credit metrics that could lead to further downgrades in its credit ratings. As seen on Table 1 below, following the recent Moody's downgrade, both rating agencies are now showing credit rating levels for Idaho Power that are considered 'Lower medium grade' by the markets. Further material downgrades could drop the Company to 'Non-investment grade speculative' status, which would further increase the cost of borrowing for Idaho Power, ultimately impacting customer rates.

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Table 1. Credit Rating Levels.

Moody's		S&P		Fitch		Rating description	
Long-term	Short-term	Long-term	Short-term	Long-term	Short-term		
Aaa	P-1	AAA	A-1+	AAA	F1+	Prime	Investment-grade
Aa1		AA+		AA+		High grade	
Aa2		AA		AA			
Aa3		AA−		AA−			
A1		A+	A-1	A+	F1	Upper medium grade	
A2		A		A			
A3	P-2	A−	A-2	A−	F2		
Baa1		BBB+		BBB+		Lower medium grade	
Baa2	P-3	BBB	A-3	BBB	F3		
Baa3		BBB−		BBB−			
Ba1	Not prime	BB+	B	BB+	B	Non-investment grade speculative	Non-investment grade aka high-yield bonds aka junk bonds
Ba2		BB		BB			
Ba3		BB−		BB−			
B1		B+		B+		Highly speculative	
B2		B		B			
B3		B−		B−			
Caa1		CCC+	C	CCC	C	Substantial risks	
Caa2		CCC				Extremely speculative	
Caa3		CCC−				Default imminent with little prospect for recovery	
Ca		CC					
		C					
C		D	/	DDD	/	In default	
/				DD			
				D			

While the additional interest rate spread expected from a Moody's rating of Baa1 to Baa2 is not particularly significant for any one particular bond issuance, it is important to consider that S&P's current credit rating for the Company, a BBB, is the equivalent of a Moody's rating of Baa2, and a further deterioration to Baa3 and/or BBB- could result in a 40 basis point increase or more for any bond issuances. Credit spreads fluctuate widely depending on market conditions, with the spread for lower rated companies widening much more than higher rated companies during times of market stress. This was particularly evident during the great recession and the early days of the COVID-19 pandemic, and even more recently stemming from geopolitical unrest, inflation, and general economic uncertainty.

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In addition, deteriorating credit ratings not only impact long-term debt costs, they also impact short-term credit markets, including existing and future credit facilities and the ability of Idaho Power to access the commercial paper market. If Idaho Power's current commercial paper rating of A-2/P-2 were to deteriorate, it would be more costly for the Company to access short-term borrowings, as the markets for A-3/P-3 and below are more expensive and significantly less liquid, resulting in times when the commercial paper market cannot be accessed reliably, and must be replaced by more costly short-term borrowings from credit facilities. Higher short-term debt costs could negatively impact customers in the form of higher Allowance for Funds Used During Construction ("AFUDC") rates. Access to commercial paper markets is particularly important in times of economic uncertainty, such as we are experiencing currently.

Additional PPAs in the future could lead to a greater impact on debt and equity costs for customers going forward. In short, while the impact of any one given project may not seem significant, when compounded with $4 billion of existing contractual obligations, the impact on the overall cost of capital and customer rates can be significant. By not considering imputed debt obligations and the impact they can have on Idaho Power's cost of capital the Company would be omitting from the bid evaluation process real costs that will ultimately impact customer rates. As seen historically in the capital markets, as the actual or perceived credit quality of a company deteriorates, the corresponding cost of equity increases due to that perception, impacting the Company's weighted average cost of capital. While customers pay the cost of prudently incurred interest expenses, the cost of equity also increases as the perceived market risk of the investment increases, unless offset by a larger equity ratio to debt. The debt-like obligation of a PPA could cause Idaho Power to fall outside of a desirable range of debt-to-equity, and the Company (through its public parent) may need to issue equity (stock) to rebalance the ratio at an additional cost to customers. The Company believes maintaining investment-grade credit ratings at historical rating levels contributes to lower overall cost of

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capital for Idaho Power, and thus leads to lower customer rates. Thus, the Company makes significant efforts to keep the debt component of the cost of capital lower, as it understands the ultimate impact of these capital costs on customers.

While the existing contractual obligations are generally imputed as debt to the utility for credit rating purposes, a PPA containing dispatch rights would actually require Idaho Power to record a liability on its balance sheet under applicable accounting rules. Accounting Standards Codification ("ASC") 842-20-25-1 requires a company to record a lease liability if an arrangement provides the company "the right to control the use of the underlying property, plant, and equipment for a period of time in exchange for consideration." [ASC 842-10-15-3]. For the Company, dispatch rights would create contractual control by the utility, and result in a lease liability on its balance sheet, as opposed to imputed debt, which is often adjusted for the level of perceived risk by the credit rating agency. The lease liability would be treated as the equivalent of long-term debt in credit quality metrics by both credit agencies, while not bringing the adjoining benefits of collateral assets that can be securitized by the utility.

The Company takes proactive steps to manage and mitigate financial risk. It is in the interest of customers to preserve Idaho Power's credit profile and maintain a solid balance sheet to support existing and planned infrastructure. Idaho Power assesses numerous factors in its review of RFP responses, both operational and financial. In the financial analysis, Idaho Power assesses and includes its own debt and equity costs in any self-build option in a competitive bidding process. Were Idaho Power to ignore the effect of imputed debt from long-term contractual obligations in its analysis of RFP responses from third parties, it would not be evaluating the projects on a financially comparable basis, nor would it be correctly assessing the net financial impact of the project on the Company and its customers.

<u>LEI Imputed Debt Comments</u>

LEI expressed concern over the imputed debt scoring because it was contrary to Commission precedent. The Company acknowledges the Commission previously rejected the

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use of imputed debt when scoring bids but notes that the current competitive bidding rules do not expressly preclude the Company from doing so. Given Idaho Power's specific factual circumstances discussed above, it is reasonable for the Company to account for the impact of imputed debt when scoring bids.

LEI also noted that the impact of imputed debt is only one factor relevant to different bid structures. The Company agrees that PPAs reduce certain utility risks, however, they also increase others. For example, the utility's obligation to serve load at acceptable system reliability levels often requires making critical real-time adjustments that may curtail an individual plant's output. A PPA owner has other incentives. There are times these priorities are in conflict, potentially to the detriment of system reliability. A recent illustration of this risk factor took place in Texas when an extreme winter storm in February 2021 shut down power for 4.5 million customers. Independent generators provide the backbone of the ERCOT supply-side resources and were caught unprepared as the generation facilities were not fortified to withstand the extreme temperatures. Under a PPA contract, the utility loses control over maintenance of the generation facilities and the Company believes this introduces a notable risk to reliably serving load. Idaho Power's qualitative component is the place where both the positive factors as well as the negative factors introduced by a PPA structure are included in RFP evaluations.

LEI also states that the inclusion of imputed debt adds a layer of complexity and lacks transparency. Idaho Power is generally following S&P's imputed debt methodology, which the Company believes is not overly complex. S&P takes into account contracts with an all-in energy price as follows: "S&P considers an implied capacity price that funds the recovery of the supplier's capital investment to be subsumed within the all-in energy price." Due to solar and wind PPA contracts having nominal costs other than ownership, Idaho Power views the all-in energy price as an implied capacity payment. Historically, when Idaho Power was resource sufficient and therefore was primarily entering into PURPA contracts, a 25 percent risk factor was applied by the rating agencies; however, as the Company has become resource deficient

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and is entering into new contracts providing the needed energy and/or capacity, Idaho Power anticipates the rating agencies to increase their risk factor, likely to 50 percent. As mentioned above, for battery storage agreements or PPAs with capital lease treatment, GAAP requires the filing entity (utility in this case) to calculate the imputed debt of the payment stream and add this debt obligation directly on its balance sheet, effectively placing 100 percent of the imputed debt on the utility's balance sheet. It is the Company's understanding based on conversations with the credit rating agencies that they follow the accounting rules with regard to leases. As such, a lease obligation resulting from a PPA will be included as a long term obligation of the utility when considering credit metrics.

The adjustment process begins with a calculation of the net present value ("NPV") of the outstanding contract payments over the remaining life of a PPA. The NPV value is then adjusted for the level of perceived credit exposure associated with a PPA. Depending on the perceived credit exposure of a PPA, the credit rating agency may apply risk factors that typically range from 0 to 50 percent – but can be as high as 100 percent. For contracts that qualify for capital lease treatment under generally accepted accounting principles, no adjustment is needed as the accounting rules impute 100% of the debt directly on to the utility's balance sheet.

Ultimately, the result of the imputed debt applied by the rating agencies will be downgrades in credit ratings unless there is some type of mitigation to offset the imputed debt, such as additional equity. For example, in June 2021 Moody's put Idaho Power on negative watch, which is the first step towards a downgrade in Moody's credit ratings for the Company. There are many factors that impact credit ratings, and imputed debt is one of those factors.

When comparing the cost of a PPA to utility ownership, it is important to consider these imputed debt adjustments, as they will eventually result in added costs to customers. To

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illustrate the financial impact of the imputed debt adjustment, the Company has prepared the following illustrative example using the following financial input assumptions:

- Current authorized return on equity = 10%
- Incremental Cost of debt = 5.5%
- Incremental composite tax rate 25.74%
- 50/50 Debt/Equity capitalization structure

Any PPA will cause rating agencies to impute debt on Idaho Power's balance sheet based on the estimated present value of the PPA resource payments discounted at the incremental cost of debt and adjusted by a risk factor. In order to maintain an assumed 50/50 capitalization structure, the company would need to issue equity equal to half of the imputed debt and then use those cash proceeds to pay off existing debt effectively rebalancing back to a 50/50 capitalization structure.

Assume the Company signs a PPA that would result in imputed debt of $200 million on the Company's balance sheet based on the estimated payments and the incremental debt rate and risk factor. In order to maintain a 50/50 debt/equity ratio, the Company must issue $100 million of equity. The company would use the $100 million proceeds of the equity issuance to pay off debt.

As a result, Idaho Power customers would now pay the monthly/annual cost of the PPA plus the cost of the equity issuance due to the PPA ($100 million x 10%) = $10 million plus a gross up for tax ($10 million x (1/(1-0.2574))) = $13.466 million.

As mentioned earlier, the Company would use the funds from the equity issuance to pay off existing debt at a rate of 5.5% or a $5.5 million cost reduction.

Therefore, in this example, customers would be paying an additional $7.97 million ($13.4662 million - $5.5 million) per year beyond the PPA price due to the imputed debt adjustment. Consequently, because of imputed debt, when evaluating the relative cost of a PPA, regulatory bodies should consider the less-visible added annual customer cost of $39.83 for every $1,000 of imputed debt related to the PPA ($7.97 million / $200 million).

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The Company has provided example imputed debt calculations to LEI, Staff and NIPPC showing how the utility's cost of capital (including both debt and equity) is used to evaluate utility bids and how imputed debt calculations affect PPA bids.

B. Response to Staff

Phase 1

Initial Screening

Staff's comments express concerns regarding the Company's statement that it may prioritize the evaluation of bids with relatively low prices to maximize the use of limited time and resources, and Staff suggests that Idaho Power commit to scoring all conforming bids. Idaho Power has revised the RFP (in response to NIPPC comments) after coordination with Staff and the IE so that the Company will develop the initial shortlist based on technology specific scoring ranking of price and non-price scores of every bid. Thus, this methodology has the same effect as "prioritizing" bids based on price and provides a transparent evaluation. As described below, AURORA will not be utilized until development of the final shortlist.

Imputed Debt

Please see the Company's discussion of imputed debt above, which provides the Company's rationale for including imputed debt in its price scoring methodology. As noted above, the Company provided several examples of its calculation of imputed debt costs of different resource types and contract terms from its 2024 RFP. The Company appreciates Staff's openness to additional discussions on this important matter.

Idaho Power understands that the inclusion of imputed debt costs in the initial shortlist phase of prior RFPs has not been previously allowed by the Commission; however, Idaho Power asserts that changes have been made to the rating agency methodology due to recently adopted accounting changes in accounting for leases that should now be considered by Staff. It should be noted that while ratings methodologies are proprietary to the ratings agencies, Idaho

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Power's discussions with S&P as well as with Moody's have led the Company to understand that going forward, whenever a lease liability is recorded on a company's balance sheet, that lease liability will be equivalent to an imputed 100 percent debt liability of the Company, consistent with the accounting method required to have been adopted. For a utility, a lease liability is required to be recorded on its balance sheet when the utility receives dispatch rights in the PPA contract. This creates a lease liability for the utility because dispatch rights create the opportunity for the utility to control the output of the facility considered in the PPA. A lease liability is treated in the same manner as any other debt of the utility for credit ratings purposes. As the accounting methodology that creates a lease obligation is new (ASC 842, adopted as required as of 2019), there are no current examples of PPAs that have been recorded on Idaho Power's balance sheet that have resulted from lease obligations.

That being said, S&P has been imputing debt obligations to Idaho Power when considering its credit ratings since at least 2007, when it published its methodology for imputing debt for U.S. utilities' PPAs. That methodology contains a generic example of the application of imputed debt by S&P, which is based on certain risk factors. The risk factor that has been applicable to Idaho Power's credit ratings since that time relates to the fact that PPA costs are considered in its annual power cost adjustment mechanisms and until recently was not needed to serve customers and would not be replaced if the PPA did not exist. Thus, Idaho Power understands that S&P has imputed 25 percent of future payment obligations related to its PPAs as debt obligations of the utility, at least since the time S&P published its methodology.

Staff points to the IE report regarding contractual structures such as PPA's that place different risks on developers, notably construction and performance risk. Idaho Power agrees that PPA's do require developers to shoulder the risk and burden to deliver projects on time. However, financial implications remain the sole remedy for not meeting commitments and thus burden Idaho Power to find replacement capacity and energy to reliably serve customers. Third-

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party entities have no requirement to provide reliability to Idaho Power customers and only financial incentives/disincentives that can leave Idaho Power customers at risk.

Staff also requested a detailed description of how equivalent long-term debt implications will be applied to benchmark resources or any resources for which the Company will assume ownership. Each Idaho Power-owned asset is assumed to have debt and equity equal to the capital structure in the most recent rate case. For example, a $100 million Idaho Power-owned project would be assumed to be financed with $49.9 million of equity and $50.1 million of debt (the Company's debt/equity ratio in its most recent general rate case was 49.9 percent equity and 50.1 percent debt). The cost of that debt and equity is calculated as part of the levelized cost of the project. The Company's debt to equity ratio stays consistent before and after the project, which does not result in degraded debt rating metrics.

Non-Price Scoring

Staff, LEI and NIPPC all expressed concerns on certain questions within the non-price scoring matrix. The Company has made modifications to the non-price scoring matrix to address those concerns and has included the updated matrix as part of the revised RFP.

Initial Shortlist

Staff requested additional explanation to ensure that bidders and stakeholders have a thorough understanding of precisely how capital costs will be converted to a levelized cost. In particular, Staff requested that the Company incorporate or reference the modeling methodology used in its most recent acknowledged IRP and explain what ways the analysis in this RFP will differ. Please refer to the 2021 IRP pages 107 and 108 under the section "Resource Costs – IRP Resources" and "LCOC – IRP Resources".

Staff also requested that the RFP include additional explanations and additional information about the availability of tax credits for the Company in this resource procurement. As of December 31, 2022, Idaho Power had no unrealized federal general business credits and has and will continue to monitor Idaho Power federal tax credits.

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Staff also notes that the Company had indicated in the RFP that the initial shortlist may also include high-scoring bids in excess of the identified capacity limits if those projects have economic benefits.

To further explain, the Company will take bids in excess of the identified capacity for two reasons: 1) to have contingency projects in case contracting issues arise or other shortlist bids drop out of the RFP and 2) to give Idaho Power the opportunity to investigate low price additional projects that may not directly address the needs of the RFP but are still economically beneficial; for example, if Idaho Power only needed capacity but received an extremely low-priced bid from an energy project (such as a wind or solar project) then that project might provide an economic benefit by reducing net power supply expenses. In such a case, that project could be moved to the shortlist.

Phase 2

IRP Modeling

As part of its shortlist evaluation process, Idaho Power agrees to run each project on the shortlist through the AURORA production cost model when substantive updates are received. The Company also agrees with Staff that the selected portfolio should be run through the Company's reliability tool, as described in the LOLE section of Technical Appendix C to the Company's 2021 IRP. The reliability tool has been improved since the 2021 IRP and the Company recommends the flexibility to leverage the applicable improvements for the RFP analysis. All assumptions, improvements, and revisions to the 2021 IRP will be provided to the IE, Staff and stakeholders for review and evaluation as part of the Company's filings.

Portfolio Development and Risk Analysis

Idaho Power appreciates Staff's comments and agrees that utilizing a stochastic analysis on several scenarios will be beneficial in assessing risk factors. As stated previously, Idaho Power believes it will be beneficial to leverage the same assumptions and inputs that were formulated for the 2023 IRP process and discussed with the IRP Advisory Council, which

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includes Staff representatives. Below are the details Staff requested pertaining to the range of values for each specified variable:

1. Natural Gas – While the planning case in the analysis will use Platt's Long-Term Gas Price Forecast, the stochastic spread will allow natural gas prices to swing within a range of $1.35 to $20.48.
2. Market Prices – Prices are an output of the model and are determined during the production cost model run as the model dispatches available resources to meet system needs on an hourly basis. The range of market prices generated within the model can be shared after the production cost model runs are complete.
3. Environmental Policy – Environmental policies are represented by modeling a carbon price adder. This stochastic carbon price adder will range between $0 and $412 per ton.
4. Other Variables – The Company recommends aligning the variables used in the RFP stochastic analysis with the 2023 IRP. In addition to those mentioned specifically above, hydro generation levels and electricity demand will be included.

These variables, specified in the most recent IRP (2023 IRP), and each project, will be modeled with the least-cost, least-risk portfolio identified in the 2023 IRP.

Benchmark Bids

As noted previously, changes to the schedule have been made to allow more time for bidders to submit their bids and more time for the IE to assess the benchmark bids and file its Benchmark Bids Report.

As noted above, the RFP evaluation team does not have transparency into potential benchmark bids and cannot at this time provide a separate exhibit identifying the affiliate bids that may be submitted including specific components of these bids that could be made available to third-party bidders. The RFP has been updated to clarify that transmission rights described in

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Exhibit E are available to all bidders. The transmission rights are controlled (or will be controlled) by Idaho Power but can be utilized by bidders in response to the RFP.

Market Energy Purchases

Staff requested additional dialog on several facets of the market energy purchases included in the RFP, as well as the inclusion of a standard contract. The Company and Staff scheduled time to further discuss the inclusion of market energy purchases and their impact on this resource procurement. The Company anticipates these market energy purchases will be made under the general terms of the WSPP Agreement[1].

Sensitivities and Boardman to Hemingway

Idaho Power will run a variety of sensitivity analyses when evaluating and selecting the preferred portfolio of resources to meet the identified capacity and energy needs in 2026 and beyond including contingencies related to Boardman to Hemingway transmission line in-service dates. This analysis (amongst others and determined through IRP modeling and in coordination with Staff and the IE) will compare various scenarios of available transmission capacity, including Boardman to Hemingway.

C. Response to NIPPC

Scoring Issues

Price-Non-Price Allocation

NIPPC recommends adjusting the allocation of price to non-price score from 75/25 to 80/20, thereby providing greater weight to the price score. The Company believes that its current 75/25 Price/Non-Price scoring ratio is reasonable and consistent with that used in other utilities' recent RFPs. For practical purposes, the Company believes that the difference

[1] For reference, the WSPP Agreement can be found here: https://www.wspp.org/pages/Agreement.aspx

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between a 75/25 and 80/20 ratio will likely be immaterial and NIPPC's proposed sensitivity analysis is unnecessary.

Imputed Debt

Please see the Company's response to the IE and Staff comments, which provides the Company's rationale for including imputed debt in its price scoring methodology. In its response to a NIPPC information request, the Company provided several examples of its calculation of imputed debt costs of different resource types and contract terms. Further, while the decisions in the RFP cases cited by NIPPC did not allow the use of imputed debt, the Company does not agree with NIPPC's interpretation that the competitive bidding rules expressly proscribe the application of imputed debt. Further, as the Company's previous explanation discusses, the Company disagrees with NIPPC's assertions that ratings agencies would not treat PPAs with utility recovery mechanisms as imputed debt and that there is no impact on credit ratings.

Timing of Portfolio Modeling

NIPPC suggests that the Company delay portfolio modeling until after the initial shortlist selection. Idaho Power believes this is a reasonable suggestion and can develop the initial shortlist based primarily on the price and non-price score, and without the use of AURORA portfolio modeling, though there may be circumstances where the use of AURORA might be helpful to differentiate similar bids with different technical specifications.

NIPPC also recommends that the RFP expressly commit to perform the sensitivity analyses necessary to evaluate the final shortlist stage. In particular, NIPPC asks that the RFP specifically state that the step of developing the final shortlist must include sensitivity analyses, including a sensitivity analysis of the impact of changes to non-price scoring (e.g., modeling the outcome with different price/non-price scoring allocations) and a sensitivity analysis of the impact of bid term lengths in the portfolio modeling. Idaho Power will clarify in the RFP that this analysis will take place as required by the rules.

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Utility Ownership Price Scores

NIPPC suggests additional clarity regarding the treatment of utility-owned bids to ensure fair treatment of all bids in the RFP. Idaho Power agrees with this recommendation and intends to treat all utility-owned bids, whether that be a Build Transfer Agreement ("BTA") contract structure or an Idaho Power self-build bid equally to non-utility-owned bids. NIPPC's comments focus on how ongoing operation and maintenance costs will be handled for utility and non-utility-owned bids. For utility-owned resources, the BEF requires a cost for operations and maintenance (for example, a Long-Term Service Agreement) over the life of the asset to maintain similar performance as would be expected for a third-party PPA or tolling agreement. Idaho Power believes that this cost, when levelized, is an accurate reflection of the project cost over the life for modeling purposes. Historically, Idaho Power has included an assumed and consistent ongoing operations and maintenance annual cost for utility-owned assets when evaluating bids.

Price Score Ranking

NIPPC requests clarification of the ranking by technology type, i.e., the Company will rank the bids against other bids of the "same technology" and then assign the points proportionally with the lowest price bid receiving 75 points. NIPPC is concerned that this ranking may be used to compare resources of different technologies and unfairly advantage certain types of bids.

The ranking within technologies is not intended and will not be used to compare across technology types. Rather, the intent of the technology based comparative ranking is to create a relative ranking within a single technology as a method to screen higher priced bids within that single technology. If a particular technology had limited bids, thus making ranking on a relative basis inconclusive, Idaho Power anticipates further evaluating the smaller pool in AURORA which can provide a technology agnostic evaluation. For example, if a single geothermal project was scored and given a total of only 25 points for the price score, but a pool of solar projects all

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scored 50 or more price points, Idaho Power anticipates moving the pool of solar projects and the geothermal project forward for further evaluation in the AURORA model, where the potential advantages and disadvantages of the geothermal resource can be better assessed.

Term Normalization

NIPPC recommends that the RFP's method of term normalization should be clarified to improve transparency for bidders and stakeholders. To that end, the Company will add the following additional language to the RFP around varying project lives in section 7.1 Phase 1 – Initial Shortlist under the sub-heading IRP Modeling and Selection of the Initial Shortlist: "For a 25-year PPA for example, we calculate the present value of the revenue requirement (contractual payment stream over the 25 years plus imputed debt) for the project and calculate the levelized payment based on the contract life."

Non-Price Scoring

Staff, LEI and NIPPC have all expressed concerns on certain questions within the non-price scoring matrix. The Company has made modifications to the non-price scoring matrix to address those concerns and has included the updated matrix as part of the revised RFP including bid eligibility checklist, non-price, and price scoring.

Cure Period

NIPPC suggests lengthening the cure period for bidders to correct flaws identified by the Company in the submitted bids from two days to five days. The Company believes two days to cure is consistent with past RFPs and urges bidders to provide a complete and comprehensive bid upon submittal.

Miscellaneous Issues

Benchmark Bids

NIPPC requests more detail on the benchmark bids be included in the RFP, as well as an explanation of whether benchmark project assets would be made available to other bidders. NIPPC also requested clarification of transmission rights listed in Appendix E of the draft RFP.

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See the comments above in response to benchmark bids. The RFP has been updated to clarify that transmission rights described in Exhibit E are available to all bidders. The transmission rights are controlled (or will be controlled) by Idaho Power but can be utilized by bidders in response to the RFP.

Firmness of Bids

NIPPC suggests that the RFP be clearer on its repricing provisions. The Company has edited the RFP to provide specificity in proposal updates prior to the final shortlist.

Exclusivity at Shortlist Stage

NIPPC objects to the RFP requirement that for projects on the shortlist Idaho Power have exclusive negotiation rights. The Company disagrees with this stance. It is important for the Company to have a degree of certainty that the shortlist bids are truly available to be selected prior to entering into contract negotiations.

Final Shortlist Fee

NIPPC recommends deletion of the proposed fee to participants on the Shortlist. The Company has made this a passive obligation and will only assess a fee if required to ensure good faith negotiations.

Contract Forms

Set of Contract Forms and Form-Related Issues

NIPPC suggests several revisions to the contract forms included in the RFP. Many of the items identified by NIPPC go to the substantive nature of the provisions themselves, which Idaho Power believes are not appropriately debated at this point in the process, but are items that would be discussed and negotiated between the parties during contract negotiations. It should be noted that Idaho Power does not view the substantive nature of a bidder's redlines to be a gating item that would exclude a bidder from the process, but rather an opportunity for the bidders to identify important contract term and conditions or assumptions they are attaching to their bids. Regardless of what bidders submit as initial redlines with their bids, it is the

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Company's experience that once a selection is made that the comprehensive nature of the ensuing negotiations runs somewhat independent of the more general initially submitted redlines. Additionally, all Idaho Power's executed agreements must be individually filed and approved as part of a public proceeding at the Idaho Public Utilities Commission. Idaho Power expects that the negotiated terms and conditions will align around a relatively tight band of reasonable industry standard terms and conditions that are widely known and accepted by developers of projects and potential bidders.

Idaho Power has supplied draft agreements to cover differing ownership and structures that are geared toward solar and battery resources and the combination thereof, primarily because those are the only currently available documents that the Company has contracted for from its other procurements. Idaho Power will make efforts to develop a wind specific template or a more general terms and conditions document for the provision of identified redlines and/or important contracting terms and conditions as part of a bid submittal. With regard to market purchases Idaho Power has proposed utilizing the WSPP standard agreement or a mutually-agreeable alternative master agreement. These purchases would also have certain terms and conditions reflecting the specific details of the transaction in a confirmation of such purchase utilizing the standard master agreement.

III. CONCLUSION

Idaho Power appreciates the robust stakeholder feedback from LEI, Staff and NIPPC and has modified the RFP in response to that feedback. Because of the limited timeframe to provide these reply comments, the Company is still evaluating certain elements of that feedback and will continue to work collaboratively with the IE and Staff to provide explanations of various subjects and make additional modifications to the RFP leading up to the next steps in the competitive bidding process. The Company anticipates resolving most issues raised by the

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participants but as discussed in these comments, the Company is still strongly supportive of the need to consider imputed debt in its evaluation of bids.

Respectfully submitted this 24th day of March 2023.

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Docket UM 2255

Attachment A

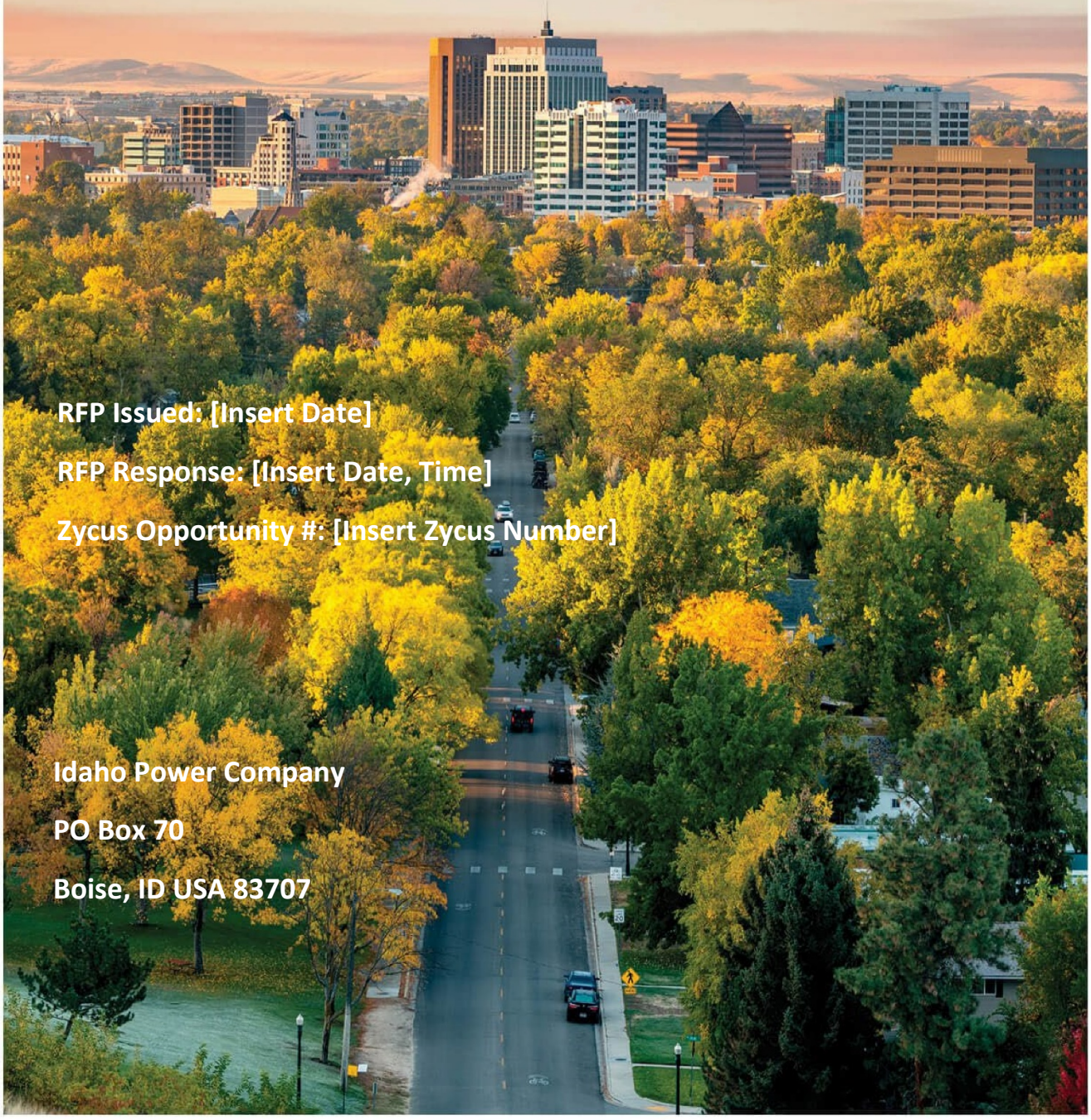
to

Idaho Power Company's Reply Comments

2026 IPC All Source Request for Proposals Draft

IDAHO POWER
An IDACORP Company

2026 All Source Request for Proposals (RFP) for Peak Capacity and Energy Resources



RFP Issued: [Insert Date]

RFP Response: [Insert Date, Time]

Zycus Opportunity #: [Insert Zycus Number]

Idaho Power Company

PO Box 70

Boise, ID USA 83707

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EXHIBIT A – Bid Definition Form

EXHIBIT B – Bid Entry Form

EXHIBIT C – Bid Eligibility Checklist

EXHIBIT D – Non-Price Scoring Matrix

EXHIBIT E – Proposed Market Purchase Volumes

EXHIBIT F – Information on Preferred Locations for Resource Based Bids

EXHIBIT G – Information on Most Valuable Hours for Resource Based Bids

EXHIBIT H – Draft Form Agreements for Resource Based Bids

EXHIBIT I – BESS Technical Specifications

EXHIBIT J – Solar Technical Specifications

EXHIBIT K – Wind Technical Specifications

EXHIBIT L – Gas-Fired Convertible to Hydrogen Specifications

EXHIBIT M – Mutual Non-Disclosure Agreement

EXHIBIT N - Counterparty Financial Questionnaire

EXHIBIT O – Draft Form Letter of Credit

Exhibit P – Bid Format and Requirements

1. Disclaimer

The information contained in this Request for Proposals (RFP) is presented to assist interested parties in deciding whether or not to submit a bid. Idaho Power Company (IPC), an operating company subsidiary of IDACORP, Inc., is issuing this RFP to solicit formal bids from qualified companies (each a Bidder) and does not represent this information to be comprehensive or to contain all of the information that a Bidder may need to consider in order to submit a bid. None of IPC, its affiliates, or their respective employees, directors, officers, customers, agents and consultants makes, or will be deemed to have made, any current or future representation, promise or warranty, express or implied, as to the accuracy, reliability or completeness of the information contained herein, or in any document or information made available to a Bidder, whether or not the aforementioned parties knew or should have known of any errors or omissions, or were responsible for their inclusion in, or omission from, this RFP.

No part of this RFP and no part of any subsequent correspondence by IPC, its affiliates, or their respective employees, directors, officers, customers, agents or consultants shall be taken as providing legal, financial or other advice or as establishing a contract or contractual obligation. IPC reserves the right to request from Bidder information that is not explicitly detailed in this document, obtain clarification from Bidders concerning bids, conduct contract development discussions with selected Bidders, conduct discussions with members of the evaluation team and other support resources as described in this RFP. The requirements specified in this RFP reflect those presently known. IPC reservices the right to vary, in detail, the requirements and/or to issue addenda to the RFP. In the event it becomes necessary to revise any part of the RFP, addenda will be provided to Bidders included in the current and applicable stage of the RFP.

IPC will, in its sole discretion and without limitation, evaluate bids and proceed in the manner IPC deems appropriate. IPC reserves the right to reject any and all, or portions of any bid submitted by Bidders for failure to meet any criteria set forth in this RFP or otherwise and to accept bids other than the lowest cost bid.

This RFP has been prepared solely to solicit bids and is not a contract offer. This RFP is not binding on IPC. The only document that will be binding on IPC is an agreement duly executed by IPC and the successful Bidder (if any) after the completion of the evaluation process and the award and negotiation of an agreement. IPC reserves the right to reject any and all bids submitted by Bidders. The issuance of this RFP does not obligate IPC to purchase any product or services offered by Bidder or any other entity. Furthermore, IPC may choose, at its sole discretion, to abandon the RFP process in its entirety. Bidders agree that they submit bids without recourse against IPC, IDACORP Inc., any of IDACORP Inc.'s affiliates, or any of their respective employees, agents, officers, or directors for failure to accept an offer for any reason. IPC also may decline to enter into any agreement with any Bidder, terminate negotiations with any Bidder or abandon the RFP process in its entirety at any time, for any reason and without notice thereof. Bidders that submit bids agree to do so without legal recourse against IPC, its affiliates, or their respective employees, directors, officers, customers, agents or consultants for rejection of their bids or for failure to execute an agreement for any reason. IPC and its affiliates shall not be liable to any Bidder or other party in law or equity for any reason whatsoever for any acts or omissions arising out of or in connection with this RFP. Bidder shall conform in all material respects to all applicable laws, ordinances, rules, and regulations and nothing in this RFP shall be construed to require IPC or Bidder to act in a manner contrary to law. Except as otherwise provided in the rules and orders of the Idaho Public Utilities Commission (IPUC) and the Public Utility Commission of Oregon (the OPUC), (jointly the Commissions), by submitting its bid, a Bidder waives any right to challenge any evaluation by IPC of its bid. Bidder whose bid may be selected in response to this RFP

acknowledges that it assumes full legal responsibility for the accuracy, validity, and legality of the work provided in conformance with this RFP. By submitting its bid, a Bidder waives any right to challenge any determination of IPC to select or reject its bid. IPC reserves the right to accept the bid in whole or in part, and to award to more than one Bidder. Furthermore, Bidder understands that any "award" by IPC does not obligate IPC in any way. IPC will not be obligated to any part unless and until IPC executes a definitive agreement between the parties.

Bidder will absorb all costs incurred in responding to this RFP, including without limitation, costs related to the preparation and presentation of its response. All materials submitted by the Bidder immediately become the property of IPC. Any exception will require written agreement by both parties prior to the time of submission.

In responding to this RFP, Bidder shall adhere to best business and ethical practices. Bidder shall adhere to IPC's Supplier Code of Conduct, also available at www.idahopower.com.

Bidder is specifically notified that failure to comply with any part of this RFP may result in disqualification of the bid, at IPC's sole discretion.

DRAFT

2. Purpose

2.0. BACKGROUND

IDACORP, Inc. is a holding company formed in 1998. Comprised of regulated and non-regulated businesses, its origins lie with Idaho Power Company (IPC), a regulated electric utility that began operations in 1916. Today, IPC is the largest regulated electric utility in the state of Idaho and IDACORP's chief subsidiary. IPC serves over 610,000 residential, business, agricultural, and industrial customers. The company's service area covers approximately 24,000 square miles, including portions of eastern Oregon. Learn more about IPC at www.idahopower.com.

IPC currently serves its customers by supplying low-cost, reliable, and clean energy. Affordable, clean hydropower is the largest source of energy for customers. Power generation comes from a diverse set of resources that continues to meet a growing demand. For a more detailed description of current generation resources, please visit: www.idahopower.com/energy-environment/energy/energy-sources/.

IPC's service territory continues to experience customer growth and an increasing peak demand (load) for electricity. IPC anticipates sustained load growth that will require the procurement of new resources to meet peak summer demand and maintain system reliability as identified in the most recent 2021 IRP (https://docs.idahopower.com/pdfs/AboutUs/PlanningforFuture/irp/2021/2021%20IRP_WEB.pdf). The addition of new resources to meet peak demand is critical to ensure IPC can continue to reliably meet the growing demands on its electrical system and serve its customers.

2.1. THE SOLICITATION

IPC is issuing this RFP to solicit formal bids from respondents for two types of electric energy and capacity products (Products). The first type is energy and capacity delivered from electric resources that employ certain technologies (**Resource Based Products: Products 1-17 in Table 3-1 and Table 3-2**). The second type is firm energy (WSPP Schedule C or equivalent preferred) that meets the eligibility requirements of the Western Resource Adequacy Program (WRAP) in terms of resource specificity, transmission and other requirements (**Market Purchase Products: Products 18-19 in Table 3-3**). The eligible types of Products are described further in Section 3 of this RFP and include asset purchases, power purchase agreements, and battery storage agreements with exclusive ownership by IPC of any and all environmental attributes associated with all energy generated. Details on the bid submission process and the bid evaluation process are also described further in this RFP.

This RFP targets resource procurement consistent with that identified in the 2021 IRP and the additional incremental 2026 and 2027 needs identified by IPC in its application to open the RFP Docket UM 2255 (https://apps.puc.state.or.us/edockets/docket.asp?DocketID=23468). Accordingly, the RFP will seek bids for a combination of capacity and energy resources that provide a minimum of approximately 350 MW of peak capacity and up to 1,100 MW of variable energy resources. IPC will be accepting bids for energy or capacity incremental to its system beginning in the summer 2026 timeframe and beyond from Resource Based Products and Market Purchase Products.

IPC holds (or expects to hold) transmission rights on various paths that could be used for delivery of Products. These rights are listed in EXHIBIT E – Proposed Market Purchase Volumes and include capacity from the

planned Boardman to Hemingway Transmission Line Project (B2H). IPC and other utilities in the region are currently expecting the B2H project to be in-service prior to summer 2026. B2H is a proposed 500-kilovolt transmission line that will run approximately 290 miles across eastern Oregon and southwestern Idaho. It will connect the proposed Longhorn Substation four miles east of Boardman, Oregon, to Idaho Power's existing Hemingway Substation in Owyhee County, Idaho. IPC's ownership share will be 45 percent representing approximately 750 MW of west-to-east delivery capability. More information on B2H can be viewed on the IPC website.[1] As part of any bid submitted, a bidder must indicate whether or not the bid is contingent on delivery of energy across B2H or any other transmission rights controlled by IPC.

Evaluation of bids will be performed by a team of IPC staff and retained consultants with relevant subject matter expertise (Evaluation Team) and be reviewed by an Independent Evaluator as described in Section 2.5.

The process of issuing and responding to this RFP, evaluation and selection of bids, and the negotiation and approval of the agreement(s) is known as the Solicitation. Bidders who are interested in participating in the Solicitation and submitting a bid must first register via the third-party solicitation portal, Zycus, further described in Section 2.7 of this RFP. This RFP sets forth the terms and conditions by which IPC will perform the Solicitation. Bidder agrees to be bound by all the terms, conditions, and other provisions of this RFP and any addenda to it that may be issued by IPC. This RFP governs the Solicitation and supersedes any other written or oral form of communication between Bidders and IPC concerning the Solicitation.

2.2. REGULATORY CONTEXT

Execution of any agreement will ultimately be subject to approval by the Commissions.

For the IPUC, this could include, but is not limited to, approval of a certificate of public convenience and necessity (CPCN) application from IPC. IPC reserves the right to: 1) inform the IPUC that IPC could not reach agreement with the Bidder of a selected resource; 2) request IPUC approval of any agreements it enters into with successful Bidders (e.g., CPCN applications); and 3) terminate any agreement if IPC fails to receive IPUC approval of submitted agreements or applications. Bidder shall provide any and all information and documentation reasonably requested by IPC to support such applications and requests.

The OPUC has issued rules on competitive bidding for resource acquisitions, where a company seeks to acquire resources or contracts with a duration greater than five years and a quantity greater than 80 MW. This RFP is subject to those rules as further described in the Oregon Competitive Bidding Rules (Order 18-324).

2.3. IPC SELF-BUILD RESOURCES AND BENCHMARK RESOURCES

In addition to bids from Bidders, Resource Based Product bids may be submitted by a separate team of IPC staff and retained consultants (Internal Bid Team). The Evaluation Team will treat the Internal Bid Team as a Bidder. The Evaluation Team will subject any bid from the Internal Bid Team (an Internal Bid) to the same requirements, evaluation methodology and other standards specified in this RFP for a bid from a Bidder. Furthermore, the Evaluation Team and the Benchmark Team must comply with an IPC Standards of Conduct Protocol (Separation of Function) to ensure the Evaluation Team functions independently from the Benchmark team, does not provide access to any non-public information or undue preference to the Internal Bid Team,

[1] https://www.idahopower.com/energy-environment/energy/planning-and-electrical-projects/current-projects/boardman-to-hemingway/

and provides the Internal Bid Team and Bidders equal access to non-public information related to the competitive bidding process for new generation resource procurement.

An Internal Bid will include a self-build ownership proposal and will be required to submit the same requirements described in this RFP. An Internal Bid may also include partnership arrangements or agreements between the Internal Bid Team and third parties that may collaborate to submit a joint Internal Bid.

IPC may submit one or more Internal Bid(s). IPC's Internal Bids will be submitted to the IE no later than seven (7) days prior to the opening of market bids. Market bids shall not be opened until the IE and IPC's evaluation team have reviewed, evaluated, validated, and scored any and all Internal Bids. The Internal Bid scores will be assigned using the same bid scoring and evaluation criteria that will be used to score market bids.

IPC is also making available to all Bidders the transmission rights defined in EXHIBIT E – Proposed Market Purchase Volumes and requests Market Purchase Product bids that utilize these IPC transmission rights.

2.4. INDEPENDENT EVALUATOR

The OPUC appointed London Economics International LLC as the independent, third-party Independent Evaluator (IE) for the Solicitation. The IE will help ensure the Solicitation is conducted transparently in accordance with OPUC Competitive Bidding Rules and that all bids are evaluated consistently and impartially. The IE will report to the OPUC. The general role and responsibilities of the IE are outlined as follows:

- The IE will review the initial draft RFP and Scoring and Modeling Methodology (SMM) developed by IPC prior to filing of the draft RFP with the OPUC and consult with IPC on changes to the draft RFP and SMM.
- After IPC files the draft RFP with the OPUC the IE will participate in workshops concerning the filed draft RFP and SMM, and review filings by OPUC Staff and others concerning the RFP.
- The selected IE will also review stakeholder comments, provide feedback, and suggest modifications to the draft RFP prior to IPC's filing of the final RFP with the OPUC.
- Prior to receipt of benchmark bids and market bids, the IE will review the assumptions to be used by IPC in its quantitative evaluation of the bids including those for its AURORA capacity expansion and production cost simulation.
- The IE will prepare and submit to the OPUC an assessment of the draft RFP (IE Draft RFP Assessment Report) and the final RFP (IE RFP Assessment Report) in conjunction with IPC's filing of the RFP with the OPUC for approval. The IE Draft RFP Assessment Report and IE RFP Assessment Report shall review the adequacy, accuracy, and completeness of all solicitation materials to ensure compliance with the OPUC competitive bidding requirements and consistency with accepted industry standards and practices.
- The IE shall independently score the competing bids and file the corresponding scores with the OPUC. As described herein, IPC will submit Benchmark Bids, and the IE will independently score the Benchmark Bids and file scores with the OPUC prior to opening and scoring the competing bids.
- The IE shall review IPC's sensitivity analysis for the final shortlist as completed per OAR 860-089-0400(5)(b) and file a written assessment with the OPUC.
- After IPC's selection of its final shortlist, the IE shall prepare the Closing Report, which shall provide the IE's detailed assessment of IPC's selection of the final shortlist of submitted bid, including but not limited to, all aspects of the solicitation process and the IE's involvement, observations, conclusions, and recommendations. Additionally, the IE shall wholly detail the reasons and basis for IPC's evaluation and

selection process including: a) ranking benchmark and market bids; b) selecting and scoring benchmark and market bids; and c) rejecting benchmark and market bids.

2.5. CONFIDENTIALITY

Bidder acknowledges and agrees that all Information obtained or produced in relation to this RFP is the sole property of IPC and shall not be released or disclosed to any person or entity for any purpose other than providing a bid to IPC, without the express written consent of IPC. Bidder agrees not to make any public comments or disclosures, including statements made for advertising purposes, regarding this RFP to the media or any other party without prior written consent of IPC. Bidder shall forward any media or other inquiries regarding this RFP to IPC.

Bidders shall specifically designate and clearly label as "CONFIDENTIAL" any bid material(s) or portions thereof, that the Bidder deems to contain proprietary information. IPC reserves the right to release all bid materials, including those marked "CONFIDENTIAL" to its affiliates and its affiliates' agents, advisors, and consultants, for purposes of bid evaluation. IPC will, to the extent required by law, advise each agent, advisor, or consultant that receives such claimed confidential information of its obligations to protect such information. All information, regardless of its confidential or proprietary nature, is subject to review by the Commissions and other governmental entities and courts with jurisdiction, and may be subject to legal discovery. Bidder acknowledges and agrees, IPC will provide a copy of Bidder's materials to the Commissions and Independent Evaluator for review and compliance with this solicitation. All Bidders whose bids are advanced to the Initial Short List will be required to execute a Mutual Nondisclosure & Confidentiality Agreement (Confidentiality Agreement) in the form of EXHIBIT M – Mutual Non-Disclosure Agreement with IPC prior to further discussion and evaluation of the bid by IPC.

2.6. SOLICITATION PORTAL AND RESTRICTION ON COMMUNICATIONS

IPC has opened a web-based portal hosted on the Zycus sourcing platform (the Portal). The web link to register within the Portal is: https://zsn.zycus.com/zsp/guest/genericRegister/IDA822. Once registered, instructions will be provided within the Portal to guide Bidder's on how to upload documents. All information exchanged between the Bidder and IPC concerning the Solicitation must only be via the Portal from the time the Portal is open until it is closed by IPC. All information, including pre-bid materials, questions, and IPC's response to questions, will be posted in the Portal or on the Idaho Power website (public information) at https://www.idahopower.com/about-us/doing-business-with-us/request-for-resources/ . The Portal allows a Bidder to see only its own information and not the information of other Bidders.

IPC has the ability to communicate with Bidders through the Portal. Other than written communication through the Portal, Bidders are prohibited from communicating with IPC employees, representatives, staff, or board members regarding the Solicitation during the period in which the Portal is open. Restricted communication includes, but is not limited to, "thank you" letters, phone calls, emails, and any contact that results in the direct or indirect discussion of the Solicitation and/or submitted bids. Violation of this provision by Bidders or their agents may lead to disqualification.

Bidder is responsible for ensuring it has registered for, and posts documents to, the correct portal hosted by Zycus. The Bidder registering for access to the Portal must be a representative of the Bidder and counterparty with which IPC will engage in any future negotiations, and not consultants or attorneys for the Bidder.

To ensure a competitive bid process, Bidders must not disclose its participation in this Solicitation (other than by attendance at any meeting held by IPC with respect to the Solicitation) or collaborate on or discuss with any other Bidder or potential Bidder bidding strategies or the substance of any bid(s), including without limitation the price or any other terms or conditions of any bid(s). This does not preclude parties from partnering in good faith to submit a competitive proposal.

Questions or support needs regarding the Portal should be directed to: ResourceRFP@idahopower.com. Any questions that are relevant to all Bidders will be provided in response through the Portal.

2.7. SCHEDULE

The key milestones for the Solicitation and their currently scheduled dates are provided in Table 2-1 below.

Table 2-1 – Key Milestones for the Solicitation

Milestone	Date
RFP Distributed to Market	4/5/2023
Bid Definition Forms Due	4/13/2023
Bid Entry Forms Distributed to Bidders	4/21/2023
Approval of AS RFP	5/16/2023
Bidder Workshop and Last Day for AS RFP Questions	5/22/2023
Benchmark Bids Due	5/29/2023
Benchmark Bid Evaluations Complete	6/2/2023
AS RFP Bids Due	6/9/2023
IE Files Report on Benchmark Bid	6/12/2023
Open AS RFP Bids	6/13/2023
Bid Eligibility Screening Completed	6/16/2023
IE Files Report on Bid Eligibility Screening	6/30/2023
Initial Bid Scoring/Ranking Complete	6/30/2023
Initial Shortlist	7/6/2023
IE Completes Review and Files Report of Initial Shortlist	7/13/2023
IPC Notifies Bidders Selected to Initial Shortlist	7/14/2023

This schedule and documents associated with the Solicitation are subject to change. IPC will endeavor to notify Bidders of any changes to the Solicitation but shall not be liable for any costs or liability incurred by Bidders or any other party due to a change or for failing to provide notice or acceptable notice of any change. Bidders should factor this schedule and any changes thereto into their project development timelines and bids.

Bidders should carefully review this RFP for questions, clarifications, defects, and questionable or objectionable materials. Comments and questions concerning clarifications, defects, and questionable or objectionable material must be submitted through the Portal and must be submitted on or before the date and time specified in the above schedule. IPC may not respond to questions submitted after this date. All questions and their applicable responses will be provided to Bidders via the Portal.

3. Product Specifications

A bid must demonstrate that the specifications stated in this section are satisfied.

3.0. ELIGIBLE PRODUCTS

The Products eligible to be proposed in response to the RFP are presented in Table 3-1, Table 3-2 and Table 3-3 below (Product Tables). The Products are distinctly aligned with two types of electric energy and capacity products.

The first type is energy and capacity delivered from electric resources that employ certain technologies (Resource Based Products: Products 1-17 in Table 3-1 and Table 3-2). All proposed Resource Based Products must be located within the IPC Balancing Area (BA) or demonstrate transmission rights to the IPC BA. Additional requirements for Resource Based Products are found in Section 4. Note that IPC does not require that Bidders provide a 35-year term for Bidder owned assets compared to shorter term lengths (for example, 20-year PPA for Solar PV) but would be very interested in receiving term bids equivalent to the life of the asset even if a bid is submitted for a shorter-term.

The second type is firm energy (preference for WSPP Schedule C or equivalent) that meets the eligibility requirements of the Western Resource Adequacy Program (WRAP) in terms of resource or system specificity, transmission, and other requirements (Market Purchase Products: Products 18-19 in Table 3-3). Additional requirements for Market Purchase Products are found in Section 5.

Table 3-1 – Resource Based Products - Renewables

Resource Type	Solar PV			Wind			Geothermal		
Product #	1	2	3	4	5	6	7	8	9
Product Description	Solar Short-Term PPA	Solar Long-Term PPA	Solar Asset Purchase	Wind Short-Term PPA	Wind Long-Term PPA	Wind Asset Purchase	Geothermal Short-Term PPA	Geothermal Long-Term PPA	Geothermal Asset Purchase
Structure	PPA	PPA	Asset Purchase	PPA	PPA	Asset Purchase	PPA	PPA	Asset Purchase
Ownership	Bidder	Bidder	IPC	Bidder	Bidder	IPC	Bidder	Bidder	IPC
Term	< 35 years	35 years	n/a	< 35 years	35 years	n/a	<35 years	35 years	n/a
Design Life	35 years								
First Delivery	On or before 6/1/2026 OR 6/1/2027								
Resource Status	Existing (not currently delivering to IPC) or proposed new in late-stage development with pending or executed LGIA/SGIA								
Peak Capacity	See Table 2 in Exhibit E								
Energy	See Table 2 in Exhibit E								
Interconnection	IPC Transmission System, or Non-IPC Transmission Systems with all necessary transmission rights to the BA								
Delivery Point	Within the boundary of the IPC Balancing Authority Area (BA), or outside with all necessary transmission rights to the BA								
Other	Products must include all environmental attributes, including Renewable Energy Certificates (RECs). Bidders will be responsible for ensuring RECs are bundled, and that they are established through Western Renewable Energy Generation Information System (WREGIS). Proposed pricing for Asset Purchases shall include Operating and Maintenance (O&M), Long-Term Services Agreement (LTSA) and warranty costs for the proposed term.								

Table 3-2 – Resource Based Products - Storage and Gas-fired

Resource Type	Battery Energy Storage (BESS)		Long Duration Storage (LDS)			Gas-fired Convertible to Hydrogen (G2H)		
Product #	10	11	12	13	14	15	16	17
Product Description	BESS BSA	BESS Asset Purchase	LDS Short-Term BSA	LDS Long-Term BSA	LDS Asset Purchase	G2H Short-Term PPA	G2H Long-Term PPA	G2H Asset Purchase
Structure	BSA[1]	Asset Purchase	BSA	BSA	Asset Purchase	PPA	PPA	Asset Purchase
Ownership	Bidder	IPC	Bidder	Bidder	IPC	Bidder	Bidder	IPC
Term	20 years	n/a	<35 years	35 years	n/a	<35 years	35 years	n/a
Design Life	20 years		35 years					
First Delivery	On or before 6/1/2026 OR 6/1/2027							
Resource Status	Existing (not currently delivering to IPC) or proposed new in late-stage development with pending or executed LGIA/SGIA							
Peak Capacity	See Table 2 in Exhibit E							
Energy	to be dispatched by IPC 0-100% of capacity							
Interconnection	IPC Transmission System, or Non-IPC Transmission Systems with all necessary transmission rights to the BA							
Delivery Point	Within the boundary of the IPC Balancing Authority Area (BA), or outside with all necessary transmission rights to the BA							
Storage Duration	4+ hours		6+ hours			n/a		
Storage Cycles	Minimum 1 cycle per day					n/a		
Other	Storage must be chargeable from the grid by IPC. Proposed pricing for Asset Purchases shall include Operating and Maintenance (O&M), Long-Term Services Agreement (LTSA) and warranty costs for the proposed term.					Proposed pricing for Asset Purchases shall include Operating and Maintenance (O&M), Long-Term Services Agreement (LTSA) and warranty costs for the proposed term.		

[1] Battery Storage Agreement (BSA)

Table 3-3 – Market Purchase Products

Resource Type	Market Purchase, Transmission Contingent	Market Purchase, Non-Transmission Contingent (i.e. able to be delivered to IPC's Border by Seller)
Product #	18	19
Product Description	Firm Heavy Load and Light Load Hour Energy and Capacity	
Structure	Agreement for purchase of firm energy and capacity (prefer WSPP Agreement Schedule C or equivalent) meeting Western Resource Adequacy Program (WRAP) eligibility requirements, including resource specificity, transmission, and other requirements. Agreement may take the form of a confirmation under a mutually agreeable master agreement (e.g., WSPP or other), or a mutually agreeable standalone agreement. See Exhibit E.	
Ownership	Bidder	
Term	Prefer 3 years or more	
First Delivery	On or before 6/1/2026	
Resource Status	Any	
Design Life	Any	
Pricing	Index-based preferred, will consider other proposals. Pricing should not include costs of regulatory structures not applicable in Idaho or Oregon, and should be based on product being sunk in Idaho or Oregon.	
Peak Capacity	See table 2 and 3 in Exhibit E	
Energy	See Exhibit E, Tables 2 and 3; and Exhibit E, Requested Attributes	
Interconnection	n/a	
Delivery Point	Delivery to an eligible Point of Delivery as listed in Exhibit E, Table 4 (Contingent on IPC-owned transmission rights as described in Exhibit E Table 4)	Delivery to Idaho Power Border, as described in Exhibit E.
Other	The volumes in Exhibit E Tables 2 and 3 reflect the minimum WRAP Qualified Capacity Contribution requested. Index or index plus adder-based pricing is preferred but other pricing structures will be considered. Pricing should not include costs associated with regulatory structures not applicable in Idaho or Oregon. See Exhibit E.	

3.1. ALTERNATIVE PRODUCTS

IPC may also accept other Products that meet the ownership and electrical functionality criteria outlined in the Product Tables. Bidders who propose a product not specifically identified in the Product Tables must fully describe how their product can meet the general desires and intent of the Product Table. Products that are not eligible include, but are not limited to; energy or capacity that is not electrical (for example, thermal energy storage without conversion to electric energy), renewable energy credits without the associated energy (Unbundled RECs), and financial instruments used to mitigate variable cost exposure without associated energy or capacity (Financial Firming).

3.2. TRANSMISSION ALTERNATIVES

As part of IPC's Integrated Resource Plan processes, in addition to supply and demand side resources, IPC is directed to give equal and balanced treatment to transmission resources. Therefore, IPC will also accept bids for transmission ownership, service, or long-term rights that may meet energy and capacity needs identified above.

4. Resource Based Products: Additional Specifications and Instructions

4.0. MINIMUM REQUIREMENTS

IPC has specified minimum requirements for participating bids (the "Minimum Requirements") for Resource Based Products. These requirements are listed in EXHIBIT C – Bid Eligibility Checklist. After IE review and consultation, non-conforming bids will be notified and given the opportunity to correct their bid within two (2) business days; otherwise, the bid will be disqualified and removed from consideration. Consistent with OAR 860-089-0400(2)(c), non-price score criteria that seek to identify minimum thresholds for a successful bid have been converted into minimum bidder requirements.

4.1. DELIVERY AND RESOURCE STATUS

IPC prefers bids from resources with proof of generator interconnection status and ability to deliver such as a pending or executed Generation Interconnection Agreement (LGIA or SGIA), progress or status of the interconnection study, and/or understanding of contingent queue projects that may hinder deliverability.

4.2. OWNERSHIP AND AGREEMENT TYPES

As reflected in the Product Tables (Tables 3-1, 3-2, and 3-3), bidders are encouraged to offer bids under any of three different structures: (1) a Power Purchase Agreement (PPA) with exclusive rights for IPC to any and all capacity and environmental attributes associated with the energy generated; (2) an asset purchase, which may include a Build-Transfer Agreement (BTA) whereby the bidder develops the project, assumes responsibility for construction, but ultimately transfers ownership of the asset to IPC or an agreement for the purchase of an existing asset; and (3) a Battery Storage Agreement (BSA)

with exclusive rights for IPC to the capacity and charging/discharging of a standalone battery. For PPA bids, IPC prefers term lengths that match the life of the asset which will help in cost comparisons between bidders. However, the term of the PPA is not a weighted score and will not advantage or disadvantage the bid on a non-price basis.

Bidders are encouraged to configure resources to maximize energy delivery during hours that are most valuable to IPC. Information concerning the hours that are most valuable to IPC is provided in EXHIBIT G – Information on Most Valuable Hours for Resource Based Bids attached hereto.

Bids for new resources (a Project) to be owned by IPC must assume the parties will execute a Build-Transfer Agreement (BTA). Under a BTA, the Bidder is responsible for all aspects of the development and construction of the Project, including but not limited to permitting, design, development, engineering, procurement, construction, interconnection, and all related costs up to achieving the to-be-agreed upon milestone, which will not be earlier than mechanical completion or later than the date the Project is placed into service for tax purposes. After reaching the milestone, the Bidder will transfer ownership of the Project assets to IPC in exchange for a purchase price. Bids that contemplate the transfer of 100% equity interests in a single member LLC are acceptable. After purchase, the Bidder will remain responsible for the completion of the Project pursuant to a Construction Completion Management Agreement. Beginning at execution of the BTA and related agreements, the Bidder must post cash collateral or a letter of credit in the amounts specified in the BTA to secure its performance (Performance Security). The amount of Performance Security increases and decreases over the term of the Project development, construction, and operation phases. IPC may elect to enter other types of agreements proposed by the Bidder, including an Engineering Procurement Construction (EPC) agreement, operation and maintenance service agreements, or other arrangements that generally achieve the desired results.

Bids for existing resources (a Plant), not currently delivering to IPC, to be owned by IPC must assume parties will execute an asset purchase agreement and an operation and maintenance agreement.

Bidders are directed to EXHIBIT H – Draft Form Agreements for Resource Based Bids for more detailed information concerning the key terms and conditions of the agreements. Bidders are required to submit a redline of the Draft Form Agreements with their bids. Bidders are also directed to EXHIBIT O – Draft Form Letter of Credit for reference. In such cases that the Bidder is successful, Bidder shall be responsible for furnishing a letter of credit in a format substantially similar to these forms included in this RFP. These forms shall be subject to review and acceptance by IPC in its reasonable discretion. Bidder shall deliver the required letter of credit no later than 30 days following any such notice of award.

4.3. INTERCONNECTION STUDIES AND COST ESTIMATING

Bidder is responsible for understanding the generator interconnection processes of IPC or other Transmission Providers, considering the durations and costs of those processes in its bids, and successfully executing those processes to achieve coordination with IPC and delivery of the proposed Products to IPC on or before the dates identified in its proposed schedule for the resource. A Bidder proposing to interconnect a resource on to IPC's system must demonstrate it has submitted a

Generator Interconnection (GI) request and is meeting the requirements of the GI request process, and that all known incremental costs to deliver energy from the resource to IPC's load have been included in the bid (including the interconnection facility types and cost estimates defined below). A Bidder proposing to interconnect to another Transmission Provider's system must demonstrate that it has submitted a GI request and any required transmission service request(s) to the relevant Transmission Providers and that it is meeting the requirements of those processes.

The Transmission Provider function within IPC, separate and apart from the Evaluation Team, performs studies for GI application requests. The studies are performed to determine the feasibility, cost, time to construct, and injection capability for the interconnection of an electric generating resource. Information concerning GIs can be found on IPC's website at Generator Interconnection - Idaho Power, including information on PURPA Qualifying Facility (QF) interconnections, Non-PURPA GIs, and Facility Connection Requirements. IPC posts the results of these studies on its OASIS website.

For purposes of aiding Bidders in determining points of interconnection and delivery on the IPC transmission system, IPC has identified areas on the IPC system that are currently expected to have relatively high injection capability and relatively low cost and time to construct if studied by the IPC Transmission Provider. These areas are identified in EXHIBIT F – Information on Preferred Locations for Resource Based Bids of this RFP.

If a Bidder has an active GI request, the Bidder must provide the GI request identifier(s) (the "queue position") associated with its resource in its bid. If the resource identified in the bid was in the queue but has since withdrawn, the Bidder should provide that queue position even though it is no longer active.

The interconnection facility types and cost estimating requirements are specified below.

a) Interconnection Customer's Interconnection Facilities (ICIF) are all facilities and equipment (including the gen tie line) located between the resource and the Point of Change of Ownership. Bidder must submit resource-specific cost estimates of ICIF as part of its bid and consider the cost of ICIF in its pricing.
b) Transmission Provider Interconnection Facilities (TPIF) connect the Interconnection Customer's Interconnection Facilities to the Transmission Provider transmission system and facilitate the metering, relaying and communications, etc. TPIF are all facilities owned, controlled or operated by the Transmission Provider from the Point of Change of Ownership to the Point of Interconnection. These are facilities that the Transmission Provider will own, and the Bidder will fund. Bidder must submit resource-specific cost estimates of TPIF as part of its bid and consider the cost of TPIF in its pricing. In the absences of an estimate, IPC will develop an estimate based on the information provided in Table 4-1 below. If an interconnection study has been performed by the Transmission Provider that includes an estimate of TPIF, then the costs from that study should be used in lieu of these estimates.

Table 4-1 – Estimated Cost for TPIF

Voltage	TPIF Estimated Cost (2023 $ 000s)
138 kV	$2,000
230 kV	$3,000
345 kV	$4,000

c) Station Network Upgrades (SNU) are either new switchyards or additions to existing switchyards or substations that are built to interconnect the generator to IPC transmission or distribution system. SNUs become a component of the integrated IPC transmission or distribution system and are incorporated into IPC tariffs. Bidders are required to provide cost estimates of SNUs.
d) Delivery Network Upgrades (DNU) are upgrades to IPC's transmission or distribution network that will be required for individual resources and groups of resources. These upgrades will be incorporated into IPC's transmission or distribution tariffs. Bidders are required to provide cost estimates of DNUs.

Based on information available from the GI request (if any) and/or studies and estimates performed by the Transmission Provider(s), separate and apart from the Evaluation Team (if available), the Evaluation Team will determine bid-specific SNUs and DNUs and associated costs to include in the evaluation of a bid. The Evaluation Team's development of bid-specific SNUs/DNUs does not take the place of the IPC Open Access Transmission Tariff (OATT) GI and transmission studies and does not remove the bidder's obligation to submit GI or transmission requests to the Transmission Provider(s).

With respect to transmission service, for resources that will be owned in full or in part by IPC or for which IPC will have an executed contract for the purchase of the generation, IPC anticipates that it will designate the resource or executed contract as Network Resources of IPC under the OATT upon commercial operation of the resource or first delivery date under the contract. Projects that are seeking to interconnect to IPC's system and have not requested NRIS may need additional costs added to account for additional upgrades needed to ensure delivery to load.

4.4. BID SUBMISSION PROCESS

A bid is considered the aggregate of the information uploaded by a Bidder to the Portal (Information). The Information is in the form of data entered into forms on the Portal and subsequently uploaded to the Portal by the Bidder, and other written documents that are uploaded to the Portal. The Portal is designed to accept the majority of the Information as data entered into the forms with data entry restricted to only certain eligible types and values. The purpose is to ensure Information is entered consistently across all Bidders and bids such that IPC can consistently, fairly, and quickly organize the information and evaluate the bids and minimize the amount of written (e.g., PDF, .docx) documents that IPC must review and interpret.

i Bid Definition Form

Any potential Bidder interested in participating in the RFP must first register in the Portal. Once registered, the bid submission process begins with completion and submission to IPC of an EXHIBIT A – Bid Definition Form (BDF) located in the Portal for each bid that a bidder intends to submit. The BDF requests preliminary information about the proposed Product(s) including a narrative description and basic Product parameters.

ii Bid Entry Form and Selectable Portfolio

IPC will review the submitted BDF and subsequently respond to the Bidder with an EXHIBIT B – Bid Entry Form (BEF) that is relevant to the proposed Product(s). The BEF requests complete technical, commercial, financial, and pricing information concerning the proposed Product(s) for purposes of subsequent bid evaluation.

A Bidder may identify two or more of its bids, that if executed by IPC together, may result in a lower total price or greater benefit to IPC than if the bids were not executed together. An example of a Selectable Portfolio is a solar bid and wind bid and a storage bid where the Bidder would not offer or contract any one of the individual components but rather all three are contingent. Another example is a 100 MW solar PPA bid and a 100 MW solar asset purchase bid from a 200 MW solar project. If a Bidder desires to combine, or make contingent, multiple Products of various structure, ownership, term, or resource type, then the Bidder will indicate within the BEF that combination of Products that make a single portfolio (Selectable Portfolio). A Selectable Portfolio will be evaluated as a complete proposal such that if it were selected, the entire Selectable Portfolio would be reviewed for contract negotiation.

IPC will provide each Bidder with Bid Fee instructions to accompany the BEF when the BEF is provided to the Bidder.

iii Bid Submittal

Bidders will submit the BEF, and ancillary Information as defined in the RFP to the Portal. The BEF requires certain cost data as inputs to the price score model.

Bidders are strongly advised to carefully review all exhibits relevant to their proposed Products prior to uploading Information to the Portal. If and when a Bidder is selected for negotiation of an agreement, IPC will utilize the Information submitted to populate the relevant portions of the agreements for that Bidder. Bidders should upload Information with the understanding that it will ultimately result in binding contract terms.

4.5. BID FEES

A Resource Based Product Bidder is required to submit to IPC a non-refundable fee with each bid submitted (Evaluation Fee). The purpose of the Evaluation Fee is to encourage submission of well-

developed and viable bids and to offset the cost to IPC for evaluation of bids. For each bid submitted, the Bidder may submit a sub-bid at a reduced Evaluation Fee as described below. Bidders must use the following guidance for the purpose of determining and submitting the Evaluation Fees, due with each bid and sub-bid.

Bid	**Fee**	**Example**
A single project site and resource type (can include multiple structures and terms)	$10,000	Site Alpha, 200MW Solar PV, PPA, 35-yr *and* Site Alpha, 200MW Solar PV, Asset Purchase
Same site and resource type but different capacity, initial delivery year or price	+$5,000	Site Alpha, 400MW Solar PV, Asset Purchase
Different site = different bid	$10,000	Site Bravo, 150MW BESS, 20-yr, BSA
Different resource = different bid **unless** the different resource is part of, and required, as part of the Selectable Portfolio	$10,000	Site Alpha, 300MW Wind, Asset Purchase (different bid = $10,000) *or* Site Alpha, 300MW Wind, Asset Purchase contingent on Site Alpha, 200MW Solar PV, PPA, 35-yr as a Selectable Resource only (not a different bid)

IPC may deem a bid that does not satisfy the requirements for a single bid as multiple bids each of which would require a separate Evaluation Fee. If IPC deems a Bidder's bid to be multiple bids, IPC will notify the Bidder and allow it to elect to pay the incremental Evaluation Fee or to revise its bid to comply with IPC's requirements for a single bid.

Bidders that have their bids selected for the Final Shortlist and are invited to begin negotiation of an agreement may be required to submit an additional fee in an amount up to $250/MW of proposed resource capacity (a Supplemental Fee) to IPC prior to commencement of negotiations. For example, a bid for a resource with a proposed capacity of 80 MW would pay a Supplemental Fee of $20,000 (e.g., 80 MW Project * $250/MW = $20,000). The purpose of the Supplemental Fee is to ensure good faith submissions and negotiations by the Bidder and to offset the costs that IPC will incur while reviewing bids and negotiating an agreement. The Supplemental Fee may be refunded by IPC.

4.6. EXCEPTIONS TO THE TECHNICAL SPECIFICATIONS

Bidders that propose a resource for IPC ownership must provide bids and pricing that are consistent and compliant with the applicable Technical Specifications provided as exhibits to this RFP (namely

EXHIBIT I – BESS Technical Specifications; EXHIBIT J – Solar Technical Specifications, EXHIBIT K – Wind Technical Specifications, and EXHIBIT L – Gas-Fired Convertible to Hydrogen Specifications). To the extent that the validity of a Bidder's bid and/or the Bidder's ability to execute an agreement is contingent upon material changes to the language in the Technical Specifications, the Bidder must specifically identify the specifications it proposes to change in the form of a redline markup to the Technical Specification and submit the redline with its bid. To the extent that a Bidder wishes to propose changes to the Technical Specification that, if accepted by IPC, would reduce the Bidder's proposed pricing the Bidder should specifically identify in the redline such changes and the associated price reduction. To the extent practicable, Bidders should develop exhibits, schedules, attachments, and other supplemental documents required by the Technical Specification in the redline.

The proposed changes must be specific and include a detailed explanation and supporting rationale for each. General comments, drafting notes and footnotes such as "parties to discuss" will be disregarded and not negotiated. Exceptions to the Technical Specifications requested by a Bidder will be reviewed as part of IPC's qualitative evaluation of the bid.

4.7. EXCEPTIONS TO THE DRAFT FORM LETTER OF CREDIT

Bidders that propose a resource for IPC ownership must provide bids and pricing that are consistent and compliant with the EXHIBIT O – Draft Form Letter of Credit. To the extent that the validity of a Bidder's bid and/or the Bidder's ability to execute an agreement is contingent upon material changes to the language in the draft form letter of credit, the Bidder should specifically identify the terms they propose to change in the form of a redline markup to EXHIBIT O – Draft Form Letter of Credit and submit the redline with its bid. To the extent that a Bidder wishes to propose changes to the draft form letter of credit that, if accepted by IPC, would reduce the Bidder's proposed pricing the bid should specifically identify in the redline such changes and the associated price reduction.

The proposed changes must be specific and include a detailed explanation and supporting rationale for each. General comments, drafting notes and footnotes such as "parties to discuss" will be disregarded and not negotiated. Exceptions requested by a Bidder will be reviewed as part of IPC's qualitative evaluation of the bid.

5. Market Purchase Products: Additional Specifications and Instructions

5.0. MINIMUM REQUIREMENTS

IPC has specified minimum requirements for bids (the "Minimum Requirements") for Market Purchase Products. These requirements are listed in EXHIBIT C – Bid Eligibility Checklist. After IE review and consultation, non-conforming bids will be notified and given the opportunity to correct their bid within two (2) business days; otherwise the bid will be disqualified and removed from consideration. Consistent with OAR 860-089-0400(2)(c), non-price score criteria that seek to identify minimum thresholds for a successful bid have been converted into minimum bidder requirements.

5.1. AGREEMENT TYPES

IPC will consider proposals for agreements consisting of confirmations under mutually-agreeable master agreements (i.e., WSPP or other), or mutually-agreeable standalone agreements.

5.2. PRODUCT ATTRIBUTES

Additional description of the volumes and product attributes Idaho Power is seeking are listed in EXHIBIT E – Proposed Market Purchase Volumes. IPC anticipates that it will designate the resource or executed contract as Network Resources of IPC under the OATT upon commercial operation of the resource or first delivery date under the contract.

5.3. BID SUBMISSION PROCESS

A bid is considered the aggregate of the information uploaded by a Bidder to the Portal (Information). The Information is in the form of data entered into forms on the Portal and subsequently uploaded to the Portal by the Bidder, and other written documents that are uploaded to the Portal. The Portal is designed to accept the majority of the Information as data entered into the forms with data entry restricted to only certain eligible types and values. The purpose is to ensure Information is entered consistently across all Bidders and bids such that IPC can consistently, fairly, and quickly organize the Information and evaluate the bids and minimize the amount of written (e.g., PDF, .docx) documents that IPC must review and interpret.

i Bid Definition Form

Any potential Bidder interested in participating in the RFP must first register in the Portal. Once registered, the bid submission process begins with completion and submission to IPC of an EXHIBIT A – Bid Definition Form (BDF) located in the Portal for each bid that a bidder intends to submit. The BDF requests preliminary information about the proposed Product(s) including a narrative description and basic Product parameters.

ii Bid Entry Form

IPC will review the submitted BDF and subsequently respond to the Bidder with an EXHIBIT A – Bid Entry Form (BEF) that is relevant to the proposed Product(s). The BEF requests complete technical, commercial, financial, and pricing information concerning the proposed Product(s) for purposes of subsequent bid evaluation.

iii Bid Submittal

Bidders will submit the BEF, and ancillary Information as defined in the RFP to the Portal. The BEF requires certain cost data as inputs to the price score model.

Bidders are strongly advised to carefully review all exhibits relevant to their proposed Products prior to uploading Information to the Portal. If and when a Bidder is selected for negotiation of an agreement, IPC will utilize the Information submitted to populate the relevant portions of the agreements for that

Bidder. Bidders should upload Information with the understanding that it will ultimately result in binding contract terms.

6. Additional Requirements for All Products and Bids

6.0. CONTENTS OF WRITTEN BID PROPOSAL

A Bidder **MUST** prepare and submit as part of the bid a written narrative that fully describes the bid and any details or nuances to fully explain the intent of the Bidder and the BEF. The narrative should include a **cover letter and introduction, company and project overview, a description of each product submitted in the BEF, and project financing and contract terms** according to EXHIBIT P – Bid Format & Requirements.

6.1. BID NAMING

A unique name for each bid (Bid Code) will be developed by selecting and entering into the BEF where indicated the Product Type, Bid Name, Delivery Level and whether the facility is new or existing. The resulting Bid Code must thereafter be used by the Bidder when referring to the bid and must be inserted into the file name of each document for the bid uploaded by the Bidder. The purpose of the Bid Code is to allow IPC to more easily identify and differentiate among bids and documents.

6.2. BID WRITTEN DOCUMENTS

Written documents must be text-searchable PDF (portable document format, non-zipped) and must contain documents reproduced directly from the native document (i.e., Word, Excel, MicroStation, AutoCAD). Scanned images and documents will be considered irregular and may be rejected.

6.3. RFP EXHIBITS

Exhibits to this RFP summarize the information that must be uploaded by Bidders to the Portal. Bidders are directed to the individual forms in the Portal to ensure review of all the current information and the specific type and level of detail that must be provided is understood. and are summarized below. Below in Table 6-1 are the required exhibits that must be completed depending on the type of contract offered.

Table 6-1 Non-Price Factor Weighting

Exhibit	Asset Purchase	PPA/BSA	Market Purchase Products
Exhibit B – Bid Entry Form	X	X	X
Redlines to Exhibit H – Draft Form Agreements for Resource Based Products	X	X	
Redlines Exhibit I, J, K, and L (Technical Specifications)	X		

Exhibit N – Counterparty Financial Questionnaire	X	X	X

6.4. FIRM BID

Each bid shall be firm, not subject to price escalation, and binding throughout the schedule of this RFP from the date the bids are due under this RFP. Note however, the bid evaluation process does have potential opportunity for updated pricing if necessary.

6.5. TAXES

Bidders are responsible for the payment of all sales, conveyance, transfer, excise, real estate transfer, business and occupation, and similar taxes assessed with respect to or imposed on either party in connection with a proposed agreement.

6.6. DATA AND CYBER SECURITY

A bid must comply with the provisions of Presidential Executive Order 13920 (E.O. 13920) issued May 1, 2020, titled *Securing the United States Bulk-Power System (BPS)* which (among other things) prohibits any acquisition, importation, transfer, or installation of BPS electric equipment by any person or with respect to any property to which a foreign adversary or an associated national thereof has any interest, that poses an undue risk to the BPS, the security or resiliency of U.S. critical infrastructure or the U.S. economy, or U.S. national security.

All design and implementation details must follow electrical industry best practices for cyber security as well as all applicable regulatory requirements pertaining to the security of electric system assets. Any additional IPC-specific requirements will be addressed during the RFP review and contracting process, pursuant to EXHIBIT M – Mutual Non-Disclosure Agreement. Bidder must state that any and all equipment utilized in the proposed resource will not be procured through an Office of Foreign Assets Control (OFAC) designated entity or otherwise be comprised of equipment prohibited for use by electric utilities in the United States.

6.7. PURCHASING RESTRICTIONS/PROHIBITED TECHNOLOGY

Pursuant to Section 889 of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 and Federal Acquisition Regulation (FAR) 52.204-25 (Aug. 2020), Bidder agrees, represents, and warrants that Bidder shall not supply or deliver to IPC any "covered telecommunications equipment or services" as a substantial or essential component of any system or critical technology of any system. As defined in FAR 52.204-25(a), "covered telecommunications equipment or services" includes equipment, systems, products, or services made by any of the following companies, or any subsidiary or affiliate thereof (including companies with the same principal word in the name, e.g., "Huawei" or "Hytera"): Huawei Technologies Company; ZTE Corporation; Hytera Communications Corporation; Hangzhou Hikvision Digital Technology Company; or Dahua Technology Company. "Covered telecommunications equipment or services" may include, but are not limited to, video/monitoring surveillance equipment/services, public switching and transmission equipment, private switches,

cables, local area networks, modems, mobile phones, wireless devices, landline telephones, laptops, desktop computers, answering machines, teleprinters, fax machines, and routers. "Covered telecommunications equipment or services" do not include telecommunications equipment that cannot route or redirect user data traffic or permit visibility into any user data or packets that the equipment transmits or handles.

To the extent that the systems, products, or services to be provided by Bidder under this Agreement may be procured by IPC in support of or to satisfy IPC's obligations under agreements with a federal governmental entity, Bidder further agrees that FAR 52.204-25 (Aug. 2020), except for paragraph (b)(2) thereof, shall be incorporated by reference into any future agreement and is binding on Bidder, and that Bidder does not use any equipment, system, or service that uses covered telecommunications equipment or services and will not supply any covered telecommunications equipment or services to IPC. Bidder further agrees that, if it identifies covered telecommunications equipment or services used as a substantial or essential component of any system or as critical technology as part of any system during contract performance, or Bidder is notified of such by a subcontractor at any tier or any other source, Bidder shall immediately notify IPC and reasonably cooperate with IPC's requests for information.

6.8. SMALL BUSINESS AND SMALL DISADVANTAGED BUSINESS PROGRAM

IPC is committed to the implementation of a Small and Disadvantaged Business Program. It is the intent of IPC that small business concerns and small businesses owned and controlled by socially and economically disadvantaged individuals have the opportunity to participate in the performance of contracts awarded by IPC. Consequently, IPC requests that Bidders indicate their eligibility as a small business based upon the regulations in Title 13, Code of Federal Regulations, Part 121. If in doubt, Bidders should consult the Small Business Administration Office in their area.

6.9. INSURANCE

Bidder is directed to the EXHIBIT H – Draft Form Agreements for Resource Based Bids for details concerning the specific insurance requirements that must be met.

6.10. FINANCIAL AND CREDIT INFORMATION

Bidder must provide a written response and associated documents in response to the Counterparty Financial Questionnaire. Details are further described in EXHIBIT N - Counterparty Financial Questionnaire of this RFP.

6.11. EXCEPTIONS TO THE DRAFT FORM AGREEMENTS

Bidders must provide bids and pricing that are consistent and compliant with EXHIBIT H – Draft Form Agreements for Resource Based Bids. To the extent that the validity of a Bidder's bid and/or the Bidder's ability to execute an agreement is contingent upon material changes to the language in the draft form agreements, the Bidder should specifically identify the terms they propose to change in the form of a redline markup and submit the redline with its bid. To the extent that a Bidder wishes to propose changes to the draft form agreements that, if accepted by IPC, would reduce the Bidder's

proposed pricing the proposed changes should specifically identify in the redline such changes and the associated price reduction. To the extent practicable, Bidders should develop exhibits, schedules, attachments and other supplemental documents required by the draft form agreements in the redline. Bidders proposing to sell existing generation facilities should propose in the redline changes to the draft form agreements for the proposed resource type reflecting the terms and conditions on which their bid is based. Note that not every technology and contract structure is presented in the draft form agreements and thus proposed contracts and terms should be provided for contracts that are substantively different to the provided draft form agreements.

The proposed changes must be specific and include a detailed explanation and supporting rationale for each. General comments, drafting notes and footnotes such as "parties to discuss" will be disregarded and not negotiated. Exceptions to the draft form agreements requested by a Bidder will be reviewed as part of IPC's qualitative evaluation of the bid.

6.12. CLARIFICATION OF BIDS

While evaluating a bid, IPC may request clarification or additional information from the Bidder about any item in its bid. Such requests will be sent via the Portal by IPC and the Bidder must provide a response via the Portal back to IPC within five (5) business days, or IPC may deem the Bidder to be non-responsive and either suspend or terminate further evaluation of its bid. Bidders are encouraged to provide an alternate point of contact to ensure a timely response to clarification requests.

6.13. ADDENDA TO RFP

Any additional responses required from Bidders as a result of an Addendum to this RFP shall become part of each bid. Bidders must acknowledge receipt of and list all Addenda where indicated in the BEF.

7. Bid Evaluation, Negotiation and Approval

7.0. THE EVALUATION PROCESS

The bid evaluation and selection process are designed to identify the combination and size of proposed resources (the "Portfolio") that will maximize customer benefits and will satisfy projected resource capacity and energy needs while maintaining reliability. The portfolio optimization models that will be used to identify the proposed resources are the same that IPC uses to evaluate proxy resources in the 2021 IRP (and subsequent IRPs). IRP portfolio optimization process details can be found in the Company's most recently acknowledged 2021 IRP report in sections 9 and 10.

IPC will separate and prioritize bids that can conform to meet a June 1, 2026 commercial operation separately from those that confirm to meet a June 1, 2027 commercial operation. The bid evaluation process is described below.

7.1. PHASE 1 – INITIAL SHORTLIST

Phase 1 of the bid evaluation process includes the screening, evaluation, and ranking of the bids to identify a subset that can be advanced to further evaluation (the Initial Shortlist). This includes: i) bid

eligibility screening to ensure conformance with the Minimum Requirements; ii) price, and non-price evaluation to score and rank bids for inclusion in the portfolio optimization models; and iii) identification of the lowest cost bids for inclusion in the Initial Shortlist.

IPC will rely on the pricing and other data submitted by Bidders to screen, evaluate and rank bids. During this phase of the bid evaluation process, IPC does not anticipate asking for, nor accepting, updated pricing or updates to any other bid components. However, IPC will contact Bidders to confirm and clarify information presented in each bid if necessary.

Additionally, if at any time during Phase 1, a Bidder determines its submitted bid is no longer valid, the Bidder should notify IPC immediately and the bid will be withdrawn from further consideration.

Conformance to Minimum Requirements

Bids will initially be screened against the Minimum Requirements using EXHIBIT C – Bid Eligibility Checklist and in consultation with the IE. After IE review and consultation, Bidders of non-conforming bids will be notified and given the opportunity to correct their bid within two (2) business days; otherwise, the bid will be removed from consideration.

Price and Non-Price Scoring, Ranking, and Initial Shortlist

After the eligibility screening has been completed, conforming bids will be evaluated and given price and non-price scores. Each bid will be ranked based on the sum of their price and non-price bid score. A maximum of 75 points are allocated to price scoring and a maximum of 25 points to non-price scoring for a total maximum score of 100 points. Bids are then ranked within the respective technology group, and the highest scoring bids within each technology group are chosen to be the Initial Shortlist. A reasonable excess to, at a minimum, meet the identified capacity and energy needs specified will be included.

Resource Based Product Price Score (up to 75 points)

IPC's proprietary price scoring model will calculate the delivered revenue requirement per kilowatt cost of each bid, inclusive of any applicable carrying cost and the impact of tax credit benefits, as applicable. In developing the revenue requirement cost for each bid, IPC requires certain cost data as inputs to the price score model. PPAs bring added costs beyond the direct contract costs in the form of imputed debt. IPC will estimate the additional cost of imputed debt for each PPA, BSA or other third-party owned asset and add this cost to the overall cost of a project. IPC will calculate the present value of the PPA or BSA payment stream to develop an imputed debt balance then multiply this by a risk factor similar to previously published S&P Rating Agency methodology. Then a net cost of imputed debt rate is applied to the risk adjusted imputed debt balance to arrive at an imputed debt cost by year. The pricing model will be made available to the IE and the Commissions. Any internal assumptions for key financial inputs (i.e., inflation rates, discount rates, marginal tax rates, asset lives, allowance for funds used during construction (AFUDC) rates, etc.) and IPC's carrying costs (i.e., integration costs, owner's costs, etc.) will be applied consistently to all bids, as applicable.

As stated under Interconnection Studies above, Bidders must provide known costs for interconnection costs and transmission network upgrade costs as provided in applicable system impact study reports or LGIAs. If this information is not available, IPC will model the bids with an anticipated cost based on the location of the interconnection point. IPC will model bids with other uncertain terms and anticipated cost or price contingencies as applicable.

IPC's proprietary price scoring model scores each bid relative to each other within the same technology where feasible. Each bid's per kilowatt price is ranked to determine the bid's price score. For each technology, a maximum score of 75 points is assigned to the bid with the highest calculated relative score and a minimum of zero (0) points to the evaluated bid with the lowest calculated relative score. The remaining bids using that same technology are scored on a 0-to-75-point scale according to their relative relationship to those of the highest and lowest performing bids.

Resource Based Products Non-Price Score (up to 25 points)

The non-price evaluation rubric for Resource Based Products is included in EXHIBIT D – Non-Price Scoring Matrix. IPC's non-price scoring model evaluates whether bids are thorough and comprehensive, whether the proposed resource is viable, and whether the bidder is likely to achieve commercial operation by June 1, 2026, (or alternatively June 1, 2027) or the proposed commercial operation date. Bidder must provide documentation, representation, warranties and other information as necessary to sufficiently assure IPC that any proposed project will complete construction and achieve full commercial operation by the defined commercial operation date. The non-price rubric is designed to be objective, intuitive, and self-scoring. Bidders are required to score themselves by answering each of the non-price questions and providing supporting documentation. The non-price questions seek to rank bids based, among other factors, on the completeness of 2026 RFP bid requirements, the ability to contract with the project, the maturity of the project, and ability to deliver the project by the commercial operation deadline. The questions and answers are defined in two categories and weighted as described in Table 7-1.

Table 7-1 Non-Price Factor Weighting

Non-Price Factor	Maximum Points
Contracting Progress and Viability	5 points
Project Readiness and Deliverability	20 points

The first non-price factor section, "Contracting Progress and Viability", scores Bidders based on their ability to contract the bid. Each of five equally weighted questions are worth up to two points each and will be given a score of zero, one, or two. The total score is then divided by two for a maximum of five total points.

The second section, "Project Readiness and Deliverability", assesses each bid's development status and viability. Points are earned based on energy and capacity certainty, transmission capacity availability, degree of site control, permits attained, status of generation interconnection, completed equipment sourcing strategy, and other operational characteristics and having a reasonable construction schedule. If a Bidder is unable to demonstrate commercial viability, and specifically, the ability to meet the applicable in-service date, then they will be removed from further evaluation. Each question is weighted differently with a focus on current progress including site control and easements, state of generation interconnection and network resource status, development schedule, and safety. Additional considerations include short-term permits, experience, financing, and status of material and contractor agreements. The maximum score possible for the 12 non-price questions is 100, which is then divided by five to achieve a total score out of 20

Market Purchase Products Price Evaluation

Market Purchase Products' pricing will be evaluated and ranked based on the price structure submitted with the bid. This initial scoring is for informational purposes. As noted below, the Market Purchase Products that meet Minimum Qualifications will be submitted to the IRP Planning Team for further analysis.

Market Purchase Products Non-Price Score (up to 25 points)

The non-price evaluation rubric for Market Purchase Products is included in EXHIBIT D – Non-Price Scoring Matrix. IPC's non-price scoring model evaluates whether bids are thorough and comprehensive and meet the requested attributes as described in EXHIBIT E – Proposed Market Purchase Volumes. Bidder must provide documentation, representation, warranties and other information as necessary to sufficiently assure IPC that any proposed product will meet the requirements. The non-price rubric is designed to be objective, intuitive, and self-scoring. Bidders are required to score themselves by answering each of the non-price questions and providing supporting documentation. The non-price questions seek to rank bids based, among other factors, on the completeness of 2026 RFP bid requirements and the bid's ability to meet the requested attributes described in EXHIBIT E – Proposed Market Purchase Volumes.

Points are earned based on the bid's ability to meet each of the product attributes requested in EXHIBIT E – Proposed Market Purchase Volumes. If a bid offers attributes that could require Idaho Power to incur additional costs (i.e., a bid of a WSPP Schedule B product could require Idaho Power to incur additional Point-to-Point transmission costs), those costs will be estimated and included in the pricing analysis. Each question is weighted differently with a focus on product type, contribution to identified needs, shaping and flexibility options, Western Resource Adequacy Program eligibility, point of delivery, and pricing structure. The maximum score possible for the 11 non-price questions is 100, which is then divided by four to achieve a total score out of 25. This initial scoring is for informational purposes. As noted below, the Market Purchase Products that meet Minimum Qualifications will be submitted to the IRP Planning Team for further analysis.

Final Ranking (up to 100 points)

To determine the initial bid pool to be further evaluated, IPC will use the combined price and non-price results to rank each bid. Based on these rankings, IPC will identify an initial pool of highest-ranked bids by product and technology. This initial pool of bids will be made available as alternatives for further modeling.

Selection of the Initial Shortlist and Notification by IPC

The highest ranking and relatively lowest cost bids within each technology category will become the initial shortlist. After the IE completes its review and files its report on the initial shortlist, IPC will notify Bidders through the Portal that were selected for the Phase 1 – Initial Shortlist.

7.2. PHASE 2 – FINAL SHORTLIST

Phase 2 is the selection of the final shortlist. Bidders on the Initial Shortlist will be required to provide IPC with any updates to their bids including relevant price or schedule modifications, interconnection study results, or any other material change that would impact the IRP production cost model or Minimum Requirements of the RFP. IPC will then process updates for inclusion in the IRP production cost models. AURORA will be run to help select the least-cost, least-risk portfolios based on bid cost, performance data, and ELCC.

IPC will perform a reliability assessment to ensure that the selected portfolio of resources can meet all hourly load and operating reserve requirements with sufficient cushion to account for other system uncertainties such as non-normal weather events. This process is described in the Company's most recently acknowledged 2021 IRP in the Technical Appendix C in the "Loss of Load Expectation" section.

IPC does not anticipate updating the non-price portion of the bid evaluation from Phase 1. However, if at any time during Phase 2, a bidder determines its submitted bid is no longer valid, the bidder should notify IPC immediately and the bid will be withdrawn from further consideration. Original non-price scores combined with IRP modeling results will be considered in a cost and risk analysis. Any other factors not expressly included in the formal evaluation process but required by applicable law, order by the Commissions, or other significant material industry or technology change may be used by IPC, in consultation with the IE, to identify a subset of Bidders from Phase 1 that can be advanced to further evaluation and negotiation (the Final Shortlist).

Processing of Bid Updates

Similar to the Phase 1 pricing evaluation, IPC uses its proprietary models to process bid updates. The models are refreshed with updated bid information, including price. Consistent with the treatment of capital revenue requirement in IPC's IRP modeling, IPC will convert any calculated revenue requirement associated with capital costs (i.e., return on investment, return of investment, and taxes and the impact of tax credits, as applicable) to first year-real-levelized costs. Similarly, all other bid costs are levelized and formatted for input into to the IRP models. Projected renewable resource performance data (expected hourly capacity factor information) and ELCC are also processed for input into the IRP models.

Bid Resource IRP Modeling, Sensitivity Analysis and Portfolio Development

The IRP team uses the AURORA model to help select the least-cost, least-risk resource types based on bid cost, performance data, and ELCC and select the final shortlist. IPC uses AURORA to develop and evaluate the cost of multiple resource portfolios with various sensitivities and contingencies (for example, Boardman to Hemingway in-service dates).

Following the initial shortlist and bid updates, IPC will submit the pool of bids (including Market Purchase Products that have met the Minimum Qualifications) to its IRP Planning Team to evaluate resources for the final shortlist. The IRP Planning Team will evaluate the pool of resources using AURORA, the production cost model used in the IRP. Consistent with the treatment of capital revenue requirement in IPC's IRP modeling, IPC will convert any calculated revenue requirement associated with capital costs (i.e., return on investment, return of investment, and taxes and the impact of tax credits, as applicable) to first year-real-levelized costs. Similarly, all other bid costs are levelized and formatted for input into to the IRP models. For a 25-year PPA for example, IPC calculates the present value of the revenue requirement (contractual payment stream over the 25 years plus imputed debt) for the project and calculate the levelized payment based on the contract life. Projected renewable resource performance data (expected hourly capacity factor information) will also be processed for input into the IRP models. Projected Effective Load Carrying Capability (ELCC) for each bid will also be processed for input into the IRP models. The IRP modeling tools will help select the least cost resource types based on bid cost, performance data, and ELCC. IPC's final shortlist may also include high-scoring bids in excess of the identified capacity limits if those projects have economic benefit.

IPC will evaluate portfolios under a range of different environmental policy and market price scenarios (policy-price scenarios). In this way, IPC uses AURORA to help optimize its selection of bid resources to identify the lowest cost, reliable portfolio under multiple scenarios prior to undergoing additional risk analysis and further consideration as part of the final shortlist process. The assumptions will be established and reviewed with the IE before updated bids with best and final pricing are received and opened.

Risk Analysis

IPC next uses AURORA to evaluate each portfolio and its ability to perform under dynamic market conditions. In AURORA a stochastic analysis will be performed, which assesses the effect on portfolio costs when select variables take on values different from their planning-case levels. AURORA measures the risk of each portfolio through its production cost estimates. By holding a resource portfolio fixed and using Latin Hypercube stochastic simulations of stochastic variables—including, for example, load, natural gas prices, and hydro generation—AURORA can measure the expected cost of each portfolio in an uncertain future. Stochastic variables are selected based on the degree to which there is uncertainty regarding their forecasts and the degree to which they can affect the analysis results (i.e., portfolio costs). The Latin Hypercube design samples the distribution range with a relatively small sample size, allowing a reduction in simulation run times. The Latin Hypercube method does this by sampling at regular intervals across the distribution spectrum. The purpose of the stochastic analysis is to understand the range of portfolio costs across the full extent of stochastic shocks (i.e., across the full set of stochastic iterations) and how the ranges for portfolios differ.

Identification of Top-Performing Resource Portfolios

IPC will then summarize and analyze the portfolios to identify the specific bid resources that are most consistently selected among the policy-price scenarios. Based on this data, as well as certain qualitative and non-price criteria, and in consultation with the IE, IPC may select one or more resource portfolios for further cost-risk analysis.

Other Factors – Applicable Law and Statutory Requirements

Before establishing a final shortlist, IPC may take into consideration, in consultation with the IE, other factors that are not expressly or adequately factored into the evaluation process outlined above, particularly any factor required by applicable law or order of either Commission to be considered.

Final Shortlist Selection

IPC will summarize and evaluate the results of its cost-risk analysis, considering present value revenue requirement results, to identify the specific least-cost, least-risk bids. Based on these data and certain other factors as described above, and in consultation with the IE, IPC will establish a final shortlist. After the final shortlist is established and approved, IPC will re-engage in negotiations with the selected bidder(s) to finalize their contract(s) and prepare the contract(s) for execution. Selection of a bid to the final shortlist does not constitute a winning bid. Only execution of a definitive agreement between IPC and the bidder, on terms acceptable to IPC, in its sole and absolute discretion, will constitute a winning bid.

7.3. ADDITIONAL RIGHTS

IPC may, in coordination with OPUC and the IE, at any time during the Solicitation:

1. Appoint evaluation committees to review bids, seek the assistance of outside technical experts and consultants in bid evaluation, and seek or obtain data from any source that has the potential to improve the understanding and evaluation of the responses to this RFP.
2. Revise and modify, at any time before the Deadline for Bid Submittal, the factors it will consider in evaluating bids and to otherwise revise or expand its evaluation methodology.
3. Hold interviews and meetings to conduct discussions and exchange correspondence with either all Bidders or only those with bids that IPC elects to select for detailed discussions (Initial Shortlisted Bids) in order to seek an improved understanding and evaluation of an individual Bidder's bid.
4. Issue a new RFP.
5. Cancel or withdraw the entire RFP or any part thereof.

7.4. ACCEPTANCE AND REJECTION OF BIDS

IPC may or may not award an agreement after analysis and evaluation of the bids. IPC reserves the right to reject any and all bids, to waive minor formalities and irregularities, and to evaluate the bids to determine which, in IPC's sole judgment, represents the best value for the Products requested.

7.5. AGREEMENT NEGOTIATIONS

In anticipation of an award, there will be a period of negotiations to finalize the agreement(s) between the parties. An agreement, including all terms, conditions, exhibits, and attachments must be executed by both IPC and the successful Bidder in order to create a binding enforceable agreement between IPC and the successful Bidder.

7.6. EXCLUSIVITY

If and when a bid is selected for the Final Shortlist, from that date through the date of execution by both Parties of an agreement, the Bidder and/or its affiliates shall not execute an agreement with any other party for the sale of the proposed Product(s) such that the Bidder would no longer be able to provide the Products proposed in the bid.

7.7. PUBLICITY

The Parties intend to issue joint public announcements, in the form of press releases, case studies, and/or other materials, containing content mutually agreed to by the Parties, upon execution of the agreements. Neither party shall use the name, logo, or any other indicia of the other party in any public statement, press release, other public relations or marketing materials, the identity of the other party, or any underlying information with respect to the agreement(s) at any time without the prior written consent of the other party, which it may withhold in such other party's sole discretion. Prior to making any such permitted use, each party shall provide for the other party's review and approval any publicity materials. Any and all goodwill from use of IPC's name, logo, or indicia will inure to IPC's sole and exclusive benefit.

7.8. COMMISSION APPROVAL

Execution of an agreement will ultimately be subject to approval by the Commissions.

8. ENTIRE RFP

This RFP and all Exhibits, Attachments, Datasheets, Forms, and Addenda within the Portal event are incorporated herein by this reference and represent the final expression of this RFP. Only information supplied by IPC in writing through the parties listed herein or by this reference made in the submittal of this RFP shall be used as the basis for the preparation of Bidders bids.

Idaho Power 2026 All Source RFP
Exhibit A – Bid Definition Form

Idaho Power Company 2023 All Source RFP
Exhibit A - Bid Definition Form

Bidder to fill
Autofill

Bidder:

Bidder's Product #					
Bidder's Product Description					
Product Definition					
Facility Name					
Resource Type	Please Select	Please Select	Please Select	Please Select	Please Select
Structure	Please Select	Please Select	Please Select	Please Select	Please Select
Ownership					
Contract Term (Years)					
Contract Capacity (MWac)					
RFP Eligible Product #					
RFP Eligible Product Description					
COD (m/d/yyyy)					
Point of Delivery					
County, State					
Contingent on B2H or other IPC transmission rights?	Please Select	Please Select	Please Select	Please Select	Please Select

Bid Definition

*Please select "Yes" for the product(s) to form your bids. A bid can be formed with one or multiple products at the **same** facility.*

		Facility					
Portfolio 1		Please Select					
Portfolio 2		Please Select					
Portfolio 3		Please Select					
Portfolio 4		Please Select					
Portfolio 5		Please Select					
Portfolio 6		Please Select					
Portfolio 7		Please Select					
Portfolio 8		Please Select					
Portfolio 9		Please Select					
Portfolio 10		Please Select					
Portfolio 11		Please Select					
Portfolio 12		Please Select					
Portfolio 13		Please Select					
Portfolio 14		Please Select					
Portfolio 15		Please Select					
Portfolio 16		Please Select					
Portfolio 17		Please Select					

Idaho Power 2026 All Source RFP
Exhibit B – Bid Entry Form

Bid Entry Form

(See Exhibit B_C_D Excel Workbook - Bid Entry Form in Portal)

IDAHO POWER
An IDACORP Company

Exhibit B

Bid Entry Form (BEF)

2026 All Source Request for Proposals (RFP)

Bidder:

Instructions:

- [Respondent Information] sheet reflects the information filled out in your Bid Definition form. No further action is needed in this BEF.

- Respondent must fill out the applicable fields on **all the blue sheets**. The proposals are listed according to the Portfolio Bid(s) submitted in your Bid Definition form.

- Definition: PPA - Power Purchase Agreement; BSA - Battery Storage Agreement

Color Code:

Applicable Input: Respondent to Fill
Calculated Input: Autofill, Do not Edit
Non Applicable Input: Do not Edit

Idaho Power 2026 All Source RFP
Exhibit C – Bid Eligibility Checklist

(See Exhibit B_C_D Excel Workbook - in Portal)

Exhibit C - Bid Eligibility Checklist
Idaho Power Company 2026 All Source RFP

Bidder:

Color Code:

Bidder to fill	
Autofill	

Proposal #					
Bidder Portfolio #					
Facility Name					
Resource Type					
Structure					
Ownership					
Capacity (MWac)					
Contract Term (Years)					
COD					
Existing or New?					
Point of Delivery					
County, State					
Contingent on B2H or other IPC transmission rights?					

Yes	Minimum criteria met
No	Bid not eligible
	Not applicable

Bid Eligibility Factor

NO.	Bid Eligibility Submittal Completeness - Bidder completed each of the following items accurately and in a manner consistent with the RFP requirements.	Name of Supporting Document(s)	Comments	Response 1	Response 2	Response 3	Response 4	Response 5
1	**Resource Based Product** - Bid is submitted on or before the submittal deadline and all applicable forms have been completed and submitted. [Resource Based Non-Pricing] and [Resource Based Pricing] tabs Counterparty Financial Questionnaire (Exhibit N) Bid narrative in accordance with the Bid Format and Requirements (Exhibit P)			Please Select	Please Select	Please Select	Please Select	Please Select
2	**Resource Based Product** - Product will be delivered to a Point of Delivery on IPC's transmission system OR if the product will be interconnected to a third-party transmission system, Bidder has provided appropriate transmission rights to deliver to IPC point of delivery.			Please Select	Please Select	Please Select	Please Select	Please Select
3	**Resource Based Product** - Bidder has provided redlines or confirmed no redlines to Draft Form Agreements for the Resource Based Product (Exhibit H).			Please Select	Please Select	Please Select	Please Select	Please Select
4	**Resource Based Product** - Bidder has provided redlines or confirmed no redlines to applicable Technical Specifications (Exhibit I, J, K, and L) are required (or this is not applicable as the product is a PPA/BSA).			Please Select	Please Select	Please Select	Please Select	Please Select
5	**Resource Based Product** - Evidence of wire transfer provided prior to bid deadline in the correct amount for the correct number of bids.			Please Select	Please Select	Please Select	Please Select	Please Select
6	Documentation submitted indicates the viability of a Commercial Operation Date (resource based proposals) or Contract Effective Date (market purchase proposals) on or before June 1, 2027 AND matches the COD submitted.			Please Select	Please Select	Please Select	Please Select	Please Select
7	**Market Purchase Product** - Bid is submitted on or before the submittal deadline and all applicable forms have been completed and submitted. [Market Purchase Information] tab Counterparty Financial Questionnaire (Exhibit N) Bid narrative in accordance with the Bid Format and Requirements (Exhibit P)			Please Select	Please Select	Please Select	Please Select	Please Select
8	**Market Purchase Product** - Bid of firm energy and capacity (prefer WSPP Agreement Schedule C or equivalent) meeting Western Resource Adequacy Program (WRAP) resource specificity, transmission and other requirements.			Please Select	Please Select	Please Select	Please Select	Please Select
9	**Market Purchase Product** - The minimum WRAP Qualified Capacity Contribution (Exhibit E) requirement is met.			Please Select	Please Select	Please Select	Please Select	Please Select

Idaho Power 2026 All Source RFP
Exhibit D – Non-Price Scoring Matrix (Market Purchase)

(See Exhibit B_C_D Excel Workbook - in Portal)

Market Purchase Information Sheet
Exhibit D
Idaho Power Company 2026 All Source RFP
Bidder:

Color Code:
Bidder to fill
Autofill

Proposal #					
Bidder Portfolio #					
Resource Type					
Structure					
Ownership					
Capacity (MWac)					
Contract Term (Years)					
COD					
Existing or New?					
Point of Delivery					
County, State					
Contingent on B2H or other IPC transmission rights?					
Non-Price Score:	0.00	0.00	0.00	0.00	0.00

Market Purchase Information

	Product Attributes		Name of Supporting Document(s)	Comments					
1	**Product Type** WSPP Schedule C or equivalent preferred	*Red - Other/less firm* *Yellow - Schedule B or equivalent* *Green - Schedule C or equivalent*			Please Select	Please Select	Please Select	Please Select	Please Select
2	**Contribution to Identified Needs** Consistency with / contribution to seasonal and hourly block energy volumes identified as needed in Exhibit E.	*Red - Offer would provide energy greater than volumes sought in some or all hourly blocks, months or seasons* *Green - Schedule C or equivalent*			Please Select	Please Select	Please Select	Please Select	Please Select
3	**Shaping Options** Product offers ability to shape into various time periods	*Red - No flexibility* *Green - Seasonal, multi-day, or intra-day shaping flexibility*			Please Select	Please Select	Please Select	Please Select	Please Select
4	**Product Flexibility** Product offers daily option to not take energy or other product flexibility	*Red - No flexibility* *Green - Daily option or other flexibility*			Please Select	Please Select	Please Select	Please Select	Please Select
5	**WRAP Eligibility** Product meets minimum WRAP eligibility requirements - resource specific, or - system sale by WRAP participant (or if non-participant, sale is surplus to seller's own needs, assurance the seller will not fail to deliver to meet other commercial obligations, and there must be priority 6 or 7 transmission to Point of Delivery)	*Red - Does not meet* *Green - Meets*			Please Select	Please Select	Please Select	Please Select	Please Select
6	**WRAP Eligibility** Product offers Qualified Capacity Contribution (QCC) value equal to volume being offered.	*Red - No QCC offered* *Yellow - QCC is less than volume being offered* *Green - Product has QCC equal to volume being offered*			Please Select	Please Select	Please Select	Please Select	Please Select
7	**Point of Delivery** Delivery to one of the points listed in Exhibit E	*Red - No* *Green - Yes*			Please Select	Please Select	Please Select	Please Select	Please Select
8	**Pricing Structure** Index Price Preferred	*Red - Fixed price offered* *Green - Index price offered*			Please Select	Please Select	Please Select	Please Select	Please Select
9	**Pricing Structure** Pricing does not include the costs of compliance with regulatory requirements not applicable in Idaho or Oregon	*Red - No, pricing includes regulatory costs (such as costs/risk associated with sinking in Washington)* *Yellow - Uncertain* *Green - Yes, pricing reflects product sinking in Idaho or Oregon.*			Please Select	Please Select	Please Select	Please Select	Please Select
10	**Term** Product offers overall term of at least 3 years	*Red - No* *Green - Yes*			Please Select	Please Select	Please Select	Please Select	Please Select
11	**Form of Agreement** Bidder proposes confirm under WSPP or IDSA Power Annex master agreement	*Red - No* *Green - Yes*			Please Select	Please Select	Please Select	Please Select	Please Select

Idaho Power 2026 All Source RFP
Exhibit D – Non-Price Scoring Matrix (Resource Based)

(See Exhibit B_C_D Excel Workbook - in Portal)

Resourced Based Non-Pricing Scoring Sheet
Exhibit D
Idaho Power Company 2026 All Source RFP
Bidder:

Color Code:
Bidder to fill
Autofill

Proposal #					
Bidder Portfolio #					
Facility Name					
Resource Type					
Structure					
Ownership					
Capacity (MWac)					
Contract Term (Years)					
COD					
Existing or New?					
Point of Delivery					
County, State					
Contingent on B2H or other IPC transmission rights?					
Contracting Progress and Viability	0.00	0.00	0.00	0.00	0.00
Project Readiness and Deliverability	0.00	0.00	0.00	0.00	0.00
Total Non-Pricing Score	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Proposal / Project Information (not for scoring)

Proposal / Project Information		Response 1	Response 2	Response 3	Response 4	Response 5
Project Street Address						
Project City						
Project State						
Project Zip						
Project Elevation						
Project Latitude						
Project Longitude						
Interconnection Request Number (if available)						

Non-Price Factor

NO.	I. Contracting Progress and Viability		Name of Supporting Document(s)	Comments	Response 1	Response 2	Response 3	Response 4	Response 5
1	**Contract Risk** Bidder should specifically identify the terms they propose to change in the form of a redline markup and submit the redline with its bid.	***Red*** *- Redlines if accepted would significantly increase risk or cost to IPC* ***Yellow*** *- Redlines if accepted would increase risk or cost to IPC* ***Green*** *- No redlines, or redlines if accepted would not increase risk or cost to IPC*			Please Select	Please Select	Please Select	Please Select	Please Select
2	**Technical Specifications** To the extent that the validity of a Bidder's bid and/or the Bidder's ability to execute an agreement is contingent upon material changes to the language in the Technical Specifications, the Bidder must specifically identify the specifications it proposes to change in the form of a redline markup to the Technical Specification and submit the redline with its bid.	***Red*** *- Redlines if accepted would significantly reduce the technical quality of the resource to IPC* ***Yellow*** *- Redlines if accepted would reduce the technical quality of the resource to IPC* ***Green*** *- No redlines, or redlines if accepted would not reduce the technical quality of the resource to IPC*			Please Select	Please Select	Please Select	Please Select	Please Select
3	**Risk/Price Influence** Contract redlines must be consistent with the submitted bid and the pricing inputs (i.e. product, price, term, 8760 shape of generation output, capacity factor, degradation, storage specifications, BTA milestone payments, etc).	***Red*** *- Redlines are significantly inconsistent with the submitted bid and pricing* ***Yellow*** *- Redlines are somewhat inconsistent with the submitted bid and pricing* ***Green*** *- Redlines are consistent with the submitted bid and pricing*			Please Select	Please Select	Please Select	Please Select	Please Select
4	**Performance Guarantees** Price proposed reflects pro forma performance guarantees.	***Red*** *- No* ***Yellow*** *- Partially or uncertain* ***Green*** *- Yes*			Please Select	Please Select	Please Select	Please Select	Please Select
5	**Credit** To the extent that the validity of a Bidder's bid and/or the Bidder's ability to execute an agreement is contingent upon material changes to the language in the draft form letter of credit, the Bidder should specifically identify the terms they propose to change in the form of a redline markup to EXHIBIT D - Draft Form Letter of Credit and submit the redline with its bid.	***Red*** *, - Redlines if accepted would significantly increase risk or cost to IPC* ***Yellow*** *- Redlines if accepted would increase risk or cost to IPC* ***Green*** *- No redlines, or redlines if accepted would not increase risk or cost to IPC*			Please Select	Please Select	Please Select	Please Select	Please Select

NO.	II. Project Readiness and Deliverability		Name of Supporting Document(s)	Comments	Response 1	Response 2	Response 3	Response 4	Yes
6	**Site Control** Bidder must provide sufficient documentation that it will have site control and site access to support the project development schedule, for all land (including private, state, and federal) up to the point of interconnection by contract execution date.	***Red*** *- Documentation (or lack thereof) indicates that Bidder has not engaged with the landowner OR does not have a defined site OR has not made application to state/federal agencies.* ***Yellow*** *- Documentation indicates that Bidder has identified a site and has demonstrated progress with land owner OR has a pending application to state/federal agencies and a schedule that supports the project development schedule and commercial operation date.* ***Green*** *- Documentation indicates that Bidder has executed and recorded lease or warranty deed of ownership or has a non-appealable permit authorized by a state/federal agency.*			Please Select	Please Select	Please Select	Please Select	Please Select
7	**Zoning** Bidder must provide sufficient documentation that the identified site and ancillary facilities will be zoned for the proposed use to support the project development schedule.	***Red*** *- Documentation (or lack thereof) indicates that Bidder does not have a site identified OR has not submitted applicable applications to the appropriate land zoning jurisdiction.* ***Yellow*** *- Documentation indicates that Bidder has submitted applicable applications to the appropriate land zoning jurisdiction with a schedule that supports the commercial operation date with a pending decision.* ***Green*** *- Documentation indicates that Site has appropriate non-appealable zoning approval OR confirmed no zoning authority is required (ie - federal land).*			Please Select	Please Select	Please Select	Please Select	Please Select
8	**Easements** Bidder must provide sufficient documention that required private easements will be secured including project site, access and any generation interconnection line up to point of interconnection to support the project development schedule.	***Red*** *- Documentation (or lack thereof) indicates that Bidder has not engaged with the landowner for the identified easement and/or has not investigated whether there are easements required.* ***Yellow*** *- Documentation indicates that Bidder has pending options for easements ready for execution.* ***Green*** *- Bidder has executed and recorded easements OR confirmed no easements will be required.*			Please Select	Please Select	Please Select	Please Select	Please Select

Idaho Power 2026 All Source RFP
Exhibit D – Non-Price Scoring Matrix (Resource Based)

9	**Permits** Bidder must provide sufficient documentation that permits for the site and ancillary facilities will be complete by the planned date, which supports the project development schedule and target commercial operation date.	***Red*** *- Documentation (or lack thereof) indicates that Bidder has not submitted applicable permit applications.* ***Yellow*** *- Documentation indicates that Bidder has pending applications with applicable permitting agency.* ***Green*** *- Site, access, and generation interconnection line up to the point of interconnection have all required permits OR confirmed no long-term permits (excluding typical construction permits) will be required.*			Please Select	Please Select	Please Select	Please Select	Please Select
10	**GIA** Bidder must provide sufficient documentation that preliminary studies have been provided by the Transmission Provider with a schedule and cost estimate for all upgrades that supports the commercial operation date.	***Red*** *- Documentation (or lack thereof) indicates that Generation Interconnection application has not been submitted to the Transmission Provider OR the schedule provided in the studies do not support the commercial operation date.* ***Yellow*** *- Documentation indicates that Generation Interconnection application has been submitted and/or preliminary studies have been provided by the Transmission Provider with a schedule and cost estimate for all upgrades that support the commercial operation date.* ***Green*** *- Documentation indicates that Generation Interconnect Agreement has been executed with the schedule and cost estimate specified for all upgrades support the commercial operation date.*			Please Select	Please Select	Please Select	Please Select	Please Select
11	**NRIS/ERIS** Bidder must provide sufficient documentation that Network Resource Interconnection Service (NRIS) has been assessed.	***Red*** *- Documentation (or lack thereof) indicates that No interconnection studies are provided OR Interconnection studies are provided, and include an assessment of Energy Resource Interconnect Service (ERIS) only.* ***Green*** *- Documentation indicates that Interconnection studies are provided, and include an assessment of*			Please Select	Please Select	Please Select	Please Select	Please Select
12	**Experience** Bidder must provide sufficient documentation that Bidder has sufficient experience with developing, constructing and/or operating the same technology as being proposed.	***Red*** *- Documentation (or lack thereof) indicates no documented experience.* ***Yellow*** *- Documentation indicates that Experience includes development (but not commercial operation) of facilities of at least 50% of the nameplate capacity.* ***Green*** *- Documentation indicates that Experience includes facilities greater than 50% of the nameplate*			Please Select	Please Select	Please Select	Please Select	Please Select
13	**Safety** Bidder must provide sufficient documentation that With regards to safety, bidder represents it has a total recordable incident (TRI) level lower than or equal to the TRI for their industry as determined by the U.S. Occupational Health and Safety Administration (OSHA).	***Red*** *- Documentation (or lack thereof) indicates TRI level worse than this standard.* ***Green*** *- Documentation indicates a a TRI level better than this standard.*			Please Select	Please Select	Please Select	Please Select	Please Select
14	**Financing** Bidder must provide sufficient documentation that Bidder has a Financing Plan that demonstrates ability to finance project construction and/or ongoing operations.	***Red*** *- Documentation (or lack thereof) indicates no financing plan is in place* ***Green*** *- Documentation indicates that Bidder has a Financing Plan that demonstrates ability to finance project construction and/or ongoing operations.*			Please Select	Please Select	Please Select	Please Select	Please Select
15	**Development Schedule** Bidder must provide sufficient documentation that the schedule includes development and construction milestones (major equipment procurement and delivery on site, EPC execution and notice to proceed, interconnection backfeed, mechanical completion) which support the commercial operations date (including consideration for RFP evluation, contract negotiation, regulatory approvals, etc).	***Red*** *- Documentation (or lack thereof) indicates that the milestones do not support the commercial operation date.* ***Green*** *- Documentation indicates that the milestones do support the commercial operation date.* ***Not Applicable*** *- this is not applicable for operating assets*			Please Select	Please Select	Please Select	Please Select	Please Select
16	**Material/EPC** Bidder must provide sufficient documentation that Major equipment has been selected and Engineering Procurement and Construction (EPC) and/or other balance-of-plant construction contracts have been identified.	***Red*** *- Documentation (or lack thereof) indicates that Major equipment and EPC contracts are not established and/or suppliers have not been identified.* ***Yellow*** *- Documentation indicates that Major equipment and EPC contracts are under negotiation or master supply arangements/agreements exist.* ***Green*** *- Documentation indicates that Major equipment and EPC contracts are executed.* ***Not Applicable*** *- this is not applicable for operating*			Please Select	Please Select	Please Select	Please Select	Please Select
17	**Existing Conditions** Bidder must provide sufficient documentation that For proposed projects involving existing assets, the facility condition does not require capital improvements or repairs to ensure operations and reliability for the term identified in the bid.	***Red*** *- Documentation (or lack thereof) indicates that the facility will require several significant capital improvements or repairs.* ***Yellow*** *- Documentation indicates that the facility will require some significant capital improvements or repairs.* ***Green*** *- Documentation indicates that the facility will require no significant capital improvements or repairs.*			Please Select	Please Select	Please Select	Please Select	Please Select

Idaho Power 2026 All Source RFP
Exhibit E - Proposed Market Purchase Volumes

Background

The Boardman to Hemingway 500-kV Transmission Line project (B2H) and associated market purchases were identified as the least-cost, least-risk resource addition in Idaho Power Company's (Idaho Power or IPC or Company) 2021 Integrated Resource Plan (2021 IRP) to meet projected future demand. This document summarizes the associated market purchase procurement strategy and volumes coinciding with the increase in transmission capacity brought on by B2H. Market purchases will be evaluated against other resource submittals to the 2026 All-Source Request for Proposals (2026 RFP) as part of an overall resource procurement process and scored and modeled as defined in the 2026 RFP; however, this Exhibit E focuses exclusively on market purchases.

Proposed Market Purchase Volumes

Idaho Power is seeking energy purchases to serve load in varying monthly amounts for the years 2026 and beyond. Idaho Power is interested in offers with terms of up to 10 years, but the focus is on the first three to five years (2026-2031).

In short, the identified needs have been determined based on the quantity of energy purchases required to economically serve load according to analysis from the 2021 IRP, with the addition of new incremental large load that Idaho Power is now forecasting since the completion of the 2021 IRP. The energy purchase needs identified in the 2026 RFP are described more fully below. The transmission capacity that Idaho Power has available for importing energy is shown in Table 4 below.

In the 2026 RFP, Idaho Power is not seeking 100 percent of the identified need. Rather, the 2026 RFP seeks a portion of the total volumes that will be needed. This approach is intended to result in the acquisition of a base volume of energy that is forecasted to be necessary to serve load. Additional purchases will be necessary to supplement firm base volumes to serve load in many hours throughout the years. These additional purchases will be made closer in time to the operating season. This approach ensures that Idaho Power begins to acquire energy resources that will be necessary to serve load in a timely and cost-effective manner, while not purchasing more than will be necessary. This approach will also allow Idaho Power to make additional procurement decisions as the Company moves forward in time, considering updated information and the most recent IRP available at that time.

Because the 2021 IRP forecasts a significant volume of purchases to serve load, it is prudent to begin acquiring a portion of that energy now. Phasing the purchase activity over multiple years and procurement processes will ensure that Idaho Power is right-sizing its resource acquisition volumes based on current information. Phasing the purchases will also ensure that Idaho Power timely builds the purchase and resource portfolio needed to reliably serve its customers.

Requested Energy Volumes

Idaho Power is requesting proposals for energy volumes based on a percentage of the peak hour purchases identified as economic by the model Idaho Power uses for long-term capacity expansion planning, the AURORA model, for the preferred portfolio from the 2021 IRP. The AURORA model provides a total hourly economic purchase volume. Those volumes reflect all the

Idaho Power 2026 All Source RFP
Exhibit E - Proposed Market Purchase Volumes

purchases AURORA identified as economic. In determining needs for the 2026 RFP, those volumes were reduced by application of a seasonal percentage intended to ensure that purchases are right-sized and that additional purchases are made closer in time to the need. The percentages vary by time of year (winter versus other months) and heavy load hours versus light load hours.[1] The percentages are higher in the winter season due to the higher winter Planning Reserve Margin requirements expected in the Western Resource Adequacy Program (WRAP).

Table 1: Percentages applied to AURORA preferred portfolio peak hour economic purchases to determine need.

	Heavy Load Hours	Light Load Hours
April-October	40%	30%
November-March	50%	40%

These percentages reflect a minimum level of energy that will be needed to serve load across a majority of hours.

The volumes that are calculated by these percentages are capped at reliability needs where applicable (the need is the lesser of the percentage of the economic volume or the reliability need). The reliability cap reflects the minimum level of purchases needed to serve load as determined by the 2021 IRP's Load and Resource Balance.

Finally, the quantities resulting from the calculation described here are adjusted to reflect the new incremental large load that Idaho Power is now forecasting since the completion of the 2021 IRP. Specifically, the quantities have been increased by the amount of the anticipated load addition that exceeds existing generation capacity in any given month.

The following tables provide the energy needs that Idaho Power is currently seeking:

Table 2: Heavy Load Hour Energy Need.

[1] Heavy load hours (HLH or on-peak) means all hours in the peak period hour ending 0700 through 2200, Monday through Saturday, excluding North American Electric Reliability Corporation (NERC) holidays. Light load hours (LLH or off-peak) means all hours that are not on-peak hours – generally all hours in the peak period hour ending 2200 through 0600, Monday through Saturday, and all day on Sundays and NERC holidays.

Idaho Power 2026 All Source RFP
Exhibit E - Proposed Market Purchase Volumes

Heavy Load Hour Requested Energy (MW)

	January	February	March	April	May	June	July	August	September	October	November	December
2026						293	510	495	302	263	477	333
2027	363	262	-	-	187	510	613	700	446	425	650	419
2028	462	407	112	-	241	499	667	716	419	461	545	526
2029	419	419	185	-	203	608	692	579	419	419	532	580
2030	419	490	175	-	171	626	769	522	439	518	498	616
2031	419	419	187	-	159	612	722	634	419	521	629	652
2032	419	504	179	-	131	598	718	826	454	419	762	574
2033	663	497	167	-	82	571	737	837	438	436	694	609
2034	632	460	118	-	-	527	832	882	428	441	575	602
2035	561	581	330	-	55	483	910	572	419	424	604	475

Table 3: Light Load Hour Energy Need.

Light Load Hour Requested Energy (MW)

	January	February	March	April	May	June	July	August	September	October	November	December
2026						320	436	470	299	298	363	377
2027	420	278	-	-	187	617	544	557	474	573	549	435
2028	499	407	112	-	241	617	628	562	447	513	506	566
2029	426	419	185	-	203	597	604	679	419	527	422	498
2030	453	419	175	-	171	584	639	655	419	550	536	550
2031	419	462	187	-	159	617	728	696	419	489	555	555
2032	514	419	179	-	131	600	715	743	519	547	591	528
2033	467	419	167	-	82	568	689	626	419	479	625	612
2034	490	419	118	-	-	533	632	714	447	476	487	668
2035	500	460	330	-	55	522	850	808	419	613	549	595

Requested Energy Attributes

Idaho Power is seeking these volumes as firm energy. Idaho Power prefers offers of WSPP Agreement Schedule C or equivalent firm energy/capacity, but will consider offers of other products such as WSPP Schedule B. The volumes in Tables 2 and 3 reflect the minimum Qualified Capacity Contribution that Idaho Power is seeking, as that term is defined by the WRAP. Bid-in energy or products must meet WRAP eligibility requirements. Idaho Power anticipates it will designate purchased energy as a Network Resource under the Open Access Transmission Tariff and will evaluate bids accordingly.

Idaho Power prefers bids with optionality to not take the energy if Idaho Power determines it is not needed on particular days within the month. Idaho Power will consider various proposals for the optionality including potential limits on the optionality to reach the most economical total cost of the energy product.

Idaho Power will consider bids with different structures or different volumes than listed above, including but not limited to multi-month or seasonal volume structures for Summer or Winter,[2] if such structures facilitate more competitive bids. Multi-month or seasonal bids should include optionality to not take the energy on days in the months when the bid volume exceeds the needs shown in Tables 2 and 3. Idaho Power will consider proposals for standard heavy load or light

[2] Summer: June – September and Winter: November – March.

Idaho Power 2026 All Source RFP
Exhibit E - Proposed Market Purchase Volumes

load hour products or other proposals that include the ability to shape the energy into particular hours of the day.

Idaho Power's greatest need at this time is in the first three to five years (2026-2031). Bidders may submit proposals for any period of time greater than a month in the requested time period. For example, bidders may bid on a month or multiple months, or for a season assuming the optionality described above, and for one or more years.

With respect to pricing, Idaho Power prefers index or index plus adder-based pricing, but will consider other pricing structures. Pricing should not include costs associated with regulatory structures not applicable in Idaho or Oregon, and should be based on product being sunk in Idaho or Oregon.

With respect to the form of agreement, Idaho Power prefers to use a confirmation under a mutually-agreeable master agreement (such as the WSPP Agreement) but will consider proposals for other agreement forms.

Eligible Delivery Points

Bids must provide for delivery to Idaho Power at its border or at one of the points listed in Table 4 below.

Bids may be delivered to the Idaho Power Border (Walla Walla, Lolo, SMLK, HURR, LaGrande, M345, Jeff, Brady, Bora). The capacity available at the Idaho Power Border varies by point.[3] Idaho Power will consider the impact to and use of available transmission capacity in its evaluation. Bids that deliver to the Idaho Power Border will be considered Product Number 19.

Bids may also be delivered to one of the points listed in Table 4 below. The table below indicates firm transmission capacity rights Idaho Power has available for imports of energy to its system. Idaho Power will consider the impact to and use of available transmission capacity in its evaluation. Idaho Power will include the costs it incurs under the transmission provider's Open Access Transmission Tariff for use of the capacity listed below in its evaluation of bids delivered to these points and relying on such capacity. Bids that deliver to the Point(s) of Delivery identified in Table 4 will be considered Product Number 18.

Table 4: Available Transmission Capacity for Imports to Idaho Power's System by Points of Delivery.

Point of Delivery	Import Capability
MIDC	Up to 100 MW[4]
MIDCREMOTE	Up to 500 MW[5]

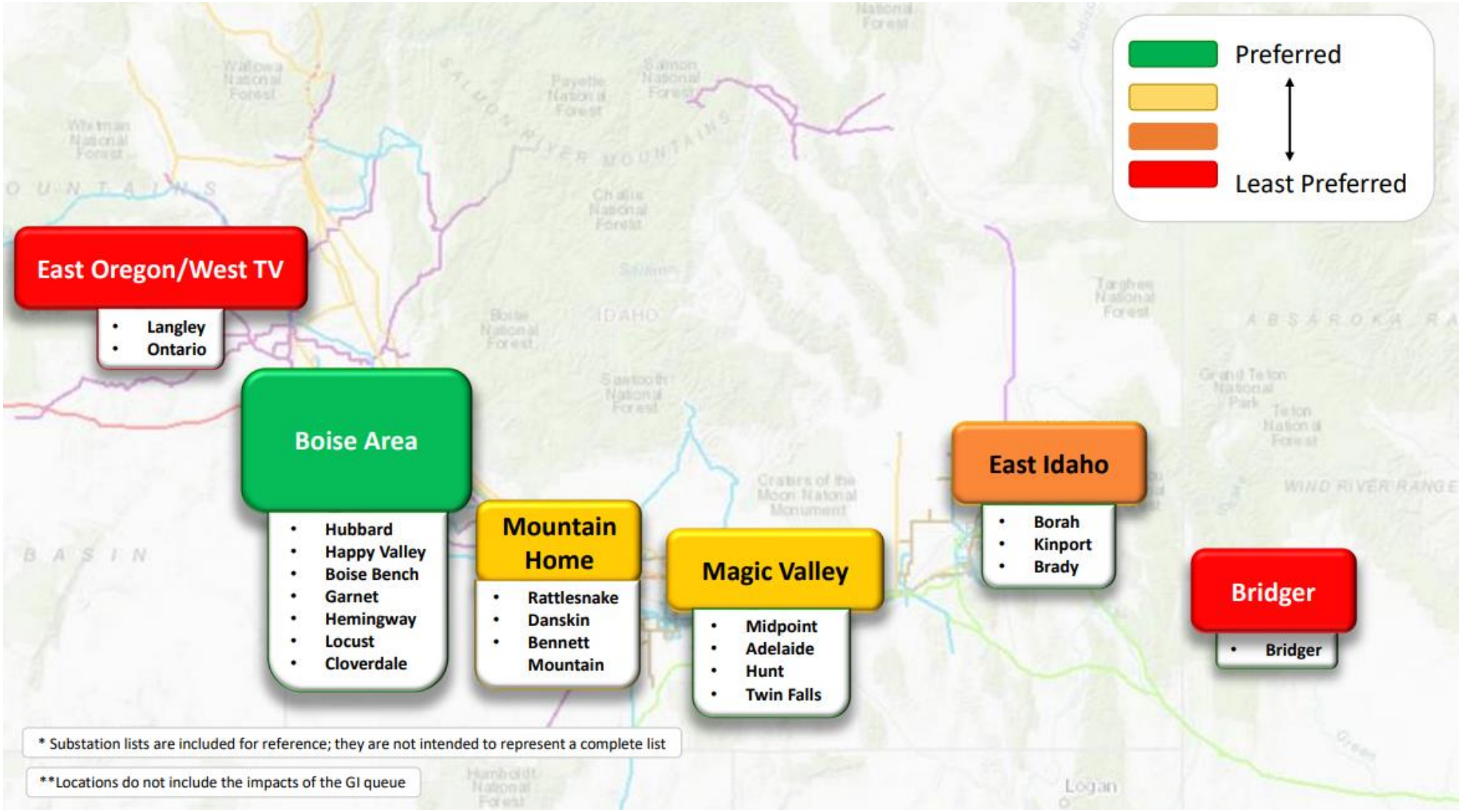
[3] The Idaho Power Transmission Provider determines what capacity is available on Idaho Power's transmission system for Idaho Power load service on an annual basis. Any resources or energy procured under the 2026 RFP would be included in Idaho Power's load and resource forecast and included in transmission evaluations as of Idaho Power's ownership or purchase of the resource or energy.
[4] Available through April 30, 2026, with the potential to extend beyond that date if renewed by Idaho Power Load Serving Operations, such renewal being subject to the Transmission Provider's ability to continue to offer the service.
[5] Contingent on B2H being in service.

Idaho Power 2026 All Source RFP
Exhibit E - Proposed Market Purchase Volumes

Point of Delivery	Import Capability
AVA.BPAT	Up to 100 MW[6]
McNary	Up to 80 MW[7]
LaGrande	Up to 50 MW[8]
Mona/Four Corners	Up to 200 MW available between the two points[9]
RedButte	Up to 50 MW, June-October only[10]

[6] Available through April 30, 2027, with the potential to extend beyond that date if renewed by Idaho Power Load Serving Operations.
[7] Available through December 31, 2027, with the potential to extend beyond that date if renewed by Idaho Power Load Serving Operations.
[8] Available through December 31, 2025, with the potential to extend beyond that date if renewed by Idaho Power Load Serving Operations.
[9] Contingent on PacifiCorp / Idaho Power asset swap associated with B2H. The Mona and Four Corners points of delivery, in aggregate, may not exceed 200 MW.
[10] Available through May 31, 2024, with the potential to extend beyond that date if renewed by Idaho Power Load Serving Operations.

Idaho Power 2026 All Source RFP
Exhibit F - Information on Preferred Locations for Resource Based Bids



Idaho Power 2026 All Source RFP
Exhibit G - Information on Most Valuable Hours for Resource Based Bids

Most Valuable Hours

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
January							■	■	■	■								■	■	■	■	■	■	
February						■	■	■	■									■	■	■	■	■	■	
March																								
April																								
May																								
June																	■	■	■	■	■	■	■	■
July																■	■	■	■	■	■	■	■	■
August																■	■	■	■	■	■	■	■	
September																■	■	■	■	■	■	■	■	
October						■	■	■	■	■									■	■	■	■		
November						■	■	■	■									■	■	■	■	■	■	
December							■	■	■	■	■	■					■	■	■	■	■	■		

■ Critical Hours: These are the critical need hours for Idaho Power's capacity deficit; the Company will favor resources that can meet these identified hours

Respondent shall review and redline the following draft agreement into the submitted proposal for the specific product type and ownership structure as defined in this RFP.

This draft Exhibit H is not comprehensive and does not constitute a binding offer, shall not form the bases for an agreement by estoppel nor otherwise, and is not conditions upon each party's receipt of all requirement management approvals (including final credit and legal approval) and all regulatory approvals. Any actions taken by a party in reliance on the terms set forth in this working draft or on statements made during negotiations pursuant to this working draft shall be at that party's own risk. Until this agreement is negotiated, approved by management, executed, delivered, and approved by all required regulatory bodies, no party shall have any other legal obligations, expressed or implied, or arising in any other manner under this working draft or in the course of negotiations.

DRAFT

BATTERY STORAGE AGREEMENT

BETWEEN

_____

AND

IDAHO POWER COMPANY

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EXHIBITS

DRAFT

THIS WORKING DRAFT DOES NOT CONSTITUTE A BINDING OFFER, SHALL NOT FORM THE BASIS FOR AN AGREEMENT BY ESTOPPEL OR OTHERWISE, AND IS CONDITIONED UPON EACH PARTY'S RECEIPT OF ALL REQUIRED MANAGEMENT APPROVALS (INCLUDING FINAL CREDIT AND LEGAL APPROVAL) AND ALL REGULATORY APPROVALS. ANY ACTIONS TAKEN BY A PARTY IN RELIANCE ON THE TERMS SET FORTH IN THIS WORKING DRAFT OR ON STATEMENTS MADE DURING NEGOTIATIONS PURSUANT TO THIS WORKING DRAFT SHALL BE AT THAT PARTY'S OWN RISK. UNTIL THIS AGREEMENT IS NEGOTIATED, APPROVED BY MANAGEMENT, EXECUTED, DELIVERED AND APPROVED BY ALL REQUIRED REGULATORY BODIES, NO PARTY SHALL HAVE ANY OTHER LEGAL OBLIGATIONS, EXPRESSED OR IMPLIED, OR ARISING IN ANY OTHER MANNER UNDER THIS WORKING DRAFT OR IN THE COURSE OF NEGOTIATIONS.

BATTERY STORAGE AGREEMENT

THIS BATTERY STORAGE AGREEMENT (this "Agreement"), dated as of _____, 202_, (the "Effective Date"), is entered into between _____ (the "Seller") and Idaho Power Company, an Idaho corporation ("Idaho Power" or "Buyer"). Seller and Idaho Power are sometimes hereinafter referred to collectively as the "Parties" and individually as a "Party."

WHEREAS, Seller intends to construct, own, operate and maintain a battery energy storage system ("BESS") for the storage and discharge of electric energy located in [_____ ____], [Idaho] with a Storage Capacity (as defined below) of ____ MWh (the "Facility").

WHEREAS, Seller desires to sell, and Idaho Power desires to purchase, the Storage Product (as defined below) delivered by the Facility in accordance with the terms and conditions hereof.

NOW, THEREFORE, in consideration of the foregoing and the mutual promises set forth below and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties mutually agree as follows:

SECTION 1
DEFINITIONS, RULES OF INTERPRETATION

Defined Terms. Unless otherwise required by the context in which any term appears, initially capitalized terms used herein shall have the following meanings:

1.1 "Abandonment" means (a) the relinquishment of all possession and control of the Facility by Seller, other than pursuant to a transfer permitted under this Agreement, or (b) if after commencement of the construction, testing, and inspection of the Facility, and prior to the Commercial Operation Date, there is a complete cessation of the construction, testing, and inspection of the Facility for ninety (90) consecutive days by Seller and Seller's contractors, but only if such relinquishment or cessation is not caused by or attributable to

an Event of Default by Idaho Power, a request by Idaho Power, or an event of Force Majeure.

1.2 "AC" means alternating current.

1.3 "Affiliate" means, with respect to any entity, each entity that directly or indirectly controls, is controlled by, or is under common control with, such designated entity, with "control" meaning the possession, directly or indirectly, of the power to direct management and policies, whether through the ownership of voting securities or by contract or otherwise.

1.4 "Agreement" is defined in the opening paragraph hereto.

1.5 "Ancillary Services" has the meaning set forth in Idaho Power's Open Access Transmission Tariff as approved by FERC.

1.6 "Anything of Value" includes, but is not limited to, cash or a cash equivalent (including "grease", "expediting" or facilitation payments), discounts, rebates, gifts, meals, entertainment, hospitality, use of materials, facilities or equipment, transportation, lodging, or promise of future employment.

1.7 "As-built Supplement" is a supplement to be added to Exhibit 16 that describes the Facility as actually built, pursuant to Section 7.1 and includes an American Land Title Association survey of the Premises.

1.8 "Auxiliary Load Test" has the meaning set forth in Exhibit 23.

1.9 "Book Value" means cost minus accumulated depreciation, and not deducting for debt or other encumbrances, calculated in accordance with generally accepted accounting principles consistently applied.

1.10 "Business Day" means any Monday through Friday except NERC recognized holidays beginning at 6:00 a.m. and ending at 5:00 p.m. local time in Boise, Idaho.

1.11 "Capacity Rights" means any current or future defined characteristic, certificate, tag, credit, reactive power, Ancillary Service or attribute thereof, or accounting construct, including any of the same counted towards any current or future resource adequacy or reserve requirements, associated with the energy storage and discharge of the Facility or the Facility's capability and ability to store and discharge energy. Capacity Rights are measured in MW and do not include any Tax Credits, or any other tax incentives existing now or in the future associated with the construction, ownership or operation of the Facility.

1.12 "Change of Control" means, with respect to Seller, any transaction or series of transactions following which Seller's Parent Entity no longer directly or indirectly (i) remains the owner of more than fifty percent (50%) of the direct or indirect equity or voting interests of Seller which are not otherwise held by Seller's Lenders (excluding any Tax Equity Investors), or (ii) retains the power to control the management and policies of Seller; provided, however, that a Seller Permitted Transfer shall not be a Change of Control.

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1.13 "Charge Rate Test" has the meaning set forth in Exhibit 23.

1.14 "Charging Energy" means the Energy provided to charge the Facility, which shall be charged solely from energy provided by Buyer from the System.

1.15 "Charging Notice" means the operating instruction, and any subsequent updates, given by Idaho Power to Seller, directing the Facility to charge at a specific MW rate to a specified Stored Energy Level, including in connection with a Guaranteed Storage Capacity Test, provided that any such operating instruction shall be in accordance with the Storage Operating Restrictions.

1.16 "Commercial Operation" means that not less than the Storage Capacity of the Facility is fully operational and reliable, the Guaranteed Roundtrip Efficiency has been met, all Performance Tests have otherwise been completed with results submitted to Idaho Power and the Facility is fully interconnected, fully integrated, and synchronized with the System, all of which shall be Seller's responsibility to receive or obtain, and without limiting Seller's other obligations under this Agreement, which occurs when all of the enumerated events listed in Section 4.2 (a) have occurred, and (b) remain simultaneously true and accurate as of the date and moment on which Seller gives Idaho Power written notice that Commercial Operation has occurred.

1.17 "Commercial Operation Date" means the day commencing at 00:01 hours, Mountain Time, following the day that all requirements of Section 4 have been completed and after the Seller requested Operation Date.

1.18 "Confidential Business Information" is defined in Section 25.1.

1.19 "Construction Progress Report" is defined in Section 3.2.1.

1.20 "Contract Interest Rate" means the lesser of (a) the highest rate permitted under Requirements of Law or (b) 200 basis points per annum plus the rate per annum equal to the publicly announced prime rate or reference rate for commercial loans to large businesses in effect from time to time quoted by Citibank, N.A. as its "prime rate." If a Citibank, N.A. prime rate is not available, the applicable prime rate shall be the announced prime rate or reference rate for commercial loans in effect from time to time quoted by a bank with $10 billion or more in assets in New York City, N.Y., selected by the Party to whom interest is being paid.

1.21 "Contract Price" means the applicable price, expressed in dollars per kW-month for the Storage Product, as set forth in Exhibit 5.

1.22 "Contract Year" means any consecutive 12-month period during the Term, commencing at 00:00 hours on the Commercial Operation Date or any of its anniversaries and ending at 24:00 hours on the last day of such 12-month period.

1.23 "Costs" means, with respect to the non-defaulting Party, (a) brokerage fees, commissions and other similar third party transaction costs and expenses reasonably incurred by such Party either in terminating any arrangement entered into pursuant to this Agreement or

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entering into new arrangements which replace this Agreement and (b) all reasonable attorneys' fees and expenses incurred by the non-defaulting Party in connection with the termination of this Agreement.

1.24 "CPCN" means Certificate of Public Convenience and Necessity.

1.25 "Credit Requirements" means (a) three (3) years of audited financial statements, a view of the financial position and financial performance, financial statement analysis and financial trend analysis; (b) Debt Agency Ratings - a senior, unsecured long term debt rating (or corporate rating if such debt rating is unavailable) of BBB+ or greater from S&P, or Baa1 or greater from Moody's, and if such ratings are split, the lower of the two ratings must be at least 'BBB+' or 'Baa1' from S&P or Moody's, respectively. Idaho Power performs a credit analysis, which considers both qualitative and quantitative factors, to determine whether potential Counterparties have satisfied the Credit Requirements.

1.26 "Default" is defined in Section 12.1.

1.27 "Default Security" is defined in Section 9.2.1.

1.28 "Delay Damages" means for each day in which Commercial Operation is not achieved after the Scheduled Commercial Operation Date, the amount equal to $100 for each MWh, prorated for fractional amounts thereof, of Storage Capacity below the Guaranteed Storage Capacity.

1.29 "Discharging Energy" means _____MWh in the first, full Contract Year, reduced by an annual degradation factor of ____ percent per Contract Year, measured at the Point of Delivery. If at Final Completion the Facility's Storage Capacity is less than the Guaranteed Storage Capacity, Discharging Energy shall be reduced proportionally per year for each MWh of Storage Capacity below the Guaranteed Storage Capacity. Seller acknowledges that Idaho Power will include Discharging Energy in Idaho Power's resource planning.

1.30 "Effective Date" is the date stated in the opening paragraph hereto which represents the date upon which this Agreement was fully executed by both Parties.

1.31 "Electric System Authority" means each of NERC, WECC, WREGIS, an RTO, a regional or sub-regional reliability council or authority, and any other similar council, corporation, organization or body of recognized standing with respect to the operations of the electric system in the WECC region, as such are applicable to the Seller or Idaho Power.

1.32 "Emissions Reduction Credit" means any credit, allowance or instrument issued or issuable by a Governmental Authority under regulations of the Environmental Protection Agency under the Clean Air Act.

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1.33 "Energy" means [single][three][1]-phase, sixty (60)-hertz alternating current electrical energy (measured in MWh).

1.34 "Energy Imbalance Market" means the California Independent System Operator's Western Energy Imbalance Market.

1.35 "Environmental Contamination" means the introduction or presence of Hazardous Materials at such levels, quantities or location, or of such form or character, as to constitute a violation of federal, state or local laws or regulations, and present a material risk under federal, state or local laws and regulations that the Premises will not be available or usable for the purposes contemplated by this Agreement.

1.36 "Event of Default" is defined in Section 12.1.

1.37 "Facility" is defined in the Recitals and is more fully described in attached Exhibit 2 and includes an AC-connected battery energy storage system, inverters, transformers, and performance monitoring instruments, associated electrical components, and civil infrastructure associated with the aforementioned components owned, controlled, operated and managed by Seller in connection with, or to facilitate, the storage, discharge, transmission, delivery, or furnishing of the Storage Product by Seller to Idaho Power and required to interconnect with the System, as well as Seller's interests in the Premises, including Leases and any fee owned real property.

1.38 "FERC" means the Federal Energy Regulatory Commission.

1.39 "Final Completion" means the Facility is fully operational and reliable, at the Guaranteed Storage Capacity, and fully interconnected, fully integrated, and synchronized with the Transmission Provider's System, modified if necessary to reflect the Storage Capacity and, if applicable, through completion of all the items set forth on the Final Completion Schedule.

1.40 "Final Completion Schedule" means the full list of all items to be completed in order to achieve Final Completion in accordance with Section 4.2 (Commercial Operation Date).

1.41 "First Operation Date" means the day commencing at 00:01 hours, Mountain Time, following the day that Seller has satisfied the requirements of Section 3 and after the Seller requested First Operation Date.

1.42 "Force Majeure" and "event of Force Majeure" are defined in Section 15.1.

1.43 "Forced Outage" means NERC Event Types U1, U2 and U3, as set forth in attached Exhibit 6, and specifically excludes any Maintenance Outage or Planned Outage.

1.44 "Forward Settlement Amount" means, with respect to the non-defaulting Party, the net Losses and Gains, and Costs, expressed in U.S. Dollars, which such Party incurs as a result

[1] ***Note to Draft***: Include as applicable based on the design of the Project.

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of the termination of this Agreement plus all amounts then owed to the non-defaulting Party by the defaulting Party. If the non-defaulting Party's aggregate Gains exceed its aggregate Losses and Costs, if any, resulting from the termination of this Agreement, the Forward Settlement Amount shall be zero.

1.45 "Full Cycle" means the Facility is charged, then discharged at a MWh quantity equal to the energy capacity in MWh. For example, state of charge starts at one percent (1%), the Facility is charged to one hundred percent (100%) and then discharged to one percent (1%).

1.46 "Full Cycle Equivalent" means Partial Cycles that aggregate to one Full Cycle. For example, two fifty percent (50%) Partial Cycles or four twenty-five percent (25%) Partial Cycles is one (1) Full Cycle Equivalent.

1.47 "Gains" means, with respect to any Party, an amount equal to the present value of the economic benefit to it, if any (exclusive of Costs), resulting from the early termination of this Agreement for the remainder of the Term that would have occurred but for the occurrence of the Event of Default and early termination, determined in a commercially reasonable manner.

1.48 "Generator Interconnection Agreement" or "GIA" means the large generator interconnection agreement entered into separately between Seller and Interconnection Provider concerning the Interconnection Facilities.

1.49 "Government Official" means any official or employee of any multinational, national, regional, or local government in any country, including any official or employee of any government department, agency, commission, or division; any official or employee of any government-owned or -controlled enterprise; any official or employee of any public educational, scientific, or research institution; any political party or official or employee of a political party; any candidate for public office; any official or employee of a public international organization; and any person acting on behalf of or any relatives, family, or household members of any of those listed above.

1.50 "Governmental Authority" means any supranational, federal, state or other political subdivision thereof, having jurisdiction over Seller, Idaho Power or this Agreement, including any municipality, township or county, and any entity or body exercising executive, legislative, judicial, regulatory or administrative functions of or pertaining to government, including any corporation or other entity owned or controlled by any of the foregoing.

1.51 "Guaranteed Commercial Operation Date" means June 1, 2024.

1.52 "Guaranteed Roundtrip Efficiency" means a Roundtrip Efficiency during the Term of no less than 87[2] %.

[2] ***Note to Parties:*** *To be discussed.*

1.53 "Guaranteed Roundtrip Efficiency Test" has the meaning set forth in Exhibit 23.

1.54 "Guaranteed Storage Availability" means, in each Contract Year, Storage Availability equal to 98 % or greater.

1.55 "Guaranteed Storage Availability Test" has the meaning set forth in Exhibit 23.

1.56 "Guaranteed Storage Capacity" means the energy capacity of the Facility of [____] MWh measured over [four] hours by AC monitoring equipment, as more particularly described in Exhibit 2 and determined in accordance with the Guaranteed Storage Capacity Test.

1.57 "Guaranteed Storage Capacity Test" has the meaning set forth in Exhibit 23.

1.58 "Hazardous Materials" means any waste or other substance that is listed, defined, designated or classified as or determined to be hazardous under or pursuant to any environmental law or regulation.

1.59 "Idaho Power" and "Buyer" are defined in the opening paragraph, and explicitly excludes Idaho Power Transmission.

1.60 "Idaho Power's Cost to Cover" means the positive difference, if any, between (a) the time weighted average of the Market Price Index for each day for which the determination is being made, and (b) the Contract Price specified in Exhibit 5 in effect on such days, stated as an amount of dollars per kW-month. If on a given day the difference between (a) minus (b) referenced above is zero or negative, then Idaho Power's Cost to Cover shall be zero dollars ($0), and Seller shall have no obligation to pay any amount to Idaho Power on account of Section 7.12.3 or Section 12.2.1 with respect to such day.

1.61 "Idaho Power Indemnitees" is defined in Section 13.1.1.

1.62 "Idaho Power Representatives" is defined in Section 7.13.

1.63 "Idaho Power Transmission" means Idaho Power Company, an Idaho corporation, acting in its interconnection or transmission function capacity.

1.64 "Indemnified Party" is defined in Section 7.2.3.2.

1.65 "Indemnifying Party" is defined in Section 7.2.3.2.

1.66 "Interconnection Facilities" means all the facilities installed, or to be installed, for the purpose of interconnecting the Facility to the System, including electrical transmission lines, upgrades, transformers and associated equipment, substations, relay and switching equipment, and safety equipment.

1.67 "Interconnection Provider" means Idaho Power Transmission.

1.68 "Inverter" means the equipment installed at the Facility to convert direct current to AC, as described in Exhibit 2.

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1.69 "IPUC" means the Idaho Public Utilities Commission.

1.70 "IRP" means Idaho Power's Integrated Resource Plan.

1.71 "ITC" means the investment tax credit established pursuant to Section 48 of the Internal Revenue Code, as such law may be amended or superseded.

1.72 "kW-month" means kilowatts per month.

1.73 "Leases" means the memoranda of lease and redacted leases recorded in connection with the development of the Facility, as the same may be supplemented, amended, extended, restated, or replaced from time to time.

1.74 "Lender" means an entity lending money or extending credit (including any financing lease, monetization of tax benefits, transaction with a tax equity investor, backleverage financing or credit derivative arrangement) to Seller or Seller's Affiliates (a) for the construction, term or permanent financing or refinancing of the Facility; (b) for working capital or other ordinary business requirements for the Facility (including for the maintenance, repair, replacement or improvement of the Facility); (c) for any development financing, bridge financing, credit support, and related credit enhancement in connection with the development, construction or operation of the Facility; or (d) for the purchase of the Facility and related rights from Seller.

1.75 "Letter of Credit" means an irrevocable standby letter of credit in a form reasonably acceptable to Idaho Power, naming Idaho Power as the party entitled to demand payment and present draw requests thereunder that:

1.75.1 is issued by a Qualifying Institution;

1.75.2 by its terms, permits Idaho Power to draw up to the face amount thereof for the purpose of paying any and all amounts owing by Seller hereunder;

1.75.3 permits Idaho Power to draw the entire amount available thereunder if such letter of credit is not renewed or replaced at least thirty (30) days prior to its stated expiration date;

1.75.4 permits Idaho Power to draw the entire amount available thereunder if such letter of credit is not increased or replaced as and when provided in Section 9;

1.75.5 is transferable by Idaho Power to any party to which Idaho Power may assign this Agreement; and

1.75.6 shall remain in effect for at least ninety (90) days after the end of the Term.

1.76 "Liabilities" is defined in Section 13.1.1.

1.77 "Licensed Professional Engineer" means a person proposed by Seller and acceptable to Idaho Power in its reasonable judgment who (a) to the extent mandated by Requirements

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of Law is licensed to practice engineering in the appropriate engineering discipline for the required certification being made, in the state of Idaho, (b) has training and experience in the engineering disciplines relevant to the matters with respect to which such person is called upon to provide a certification, evaluation or opinion, (c) has no economic relationship, association, or nexus with Seller and is not an employee of its members or Affiliates, other than with the prior written consent of Idaho Power, for services previously or currently being rendered to Seller or its members or Affiliates, and (d) is not a representative of a consulting engineer, contractor, designer or other individual involved in the development of the Facility, or a representative of a manufacturer or supplier of any equipment installed in the Facility.

1.78 "Losses" means, with respect to any Party, an amount equal to the present value of the economic loss to it, if any (exclusive of Costs), resulting from the termination of this Agreement for the remainder of the Term that would have occurred but for the occurrence of the Event of Default and early termination of this Agreement, determined in a commercially reasonable manner. If Seller is the non-defaulting Party, "Losses" will exclude the loss, repayment or recapture of any Tax Credits. If Idaho Power is the non-defaulting Party, "Losses" will include Idaho Power's cost of replacing this Agreement with an agreement for new renewable capacity from a facility with similar technology that has not yet been constructed.

1.79 "Maintenance Outage" means NERC Event Type MO, as set forth in attached Exhibit 6, and includes any outage involving ten percent (10%) of the Facility's Storage Capacity that is not a Forced Outage or a Planned Outage.

1.80 "Market Operator" means the California Independent System Operator or any other entity performing the market operator function for the Energy Imbalance Market.

1.81 "Market Price Index" means 82.4% of the monthly arithmetic average of each day's Intercontinental Exchange ("ICE") daily firm Mid-C Peak Avg and Mid-C Off-Peak Avg index prices in the month as follows:

The actual calculation being:

$$.824 * \left(\sum_{X=1}^{n} \{(\text{ICE Mid-C Peak Avg}_x * \text{HLH hours for day}) + (\text{ICE Mid-C Off-Peak Avg}_x * \text{LLH hours for day})\} / (n*24) \right)$$

where n = number of days in the month

If the ICE Mid-C Index prices are not reported for a particular day or days, prices derived from the respective averages of HLH and LLH prices for the immediately preceding and following reporting periods or days shall be substituted into the formula stated in this definition and shall therefore be multiplied by the appropriate respective numbers of HLH and LLH Hours for such particular day or days with the result that each hour in such month

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shall have a related price in such formula. If the day for which prices are not reported has in it only LLH Hours (for example a Sunday), the respective averages shall use only prices reported for LLH hours in the immediately preceding and following reporting periods or days. If the day for which prices are not reported is a Saturday or Monday or is adjacent on the calendar to a holiday, the prices used for HLH Hours shall be those for HLH hours in the nearest (forward or backward) reporting periods or days for which HLH prices are reported.

1.82 "Maximum Delivery Rate" means the maximum hourly rate of delivery of Discharging Energy in MWh from the Facility to the Point of Delivery, calculated on the basis of the Discharging Energy delivered in an hour accruing at an average rate equivalent to the actual Storage Capacity.

1.83 "Moody's" means Moody's Investor Services, Inc.

1.84 "Mountain Prevailing Time" or "MPT" means Mountain Standard Time or Mountain Daylight Time, as applicable in Idaho on the day in question.

1.85 "MW" means megawatt.

1.86 "MWh" means megawatt hour.

1.87 "NERC" means the North American Electric Reliability Corporation.

1.88 "Network Resource" is defined in the Tariff.

1.89 "Network Service Provider" means Idaho Power Transmission, as a provider of network service to Idaho Power under the Tariff.

1.90 "Noise Test" has the meaning set forth in Exhibit 23.

1.91 "Offer Notice" is defined in Section 8.2.

1.92 "Offered Interests" is defined in Section 8.4.1.

1.93 "Off-Peak Hours" or "LLH" [3]means the daily hours from hour ending 2300 – 0600 MPT, (8 hours), plus all other hours on all Sundays and NERC designated holidays.

1.94 "On-Peak Hours" or "HLH" [4]means the daily hours from hour ending 0700 - 2200 MPT, (16 hours), Monday through Saturday, excluding all hours on all Sundays and NERC designated holidays.

1.95 "Operations Report" is defined in Section 3.2.2.

1.96 "OPUC" means the Public Utility Commission of Oregon.

[3]***Note to Parties*:** 1.93 "Off-Peak Hours" or "LLH" to be discussed.

[4] ***Note to Parties*:** 1.94 "On-Peak Hours" or "HLH" to be discussed.

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1.97 "Partial Cycle" means the Facility is charged and discharged at a MWh quantity less than one hundred percent (100%) of the Facility energy capacity. For example, State of Charge starts at fifty percent (50%), the Storage Facility is discharged to zero percent (0%) and then charged back to fifty percent (50%).

1.98 "Party" and "Parties" are defined in the opening paragraph hereto.

1.99 "Performance Tests" means the Guaranteed Storage Availability Test, the Guaranteed Storage Capacity Test, the Guaranteed Roundtrip Efficiency Test, the Charge Rate Test, the Ramp Rate Test, the Response Time Test, the Auxiliary Load Test, the Power Factor Test, and the Noise Test.

1.100 "Permits" means the permits, licenses, approvals, certificates, entitlements and other authorizations issued by Governmental Authorities required for the construction, ownership or operation of the Facility or occupancy of the Premises, and all amendments, modifications, supplements, general conditions and addenda thereto.

1.101 "Planned Outage" means NERC Event Type PO, as set forth in attached Exhibit 6, and specifically excludes any Maintenance Outage or Forced Outage.

1.102 "Point of Delivery" means the point of interconnection between the Facility and the System, as specified in the Generator Interconnection Agreement and as further described in Exhibit 3.

1.103 "Power Factor Test" has the meaning set forth in Exhibit 23.

1.104 "Pre-COD Damages Payment" means liquidated damages in an amount equal to the amount of Project Development Security required to be provided hereunder, plus the Delay Damages Seller has paid to Buyer.

1.105 "Premises" means the real property on which the Facility is or will be located, as more fully described on Exhibits 9, 10 and 15.

1.106 "Project Development Security" is defined in Section 9.1.1.

1.107 "Prudent Electrical Practices" means any of the practices, methods and acts engaged in or approved by a significant portion of the independent electric power generation industry in the United States for BESS facilities of similar size and characteristics or any of the practices, methods or acts, which, in the exercise of reasonable judgment in the light of the facts known at the time a decision is made, could have been expected to accomplish the desired result at the lowest reasonable cost consistent with reliability, safety and expedition.

1.108 "Qualified Operator" is (a) a partnership, corporation or limited liability company that has at least five (5) years' experience with operating at least five hundred (500) MW(AC) of BESS facilities, or (b) any other Person reasonably acceptable to Buyer.

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1.109 "Qualifying Institution" means a United States commercial bank or trust company organized under the laws of the United States of America or a political subdivision thereof having assets of at least $10,000,000,000 (net of reserves) and a credit rating on its long-term senior unsecured debt of at least "A" from S&P and "A2" from Moody's.

1.110 "Ramp Rate Test" has the meaning set forth in Exhibit 23.

1.111 "Reporting Month" is defined in Section 7.10.1.

1.112 "Required Facility Documents" means the Permits and other authorizations, rights and agreements now or hereafter necessary for construction, ownership, operation, and maintenance of the Facility, and to deliver the Storage Product to Idaho Power in accordance with this Agreement and Requirements of Law, including those set forth in Exhibit 9.

1.113 "Requirements of Law" means any applicable and mandatory (but not merely advisory) federal, state and local law, statute, regulation, rule, action, order, code or ordinance enacted, adopted, issued or promulgated by any federal, state, local or other Governmental Authority or regulatory body (including those pertaining to electrical, building, zoning, environmental and wildlife protection and occupational safety and health).

1.114 "Response Time Test" has the meaning set forth in Exhibit 23.

1.115 "Restricted Period" is defined in Section 8.2.

1.116 "Restricted Transaction" is defined in Section 8.4.1.

1.117 "ROFO" is defined in Section 8.2.

1.118 "ROFO Period" is defined in Section 8.4.1.

1.119 "ROFO Seller" is defined in Section 8.4.1.

1.120 "Roundtrip Efficiency" means the round trip DC-to-storage-to-DC energy efficiency of the battery, or the fraction of energy put into the storage that can be retrieved, calculated in accordance with Exhibit 23.

1.121 "RTO" means any entity (including an independent system operator) that becomes responsible as system operator for, or directs the operation of, the System.

1.122 "S&P" means Standard & Poor's Rating Group (a division of S&P Global, Inc.).

1.123 "Sanctioned Person" means any person (i) that is the target of Sanctions or owned or controlled by any such person(s), or (ii) located, organized or resident in, or directly or indirectly owned or controlled by the government of any Sanctioned Territory.

1.124 "Sanctioned Territory" means any country or territory now or hereafter subject to comprehensive Sanctions.

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1.125 "Sanctions" means any economic or trade sanctions administered or enforced by any Government Authorities of the United States, (including the Office of Foreign Assets Control of the U.S. Department of the Treasury ("OFAC") and the U.S. Department of State), the United Nations, the European Community or, Her Majesty's Treasury or any, and each other sanctions authority which has jurisdiction in respect of any Party or the Facility.

1.126 "SCADA" means supervisory control and data acquisition.

1.127 "Scheduled Commercial Operation Date" means means the date that is ninety (90) days [5]prior to the Guaranteed Commercial Operation Date.

1.128 "Seller" is defined in the opening paragraph hereto.

1.129 "Seller Indemnitees" is defined in Section 13.1.2.

1.130 "Seller ROFO Notice" is defined in Section 8.4.1.

1.131 "Seller Uncontrollable Minutes" means, for the Facility in any month, the total number of minutes during such month during which the Facility was unable to deliver Discharging Energy to Idaho Power (or during which Idaho Power failed to accept such delivery) due to one or more of the following events, each as recorded by SCADA and indicated by electronic fault logs: (a) an emergency or Force Majeure event; (b) [reserved]; (c) the System operating outside the voltage or frequency limits defined in the applicable operating manual for the Inverters installed at the Facility; (d) Planned Outages, but in no event exceeding thirty six (36) hours per Contract Year consistent with such operating manual; (e) [reserved]; (f) a default by Idaho Power; provided, however, that if any of the events described above in items (a) through (e) occur simultaneously, then the relevant period of time shall only be counted once in order to prevent double counting. Seller Uncontrollable Minutes shall not include minutes when (i) the Facility or any portion thereof was unavailable solely due to Seller's non-conformance with the Generation Interconnection Agreement or (ii) the Facility or any portion thereof was paused or withdrawn from use by Seller for reasons other than those covered in this definition.

1.132 "Seller's Cost to Cover" means the positive difference, if any, between (a) the Contract Price specified in Exhibit 5, and (b) the time weighted average of the Market Price Index of Discharging Energy not purchased by Idaho Power as required hereunder. If on any given day the difference between (a) minus (b) referenced above is zero or negative, then Seller's Cost to Cover shall be zero dollars with respect to such day, and Idaho Power shall have no obligation to pay any amount to Seller on account of Section 12.2.2. For any days prior to the Commercial Operation Date, the Contract Price applicable in the first Contract Year shall be utilized for purposes of clause (a).

1.133 "Seller's Parent Entity" means [_____].

[5] ***Note to Parties:*** *To be discussed.*

1.134 "Senior Lenders" means Lenders being granted senior security interests on the Facility or its assets, or Seller or its equity, other than Affiliates of Seller.

1.135 "Storage Availability" shall be at least _____ percent (_____%), calculated in accordance with the Guaranteed Storage Availability Test.

1.136 "Storage Availability Damages" means a payment equal to the difference between (i) Storage Availability, calculated in accordance with Exhibit 23 and (ii) the Guaranteed Storage Availability, multiplied by $150,000.

1.137 "Storage Availability Damages Cap" means _____ per year.

1.138 "Storage Capacity" means the maximum energy capacity of the completed Facility, measured in MWh over a [four] hour period, when operated in compliance with the Generator Interconnection Agreement and consistent with the recommended power factor and operating parameters provided by the manufacturer of the BESS, as set forth in a written notice from Seller to Idaho Power delivered prior to the Commercial Operation Date and, if applicable, updated in a subsequent written notice from Seller to Idaho Power as required for Final Completion.

1.139 "Storage Capacity Damages" means a payment equal to the difference between (i) the Storage Capacity measured in accordance with Exhibit 23 and (ii) the Guaranteed Storage Capacity, multiplied by $100/MWh.

1.140 "Storage Capacity Damages Cap" means _____.

1.141 "Storage Operating Restrictions" means those operating parameters and restrictions set forth in Exhibit 4.

1.142 "Storage Product" means the Discharging Energy, Capacity Rights, Storage Capacity, and Ancillary Services.

1.143 "Stored Energy Level" means, at a particular time, the amount of electric energy in the Facility available to be discharged as Discharging Energy, expressed in MWh.

1.144 "System" means the electric transmission substation and transmission or distribution facilities owned, operated or maintained by Transmission Provider, which shall include, after construction and installation of the Facility, the circuit reinforcements, extensions, and associated terminal facility reinforcements or additions required to interconnect the Facility, all as set forth in the Generation Interconnection Agreement.

1.145 "Tariff" means the Idaho Power FERC Electric Tariff Volume No. 11 Open Access Transmission Tariff, as revised from time to time.

1.146 "Tax Credits" means any state, local and/or federal production tax credit, tax deduction, and/or investment tax credit (including the ITC) specific to the production of renewable energy and/or investments in renewable energy facilities.

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1.147 "Term" is defined in Section 4.1.

1.148 "Transmission Provider" means Idaho Power Transmission.

1.149 "WECC" means the Western Electricity Coordinating Council.

1.150 "WREGIS" means the Western Renewable Energy Generation Information System.

1.151 Rules of Interpretation.

1.151.1 General. Unless otherwise required by the context in which any term appears, (a) the singular includes the plural and vice versa; (b) references to "Articles," "Sections," "Schedules," "Appendices" or "Exhibits" are to articles, sections, schedules, appendices or exhibits hereof; (c) all references to a particular entity or an electricity market price index include a reference to such entity's or index's successors; (d) "herein," "hereof" and "hereunder" refer to this Agreement as a whole; (e) all accounting terms not specifically defined herein shall be construed in accordance with generally accepted accounting principles, consistently applied; (f) the masculine includes the feminine and neuter and vice versa; (g) "including" means "including, without limitation" or "including, but not limited to"; (h) all references to a particular law or statute mean that law or statute as amended from time to time; (i) all references to electric energy or capacity are to be interpreted as utilizing alternating current, unless expressly stated otherwise; and (j) the word "or" is not necessarily exclusive. Reference to "days" shall be calendar days, unless expressly stated otherwise herein.

1.151.2 Terms Not to be Construed For or Against Either Party. Each term hereof shall be construed according to its fair meaning and not strictly for or against either Party. The Parties have jointly prepared this Agreement, and no term hereof shall be construed against a Party on the ground that the Party is the author of that provision.

1.151.3 Headings. The headings used for the sections and articles hereof are for convenience and reference purposes only and shall in no way affect the meaning or interpretation of the provisions hereof.

1.151.4 Examples. Example calculations and other examples set forth herein are for purposes of illustration only and are not intended to constitute a representation, warranty or covenant concerning the example itself or the matters assumed for purposes of such example. If there is a conflict between an example and the text hereof, the text shall control.

1.151.5 Interpretation with FERC Orders. Each Party conducts and shall conduct its operations in a manner intended to comply with FERC Order No. 717, Standards of Conduct for Transmission Providers, and its companion orders, requiring the separation of its transmission and merchant functions. Moreover, the Parties acknowledge that Interconnection Provider's transmission function offers

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transmission service on its system in a manner intended to comply with FERC policies and requirements relating to the provision of open-access transmission service. The Parties recognize that Seller will enter into the Generation Interconnection Agreement with the Interconnection Provider. Nothing herein is intended to make any statement about FERC jurisdiction in relation to the Seller.

1.152 Other Terms. The Parties acknowledge and agree that the Generator Interconnection Agreement shall be a separate and free standing contract and that the terms hereof are not binding upon the Interconnection Provider.

Notwithstanding any other provision in this Agreement, nothing in the Generation Interconnection Agreement, nor any other agreement between Seller on the one hand and Transmission Provider or Interconnection Provider on the other hand, nor any alleged event of default thereunder, shall alter or modify the Parties' rights, duties, and obligation hereunder. This Agreement shall not be construed to create any rights between Seller and the Interconnection Provider or between Seller and the Transmission Provider.

Seller expressly recognizes that, for purposes hereof, the Interconnection Provider and Transmission Provider each shall be deemed to be a separate entity and separate contracting party from Idaho Power whether or not the Generation Interconnection Agreement is entered into with Interconnection Provider or an Affiliate thereof. Seller acknowledges that Idaho Power, acting in its merchant capacity function as purchaser hereunder, has no responsibility for or control over Interconnection Provider or Transmission Provider, and is not liable for any breach of agreement or duty by Interconnection Provider or Transmission Provider.

SECTION 2
REPRESENTATIONS AND WARRANTIES

2.1 Mutual Representations and Warranties. Each Party represents, covenants, and warrants to the other that:

2.1.1 Organization. It is duly organized and validly existing under the laws of the State of its organization.

2.1.2 Authority. It has the requisite power and authority to enter this Agreement and to perform according to the terms hereof.

2.1.3 Corporate Actions. It has taken all corporate or entity actions required to be taken by it to authorize the execution, delivery and performance hereof and the consummation of the transactions contemplated hereby.

2.1.4 No Contravention. The execution and delivery hereof does not contravene any provision of, or constitute a default under, any indenture, mortgage, security instrument or undertaking, or other material agreement to which it is a party or by which it is bound, or any valid order of any court, or any regulatory agency or other Governmental Authority having authority to which it is subject.

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2.1.5 Valid and Enforceable Agreement. This Agreement is a valid and legally binding obligation of it, enforceable against it in accordance with its terms, except as the enforceability hereof may be limited by general principles of equity or bankruptcy, insolvency, bank moratorium or similar laws affecting creditors' rights generally and laws restricting the availability of equitable remedies.

2.1.6 Litigation. No litigation, arbitration, investigation or other proceeding is pending or, to the best of either Party's knowledge, threatened in writing against either Party or its members, with respect hereto and the transactions contemplated hereunder. No other investigation or proceeding is pending or threatened in writing against a Party, its members, or any Affiliate, the effect of which would materially and adversely affect the Party's performance of its obligations hereunder.

2.1.7 Eligible Contract Participant. It, and any guarantor of its obligations under this Agreement, is an "eligible contract participant" as that term is defined in the United States Commodity Exchange Act.

2.1.8 Not a Sanctioned Person. It is not a Sanctioned Person.

2.2 Seller's Further Representations and Warranties. Seller further represents, covenants, and warrants to Idaho Power that:

2.2.1 Authority. Seller (a) has (or will have prior to the Commercial Operation Date) all required regulatory authority to make wholesale sales from and purchases of Charging Energy for the Facility; (b) has the power and authority to own and operate the Facility and be present upon the Premises for the Term; and (c) is duly qualified and in good standing under the laws of the state of Idaho and each other jurisdiction where its ownership, lease or operation of property or the conduct of its business requires such qualification.

2.2.2 No Contravention. The execution, delivery, performance and observance by Seller of its obligations hereunder do not and will not:

2.2.2.1 contravene, conflict with or violate any provision of any material Requirements of Law presently in effect having applicability to either Seller or any of Seller's members;

2.2.2.2 require the consent or approval of or material filing or registration with any Governmental Authority or other person other than such consents and approvals which are (i) set forth in Exhibit 9 or (ii) required in connection with the construction, operation, or maintenance of the Facility and expected to be obtained in due course;

2.2.2.3 result in a breach of or constitute a default under any provision of any security issued by any of Seller's members or managers, the effect of which would materially and adversely affect Seller's performance

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of, or ability to perform, its obligations hereunder, or any material agreement, instrument or undertaking to which either Seller's members or any Affiliates of Seller's members is a party or by which the property of any of Seller's members or any Affiliates of Seller's members is bound, the effect of which would materially and adversely affect Seller's performance of, or ability to perform, its obligations hereunder.

2.2.3 Required Facility Documents. All Required Facility Documents are listed on Exhibit 9. Pursuant to the Required Facility Documents, Seller holds as of the Effective Date, or will hold by the Commercial Operation Date (or such other later date as may be specified under Requirements of Law), and will maintain for the Term all Required Facility Documents. The anticipated use of the Facility complies with all applicable restrictive covenants affecting the Premises. Following the Commercial Operation Date, Seller shall promptly notify Idaho Power of any additional Required Facility Documents.

2.2.4 Delivery of Storage Product. On or before the Commercial Operation Date, Seller shall hold rights sufficient to enable Seller to deliver the Storage Product from the Facility to the Point of Delivery pursuant to this Agreement throughout the Term.

2.2.5 Control of Premises. Seller has all legal rights necessary for the Seller to enter upon and occupy the Premises for the purpose of constructing, operating and maintaining the Facility for the Term. All leases of real property required for the operation of the Facility or the performance of any obligations of Seller hereunder are set forth and accurately described in Exhibits 9 and 10. Seller shall maintain all leases or other land grants necessary for the construction, operation and maintenance of the Facility as valid for the Term. Upon request by Idaho Power, Seller shall provide copies of the memoranda of lease recorded in connection with the development of the Facility.

2.2.6 Undertaking of Agreement; Professionals and Experts. Seller has engaged those professional or other experts it believes necessary to understand its rights and obligations pursuant to this Agreement. All professionals or experts including engineers, attorneys or accountants, that Seller may have consulted or relied on in undertaking the transactions contemplated by this Agreement have been solely those of Seller. In entering into this Agreement and the undertaking by Seller of the obligations set forth herein, Seller has investigated and determined that it is capable of performing hereunder and has not relied upon the advice, experience or expertise of Idaho Power in connection with the transactions contemplated by this Agreement.

2.2.7 Verification. All information relating to the Facility, its operation and output and the Premises provided to Idaho Power and contained in this Agreement has been verified by Seller and is true and accurate.

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2.3 No Other Representations or Warranties. Each Party acknowledges that it has entered into this Agreement in reliance upon only the representations and warranties set forth in this Agreement, and that no other representations or warranties have been made by the other Party with respect to the subject matter hereof.

2.4 Continuing Nature of Representations and Warranties; Notice. The representations and warranties set forth in this Section are made as of the Effective Date and deemed repeated as of the Commercial Operation Date. If at any time during the Term, a Party obtains actual knowledge of any event or information that would have caused any of the representations and warranties in this Section 2 to be materially untrue or misleading at the time given, such Party shall provide the other Party with written notice of the event or information, the representations and warranties affected, and the action, if any, which such Party intends to take to make the representations and warranties true and correct. If at any time a Party obtains actual knowledge that the representations and warranties in this Section 2 are not true, said Party shall provide written notice to the other Party. The notice required pursuant to this section shall be given as soon as practicable after the occurrence of each such event.

SECTION 3
CONDITIONS PRECEDENT TO TERM

3.1 Conditions to be granted First Operation Date. As a condition of the Buyer's acceptance of deliveries of the Storage Product from the Seller, the following conditions shall be satisfied.

3.1.1 Commission/Regulatory Approval. This Agreement shall only become finally effective upon the IPUC's approval of all terms and provisions hereof without change or condition, and declaration that all payment to be made to Seller hereunder shall be allowed as prudently incurred expenses for ratemaking purposes, and compliance of this Agreement with Idaho Power's regulatory requirements with the IPUC and OPUC ("IPUC Approval").

3.1.2 The Parties recognize and acknowledge that regulatory proceedings at both the IPUC and the OPUC may be required. This Agreement shall not become finally effective should the Agreement be disapproved by the IPUC and/or the OPUC. Idaho Power will file a case seeking approval of this Agreement with the IPUC. Additional and concurrent proceedings could include but may not be limited to: the Facility's successful selection in a possible Request for Proposals process that complies with the OPUC's procurement rules; cases before the IPUC and OPUC regarding the waiver of process, timing, etc. related to compliance or lack thereof with the OPUC procurement rules, and inclusion of the Facility in Idaho Power's Integrated Resource Planning process.

3.2 Idaho Power's Right to Monitor. After the Effective Date, Seller shall, and shall permit Idaho Power and its advisors and consultants to:

3.2.1 On and after the Execution Date through the Commercial Operation Date, by the tenth (10th) Business Day of each month, Seller will provide Buyer a monthly report for the prior month regarding development, financing and construction

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updates in the form attached hereto as Exhibit 18, the form of which may be reasonably revised by Buyer from time to time (the "Construction Progress Report").

3.2.2 Thirty (30) days prior to the expected Commercial Operation Date and thereafter from the Commercial Operation Date and throughout the Settlement Term of this Agreement, no later than the end of the month immediately following the month for which information is being reported, Seller shall provide Buyer with a monthly report for the prior month regarding material data pertaining to the operation of the Facility in the form of Exhibit 19, the form of which may be reasonably revised by Buyer from time to time (the "Operations Report"). Each Operations Report shall include, at a minimum, the following information for the Facility in such month: (i) A description of any Outages or other performance issues in the prior month; (ii) the Storage Availability calculated in accordance with Exhibit 23; and (iii) a description of any issues that could materially impact (ii).

3.2.3 Review and discuss with Seller and its advisors and consultants monthly status reports on the progress of the acquisition, design, financing, engineering, construction and installation of the Facility.

3.2.4 Monitor the status of the acquisition, Premises, land leasing, design, financing, engineering, construction and installation of the Facility and the performance of the contractors constructing the Facility.

3.2.5 Witness initial performance tests and other tests and review the results thereof; with Seller to make best efforts to provide Idaho Power five (5) Business Days' advance written notice of each such major test. Seller shall provide Idaho Power with at least two (2) Business Days prior written notice of each such test.

3.2.6 Perform such examinations, inspections, and quality surveillance as, in Idaho Power's reasonable judgment, are appropriate and advisable to determine that the Facility has been properly commissioned and Commercial Operation and Final Completion have been achieved.

With respect to Idaho Power's right to monitor under this Section 3.2, (i) Idaho Power is under no obligation to exercise any of these monitoring rights, (ii) such monitoring shall occur subject to reasonable rules developed by Seller regarding Facility construction, access, health, safety, and environmental requirements, and (iii) Idaho Power shall have no liability to Seller for failing to advise it of any condition, damages, circumstances, infraction, fact, act, omission or disclosure discovered or not discovered by Idaho Power with respect to the Facility or any contractor. Any review or monitoring of the Facility conducted by Idaho Power hereunder shall be performed in a manner that does not impede, hinder, postpone, or delay Seller or its contractors in their performance of the engineering, construction, design or testing of the Facility. Idaho Power shall maintain one or more designated representatives for purposes of the monitoring activities contemplated in this Section 3.2, which representatives shall have authority to act for Idaho Power in all technical matters under this Section 3.2 as authorized by Idaho Power but not to amend or

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modify any provision hereof. A Construction Progress Report and Operations Report delivered pursuant to this Section 3.2 shall not constitute notice for any purpose under this Agreement, including with respect to any fact, circumstance, request, issue, dispute or matter included in such report. Seller does not herein grant Idaho Power the right to review, comment on or approve of the terms or conditions of any contract or negotiation between Seller and a third party, the terms and conditions of each such contract or negotiation being confidential and to be determined by Seller in its sole discretion. Conversely, nothing in this Agreement shall be construed to require Idaho Power to review, comment on, or approve of any contract between Seller and a third party and any such review, comment or approval by Idaho Power shall not constitute a waiver by Idaho Power or any of Seller's obligations under this Agreement or create any obligation or liability for Idaho Power.

SECTION 4
TERM AND COMMERCIAL OPERATION DATE

4.1 Term. This Agreement shall become effective on the Effective Date and, subject to earlier termination as provided in this Agreement, shall continue in full force and effect for a period of _____ Contract Years from the Commercial Operation Date (the "Term").

4.2 Commercial Operation Date. Seller will in good faith using commercially reasonable efforts seek to achieve the Commercial Operation Date by the Scheduled Commercial Operation Date. The Commercial Operation Date shall occur after all the following conditions have been satisfied.

4.2.1 Idaho Power has received the Default Security, as applicable.

4.2.2 Seller shall notify Buyer of the Seller's proposed Commercial Operation Date, in written form no later than five (5) Business Days prior to the proposed Commercial Operation Date.

4.2.3 Seller shall provide to Idaho Power a certificate from a Licensed Professional Engineer licensed in the state of Idaho addressed to Idaho Power stating that Seller has (a) the Required Facility Documents including the material permits, consents and agreements necessary to operate and maintain the Facility and (b) obtained or entered into all Permits and Required Facility Documents. Seller must provide copies of any or all Required Facility Documents requested by Idaho Power.

4.2.4 Seller shall provide Idaho Power with documentation showing that Seller has obtained retail electric service for the Facility.

4.2.5 Idaho Power has received a certificate addressed to Idaho Power from a Licensed Professional Engineer stating that, in conformance with the requirements of the Generation Interconnection Agreement: (1) all required Interconnection Facilities have been constructed; (2) all required interconnection tests have been completed; and (3) the Facility is physically interconnected with the System in conformance with the Generation Interconnection Agreement and able to deliver electric energy consistent with the terms of this Agreement.

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4.2.6 Idaho Power has received, addressed to Idaho Power from a Licensed Professional Engineer, an executed Engineer's Certification of Design & Construction Adequacy and an Engineer's Certification of Operations and Maintenance (O&M) Policy. These certificates will be in the form specified in Exhibit 11 but may be modified to the extent necessary to recognize the different engineering disciplines providing the certificates.

4.2.7 Idaho Power has received an opinion from a law firm or attorney licensed in the State of Idaho stating, after all appropriate and reasonable inquiry (1) Seller has obtained or entered into all Required Facility Documents; and (2) neither Seller nor the Facility are in violation of or subject to any liability under any Requirements of Law.

4.2.8 Idaho Power has received a certificate addressed to Idaho Power from an authorized officer of Seller (1) stating that Seller has completed all of its obligations under the Generation Interconnection Agreement.

4.2.9 Seller has satisfied its obligation to pay for any required Network Upgrades as a Network Resource pursuant to the Generation Interconnection Agreement (as those terms are defined in the Generation Interconnection Agreement).

4.2.10 Seller shall submit written proof to the Buyer of all insurance required in Section 14.

4.2.11 Seller has completed all Start-Up Testing in accordance with Exhibit 7.

4.2.12 Seller has completed all Performance Tests, submitted the results thereof to Idaho Power, and has achieved (i) the Guaranteed Storage Availability or paid all Storage Availability Damages in accordance with Section 4.5.5, (ii) the Guaranteed Storage Capacity or paid all Storage Capacity Damages in accordance with Section 4.5.5, and (iii) Guaranteed Roundtrip Efficiency.

4.2.13 Commercial Operation Date Notice. Seller shall provide written notice to Idaho Power stating when Seller believes that the Facility has achieved Commercial Operation accompanied by the certificates and opinions described above.

4.2.14 Idaho Power shall have ten (10) Business Days after receipt of such written notice from Seller either to confirm to Seller that all of the conditions to Commercial Operation have been satisfied or have occurred, or to state with specificity what Idaho Power reasonably believes has not been satisfied. If, within such ten (10) Business Day period, Idaho Power does not respond or notifies Seller confirming that the Facility has achieved Commercial Operation, the original date of receipt of Seller's written notice shall be the Commercial Operation Date. If Idaho Power notifies Seller within such ten (10) Business Day period that Idaho Power reasonably believes the Facility has not achieved Commercial Operation, Seller must address the concerns stated in Idaho Power's notice to the satisfaction of Idaho Power. In the event Idaho Power provides notice of deficiency with regards to the information submitted to establish the Commercial Operation Date, then

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the Commercial Operation Date will be the date upon which Seller has addressed the concerns stated in Idaho Power's notice to Idaho Power's reasonable satisfaction.

With respect to Sections 4.2.3 through 4.2.6 above, the certificate or opinion provided to Idaho Power must come from a Licensed Professional Engineer or, in the case of Section 4.2.7 above, an attorney that is not an employee of Seller (or any Affiliate) and has no financial interest in the Facility.

Notwithstanding the foregoing in this Section 4.2, the date for achieving each of the foregoing items shall be extended on a day for day basis for any delay due solely to Idaho Power's delay in taking, or failure to take, any action required of it hereunder in breach of this Agreement. These Commercial Operation Date requirements are to be used solely for purposes of determining when the Facility has achieved its Commercial Operation Date.

4.3 Condition Precedents to Commercial Operation. Seller covenants and agrees that before it achieves the Commercial Operation Date, it shall ensure that it has done all of the following, and Seller shall hold Idaho Power harmless from and against any failure of Seller to have done so:

4.3.1 All Facility systems necessary for the stable, safe, reliable and consistent operation of the installed Facility are substantially complete,

4.3.2 Any testing of the installed Facility required pursuant to the Interconnection Agreement(s) and Interconnection Provider documents and equipment supplier requirements have been successfully completed;

4.3.3 Seller has completed all of the Performance Tests and has achieved (i) the Guaranteed Storage Availability or paid all Storage Availability Damages in accordance with Section 4.5.5, (ii) the Guaranteed Storage Capacity or paid all Storage Capacity Damages in accordance with Section 4.5.5, and (iii) the Guaranteed Roundtrip Efficiency; and

4.3.4 the Facility is available for operation in all material respects in accordance with the Requirements of Law.

4.4 Continuing Obligations. Seller shall provide Buyer with the following during the Term of this Agreement:

4.4.1 At Buyer's request, Seller shall provide evidence that it is in compliance with the insurance requirements set forth in Section 14.

4.4.2 Seller shall maintain compliance and remain in good standing in all requirements of Sections 3 and 4 of this Agreement.

4.5 Commercial Operation Date Delay, Delay Damages, Storage Capacity Damages, Storage Availability Damages.

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4.5.1 If Commercial Operation is not achieved on or before the Scheduled Commercial Operation Date, Seller shall pay to Idaho Power Delay Damages from and after the Scheduled Commercial Operation Date up to, but not including, the date that the Facility achieves Commercial Operation. Delay Damages cease to accrue in the event of termination of this Agreement.

4.5.2 If the Facility does not achieve Commercial Operation by the Guaranteed Commercial Operation Date, Idaho Power may terminate this Agreement pursuant to Section 12.

4.5.3 If the Facility does not achieve the Guaranteed Roundtrip Efficiency, Idaho Power may terminate this Agreement pursuant to Section 12.

4.5.4 If the Facility achieves Commercial Operation based on less than the Guaranteed Storage Capacity, Seller shall pay to Idaho Power the Storage Capacity Damages, provided, Seller shall not be required to pay Storage Capacity Damages in excess of the Storage Capacity Damages Cap.

4.5.5 If the Facility achieves Commercial Operation based on less than the Guaranteed Storage Availability, Seller shall pay to Idaho Power the Storage Availability Damages, provided, Seller shall not be required to pay Storage Availability Damages in excess of the Storage Availability Damages Cap.

4.6 Damages Calculation. Each Party agrees and acknowledges that (a) the damages that Idaho Power would incur due to Seller's delay in achieving Commercial Operation or failure to achieve the Guaranteed Storage Capacity or Guaranteed Storage Availability would be difficult or impossible to predict with certainty, and (b) it is impractical and difficult to assess actual damages in the circumstances stated, and therefore the Delay Damages, Storage Capacity Damages, and Storage Availability Damages as agreed to by the Parties and set forth herein are a fair and reasonable calculation of such damages. The Parties agree that Delay Damages, Storage Capacity Damages, and Storage Availability Damages shall be Idaho Power's exclusive remedy for a delay in achieving Commercial Operation or failure to achieve the Guaranteed Storage Availability and Guaranteed Storage Capacity and believe that Delay Damages, Storage Capacity Damages, and Storage Availability Damages fairly represent actual damages. Subject to the foregoing sentence, this Section 4.6 shall not limit Seller's termination rights or the amount of damages payable to Idaho Power if this Agreement is terminated as a result of Seller's failure to achieve Commercial Operation by the Guaranteed Commercial Operation Date. Any such termination damages shall be determined in accordance with Section 12.4.

4.7 Damages Invoicing. By the tenth (10^{th}) day following the end of the calendar month in which Delay Damages begin to accrue or Storage Capacity Damages or Storage Availability Damages are incurred, as applicable, and continuing on the tenth (10^{th}) day of each calendar month during the period in which Delay Damages accrue (and the following months, if applicable), Idaho Power shall deliver to Seller an invoice showing Idaho Power's computation of such damages and any amount due Idaho Power in respect thereof for the preceding calendar month. No later than ten (10) days after receiving such an

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invoice and subject to Sections 11.2 and 11.3, Seller shall pay to Idaho Power, by wire transfer of immediately available funds to an account specified in writing by Idaho Power or by any other means agreed to by the Parties in writing from time to time, the amount set forth as due in such invoice.

SECTION 5
DELIVERIES OF STORAGE PRODUCT

5.1 Purchase and Sale. Except as otherwise expressly provided herein, commencing on the Commercial Operation Date and continuing through the Term, Seller shall sell and make available to Idaho Power, and Idaho Power shall purchase and receive the Storage Product. Idaho Power shall be under no obligation to make any purchase hereunder other than the Storage Product, as described above. Idaho Power shall not be obligated to purchase, receive or pay for Storage Product that is not delivered to Idaho Power at the Point of Delivery or otherwise.

5.2 No Sales to Third Parties. During the Term, Seller shall not sell any Storage Product from the Facility to any party other than Idaho Power; provided, however, that this restriction shall not apply during periods when Idaho Power is in default hereof because it has failed to accept the Storage Product delivered by Seller to Idaho Power as required hereunder.

5.3 Title and Risk of Loss of Storage Product. Seller shall deliver the Storage Product to Idaho Power free and clear of all liens, claims and encumbrances. Title to and risk of loss of all Storage Product shall transfer from Seller to Idaho Power upon its delivery to Idaho Power at the Point of Delivery. Seller shall be deemed to be in exclusive control of, and responsible for, any damage or injury caused by, all delivery of the Storage Product up to and at the Point of Delivery, or failure to deliver the Storage Product to the Point of Delivery. Idaho Power shall be deemed to be in exclusive control of Storage Product after the Point of Delivery.

5.4 Idaho Power as Merchant. Seller acknowledges that Idaho Power, acting in its merchant capacity function as purchaser under this Agreement, has no responsibility for or control over Idaho Power Transmission or any successor Transmission Provider.

5.5 Purchase and Sale of Capacity Rights. For and in consideration of Idaho Power's agreement to purchase from Seller the Storage Product on the terms and conditions set forth herein, Seller transfers to Idaho Power, and Idaho Power accepts from Seller, all right, title, and interest that Seller may have in and to Capacity Rights, if any, existing during the Term.

5.6 Representation Regarding Ownership of Capacity Rights. Seller represents that it has not sold, and covenants that during the Term it will not sell or attempt to sell to any other person or entity the Capacity Rights, if any. During the Term, Seller shall not report to any person or entity that the Capacity Rights, if any, belong to anyone other than Idaho Power. Idaho Power may at its own risk and expense report to any person or entity that Capacity Rights exclusively belong to it.

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5.7 Authority to Make Sales. Seller covenants that during the Term it will maintain all required regulatory authority to make wholesale sales from the Facility to Idaho Power.

5.8 Further Assurances. At Idaho Power's request, the Parties shall execute such documents and instruments as may be reasonably required to effect recognition and transfer of the Storage Product to Idaho Power.

SECTION 6
CONTRACT PRICE; COSTS

6.1 Contract Price. Idaho Power shall pay Seller the Contract Price for the Storage Product. Seller shall not be entitled to any compensation over and above the Contract Price for the Storage Product.

6.2 Costs and Charges. Seller shall be responsible for paying or satisfying when due all costs or charges imposed in connection with the scheduling and delivery of Storage Product up to and at the Point of Delivery, including transmission costs, Transmission Service, and transmission line losses, and any operation and maintenance charges imposed by Interconnection Provider and Transmission Provider for the Interconnection Facilities. Idaho Power shall be responsible for all costs or charges, if any, imposed in connection with the delivery of Storage Product at and from the Point of Delivery, including transmission costs and transmission line losses and imbalance charges or penalties. Without limiting the generality of the foregoing, Seller, in accordance with the Generation Interconnection Agreement, shall bear all costs associated with the modifications to Interconnection Facilities or the System (including system upgrades) caused by or related to (a) the interconnection of the Facility with the System and (b) any increase in generating capacity of the Facility.

6.3 Station Service. Seller shall be responsible for arranging and obtaining, at its sole risk and expense, any station service required by the Facility that is not provided by the Facility itself.

6.4 Taxes. Seller shall pay or cause to be paid when due, or reimburse Idaho Power for, all existing and any new sales, use, excise, severance, ad valorem, and any other similar taxes, imposed or levied by any Governmental Authority on the Storage Product up to and including, but not beyond, the Point of Delivery, regardless of whether such taxes are imposed on Idaho Power or Seller under Requirements of Law. Idaho Power shall pay or cause to be paid when due all such taxes imposed or levied by any Governmental Authority on the Storage Product beyond the Point of Delivery, regardless of whether such taxes are imposed on Idaho Power or Seller under Requirements of Law. The Contract Price shall not be adjusted on the basis of any action of any Governmental Authority with respect to changes to or revocations of sales and use tax benefits, rebates, exception or give back. In the event any taxes are imposed on a Party for which the other Party is responsible hereunder, the Party on which the taxes are imposed shall promptly provide the other Party written notice thereof and such other information as such Party may reasonably request with respect to any such taxes. Seller shall be responsible for any and all sun and light severance taxes.

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6.5 Costs of Ownership and Operation. Without limiting the generality of any other provision hereof and subject to Section 6.4, Seller shall be solely responsible for paying when due (a) all costs of owning and operating the Facility in compliance with existing and future Requirements of Law and the terms and conditions hereof, and (b) all taxes and charges (however characterized) now existing or hereinafter imposed on or with respect to the Facility, its operation, or on or with respect to emissions or other environmental impacts of the Facility.

6.6 Rates Not Subject to Review. The rates for service specified herein shall remain in effect until expiration of the Term and shall not be subject to change for any reason, including regulatory review, absent agreement of the Parties. Neither Party shall petition FERC pursuant to the provisions of Sections 205 or 206 of the Federal Power Act (16 U.S.C. § 792 et seq.) to amend such prices or terms or support a petition by any other person or entity seeking to amend such prices or terms, absent the agreement in writing of the other Party. Further, absent the agreement in writing by both Parties, the standard of review for changes hereto proposed by a Party, a non-party or the FERC acting sua sponte shall be the "public interest" application of the "just and reasonable" standard of review set forth in United Gas Pipe Line Co. v. Mobile Gas Service Corp., 350 U.S. 332 (1956) and Federal Power Commission v. Sierra Pacific Power Co., 350 U.S. 348 (1956) and clarified by Morgan Stanley Capital Group. Inc. v. Public Util. Dist. No. 1 of Snohomish, 554 U.S. 527, 128 S. Ct. 2733 (2008).

SECTION 7
OPERATION AND CONTROL

7.1 As-Built Supplement. Within thirty (30) days of completion of construction of the Facility, Seller shall provide Idaho Power the As-built Supplement. The As-built Supplement shall be deemed effective and shall be added to Exhibit 16 when it has been reviewed and approved by Idaho Power, which approval shall not be unreasonably withheld or delayed. If the proposed As-built Supplement does not accurately describe the Facility as actually built or is otherwise defective as to form in any material respect, Idaho Power may within fifteen (15) days after receiving the proposed As-built Supplement give Seller a notice describing what Idaho Power wishes to correct. If Idaho Power does not give Seller such a notice within the fifteen (15) day period, the As-built Supplement shall be deemed approved. If Idaho Power provides a timely notice requiring corrections, Seller shall in good faith cooperate with Idaho Power to revise the As-built Supplement to address Idaho Power's concerns. Notwithstanding the foregoing, Idaho Power shall have no right to require Seller to relocate, modify or otherwise change in any respect any aspect of the Facility as actually built.

7.2 Standard of Facility Operation.

7.2.1 General. At Seller's sole cost and expense, Seller shall build, operate, maintain and repair the Facility and the Interconnection Facilities in accordance with (a) the applicable and mandatory standards, criteria and formal guidelines of FERC, NERC, any RTO, and any other Electric System Authority and any successors to the functions thereof; (b) the Permits and Required Facility Documents; (c) the

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Generation Interconnection Agreement; (d) all Requirements of Law; (e) the requirements hereof; and (f) Prudent Electrical Practice. Seller acknowledges that it shall have no claims hereunder against Idaho Power with respect to any requirements imposed by or damages caused by (or allegedly caused by) the Transmission Provider. Seller will have no claims against Idaho Power under this Agreement with respect to the provision of station service.

7.2.2 Qualified Operator. From and after the Commercial Operation Date, Seller will cause the Project to be operated and maintained by a Qualified Operator. Seller shall provide Idaho Power thirty (30) days prior written notice of any proposed change in the Qualified Operator of the Facility.

7.2.3 Fines and Penalties.

7.2.3.1 Without limiting a Party's rights under Section 7.2.3.2, each Party shall pay all fines and penalties incurred by such Party on account of noncompliance by such Party with Requirements of Law in respect to this Agreement, except where such fines and penalties are being contested in good faith through appropriate proceedings.

7.2.3.2 If fines, penalties, or legal costs are assessed against or incurred by either Party (the "Indemnified Party") on account of any action by any Governmental Authority due to noncompliance by the other Party (the "Indemnifying Party") with any Requirements of Law or the provisions hereof, or if the performance of the Indemnifying Party is delayed or stopped by order of any Governmental Authority due to the Indemnifying Party's noncompliance with any Requirements of Law, the Indemnifying Party shall indemnify and hold harmless the Indemnified Party against any and all losses, liabilities, damages, and claims suffered or incurred by the Indemnified Party as a result thereof. Without limiting the generality of the foregoing, the Indemnifying Party shall reimburse the Indemnified Party for all fees, damages, or penalties imposed on the Indemnified Party by any Governmental Authority, other person or entity or to other utilities for violations to the extent caused by a default by the Indemnifying Party or a failure of performance by the Indemnifying Party hereunder.

7.3 Interconnection. Seller shall be responsible for the costs and expenses associated with obtaining from the Transmission Provider Network Resource interconnection service for the Facility at its Nameplate Capacity Rating at the Point of Delivery. Seller shall have no claims hereunder against Idaho Power, acting in its merchant function capacity, with respect to any requirements imposed by or damages caused by (or allegedly caused by) acts or omissions of the Transmission Provider or Interconnection Provider, in connection with the Generation Interconnection Agreement or otherwise.

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7.4 Coordination with System. Seller shall be responsible for the coordination and synchronization of the Facility and the Interconnection Facilities with the System.

7.5 Outages.

7.5.1 Planned Outages. Except as otherwise provided herein, Seller shall not schedule a Planned Outage during daylight hours (sun up to sunset) during any portion of the months of November, December, January, February, June, July, and August, except to the extent a Planned Outage is reasonably required to enable a vendor to satisfy a guarantee requirement. Seller shall provide Idaho Power with an annual forecast of Planned Outages for each Contract Year at least one (1) month, but no more than three (3) months, before the first day of that Contract Year, and shall promptly update such schedule, or otherwise change it, only to the extent that Seller is reasonably required to change it in order to comply with Prudent Electrical Practices. Seller shall not schedule any maintenance of Interconnection Facilities during such months, without the prior written approval of Idaho Power, which approval shall not be unreasonably withheld or delayed.

7.5.2 Maintenance Outages. If Seller reasonably determines that it is necessary to schedule a Maintenance Outage, Seller shall notify Idaho Power in writing of the proposed Maintenance Outage as soon as practicable but in any event at least five (5) days before the outage begins. Upon such notice, the Parties shall plan the Maintenance Outage to mutually accommodate the reasonable requirements of Seller and the service obligations of Idaho Power; provided, however, that Seller shall take all reasonable measures consistent with Prudent Electrical Practices to not schedule any Maintenance Outage during the daylight hours of the following periods: November, December, January, February, June 15 through June 30, July, August, and September 1 through September 15. Notice of a proposed Maintenance Outage shall include the expected start date and time of the outage, the amount of generation capacity of the Facility that will not be available, and the expected completion date and time of the outage. Seller shall give Idaho Power notice of the Maintenance Outage as soon as practicable after Seller determines that the Maintenance Outage is necessary. Idaho Power shall promptly respond to such notice and may request reasonable modifications in the schedule for the outage. Seller shall use all reasonable efforts to comply with any request to modify the schedule for a Maintenance Outage provided that such change has no substantial impact on Seller. Seller shall notify Idaho Power of any subsequent changes in generation capacity available to Idaho Power as a result of such Maintenance Outage or any changes in the Maintenance Outage completion date and time. As soon as practicable, any notifications given orally shall be confirmed in writing. Seller shall take all reasonable measures consistent with Prudent Electrical Practices to minimize the frequency and duration of Maintenance Outages.

7.5.3 Forced Outages. Seller shall promptly provide to Idaho Power an oral report, via telephone to a number specified by Idaho Power (or other method approved by Idaho Power), of any Forced Outage resulting in more than ten percent (10%) of

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the Storage Capacity of the Facility being unavailable. This report shall include the amount of the generation capacity of the Facility that will not be available because of the Forced Outage and the expected return date of such generation capacity. Seller shall promptly update the report as necessary to advise Idaho Power of changed circumstances. As soon as practicable, the oral report shall be confirmed in writing by notice to Idaho Power. Seller shall take all reasonable measures consistent with Prudent Electrical Practices to avoid Forced Outages and to minimize their duration.

7.5.4 Notice of Deratings and Outages. Without limiting the foregoing, Seller will inform Idaho Power, via telephone to a number specified by Idaho Power (or other method approved by Idaho Power), of any major limitations, restrictions, deratings or outages known to Seller affecting the Facility for the following day and will promptly update Seller's notice to the extent of any material changes in this information, with "major" defined as affecting more than five percent (5%) of the Storage Capacity.

7.6 Scheduling.

7.6.1 Cooperation and Standards. With respect to any and all scheduling requirements hereunder, (a) Seller shall cooperate with Idaho Power with respect to scheduling Discharging Energy and Ancillary Services, and (b) each Party shall designate authorized representatives to communicate with regard to scheduling and related matters arising hereunder. Each Party shall comply with the applicable variable resource standards and criteria of any applicable Electric System Authority. Idaho Power shall have all right, title, and interest in and to any gross revenues received by Seller for any Ancillary Services provided by the Facility. Seller shall operate the Facility in accordance with the Storage Operating Restrictions.

7.6.2 Schedule Coordination. If, as a result hereof, Idaho Power is deemed by an RTO to be financially responsible for Seller's performance under the Generation Interconnection Agreement, due to Seller's lack of standing as a "scheduling coordinator" or other RTO recognized designation, qualification or otherwise, then Seller shall acquire such RTO recognized standing (or shall contract with a third party who has such RTO recognized standing) such that Idaho Power is no longer responsible for Seller's performance under the Generation Interconnection Agreement or RTO requirement.

7.7 Charging Energy Management.

7.7.1 Upon receipt of a valid Charging Notice, but subject to Section 7.7.2, Seller shall take any and all action necessary to accept the Charging Energy from the Idaho Power generating facilities to the Facility in order to deliver the Storage Product in accordance with the terms and conditions of this Agreement. Idaho Power shall have the right to direct Seller to charge the Facility seven (7) days per week and twenty-four (24) hours per day (including holidays), by providing Charging Notices to Seller electronically; provided, that Idaho Power's right to issue

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Charging Notices is subject to the requirements and limitations set forth in this Agreement, including the Storage Operating Restrictions set forth in Exhibit 4. Each Charging Notice issued in accordance with this Agreement will be effective unless and until Idaho Power modifies such Charging Notice by providing Seller with an updated Charging Notice. Seller shall not charge the Facility other than pursuant to a valid Charging Notice or in connection with a Guaranteed Storage Capacity Test. If Seller (a) charges the Facility to a Stored Energy Level greater than the Stored Energy Level provided for in the Charging Notice or (b) charges the Facility in violation of the first sentence of this Section 7.7.1, then (x) Seller shall be responsible for all Energy costs associated with such charging of the Facility, (y) Idaho Power shall not be required to pay for the charging of such Energy (i.e., Charging Energy), and (z) Idaho Power shall be entitled to discharge such Energy and entitled to all of the benefits (including Storage Product) associated with such discharge. Idaho Power shall have the right to direct Seller to discharge the Facility seven (7) days per week and twenty-four (24) hours per day (including holidays), by providing Discharging Notices to Seller electronically, and subject to the requirements and limitations set forth in this Agreement, including the Storage Operating Restrictions. Each Discharging Notice issued in accordance with this Agreement will be effective unless and until Idaho Power modifies such Discharging Notice by providing Seller with an updated Discharging Notice.

7.7.2 Notwithstanding anything in this Agreement to the contrary, any curtailment order issued by the RTO or any other Governmental Authority, as applicable, regarding the reduced or increased generation of the Facility, whether in response to an Emergency or otherwise, shall have priority over any Charging Notices and Discharging Notices for the applicable period, and Seller shall have no liability for violation of this Section 7.1 or any Charging Notice or Discharging Notice if and to the extent such violation is caused by Seller's compliance with any such notice of curtailment.

7.8 Performance Tests; Guarantees.

7.8.1 Guaranteed Storage Capacity. Seller shall perform the Storage Capacity Test as provided in Exhibit 23, provided in the event that Seller fails to demonstrate compliance with the Guaranteed Storage Capacity. Seller shall pay as liquidated damages for such failure and not as a penalty, the Storage Capacity Damages in the event that Seller fails to demonstrate compliance with the Guaranteed Storage Capacity.

7.8.2 Guaranteed Storage Availability. Seller shall perform the Storage Availability Test as provided in Exhibit 23; provided, if Seller does not achieve the Guaranteed Storage Availability for the previous Contract Year as determined in accordance with the terms of Exhibit 23, then, Seller shall pay as liquidated damages for such failure and not as a penalty, the Storage Availability Damages for each Day during the previous Contract Year in which Seller fails to demonstrate compliance with the Guaranteed Storage Availability.

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7.8.3 Guaranteed Roundtrip Efficiency. Seller shall perform the Roundtrip Efficiency Test as provided in Exhibit 23.

7.8.4 Ramp Rate Test. Seller shall perform the Ramp Rate Test as provided in Exhibit 23.

7.8.5 Response Time Test. Seller shall perform the Response Time Test as provided in Exhibit 23.

7.8.6 Auxiliary Load Test. Seller shall perform the Auxiliary Load Test as provided in Exhibit 23.

7.8.7 Power Factor Test. Seller shall perform the Power Factor Test as provided in Exhibit 23.

7.8.8 Noise Test. Seller shall perform the Noise Test as provided in Exhibit 23.

7.9 Electronic Communications.

7.9.1 GOLC. Beginning on the Commercial Operation Date, Idaho Power will dispatch Facility through its GOLC system installed by Seller. The GOLC Set-Point is calculated by the Transmission Provider and communicated electronically through the SCADA system. Seller shall ensure that, throughout the Term, the SCADA signal is capable of functioning on all GOLC Set-Points within the margin of error specified in the Facility control system manufacturer's set point margin of error. Unless otherwise directed by Idaho Power, Seller shall ensure that the Facility GOLC is in "Remote" set-point control during normal operations.

7.9.2 Telemetering. Seller shall during the Term provide telemetering equipment and facilities capable of transmitting the following information concerning the Facility pursuant to the Generation Interconnection Agreement and to Idaho Power on a real-time basis, and will operate such equipment when requested by Idaho Power to indicate instantaneous MW output at the Point of Delivery.

Commencing on the Commercial Operation Date, Seller shall also transmit or cause to be transmitted to or make accessible to Idaho Power any other data from the Facility that Seller receives on a real time basis, including meteorological data, Charging Energy, Discharging Energy, Storage Capacity, Storage Availability and any Ancillary Services provided by the Facility. Such real time data shall be provided to or be made accessible to Idaho Power on the same basis on which Seller receives the data (e.g., if Seller receives the data in four second intervals, Idaho Power shall also receive the data in four second intervals). Seller must provide Idaho Power access to Seller's web-based performance monitoring system.

7.9.3 Transmission Provider Consent. Seller shall execute a consent, in the form required by Transmission Provider, to provide that Idaho Power can read the meter and

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receive any and all data from the Transmission Provider relating to the Charging Energy or Storage Product, or other matters relating to the Facility without the need for further consent from Seller.

7.9.4 Dedicated Communication Circuit. Seller shall install a dedicated direct communication circuit (which may be by common carrier telephone) between Idaho Power and the control center in the Facility's control room or such other communication equipment as the Parties may agree.

7.10 Reports and Records.

7.10.1 Monthly Reports. Commencing on the Commercial Operation Date, within thirty (30) days after the end of each calendar month during the Term (each, a "Reporting Month"), Seller shall provide to Idaho Power a report in electronic format, which report shall include (a) summaries of the Facility's Charging Energy, Discharge Energy, and Ancillary Services provided, including information from the Facility's computer monitoring system; (b) summaries of any other significant events related to the construction or operation of the Facility for the Reporting Month; and (c) any supporting information that Idaho Power may from time to time reasonably request.

7.10.2 Electronic Fault Log. Seller shall maintain an electronic fault log of operations of the Facility during each hour of the Term commencing on the Commercial Operation Date. Seller shall provide Idaho Power with a copy of the electronic fault log within thirty (30) days after the end of the calendar month to which the fault log applies.

7.10.3 Other Information to be Provided to Idaho Power. Seller shall provide to Idaho Power the following information concerning the Facility:

7.10.3.1 Upon the request of Idaho Power, the manufacturers' guidelines and recommendations for maintenance of the Facility equipment;

7.10.3.2 A report summarizing the results of maintenance performed during each Maintenance Outage, Planned Outage, and any Forced Outage, and upon request of Idaho Power any of the technical data obtained in connection with such maintenance;

7.10.3.3 Before Final Completion, a monthly progress report stating the percentage completion of the Facility and a brief summary of construction activity during the prior month;

7.10.3.4 Before Final Completion, a monthly report containing a brief summary of construction activity contemplated for the next calendar month;

7.10.3.5 From and after the Commercial Operation Date, a monthly report detailing the availability of the Facility; and

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7.10.3.6 At any time from the Effective Date, one year's advance notice of the termination or expiration of any material agreement, including Leases, pursuant to which the Facility or any material equipment relating thereto is upon the Premises; provided that the foregoing does not authorize any early termination of any land lease. In the event Seller has less than one year's advance notice of such termination or expiration, Seller shall provide the notice contemplated by this Section to Idaho Power within fifteen (15) Business Days of Seller obtaining knowledge of the termination or expiration.

7.10.4 Information to Governmental Authorities. Seller shall, promptly upon written request from Idaho Power, provide Idaho Power with all data collected by Seller related to the construction, operation or maintenance of the Facility reasonably required by Idaho Power or an Affiliate thereof for reports to, and information requests from, any Governmental Authority or Electric System Authority. Along with this information, Seller shall provide to Idaho Power copies of all submittals to Governmental Authorities or Electric System Authorities directed by Idaho Power and related to the operation of the Facility with a certificate that the contents of the submittals are true and accurate to the best of Seller's knowledge. Seller shall use best efforts to provide this information to Idaho Power with sufficient advance written notice to enable Idaho Power to review such information and meet any submission deadlines imposed by the requesting organization or entity.

7.10.5 Data Request. Seller shall, promptly upon written request from Idaho Power, provide Idaho Power with data collected by Seller related to the construction, operation or maintenance of the Facility reasonably required for information requests from any Governmental Authorities, state or federal agency intervener or any other party achieving intervenor status in any Idaho Power rate proceeding or other proceeding before any Governmental Authority. Seller shall use best efforts to provide this information to Idaho Power sufficiently in advance to enable Idaho Power to review it and meet any submission deadlines. Idaho Power shall reimburse Seller for all of Seller's reasonable actual costs and expenses in excess of $10,000 per year, if any, incurred in connection with Idaho Power's requests for information under this Section 7.10.5.

7.10.6 Documents to Governmental Authorities. After sending or filing any statement, application, and report or any document with any Governmental Authority or Electric System Authority relating to operation and maintenance of the Facility, Seller shall, within five (5) Business Days of such submission or filing, provide to Idaho Power a copy of the same.

7.10.7 Environmental Information. Seller shall, promptly upon written request from Idaho Power, provide Idaho Power with all data reasonably requested by Idaho Power relating to environmental information under the Required Facility Documents. Seller shall further provide Idaho Power with information relating to

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environmental impact mitigation measures it is taking in connection with the Facility's construction or operation that are required by any Governmental Authority. As soon as it is known to Seller, Seller shall disclose to Idaho Power, the extent of any material violation of any environmental laws or regulations arising out of the construction, operation, or maintenance of the Facility, or the presence of Environmental Contamination at the Facility or on the Premises, alleged to exist by any Governmental Authority having jurisdiction over the Premises, or the present existence of, or the occurrence during Seller's occupancy of the Premises of, any enforcement, legal, or regulatory action or proceeding relating to such alleged violation or alleged presence of Environmental Contamination presently occurring or having occurred during the period of time that Seller has occupied the Premises.

7.10.8 Operational Reports. Seller shall provide Idaho Power monthly operational reports in a form and substance reasonably acceptable to Idaho Power, and Seller shall, promptly upon written request from Idaho Power, provide Idaho Power with all operational data requested by Idaho Power with respect to the performance of the Facility and delivery of the Storage Product.

7.10.9 Notice of Material Adverse Events. Seller shall promptly notify Idaho Power of receipt of written notice or actual knowledge by Seller or its Affiliates of the occurrence of any event of default under any material agreement to which Seller is a party and of any other development, financial or otherwise, which would have a material adverse effect on Seller, the Facility or Seller's ability to develop, construct, operate, maintain or own the Facility as provided herein. Seller shall promptly disclose to Buyer (but in no case later than two (2) Business Days after Seller obtains actual knowledge) any violation of any Applicable Laws arising out of the construction or operation of the Facility by Seller, its Affiliates or any contractor of any of them, including any Qualified Operator, or the existence of any past or present enforcement, legal, or regulatory action or proceeding relating to the Facility, if such violation, action or proceeding adversely affects or could reasonably be expected to adversely affect the construction or operation of the Facility or the commercial reputation of Buyer or its Affiliates.

7.10.10 Notice of Litigation. Following its receipt of written notice or actual knowledge of the commencement of any action, suit, or proceeding before any court or Governmental Authority against Seller or its members with respect to this Agreement or the transactions contemplated hereunder, Seller shall, within ten (10) days of such notice or knowledge, give written notice to Idaho Power of the same. Following its receipt of written notice or actual knowledge of the commencement of any action, suit or proceeding before any court or Governmental Authority against Seller, its members or any Affiliate, the effect of which would materially and adversely affect Seller's performance of its obligations hereunder, Seller shall, within ten (10) days of such notice or knowledge, give notice to Idaho Power of the same.

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7.10.11 Additional Information. Seller shall provide to Idaho Power such other information respecting the condition or operations of Seller, as such pertains to Seller's performance of its obligations hereunder, or the Facility as Idaho Power may, from time to time, reasonably request.

7.10.12 Confidential Treatment. The monthly reports and other information provided to Idaho Power under this Section 7.10 shall be treated as Confidential Business Information if such treatment is requested in writing by Seller at the time the information is provided to Idaho Power, subject to Idaho Power's rights to disclose such information pursuant to Sections 7.10.4, 7.10.5, 7.10.7, 11.5, 25.2 and 25.3, and pursuant to any applicable Requirements of Law. Seller shall have the right to seek confidential treatment of any such information from the Governmental Authority entitled to receive such information.

7.11 Financial and Accounting Information. If Idaho Power or one of its Affiliates determines that, under (i) the Accounting Standards Codification (ASC) 810, Consolidation of Variable Interest Entities, and (ii) Requirements of Law that it may hold a variable interest in Seller, but it lacks the information necessary to make a definitive conclusion, Seller hereby agrees to provide, upon Idaho Power's written request, sufficient financial and ownership information so that Idaho Power or its Affiliate may confirm whether a variable interest does exist under ASC 810 and Requirements of Law. If Idaho Power or its Affiliate determines that, under ASC 810, it holds a variable interest in Seller, Seller hereby agrees to provide, upon Idaho Power's written request, sufficient financial and other information to Idaho Power or its Affiliate so that Idaho Power may properly consolidate the entity in which it holds the variable interest or present the disclosures required by ASC 810 and Requirements of Law. Idaho Power shall reimburse Seller for Seller's reasonable costs and expenses, if any, incurred in connection with Idaho Power's requests for information under this Section 7.11.

7.12 Access Rights. Upon reasonable prior notice and subject to the prudent safety requirements of Seller, and Requirements of Law relating to workplace health and safety, Seller shall provide Idaho Power and its authorized agents, employees and inspectors ("Idaho Power Representatives") with reasonable access to the Facility: (a) for the purpose of reading or testing metering equipment, (b) as necessary to witness any acceptance tests, (c) to provide tours of the Facility to customers and other guests of Idaho Power (not more than twelve (12) times per year), (d) for purposes of implementing Sections 2.7 or 10.5, and (e) for other reasonable purposes at the reasonable request of Idaho Power. Idaho Power shall release Seller from any and all Liabilities resulting from actions or omissions by any of the Idaho Power Representatives in connection with their access to the Facility, except to the extent that such Liabilities are caused by the intentional or negligent act or omission of Seller or its agents or Affiliates.

7.13 Facility Images. Idaho Power shall be free to use any and all images from or of the Facility for promotional purposes, subject to Seller's consent (not to be unreasonably withheld or delayed, and which consent may consider Requirements of Law relating to Premises security, obligations to outside vendors (including any confidentiality obligations), and the corporate policies of Seller's Affiliates). Upon Idaho Power's request and at Idaho Power's

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expense, Seller shall install imaging equipment at the Facility as Idaho Power may request, including video and or web-based imaging equipment subject to the prudent safety requirements of Seller, and Requirements of Law relating to workplace health and safety. Idaho Power shall retain full discretion on how such images are presented including associating images of the Facility with a Idaho Power-designated corporate logo.

SECTION 8
RIGHT OF FIRST OFFER AND OWNERSHIP OR PURCHASE OPTION

8.1 Buyer's Affiliates. For purposes of this Section 8, any reference to "Buyer" or "Idaho Power" shall also mean Buyer's or Idaho Power's "Affiliate" as that term is defined in this Agreement.

8.2 Right of First Offer. If this Agreement is terminated for any reason prior to the Commercial Operation Date, then during the Restricted Period, neither Seller nor any of Seller's Affiliates may enter into any agreement to sell, or hedge the quantity of, Storage Product to any party other than Buyer, without first offering the same material price and terms of such agreement to Buyer by written notice ("Offer Notice"). "Restricted Period" means a period that ends eighteen (18) months after the effective date of a termination. If Buyer rejects or fails to respond to the Offer Notice within thirty (30) Business Days, or the Parties negotiate to enter into an agreement but are unable to execute a definitive agreement within sixty (60) days after Buyer accepts such offer from Seller, then Seller shall have the right to enter into an agreement with a third party on terms and conditions in the aggregate not more favorable than the terms and conditions contained in the Offer Notice. If either Seller or any of its Affiliates wish to enter into an agreement with a third party on terms in the aggregate more favorable to such third party than those offered to Buyer in the Offer Notice, or if Seller or such Affiliate fails to close the transaction (which gave rise to Seller's obligation to provide an Offer Notice) within nine (9) months following the issuance of the Offer Notice, then any subsequent agreement during the Restricted Period shall again be subject to this Section 8.2. This Section 8.2 shall be specifically enforceable by Buyer without bond and without the need to prove irreparable harm. Neither Seller nor Seller's Affiliates may sell or transfer the Facility, or any part thereof, or land rights or interests in the Site (including the Interconnection Agreement) during the Restricted Period, except by a transfer permitted by Section 8.2. Upon termination of this Agreement prior to the Commercial Operation Date, Seller shall deliver a notice of Buyer's rights in respect of the Site, in an executed, recordable form reasonably acceptable to Buyer, that Buyer may record in the real estate records giving notice of Buyer's rights under this Section 8.2. Seller enters into this Section 8.2 as authorized agent for all of its present and future Affiliates. This Section 8.2 shall apply until the earlier of the expiration of the Restricted Period and the consummation of the first bona fide transfer in accordance with its terms.

8.3 Termination of Duty to Buy. If this Agreement is terminated because of a default by Seller, neither Seller, nor any successor to Seller with respect to the ownership of the Facility (for whom Seller acts herein as agent), may thereafter require or seek to require Buyer to purchase Output from the Facility under Public Utility Regulatory policy Act on account of its status as a Qualifying Facility, or any other Requirements of Law, for any periods that would have been within the Term had this Agreement remained in effect. Seller, on

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behalf of itself and on behalf of any other entity on whose behalf it may act, hereby waives its rights to require Buyer to do so.

8.4 Right of First Offer on Ownership.

8.4.1 At any time subsequent to the Effective Date of this Agreement, except in accordance with this Section 8.4.1, Seller: (a) shall not sell, transfer or offer to sell or transfer, the Facility; and (b) shall cause its immediately upstream owner(s) (together with Seller, each a "ROFO Seller") not to sell, transfer or offer to sell or transfer, any ownership interest in Seller (the Facility and ownership interests in Seller, as applicable, each the "Offered Interests") other than to an Affiliate in accordance with the provisions of Section 22.2 (each a "Restricted Transaction"). If a ROFO Seller intends to enter into a Restricted Transaction, Seller shall provide Buyer with written notice of same (a "Seller ROFO Notice"), and Buyer shall have a right of first offer with respect to the purchase of such Offered Interests. Within thirty (30) days after receipt of the Seller ROFO Notice, Buyer shall notify Seller in writing of its decision whether or not to negotiate with ROFO Seller for the purchase of the Offered Interests (the "Buyer ROFO Notice"). If Buyer elects to negotiate with ROFO Seller for the purchase of the Offered Interests, Seller shall cause ROFO Seller to negotiate in good faith and exclusively with Buyer, for a period of not less than ninety (90) days following ROFO Seller's receipt of the Buyer ROFO Notice. ("ROFO Period").

8.4.2 In the event that Buyer does not elect to negotiate with ROFO Seller for the purchase of the Offered Interests pursuant to Section 8.4.1, ROFO Seller shall be free to sell, transfer or offer or negotiate to sell or transfer the Offered Interests in ROFO Seller's sole discretion. In the event that Buyer elects to negotiate with ROFO Seller for the purchase of the Offered Interests pursuant to Section 8.4.1, and if definitive transaction documents between ROFO Seller and Buyer or its designee have not been executed with respect to the Offered Interests within the ROFO Period, ROFO Seller may negotiate a Restricted Transaction with any other Person, subject, in all cases, to the terms and conditions of this Agreement, including Section 8.4.1 and the provisions of Section 22. In no event may ROFO Seller enter into a Restricted Transaction with any other Person on economic terms (such as purchase price, payment terms and overall revenue streams associated with such transaction) or other material terms less favorable to ROFO Seller than such economic terms, if any, as were negotiated by Buyer and ROFO Seller. As used in this Section 8.4.2, "other material terms" means any terms identified by the Parties acting in good faith within five (5) Business Days following expiration of the ROFO Period that the Parties have not agreed to during their negotiation.

8.4.3 If ROFO Seller and such other Person do not agree upon the terms, conditions and pricing for the Offered Interests within one hundred eighty (180) days following the expiration of the ROFO Period, ROFO Seller and any Offered Interests shall again be subject to this Section 8.2 with respect to any Restricted Transaction.

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8.5 Negotiation of Facility Purchase. Promptly following the Effective Date, the Parties agree to commence negotiation in good faith for Buyer's purchase of the Facility (or, alternatively, all or a portion of the equity interests of the entity or entities owning the Facility, including potential limited partnership interests or limited liability company membership interests), under terms and conditions and pursuant to a purchase and sale agreement that are commercially reasonable for a facility of the nature and size of the Facility and at a price mutually agreed upon by the Parties, taking into account the income tax credits associated with the Facility. The Parties will have a maximum of one hundred and twenty (120) days following the Effective Date (failing the completion of which by such date, this sentence Section shall expire by its terms) to negotiate such purchase under a timeline that provides for Buyer's acquisition of such Facility or equity interests no later than immediately prior to the Commercial Operation Date of the Facility, unless the Parties mutually agree to a purchase, or a deadline for negotiation, for an earlier or later date. Buyer shall not be obligated to purchase the Facility or equity interests unless it shall have reached mutual agreement with the Seller on the purchase price for the Facility or equity interests.

8.6 Efforts Required to Transfer Facility and Offered Interests. If Buyer exercises any right to purchase or agrees to purchase the Facility (or Offered Interests) pursuant to any of the means specified in this Section 8, then such purchase shall occur pursuant to a form of purchase and sale agreement prepared by Buyer which shall contain customary representations, warranties and covenants and otherwise be in form reasonably acceptable to Buyer. It shall be a condition of any such purchase that Buyer obtains all necessary Governmental Approvals, and notwithstanding any language to the contrary in this Agreement, Buyer shall be given sufficient time to obtain such approvals in accordance with applicable statutes and regulations. Pursuant to the purchase and sale agreement, Seller will take all actions necessary to transfer by deed, bill of sale, or both, the Facility or Offered Interests to Buyer, as well as all other improvements placed on the Premises by Seller that are required for the continued and uninterrupted use, maintenance and operation of the Facility, free and clear from any lien or monetary encumbrance created by or on behalf of Seller or its Affiliates. In addition, Seller will assign to Buyer all transferrable Governmental Approvals applicable to the Facility and Required Facility Documents, and all transferrable warranties for the Facility. Seller shall cooperate with Buyer to assign and enforce any and all warranties that apply to the Facility or any of its component parts, which obligation shall survive the termination of this Agreement.

8.7 Due Diligence; Cooperation; Governmental Approvals; Notice of Rights. Seller will provide, in a timely manner, information regarding the Facility and Offered Interests which is reasonably requested by Buyer to allow Buyer to perform due diligence for the purchase of the Facility and Offered Interests pursuant to this Section 8. Seller shall further provide commercially reasonable cooperation and assistance to Buyer, without further compensation, throughout Buyer's efforts to properly account for and obtain any necessary Governmental Approvals with respect to the purchase of the Facility and Offered Interests pursuant to this Section 8. Notwithstanding anything in this Agreement or any definitive transaction documentation, Buyer shall not be obligated to proceed with the purchase of the Facility or any Offered Interests pursuant to this Section 8 if Buyer does not receive all necessary Governmental Approvals in connection with such transaction. Seller shall put

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any Person with which it enters into discussions or negotiations regarding a Restricted Transaction on notice of the rights of Buyer set forth in this Section 8. Buyer shall be permitted to file a notice of the rights contained in this Section 8 with respect to the Premises.

8.8 Termination of Agreement. Upon the acquisition of the Facility or Offered Interests by Buyer pursuant to this Section 8, this Agreement shall terminate and neither Party shall have any obligation to the other under this Agreement, except with respect to the terms and provisions hereof that expressly survive the termination of this Agreement.

SECTION 9
SECURITY AND CREDIT SUPPORT

9.1 Project Development Security. Seller shall provide within five (5) Business Days from receipt of a written request from Idaho Power all reasonable financial records necessary for Idaho Power to confirm Seller satisfies the Credit Requirements.

9.1.1 Form and Amount of Project Development Security. On or before thirty (30) days of the date of the Effective Date, Seller shall post and maintain in favor of Idaho Power (a) a guaranty from a party that satisfies the Credit Requirements, in substantially the form attached hereto as Exhibit 8, or (b) a Letter of Credit in favor of Idaho Power, in a form acceptable to Idaho Power in its reasonable discretion, equal in each case to $40,000 per MWh of Guaranteed Storage Capacity (the "Project Development Security"). Seller and any person or entity providing a guaranty shall provide within five (5) Business Days from receipt of a written request from Idaho Power all reasonable financial records necessary for Idaho Power to confirm the guarantor satisfies the Credit Requirements.

9.1.2 Use of Project Development Security to Pay Delay Damages. If the Commercial Operation Date occurs after the Scheduled Commercial Operation Date and Seller has failed to pay any Delay Damages when due under Section 4.5, Idaho Power shall be entitled to and shall draw upon the Project Development Security an amount equal to the Delay Damages. Idaho Power shall also be entitled to draw upon the Project Development Security for other damages if this Agreement is terminated under Section 12 because of Seller's default.

9.1.3 Termination of Project Development Security. Seller shall no longer be required to maintain the Project Development Security after the Commercial Operation Date, if at such time no damages are owed to Idaho Power under this Agreement. However, as of the Commercial Operation Date, Seller may elect to apply the Project Development Security toward the Default Security required by Section 9.2, including by the automatic continuation (as opposed to the replacement) thereof.

9.2 Default Security.

9.2.1 Duty to Post Default Security. On the date specified in Section 4.2.1, Seller shall post and maintain in favor of Idaho Power (a) a guaranty from an entity that

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satisfies the Credit Requirements, in substantially the form attached hereto as Exhibit 8, or (b) a Letter of Credit, each in the amount specified in Section 9.2.2 (the "Default Security"), as provided in this Section 9.2. Seller and any person or entity providing a guaranty shall provide within five (5) Business Days from receipt of a written request from Idaho Power all reasonable financial records necessary for Idaho Power to confirm the guarantor satisfies the Credit Requirements.

9.2.2 Amount of Default Security. The amount of the Default Security required by Section 9.2.1 shall be $20,0000 per MWh of Guaranteed Storage Capacity and will be held until this Agreement expires.

9.2.3 Use of Default Security to Pay Deficit Damages. If the Seller has failed to pay any Storage Capacity Damages or Storage Availability Damages when due under Section 4.5, Idaho Power shall be entitled to and shall draw upon the Default Security an amount equal to the amount of such damages owed until such time as the Default Security is exhausted. Idaho Power shall also be entitled to draw upon the Default Security for other damages if this Agreement is terminated under Section 12 because of Seller's default.

9.3 Senior Lenders. If Seller collaterally assigns this Agreement to Seller's Lenders in a manner permitted under this Agreement, Buyer, at Seller's sole cost and expense, if requested shall enter into a Lender Consent with Seller's Lenders substantially in the form of Exhibit 21. If Seller enters into a Tax Equity Financing, Buyer, at Seller's sole cost and expense, if requested shall provide an Estoppel Certificate to Seller's Tax Equity Investors substantially in the form of Exhibit 22. Seller will within five (5) Business Days of written demand reimburse Buyer all Buyer's costs and expenses, including legal fees and costs of due diligence, incurred in connection with any action or exercise of rights or remedies by any of Seller's Lenders against Seller, including any proceeding or foreclosure against Seller or this Agreement.

9.4 Change of Control. Seller may not suffer any Change of Control, whether voluntary or by operation of law, without Buyer's prior written consent, granted or withheld in Buyer's reasonable discretion. Seller may not suffer a Change of Control or any other change of ownership or control, whether direct or indirect, voluntary or by operation of law, such that Seller becomes a Sanctioned Person. Seller shall give Buyer notice of any Change of Control within ten (10) Business Days following the effectiveness thereof

9.5 Security is Not a Limit on Seller's Liability. The security contemplated by this Section 9 (a) constitutes security for, but is not a limitation of, Seller's obligations hereunder and (b) shall not be Idaho Power's exclusive remedy for Seller's failure to perform in accordance with this Agreement. Seller shall maintain security as required by Sections 9.1 and 9.2, as applicable per this Agreement. To the extent that Idaho Power draws on any security, Seller shall, within five (5) Business Days following such draw, replenish or reinstate the security to the full amount then required under this Section 9. If at any time the Seller or Seller's credit support provider(s) fails to meet the Credit Requirements, then Seller shall provide replacement security meeting the requirements set forth in Section 9 within ten (10)

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Business Days after the earlier of (x) Seller's receipt of notice from any source that Seller or the credit support provider(s), as applicable, no longer meets the Credit Requirements or (y) Seller's receipt of written notice from Idaho Power requesting the posting of alternate security.

SECTION 10
METERING, METERING COMMUNICATIONS AND SCADA TELEMETRY

10.1 Metering. Idaho Power shall, provide, install, and maintain metering equipment needed for metering the electrical energy storage and discharge from the Facility. The metering equipment will be capable of measuring, recording, retrieving and reporting the Facility's hourly gross electrical energy storage, production, station use, maximum energy deliveries (MW) and any other energy measurements at the Point of Delivery that Idaho Power needs to administer this Agreement and integrate this Facility's energy production into the Idaho Power electrical system. Specific equipment, installation details and requirements for this metering equipment will be established in the GIA process and documented in the GIA. Seller shall be responsible for all initial and ongoing costs of this equipment as specified in Schedule 72 of the Tariff and the GIA. Seller shall cause the Facility to implement all necessary generation information communications in WREGIS, and report generation information to WREGIS pursuant to a WREGIS-approved meter that is dedicated to the Facility and only the Facility.

10.2 Metering Communications. Seller shall, at the Seller's sole initial and ongoing expense, arrange for, provide, install, and maintain dedicated metering communications equipment capable of transmitting the metering data specified in Section10.1 to Idaho Power in a frequency, manner and form acceptable to Idaho Power. Seller shall grant Idaho Power sole control and use of this dedicated metering communications equipment. Specific details and requirements for this metering communications equipment will be established in the GIA process and documented in the GIA.

10.3 Supervisory Control and Data Acquisition (SCADA) Telemetry. If the Facility's Nameplate Capacity exceeds 3 MW, in addition to the requirements of Section 10.1 and 10.2, Idaho Power may require telemetry equipment and telecommunications which will be capable of providing Idaho Power with continuous instantaneous SCADA telemetry of the Seller's Charging Energy and Discharging Energy in a form acceptable to Idaho Power. Seller shall grant Idaho Power sole control and use of this dedicated SCADA and telecommunications equipment. Specific details and requirements for this SCADA Telemetry and telecommunications equipment will be established in the GIA process and documented in the GIA. Seller shall be responsible for all initial and ongoing costs of this equipment as specified in Schedule 72 of the Tariff and the GIA.

10.4 Metering Costs. To the extent not otherwise provided in the Generation Interconnection Agreement, Seller shall bear all costs (including Idaho Power's costs) relating to all metering equipment installed to accommodate the Facility.

10.5 Losses. If the Idaho Power Metering equipment is capable of measuring the exact energy deliveries by the Seller to the Idaho Power electrical system at the Point of Delivery, no

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Losses will be calculated for this Facility. If the Idaho Power Metering Equipment is unable to measure the exact electric energy deliveries by the Seller to the Idaho Power electrical system at the Point of Delivery, a Losses calculation will be established to measure the energy losses (MWh) between the Seller's Facility and the Idaho Power Point of Delivery. This loss calculation will be initially set at two percent (2%) of the MWh energy discharge recorded on the Facility generation metering equipment. At such time as Seller provides Idaho Power with the electrical equipment specifications (transformer loss specifications, conductor sizes, etc.) of all of the electrical equipment between the Facility and the Idaho Power electrical system, Idaho Power will configure a revised loss calculation formula to be agreed to by both parties and used to calculate the MWh Losses for the remaining term of the Agreement. If at any time during the term of this Agreement, Idaho Power determines that the loss calculation does not correctly reflect the actual MWh losses attributed to the electrical equipment between the Facility and the Idaho Power electrical system, Idaho Power may adjust the calculation and retroactively adjust the previous month's MWh loss calculations.

SECTION 11
BILLINGS, COMPUTATIONS AND PAYMENTS

11.1 Monthly Invoices. On or before the tenth (10^{th}) day following the end of each calendar month, Seller shall deliver to Idaho Power a proper invoice showing Seller's computation of Discharging Energy delivered to the Point of Delivery during such month in the form of Exhibit 1. When calculating the invoice, Seller shall provide computations showing the portion of Discharging Energy that was delivered during On-Peak Hours and the portion of Discharging Energy that was delivered during Off-Peak Hours. If such invoice is delivered by Seller to Idaho Power, then Idaho Power shall make payment to Seller within thirty (30) days of receipt of an accurate and undisputed invoice; provided, however, that IPC's payment is not due unless Seller is in compliance with all provisions of this Agreement.

11.2 Offsets. Either Party may offset any payment due hereunder against amounts owed by the other Party pursuant to the terms of this Agreement. Either Party's exercise of recoupment and set off rights shall not limit the other remedies available to such Party hereunder.

11.3 Interest on Late Payments. Any amounts that are not paid when due hereunder shall bear interest at the Contract Interest Rate from the date due until paid.

11.4 Disputed Amounts. If either Party, in good faith, disputes any amount due pursuant to an invoice rendered hereunder, such Party shall notify the other Party of the specific basis for the dispute and, if the invoice shows an amount due, shall pay that portion of the statement that is undisputed, on or before the due date. Except with respect to invoices provided under Section 11.1, any such notice shall be provided within two (2) years of the date of the invoice in which the error first occurred. If any amount disputed by such Party is determined to be due the other Party, or if the Parties resolve the payment dispute, the amount due shall be paid within thirty (30) Business Days after such determination or resolution, along with interest at the Contract Interest Rate from the date due until the date paid.

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11.5 Audit Rights. Each Party, through its authorized representatives, shall have the right, at its sole expense upon reasonable written notice and during normal business hours, to examine and copy the records of the other Party to the extent reasonably necessary to verify the accuracy of any statement, charge or computation made hereunder or to verify the other Party's performance of its obligations hereunder. Upon request, each Party shall provide to the other Party statements evidencing the quantities of Discharging Energy delivered at the Point of Delivery or Ancillary Services, if any, provided under this Agreement. If any statement is found to be inaccurate, a corrected statement shall be issued and any amount due thereunder will be promptly paid and shall bear interest at the Contract Interest Rate from the date of the overpayment or underpayment to the date of receipt of the reconciling payment. Notwithstanding the foregoing, no adjustment shall be made with respect to any statement or payment hereunder unless a Party questions the accuracy of such payment or statement within two (2) years after the date of such statement or payment.

SECTION 12
DEFAULTS AND REMEDIES

12.1 Defaults. The following events are defaults (each a "default" before the passing of applicable notice and cure periods, and an "Event of Default" thereafter) hereunder:

12.1.1 Defaults by Either Party:

12.1.1.1 A Party fails to make a payment when due hereunder if the failure is not cured within ten (10) Business Days after the non-defaulting Party gives the defaulting Party a notice of the default.

12.1.1.2 A Party (i) makes a general assignment for the benefit of its creditors; (ii) files a petition or otherwise commences, authorizes or acquiesces in the commencement of a proceeding or cause of action under any bankruptcy or similar law for the protection of creditors, or has such a petition filed against it and such petition is not withdrawn or dismissed within sixty (60) days after such filing; (iii) becomes insolvent; or (iv) is unable to pay its debts when due.

12.1.1.3 A Party breaches a representation or warranty made by it herein if the breach is not cured within thirty (30) days after the non-defaulting Party gives the defaulting Party a written notice of the default; provided that if such default is not reasonably capable of being cured within the thirty (30) day cure period but is reasonably capable of being cured within a ninety (90) day cure period, the defaulting Party will have such additional time (not exceeding an additional sixty (60) days) as is reasonably necessary to cure, if, prior to the end of the thirty (30) day cure period the defaulting Party provides the non-defaulting Party a remediation plan, the non-defaulting Party approves such remediation plan, and the defaulting Party promptly commences and diligently pursues the remediation plan.

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12.1.1.4 A Party otherwise fails to perform any material obligation hereunder for which an exclusive remedy is not provided hereunder and which is not addressed in any other default described in Section 12.1, if the failure is not cured within thirty (30) days after the non-defaulting Party gives the defaulting Party written notice of the default; provided that if such default is not reasonably capable of being cured within the thirty (30) day cure period but is reasonably capable of being cured within a ninety (90) day cure period, the defaulting Party will have such additional time (not exceeding an additional sixty (60) days) as is reasonably necessary to cure, if, prior to the end of the thirty (30) day cure period the defaulting Party provides the non-defaulting Party a remediation plan, the non-defaulting Party approves such remediation plan, and the defaulting Party promptly commences and diligently pursues the remediation plan.

12.1.2 Defaults by Seller.

12.1.2.1 Seller fails to post, increase, or maintain the Project Development Security or Default Security as required under, and by the applicable dates set forth in, Section 9.1 and Section 9.2 and such failure is not cured within ten (10) Business Days after Idaho Power gives Seller notice of default.

12.1.2.2 Seller fails to (i) cause the Facility to achieve Commercial Operation on or before the Guaranteed Commercial Operation Date, or (ii) complete all items included on the Final Completion Schedule within ninety (90) days after the Commercial Operation Date.

12.1.2.3 Seller sells Storage Product from the Facility to a party other than Idaho Power in breach of Section 5.2.

12.1.2.4 Idaho Power receives notice of foreclosure of the Facility or any part thereof by a Lender, mechanic or materialman, or any other holder, of an unpaid lien or other charge or encumbrance, if the same has not been stayed, paid, or bonded around within ten (10) days of the date of the notice received by Idaho Power.

12.1.2.5 After the Commercial Operation Date, Seller fails to maintain any Required Facility Documents or Permits necessary to own, operate, or maintain the Facility and such failure continues for thirty (30) days after Seller's receipt of written notice thereof from Idaho Power; provided, however, that, upon written notice from Seller, the thirty (30) day period shall be extended by an additional sixty (60) days if (i) the failure cannot reasonably be cured within the thirty (30) day period despite diligent efforts, (ii) the default is capable of being cured within the additional sixty (60) day period, and (iii) Seller commences the cure within the original thirty (30) day period

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and is at all times thereafter diligently and continuously proceeding to cure the failure.

12.1.2.6 Seller's Abandonment of construction or operation of the Facility and such failure continues for thirty (30) days after Seller's receipt of written notice thereof from Idaho Power.

12.1.2.7 Seller fails to maintain insurance as required by the Agreement and such failure continues for fifteen (15) days after Seller's receipt of written notice thereof from Idaho Power.

12.1.2.8 Seller fails to meet the Guaranteed Storage Availability for two (2) consecutive Contract Years.

12.1.2.9 Seller accrues Storage Availability Damages in excess of the Storage Availability Damages Cap in any Contract Year.

12.1.2.10 Seller accrues Storage Capacity Damages in excess of the Storage Capacity Damages Cap.

12.1.2.11 Every three (3) years after the Commercial Operation Date, Seller will supply Idaho Power with a Certification of Ongoing Operations and Maintenance (O&M) from a Registered Professional Engineer licensed in the State of Idaho, which Certification of Ongoing O&M shall be in the form specified in Exhibit 11. Seller's failure to supply the required certificate will be an event of default. Such a default may only be cured by Seller providing the required certificate; and

12.1.2.12 During the full Term of this Agreement, Seller shall maintain compliance with all Required Facility Documents and determinations described in Exhibit 9 of this Agreement. In addition, Seller will supply Idaho Power with copies of any new or additional Required Facility Documents or determinations. At least every fifth (5^{th}) Contract Year, Seller will update the documentation described in Exhibit 9. If at any time Seller fails to maintain compliance with the Required Facility Documents and determinations described in Section 2.2.3 or to provide the documentation required by this paragraph, such failure will be a default of Seller and may only be cured by Seller submitting to Idaho Power evidence of compliance from the permitting agency.

12.1.2.13 Seller is or becomes a Sanctioned Person.

12.1.2.14 Seller breaches any obligation in Section 27.2, or any representation or warranty made by Seller in Section 27.2 is or becomes false or misleading in any material respect (provided that if the falsity or misleading nature of the representation or breach of the obligation is capable of being cured, an Event of Default will be deemed to

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occur only if the falsity or misleading nature of the representation or breach of obligation is not remedied within five (5) days after notice);

12.2 Remedies for Failure to Deliver/Receive.

12.2.1 Remedy for Seller's Failure to Deliver. Upon the occurrence and during the continuation of a default of Seller under Section 12.1.2, Seller shall pay Idaho Power within five (5) Business Days after invoice receipt, an amount equal to the sum of (a) Idaho Power's Cost to Cover multiplied by the Discharging Energy delivered to a party other than Idaho Power, (b) additional transmission charges, if any, reasonably incurred by Idaho Power in moving replacement energy to the Point of Delivery or if not there, to such points in Idaho Power's control area as are determined by Idaho Power, and (c) any additional cost or expense incurred as a result of Seller's default under Section 12.1.3, as determined by Idaho Power in a commercially reasonable manner, including the loss of value of Ancillary Services. The invoice for such amount shall include a written statement explaining in reasonable detail the calculation of such amount.

12.2.2 Remedy for Idaho Power's Failure to Purchase. If Idaho Power fails to receive or purchase all or part of the Storage Product required to be purchased pursuant hereto and such failure is not excused under the terms hereof or by Seller's failure to perform, then Seller shall first satisfy its obligations under Section 12.7 and then Idaho Power shall pay Seller, on the earlier of the date payment would otherwise be due in respect of the month in which the failure occurred or within five (5) Business Days after invoice receipt, an amount equal to Seller's Cost to Cover multiplied by the amount of Storage Product so not purchased, less amounts received by Seller pursuant to Section 12.7. The invoice for such amount shall include a written statement explaining in reasonable detail the calculation thereof.

12.2.3 Remedy for Seller's Failure to Sell/Deliver Capacity Rights. Seller shall be liable for Idaho Power's actual damages in the event Seller fails to sell or deliver all or any portion of the Capacity Rights of the Facility to Idaho Power.

12.3 Termination and Remedies. From and during the continuance of an Event of Default, the non-defaulting Party shall be entitled to all remedies available at law or in equity, and may terminate this Agreement by written notice to the other Party designating the date of termination and delivered to the defaulting Party no less than one (1) Business Day before such termination date. The notice required by this Section 12.3 may be provided in the notice of default (and does not have to be a separate notice) so long as it complies with all other terms of this Section 12.3. As a precondition to Seller's exercise of this termination right, Seller must also provide copies of such notice to the notice addresses of the then-current President and General Counsel of Idaho Power. Such copies shall be sent by registered overnight delivery service or by certified or registered mail, return receipt requested. In addition, Seller's termination notice shall state prominently therein in type font no smaller than 14-point all-capital letters that "THIS IS A TERMINATION NOTICE

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UNDER A BSA. YOU MUST CURE A DEFAULT, OR THE BSA WILL BE TERMINATED," and shall state therein any amount purported to be owed and wiring instructions. Notwithstanding any other provision of this Agreement to the contrary, Seller will not have any right to terminate this Agreement if the default that gave rise to the termination right is cured within fifteen (15) Business Days of Idaho Power's receipt of such notice. Further, from and after the date upon which Seller fails to remedy a default within the time periods provided in Section 12.1, and until Idaho Power has recovered all damages incurred on account of such default by Seller, without exercising its termination right, Idaho Power may offset its damages against any payment due Seller. Except in circumstances in which a remedy provided for in this Agreement is described as a Party's sole or exclusive remedy, upon termination, the non-defaulting Party may pursue any and all legal or equitable remedies provided by law, equity or this Agreement. The rights contemplated by this Section 12 are cumulative such that the exercise of one or more rights shall not constitute a waiver of any other rights. In the event of a termination hereof:

12.3.1 Each Party shall pay to the other all amounts due the other hereunder for all periods prior to termination, subject to offset by the non-defaulting Party against damages incurred by such Party.

12.3.2 The amounts due pursuant to Section 12.3.1 shall be calculated and paid within thirty (30) days after the billing date for such charges and shall bear interest thereon at the Contract Interest Rate from the date of termination until the date paid. The foregoing does not extend the due date of, or provide an interest holiday for any payments otherwise due hereunder.

12.3.3 Before and after the effective date of termination, the non-defaulting Party may pursue, to the extent permitted by this Agreement, any and all legal or equitable remedies provided by law, equity or this Agreement.

12.3.4 Without limiting the generality of the foregoing, the provisions of Sections 6.4, 6.5, 7.10.4, 7.10.5, 7.10.7, 11.3, 11.4, 11.5, and Section 12, Section 13, Section 14.1, Section 17, Section 23, Section 24, Section 25, and Section 26 shall survive the termination hereof.

12.4 Termination Damages. If this Agreement is terminated as a result of an Event of Default by one of the Parties, termination damages shall be determined. The amount of termination damages shall be calculated by the non-defaulting Party within a reasonable period after termination of the Agreement. In the event of a default by Seller before the Commercial Operation Date, the termination payment shall be the Pre-COD Damages Payment. In the event of default by Seller on or after the Commercial Operation Date, or any default by Buyer, the termination payment shall be the Forward Settlement Amount. Amounts owed pursuant to this section shall be due within five (5) Business Days after the non-defaulting Party gives the defaulting Party written notice of the amount due. The non-defaulting Party shall under no circumstances be required to account for or otherwise credit or pay the defaulting Party for economic benefits accruing to the non-defaulting Party as a result of the defaulting Party's default.

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12.5 Duty/Right to Mitigate. Each Party agrees that it has a duty to mitigate damages and covenants that it will use commercially reasonable efforts to minimize any damages it may incur as a result of the other Party's performance or non-performance hereof; provided, however, that this duty to mitigate shall not limit the amounts payable by the defaulting Party to the non-defaulting Party pursuant to Section 12.4. "Commercially reasonable efforts" (a) by Seller shall include requiring Seller to use commercially reasonable efforts to maximize the price for Storage Product received by Seller from third parties, including entering into an enabling agreement with, or being affiliated with, one or more power marketers of nationally recognized standing to market such Storage Product not purchased or accepted by Idaho Power (only during a period Idaho Power is in default), in each case only to the extent any of the foregoing actions are permitted under Requirements of Law and the Interconnection Agreement; and (b) by Idaho Power shall include requiring Idaho Power to use commercially reasonable efforts to minimize the price paid to third parties for Storage Product purchased to replace Storage Product not delivered by Seller as required hereunder.

12.6 Security. If this Agreement is terminated because of Seller's default, Idaho Power may, in addition to pursuing any and all other remedies available at law or in equity, proceed against any Seller security held by Idaho Power in whatever form to reduce any amounts that Seller owes Idaho Power arising from such default.

12.7 Cumulative Remedies. Except in circumstances in which a remedy provided for in this Agreement is described as a sole or exclusive remedy, the rights and remedies provided to Idaho Power hereunder are cumulative and not exclusive of any rights or remedies of Idaho Power.

INDEMNIFICATION AND LIABILITY

13.1 Indemnities.

13.1.1 Indemnity by Seller. To the extent permitted by Requirements of Law and subject to Section 13.1.5, Seller shall release, indemnify and hold harmless Idaho Power, its Affiliates, and each of its and their respective directors, officers, employees, agents, and representatives (collectively, the "Idaho Power Indemnitees") against and from any and all losses, fines, penalties, claims, demands, damages, liabilities, actions or suits of any nature whatsoever (including legal costs and attorneys' fees, both at trial and on appeal, whether or not suit is brought) (collectively, "Liabilities") actually or allegedly resulting from, or arising out of, or in any way connected with, the performance by Seller of its obligations hereunder, or relating to the Facility or Premises, for or on account of injury, bodily or otherwise, to, or death of, or damage to or destruction of property of, any person or entity, or for or on account of violation of environmental or criminal law, excepting only to the extent such Liabilities as may be caused by the gross negligence or willful misconduct of any person or entity within the Idaho Power Indemnitees. Seller shall be solely responsible for (and shall defend and hold Idaho Power harmless against) any damage that may occur as a direct result of Seller's breach of the Generation Interconnection Agreement.

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13.1.2 Indemnity by Idaho Power. To the extent permitted by Requirements of Law and subject to Section 13.1.5, Idaho Power shall release, indemnify and hold harmless Seller, its Affiliates, and each of its and their respective directors, officers, employees, agents, and representatives (collectively, the "Seller Indemnitees") against and from any and all Liabilities actually or allegedly resulting from, or arising out of, or in any way connected with, the performance by Idaho Power of its obligations hereunder for or on account of (a) injury, bodily or otherwise, to, or death of, or (b) for damage to, or destruction of property of, any person or entity within the Seller Indemnitees, excepting only to the extent such Liabilities as may be caused by the negligence or willful misconduct of any person or entity within the Seller Indemnitees.

13.1.3 Additional Cross Indemnity. Without limiting Sections 13.1.1 and 13.1.2, Seller shall release, indemnify and hold harmless the Idaho Power Indemnitees from and against all Liabilities related to Storage Product prior to its delivery by Seller at the Point of Delivery, and Idaho Power shall release, indemnify and hold harmless the Seller Indemnitees from and against all Liabilities related to Storage Product once delivered to Idaho Power at the Point of Delivery as provided herein, except in each case to the extent such Liabilities are attributable to the gross negligence or willful misconduct or a breach of this Agreement by any member of the Idaho Power Indemnitees or the Seller Indemnitees, respectively, seeking indemnification hereunder.

13.1.4 No Dedication. Nothing herein shall be construed to create any duty to, any standard of care with reference to, or any liability to any person not a Party. No undertaking by one Party to the other under any provision hereof shall constitute the dedication of Idaho Power's facilities or any portion thereof to Seller or to the public, nor affect the status of Idaho Power as an independent public utility corporation or Seller as an independent individual or entity.

13.1.5 Consequential Damages. **NEITHER PARTY SHALL BE LIABLE TO THE OTHER PARTY FOR SPECIAL, PUNITIVE, INDIRECT, EXEMPLARY OR CONSEQUENTIAL DAMAGES, WHETHER SUCH DAMAGES ARE ALLOWED OR PROVIDED BY CONTRACT, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY, STATUTE OR OTHERWISE. THE PARTIES AGREE THAT ANY LIQUIDATED DAMAGES, SECURITY, INDEMNIFIED CLAIMS OR DAMAGES, DELAY DAMAGES, IDAHO POWER AND SELLER COST TO COVER DAMAGES, SECTION 12.2.3 CAPACITY RIGHTS LOSS DAMAGES, OR OTHER SPECIFIED MEASURE OF DAMAGES EXPRESSLY PROVIDED FOR HEREIN, ARE NOT INTENDED BY THEM TO REPRESENT AND WILL NOT BE DEEMED SPECIAL, PUNITIVE, INDIRECT, EXEMPLARY OR CONSEQUENTIAL DAMAGES AND SHALL NOT BE LIMITED IN AMOUNT BY THIS SECTION 13.1.5.**

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SECTION 14
INSURANCE

14.1 Required Policies and Coverages. Without limiting any liabilities or any other obligations of Seller hereunder, Seller shall secure and continuously carry the insurance coverage specified on Exhibit 13 during the Term or longer period if specified in Exhibit 13.

14.2 Certificates of insurance. Seller shall provide Idaho Power with certificates of insurance within ten (10) days after the date by which such policies are required to be obtained (as set forth in Exhibit 13). Seller shall provide a certificate of insurance (in ACORD or similar industry form) to Idaho Power within ten (10) days of the effective date of any insurance policy required under this Agreement.

SECTION 15
FORCE MAJEURE

15.1 Definition of Force Majeure. "Force Majeure" or "an event of Force Majeure" means an event that (a) is not reasonably anticipated as of the Effective Date hereof, (b) is not within the reasonable control of the Party affected by the event, (c) is not the result of such Party's negligence or failure to act, and (d) could not be overcome by the affected Party's use of due diligence in the circumstances. Force Majeure includes, but is not restricted to, events of the following types (but only to the extent that such an event, in consideration of the circumstances, satisfies the tests set forth in the preceding sentence): acts of God; civil disturbance; sabotage; strikes; lock-outs; work stoppages; and action or restraint by court order or public or Governmental Authority (as long as the affected Party has not applied for or assisted in the application for, and has opposed to the extent reasonable, such court or government action). Notwithstanding the foregoing, none of the following constitute Force Majeure: (i) Seller's ability to sell, or Idaho Power's ability to purchase the Storage Product at a more advantageous price than is provided hereunder; (ii) the cost or availability of Charging Energy for the Facility; (iii) economic hardship, including lack of money; (iv) any breakdown or malfunction of the Facility's equipment (including any serial equipment defect) that is not caused by an independent event of Force Majeure, (v) the imposition upon a Party of costs or taxes allocated to such Party under Section 6.4, (vi) delay or failure of Seller to obtain or perform any Required Facility Document unless due to a Force Majeure event, (vii) any delay, alleged breach of contract, or failure by the Transmission Provider, Network Service Provider or Interconnection Provider unless due to a Force Majeure event, (viii) maintenance upgrade or repair of any facilities or right of way corridors constituting part of or involving the Interconnection Facilities, whether performed by or for Seller, or other third parties (except for repairs made necessary as a result of an event of Force Majeure); (ix) Seller's failure to obtain, or perform under, the Generation Interconnection Agreement, or its other contracts and obligations to transmission owner, Transmission Provider or Interconnection Provider, unless due to a Force Majeure event; (x) Seller's inability to obtain any supply of any good or service, unless due to an independent event of Force Majeure; or (xi) any event attributable to the use of Interconnection Facilities for deliveries of Storage Product to any party other than Idaho Power. Notwithstanding anything to the contrary herein, in no event will the

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increased cost of electricity, steel, labor, or transportation constitute an event of Force Majeure.

15.2 Suspension of Performance. Neither Party shall be liable for any delay or failure in its performance under this Agreement, nor shall any delay, failure, or other occurrence or event become a default, to the extent such delay, failure, occurrence or event is substantially caused by conditions or events of Force Majeure during the continuation of the event of Force Majeure, for the same number of days that the event of Force Majeure has prevailed, provided that:

15.2.1 the Party affected by the Force Majeure, shall, within five (5) days after the occurrence of the event of Force Majeure, give the other Party written notice describing the particulars of the event; and

15.2.2 the suspension of performance shall be of no greater scope and of no longer duration than is required to remedy the effect of the Force Majeure; and

15.2.3 the affected Party shall use diligent efforts to remedy its inability to perform and shall provide prompt notice to the other Party of the cessation of the event or condition giving rise to its excuse from performance.

15.3 Force Majeure Does Not Affect Other Obligations. No obligations of either Party that arose before the Force Majeure causing the suspension of performance or that arise after the cessation of the Force Majeure shall be excused by the Force Majeure. No obligation of Seller arising before the Commercial Operation Date may be excused by Force Majeure.

15.4 Strikes. Notwithstanding any other provision hereof, neither Party shall be required to settle any strike, walkout, lockout or other labor dispute on terms which, in the sole judgment of the Party involved in the dispute, are contrary to the Party's best interests.

15.5 Right to Terminate. If a Force Majeure event prevents a Party from substantially performing its obligations hereunder for a period exceeding one hundred and eighty (180) consecutive days (despite the affected Party's effort to take all reasonable steps to remedy the effects of the Force Majeure with all reasonable dispatch), then the Party not affected by the Force Majeure event, with respect to its obligations hereunder, may terminate this Agreement by giving ten (10) days prior written notice to the other Party. Upon such termination, neither Party will have any liability to the other with respect to the period following the effective date of such termination; provided, however, that this Agreement will remain in effect to the extent necessary to facilitate the settlement of all liabilities and obligations arising hereunder before the effective date of such termination.

SECTION 16
SEVERAL OBLIGATIONS; THIRD PARTY BENEFICIARIES

Nothing contained herein shall be construed to create an association, trust, partnership or joint venture or to impose a trust, partnership or fiduciary duty, obligation or liability on or between the Parties. Nothing in this Agreement shall be construed to create any duty, obligation or liability of Seller or Buyer to any Person not a Party to this Agreement.

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SECTION 17
CHOICE OF LAW

This Agreement shall be interpreted and enforced in accordance with the laws of the State of Idaho notwithstanding its choice of law provisions.

SECTION 18
PARTIAL INVALIDITY

The Parties do not intend to violate any laws governing the subject matter hereof. If any of the terms hereof are finally held or determined to be invalid, illegal or void as being contrary to any Requirements of Law or public policy, all other terms hereof shall remain in effect. The Parties shall use best efforts to amend this Agreement to reform or replace any terms determined to be invalid, illegal or void, such that the amended terms (a) comply with and are enforceable under Requirements of Law, (b) give effect to the intent of the Parties under this Agreement, and (c) preserve the balance of the economics and equities contemplated by this Agreement in all material respects.

SECTION 19
NON-WAIVER

No waiver of any provision hereof shall be effective unless the waiver is set forth in a writing that (a) expressly identifies the provision being waived, and (b) is executed by the Party waiving the provision. A Party's waiver of one or more failures by the other Party in the performance of any of the provisions hereof shall not be construed as a waiver of any other failure or failures, whether of a like kind or different nature.

SECTION 20
GOVERNMENTAL JURISDICTION AND AUTHORIZATIONS

This Agreement is subject to the jurisdiction of those Governmental Authorities having control over either Party, the Facility, or this Agreement. During the Term, Seller shall maintain all Permits required, as applicable, for the construction, operation, or ownership of the Facility.

SECTION 21
[INTENTIONALLY OMITTED]

SECTION 22
SUCCESSORS AND ASSIGNS

22.1 Restriction on Assignments. Except as expressly provided in this Section 20, neither Party may assign this Agreement or any of its rights or obligations hereunder without the prior written consent of the other Party, which consent shall not be unreasonably withheld.

22.2 Permitted Assignments. Notwithstanding Section 22.1, either Party may, without the need for consent from the other Party (but with written notice to the other Party, including the names of the assignees): (a) transfer, sell, pledge, encumber or assign this Agreement or

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the accounts, revenues or proceeds therefrom in connection with project financing for the Facility; or (b) transfer or assign this Agreement to an Affiliate meeting the requirements of this Agreement; provided, however, that Seller shall not transfer, sell, encumber or assign this Agreement or any interest herein to any Affiliate of Idaho Power without the prior written consent of Idaho Power. Except with respect to collateral assignments for financing purposes in every assignment permitted under this Section 22.2, the assignee must not be a Sanctioned Person, must agree in writing to be bound by the terms and conditions hereof and must possess the same or similar experience, and possess the same or better creditworthiness, as the assignor. Idaho Power may assign this Agreement in whole or in part without the consent of Seller to any person or entity in the event that Idaho Power ceases to be a load-serving entity, in which event Idaho Power shall be released from liability hereunder upon approval of Idaho Power ceasing to be a load-serving entity by the IPUC and OPUC. The Party seeking to assign or transfer this Agreement shall be solely responsible for paying all costs of assignment.

SECTION 23
ENTIRE AGREEMENT

This Agreement supersedes all prior agreements, proposals, representations, negotiations, discussions or letters, whether oral or in writing, regarding the subject matter hereof. No modification hereof shall be effective unless it is in writing and executed by both Parties.

SECTION 24
NOTICES

24.1 Addresses and Delivery Methods. All notices, requests, statements or payments shall be made to the addresses set out below. In addition, copies of a notice of termination of this Agreement under Section 12.3 shall contain the information required by Section 12.3 and shall be sent to the then-current President and General Counsel of Idaho Power. Notices required to be in writing shall be delivered by letter, facsimile or other tangible documentary form. Notice by overnight mail or courier shall be deemed to have been given on the date and time evidenced by the delivery receipt. Notice by hand delivery shall be deemed to have been given when received or hand delivered. Notice by facsimile is effective as of transmission to each and all of the telefacsimile numbers provided below for a Party, but must be followed up by notice by registered mail or overnight carrier to be effective. Notice by overnight mail shall be deemed to have been given the Business Day after it is sent, if sent for next day delivery to a domestic address by a recognized overnight delivery service (e.g., Federal Express or UPS). Notice by certified or registered mail, return receipt requested, shall be deemed to have been given upon receipt.

To Seller:

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To Idaho Power:

Idaho Power
1221 W Idaho St
Boise, ID 83702
Attn: Vice President, Power Supply
Email: energycontracts@idahopower.com

with a copy to:

Idaho Power
1221 W Idaho St
Boise, ID 83702
Attn: Energy Contracts
Email: energycontracts@idahopower.com

and termination notices copied to: Idaho Power
1221 W Idaho St
Boise, ID 83702
Attn: Vice President and General Counsel
Email: PHarrington@idahopower.com

24.2 Changes of Address. The Parties may change any of the persons to whom notices are addressed, or their addresses, by providing written notice in accordance with this section.

SECTION 25
CONFIDENTIALITY

25.1 Confidential Business Information. The following constitutes "Confidential Business Information," whether oral or written: (a) the Parties' proposals and negotiations concerning this Agreement, made or conducted prior to the Effective Date, (b) the actual charges billed to Idaho Power hereunder, and (c) any information delivered by Idaho Power to Seller prior to the Effective Date relating to the market prices of Storage Product and methodologies for their determination or estimation. Seller and Idaho Power each agree to hold such Confidential Business Information wholly confidential, except as otherwise expressly provided in this Agreement. "Confidential Business Information" shall not include information that (x) is in or enters the public domain through no fault of the Party receiving such information, or (y) was in the possession of a Party prior to the Effective Date, other than through delivery thereof as specified in subsections (a) and (c) above. A Party providing any written Confidential Business Information under this Agreement shall clearly mark all pages of all documents and materials to be treated as Confidential Business information with the term "Confidential" on the front of each page, document or material. If the Confidential Business Information is transmitted by electronic means the title or subject line shall indicate the information is Confidential Business Information. All Confidential Business Information shall be maintained as confidential, pursuant to the terms of this Section 25.1, for a period of two (2) years from the date it is received by the receiving Party unless otherwise agreed to in writing by the Parties.

25.2 Duty to Maintain Confidentiality. Each Party agrees not to disclose Confidential Business Information to any other person (other than its Affiliates, accountants, auditors, counsel, consultants, lenders, prospective lenders, employees, officers and directors), without the

prior written consent of the other Party, provided that: (a) either Party may disclose Confidential Business Information, if and to the extent such disclosure is required (i) by Requirements of Law, (ii) in order for Idaho Power to receive regulatory approval and recovery of expenses related to this Agreement, (iii) pursuant to an order of a court or regulatory agency, or (iv) in order to enforce this Agreement or to seek approval hereof, and (b) notwithstanding any other provision hereof, Idaho Power may in its sole discretion disclose or otherwise use for any purpose in its sole discretion the Confidential Business Information described in Sections 25.1(b) or 25.1(c). In the event a Party is required by Requirements of Law to disclose Confidential Business Information, such Party shall to the extent possible promptly notify the other Party of the obligation to disclose such information.

25.3 Idaho Power Regulatory Compliance. The Parties acknowledge that Idaho Power is required by Requirements of Law to report certain information that is or could otherwise embody Confidential Business Information from time to time. Such reports include models, filings, reports of Idaho Power's net power costs, general rate case filings, power cost adjustment mechanisms, FERC-required reporting such as those made on FERC Form 1 or Form 714, market power and market monitoring reports, annual state reports that include resources and loads, integrated resource planning reports, reports to entities such as NERC, WECC, Pacific Northwest Utility Coordinating Committee, WREGIS, or similar or successor organizations, forms, filings, or reports, the specific names of which may vary by jurisdiction, along with supporting documentation. Additionally, in regulatory proceedings in all state and federal jurisdictions in which it does business, Idaho Power will from time to time be required to produce Confidential Business Information. Idaho Power may use its business judgment in its compliance with all of the foregoing and the appropriate level of confidentiality it seeks for such disclosures. Idaho Power may submit Confidential Business Information in regulatory proceedings without notice to Seller.

25.4 Irreparable Injury; Remedies. Each Party agrees that violation of the terms of this Section 25 constitutes irreparable harm to the other, and that the harmed Party may seek any and all remedies available to it at law or in equity, including injunctive relief.

25.5 News Releases and Publicity. Except as otherwise provided in Section 7.14, before either Party issues any news release or publicly distributed promotional material regarding the Facility that mentions the Facility, such Party shall first provide a copy thereof to the other Party for its review and approval. Any use of either Party's name in such news release or promotional material must adhere to such Party's publicity guidelines then in effect; any use of Idaho Power's name requires Idaho Power's prior written consent.

SECTION 26
DISAGREEMENTS

26.1 Negotiations. Prior to proceeding with formal dispute resolution procedures as provided below in this Section 26, the Parties must first attempt in good faith to resolve all disputes arising out of, related to or in connection with this Agreement promptly by negotiation, as follows. Any Party may give the other Party written notice of any dispute not resolved in the normal course of business. Executives of both Parties at levels one level above those

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employees who have previously been involved in the dispute must meet at a mutually acceptable time and place within ten (10) days after delivery of such notice, and thereafter as often as they reasonably deem necessary, to exchange relevant information and to attempt to resolve the dispute. If the matter has not been resolved within thirty (30) days after the referral of the dispute to such senior executives, or if no meeting of such senior executives has taken place within fifteen (15) days after such referral, either Party may initiate any legal remedies available to the Party. All negotiations pursuant to this clause are confidential.

26.2 Choice of Forum. Each Party irrevocably consents and agrees that any legal action or proceeding arising out of this Agreement or the actions of the Parties leading up to this Agreement shall be brought exclusively in the United States District Court for the District of Idaho in Boise, Idaho, or if such court does not have jurisdiction, in the 4th Judicial District (Ada County) Court of the State of Idaho. By execution and delivery hereof, each Party (a) accepts the exclusive jurisdiction of such court and waives any objection that it may now or hereafter have to the exercise of personal jurisdiction by such court over each Party for the purpose of any proceeding related to this Agreement, (b) irrevocably agrees to be bound by any final judgment (after any and all appeals) of any such court arising out of such documents or actions, (c) irrevocably waives, to the fullest extent permitted by law, any objection that it may now or hereafter have to the laying of venue of any suit, action or proceedings arising out of such documents brought in such court (including any claim that any such suit, action or proceeding has been brought in an inconvenient forum) in connection herewith, (d) agrees that service of process in any such action may be effected by mailing a copy thereof by registered or certified mail, postage prepaid, to such Party at its address as set forth herein, and (e) agrees that nothing herein shall affect the right to effect service of process in any other manner permitted by law.

26.3 Settlement Discussions. No statements of position or offers of settlement made in the course of the dispute process described in this Section 26 will be offered into evidence for any purpose in any litigation between the Parties, nor will any such statements or offers of settlement be used in any manner against either Party in any such litigation. Further, no such statements or offers of settlement shall constitute an admission or waiver of rights by either Party in connection with any such litigation. At the request of either Party, any such statements and offers of settlement, and all copies thereof, shall be promptly returned to the Party providing the same.

26.4 Waiver of Jury Trial. EACH PARTY KNOWINGLY, VOLUNTARILY, INTENTIONALLY AND IRREVOCABLY WAIVES THE RIGHT TO A TRIAL BY JURY IN RESPECT OF ANY LITIGATION BASED ON THIS AGREEMENT, OR ARISING OUT OF, UNDER OR IN CONNECTION WITH THIS AGREEMENT AND ANY AGREEMENT EXECUTED OR CONTEMPLATED TO BE EXECUTED IN CONJUNCTION WITH THIS AGREEMENT, OR ANY COURSE OF CONDUCT, COURSE OF DEALING, STATEMENTS (WHETHER VERBAL OR WRITTEN) OR ACTIONS OF ANY PARTY HERETO. THIS PROVISION IS A MATERIAL INDUCEMENT TO EACH OF THE PARTIES FOR ENTERING HEREINTO. EACH PARTY HEREBY WAIVES ANY RIGHT TO CONSOLIDATE ANY ACTION, PROCEEDING OR COUNTERCLAIM ARISING OUT OF OR IN CONNECTION

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WITH THIS AGREEMENT OR ANY OTHER AGREEMENT EXECUTED OR CONTEMPLATED TO BE EXECUTED IN CONJUNCTION WITH THIS AGREEMENT, OR ANY MATTER ARISING HEREUNDER OR THEREUNDER, WITH ANY PROCEEDING IN WHICH A JURY TRIAL HAS NOT OR CANNOT BE WAIVED. THIS SECTION WILL SURVIVE THE EXPIRATION OR TERMINATION OF THIS AGREEMENT.

SECTION 27
COMPLIANCE

27.1 Nondiscrimination. Buyer is a federal contractor and maintains an equal opportunity/affirmative action program in accordance with Applicable Law. As a result, Seller must, to the extent required by Applicable Law, afford equal employment opportunity to all of its applicants and employees, regardless of their race, color, national origin, sex, age, religion, marital status, sexual orientation, gender identity and gender expression, protected veteran status, disability, or other basis protected by law. Also as a result, but only if required by Applicable Law, Seller shall abide by the requirements of 41 CFR 60-1.4(a), 60-300.5(a) and 60-741.5(a). These regulations prohibit discrimination against qualified individuals based on their status as protected veterans or individuals with disabilities and prohibit discrimination against all individuals based on their race, color, religion, sex, sexual orientation, gender identity, or national origin. Moreover, these regulations require that covered prime contractors and subcontractors take affirmative action to employ and advance in employment individuals without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, disability, or veteran status. In connection with this Agreement and the Facility, Seller will comply with, and cause all of its direct and indirect contractors and subcontractors to expressly agree to comply with, all laws and regulations relating to forced, bonded (including debt bondage) or indentured labor, involuntary or exploitative prison labor, slavery or trafficking of persons.

27.2 Anti-Corruption. In connection with the negotiation and performance of this Agreement and the development, construction, and operation of the Facility or the Premises, Seller, on behalf of itself, Seller's Parent Entity and any other direct or indirect upstream equity owners that, notwithstanding percentage of equity ownership interest, have the voting power or otherwise have the power to control the day-to-day management, operations and policies of Seller, and such Affiliates that Seller contractually or otherwise controls or directs in the management or operation of the Facility, and in each case, including the officers, directors, employees and agents of such entities, represents and warrants that it has not engaged in, and that it shall refrain from, offering, promising, paying, giving, authorizing the paying or giving of, soliciting, or accepting money or Anything of Value, directly or indirectly, to or from (a) any Government Official to (i) influence any act or decision of a Government Official in his or her official capacity, (ii) induce a Government Official to act in violation of his or her lawful duty, (iii) induce a Government Official to use his or her influence with a government or instrumentality thereof, or (iv) otherwise secure any improper advantage, in each case to the extent prohibited by applicable anti-corruption laws; or (b) any person in any manner that would constitute bribery or an illegal kickback, or would otherwise violate applicable anti-corruption laws. If Seller fails to

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comply with this Section 27.2 then Buyer may terminate this Agreement in accordance with Section 12.1.2.12. In connection with the performance of this Agreement and all fees charged Buyer, Seller shall maintain books and records practices and internal controls to ensure (a) that receipts and expenses are accurately recorded with reasonable detail and are based on accurate and sufficient supporting documentation and (b) that no "off the books" accounts are created or maintained. Unless otherwise required by law, such books and records will be maintained for five (5) years after termination or expiration of this Agreement. Seller will immediately report to Buyer any breach of this Section 27.2 by Seller or its representatives. Seller will ensure that the contractors and subcontractors it retains in connection with this Agreement expressly agree to anti-corruption undertakings, representations, and warranties substantially similar to the provisions herein. If Buyer has reason to believe that a breach of this Section 27.2 has occurred or will occur, Buyer shall have the right to audit Seller's books and records insofar as they relate to performance of this Agreement and to withhold further payments without any liability to Seller until reasonably satisfied that no breach has occurred. If the Agreement is terminated pursuant to an Event of Default under Section 12.1.2.12, Buyer shall have no obligation to make further payments hereunder. Buyer's rights and Seller's obligations under this Section 27.2 shall survive the termination or expiration of the Agreement.

27.3 Prohibited Technology. Pursuant to Section 889 of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 and Federal Acquisition Regulation (FAR) 52.204-25 (Aug. 2020), Seller agrees, represents, and warrants that Seller shall not supply or deliver to IPC any "covered telecommunications equipment or services" as a substantial or essential component of any system or critical technology of any system. As defined in FAR 52.204-25(a), "covered telecommunications equipment or services" includes equipment, systems, products, or services made by any of the following companies, or any subsidiary or affiliate thereof (including companies with the same principal word in the name, e.g., "Huawei" or "Hytera"): Huawei Technologies Company; ZTE Corporation; Hytera Communications Corporation; Hangzhou Hikvision Digital Technology Company; or Dahua Technology Company. "Covered telecommunications equipment or services" may include, but are not limited to, video/monitoring surveillance equipment/services, public switching and transmission equipment, private switches, cables, local area networks, modems, mobile phones, wireless devices, landline telephones, laptops, desktop computers, answering machines, teleprinters, fax machines, and routers. "Covered telecommunications equipment or services" do not include telecommunications equipment that cannot route or redirect user data traffic or permit visibility into any user data or packets that the equipment transmits or handles.

To the extent that the systems, products, or services to be provided by Seller under this Agreement may be procured by IPC in support of or to satisfy IPC's obligations under agreements with a federal governmental entity, Seller further agrees that FAR 52.204-25 (Aug. 2020), except for paragraph (b)(2) thereof, shall be incorporated by reference into this Agreement and is binding on Seller, and that Seller does not use any equipment, system, or service that uses covered telecommunications equipment or services and will not supply any covered telecommunications equipment or services to IPC. Seller further agrees that, if it identifies covered telecommunications equipment or services used as a substantial or essential component of any system or as critical technology as part of any

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system during contract performance, or Seller is notified of such by a subcontractor at any tier or any other source, Seller shall immediately notify IPC and reasonably cooperate with IPC's requests for information.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed in their respective names as of the date last written below.

By: _____	By: _____
Name: _____	Name: _____
Title: _____	Title: _____
Date: _____	Date: _____

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EXHIBIT 1

MONTHLY POWER PRODUCTION AND SWITCHING REPORT

Month _____ **Year** _____

Project _____ **Project** _____

Address _____ **Phone** _____

City _____ **State** _____ **Zip** _____ **State**

	Facility Output	Station Usage		Metered Maximum
Meter Number:				
End of Month MWh Meter				**MW**
Beginning of Month MWh				
Difference:				
Times Meter Constant:				**Net Generation**
MWh for the Month:		-	=	
Metered Demand:				

Breaker Opening Record

Date	Time	Meter	*	Reason

Breaker Closing Record

Date	Time	Meter

*** Breaker Opening Reason Codes**

1 Lack of Adequate Prime Mover
2 Forced Outage of Facility
3 Disturbance of IPCo System
4 Scheduled Maintenance
5 Testing of Protection Systems
6 Cause Unknown
7 Other (Explain)

I hereby certify that the above meter readings are true and correct as of Midnight on the last day of the above month and that the switching record is accurate and complete as required by the Energy Sales Agreement to

_____ _____
Signature **Date**

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A-2 AUTOMATED METER READING COLLECTION PROCESS

Monthly, Idaho Power will use the provided Metering and Telemetry equipment and processes to collect the meter reading information from the Idaho Power provided Metering Equipment that measures the Net Energy and energy delivered to supply Station Use for the Facility recorded at 12:00 AM (Midnight) of the last day of the month.

The meter information collected will include but not be limited to energy production, Station Use, the maximum generated power (MW) and any other required energy measurements to adequately administer this Agreement.

A-3 SELLER CONTACT INFORMATION

Seller's Contact Information

Name:
Telephone Number:
Cell Phone:
E-Mail:

24-Hour Project Operational Contact

Name:
Telephone Number:
Cell Phone:
E-Mail:

Project On-site Contact information

Name:
Telephone Number:
Cell Phone:
E-Mail:

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EXHIBIT 2

DESCRIPTION OF FACILITY

Project Name: _____

Project Number: _____

B-1 DESCRIPTION OF FACILITY

(Must include the Nameplate Capacity rating and VAR capability (both leading and lagging) of all Generation Units to be included in the Facility.)

_____
_____
_____
_____
_____

Var Capability (Both leading and lagging) Leading is _____Lagging is _____.

B-2 LOCATION OF FACILITY

Near: _____

Actual or nearest physical street address: _____

GPS Coordinates: Latitude Decimal Degrees: _____

Longitude Decimal Degrees: _____

State: _____ County: _____

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EXHIBIT 3

POINT OF DELIVERY/INTERCONNECTION FACILITIES

Instructions to Seller:

1. Include description of point of metering, and Point of Interconnection
2. Include description of Point of Delivery
3. Provide interconnection single line drawing of Facility including any transmission facilities on Seller's side of the Point of Interconnection.
4. Describe Seller's arrangements for station service to the Facility and show on one-line diagram how station service will be provided and metered.
5. Specify the maximum hourly rate (MW) at which Seller is permitted to deliver energy to the Point of Delivery and in compliance with Seller's transmission rights between the Point of Interconnection and the Point of Delivery ("Maximum Transmission Rate"):

_____MW.

Seller to provide to Buyer with a copy of the final Generator Interconnection Agreement

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EXHIBIT 4

STORAGE OPERATING RESTRICTIONS

Maximum Storage Level:	[____] MWh
Minimum Storage Level:	[____] MWh
Maximum Charging Capacity:	[____] MW
Minimum Charging Capacity:	[____] MW
Maximum Discharging Capacity:	[____] MWh
Minimum Discharging Capacity:	[____] MWh
Maximum State of Charge during Charging:	[____]%
Minimum State of Charge during Discharging:	[____]%
Ramp Rate:	[___] MW/minute
Annual Cycles:	Maximum of [___] Full Cycle Equivalents per Contract Year with no monthly cap.
Daily Dispatch Limits:	Charging: [___] per day Discharging: [___] per day Partial Charging/Discharging: [___]

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Maximum Time at Minimum Storage Level:	N/A
Other Operating Limits:	1. Storage Facility to be charged only from the Generating Facility. 2. All manual dispatch commands by Idaho Power must use the supplied energy management system. 3. The average resting State of Charge per Contract Year must be below [___]%. 4. Up to [___] hours of idle time is required following a continuous discharge of greater than [___]% of the Storage Capacity (as measured in MWh).

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EXHIBIT 5

CONTRACT PRICE

Contract Price	
Contract Year	$/kW-Month
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

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EXHIBIT 6

NERC EVENT TYPES

Event Type	**Description of Outages**
U1	Unplanned (Forced) Outage—Immediate – An outage that requires immediate removal of a unit from service, another outage state or a Reserve Shutdown state. This type of outage results from immediate mechanical/electrical/hydraulic control systems trips and operator-initiated trips in response to unit alarms.
U2	Unplanned (Forced) Outage—Delayed – An outage that does not require immediate removal of a unit from the in-service state but requires removal within six (6) hours. This type of outage can only occur while the unit is in service.
U3	Unplanned (Forced) Outage—Postponed – An outage that can be postponed beyond six hours but requires that a unit be removed from the in-service state before the end of the next weekend. This type of outage can only occur while the unit is in service.
SF	Startup Failure – An outage that results from the inability to synchronize a unit within a specified startup time period following an outage or Reserve Shutdown. A startup period begins with the command to start and ends when the unit is synchronized. An SF begins when the problem preventing the unit from synchronizing occurs. The SF ends when the unit is synchronized or another SF occurs.
MO	Maintenance Outage – An outage that can be deferred beyond the end of the next weekend, but requires that the unit be removed from service before the next planned outage. (Characteristically, a MO can occur any time during the year, has a flexible start date, may or may not have a predetermined duration and is usually much shorter than a PO.)
ME	Maintenance Outage Extension – An extension of a maintenance outage (MO) beyond its estimated completion date. This is typically used where the original scope of work requires more time to complete than originally scheduled. Do not use this where unexpected problems or delays render the unit out of service beyond the estimated end date of the MO.
PO	Planned Outage – An outage that is scheduled well in advance and is of a predetermined duration, lasts for several weeks and occurs only once or twice a year. (Boiler overhauls, turbine replacement or inspections are typical planned outages.)
PE	Planned Outage Extension – An extension of a planned outage (PO) beyond its estimated completion date. This is typically used where the original scope of work requires more time to complete than originally scheduled. Do not use this where unexpected problems or delays render the unit out of service beyond the estimated end date of the PO.

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EXHIBIT 7

START-UP TESTING

(Seller to provide to Buyer before the First Operation Date)

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EXHIBIT 8

FORM OF GUARANTY — CREDIT SUPPORT OBLIGATION

FORMS OF LIQUID SECURITY

The Seller shall provide Idaho Power with commercially reasonable security instruments such as Cash, Cash Escrow Security, Guarantee or Letter of Credit as those terms are defined below or other forms of liquid financial security that would provide readily available cash to Idaho Power to satisfy the security requirements within this Agreement.

For the purpose of this Appendix D, the term "Credit Requirements" shall mean acceptable financial creditworthiness of the entity providing the security instrument in relation to the term of the obligation in the reasonable judgment of Idaho Power, provided that any guarantee and/or Letter of Credit issued by any other entity with a short-term or long-term investment grade credit rating by Standard & Poor's Corporation or Moody's Investor Services, Inc. or any successors shall be deemed to have acceptable financial creditworthiness.

1. Cash – Seller shall deposit cash in the amount of the required security with Idaho Power. Idaho Power will not be responsible to calculate or pay any interest on these funds deposited with Idaho Power.

2. Cash Escrow Security – Seller shall deposit funds in an escrow account established by the Seller in a banking institution acceptable to both Parties equal to the required security. The Seller shall be responsible for all costs, and receive any interest earned associated with establishing and maintaining the escrow account(s).

3. Guarantee or Letter of Credit Security – Seller shall post and maintain in an amount equal to the required security: (a) a guaranty from a party that satisfies the Credit Requirements, in a form acceptable to Idaho Power at its discretion, or (b) an irrevocable Letter of Credit in a form acceptable to Idaho Power, in favor of Idaho Power. The Letter of Credit will be issued by a financial institution acceptable to both parties. The Seller shall be responsible for all costs associated with establishing and maintaining the Guarantee(s) or Letter(s) of Credit.

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EXHIBIT 9

REQUIRED FACILITY DOCUMENTS

1. **Obtained Required Facility Documents:**

Permits:

Conditional Use Permits from Twin Falls County for the construction and operation of the Facility

Land Rights:

Lease Agreement for the land, access, and interconnection of the Facility.

2. **To Be Obtained (Prior to Commercial Operation) Required Facility Documents:**

Licenses, Permits and Authorizations:

Evidence of market-based rate authority under Section 205 of the Federal Power Act or evidence of qualifying facility certification under the Public Utility Regulatory Policies Act

Access road easement

Electrical Permit

Building Permit

Interconnection approval

Utility easement

Crossing Agreement

Construction and Operations and Maintenance:

Contract for the Sale of Power Generation Equipment and Related Services between vendors and engineering, procurement, and construction contractor and Seller

Generator Interconnection Agreement

Retail Electric Service Agreement

Proof of Insurance

Construction Agreements:

Balance of Plant/Construction Services Agreement

Operations and Maintenance Agreements:

Warranty, Service and Maintenance Agreement

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SUCH LIST MAY BE UPDATED PURSUANT TO SECTION 2.2.3

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EXHIBIT 10

LEASES

(Seller to provide to Buyer before the Commercial Operation Date)

Memorandum of Lease Agreement 1

Memorandum of Lease Agreement 2

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EXHIBIT 11

ENGINEER'S CERTIFICATIONS

ENGINEER'S CERTIFICATION

OF

OPERATIONS & MAINTENANCE POLICY

The undersigned _____, on behalf of himself/herself and _____ , hereinafter collectively referred to as "Engineer," hereby states and certifies to the Seller as follows:

1. That Engineer is a Licensed Professional Engineer in good standing in the State of Idaho.
2. That Engineer has reviewed the Energy Sales Agreement, hereinafter referred to as the "Agreement," between Idaho Power as Buyer, and _____as Seller, dated _____.
3. That the cogeneration or small power production project which is the subject of the Agreement and this Statement is identified as Idaho Power Company Facility No. _____ and is hereinafter referred to as the "Project."
4. That the Project, which is commonly known as the _____Project, is located in Section _____ Township _____ Range _____, Boise Meridian, _____ County, Idaho.
5. That Engineer recognizes that the Agreement provides for the Project to furnish electrical energy to Idaho Power for a _____ year period.
6. That Engineer has substantial experience in the design, construction and operation of electric power plants of the same type as this Project.
7. That Engineer has no economic relationship to the Design Engineer of this Project.
8. That Engineer has reviewed and/or supervised the review of the Policy for Operation and Maintenance ("O&M") for this Project and it is his professional opinion that, said Project has been designed and built to appropriate standards, and adherence to said O&M Policy will result in the Project's producing at or near the design electrical output, efficiency and plant factor for the full Contact Term of _____ years.
9. That Engineer recognizes that Idaho Power, in accordance with paragraph 5.2 of the Agreement, is relying on Engineer's representations and opinions contained in this Statement.
10. That Engineer certifies that the above statements are complete, true and accurate to the best of his/her knowledge and therefore sets his/her hand and seal below.

DRAFT

By _____

(P.E. Stamp)

Date _____

DRAFT

ENGINEER'S CERTIFICATION

OF

ONGOING OPERATIONS AND MAINTENANCE

The undersigned _____, on behalf of himself/herself and _____ hereinafter collectively referred to as "Engineer," hereby states and certifies to the Seller as follows:

1. That Engineer is a Licensed Professional Engineer in good standing in the State of Idaho.
2. That Engineer has reviewed the Energy Sales Agreement, hereinafter referred to as the "Agreement," between Idaho Power as Buyer, and _____ as Seller, dated _____.
3. That the cogeneration or small power production project which is the subject of the Agreement and this Statement is identified as Idaho Power Company Facility No. _____ and hereinafter referred to as the "Project".
4. That the Project, which is commonly known as the _____Project, is located in Section _____ Township _____ Range _____, Boise Meridian, _____ County, Idaho.
5. That Engineer recognizes that the Agreement provides for the Project to furnish electrical energy to Idaho Power for a _____ year period.
6. That Engineer has substantial experience in the design, construction and operation of electric power plants of the same type as this Project.
7. That Engineer has no economic relationship to the Design Engineer of this Project.
8. That Engineer has made a physical inspection of said Project, its operations and maintenance records since the last previous certified inspection. The Engineer certifies, based on the Project's appearance and the information provided by the Project, that the Project's ongoing O&M has been completed in accordance with said O&M Policy; that it is in reasonably good operating condition; and it is in the Engineer's professional opinion that if adherence to said O&M Policy continues, the Project will continue producing at or near its design electrical output, efficiency and plant factor for the remaining _____ years of the Agreement.
9. That Engineer recognizes that Idaho Power, in accordance with paragraph 5.2 of the Agreement, is relying on Engineer's representations and opinions contained in this Statement.
10. That Engineer certifies that the above statements are complete, true and accurate to the best of his/her knowledge and therefore sets his/her hand and seal below.

DRAFT

By _____

(P.E. Stamp)

Date _____

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ENGINEER'S CERTIFICATION

OF

DESIGN & CONSTRUCTION ADEQUACY

The undersigned _____, on behalf of himself/herself and _____ hereinafter collectively referred to as "Engineer", hereby states and certifies to Idaho Power as follows:

1. That Engineer is a Licensed Professional Engineer in good standing in the State of Idaho.
2. That Engineer has reviewed the Energy Sales Agreement, hereinafter referred to as the "Agreement", between Idaho Power as Buyer, and _____as Seller, dated _____,_____.
3. That the cogeneration or small power production project, which is the subject of the Agreement and this Statement, is identified as Idaho Power Company Facility No _____ and is hereinafter referred to as the "Project".
4. That the Project, which is commonly known as the _____Project is located in Section _____ Township _____ Range _____, Boise Meridian, _____ County, Idaho.
5. That Engineer recognizes that the Agreement provides for the Project to furnish electrical energy to Idaho Power for a _____ year period.
6. That Engineer has substantial experience in the design, construction and operation of electric power plants of the same type as this Project.
7. That Engineer has no economic relationship to the Design Engineer of this Project and has made the analysis of the plans and specifications independently.
8. That Engineer has reviewed the engineering design and construction of the Project, including the civil work, electrical work, generating equipment, prime mover conveyance system, Seller furnished Interconnection Facilities and other Project facilities and equipment.
9. That the Project has been constructed in accordance with said plans and specifications, all applicable codes and consistent with Prudent Electrical Practices as that term is described in the Agreement.
10. That the design and construction of the Project is such that with reasonable and prudent operation and maintenance practices by Seller, the Project is capable of performing in accordance with the terms of the Agreement and with Prudent Electrical Practices for a _____ year period.
11. That Engineer recognizes that Idaho Power, in accordance with paragraph 5.2 of the Agreement, in interconnecting the Project with its system, is relying on Engineer's representations and opinions contained in this Statement.
12. That Engineer certifies that the above statements are complete, true and accurate to the best of his/her knowledge and therefore sets his/her hand and seal below.

DRAFT

By _____

(P.E. Stamp)

Date _____

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EXHIBIT 12

[RESERVED]

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EXHIBIT 13

REQUIRED INSURANCE

The Seller shall secure and continuously carry insurance as specified within this Appendix for the term of the Agreement.

Insurance Requirements:

1. All insurance required by this Agreement shall be placed with an insurance company with an A.M. Best Company rating of A- or better.

2. If the insurance coverage required in this Appendix is cancelled, materially changed or lapses for any reason, the Seller will immediately notify Idaho Power in writing. This notice will advise Idaho Power of the specific reason for cancellation, material change or lapse and the steps being taken to comply with these Insurance Requirements. Failure to provide this notice and to comply with these Insurance Requirements within 5 days of the cancellation, material change or lapse will constitute a material breach and Idaho Power may terminate this Agreement.

3. Prior to the First Energy date and subsequently within 10 days of the annual anniversary of the Operation Date, the Seller shall provide a Certificate of Insurance in the name of Idaho Power Company and list Idaho Power Company as an Additional Insured Endorsement and Waiver of Subrogation Endorsement.

4. The Certificate of Insurance shall evidence the appropriate insurance coverage of Comprehensive General Liability Insurance for both bodily injury and property damage with limits equal to $1,000,000, each occurrence, combined single limit. The deductible for such insurance shall be consistent with current Insurance Industry Utility practices for similar property.

Seller shall be entitled to self-insure these coverages with approval of Idaho Power, which shall not be unreasonable withheld, delayed or conditioned.

4.1 Periodic Review. Idaho Power may review this schedule of insurance as often as once every two (2) years. Idaho Power may in its discretion require Seller to make reasonable changes to the policies and coverages described in this Exhibit to the extent reasonably necessary to cause such policies and coverages to conform to the insurance policies and coverages typically obtained or required for power generation facilities comparable to the Facility at the time Idaho Power's review takes place.

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EXHIBIT 14

SELLER AUTHORIZATION TO RELEASE GENERATION DATA TO IDAHO POWER

[DATE]

Idaho Power
1221 W Idaho St
Boise, ID 83702
Email: energycontracts@idahopower.com

To Whom it May Concern:

_____ ("Seller") hereby voluntarily authorizes Idaho Power's Transmission business unit to share Seller's interconnection information with marketing function employees of Idaho Power, including but not limited to those in Power Supply. Seller acknowledges that Idaho Power did not provide it any preferences, either operational or rate-related, in exchange for this voluntary consent.

_____

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EXHIBIT 15

ATTACHMENTS

(Seller to provide to Buyer before the First Generation Date)

1. Site Map
2. As-Builts
3. Manufacturer's performance warranties
4. [Other]

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EXHIBIT 16

AS-BUILT SUPPLEMENT

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EXHIBIT 17

[NOT USED]

EXHIBIT 18

FORM OF CONSTRUCTION PROGRESS REPORT

Construction Progress Report
of
_____
("Seller")
provided to
[BUYER ENTITY]
("Buyer")
[Date]

Instructions.
Any capitalized terms used in this report which are not defined herein are defined in the Power Purchase Agreement by and between , ("Seller") and [BUYER ENTITY] dated _____, (the "Agreement").

Seller shall review the status of each milestone of the construction schedule for the Facility and Seller shall identify such matters referenced in clauses (i)-(v) below as known to Seller and which in Seller's reasonable judgment are expected to adversely affect the schedule, and with respect to any such matters, shall state the actions which Seller intends to take to ensure that the milestones will be attained by their required dates. Such matters may include:

(i) Any material matter or issue arising in connection with a Permit, or compliance therewith, with respect to which there is an actual or threatened dispute over the interpretation of an Applicable Law, actual or threatened opposition to the granting of a necessary Permit, any organized public opposition, any action or expenditure required for compliance or obtaining approval that Seller is unwilling to take or make, or in each case which could reasonably be expected to materially threaten or prevent financing of the Facility, attaining any milestone, or obtaining any contemplated agreements with other parties which are necessary for attaining any milestone or which otherwise reasonably could be expected to materially threaten Seller's ability to attain any milestone.

(ii) Any development or event in the financial markets or the independent power industry, any change in taxation or accounting standards or practices or in Seller's business or prospects which reasonably could be expected to materially threaten financing of the Facility, attainment of any milestone or materially threaten any contemplated agreements with other parties which are necessary for attaining any Milestone or could otherwise reasonably be expected to materially threaten Seller's ability to attain any milestone;

(iii) A change in, or discovery by Seller of, any legal or regulatory requirement which would reasonably be expected to materially threaten Seller's ability to attain any milestone;

(iv) Any material change in Seller's schedule for initiating or completing any material aspect of Facility;

(v) The status of any matter or issue identified as outstanding in any prior Construction Progress Report and any material change in Seller's proposed actions to remedy or overcome such matter or issue.

For guidance, each "overview" subsection shall include a summary of the status and progress of major activities associated with that section, whether planned, in progress, or completed, including relevant dates. Each "recent activities" subsection shall include details of activities during the previous month. Each "expected activities" subsection shall include a brief list of major activities planned for the current month.

Seller shall complete, certify, and deliver this form of Construction Progress Report to [_____], together with all attachments and exhibits, with copies of this report delivered to [_____].

1. Executive Summary

Please provide an overview of the Facility, including technology, size, location, and ownership. Please provide a brief chronological cumulative summary of the major activities completed for each of the following aspects of the Facility. Include the date each item was added to the summary:

1.1 Milestones

1.2 Permits

1.3 Financing

1.4 Property Acquisition

1.5 Design and Engineering

1.6 Major Equipment procurement

1.7 Construction

1.8 Interconnection

1.9 Startup

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2. Milestones

In this section, please include information on each significant milestone related to the Facility.

2.1 Milestone schedule

Please state the status and progress of each milestone. Provide the date of completion of completed milestone(s) and the expected date of completion of uncompleted milestone(s). The expected date is the current best estimate, and may change from time to time as better information becomes available.

2.2 Remedial Action Plan (applicable if Seller fails to achieve a milestone by the anticipated milestone date)

Please describe in detail any delays (actual or anticipated) beyond the scheduled milestone dates. Describe the cause of the delay (e.g., governmental approvals, financing, property acquisition, design activities, equipment procurement, Facility construction, interconnection, or any other factor). Describe Seller's remedial action plan which shall include detailed plans to achieve the missed milestone and subsequent milestones.

3. Permits

In this section, please include information on each of the Permits required for the construction of the Facility and the status thereof. List the applicable government agency, the type of application/approval requested, and the dates (expected or actual) of significant activity. Significant activity includes application submission, notice of complete application, notice of preparation, public hearing or comment period, draft documents or approvals, final documents or approvals, notice of determination, or issuance of permit. If the government agency maintains a website with information on the approval process for the Facility, please provide a link.

3.1 Environmental Impact Report/Statement (EIR/EIS) of Conditional Use Permit (CUP)

Please describe the environmental review process and each of the Permit(s) to be obtained for the Facility. Provide the status and completion date (expected or actual) of each significant activity in the process.

3.2 Other Permits

Please describe each of the other Permits to be obtained for the Facility. Provide the status and completion date (expected or actual) of each significant activity.

3.3 Recent Permit activities

Please describe in detail the Permit activities that occurred during the previous calendar month.

3.4 Expected Permit activities

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Please list all Permit activities that are expected to be performed during the current calendar month.

4. Financing Activities

In this section, please include information on each separate phase of financing for the Facility. Include information on debt, equity, or federal or state loans or grants.

4.1 Overview of financing activities

Please provide a summary of the status and progress of each major financing activity, including the date of execution of significant documents, and information on the expected timing of future significant activities.

4.2 Recent financing activities

Please describe in detail the financing activities that occurred during the previous calendar month.

4.3 Expected financing activities

Please list the financing activities that are expected to be performed during the current calendar month.

5. Property Acquisition Activities

In this section, please include information on property acquisition or site control activities for the Facility.

5.1 Overview of property acquisition activities

Please provide a summary of the status and progress of each major property acquisition activity, including the date of execution of significant documents, and information on the expected timing of future significant activities.

5.2 Recent property acquisition activities

Please describe in detail the property acquisition activities that occurred during the previous calendar month.

5.3 Expected property acquisition activities

Please list the property acquisition activities that are expected to be performed during the current calendar month.

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6. Design and Engineering Activities

In this section, please include information on the status of design and engineering for the Facility.

6.1 Overview of design activities

Please provide a summary of the status and progress of each major design or engineering activity, including dates of completion of significant activities and expected timing of future activities.

6.2 Recent design activities

Please describe in detail the design activities that occurred during the previous calendar month.

6.3 Expected design activities

Please list the design activities that are expected to be performed during the current calendar month.

7. Major Equipment Procurement

In this section, please include information on all major equipment to be procured for all portions of the Facility to be completed by Seller, including switchyards, substations and any other interconnection equipment, in addition to generating and auxiliary equipment.

7.1 Overview of major equipment procurement activities

For each type of equipment, list the number of each major item to be procured, the manufacturer, model number (if applicable), and rating. List the delivery schedule (expected or actual as applicable), breaking out the number of each item (to be) procured or delivered in each month.

7.2 Recent major equipment procurement activities

Please describe in detail the major equipment procurement activities that occurred during the previous calendar month.

7.3 Expected major equipment procurement activities

Please list the major equipment procurement activities that are expected to be performed during the current calendar month.

8. Construction Activities

In this section, please include information on the status of any construction-related factors that may affect the ability of the Facility to deliver the Storage Product. Include information on the Facility infrastructure, generating equipment, and major auxiliary equipment. Also include

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information on the substations, switchyards, gen-ties, telecommunications equipment or other interconnection facilities that are the direct responsibility of the Facility.

8.1 Overview of major construction activities

Please provide a summary of the status and progress of each major construction activity for all portions of the Facility, including a schedule showing expected or actual dates as applicable. Provide the name of the EPC Contractor, the date of execution of the EPC Contract, and the date of issuance of a Notice to Proceed (or equivalent). For each major type of equipment, break out the number of each item (to be) installed or commissioned in each month.

8.2 Recent construction activities

Please describe in detail the construction activities that occurred during the previous calendar month.

8.3 Expected construction activities

Please list the interconnection activities that are expected to be performed during the current calendar month.

8.4 EPC Contractor Progress Report

Please attach a copy of the progress reports received during the previous calendar month from the EPC Contractor pursuant to the construction contract between Seller and EPC Contractor, certified by the EPC Contractor as being true and correct as of the date issued.

8.5 Look-ahead construction schedule

Please provide a look-ahead construction schedule covering at least three months.

8.6 OSHA Recordables

Please list all OSHA recordables from the previous calendar month.

8.7 Work stoppages

Please describe any work stoppage from the previous calendar month and its effect on the construction schedule.

9. Interconnection Activities

In this section, please include information on interconnection-related factors that may affect the ability of the Facility to deliver Facility Energy. Include information on the status of interconnection studies, Interconnection Agreements, design and construction of interconnection facilities (e.g., substations, switchyards, gen-ties, system protection schemes,

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telecommunications equipment to the extent not already covered in the Facility construction information in Section 8), network upgrades, and grid outage or interconnection schedules.

9.1 Overview of interconnection activities

Please provide a summary of the status and progress of each major interconnection activity including dates of completion of significant activities and expected timing of future activities.

9.2 Recent interconnection activities

Please describe in detail the interconnection activities that occurred during the previous calendar month.

9.3 Expected interconnection activities

Please list the interconnection activities that are expected to be performed during the current calendar month.

10. Startup

In this section, please include information on the status of activities related to preparation for Commercial Operation, including equipment testing, commissioning, release to operations, requirements of the grid operator, and any other activities that must be conducted before the Facility may deliver Energy to the grid or declare Commercial Operation.

10.1 Overview of startup activities

Please provide a summary of the status and progress of each major startup activity including dates of completion of significant activities and expected timing of future activities.

10.2 Recent startup activities

Please describe in detail the startup activities that occurred during the previous calendar month.

10.3 Expected startup activities

Please list the startup activities that are expected to be performed during the current calendar month.

11. Other Information Reasonably Requested by Buyer

11.1 Litigation

Please list any communication received directly or indirectly from any third party that is in the nature of a threat of litigation, a litigation hold notice, a summons and complaint, or a

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commencement of a judicial, regulatory, or arbitration proceeding or investigation against Seller or concerning the Facility

11.2 [_____]

I, _____, on behalf of and as an authorized representative of _____, do hereby certify that any and all information contained in this Seller's Construction Progress Report is true and accurate, and reflects, to the best of my knowledge, the current status of the construction of the Facility as of the date specified below.

By:_____
Name:_____
Title:_____
Date:_____

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EXHIBIT 19

FORM OF OPERATIONS REPORT

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EXHBIT 20

[IDAHO POWER FORM OF WREGIS QRE AGREEMENT]

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EXHIBIT 21

FORM OF LENDER CONSENT

CONSENT AND AGREEMENT

This Consent and Agreement (this "Consent") is made and entered into as of ___ _, 20__, by and between Idaho Power Corporation ("Buyer"), and _____ ("Lender").

RECITALS

A. _____ ("Seller"), has entered into that certain Loan Agreement, dated as of __ __, 20__ (as amended, restated, supplemented, or otherwise modified from time to time, the "Loan Agreement"), with Lender in order to finance construction of a battery energy storage system owned by Seller and located at ____ (the "Project").

B. Seller and Buyer have entered into that certain Battery Storage Agreement, dated as of ____ (as amended, restated, supplemented or otherwise modified from time to time, the "BSA"), relating to the energy stored and discharged by the Project to supply the needs of Buyer's customers.

C. As part of the transactions contemplated by the Loan Agreement, Lender has received a pledge of all the limited liability company interests in Seller (the "Pledged Equity"), and Seller has collaterally assigned all of its rights, title and interests in, to and under the BSA (the "Pledged SA", collectively with the Pledged Equity, the "Assigned Interest") to Lender.

AGREEMENTS

NOW, THEREFORE, for and in consideration of the premises and the mutual covenants contained herein, and for other good and valuable consideration, the receipt, adequacy and legal sufficiency of which are hereby acknowledged, and intending to be legally bound hereby, the parties hereby agree as follows:

1. Consent to Assignment. Buyer hereby consents to the collateral assignment by Seller to Lender of the Pledged BSA and the pledge to Lender of the Pledged Equity and acknowledges the right of Lender to exercise Lender's rights and remedies as a secured creditor with respect to the Assigned Interest.

2. Pledged BSA Step-In. "Subsequent Seller Requirements" means an entity that (a) is acceptable to Buyer; (b) is not involved, and has no Affiliate involved, in any state or federal litigation or regulatory proceeding adverse to Buyer or any Affiliate of Buyer; (c) has, or has retained, a reputable entity acceptable to Buyer that has, at least five (5) years' experience in the operation and maintenance of battery energy storage facilities of comparable size to the Facility and the ability perform all aspects of the BSA; (d) has agreed in writing to be bound by the BSA and to assume all of Seller's obligations under the BSA; and (e) is not a Sanctioned Person. Buyer agrees that, if Lender has elected to exercise its rights and remedies to proceed against the

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Pledged BSA, and has so notified Buyer, then, if and only if (i) the hereinafter-defined Subsequent Seller meets all of the Subsequent Seller Requirements, (ii) Buyer is holding, and will be holding as of and after the date of assignment, the Project Development Security or Default Security, as applicable, and (iii) Buyer has not terminated this BSA pursuant to the terms thereof and of this Consent, then Lender or any assignee or designee of Lender, including Lender or any purchaser in a foreclosure sale or in lieu of foreclosure of the Pledged BSA (a "Subsequent Seller"), may be substituted for Seller under the BSA and Buyer shall recognize such Subsequent Seller as its counterparty under the BSA and, subject to all rights and remedies of Buyer under the BSA, continue to perform its obligations under the BSA in favor of such Subsequent Seller. Lender shall have no liability or obligation under the BSA as a result of this Consent except if Lender becomes a Subsequent Seller. Any Subsequent Seller succeeds to the interests and obligations of Seller and must comply with the BSA. The transfer of the BSA from Seller to a Subsequent Seller does not relieve or discharge Seller of its obligations and liabilities to Buyer which accrued prior to the date of such transfer.

3. Change of Control. Buyer hereby consents to both (i) the pledge of the Pledged Equity to Lender as part of the transactions contemplated by the Loan Agreement, and (ii) the transfer of such Pledged Equity, in connection with such an exercise of Lender's remedies against the Pledged Equity, to a Subsequent Seller that meets the Subsequent Seller Requirements, provided that Lender provides written notice to Buyer in advance of any such transfer.

4. Notice of Default. If Seller defaults in the performance of any of its obligations under the BSA, Lender may cure such default by the deadline provided therefor in the BSA. Buyer will not terminate the BSA before providing notice to Lender and giving Lender the opportunity to cure such default as follows: (a) with respect to payment defaults, or a default under Section 11.1(l) of the BSA, before the later of (i) ten (10) business days after Buyer's delivery of notice to Lender of such default or (ii) five (5) business days plus the number of days in the applicable cure period provided Seller in the BSA, and (b) with respect to other defaults (except those set forth in Section 11.1(e)-(j) of the BSA, for which no notice or extension is promised by Buyer herein), within the greater of (i) ninety (90) days or (ii) thirty (30) days plus the number of days in the applicable cure period provided Seller in the BSA following delivery of such notice from Buyer to Lender; provided, however, that such cure period in clause (b) may be extended by a reasonable period of time, not to exceed an additional ninety (90) days (or, with respect to an Event of Default under Section 11.1(c) of the BSA, to a date that is no greater than ninety (90) days after Buyer's delivery of notice to Lender of such default), if Lender has commenced and is diligently pursuing appropriate action to cure such non-monetary default; provided further, that to the extent that such default permits Lender to foreclose on its security interests in the Assigned Interest and Lender needs to gain possession of the Project in order to perform such cure, Buyer will allow an additional reasonable amount of time, not to exceed sixty (60) days, to permit Lender to do so.

5. BSA Termination. Buyer agrees that it shall not, without Lender's prior written consent, mutually agree with Seller to a voluntary termination of the BSA; provided that notwithstanding the foregoing, Buyer may terminate the BSA without Lender consent due to an

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uncured Event of Default under the BSA after the expiration of Lender's rights to cure under Section 4 hereof.

6. No Setoff. Notwithstanding any provision to the contrary set forth in this Consent, Lender may not use the Consent or any other setoff or other right set forth in the BSA as a basis for any action under, or nonperformance of, its obligations under any letter of credit naming Buyer or any affiliate as beneficiary, with respect to which the terms of such letter of credit shall control.

7. Certifications of Buyer. Buyer hereby certifies to Lender, as of the date hereof, that (i) the execution, delivery and performance by Buyer of this Consent and the BSA have been duly authorized by all necessary corporate action on the part of Buyer, (ii) each of this Consent and the BSA is in full force and effect and constitutes the legal, valid and binding obligation of Buyer, enforceable against Buyer in accordance with its terms, except as the enforceability thereof may be limited by bankruptcy, insolvency, reorganization or other similar laws affecting the enforcement of creditors' rights generally and general equitable principles, (iii) the BSA and the Acknowledgment of Consent and Agreement (attached hereto) with respect to this Consent are the only agreements between Seller and Buyer, (iv) a true and correct copy of the BSA is attached hereto as Exhibit A and the BSA has not been further amended, (v) Buyer is not in default of any of its obligations under the BSA, (vi) solely to the best of the actual knowledge of its employees with responsibility for administering the BSA, Seller is not in default of any of its obligations under the BSA, (vii) solely to the best of the actual knowledge of its employees with responsibility for administering the BSA, there are no material disputes between Buyer and Seller under the BSA, (viii) Buyer has not assigned any interest it has in the BSA, and Buyer has no notice of, and has not consented to, any previous assignment by Seller of all or any part of its rights under the BSA, (ix) there are no actions pending against Buyer as a debtor under any federal or state bankruptcy or insolvency laws, (x) there are no proceedings pending or, to Buyer's knowledge, threatened against or affecting Buyer before any court, governmental authority, or arbitration board or tribunal which could reasonably be expected to have a material adverse effect on the ability of Buyer to perform its obligations under the BSA, (xi) solely to the best of the actual knowledge of its employees with responsibility for administering the BSA, no event of Force Majeure has occurred, and (xii) subject to Seller's obligation to declare the Commercial Operation Date on or before the Guaranteed Commercial Operation date, solely to the best of the actual knowledge of Buyer's employees with responsibility for administering the BSA, no event or condition exists that would either immediately or with the passage of any applicable grace period or giving of notice, or both, enable either Buyer or Seller to terminate or suspend its obligations under the BSA.

8. Replacement Agreement. If the BSA is rejected or terminated as a result of any bankruptcy, insolvency, reorganization or similar proceeding affecting Seller, Buyer will, at the option of Lender exercised by providing written notice thereof to Buyer within forty-five (45) days after such rejection or termination, enter into a new agreement with Lender (or its designee or assignee) having identical terms as the BSA (subject to any conforming changes (none of which may include limitation of Buyer's remedies) necessitated by the substitution of the seller entity); provided that the following conditions shall apply: (i) the seller under the new agreement must meet the Subsequent Seller Requirements; (ii) the term under such new agreement shall be

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equal to the remaining balance of the term specified in the BSA and (iii) Lender (or its designee or assignee) shall have cured any then-existing payment or performance defaults by Seller under the BSA (other than the bankruptcy of Seller or a transfer of the Facility to Lender, or of Seller to Lender, that was in connection with Lender's foreclosure thereupon and in compliance with this Consent but that was not in compliance with Section 9.2 of the BSA).

9. Notices. All notices given under this Consent shall be in writing and shall be deemed effectively given: (a) upon personal delivery to the party to be notified; (b) one business day after deposit with a reputable overnight courier, prepaid for overnight delivery and addressed as set forth below, with a copy of the notice simultaneously emailed to each applicable recipient at the email address shown below; provided that the sending party receives a confirmation of delivery from the overnight courier service; or (c) three (3) business days after deposit with the U.S. Post Office, postage prepaid, certified with return receipt requested and addressed to the party to be notified at the address indicated for such party below with a copy of the notice simultaneously emailed to each applicable recipient at the email address shown below. The parties may designate alternative notice addresses upon ten (10) days' advance written notice to the other parties:

If to Seller:

With a copy to:

If to Buyer:

With copies to all of:

If to Lender:

With a copy to:

10. Successors and Assigns. This Consent shall be binding upon Buyer and Seller and their permitted successors and assigns.

11. Termination. Upon the satisfaction in full of Seller's obligations under the Loan Agreement (other than contingent indemnification and reimbursement obligations that survive repayment of the loans and advances, interest fees and other amounts owed under the Loan Documents): (a) Lender shall notify Buyer of such fact and (b) this Consent shall terminate without further action of the parties hereto. Additionally, upon Lender's consummation of all of its remedies available under this Consent, this Consent shall terminate without further action of the parties hereto.

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12. Waiver of Right to Jury Trial. TO THE FULLEST EXTENT PERMITTED BY LAW, EACH OF THE PARTIES HERETO WAIVES ANY RIGHT IT MAY HAVE TO A TRIAL BY JURY IN RESPECT OF LITIGATION DIRECTLY OR INDIRECTLY ARISING OUT OF, UNDER OR IN CONNECTION WITH THIS CONSENT. EACH PARTY FURTHER WAIVES ANY RIGHT TO CONSOLIDATE ANY ACTION IN WHICH A JURY TRIAL HAS BEEN WAIVED WITH ANY OTHER ACTION IN WHICH A JURY TRIAL CANNOT BE OR HAS NOT BEEN WAIVED.

13. Governing Law. This Consent will be governed by and construed in accordance with the laws of the State of New York, without giving effect to principles of conflicts of law.

14. Severability. If any provision of this Consent or the application thereof is determined by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions hereof, or the application of such provision to the parties hereto or circumstances other than those as to which it has been held invalid or unenforceable, shall remain in full force and effect and shall in no way be affected, impaired or invalidated thereby, so long as the economic or legal substance of the transactions contemplated hereby is not affected in any manner materially adverse to any party by the invalidity, unenforceability or nullification of the offensive provisions.

15. Amendment. This Consent may not be amended, modified, or changed in any respect except by an agreement in writing signed by Lender and Buyer. Nothing in this Consent amends or modifies the BSA.

16. Counterparts; Rules of Construction; Definitions. This Consent may be executed in one or more counterparts, each of which will be an original and all of which, when taken together, will constitute one and the same original agreement. All references made (a) in the neuter, masculine, or feminine gender are made in all such genders, and (b) in the singular or plural includes the plural or singular number as well. Any capitalized term used but not defined herein is defined in the BSA.

17. Third Party Rights. Nothing in this Consent, expressed or implied, is intended or shall be construed to confer upon, or give to any Person, other than Buyer and Lender, respectively, rights, remedies or claims, legal or equitable, under or by reason hereof, or any covenant or condition hereof; and this Consent and the covenants and agreements, here contained are and shall be held for the sole and exclusive benefit of Buyer and Lender.

18. Seller Acknowledgement of Consent and Agreement. Buyer's obligations under this Consent are conditioned upon the execution and delivery by Seller to Buyer of the Acknowledgment of Consent and Agreement attached hereto.

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IN WITNESS WHEREOF, the parties hereto have caused this Consent to be duly executed and delivered by their duly authorized signatories as of the date first above written.

IDAHO POWER COPRPORATION

By: _____
Name:_____
Title:_____

[LENDER]

By _____
Its _____

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ACKNOWLEDGEMENT OF CONSENT AND AGREEMENT

Reference is made to the Consent and Agreement dated as of _____ (the "Consent and Agreement") between Idaho Power Corporation (as "Buyer"), and _____ (as "Lender"). _____ as "Seller" under the BSA (as defined in the Consent and Agreement) hereby directs Buyer to pay any amounts payable by Buyer under the BSA, as and when required under the BSA, pursuant to the payment instructions delivered and effective as of or proximate to the date hereof, from Seller to Buyer, or as may otherwise be specified from time to time by Lender or Seller to Buyer in writing. Any payment made to Seller or as Buyer in good faith believes to have been directed by Seller or Lender shall discharge any obligation of Buyer to Seller with respect to the making of such payment. Seller, by its execution of this Acknowledgment of Consent and Agreement, acknowledges and agrees that, notwithstanding any term to the contrary in the BSA, Buyer and Lender may perform all acts or obligations as set forth in the Consent and Agreement, and Buyer may perform as set forth herein or as otherwise purportedly instructed by Lender, including, without limitation, the manner and place of any payments to be made by Buyer that would otherwise be required pursuant to the BSA, and further agrees and consents to the various agreements made by Buyer in the Consent and Agreement, issues or confirms the instructions contained in the Consent and Agreement or herein or as hereafter issued by Seller or Lender, agrees to indemnify Buyer for any damages or liabilities suffered in the performance of the Consent and Agreement or such instruction; and further agrees that none of the execution of the Consent and Agreement, the performance by Buyer or Lender of any of their respective obligations thereunder, the exercise of any of the rights of Buyer or Lender thereunder, or the acceptance by Buyer of performance of the BSA by any party acting at the direction of Seller, Lender, or a Subsequent Seller shall subject Buyer to liability to Seller or release Seller from any obligation of Seller under the BSA. Seller acknowledges that Buyer need not enter into any agreement in the nature of the Consent and Agreement with any of Seller's other lenders prior to the termination of the Consent and Agreement. Nothing in this Acknowledgment of Consent and Agreement or in the Consent and Agreement amends or modifies the BSA. Seller shall have no rights against Buyer, under the BSA or otherwise, arising out of or on account of the Consent and Agreement or Buyer's performance (or nonperformance) thereunder or of the instruction.

Agreed to and Accepted:

By:
Its:
Date:

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EXHIBIT 22

FORM OF ESTOPPEL CERTIFICATE

ESTOPPEL CERTIFICATE

This Estoppel Certificate ("Estoppel") is dated _____ __, 20__. Reference is made to that certain Battery Storage Agreement, dated as of _____ (the "BSA"), by and between Idaho Power Corporation ("Buyer"), and _____ ("Seller") concerning the storage and discharge of electrical energy and other services provided the battery energy storage system owned by Seller and located in ____ (the "Project"). This certificate is delivered by Buyer to _____ ("Investor") and _____ as Administrative Agent (as defined in the Consent defined below) ("Administrative Agent"). Capitalized terms used but not defined herein are defined in the BSA.

Buyer certifies that, as of the date hereof, that (i) the execution, delivery and performance by Buyer of this Estoppel and the BSA have been duly authorized by all necessary action on the part of Buyer, (ii) each of this Estoppel and the BSA is in full force and effect and constitutes the legal, valid and binding obligation of Buyer, enforceable against Buyer in accordance with its terms, except as the enforceability thereof may be limited by bankruptcy, insolvency, reorganization or other similar laws affecting the enforcement of creditors' rights generally and general equitable principles, (iii) the BSA and the Acknowledgment of Consent and Agreement dated _____ are the only agreements between Seller and Buyer, (iv) a true and correct copy of the BSA is attached hereto as Exhibit A and the BSA has not been further amended, (v) solely to the best of the actual knowledge of its employees responsible for administering the BSA, Buyer is not in default of any of its obligations under the BSA, (vi) solely to the best of the actual knowledge of its employees with responsibility for administering the BSA, Seller is not in default of any of its obligations under the BSA, (vii) solely to the best of the actual knowledge of its employees with responsibility for administering the BSA, there are no material disputes between Buyer and Seller under the BSA, (viii) Buyer has not assigned any interest it has in the BSA, and Buyer has no notice of, and has not consented to, any previous assignment by Seller of all or any part of its rights under the BSA, (ix) there are no actions pending against Buyer as a debtor under any federal or state bankruptcy or any other similar laws, (x) there are no proceedings pending or, to Buyer's knowledge, threatened against or affecting Buyer before any court, governmental authority, or arbitration board or tribunal which could reasonably be expected to have a material adverse effect on the ability of Buyer to perform its obligations under the BSA, (xi) solely to the best of the actual knowledge of its employees with responsibility for administering the BSA, no event of Force Majeure has occurred, and [(xii) subject to Seller's obligation to declare the Commercial Operation Date on or before the Guaranteed Commercial Operation Date, solely to the best of the actual knowledge of Buyer's employees with responsibility for administering the BSA][omit if estoppel delivered after COD], no event or condition exists that would either immediately or with the passage of any applicable grace period or giving of notice, or both, enable either Buyer or Seller to terminate or suspend its obligations under the BSA. Buyer disclaims any obligation to advise Investor or Administrative Agent of any changes to the foregoing.

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IN WITNESS WHEREOF, the undersigned has caused this Estoppel to be signed by its authorized signatory as of the date first set forth above.

IDAHO POWER CORPORATION

By: _____
Name:_____
Title:_____

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EXHIBIT 23

PERFORMANCE TESTS

Test Records: Seller shall record the results of each Performance Test, provide all raw data, records and results associated with each Performance Test, and submit a testing report detailing all results and findings of each Performance Test to Buyer within four (4) Business Days following completion of such Performance Test. During the performance of each Performance Test, the Facility shall be functioning in a manner to permit Buyer to remotely monitor, observe and independently verify the performance of the Facility through the Facility's remote monitoring and control systems.

Guaranteed Storage Availability Test

No later than forty-five (45) days prior to the Scheduled Commercial Operation Date, and no later than thirty (30) days following the conclusion of each Contract Year thereafter for the Settlement Term, the Storage Availability shall be at least _____ percent (_____%), calculated in accordance with the following procedure ("Guaranteed Storage Availability Test"):[6]

"**Storage Availability**" shall be calculated based upon the following formula:

- PH = period hours
- PMH = period planned maintenance hours
- GPC = Guaranteed Power Capacity
- PC = Available power capacity (MW) defined as battery power capability on-line and available for operation in either charge or discharge
- GEC = Guaranteed Rated Energy Capacity
- AC = Available energy capacity (MWh) defined as the battery energy storage capacity online and available for operation in either charge or discharge
- PAC = Period unavailable average capability, calculated as the normalized average of the maximum either energy storage capacity or power available during the period. A sample is not valid if during planned maintenance or a no-fault outage.

$$PAC = \sum \left(1 - min\left\{\frac{AC}{GEC}, \frac{PC}{GPC}\right\}\right)$$

- PFO = Period at-fault outage hours, defined as hours during which all or a portion of the available energy or power capacity is unavailable

[6] Note: The Facility will need to be operational in order to conduct the Storage Availability Test, and thereafter calculated annually in accordance with a procedure to be agreed upon by the Parties.

- PNFO = Period of not at fault (excused) outage hours, defined as hours during which all or a portion of the available energy or power capacity is unavailable due to no fault of Seller provided equipment

Therefore, Availability is calculated as the following:

$$Availability = 100 * \frac{(PH - PMH - PNFO - \sum[PFO * PAC])}{(PH - PMH - PNFO)}$$

Guaranteed Storage Capacity Test

No later than thirty (30) days prior to the Scheduled Commercial Operation Date, and no later than thirty (30) days following the conclusion of each Contract Year thereafter for the Settlement Term, the Facility shall be capable of the Guaranteed Storage Capacity. The Storage Capacity shall be calculated in accordance with the following procedure ("Guaranteed Storage Capacity Test"):

The "**Guaranteed Storage Capacity**" shall mean the guaranteed energy capacity (MWhAC) delivered over a full continuous discharge of the Facility at the Guaranteed Power Capacity (MW).

The "**Energy Capacity**" shall be defined as:

Energy Capacity = MVD

Where the following terms are defined as:

MV_D = Medium Voltage Main Meter reading during discharge cycle ("Gross Metering" in the metering configuration)

AX_D = Auxiliary Meter reading during the discharge cycle ("Aux Metering" in the metering configuration)

MV_C = Medium Voltage Main Meter reading during charge cycle ("Gross Metering" in the metering configuration)

AX_C = Auxiliary Meter reading during the charge cycle ("Aux Metering" in the metering configuration)

AXM = Maximum auxiliary energy consumed based on nameplate rating of the auxiliary power transformer(s)

The "**Guaranteed Storage Capacity**" shall mean the guaranteed Power Capacity set forth in the Agreement. The "**Power Capacity**" is defined as the Energy Capacity

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divided by the measured time required for discharge of the Guaranteed Storage Capacity. The metered instantaneous power shall be within +/- 2% of the guaranteed power for the duration of the guaranteed power capacity test, with infrequent momentary excursions from this band being acceptable.

Energy Capacity and Power Capacity shall be calculated by the following testing procedure:

i. Rest 2 hours with cell temperatures at 25-35 °C.
ii. Charge the batteries with 0.25 cp to its cut-off voltage, then charge via constant current – constant voltage method to full charge. Record the AC energy for both the Gross Metering (MV_C) and the Aux Metering (AX_C)
iii. Allow batteries to rest for up to 30 minutes
iv. Discharge the batteries with 0.25 cp to its cut-off voltage to starting SOC using constant current method. Record the AC energy for both the Gross Metering (MV_D) and the Aux Metering (AX_D)
v. Allow batteries to rest for up to 30 minutes
vi. Repeat steps (ii) through (iv) two (2) times in total

The "**Energy Capacity**" is calculated as

$$E_D = max\{MV_{D1} + AX_{D1} - AXM_1, MV_{D2} + AX_{D2} - AXM_2, MV_{D3} + AX_{D3} - AXM_3\}$$

Guaranteed Roundtrip Efficiency Test

No later than thirty (30) days prior to the Scheduled Commercial Operation Date, and no later than thirty (30) days following the conclusion of each Contract Year thereafter for the Settlement Term, the Facility shall be capable of the Guaranteed Roundtrip Efficiency. The Roundtrip Efficiency shall be conducted in accordance with the following procedure ("Guaranteed Roundtrip Efficiency Test"):

Roundtrip Efficiency Test shall be conducted in conjunction with the Guaranteed Storage Capacity Test.

The "**Roundtrip Efficiency**" is calculated as

$$RTE = max\left\{\frac{MV_{D1}+AX_{D1}}{MV_{C1}-AX_{C1}}, \frac{MV_{D2}+AX_{D2}}{MV_{C2}-AX_{C2}}, \frac{MV_{D3}+AX_{D3}}{MV_{C3}-AX_{C3}}\right\}$$

Where the following terms are defined as:

MV_D = Medium Voltage Main Meter reading during discharge cycle

MV_C = Medium Voltage Main Meter reading during charge cycle

AX_C = Auxiliary Meter reading during charge cycle

AX_D = Auxiliary Meter reading during discharge cycle

Charge Rate Test

No later than thirty (30) days prior to the Scheduled Commercial Operation Date, the Charge Rate Test shall be performed in accordance with the following procedure ("Charge Rate Test"):

The Facility, not including auxiliary power, must be designed and capable of charging at 100% of the proposed AC power and energy capacity at the POI.

The charge rate shall be determined as part of the Roundtrip Efficiency Test.

The charge rate shall be defined as the energy capacity divided by the time required to charge the Guaranteed Storage Capacity.

Charge Rate Guarantee = $(MVC - AXC)/T_{CH}$

Where the following terms are defined as:

MVC = Medium Voltage Main Meter ("Gross Metering") reading during charge cycle

T_{CH} = Total Time to Charge

AXC = Auxiliary Meter ("Aux Metering") reading during charge cycle

Ramp Rate Test

No later than thirty (30) days prior to the Scheduled Commercial Operation Date, the Ramp Rate Test shall be performed in accordance with the following procedure ("Ramp Rate Test"):

The Facility shall be capable of responding to input signals and reaching 98% of full power charging and discharging within 200 ms. The Response Time Test is conducted concurrent with the Ramp Rate Test.

Response Time Test

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No later than thirty (30) days prior to the Scheduled Commercial Operation Date, the Response Time Test shall be performed in accordance with the following procedure ("Response Time Test"):

The Facility shall be capable of responding to input signals and responding within 200 ms for the Term.

The response shall be defined as the time required for the Facility output to transition from no discharge to full rated discharge and from no charge to full rated charge when the breakers are closed and the system is on-line.

The start time shall be when the signal is received at the Facility boundary, and the end time shall be when the measured discharge power reaches 100% ±2% of the rated power when the breakers are closed and the system is on-line.

Auxiliary Load Test

No later than thirty (30) days prior to the Scheduled Commercial Operation Date, the Auxiliary Load Test shall be performed in accordance with the following procedure ("Auxiliary Load Test"):

The maximum instantaneous auxiliary power consumption of the Facility will be lower than the rating of the auxiliary power transformer. Seller shall guarantee the maximum amount of auxiliary load to be consumed by the Facility, expressed in kW, measured at the auxiliary load meter.

The auxiliary load test condition, including but not limited to ambient temperature, duty cycle will be agreed upon by Buyer and Seller. Correction curves will be allowed with the concurrence of both Parties.

Auxiliary Load Guarantee = $(Max\{AXC, AXD, AXS\})$

Where the following terms are defined:

AXC = Auxiliary Meter maximum power reading during charge cycle

AXD = Auxiliary Meter maximum power reading during discharge cycle

AXS = Auxiliary Meter maximum power reading during standby

Power Factor Test

No later than thirty (30) days prior to the Scheduled Commercial Operation Date, the Power Factor Test shall be performed in accordance with the following procedure ("Power Factor Test"):

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In accordance with Exhibit A, the power factor during charge and discharge operation shall be controlled to ± 0.95 at the POI, except as may be provided in a Subsequent Purchase Order. The sizing and design requirements to meet Buyer power factor requirements.

Details of the testing will depend on Facility Site reactive power constraints and will be determined as a part of Facility Site design. Testing shall meet MRO MOD-025-02 including:

- At the real power rating equal to the real power rating of the Facility Site (i.e. ±0.95 PF at 25 MW for a 25 MW rated site)
- Testing of active power under charge and discharge conditions

Testing shall be done with approval of and in coordination with WECC and Buyer.

Noise Test

No later than thirty (30) days prior to the Scheduled Commercial Operation Date, the Noise Test shall be performed in accordance with the following procedure ("Noise Test"):

The noise shall be less than 85 decibels on the A weighted scale at a distance of 1 meter along the perimeter of the Facility. Sound shall be measured at 1.5 meters above the grade elevation.

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Respondent shall review and redline the following draft agreement into the submitted proposal for the specific product type and ownership structure as defined in this RFP.

This draft Exhibit H is not comprehensive and does not constitute a binding offer, shall not form the bases for an agreement by estoppel nor otherwise, and is not conditions upon each party's receipt of all requirement management approvals (including final credit and legal approval) and all regulatory approvals. Any actions taken by a party in reliance on the terms set forth in this working draft or on statements made during negotiations pursuant to this working draft shall be at that party's own risk. Until this agreement is negotiated, approved by management, executed, delivered, and approved by all required regulatory bodies, no party shall have any other legal obligations, expressed or implied, or arising in any other manner under this working draft or in the course of negotiations.

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POWER PURCHASE AGREEMENT

BETWEEN

_____

AND

IDAHO POWER COMPANY

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EXHIBITS

THIS WORKING DRAFT DOES NOT CONSTITUTE A BINDING OFFER, SHALL NOT FORM THE BASIS FOR AN AGREEMENT BY ESTOPPEL OR OTHERWISE, AND IS CONDITIONED UPON EACH PARTY'S RECEIPT OF ALL REQUIRED MANAGEMENT APPROVALS (INCLUDING FINAL CREDIT AND LEGAL APPROVAL) AND ALL REGULATORY APPROVALS. ANY ACTIONS TAKEN BY A PARTY IN RELIANCE ON THE TERMS SET FORTH IN THIS WORKING DRAFT OR ON STATEMENTS MADE DURING NEGOTIATIONS PURSUANT TO THIS WORKING DRAFT SHALL BE AT THAT PARTY'S OWN RISK. UNTIL THIS AGREEMENT IS NEGOTIATED, APPROVED BY MANAGEMENT, EXECUTED, DELIVERED AND APPROVED BY ALL REQUIRED REGULATORY BODIES, NO PARTY SHALL HAVE ANY OTHER LEGAL OBLIGATIONS, EXPRESSED OR IMPLIED, OR ARISING IN ANY OTHER MANNER UNDER THIS WORKING DRAFT OR IN THE COURSE OF NEGOTIATIONS.

POWER PURCHASE AGREEMENT

THIS POWER PURCHASE AGREEMENT (this "Agreement"), dated as of _____, 202_, (the "Effective Date"), is entered into between _____ (the "Seller") and Idaho Power Company, an Idaho corporation ("Idaho Power" or "Buyer"). Seller and Idaho Power are sometimes hereinafter referred to collectively as the "Parties" and individually as a "Party."

WHEREAS, Seller intends to construct, own, operate and maintain a solar powered generation facility for the generation of electric energy located in [_____ ____], [Idaho] with an Expected Nameplate Capacity Rating (as defined below) of [____] MW (AC) (the "Facility").

WHEREAS, Seller desires to sell, and Idaho Power desires to purchase, the Net Output and Green Tags (as defined below) delivered by the Facility in accordance with the terms and conditions hereof.

WHEREAS,

NOW, THEREFORE, in consideration of the foregoing and the mutual promises set forth below and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties mutually agree as follows:

SECTION 1
DEFINITIONS, RULES OF INTERPRETATION

Defined Terms. Unless otherwise required by the context in which any term appears, initially capitalized terms used herein shall have the following meanings:

1.1 "Abandonment" means (a) the relinquishment of all possession and control of the Facility by Seller, other than pursuant to a transfer permitted under this Agreement, or (b) if after commencement of the construction, testing, and inspection of the Facility, and prior to

the Commercial Operation Date, there is a complete cessation of the construction, testing, and inspection of the Facility for ninety (90) consecutive days by Seller and Seller's contractors, but only if such relinquishment or cessation is not caused by or attributable to an Event of Default by Idaho Power, a request by Idaho Power, or an event of Force Majeure.

1.2 "AC" means alternating current.

1.3 "Affiliate" means, with respect to any entity, each entity that directly or indirectly controls, is controlled by, or is under common control with, such designated entity, with "control" meaning the possession, directly or indirectly, of the power to direct management and policies, whether through the ownership of voting securities or by contract or otherwise.

1.4 "Agreement" is defined in the opening paragraph hereto.

1.5 "As-built Supplement" is a supplement to be added to Exhibit 16 that describes the Facility as actually built, pursuant to Section 7.1 and includes an American Land Title Association survey of the Premises.

1.6 "Anything of Value" includes, but is not limited to, cash or a cash equivalent (including "grease", "expediting" or facilitation payments), discounts, rebates, gifts, meals, entertainment, hospitality, use of materials, facilities or equipment, transportation, lodging, or promise of future employment.

1.7 "Book Value" means cost minus accumulated depreciation, and not deducting for debt or other encumbrances, calculated in accordance with generally accepted accounting principles consistently applied.

1.8 "Business Day" means any Monday through Friday except NERC recognized holidays beginning at 6:00 a.m. and ending at 5:00 p.m. local time in Boise, Idaho.

1.9 "Capacity Rights" means any current or future defined characteristic, certificate, tag, credit, reactive power, ancillary service or attribute thereof, or accounting construct, including any of the same counted towards any current or future resource adequacy or reserve requirements, associated with the electric generation capability and capacity of the Facility or the Facility's capability and ability to produce energy. Capacity Rights are measured in MW and do not include any Tax Credits, or any other tax incentives existing now or in the future associated with the construction, ownership or operation of the Facility.

1.10 "Change of Control" means, with respect to Seller, any transaction or series of transactions following which Seller's Parent Entity no longer directly or indirectly (i) remains the owner of more than fifty percent (50%) of the direct or indirect equity or voting interests of Seller which are not otherwise held by Seller's Lenders (excluding any Tax Equity Investors), or (ii) retains the power to control the management and policies of

Seller; provided, however, that a Seller Permitted Transfer shall not be a Change of Control.

1.11 "Commercial Operation" means that not less than the Required Percentage of the Expected Nameplate Capacity Rating of the Facility is fully operational and reliable and the Facility is fully interconnected, fully integrated, and synchronized with the System, all of which shall be Seller's responsibility to receive or obtain, and without limiting Seller's other obligations under this Agreement, which occurs when all of the enumerated events listed in Section 4.2 (a) have occurred, and (b) remain simultaneously true and accurate as of the date and moment on which Seller gives Idaho Power written notice that Commercial Operation has occurred:

1.12 "Commercial Operation Date" means the day commencing at 00:01 hours, Mountain Time, following the day that all requirements of Section 4 have been completed and after the Seller requested Operation Date.

1.13 "Confidential Business Information" is defined in Section 25.1.

1.14 "Construction Progress Report" is defined in Section 3.2.1.

1.15 "Contract Interest Rate" means the lesser of (a) the highest rate permitted under Requirements of Law or (b) 200 basis points per annum plus the rate per annum equal to the publicly announced prime rate or reference rate for commercial loans to large businesses in effect from time to time quoted by Citibank, N.A. as its "prime rate." If a Citibank, N.A. prime rate is not available, the applicable prime rate shall be the announced prime rate or reference rate for commercial loans in effect from time to time quoted by a bank with $10 billion or more in assets in New York City, N.Y., selected by the Party to whom interest is being paid.

1.16 "Contract Price" means the applicable price, expressed in dollars per MWh for Net Output, Green Tags and Capacity Rights stated in Section 6.1.

1.17 "Contract Year" means any consecutive 12-month period during the Term, commencing at 00:00 hours on the Commercial Operation Date or any of its anniversaries and ending at 24:00 hours on the last day of such 12-month period.

1.18 "Costs" means, with respect to the non-defaulting Party, (a) brokerage fees, commissions and other similar third party transaction costs and expenses reasonably incurred by such Party either in terminating any arrangement entered into pursuant to this Agreement or entering into new arrangements which replace this Agreement and (b) all reasonable attorneys' fees and expenses incurred by the non-defaulting Party in connection with the termination of this Agreement.

1.19 "CPCN" means Certificate of Public Convenience and Necessity.

1.20 "Credit Requirements" means (a) three (3) years of audited financial statements, a view

of the financial position and financial performance, financial statement analysis and financial trend analysis; (b) Debt Agency Ratings - a senior, unsecured long term debt rating (or corporate rating if such debt rating is unavailable) of BBB+ or greater from S&P, or Baa1 or greater from Moody's, and if such ratings are split, the lower of the two ratings must be at least 'BBB+' or 'Baa1' from S&P or Moody's, respectively. Idaho Power performs a credit analysis, which considers both qualitative and quantitative factors, to determine whether potential Counterparties have satisfied the Credit Requirements.

1.21 "Customer" means [_____]and its permitted successors and assigns.

1.22 "default" is defined in Section 12.1.

1.23 "Default Security" is defined in Section 9.2.1.

1.24 "Deficit Damages" means a one-time payment equal to (a) the difference between (i) Expected Nameplate Capacity Rating and (ii) the Nameplate Capacity Rating of the Facility on the 120th day after the Guaranteed Commercial Operation Date, stated in MWs, multiplied by (b) $150,000.

1.25 "Delay Damages" means for any given day the amount equal to $400 multiplied by the Expected Nameplate Capacity Rating in MW.

1.26 "Effective Date" is the date stated in the opening paragraph hereto which represents the date upon which this Agreement was fully executed by both Parties.

1.27 "Electric System Authority" means each of NERC, WECC, WREGIS, an RTO, a regional or sub-regional reliability council or authority, and any other similar council, corporation, organization or body of recognized standing with respect to the operations of the electric system in the WECC region, as such are applicable to the Seller or Idaho Power.

1.28 "Emissions Reduction Credit" means any credit, allowance or instrument issued or issuable by a Governmental Authority under regulations of the Environmental Protection Agency under the Clean Air Act.

1.29 "Energy Imbalance Market" means the California Independent System Operator's Western Energy Imbalance Market.

1.30 "Environmental Attributes" means the environmental and other attributes as may exist from time to time that differentiate the Project or its Project Energy from energy generated by fossil fuel or nuclear powered generating units, and any and all claims, credits, benefits, emissions reductions, offsets, and allowances, howsoever entitled, attributable to the generation from the Project, and its displacement of conventional energy generation, or resulting from the avoidance of the emission of any gas, chemical, or other substance to the air, soil or water. Environmental Attributes include but are not

limited to: (a) any avoided emissions of pollutants to the air, soil, or water such as (subject to the foregoing) sulfur oxides (SOx), nitrogen oxides (NOx), carbon monoxide (CO), and other pollutants; (b) any avoided emissions of carbon dioxide (CO2), methane (CH4), and other greenhouse gases (GHGs) that have been determined by the United Nations Intergovernmental Panel on Climate Change or any Governmental Authority to contribute to the actual or potential threat of altering the Earth's climate by trapping heat in the atmosphere; (c) and Emission Reduction Credits; (d) any cryptocurrency, blockchain, and similar or related matters, items commodities, tokens, or anything of actual, potential, or theoretical value related to, measured by, or associated with anything produced by Facility Energy and (e) credits, benefits or allowances resulting from the compliance of the Facility or Facility Energy with the laws, rules and standards of the United Nations Framework Convention on Climate Change (the "UNFCCC") or the Kyoto Protocol of the UNFCCC or crediting "early action" with a view thereto. Environmental Attributes do not include (i) the ITC or any other Tax Credits, or certain other tax incentives existing now or in the future associated with the construction, ownership or operation of the Facility, (ii) matters designated by Idaho Power as sources of liability, or (iii) adverse wildlife or environmental impacts.

1.31 "Environmental Contamination" means the introduction or presence of Hazardous Materials at such levels, quantities or location, or of such form or character, as to constitute a violation of federal, state or local laws or regulations, and present a material risk under federal, state or local laws and regulations that the Premises will not be available or usable for the purposes contemplated by this Agreement.

1.32 "Event of Default" is defined in Section 12.1.

1.33 "Expected Energy" means _____MWh of Net Output in the first, full Contract Year, reduced by an annual degradation factor of 0.3 percent per Contract Year, measured at the Point of Delivery, which is Seller's best estimate of the projected long-term average annual Net Output production, based upon typical solar conditions at the Facility as determined by a Solar Performance Modeling Program, delivered to the Point of Delivery and the Expected Nameplate Capacity Rating. Seller estimates that the Net Output will be delivered during each Contract Year according to the estimates of Monthly Net Output set forth in Exhibit 4. If at Final Completion the Facility's Nameplate Capacity Rating is less than the Expected Nameplate Capacity Rating, Expected Energy shall be reduced proportionally per year for each full MW of Nameplate Capacity Rating below the Expected Nameplate Capacity Rating. Seller acknowledges that Idaho Power will include Expected Energy in Idaho Power's resource planning. Idaho Power acknowledges that solar insolation is variable and that the Facility's actual annual output of Net Output in the ordinary course in any given year will be subject to variation caused by differences in the actual solar insolation at the Facility from year to year and month to month.

1.34 "Expected Nameplate Capacity Rating" means [____] MW (AC). The expected maximum instantaneous generation capacity of the Facility.

1.35 "Facility" is defined in the Recitals and is more fully described in attached Exhibit 2 and

includes the photovoltaic power generating equipment, including panels, arrays, tracking system (if applicable), inverters, and all other equipment, devices, associated appurtenances owned, controlled, operated and managed by Seller in connection with, or to facilitate, the production, generation, transmission, delivery, or furnishing of electric energy by Seller to Idaho Power and required to interconnect with the System and Seller's interests in the Premises, including Leases and any fee owned real property.

1.36 "FERC" means the Federal Energy Regulatory Commission.

1.37 "Final Completion" means the Facility is fully operational and reliable, at or greater than the Required Percentage of the Expected Nameplate Capacity Rating, and fully interconnected, fully integrated, and synchronized with the Transmission Provider's System, modified if necessary to reflect the Nameplate Capacity Rating and, if applicable, through completion of all the items set forth on the Final Completion Schedule.

1.38 "Final Completion Schedule" means the full list of all items to be completed in order to achieve Final Completion, See Section 4.2, Commercial Operation Date.

1.39 "First Generation Date" means the day commencing at 00:01 hours, Mountain Time, following the day that Seller has satisfied the requirements of Section 3 and after the Seller requested First Generation Date.

1.40 "Force Majeure" and "event of Force Majeure" are defined in Section 15.1.

1.41 "Forced Outage" means NERC Event Types U1, U2 and U3, as set forth in attached Exhibit 6, and specifically excludes any Maintenance Outage or Planned Outage.

1.42 "Forward Settlement Amount" means, with respect to the non-defaulting Party, the net Losses and Gains, and Costs, expressed in U.S. Dollars, which such Party incurs as a result of the termination of this Agreement plus all amounts then owed to the non-defaulting Party by the defaulting Party. If the non-defaulting Party's aggregate Gains exceed its aggregate Losses and Costs, if any, resulting from the termination of this Agreement, the Forward Settlement Amount shall be zero.

1.43 "Gains" means, with respect to any Party, an amount equal to the present value of the economic benefit to it, if any (exclusive of Costs), resulting from the early termination of this Agreement for the remainder of the Term that would have occurred but for the occurrence of the Event of Default and early termination, determined in a commercially reasonable manner.

1.44 "Generator Interconnection Agreement" or "GIA" means the large generator interconnection agreement entered into separately between Seller and Interconnection Provider concerning the Interconnection Facilities.

1.45 "GOLC" or "Generator Output Limit Control" means the equipment and capability of an

electric generation facility to automatically adjust the generation quantity.

1.46 "GOLC Set-Point" means the analog or digital signal sent to the Facility by Idaho Power, the Interconnection Provider, the Transmission Provider or the Market Operator representing the maximum Net Output for the Facility.

1.47 "Government Official" means any official or employee of any multinational, national, regional, or local government in any country, including any official or employee of any government department, agency, commission, or division; any official or employee of any government-owned or -controlled enterprise; any official or employee of any public educational, scientific, or research institution; any political party or official or employee of a political party; any candidate for public office; any official or employee of a public international organization; and any person acting on behalf of or any relatives, family, or household members of any of those listed above.

1.48 "Governmental Authority" means any supranational, federal, state or other political subdivision thereof, having jurisdiction over Seller, Idaho Power or this Agreement, including any municipality, township or county, and any entity or body exercising executive, legislative, judicial, regulatory or administrative functions of or pertaining to government, including any corporation or other entity owned or controlled by any of the foregoing.

1.49 "Green Tags" means (a) the Environmental Attributes associated with all Output, together with (b) the Green Tag Reporting Rights associated with such energy and Environmental Attributes, however commercially transferred or traded under any or other product names, such as "Renewable Energy Credits," "Green-e Certified," or otherwise. One Green Tag represents the Environmental Attributes made available by the generation of one MWh of electric energy from the Facility.

1.50 "Green Tags Price Component" means the greatest of: (1) the price for Green Tags determined by arithmetically averaging quotes for Green Tags from three nationally recognized independent Green Tag brokers selected by Idaho Power pursuant to which Idaho Power could reasonably purchase substitute Green Tags similar to those Green Tags that Seller failed to deliver, with delivery terms, vintage period and any renewable program certification eligibility that are similar to those contained herein, calculated as of the date of default or as soon as reasonably possible thereafter; (2) if after the Effective Date a liquid market for Green Tags exists, the price established for Green Tags from the established liquid market for Green Tags in a form and location that Idaho Power determines reasonably states the market value of the Green Tags delivered hereunder; or (3) Five Dollars ($5.00) per Green Tag.

1.51 "Green Tag Reporting Rights" means the exclusive right of a purchaser of Environmental Attributes to report ownership of Environmental Attributes in compliance with federal or state law, if applicable, and to federal or state agencies or other parties at such purchaser's discretion, including under any present or future domestic, international, or foreign emissions trading program or renewable portfolio standard.

1.52 "Guaranteed Commercial Operation Date" means the date that is ninety (90) days after the Scheduled Commercial Operation Date.

1.53 "Hazardous Materials" means any waste or other substance that is listed, defined, designated or classified as or determined to be hazardous under or pursuant to any environmental law or regulation.

1.54 "Idaho Power" and "Buyer" are defined in the opening paragraph, and explicitly excludes Idaho Power Transmission.

1.55 "Idaho Power's Cost to Cover" means the positive difference, if any, between (a) the sum of (i) the time weighted average of the Market Price Index for each day for which the determination is being made, plus (ii) the Green Tags Price Component, and (b) the Contract Price specified in Exhibit 5 in effect on such days, stated as an amount per MWh. If on a given day (or month in the case of calculating Output Shortfall) the difference between (a) minus (b) referenced above is zero or negative, then Idaho Power's Cost to Cover shall be zero dollars ($0), and Seller shall have no obligation to pay any amount to Idaho Power on account of Section 7.12.3 or Section 12.2.1 with respect to such day (or month in the case of calculating Output Shortfall).

1.56 "Idaho Power Indemnitees" is defined in Section 13.1.1.

1.57 "Idaho Power Representatives" is defined in Section 7.13.

1.58 "Idaho Power Transmission" means Idaho Power Company, an Idaho corporation, acting in its interconnection or transmission function capacity.

1.59 "Indemnified Party" is defined in Section 7.2.3.2.

1.60 "Indemnifying Party" is defined in Section 7.2.3.2.

1.61 "Interconnection Facilities" means all the facilities installed, or to be installed, for the purpose of interconnecting the Facility to the System, including electrical transmission lines, upgrades, transformers and associated equipment, substations, relay and switching equipment, and safety equipment.

1.62 "Interconnection Provider" means Idaho Power Transmission.

1.63 "Inverter" means the equipment installed at the Facility to convert direct current from the Solar Panels to AC, as described in Exhibit 2.

1.64 "IPUC" means the Idaho Public Utilities Commission.

1.65 "IRP" means Idaho Power's Integrated Resource Plan.

1.66 "ITC" means the investment tax credit established pursuant to Section 48 of the Internal Revenue Code, as such law may be amended or superseded.

1.67 "Leases" means the memoranda of lease and redacted leases recorded in connection with the development of the Facility, as the same may be supplemented, amended, extended, restated, or replaced from time to time.

1.68 "Lender" means an entity lending money or extending credit (including any financing lease, monetization of tax benefits, transaction with a tax equity investor, backleverage financing or credit derivative arrangement) to Seller or Seller's Affiliates (a) for the construction, term or permanent financing or refinancing of the Facility; (b) for working capital or other ordinary business requirements for the Facility (including for the maintenance, repair, replacement or improvement of the Facility); (c) for any development financing, bridge financing, credit support, and related credit enhancement in connection with the development, construction or operation of the Facility; or (d) for the purchase of the Facility and related rights from Seller.

1.69 "Letter of Credit" means an irrevocable standby letter of credit in a form reasonably acceptable to Idaho Power, naming Idaho Power as the party entitled to demand payment and present draw requests thereunder that:

1.69.1 is issued by a Qualifying Institution;

1.69.2 by its terms, permits Idaho Power to draw up to the face amount thereof for the purpose of paying any and all amounts owing by Seller hereunder;

1.69.3 permits Idaho Power to draw the entire amount available thereunder if such letter of credit is not renewed or replaced at least thirty (30) days prior to its stated expiration date;

1.69.4 permits Idaho Power to draw the entire amount available thereunder if such letter of credit is not increased or replaced as and when provided in Section 9;

1.69.5 is transferable by Idaho Power to any party to which Idaho Power may assign this Agreement; and

1.69.6 shall remain in effect for at least ninety (90) days after the end of the Term.

1.70 "Liabilities" is defined in Section 13.1.1.

1.71 "Licensed Professional Engineer" means a person proposed by Seller and acceptable to Idaho Power in its reasonable judgment who (a) to the extent mandated by Requirements of Law is licensed to practice engineering in the appropriate engineering discipline for the required certification being made, in the state of Idaho, (b) has training and experience in the engineering disciplines relevant to the matters with respect to which such person is called upon to provide a certification, evaluation or opinion, (c) has no

economic relationship, association, or nexus with Seller and is not an employee of its members or Affiliates, other than with the prior written consent of Idaho Power, for services previously or currently being rendered to Seller or its members or Affiliates, and (d) is not a representative of a consulting engineer, contractor, designer or other individual involved in the development of the Facility, or a representative of a manufacturer or supplier of any equipment installed in the Facility.

1.72 "Losses" means, with respect to any Party, an amount equal to the present value of the economic loss to it, if any (exclusive of Costs), resulting from the termination of this Agreement for the remainder of the Term that would have occurred but for the occurrence of the Event of Default and early termination of this Agreement, determined in a commercially reasonable manner. If Seller is the non-defaulting Party, "Losses" will exclude the loss, repayment or recapture of any Tax Credits. If Buyer is the non-defaulting Party, "Losses" will include Buyer's cost of replacing this Agreement with an agreement for new renewable capacity from a facility with similar technology that has not yet been constructed.

1.73 "Maintenance Outage" means NERC Event Type MO, as set forth in attached Exhibit 6, and includes any outage involving ten percent (10%) of the Facility's Net Output that is not a Forced Outage or a Planned Outage.

1.74 "Market Operator" means the California Independent System Operator or any other entity performing the market operator function for the Energy Imbalance Market.

1.75 "Market Price Index" means 82.4% of the monthly arithmetic average of each day's Intercontinental Exchange ("ICE") daily firm Mid-C Peak Avg and Mid-C Off-Peak Avg index prices in the month as follows:

The actual calculation being:

$$.824 * \left(\sum_{X=1}^{n} \{(\text{ICE Mid-C Peak Avg}_x * \text{HLH hours for day}) + (\text{ICE Mid-C Off-Peak Avg}_x * \text{LLH hours for day})\} / (n*24) \right)$$

where n = number of days in the month

If the ICE Mid-C Index prices are not reported for a particular day or days, prices derived from the respective averages of HLH and LLH prices for the immediately preceding and following reporting periods or days shall be substituted into the formula stated in this definition and shall therefore be multiplied by the appropriate respective numbers of HLH and LLH Hours for such particular day or days with the result that each hour in such month shall have a related price in such formula. If the day for which prices are not reported has in it only LLH Hours (for example a Sunday), the respective averages shall use only prices reported for LLH hours in the immediately preceding and following reporting periods or days. If the day for which prices are not reported is a Saturday or Monday or is adjacent on

the calendar to a holiday, the prices used for HLH Hours shall be those for HLH hours in the nearest (forward or backward) reporting periods or days for which HLH prices are reported

1.76 "Marketing Communications Agreement" means an agreement substantially in the form of Exhibit "xx" attached hereto, with such revisions as may be mutually agreed upon by Seller, Customer, and Buyer.

1.77 "Maximum Delivery Rate" means the maximum hourly rate of delivery of Net Output in MWh from the Facility to the Point of Delivery, calculated on the basis of the Net Output delivered in an hour accruing at an average rate equivalent to the actual Nameplate Capacity Rating.

1.78 "Moody's" means Moody's Investor Services, Inc.

1.79 "Mountain Prevailing Time" or "MPT" means Mountain Standard Time or Mountain Daylight Time, as applicable in Idaho on the day in question.

1.80 "MW" means megawatt.

1.81 "MWh" means megawatt hour.

1.82 "Nameplate Capacity Rating" means the maximum installed instantaneous generation capacity of the completed Facility, expressed in MW (AC), when operated in compliance with the Generator Interconnection Agreement and consistent with the recommended power factor and operating parameters provided by the manufacturer of the Solar Panels and Inverters, as set forth in a written notice from Seller to Idaho Power delivered prior to the Commercial Operation Date and, if applicable, updated in a subsequent written notice from Seller to Idaho Power as required for Final Completion. The Nameplate Capacity Rating of the Facility shall not exceed the Expected Nameplate Capacity Rating.

1.83 "NERC" means the North American Electric Reliability Corporation.

1.84 "Net Output" means all electric energy and capacity produced by the Facility, less station use and less transformation and transmission losses and other adjustments (e.g., Seller's load other than station use), if any. For purposes of calculating payment under this Agreement, Net Output of electric energy shall be the amount of electric energy flowing through the Point of Delivery.

1.85 "Network Resource" is defined in the Tariff.

1.86 "Network Service Provider" means Idaho Power Transmission, as a provider of network service to Idaho Power under the Tariff.

1.87 "Non-Compensable Curtailment" is defined in Section 5.4.1.

1.88 "Offer Notice" is defined in Section 8.2.

1.89 "Offered Interests" is defined in Section 8.4.1.

1.90 "Off-Peak Hours" or "LLH" means the daily hours from hour ending 2300 – 0600 MPT, (8 hours), plus all other hours on all Sundays and NERC designated holidays.

1.91 "On-Peak Hours" or "HLH" means the daily hours from hour ending 0700 - 2200 MPT, (16 hours), Monday through Saturday, excluding all hours on all Sundays and NERC designated holidays.

1.92 "Operations Report" is defined in Section 3.2.2.

1.93 "OPUC" means the Public Utility Commission of Oregon.

1.94 "Output" means all electric energy produced by the Facility.

1.95 "Output Guarantee" is defined in Section 7.12.1.

1.96 "Output Shortfall" is defined in Section 7.12.3.2.

1.97 "Party" and "Parties" are defined in the opening paragraph hereto.

1.98 "Permits" means the permits, licenses, approvals, certificates, entitlements and other authorizations issued by Governmental Authorities required for the construction, ownership or operation of the Facility or occupancy of the Premises, and all amendments, modifications, supplements, general conditions and addenda thereto.

1.99 "Planned Outage" means NERC Event Type PO, as set forth in attached Exhibit 6, and specifically excludes any Maintenance Outage or Forced Outage.

1.100 "Point of Delivery" means the point of interconnection between the Facility and the System, as specified in the Generator Interconnection Agreement and as further described in Exhibit 3.

1.101 "Pre-COD Damages Payment" means liquidated damages in an amount equal to the amount of Project Development Security required to be provided hereunder, plus the Delay Damages Seller has paid to Buyer.

1.102 "Premises" means the real property on which the Facility is or will be located, as more fully described on Exhibits 9, 10 and 15.

1.103 "Project Development Security" is defined in Section 9.1.1.

1.104 "Prudent Electrical Practices" means any of the practices, methods and acts engaged in or approved by a significant portion of the independent electric power generation industry in

the United States for solar facilities of similar size and characteristics or any of the practices, methods or acts, which, in the exercise of reasonable judgment in the light of the facts known at the time a decision is made, could have been expected to accomplish the desired result at the lowest reasonable cost consistent with reliability, safety and expedition.

1.105 "Qualified Operator" is (a) a partnership, corporation or limited liability company that has at least five (5) years' experience with operating at least one thousand (1000) MWac of solar generation, or (b) any other Person reasonably acceptable to Buyer.

1.106 "Qualifying Institution" means a United States commercial bank or trust company organized under the laws of the United States of America or a political subdivision thereof having assets of at least $10,000,000,000 (net of reserves) and a credit rating on its long-term senior unsecured debt of at least "A" from S&P and "A2" from Moody's.

1.107 "Reporting Month" is defined in Section 7.10.1.

1.108 "Required Facility Documents" means the Permits and other authorizations, rights and agreements now or hereafter necessary for construction, ownership, operation, and maintenance of the Facility, and to deliver the Net Output to Idaho Power in accordance with this Agreement and Requirements of Law, including those set forth in Exhibit 9.

1.109 "Required Percentage" means ninety-three percent (93%).

1.110 "Requirements of Law" means any applicable and mandatory (but not merely advisory) federal, state and local law, statute, regulation, rule, action, order, code or ordinance enacted, adopted, issued or promulgated by any federal, state, local or other Governmental Authority or regulatory body (including those pertaining to electrical, building, zoning, environmental and wildlife protection and occupational safety and health).

1.111 "Restricted Period" is defined in Section 8.2.

1.112 "Restricted Transaction" is defined in Section 8.4.1.

1.113 "ROFO" is defined in Section 8.2.

1.114 "ROFO Period" is defined in Section 8.4.1.

1.115 "ROFO Seller" is defined in Section 8.4.1.

1.116 "RTO" means any entity (including an independent system operator) that becomes responsible as system operator for, or directs the operation of, the System.

1.117 "S&P" means Standard & Poor's Rating Group (a division of S&P Global, Inc.).

1.118 "Sanctions" means any economic or trade sanctions administered or enforced by any Government Authorities of the United States, (including the Office of Foreign Assets Control of the U.S. Department of the Treasury ("OFAC") and the U.S. Department of State), the United Nations, the European Community or, Her Majesty's Treasury or any, and each other sanctions authority which has jurisdiction in respect of any Party or the Facility.

1.119 "Sanctioned Person" means any person (i) that is the target of Sanctions or owned or controlled by any such person(s), or (ii) located, organized or resident in, or directly or indirectly owned or controlled by the government of any Sanctioned Territory.

1.120 "Sanctioned Territory" means any country or territory now or hereafter subject to comprehensive Sanctions.

1.121 "SCADA" means supervisory control and data acquisition.

1.122 "Scheduled Commercial Operation Date" means _____.

1.123 "Seller" is defined in the opening paragraph hereto.

1.124 "Seller Indemnitees" is defined in Section 13.1.2.

1.125 "Seller ROFO Notice" is defined in Section 8.4.1.

1.126 "Seller's Cost to Cover" means the positive difference, if any, between (a) the Contract Price per MWh specified in Exhibit 5, and (b) the time weighted average of the Market Price Index of Net Output not purchased by Idaho Power as required hereunder. If on any given day the difference between (a) minus (b) referenced above is zero or negative, then Seller's Cost to Cover shall be zero dollars with respect to such day, and Idaho Power shall have no obligation to pay any amount to Seller on account of Section 12.2.2. For any days prior to the Commercial Operation Date, the Contract Price applicable in the first Contract Year shall be utilized for purposes of clause (a).

1.127 "Seller's Parent Entity" means [_____].

1.128 "Seller Uncontrollable Minutes" means, for the Facility in any month, the total number of minutes during such month during which the Facility was unable to deliver Net Output to Idaho Power (or during which Idaho Power failed to accept such delivery) due to one or more of the following events, each as recorded by SCADA and indicated by electronic fault logs: (a) an emergency or Force Majeure event; (b) to the extent not caused by Seller's actions or omissions, a Non-Compensable Curtailment in accordance with Section 5.4.1; (c) the System operating outside the voltage or frequency limits defined in the applicable operating manual for the Inverters installed at the Facility; (d) Planned Outages, but in no event exceeding thirty six (36) hours per Contract Year consistent with such operating manual; (e) Compensable Curtailment as provided in Section 6.1.3; (f) a default by Idaho Power; provided, however, that if any of the events described above in

items (a) through (e) occur simultaneously, then the relevant period of time shall only be counted once in order to prevent double counting. Seller Uncontrollable Minutes shall not include minutes when (i) the Facility or any portion thereof was unavailable solely due to Seller's non-conformance with the Generation Interconnection Agreement or (ii) the Facility or any portion thereof was paused or withdrawn from use by Seller for reasons other than those covered in this definition.

1.129 "Senior Lenders" means Lenders being granted senior security interests on the Facility or its assets, or Seller or its equity, other than Affiliates of Seller.

1.130 "Solar Array" means one or more Solar Panels connected to the same Inverter.

1.131 "Solar Energy Production Forecasting" is defined in Section 7.7.1.

1.132 "Solar Panels" means the photovoltaic electric energy generating panels installed at the Facility, as described in Exhibits 2 and 15.

1.133 "Solar Performance Modeling Program" means a commercially available computer modeling program that is generally accepted in the United States solar energy industry capable of modeling the Expected Energy and other similar outputs. Solar Performance Modeling Program includes, but is not limited to, the PVSYST program. If Seller elects a Solar Performance Modeling Program to which Idaho Power does not have access, Seller, at its cost, shall provide Idaho Power access to and the right to use the Solar Performance Modeling Program in order for Idaho Power to fully analyze all modeling provided by Seller under this Agreement.

1.134 "Special Contract" means that certain Special Contract between Idaho Power and Customer dated _____.

1.135 "Start-Up Testing" means the start-up tests for the Facility as set forth in Exhibit 7.

1.136 "System" means the electric transmission substation and transmission or distribution facilities owned, operated or maintained by Transmission Provider, which shall include, after construction and installation of the Facility, the circuit reinforcements, extensions, and associated terminal facility reinforcements or additions required to interconnect the Facility, all as set forth in the Generation Interconnection Agreement.

1.137 "Tariff" means the Idaho Power FERC Electric Tariff Volume No. 11 Open Access Transmission Tariff, as revised from time to time.

1.138 "Tax Credits" means any state, local and/or federal production tax credit, tax deduction, and/or investment tax credit (including the ITC) specific to the production of renewable energy and/or investments in renewable energy facilities.

1.139 "Term" is defined in Section 4.1.

1.140 "Test Energy" means any Net Output during periods prior to the Commercial Operation Date and related Capacity Rights.

1.141 "Transmission Provider" means Idaho Power Transmission.

1.142 "WECC" means the Western Electricity Coordinating Council.

1.143 "WREGIS" means the Western Renewable Energy Generation Information System.

1.144 "Compensable Curtailment Energy" is defined in Section 6.1.3.

1.145 "Compensable Curtailment Price" is defined in Section 6.1.3.2.

1.144 Rules of Interpretation.

1.144.1 General. Unless otherwise required by the context in which any term appears, (a) the singular includes the plural and vice versa; (b) references to "Articles," "Sections," "Schedules," "Appendices" or "Exhibits" are to articles, sections, schedules, appendices or exhibits hereof; (c) all references to a particular entity or an electricity market price index include a reference to such entity's or index's successors; (d) "herein," "hereof" and "hereunder" refer to this Agreement as a whole; (e) all accounting terms not specifically defined herein shall be construed in accordance with generally accepted accounting principles, consistently applied; (f) the masculine includes the feminine and neuter and vice versa; (g) "including" means "including, without limitation" or "including, but not limited to"; (h) all references to a particular law or statute mean that law or statute as amended from time to time; (i) all references to electric energy or capacity are to be interpreted as utilizing alternating current, unless expressly stated otherwise; and (j) the word "or" is not necessarily exclusive. Reference to "days" shall be calendar days, unless expressly stated otherwise herein.

1.144.2 Terms Not to be Construed For or Against Either Party. Each term hereof shall be construed according to its fair meaning and not strictly for or against either Party. The Parties have jointly prepared this Agreement, and no term hereof shall be construed against a Party on the ground that the Party is the author of that provision.

1.144.3 Headings. The headings used for the sections and articles hereof are for convenience and reference purposes only and shall in no way affect the meaning or interpretation of the provisions hereof.

1.144.4 Examples. Example calculations and other examples set forth herein are for purposes of illustration only and are not intended to constitute a representation, warranty or covenant concerning the example itself or the matters assumed for purposes of such example. If there is a conflict between an example and the text hereof, the text shall control.

1.144.5 Interpretation with FERC Orders. Each Party conducts and shall conduct

its operations in a manner intended to comply with FERC Order No. 717, Standards of Conduct for Transmission Providers, and its companion orders, requiring the separation of its transmission and merchant functions. Moreover, the Parties acknowledge that Interconnection Provider's transmission function offers transmission service on its system in a manner intended to comply with FERC policies and requirements relating to the provision of open-access transmission service. The Parties recognize that Seller will enter into the Generation Interconnection Agreement with the Interconnection Provider. Nothing herein is intended to make any statement about FERC jurisdiction in relation to the Seller.

1.145 Other Terms. The Parties acknowledge and agree that the Generator Interconnection Agreement shall be a separate and free standing contract and that the terms hereof are not binding upon the Interconnection Provider.

Notwithstanding any other provision in this Agreement, nothing in the Generation Interconnection Agreement, nor any other agreement between Seller on the one hand and Transmission Provider or Interconnection Provider on the other hand, nor any alleged event of default thereunder, shall alter or modify the Parties' rights, duties, and obligation hereunder. This Agreement shall not be construed to create any rights between Seller and the Interconnection Provider or between Seller and the Transmission Provider.

Seller expressly recognizes that, for purposes hereof, the Interconnection Provider and Transmission Provider each shall be deemed to be a separate entity and separate contracting party from Idaho Power whether or not the Generation Interconnection Agreement is entered into with Interconnection Provider or an Affiliate thereof. Seller acknowledges that Idaho Power, acting in its merchant capacity function as purchaser hereunder, has no responsibility for or control over Interconnection Provider or Transmission Provider, and is not liable for any breach of agreement or duty by Interconnection Provider or Transmission Provider.

SECTION 2
REPRESENTATIONS AND WARRANTIES

2.1 Mutual Representations and Warranties. Each Party represents, covenants, and warrants to the other that:

2.1.1 Organization. It is duly organized and validly existing under the laws of the State of its organization.

2.1.2 Authority. It has the requisite power and authority to enter this Agreement and to perform according to the terms hereof.

2.1.3 Corporate Actions. It has taken all corporate or entity actions required to be taken by it to authorize the execution, delivery and performance hereof and the consummation of the transactions contemplated hereby.

2.1.4 No Contravention. The execution and delivery hereof does not contravene any

provision of, or constitute a default under, any indenture, mortgage, security instrument or undertaking, or other material agreement to which it is a party or by which it is bound, or any valid order of any court, or any regulatory agency or other Governmental Authority having authority to which it is subject.

2.1.5 Valid and Enforceable Agreement. This Agreement is a valid and legally binding obligation of it, enforceable against it in accordance with its terms, except as the enforceability hereof may be limited by general principles of equity or bankruptcy, insolvency, bank moratorium or similar laws affecting creditors' rights generally and laws restricting the availability of equitable remedies.

2.1.6 Litigation. No litigation, arbitration, investigation or other proceeding is pending or, to the best of either Party's knowledge, threatened in writing against either Party or its members, with respect hereto and the transactions contemplated hereunder. No other investigation or proceeding is pending or threatened in writing against a Party, its members, or any Affiliate, the effect of which would materially and adversely affect the Party's performance of its obligations hereunder.

2.1.7 Eligible Contract Participant. It, and any guarantor of its obligations under this Agreement, is an "eligible contract participant" as that term is defined in the United States Commodity Exchange Act.

2.1.8 Not a Sanctioned Person. It is not a Sanctioned Person.

2.2 Seller's Further Representations and Warranties. Seller further represents, covenants, and warrants to Idaho Power that:

2.2.1 Authority. Seller (a) has (or will have prior to the Commercial Operation Date) all required regulatory authority to make wholesale sales from the Facility; (b) has the power and authority to own and operate the Facility and be present upon the Premises for the Term; and (c) is duly qualified and in good standing under the laws of the state of Idaho and each other jurisdiction where its ownership, lease or operation of property or the conduct of its business requires such qualification.

2.2.2 No Contravention. The execution, delivery, performance and observance by Seller of its obligations hereunder do not and will not:

2.2.2.1 contravene, conflict with or violate any provision of any material Requirements of Law presently in effect having applicability to either Seller or any of Seller's members;

2.2.2.2 require the consent or approval of or material filing or registration with any Governmental Authority or other person other than such consents and approvals which are (i) set forth in Exhibit 9 or (ii) required in connection with the construction, operation, or maintenance of the Facility and expected to be obtained in due course;

2.2.2.3 result in a breach of or constitute a default under any provision of any security issued by any of Seller's members or managers, the effect of which would materially and adversely affect Seller's performance of, or ability to perform, its obligations hereunder, or any material agreement, instrument or undertaking to which either Seller's members or any Affiliates of Seller's members is a party or by which the property of any of Seller's members or any Affiliates of Seller's members is bound, the effect of which would materially and adversely affect Seller's performance of, or ability to perform, its obligations hereunder.

2.2.3 Required Facility Documents. All Required Facility Documents are listed on Exhibit 9. Pursuant to the Required Facility Documents, Seller holds as of the Effective Date, or will hold by the Commercial Operation Date (or such other later date as may be specified under Requirements of Law), and will maintain for the Term all Required Facility Documents. The anticipated use of the Facility complies with all applicable restrictive covenants affecting the Premises. Following the Commercial Operation Date, Seller shall promptly notify Idaho Power of any additional Required Facility Documents.

2.2.4 Delivery of Energy. On or before the Commercial Operation Date, Seller shall hold rights sufficient to enable Seller to deliver Net Output at the Nameplate Capacity Rating from the Facility to the Point of Delivery pursuant to this Agreement throughout the Term.

2.2.5 Control of Premises. Seller has all legal rights necessary for the Seller to enter upon and occupy the Premises for the purpose of constructing, operating and maintaining the Facility for the Term. All leases of real property required for the operation of the Facility or the performance of any obligations of Seller hereunder are set forth and accurately described in Exhibits 9 and 10. Seller shall maintain all leases or other land grants necessary for the construction, operation and maintenance of the Facility as valid for the Term. Upon request by Idaho Power, Seller shall provide copies of the memoranda of lease recorded in connection with the development of the Facility.

2.2.6 Undertaking of Agreement; Professionals and Experts. Seller has engaged those professional or other experts it believes necessary to understand its rights and obligations pursuant to this Agreement. All professionals or experts including engineers, attorneys or accountants, that Seller may have consulted or relied on in undertaking the transactions contemplated by this Agreement have been solely those of Seller. In entering into this Agreement and the undertaking by Seller of the obligations set forth herein, Seller has investigated and determined that it is capable of performing hereunder and has not relied upon the advice, experience or expertise of Idaho Power in connection with the transactions contemplated by this Agreement.

2.2.7 Verification. All information relating to the Facility, its operation and output and the Premises provided to Idaho Power and contained in this Agreement has been verified by Seller and is true and accurate.

2.2.8 Renewable Claims. Seller has at all times complied with the Federal Trade Commission requirements set forth in 16 CFR Part 260 in any communications concerning the Output, the Facility and the Green Tags that have or may be generated from the Facility. Seller has not claimed the Green Tags, Environmental Attributes or other "renewable energy," "green energy," "clean energy" or similar attributes of the Output or the Facility as belonging to the Seller or any Seller Affiliate and is not aware of any such claims made by third parties with respect to the Facility or the Output.

2.3 No Other Representations or Warranties. Each Party acknowledges that it has entered into this Agreement in reliance upon only the representations and warranties set forth in this Agreement, and that no other representations or warranties have been made by the other Party with respect to the subject matter hereof.

2.4 Continuing Nature of Representations and Warranties; Notice. The representations and warranties set forth in this Section are made as of the Effective Date and deemed repeated as of the Commercial Operation Date. If at any time during the Term, a Party obtains actual knowledge of any event or information that would have caused any of the representations and warranties in this Section 2 to be materially untrue or misleading at the time given, such Party shall provide the other Party with written notice of the event or information, the representations and warranties affected, and the action, if any, which such Party intends to take to make the representations and warranties true and correct. If at any time a Party obtains actual knowledge that the representations and warranties in this Section 2 are not true, said Party shall provide written notice to the other Party. The notice required pursuant to this section shall be given as soon as practicable after the occurrence of each such event.

SECTION 3
CONDITIONS PRECEDENT TO TERM

3.1 Conditions to be granted First Generation Date. As a condition of the Buyer's acceptance of deliveries of Net Output from the Seller, the following conditions shall be satisfied.

3.1.1 Commission/Regulatory Approval. This Agreement shall only become finally effective upon all regulatory approvals deemed appropriate by Idaho Power and Customer in form and substance satisfactory to Idaho Power and Customer in all respects, including the IPUC's approval of this Agreement and the Special Contract between Idaho Power and Customer, the OPUC's approval of a waiver of its procurement rules as it relates to this Agreement and the Special Contract, and compliance with Idaho Power's regulatory requirements with the IPUC and OPUC.

3.1.2 This Agreement is subject to, and shall only become finally effective upon: (i) the approval by the IPUC of all terms and provisions hereof without change or condition and declaration that all payments to be made to Seller hereunder shall be allowed as prudently incurred expenses for ratemaking purposes, and (ii) the approval by the OPUC of a waiver of the application of the OPUC's resource procurement rules, OAR Chapter 860, Division 89.

3.1.3 The Parties recognize and acknowledge that regulatory proceedings at both the IPUC and the OPUC will be required. This Agreement shall not become finally effective should the Agreement be disapproved by the IPUC, should the OPUC disapprove a waiver of its procurement rules, or Idaho Power not obtain all regulatory approvals deemed appropriate by Idaho Power and Customer. Idaho Power will file a case seeking approval of this Agreement with the IPUC. Idaho Power will also file a case with the OPUC requesting a waiver of the application of the OPUC's procurement rules. Additional and concurrent proceedings could include, but may not be limited to: the Facility's successful selection in a possible Request for Proposals ("RFP") process that complies with the OPUC's procurement rules; cases before the IPUC and OPUC regarding the waiver of process, timing, etc. related to compliance or lack thereof with the OPUC procurement rules, and inclusion of the facility in Idaho Power Integrated Resource Planning process.

3.2. Idaho Power's Right to Monitor. After the Effective Date, Seller shall, and shall permit Idaho Power and Customer, and each of their respective advisors and consultants to:

3.2.1 On and after the Execution Date through the Commercial Operation Date, by the tenth (10th) Business Day of each month, Seller will provide Buyer a monthly report for the prior month regarding development, financing and construction updates in the form attached hereto as Exhibit 18, the form of which may be reasonably revised by Buyer from time to time (the "Construction Progress Report").

3.2.2 Thirty (30) days prior to the expected Commercial Operation Date and thereafter from the Commercial Operation Date and throughout the Settlement Term of this Agreement, no later than the end of the month immediately following the month for which information is being reported, Seller shall provide Buyer with a monthly report for the prior month regarding material data pertaining to the operation of the Facility in the form of Exhibit 19, the form of which may be reasonably revised by Buyer from time to time (the "Operations Report"). Each Operations Report shall include any information provided in a similar report delivered pursuant to the Facility's power purchase agreement, and including, but not limited to, the following information for the Facility in such month: (i) A description of any Outages or other performance issues or curtailments in the prior month; (ii) Updated forecast (hourly) of Facility Energy for the immediately succeeding twelve (12) month period, or shorter period ending through the end of the Term if applicable; and (iii) A description of any issues that could materially impact (ii).

3.2.3 Review and discuss with Seller and its advisors and consultants monthly status reports on the progress of the acquisition, design, financing, engineering, construction and installation of the Facility.

3.2.4 Monitor the status of the acquisition, Premises, land leasing, design, financing, engineering, construction and installation of the Facility and the performance of the contractors constructing the Facility.

3.2.5 Witness initial performance tests and other tests and review the results thereof; with Seller to make best efforts to provide Idaho Power five (5) Business Days' advance written notice of each such major test. Seller shall provide Idaho Power with at least two (2) Business Days prior written notice of each such test, with the understanding that if the performance of such test is dependent on the presence of sufficient solar insolation or other variables beyond the control of Seller, the date of such test may be postponed if, on the date specified in the related notice, there is insufficient solar insolation or other circumstances beyond the control of Seller that prevent the performance of such test on the scheduled date.

3.2.6 Perform such examinations, inspections, and quality surveillance as, in Idaho Power's reasonable judgment, are appropriate and advisable to determine that the Facility has been properly commissioned and Commercial Operation and Final Completion have been achieved.

With respect to Idaho Power's right to monitor under this Section 3.2, (i) Idaho Power is under no obligation to exercise any of these monitoring rights, (ii) such monitoring shall occur subject to reasonable rules developed by Seller regarding Facility construction, access, health, safety, and environmental requirements, and (iii) Idaho Power shall have no liability to Seller for failing to advise it of any condition, damages, circumstances, infraction, fact, act, omission or disclosure discovered or not discovered by Idaho Power with respect to the Facility or any contractor. Any review or monitoring of the Facility conducted by Idaho Power hereunder shall be performed in a manner that does not impede, hinder, postpone, or delay Seller or its contractors in their performance of the engineering, construction, design or testing of the Facility. Idaho Power shall maintain one or more designated representatives for purposes of the monitoring activities contemplated in this Section 3.2, which representatives shall have authority to act for Idaho Power in all technical matters under this Section 3.2 as authorized by Idaho Power but not to amend or modify any provision hereof. A Construction Progress Report and Operations Report delivered pursuant to this Section 3.2 shall not constitute notice for any purpose under this Agreement, including with respect to any fact, circumstance, request, issue, dispute or matter included in such report. Seller does not herein grant Idaho Power the right to review, comment on or approve of the terms or conditions of any contract or negotiation between Seller and a third party, the terms and conditions of each such contract or negotiation being confidential and to be determined by Seller in its sole discretion. Conversely, nothing in this Agreement shall be construed to require Idaho Power to review, comment on, or approve of any contract between Seller and a third party and any such review, comment or approval by Idaho Power shall not constitute a waiver by Idaho Power or any of Seller's obligations under this Agreement or create any obligation or liability for Idaho Power.

SECTION 4
TERM AND COMMERCIAL OPERATION DATE

4.1 Term. This Agreement shall become effective on the Effective Date and, subject to earlier termination as provided in this Agreement, shall continue in full force and effect for a period of _____ Contract Years from the Commercial Operation Date (the "Term").

4.2 Commercial Operation Date. Seller will in good faith using commercially reasonable efforts seek to achieve the Commercial Operation Date by the Scheduled Commercial Operation Date. The Commercial Operation Date shall occur after all the following conditions have been satisfied.

4.2.1 Idaho Power has received the Default Security, as applicable.

4.2.2 Seller shall notify Buyer of the Seller's proposed Commercial Operation Date, in written form no later than five (5) Business Days prior to the proposed Commercial Operation Date.

4.2.3 Seller shall provide to Idaho Power a certificate from a Licensed Professional Engineer licensed in the state of Idaho addressed to Idaho Power stating that Seller has (a) the Required Facility Documents including the material permits, consents and agreements necessary to operate and maintain the Facility and (b) obtained or entered into all Permits and Required Facility Documents. Seller must provide copies of any or all Required Facility Documents requested by Idaho Power.

4.2.4 Seller shall provide Idaho Power with documentation showing that Seller has obtained retail electric service for the Facility.

4.2.5 Idaho Power has received a certificate addressed to Idaho Power from a Licensed Professional Engineer stating that, in conformance with the requirements of the Generation Interconnection Agreement: (1) all required Interconnection Facilities have been constructed; (2) all required interconnection tests have been completed; and (3) the Facility is physically interconnected with the System in conformance with the Generation Interconnection Agreement and able to deliver electric energy consistent with the terms of this Agreement.

4.2.6 Idaho Power has received, addressed to Idaho Power from a Licensed Professional Engineer, an executed Engineer's Certification of Design & Construction Adequacy and an Engineer's Certification of Operations and Maintenance (O&M) Policy. These certificates will be in the form specified in Exhibit 11 but may be modified to the extent necessary to recognize the different engineering disciplines providing the certificates.

4.2.7 Idaho Power has received an opinion from a law firm or attorney licensed in the State of Idaho stating, after all appropriate and reasonable inquiry (1) Seller has obtained or entered into all Required Facility Documents; and (2) neither Seller nor the Facility are in violation of or subject to any liability under any Requirements of Law.

4.2.8 Idaho Power has received a certificate addressed to Idaho Power from an authorized officer of Seller (1) stating that Seller has completed all of its obligations under the Generation Interconnection Agreement that would permit Idaho Power to designate the Facility as a Network Resource and receive firm transmission service from the Transmission Provider in sufficient capacity to meet or exceed the Maximum

Delivery Rate; and (2) that includes a document from the Transmission Provider confirming each of the items to which the Seller certifies in (1) above.

4.2.9 Seller has satisfied its obligation to pay for any required Network Upgrades as a Network Resource pursuant to the Generation Interconnection Agreement (as those terms are defined in the Generation Interconnection Agreement).

4.2.10 Seller shall submit written proof to the Buyer of all insurance required in Section 14.

4.2.11 Commercial Operation Date Notice. Seller shall provide written notice to Idaho Power stating when Seller believes that the Facility has achieved Commercial Operation and its Nameplate Capacity Rating accompanied by the certificates and opinions described above.

4.2.12 Idaho Power shall have ten (10) Business Days after receipt of such written notice from Seller either to confirm to Seller that all of the conditions to Commercial Operation have been satisfied or have occurred, or to state with specificity what Idaho Power reasonably believes has not been satisfied. If, within such ten (10) Business Day period, Idaho Power does not respond or notifies Seller confirming that the Facility has achieved Commercial Operation, the original date of receipt of Seller's written notice shall be the Commercial Operation Date. If Idaho Power notifies Seller within such ten (10) Business Day period that Idaho Power reasonably believes the Facility has not achieved Commercial Operation, Seller must address the concerns stated in Idaho Power's notice to the satisfaction of Idaho Power. In the event Idaho Power provides notice of deficiency with regards to the information submitted to establish the Commercial Operation Date, then the Commercial Operation Date will be the date upon which Seller has addressed the concerns stated in Idaho Power's notice to Idaho Power's reasonable satisfaction.

4.2.13 If Commercial Operation of the Facility is achieved based on less than one hundred percent (100%) of the Expected Nameplate Capacity Rating, then Seller may inform Idaho Power, by written notice received no later than ten (10) Business Days after the Commercial Operation Date, that Seller intends to bring the Facility above the Required Percentage up to but not exceeding one hundred percent (100%) of the Expected Nameplate Capacity Rating. Such notice from Seller shall include a Final Completion Schedule. After providing that notice, Seller shall cause the Facility to achieve Final Completion on or before the ninetieth (90^{th}) day after the Commercial Operation Date.

4.2.14 If Commercial Operation is achieved at less than one hundred percent (100%) of the Expected Nameplate Capacity Rating and Seller informs Idaho Power that Seller intends to bring the Facility to one hundred percent (100%) of the Expected Nameplate Capacity Rating, Seller shall provide Idaho Power, no later than ten (10) Business Days after the Commercial Operation Date, with the Final Completion Schedule. All items on the Final Completion Schedule must be completed on or before the ninetieth (90^{th}) day after the Commercial Operation Date. If a Final Completion Schedule is not provided to

Idaho Power within ten (10) Business Days following the Commercial Operation Date, then the date of Final Completion shall be the same as the Commercial Operation Date.

The conditions set forth in this Section are to be used solely for the purposes of determining when the Facility has achieved a First Generation Date and are not intended to affect in any way when the Facility is deemed to have been "placed in service" for tax treatment purposes.

With respect to Sections 4.2.3 through 4.2.6 above, the certificate or opinion provided to Idaho Power must come from a Licensed Professional Engineer or, in the case of Section 4.2.7 above, an attorney that is not an employee of Seller (or any Affiliate) and has no financial interest in the Facility.

Notwithstanding the foregoing, the date for achieving each of the foregoing items shall be extended on a day for day basis for any delay due solely to Idaho Power's delay in taking, or failure to take, any action required of it hereunder in breach of this Agreement.

Without limiting Seller's obligations under this Agreement, none of the following shall excuse in any respect Seller's failure to comply with any and all provisions in this Section 3, no matter what the source or reason, unless an accepted event of Force Majeure.

These Commercial Operation Date requirements are to be used solely for purposes of determining when the Facility has achieved its Commercial Operation Date. They are not intended to affect in any way when the Facility is deemed to have been "placed in service" for purposes of tax treatment eligibility or purposes.

4.3 Seller covenants and agrees that before it delivers Test Energy to Buyer, it shall ensure that it has done all of the following, and Buyer shall hold Buyer harmless from and against any failure of Seller to have done so:

4.3.1 All Facility systems necessary for the stable, safe, reliable and consistent operation of the installed Facility are substantially complete, any testing of the installed Facility required pursuant to the Interconnection Agreement(s) and Interconnection Provider documents and equipment supplier requirements have been successfully completed, and the Facility is available for operation in all material respects in accordance with the Requirements of Law.

4.3.2 Seller shall request and obtain written confirmation from the Buyer that all conditions to acceptance of Test Energy have been fulfilled. Such written confirmation shall be provided within a commercially reasonable time following the Seller's request and will not be unreasonably withheld by the Buyer.

4.4 Continuing Obligations. Seller shall provide Buyer with the following during the Term of this Agreement:

4.4.1 At Buyer's request, Seller shall provide evidence that it is in compliance with the insurance requirements set forth in Section 14.

4.4.2 Seller shall maintain compliance and remain in good standing in all requirements of Sections 3 and 4 of this Agreement.

4.5 Commercial Operation Date Delay, Delay Damages and Deficit Damages.

4.5.1 If Commercial Operation is not achieved on or before the Scheduled Commercial Operation Date, Seller shall pay to Idaho Power Delay Damages from and after the Scheduled Commercial Operation Date up to, but not including, the date that the Facility achieves Commercial Operation. Delay Damages cease to accrue in the event of termination of this Agreement.

4.5.2 If the Facility does not achieve Commercial Operation by the Guaranteed Commercial Operation Date, Idaho Power may terminate this Agreement pursuant to Section 12.

4.5.3 If the Facility achieves Final Completion based on less than one hundred percent (100%) of the Expected Nameplate Capacity Rating, Seller shall pay to Idaho Power Deficit Damages.

After the date of Final Completion, any partially completed Solar Array shall not be part of the Facility, and Seller shall not undertake to add any such partially completed Solar Array or output from such partially completed Solar Array to the Facility without the prior written consent of Idaho Power, such consent will not be unreasonably withheld.

4.6 Damages Calculation. Each Party agrees and acknowledges that (a) the damages that Idaho Power would incur due to Seller's delay in achieving Commercial Operation or failure to reach Final Completion based on one hundred percent (100%) of the Expected Nameplate Capacity Rating would be difficult or impossible to predict with certainty, and (b) it is impractical and difficult to assess actual damages in the circumstances stated, and therefore the Delay Damages and Deficit Damages as agreed to by the Parties and set forth herein are a fair and reasonable calculation of such damages. The Parties agree that Delay Damages and Deficit Damages shall be Idaho Power's exclusive remedy for a delay in achieving Commercial Operation or failure to reach Final Completion based on one hundred percent (100%) of the Expected Nameplate Capacity Rating and believe that Delay Damages and Deficit Damages fairly represent actual damages. Subject to the foregoing sentence, this Section 4.5 shall not limit Seller's termination rights or the amount of damages payable to Idaho Power if this Agreement is terminated as a result of Seller's failure to achieve Commercial Operation by the Guaranteed Commercial Operation Date. Any such termination damages shall be determined in accordance with Section 12.4.

4.7 Damages Invoicing. By the tenth (10^{th}) day following the end of the calendar month in which Delay Damages begin to accrue or Deficit Damages are incurred, as applicable, and continuing on the tenth (10^{th}) day of each calendar month during the period in which Delay Damages accrue (and the following months, if applicable), Idaho Power shall deliver to Seller an invoice showing Idaho Power's computation of such damages and any amount due Idaho Power

in respect thereof for the preceding calendar month. No later than ten (10) days after receiving such an invoice and subject to Sections 11.2 and 11.3, Seller shall pay to Idaho Power, by wire transfer of immediately available funds to an account specified in writing by Idaho Power or by any other means agreed to by the Parties in writing from time to time, the amount set forth as due in such invoice.

4.8 Tax Credits. Seller shall notify Idaho Power whether Seller has elected to claim the ITC within thirty (30) days following the date that Seller (or Seller's Affiliate, on a consolidated basis) files its first tax return after the Commercial Operation Date. Seller shall bear all risks, financial and otherwise throughout the Term, associated with Seller's or the Facility's eligibility to receive the ITC or other Tax Credits, or to qualify for accelerated depreciation for Seller's accounting, reporting or tax purposes. The obligations of the Parties hereunder, including those obligations set forth herein regarding the purchase and price for and Seller's obligation to deliver Net Output, shall be effective regardless of whether the sale of Output or Net Output from the Facility is eligible for, or receives, the ITC or other Tax Credits during the Term.

SECTION 5
DELIVERIES OF NET OUTPUT AND GREEN TAGS

5.1 Purchase and Sale. Except as otherwise expressly provided herein, commencing on the Commercial Operation Date and continuing through the Term, Seller shall sell and make available to Idaho Power, and Idaho Power shall purchase and receive (a) the entire Net Output from the Facility at the Point of Delivery, and (b) all Green Tags associated with the Output or otherwise resulting from the generation of energy by the Facility. Idaho Power shall be under no obligation to make any purchase hereunder other than Net Output and all Green Tags, as described above. Idaho Power shall not be obligated to purchase, receive or pay for Output (or Green Tags associated with such Output) that is not delivered to the Point of Delivery. In addition, during the period between the Effective Date and the Commercial Operation Date, Seller shall sell and make available to Idaho Power, and Idaho Power shall purchase and receive, all Net Output and Green Tags from the Facility as Test Energy at the price specified in Section 6.1.1.

5.2 No Sales to Third Parties. During the Term, Seller shall not sell any Net Output, energy, Green Tags or Capacity Rights from the Facility to any party other than Idaho Power; provided, however, that this restriction shall not apply during periods when Idaho Power is in default hereof because it has failed to accept the Net Output or Green Tags delivered by Seller to Buyer as required hereunder .

5.3 Title and Risk of Loss of Net Output. Seller shall deliver Net Output, Green Tags and Capacity Rights to Idaho Power free and clear of all liens, claims and encumbrances. Title to and risk of loss of all Net Output shall transfer from Seller to Idaho Power upon its delivery to Idaho Power at the Point of Delivery. Seller shall be deemed to be in exclusive control of, and responsible for, any damage or injury caused by, all Output up to and at the Point of Delivery. Idaho Power shall be deemed to be in exclusive control of, and responsible for, any damages or injury caused by, Net Output after the Point of Delivery.

5.4 Curtailment.

5.4.1 Non-Compensable Curtailment. Except for Compensable Curtailment Energy in accordance with Section 6.1.3, Idaho Power shall not be obligated to purchase, receive, pay for, or pay any damages associated with, Net Output if such Net Output is not delivered to the System or Point of Delivery for any of the following reasons: (a) the interconnection between the Facility and the System is disconnected, suspended or interrupted, in whole or in part, consistent with the terms of the Generation Interconnection Agreement, (b) the Market Operator, Transmission Provider or Network Service Provider directs a general curtailment, reduction, or redispatch of generation in the area, (which would include the Net Output) for any reason (excluding curtailment of purchases for general economic reasons unilaterally directed by the Market Operator or Idaho Power acting solely in its merchant function capacity), even if and no matter how such curtailment or redispatch directive is carried out by Idaho Power, which may fulfill such directive by acting in its sole discretion; or if Idaho Power curtails or otherwise reduces the Net Output in any way in order to meet its obligations to the Market Operator, Transmission Provider or Network Service Provider to operate within system limitations or otherwise, (c) the Facility's Output is not received because the Facility is not fully integrated or synchronized with the System, or (d) an event of Force Majeure prevents either Party from delivering or receiving Net Output (each of the foregoing a "Non-Compensable Curtailment").

5.4.2 Curtailed Amount. The quantity of Non-Compensable Curtailment will be calculated by determining the quantity of Net Output that would have been produced by the Facility and delivered to the Point of Delivery had its generation not been so curtailed under this Section 5.4. The quantity of such curtailed electric energy shall be determined based on (a) the time and duration of the Non-Compensable Curtailment and (b) solar conditions recorded at the Facility during the period of Non-Compensable Curtailment and the production estimate based on the Solar Panels and Inverter performance guaranties provided by Seller to Idaho Power in accordance with Exhibits 2 and 15. Seller shall promptly provide Idaho Power with access to such information and data as Idaho Power may reasonably require to confirm to its reasonable satisfaction the amount of electric energy that was not generated or delivered because of a Non-Compensable Curtailment.

5.4.3 Compensable Curtailment. Idaho Power shall pay Seller for Compensable Curtailment Energy as set forth in Section 6.1.3.

5.5 Idaho Power as Merchant. Seller acknowledges that Idaho Power, acting in its merchant capacity function as purchaser under this Agreement, has no responsibility for or control over Idaho Power Transmission or any successor Transmission Provider.

5.6 Green Tags.

5.6.1 Title. Idaho Power will be granted ownership of 100% of the Green Tags and Environmental Attributes associated with the Facility. Title to 100% of the Green Tags

and Environmental Attributes shall pass from Seller to Idaho Power immediately upon the generation of the Output at the Facility that gives rise to such Green Tags or Environmental Attributes. Idaho Power's title to 100% of the Environmental Attributes and Green Tags shall expire at the end of the term of this Agreement with respect to Output generated after the end of the term of this Agreement, unless the Parties agree to extend in future agreements. If after the Effective Date and during the term of this Agreement any additional Green Tags, Environmental Attributes or similar environmental value is created by legislation, regulation, or any other action, including but not limited to, carbon credits and carbon offsets, Idaho Power shall be granted ownership of 100% of these additional Green Tags and Environmental Attributes and environmental values that are associated with the Net Output delivered by the Seller to Idaho Power. Seller shall use prudent and commercially reasonable efforts to ensure that any operations of the Facility do not jeopardize the current or future Green Tags or Environmental Attribute status of this solar generation Facility. Seller will deliver all of the Green Tags and Environmental Attributes generated by the Facility during the Term, without substitution of Green Tags or Environmental Attributes from any other source.

5.6.2 Documentation. At least sixty (60) days prior to the First Generation Date, the Parties shall mutually cooperate to enable Idaho Power's Green Tags and Environmental Attributes from this Facility to be placed into the WREGIS account designated by Idaho Power's or any other Green Tag or Environment Attribute accounting and tracking system selected by the Idaho Power. The Seller at the Seller's sole expense will be responsible to establish and maintain the Seller's WREGIS or other Green Tag and Environmental Attribute account and/or system that enables the creation of the Environmental Attribute certificates associated with this Facility and the transfer of 100% of the Green Tags and Environmental Attributes to Idaho Power for the Term of this Agreement. If the Green Tag or Environmental Attribute accounting and tracking system initially selected by Idaho Power is materially altered or discontinued during the Term of this Agreement, the Parties shall cooperate to identify an appropriate alternative Green Tag or Environmental Attribute accounting and tracking process and enable the Green Tag or Environmental Attributes be processed through this alternative method.

5.6.3 Seller, at its own cost and expense, shall register with, pay all fees required by, and comply with, all reporting and other requirements of WREGIS relating to the Facility or Green Tags. Seller shall ensure that the Facility will participate in and comply with, during the Term, all aspects of WREGIS. Seller shall, at its sole expense, effectuate the transfer of WREGIS Certificates to Idaho Power's WREGIS account in accordance with WREGIS Operating Rules. Seller may either elect to enter into a Qualified Reporting Entity Services Agreement with Idaho Power in a form similar to that in Exhibit 20 or elect to retain a third-party or act as its own WREGIS-defined Qualified Reporting Entity; provided, however, that if the Facility is in Idaho Power's balancing authority area, Seller must enter into a Qualified Reporting Entity Services Agreement with Idaho Power in the form of Exhibit 20 and not do so with any third party. Unless the failure to deliver WREGIS Certificates was caused by action of Idaho Power not acting in its capacity as Qualified Reporting Entity under the Qualified Reporting Entity Services Agreement, Idaho Power shall be entitled to a refund of the Green Tags Price Component

of Green Tags associated with any Net Output for which WREGIS Certificates are not delivered, and shall not transfer the affected Green Tags back to Seller, provided that Seller shall have thirty (30) days after the conclusion of any applicable WREGIS dispute resolution process to correct any error and deliver such WREGIS Certificates to Idaho Power or provide such refund payment. Seller shall promptly provide Idaho Power copies of all documentation it submits to WREGIS. If WREGIS changes the WREGIS Operating Rules after the execution of this Agreement or applies the WREGIS Operating Rules in a manner inconsistent with this Agreement after the execution of this Agreement, the Parties will promptly cooperate as reasonably required to cause and enable Seller to deliver WREGIS Certificates associated with the Output to Idaho Power's WREGIS account. Further, in the event of the promulgation of a scheme involving Green Tags administered by a Governmental Authority, upon notification by such Governmental Authority that any transfers contemplated by this Agreement will not be recorded, the Parties shall promptly cooperate in taking all reasonable actions necessary so that such transfers can be recorded.

5.6.4 If Idaho Power requests additional Environmental Attribute certifications beyond what is provided by the WREGIS process the Seller shall use its best efforts to obtain any Environmental Attribute certifications required by Idaho Power for those Environmental Attributes delivered to Idaho Power from the Seller. If the Seller incurs cost, as a result of Idaho Power's request, and if the additional certification provides benefits to both Parties, the Parties shall share the costs in proportion to the additional benefits obtained. If Idaho Power elects to obtain its own certifications, then Seller shall fully cooperate with Idaho Power in obtaining such certification.

5.6.5 Publicity. Seller shall not make any public statement or report under any program that any of the Green Tags purchased by Idaho Power hereunder belong to any person other than Idaho Power. Seller shall reasonably cooperate in any registration by Idaho Power of the Facility in the renewable portfolio standard or equivalent program in all such further states and programs in which Idaho Power may wish to register or maintained registered the Facility by providing copies of all such information as Idaho Power reasonably requires for such registration.

5.6.6 Renewable Claims. Seller shall not report in any public communication, or under any program, that any of the Environmental Attributes or part thereof provided to Buyer hereunder belong to any Person other than Buyer or Customer. Seller hereby irrevocably assigns to Buyer all rights, title and interest in the Environmental Attributes for Buyer to own, hold and transfer to Customer, including any rights associated with any renewable energy information or tracking system that exists or may be established (including participation in any applicable Environmental Attribute registration or tracking program) with regard to monitoring, registering, tracking, certifying, or trading such Environmental Attributes. Seller will not claim the Green Tags, Environmental Attributes or other "renewable energy," "green energy," "clean energy" or similar attributes of the Output or the Facility as belonging to the Seller or any Seller Affiliate or to any person or entity other than Idaho Power or Customer. Seller shall promptly report to Buyer any such claims made by third parties of which Seller becomes aware. To the extent that any such

public communication is allowed under this Agreement, in any public communication concerning the Facility, Facility Energy or the Environmental Attributes, Seller must at all times be fully compliant with the Federal Trade Commission's "Green Guides," 77 Federal Register 62122, including 16 Code of Federal Regulations §260.15. The Parties agree to work together in good faith to cause the correction of any confusing or misleading claim or public communications made by a Party or a third party concerning any relationship with each other or each other's Affiliates, the Environmental Attributes, or the Facility. Seller covenants not to collect for its own benefit any cryptocurrency, blockchain, and similar or related commodities, tokens, or anything of actual, potential, or theoretical value related to, measured by, or associated with Facility Energy or based upon or relating to Facility Energy.

5.7 Purchase and Sale of Capacity Rights. For and in consideration of Idaho Power's agreement to purchase from Seller the Facility's Net Output and Green Tags on the terms and conditions set forth herein, Seller transfers to Idaho Power, and Idaho Power accepts from Seller, all right, title, and interest that Seller may have in and to Capacity Rights, if any, existing during the Term.

5.8 Representation Regarding Ownership of Capacity Rights. Seller represents that it has not sold, and covenants that during the Term it will not sell or attempt to sell to any other person or entity the Capacity Rights, if any. During the Term, Seller shall not report to any person or entity that the Capacity Rights, if any, belong to anyone other than Idaho Power. Idaho Power may at its own risk and expense report to any person or entity that Capacity Rights exclusively belong to it.

5.9 Authority to Make Sales. Seller covenants that during the Term it will maintain all required regulatory authority to make wholesale sales from the Facility to Idaho Power.

5.10 Further Assurances. At Idaho Power's request, the Parties shall execute such documents and instruments as may be reasonably required to effect recognition and transfer of the Net Output or Capacity Rights, if any, to Idaho Power or Green Tags to Customer.

SECTION 6
CONTRACT PRICE; COSTS

6.1 Contract Price includes Green Tags and Capacity Rights. Idaho Power shall pay Seller the prices stated below for all deliveries of Net Output, Green Tags and Capacity Rights, up to the Maximum Delivery Rate. The price provided for Test Energy in Section 6.1.1 and the Contract Price provided for in Section 6.1.2, and the Compensable Curtailment Price provided for in Section 6.1.3 include the consideration to be paid by Idaho Power to Seller for all Net Output, Green Tags, Capacity Rights and Test Energy, respectively, and Seller shall not be entitled to any compensation over and above the Contract Price or the Test Energy price, as the case may be, for the Green Tags and Capacity Rights associated therewith.

6.1.1 Test Energy and Net Output Before Commercial Operation Date. Between the Effective Date and the Commercial Operation Date, Seller shall sell and deliver to Idaho

Power all Test Energy and Net Output. Idaho Power shall pay Seller for such Test Energy and Net Output delivered at the Point of Delivery, an amount per MWh equal to eighty-five percent (85%) of the Market Price Index for the applicable hour on the applicable day in the applicable month, provided, however, that Seller's right to receive payment for such Test Energy and Net Output is subject to Idaho Power's right of offset under Section 11.2 for, among other things, payment by Seller of any Delay Damages owed to Idaho Power by Seller pursuant to Section 4.4 and Section 9.1.2.

6.1.2 Net Output After Commercial Operation Date. For the period beginning on the Commercial Operation Date and thereafter during the Term, Idaho Power shall pay to Seller the Contract Price per MWh of Net Output delivered to the Point of Delivery, as specified in Exhibit 4.

6.1.3 Compensable Curtailment. If, during the period beginning on the Commercial Operation Date and thereafter during the Term, Net Output is curtailed by Idaho Power and such curtailment is not included as a Non-Compensable Curtailment ("Compensable Curtailment Energy"), then Idaho Power shall pay to Seller the Compensable Curtailment Price for the Compensable Curtailment Energy, as determined below.

6.1.3.1 The Parties will calculate the quantity of Compensable Curtailment Energy by determining the Potential Net Output (A) during those periods of time when the Facility is on GOLC and the GOLC Set-Point is set at a level that will not allow the entire Nameplate Capacity Rating to be deliverable by determining the difference between Potential Net Output and the delivered Net Output, and (B) during those periods of time when the Facility is not on GOLC or the GOLC Set-Point is set at a level that will allow the Nameplate Capacity Rating to be deliverable by determining the amount that would have been available for delivery had its generation not been so curtailed. Compensable Curtailment Energy shall equal the number of kWh represented by the Potential Net Output less the Net Output actually delivered to the Point of Delivery.

6.1.3.2 Idaho Power will pay Seller the Contract Price for each kWh of Compensable Curtailment Energy, net of any Non-Compensable Curtailments (the "Compensable Curtailment Price").

6.1.3.3 For purposes of determining Compensable Curtailment Energy, the amount of Potential Net Output at any given time will be calculated using Idaho Power's solar forecasting vendor/tool. 6.2 Costs and Charges. Seller shall be responsible for paying or satisfying when due all costs or charges imposed in connection with the scheduling and delivery of Net Output up to and at the Point of Delivery, including transmission costs, Transmission Service, and transmission line losses, and any operation and maintenance charges imposed by Interconnection Provider and Transmission Provider for the Interconnection Facilities. Idaho Power shall be responsible for all costs or charges, if any, imposed in connection with the delivery of Net Output at and from the Point of Delivery, including transmission costs and transmission line losses and imbalance charges or penalties. Without limiting the generality of the foregoing, Seller, in accordance with the Generation Interconnection Agreement, shall bear all costs associated with the modifications to Interconnection Facilities or the System (including system upgrades) caused by or related to (a) the interconnection of the Facility with the System and (b) any increase in generating capacity of the Facility.

6.3 Station Service. Seller shall be responsible for arranging and obtaining, at its sole risk and expense, any station service required by the Facility that is not provided by the Facility itself.

6.4 Taxes. Seller shall pay or cause to be paid when due, or reimburse Idaho Power for, all existing and any new sales, use, excise, severance, ad valorem, and any other similar taxes, imposed or levied by any Governmental Authority on the Net Output, Capacity Rights or Green Tags up to and including, but not beyond, the Point of Delivery, regardless of whether such taxes are imposed on Idaho Power or Seller under Requirements of Law. Idaho Power shall pay or cause to be paid when due all such taxes imposed or levied by any Governmental Authority on the Net Output, Capacity Rights or Green Tags beyond the Point of Delivery, regardless of whether such taxes are imposed on Idaho Power or Seller under Requirements of Law. The Contract Price shall not be adjusted on the basis of any action of any Governmental Authority with respect to changes to or revocations of sales and use tax benefits, rebates, exception or give back. In the event any taxes are imposed on a Party for which the other Party is responsible hereunder, the Party on which the taxes are imposed shall promptly provide the other Party written notice thereof and such other information as such Party may reasonably request with respect to any such taxes. Seller shall be responsible for any and all sun and light severance taxes.

6.5 Costs of Ownership and Operation. Without limiting the generality of any other provision hereof and subject to Section 6.4, Seller shall be solely responsible for paying when due (a) all costs of owning and operating the Facility in compliance with existing and future Requirements of Law and the terms and conditions hereof, and (b) all taxes and charges (however characterized) now existing or hereinafter imposed on or with respect to the Facility, its operation, or on or with respect to emissions or other environmental impacts of the Facility, including any such tax or charge (however characterized) to the extent payable by a generator of such energy or Environmental Attributes.

6.6 Rates Not Subject to Review. The rates for service specified herein shall remain in effect until expiration of the Term, and shall not be subject to change for any reason, including regulatory review, absent agreement of the Parties. Neither Party shall petition FERC pursuant to the provisions of Sections 205 or 206 of the Federal Power Act (16 U.S.C. § 792 et seq.) to amend such prices or terms, or support a petition by any other person or entity seeking to amend such prices or terms, absent the agreement in writing of the other Party. Further, absent the agreement in writing by both Parties, the standard of review for changes hereto proposed by a Party, a non-party or the FERC acting sua sponte shall be the "public interest" application of the "just and reasonable" standard of review set forth in United Gas Pipe Line Co. v. Mobile Gas Service Corp., 350 U.S. 332 (1956) and Federal Power Commission v. Sierra Pacific Power Co., 350 U.S. 348 (1956) and clarified by Morgan Stanley Capital Group. Inc. v. Public Util. Dist. No. 1 of Snohomish, 554 U.S. 527, 128 S. Ct. 2733 (2008).

SECTION 7
OPERATION AND CONTROL

7.1 As-Built Supplement. Within thirty (30) days of completion of construction of the Facility, Seller shall provide Idaho Power the As-built Supplement. The As-built Supplement shall be deemed effective and shall be added to Exhibit 16 when it has been reviewed and approved by Idaho Power, which approval shall not be unreasonably withheld or delayed. If the proposed As-built Supplement does not accurately describe the Facility as actually built or is otherwise defective as to form in any material respect, Idaho Power may within fifteen (15) days after receiving the proposed As-built Supplement give Seller a notice describing what Idaho Power wishes to correct. If Idaho Power does not give Seller such a notice within the fifteen (15) day period, the As-built Supplement shall be deemed approved. If Idaho Power provides a timely notice requiring corrections, Seller shall in good faith cooperate with Idaho Power to revise the As-built Supplement to address Idaho Power's concerns. Notwithstanding the foregoing, Idaho Power shall have no right to require Seller to relocate, modify or otherwise change in any respect any aspect of the Facility as actually built.

7.2 Standard of Facility Operation.

7.2.1 General. At Seller's sole cost and expense, Seller shall build, operate, maintain and repair the Facility and the Interconnection Facilities in accordance with (a) the applicable and mandatory standards, criteria and formal guidelines of FERC, NERC, any RTO, and any other Electric System Authority and any successors to the functions thereof; (b) the Permits and Required Facility Documents; (c) the Generation Interconnection Agreement; (d) all Requirements of Law; (e) the requirements hereof; and (f) Prudent Electrical Practice. Seller acknowledges that it shall have no claims hereunder against Idaho Power with respect to any requirements imposed by or damages caused by (or allegedly caused by) the Transmission Provider. Seller will have no claims against Idaho Power under this Agreement with respect to the provision of station service.

7.2.2 Qualified Operator. From and after the Commercial Operation Date, Seller will cause the Project to be operated and maintained by a Qualified Operator. Seller shall

provide Idaho Power thirty (30) days prior written notice of any proposed change in the Qualified Operator of the Facility.

7.2.3 Fines and Penalties.

7.2.3.1 Without limiting a Party's rights under Section 7.2.3.2, each Party shall pay all fines and penalties incurred by such Party on account of noncompliance by such Party with Requirements of Law in respect to this Agreement, except where such fines and penalties are being contested in good faith through appropriate proceedings.

7.2.3.2 If fines, penalties, or legal costs are assessed against or incurred by either Party (the "Indemnified Party") on account of any action by any Governmental Authority due to noncompliance by the other Party (the "Indemnifying Party") with any Requirements of Law or the provisions hereof, or if the performance of the Indemnifying Party is delayed or stopped by order of any Governmental Authority due to the Indemnifying Party's noncompliance with any Requirements of Law, the Indemnifying Party shall indemnify and hold harmless the Indemnified Party against any and all losses, liabilities, damages, and claims suffered or incurred by the Indemnified Party as a result thereof. Without limiting the generality of the foregoing, the Indemnifying Party shall reimburse the Indemnified Party for all fees, damages, or penalties imposed on the Indemnified Party by any Governmental Authority, other person or entity or to other utilities for violations to the extent caused by a default by the Indemnifying Party or a failure of performance by the Indemnifying Party hereunder.

7.3 Interconnection. Seller shall be responsible for the costs and expenses associated with obtaining from the Transmission Provider Network Resource interconnection service for the Facility at its Nameplate Capacity Rating at the Point of Delivery. Seller shall have no claims hereunder against Idaho Power, acting in its merchant function capacity, with respect to any requirements imposed by or damages caused by (or allegedly caused by) acts or omissions of the Transmission Provider or Interconnection Provider, in connection with the Generation Interconnection Agreement or otherwise.

7.4 Coordination with System. Seller shall be responsible for the coordination and synchronization of the Facility and the Interconnection Facilities with the System.

7.5 Outages.

7.5.1 Planned Outages. Except as otherwise provided herein, Seller shall not schedule a Planned Outage during daylight hours (sun up to sunset) during any portion of the months of November, December, January, February, June, July, and August, except to the extent a Planned Outage is reasonably required to enable a vendor to satisfy a guarantee requirement. Seller shall provide Idaho Power with an annual forecast of Planned Outages for each Contract Year at least one (1) month, but no more than three (3) months, before the first day of that Contract Year, and shall promptly update such

schedule, or otherwise change it, only to the extent that Seller is reasonably required to change it in order to comply with Prudent Electrical Practices. Seller shall not schedule any maintenance of Interconnection Facilities during such months, without the prior written approval of Idaho Power, which approval shall not be unreasonably withheld or delayed.

7.5.2 Maintenance Outages. If Seller reasonably determines that it is necessary to schedule a Maintenance Outage, Seller shall notify Idaho Power in writing of the proposed Maintenance Outage as soon as practicable but in any event at least five (5) days before the outage begins (or such shorter period to which Idaho Power may reasonably consent in light of then-existing solar conditions). Upon such notice, the Parties shall plan the Maintenance Outage to mutually accommodate the reasonable requirements of Seller and the service obligations of Idaho Power; provided, however, that Seller shall take all reasonable measures consistent with Prudent Electrical Practices to not schedule any Maintenance Outage during the daylight hours of the following periods: November, December, January, February, June 15 through June 30, July, August, and September 1 through September 15. Notice of a proposed Maintenance Outage shall include the expected start date and time of the outage, the amount of generation capacity of the Facility that will not be available, and the expected completion date and time of the outage. Seller shall give Idaho Power notice of the Maintenance Outage as soon as practicable after Seller determines that the Maintenance Outage is necessary. Idaho Power shall promptly respond to such notice and may request reasonable modifications in the schedule for the outage. Seller shall use all reasonable efforts to comply with any request to modify the schedule for a Maintenance Outage provided that such change has no substantial impact on Seller. Seller shall notify Idaho Power of any subsequent changes in generation capacity available to Idaho Power as a result of such Maintenance Outage or any changes in the Maintenance Outage completion date and time. As soon as practicable, any notifications given orally shall be confirmed in writing. Seller shall take all reasonable measures consistent with Prudent Electrical Practices to minimize the frequency and duration of Maintenance Outages. Notwithstanding anything in this Section 7.5.2 to the contrary, Seller may schedule a Maintenance Outage at any time and without the requirement to notify Idaho Power five (5) days in advance during conditions of low solar insolation, but shall notify Idaho Power promptly after Seller decides to schedule such Maintenance Outage.

7.5.3 Forced Outages. Seller shall promptly provide to Idaho Power an oral report, via telephone to a number specified by Idaho Power (or other method approved by Idaho Power), of any Forced Outage resulting in more than ten percent (10%) of the Nameplate Capacity Rating of the Facility being unavailable. This report shall include the amount of the generation capacity of the Facility that will not be available because of the Forced Outage and the expected return date of such generation capacity. Seller shall promptly update the report as necessary to advise Idaho Power of changed circumstances. As soon as practicable, the oral report shall be confirmed in writing by notice to Idaho Power. Seller shall take all reasonable measures consistent with Prudent Electrical Practices to avoid Forced Outages and to minimize their duration.

7.5.4 Notice of Deratings and Outages. Without limiting the foregoing, Seller will inform Idaho Power, via telephone to a number specified by Idaho Power (or other method approved by Idaho Power), of any major limitations, restrictions, deratings or outages known to Seller affecting the Facility for the following day (except curtailments of Net Output at the direction of Idaho Power) and will promptly update Seller's notice to the extent of any material changes in this information, with "major" defined as affecting more than five percent (5%) of the Nameplate Capacity Rating of the Facility.

7.5.5 Effect of Outages on Estimated Output. Seller represents and warrants that the estimated monthly net output set forth on Exhibit 4 takes into account the Planned Outages, Maintenance Outages, and Forced Outages that Seller reasonably expects to encounter in the ordinary course of operating the Facility.

7.6 Scheduling.

7.6.1 Cooperation and Standards. With respect to any and all scheduling requirements hereunder, (a) Seller shall cooperate with Idaho Power with respect to scheduling Net Output, and (b) each Party shall designate authorized representatives to communicate with regard to scheduling and related matters arising hereunder. Each Party shall comply with the applicable variable resource standards and criteria of any applicable Electric System Authority.

7.6.2 Schedule Coordination. If, as a result hereof, Idaho Power is deemed by an RTO to be financially responsible for Seller's performance under the Generation Interconnection Agreement, due to Seller's lack of standing as a "scheduling coordinator" or other RTO recognized designation, qualification or otherwise, then Seller shall acquire such RTO recognized standing (or shall contract with a third party who has such RTO recognized standing) such that Idaho Power is no longer responsible for Seller's performance under the Generation Interconnection Agreement or RTO requirement.

7.7 Forecasting.

7.7.1 Solar Energy Production Forecast. "Solar Energy Production Forecast" means the Idaho Power administered solar forecasting model for all solar projects that are under contract to provide energy to Idaho Power. The Seller shall be responsible for an allocated portion of the total costs of the forecasting model and to provide solar irradiation and weather data specified in Section 7.7.2.

7.7.2 Solar Energy Production Forecast Cost and Data. Seller shall contribute to the cost of the Solar Energy Production Forecasting. The Facility's share of Solar Energy Production Forecasting is determined as specified below. Seller's payments for the cost of the Solar Energy Production Forecasting in any Contract Year will not be greater than 0.1% of the total energy payments made to Seller by Idaho Power hereunder during the previous Contract Year.

a. For every month of this Agreement beginning with the first full month after the First Energy Date as specified in this Agreement, the Solar Energy Production Forecasting Monthly Cost Allocation (MCA) will be due and payable by the Seller. Any Solar Energy Production Forecasting Monthly Cost Allocations (MCA) that are not reimbursed to Idaho Power shall be deducted from energy payments to the Seller.

b. During the first Contract Year, as the value of the 0.1% cap of the total energy payments to be made to Seller by Idaho Power hereunder will not be known until the first Contract Year is complete, Idaho Power will deduct the Facility's calculated share of the Solar Energy Production Forecasting costs specified in item d each month during the first Contract Year and subsequently refund any overpayment (payments that exceed the cap) in equal monthly amounts over the ensuing Contract Year.

c. The cost allocation formula described below will be reviewed and revised if necessary on the last day of any month in which the cumulative MW nameplate of Solar projects having IPUC approved agreements to deliver energy to Idaho Power has been revised by an action of the IPUC.

d. The monthly cost allocation will be based upon the following formula:

Where: **Total MW (TMW)** is equal to the total Nameplate Capacity rating of all solar projects that are under contract to provide energy to Idaho Power Company.

Facility MW (FMW) is equal to the Expected Nameplate Capacity rating of this Facility as specified within this Agreement.

Annual Solar Energy Production Forecasting Cost (AFCost) is equal to the total annual cost Idaho Power incurs to provide Solar Energy Production Forecasting. Idaho Power will estimate the AFCost for the current year based upon the previous year's cost and expected costs for the current year. At year-end, Idaho Power will compare the actual costs to the estimated costs and any differences between the estimated AFCost and the actual AFCost will be included in the next year's AFCost.

Annual Cost Allocation (ACA) = AFCost X (FMW/TMW)

And

Monthly Cost Allocation (MCA) = ACA / 12

e. The Solar Energy Production Forecasting Monthly Cost Allocation (MCA) is due and payable to Idaho Power. The MCA will first be netted against any monthly energy payments owed to the Seller. If the netting of the MCA against the monthly energy payments results in a balance being due Idaho Power, the Facility shall pay this amount within fifteen (15) days of the date of the payment invoice.

7.7.2.1 The Seller shall also provide solar irradiation and weather data specific to the Facility's physical location to Idaho Power via real time telemetry in a form acceptable to Idaho Power. The specific equipment and location of this equipment shall be specified in the GIA. This data will provided at 10 second intervals and will consist of:

a.) Global Horizontal Irradiance
b.) Plane of Array
c.) Temperature
d.) Wind Speed and Direction

7.8 No Increase in Nameplate Capacity Rating. Without limiting Section 8 or any restrictions herein on Nameplate Capacity Rating, Seller may not increase the ability of the Facility to deliver Net Output in quantities in excess of the Maximum Delivery Rate through any means, including replacement or modification of Facility equipment or related infrastructure, without consent of Idaho Power, which Idaho Power may grant or withhold in its sole and absolute discretion.

7.9 Electronic Communications.

7.9.1 GOLC.

7.9.1.1 Beginning on the Commercial Operation Date, Idaho Power will dispatch Facility through its GOLC system installed by Seller.

Idaho Power may notify Seller, by telephonic communication or through use of the GOLC Set-Point, to curtail the delivery of Net Output to Idaho Power from the Facility and to the Point of Delivery, pursuant to Section 5.4, and Seller shall promptly comply with such notification.

The GOLC Set-Point is calculated by the Transmission Provider and communicated electronically through the SCADA system. Seller shall ensure that, throughout the Term, the SCADA signal is capable of functioning on all GOLC Set-Points within the margin of error specified in the Facility control system manufacturer's set point margin of error.

Unless otherwise directed by Idaho Power, Seller shall ensure that the Facility GOLC is in "Remote" set-point control during normal operations.

7.9.2 Telemetering. Seller shall during the Term provide telemetering equipment and facilities capable of transmitting the following information concerning the Facility pursuant to the Generation Interconnection Agreement and to Idaho Power on a real-time basis, and will operate such equipment when requested by Idaho Power to indicate instantaneous MW output at the Point of Delivery.

Commencing on the date of initial delivery of Test Energy, Seller shall also transmit or cause to be transmitted to or make accessible to Idaho Power any other data from the Facility that Seller receives on a real time basis, including meteorological data, solar insolation data and Net Output data. Such real time data shall be provided to or be made accessible to Idaho Power and Customer on the same basis on which Seller receives the data (e.g., if Seller receives the data in four second intervals, Idaho Power shall also receive the data in four second intervals). Seller must provide Idaho Power and Customer access to Seller's web-based performance monitoring system.

7.9.3 Transmission Provider Consent. Seller shall execute a consent, in the form required by Transmission Provider, to provide that Idaho Power can read the meter and receive any and all data from the Transmission Provider relating to transmission of Net Output or other matters relating to the Facility without the need for further consent from Seller.

7.9.4 Dedicated Communication Circuit. Seller shall install a dedicated direct communication circuit (which may be by common carrier telephone) between Idaho Power and the control center in the Facility's control room or such other communication equipment as the Parties may agree.

7.10 Reports and Records.

7.10.1 Monthly Reports. Commencing on the Commercial Operation Date, within thirty (30) days after the end of each calendar month during the Term (each, a "Reporting Month"), Seller shall provide to Idaho Power a report in electronic format, which report shall include (a) summaries of the Facility's solar insolation and actual and predicted output data for the Reporting Month in intervals not to exceed one hour (or such shorter period as is reasonably possible with commercially available technology), including information from the Facility's computer monitoring system; (b) summaries of any other significant events related to the construction or operation of the Facility for the Reporting Month; and (c) any supporting information that Idaho Power may from time to time reasonably request (including historical solar insolation data for the Facility).

7.10.2 Electronic Fault Log. Seller shall maintain an electronic fault log of operations of the Facility during each hour of the Term commencing on the Commercial Operation Date. Seller shall provide Idaho Power with a copy of the electronic fault log within thirty (30) days after the end of the calendar month to which the fault log applies.

7.10.3 Other Information to be Provided to Idaho Power. Seller shall provide to Idaho Power and Customer the following information concerning the Facility:

7.10.3.1 Upon the request of Idaho Power, the manufacturers' guidelines and recommendations for maintenance of the Facility equipment;

7.10.3.2 A report summarizing the results of maintenance performed during

each Maintenance Outage, Planned Outage, and any Forced Outage, and upon request of Idaho Power any of the technical data obtained in connection with such maintenance;

7.10.3.3 Before Final Completion, a monthly progress report stating the percentage completion of the Facility and a brief summary of construction activity during the prior month;

7.10.3.4 Before Final Completion, a monthly report containing a brief summary of construction activity contemplated for the next calendar month;

7.10.3.5 From and after the Commercial Operation Date, a monthly report detailing the availability of the Facility; and

7.10.3.6 At any time from the Effective Date, one year's advance notice of the termination or expiration of any material agreement, including Leases, pursuant to which the Facility or any material equipment relating thereto is upon the Premises; provided that the foregoing does not authorize any early termination of any land lease. In the event Seller has less than one year's advance notice of such termination or expiration, Seller shall provide the notice contemplated by this Section to Idaho Power within fifteen (15) Business Days of Seller obtaining knowledge of the termination or expiration.

7.10.4 Information to Governmental Authorities. Seller shall, promptly upon written request from Idaho Power, provide Idaho Power with all data collected by Seller related to the construction, operation or maintenance of the Facility reasonably required by Idaho Power or an Affiliate thereof for reports to, and information requests from, any Governmental Authority or Electric System Authority. Along with this information, Seller shall provide to Idaho Power copies of all submittals to Governmental Authorities or Electric System Authorities directed by Idaho Power and related to the operation of the Facility with a certificate that the contents of the submittals are true and accurate to the best of Seller's knowledge. Seller shall use best efforts to provide this information to Idaho Power with sufficient advance written notice to enable Idaho Power to review such information and meet any submission deadlines imposed by the requesting organization or entity. Idaho Power shall reimburse Seller for all of Seller's reasonable actual costs and expenses in excess of $10,000 per year, if any, incurred in connection with Idaho Power's requests for information under this Section 7.10.4.

7.10.5 Data Request. Seller shall, promptly upon written request from Idaho Power, provide Idaho Power with data collected by Seller related to the construction, operation or maintenance of the Facility reasonably required for information requests from any Governmental Authorities, state or federal agency intervener or any other party achieving intervenor status in any Idaho Power rate proceeding or other proceeding before any Governmental Authority. Seller shall use best efforts to provide this information to Idaho Power sufficiently in advance to enable Idaho Power to review it and meet any submission deadlines. Idaho Power shall reimburse Seller for all of Seller's reasonable

actual costs and expenses in excess of $10,000 per year, if any, incurred in connection with Idaho Power's requests for information under this Section 7.10.5.

7.10.6 Documents to Governmental Authorities. After sending or filing any statement, application, and report or any document with any Governmental Authority or Electric System Authority relating to operation and maintenance of the Facility, Seller shall, within five (5) Business Days of such submission or filing, provide to Idaho Power a copy of the same.

7.10.7 Environmental Information. Seller shall, promptly upon written request from Idaho Power, provide Idaho Power with all data reasonably requested by Idaho Power relating to environmental information under the Required Facility Documents. Seller shall further provide Idaho Power with information relating to environmental impact mitigation measures it is taking in connection with the Facility's construction or operation that are required by any Governmental Authority. Idaho Power shall reimburse Seller for all of Seller's reasonable actual costs and expenses in excess of $10,000 per year, if any, incurred in connection with Idaho Power's requests for the foregoing information under this Section 7.10.7. As soon as it is known to Seller, Seller shall disclose to Idaho Power, the extent of any material violation of any environmental laws or regulations arising out of the construction, operation, or maintenance of the Facility, or the presence of Environmental Contamination at the Facility or on the Premises, alleged to exist by any Governmental Authority having jurisdiction over the Premises, or the present existence of, or the occurrence during Seller's occupancy of the Premises of, any enforcement, legal, or regulatory action or proceeding relating to such alleged violation or alleged presence of Environmental Contamination presently occurring or having occurred during the period of time that Seller has occupied the Premises.

7.10.8 Operational Reports. Seller shall provide Idaho Power monthly operational reports in a form and substance reasonably acceptable to Idaho Power, and Seller shall, promptly upon written request from Idaho Power, provide Idaho Power with all operational data requested by Idaho Power with respect to the performance of the Facility and delivery of Net Output, Green Tags or Capacity Rights therefrom.

7.10.9 Notice of Material Adverse Events. Seller shall promptly notify Idaho Power of receipt of written notice or actual knowledge by Seller or its Affiliates of the occurrence of any event of default under any material agreement to which Seller is a party and of any other development, financial or otherwise, which would have a material adverse effect on Seller, the Facility or Seller's ability to develop, construct, operate, maintain or own the Facility as provided herein. Seller shall promptly disclose to Buyer and Customer (but in no case later than two (2) Business Days after Seller obtains actual knowledge) any violation of any Applicable Laws arising out of the construction or operation of the Facility by Seller, its Affiliates or any contractor of any of them, including any Qualified Operator, or the existence of any past or present enforcement, legal, or regulatory action or proceeding relating to the Facility, if such violation, action or proceeding adversely affects or could reasonably be expected to adversely affect the construction or operation of the Facility or the commercial reputation of Buyer, Customer or any of their respective

Affiliates.

7.10.10 Notice of Litigation. Following its receipt of written notice or actual knowledge of the commencement of any action, suit, or proceeding before any court or Governmental Authority against Seller or its members with respect to this Agreement or the transactions contemplated hereunder, Seller shall, within ten (10) days of such notice or knowledge, give written notice to Idaho Power of the same. Following its receipt of written notice or actual knowledge of the commencement of any action, suit or proceeding before any court or Governmental Authority against Seller, its members or any Affiliate, the effect of which would materially and adversely affect Seller's performance of its obligations hereunder, Seller shall, within ten (10) days of such notice or knowledge, give notice to Idaho Power of the same.

7.10.11 Additional Information. Seller shall provide to Idaho Power and Customer such other information respecting the condition or operations of Seller, as such pertains to Seller's performance of its obligations hereunder, or the Facility as Idaho Power or Customer may, from time to time, reasonably request.

7.10.12 Confidential Treatment. The monthly reports and other information provided to Idaho Power under this Section 7.10 shall be treated as Confidential Business Information if such treatment is requested in writing by Seller at the time the information is provided to Idaho Power, subject to Idaho Power's rights to disclose such information pursuant to Sections 7.10.4, 7.10.5, 7.10.7, 11.5, 25.2 and 25.3, and pursuant to any applicable Requirements of Law. Seller shall have the right to seek confidential treatment of any such information from the Governmental Authority entitled to receive such information.

7.11 Financial and Accounting Information. If Idaho Power or one of its Affiliates determines that, under (i) the Accounting Standards Codification (ASC) 810, Consolidation of Variable Interest Entities, and (ii) Requirements of Law that it may hold a variable interest in Seller, but it lacks the information necessary to make a definitive conclusion, Seller hereby agrees to provide, upon Idaho Power's written request, sufficient financial and ownership information so that Idaho Power or its Affiliate may confirm whether a variable interest does exist under ASC 810 and Requirements of Law. If Idaho Power or its Affiliate determines that, under ASC 810, it holds a variable interest in Seller, Seller hereby agrees to provide, upon Idaho Power's written request, sufficient financial and other information to Idaho Power or its Affiliate so that Idaho Power may properly consolidate the entity in which it holds the variable interest or present the disclosures required by ASC 810 and Requirements of Law. Idaho Power shall reimburse Seller for Seller's reasonable costs and expenses, if any, incurred in connection with Idaho Power's requests for information under this Section 7.11.

7.12 Output Guarantee.

7.12.1 Output Guarantee. Seller is obligated to deliver a quantity of Net Output during each month which is equal to the Output Guarantee. For purposes of this Agreement, "Output Guarantee" for any month means the sum of (i) 90% of the Expected Energy of

the Facility for such month, less (ii) any quantities of Output that were not delivered to the Point of Delivery (or accepted by Idaho Power) in such month during periods constituting Seller Uncontrollable Minutes (such quantity calculated on the basis of the Net Output capable of being delivered in an hour at an average rate equivalent to the actual Nameplate Capacity Rating).

7.12.1.2 Seller's Adjustment of Estimated Monthly Net Output Amounts in Exhibit 4 After the Commercial Operation Date. After the Commercial Operation Date, the Seller may revise any future estimated monthly Net Output amounts in Exhibit 4 by providing written notice no later than 5 PM Mountain Time on the 25th day of the month that is prior to the month to be revised. If the 25th day of the month falls on a weekend or holiday, then written notice must be received on the last Business Day prior to the 25th day of the month. For example, if the Seller would like to revise the Estimated Net Output Amount for October, they would need to submit a revised schedule no later than September 25th or the last Business Day prior to September 25th.

a.) This written notice must be provided to Idaho Power in accordance with Section 24.1 or by electronic notice as agreed to by both Parties.

b.) Failure to provide timely written notice of changes to the Estimated Net Output Amounts will be deemed to be an election of no change from the most recently provided monthly Estimated Net Output Amounts.

7.12.2 Liquidated Damages for Output Shortfall.

7.12.2.1 If the quantity of Net Output delivered by the Facility during any month is equal to or greater than the Output Guarantee for such month, Seller's delivery obligation for such month shall be deemed satisfied for that month.

7.12.2.2 If the quantity of Net Output delivered by the Facility during any month is less than the Output Guarantee for such month, the resulting shortfall, if any, shall be determined for that month (the "Output Shortfall"). The Output Shortfall shall be expressed in MWh and calculated in accordance with the following formula:

Output Shortfall = (90% of the Expected Energy for the month).

less

Any quantities of Output that were not delivered to the Point of Delivery (or accepted by Idaho Power) in such month during periods constituting Seller Uncontrollable Minutes (such quantity calculated on the basis of the Net Output capable of being delivered in an hour at an average rate equivalent to the actual Nameplate Capacity Rating),

less

The Net Output for the month.

7.12.2.3 If the product of the Output Shortfall calculation set forth in Section 7.12.2.1 is a positive number, Seller shall pay Idaho Power liquidated damages equal to the product of (i) the Output Shortfall for that month, multiplied by (ii) Idaho Power's Cost to Cover for that month. If the product of the Output Shortfall calculation set forth in Section 7.12.2.1 is a negative number, Seller shall not be obligated to pay Idaho Power liquidated damages for such month.

7.12.2.4 Each Party agrees and acknowledges that (i) the damages that Idaho Power would incur due to the Facility's failure to achieve the Output Guarantee would be difficult or impossible to predict with certainty and (ii) the liquidated damages contemplated by this provision are a fair and reasonable calculation of such damages.

7.13 Access Rights. Upon reasonable prior notice and subject to the prudent safety requirements of Seller, and Requirements of Law relating to workplace health and safety, Seller shall provide Idaho Power and its authorized agents, employees and inspectors ("Idaho Power Representatives") with reasonable access to the Facility: (a) for the purpose of reading or testing metering equipment, (b) as necessary to witness any acceptance tests, (c) to provide tours of the Facility to customers and other guests of Idaho Power (not more than twelve (12) times per year), (d) for purposes of implementing Sections 2.7 or 10.5, and (e) for other reasonable purposes at the reasonable request of Idaho Power. Idaho Power shall release Seller from any and all Liabilities resulting from actions or omissions by any of the Idaho Power Representatives in connection with their access to the Facility, except to the extent that such Liabilities are caused by the intentional or negligent act or omission of Seller or its agents or Affiliates.

7.14 Facility Images. Idaho Power shall be free to use any and all images from or of the Facility for promotional purposes, subject to Seller's consent (not to be unreasonably withheld or delayed, and which consent may consider Requirements of Law relating to Premises security, obligations to outside vendors (including any confidentiality obligations), and the corporate policies of Seller's Affiliates). Upon Idaho Power's request and at Idaho Power's expense, Seller shall install imaging equipment at the Facility as Idaho Power may request, including video and or web-based imaging equipment subject to the prudent safety requirements of Seller, and Requirements of Law relating to workplace health and safety. Idaho Power shall retain full discretion on how such images are presented including associating images of the Facility with a Idaho Power-designated corporate logo.

SECTION 8
RIGHT OF FIRST OFFER AND OWNERSHIP OR PURCHASE OPTION

8.1 For purposes of this Section 8, any reference to "Buyer" or "Idaho Power" shall also

mean Buyer's or Idaho Power's "Affiliate" as that term is defined in this Agreement.

8.2 Right of First Offer. If this Agreement is terminated for any reason prior to the Commercial Operation Date, then during the Restricted Period, neither Seller nor any of Seller's Affiliates may enter into any agreement to sell, or hedge the quantity of, Energy or Green Tags generated by equipment installed at the Premises to any party other than Buyer, without first offering the same material price and terms of such agreement to Buyer by written notice ("Offer Notice"). "Restricted Period" means a period that ends eighteen (18) months after the effective date of a termination. If Buyer rejects or fails to respond to the Offer Notice within fifteen (15) Business Days, or the Parties negotiate to enter into an agreement but are unable to execute a definitive agreement within sixty (60) days after Buyer accepts such offer from Seller, then Seller shall have the right to enter into an agreement with a third party on terms and conditions in the aggregate not more favorable than the terms and conditions contained in the Offer Notice. If either Seller or any of its Affiliates wish to enter into an agreement with a third party on terms in the aggregate more favorable to such third party than those offered to Buyer in the Offer Notice, or if Seller or such Affiliate fails to close the transaction which gave rise to Seller's obligation to provide an Offer Notice within nine (9) months following the issuance of the Offer Notice, then any subsequent agreement during the Restricted Period shall again be subject to this Section 8.2. This Section 8.2 shall be specifically enforceable by Buyer without bond and without the need to prove irreparable harm. Neither Seller nor Seller's Affiliates may sell or transfer the Facility, or any part thereof, or land rights or interests in the Site (including the Interconnection Agreement) during the Restricted Period, except by a transfer permitted by Section 8.2. Upon termination of this Agreement prior to the Commercial Operation Date, Seller shall deliver a notice of Buyer's rights in respect of the Site, in an executed, recordable form reasonably acceptable to Buyer, that Buyer may record in the real estate records giving notice of Buyer's rights under this Section 8.2. Seller enters into this Section 8.2 as authorized agent for all of its present and future Affiliates. This Section 8.2 shall apply until the earlier of the expiration of the Restricted Period and the consummation of the first bona fide transfer in accordance with its terms.

8.3 Termination of Duty to Buy. If this Agreement is terminated because of a default by Seller, neither Seller, nor any successor to Seller with respect to the ownership of the Facility (for whom Seller acts herein as agent), may thereafter require or seek to require Buyer to purchase Output from the Facility under Public Utility Regulatory policy Act on account of its status as a Qualifying Facility, or any other Requirements of Law, for any periods that would have been within the Term had this Agreement remained in effect. Seller, on behalf of itself and on behalf of any other entity on whose behalf it may act, hereby waives its rights to require Buyer to do so.

8.4 Right of First Offer on Ownership.

8.4.1 At any time subsequent to the Effective Date of this Agreement, except in accordance with this Section 8.4.1, Seller: (a) shall not sell, transfer or offer to sell or transfer, the Facility; and (b) shall cause its immediately upstream owner(s) (together with Seller, each a "ROFO Seller") not to sell, transfer or offer to sell or transfer, any ownership interest in Seller (the Facility and ownership interests in Seller, as applicable, each the "Offered Interests") other than to an Affiliate in accordance with the provisions

of Section 22.2 (each a "Restricted Transaction"). If a ROFO Seller intends to enter into a Restricted Transaction, Seller shall provide Buyer with written notice of same (a "Seller ROFO Notice"), and Buyer shall have a right of first offer with respect to the purchase of such Offered Interests. Within thirty (30) days after receipt of the Seller ROFO Notice, Buyer shall notify Seller in writing of its decision whether or not to negotiate with ROFO Seller for the purchase of the Offered Interests (the "Buyer ROFO Notice"). If Buyer elects to negotiate with ROFO Seller for the purchase of the Offered Interests, Seller shall cause ROFO Seller to negotiate in good faith and exclusively with Buyer, for a period of not less than ninety (90) days following ROFO Seller's receipt of the Buyer ROFO Notice. ("ROFO Period").

8.4.2 In the event that Buyer does not elect to negotiate with ROFO Seller for the purchase of the Offered Interests pursuant to Section 8.4.1, ROFO Seller shall be free to sell, transfer or offer or negotiate to sell or transfer the Offered Interests in ROFO Seller's sole discretion. In the event that Buyer elects to negotiate with ROFO Seller for the purchase of the Offered Interests pursuant to Section 8.4.1, and if definitive transaction documents between ROFO Seller and Buyer or its designee have not been executed with respect to the Offered Interests within the ROFO Period, ROFO Seller may negotiate a Restricted Transaction with any other Person, subject, in all cases, to the terms and conditions of this Agreement, including Section 8.4.1 and the provisions of Section 22. In no event may ROFO Seller enter into a Restricted Transaction with any other Person on economic terms (such as purchase price, payment terms and overall revenue streams associated with such transaction) or other material terms less favorable to ROFO Seller than such economic terms, if any, as were negotiated by Buyer and ROFO Seller. As used in this Section 8.4.2, "other material terms" means any terms identified by the Parties acting in good faith within five (5) Business Days following expiration of the ROFO Period that the Parties have not agreed to during their negotiation.

8.4.3 If ROFO Seller and such other Person do not agree upon the terms, conditions and pricing for the Offered Interests within one hundred eighty (180) days following the expiration of the ROFO Period, ROFO Seller and any Offered Interests shall again be subject to this Section 8.2 with respect to any Restricted Transaction.

8.5 Negotiation of Facility Purchase. Promptly following the Effective Date, the Parties agree to commence negotiation in good faith for Buyer's purchase of the Facility (or, alternatively, all or a portion of the equity interests of the entity or entities owning the Facility, including potential limited partnership interests or limited liability company membership interests), under terms and conditions and pursuant to a purchase and sale agreement that are commercially reasonable for a facility of the nature and size of the Facility and at a price mutually agreed upon by the Parties, taking into account the income tax credits associated with the Facility. The Parties will have a maximum of one hundred and twenty (120) days following the Effective Date (failing the completion of which by such date, this sentence Section shall expire by its terms) to negotiate such purchase under a timeline that provides for Buyer's acquisition of such Facility or equity interests no later than immediately prior to the Commercial Operation Date of the Facility, unless the Parties mutually agree to a purchase, or a deadline for negotiation, for an earlier or later date. Buyer shall not be obligated to purchase the Facility or equity interests unless it shall have

reached mutual agreement with the Seller on the purchase price for the Facility or equity interests.

8.6 Efforts Required to Transfer Facility and Offered Interests. If Buyer exercises any right to purchase or agrees to purchase the Facility (or Offered Interests) pursuant to any of the means specified in this Section 8, then such purchase shall occur pursuant to a form of purchase and sale agreement prepared by Buyer which shall contain customary representations, warranties and covenants and otherwise be in form reasonably acceptable to Buyer. It shall be a condition of any such purchase that Buyer obtains all necessary Governmental Approvals, and notwithstanding any language to the contrary in this Agreement, Buyer shall be given sufficient time to obtain such approvals in accordance with applicable statutes and regulations. Pursuant to the purchase and sale agreement, Seller will take all actions necessary to transfer by deed, bill of sale, or both, the Facility or Offered Interests to Buyer, as well as all other improvements placed on the Premises by Seller that are required for the continued and uninterrupted use, maintenance and operation of the Facility, free and clear from any lien or monetary encumbrance created by or on behalf of Seller or its Affiliates. In addition, Seller will assign to Buyer all transferrable Governmental Approvals applicable to the Facility and Required Facility Documents, and all transferrable warranties for the Facility. Seller shall cooperate with Buyer to assign and enforce any and all warranties that apply to the Facility or any of its component parts, which obligation shall survive the termination of this Agreement.

8.7 Due Diligence; Cooperation; Governmental Approvals; Notice of Rights. Seller will provide, in a timely manner, information regarding the Facility and Offered Interests which is reasonably requested by Buyer to allow Buyer to perform due diligence for the purchase of the Facility and Offered Interests pursuant to this Section 8. Seller shall further provide commercially reasonable cooperation and assistance to Buyer, without further compensation, throughout Buyer's efforts to properly account for and obtain any necessary Governmental Approvals with respect to the purchase of the Facility and Offered Interests pursuant to this Section 8. Notwithstanding anything in this Agreement or any definitive transaction documentation, Buyer shall not be obligated to proceed with the purchase of the Facility or any Offered Interests pursuant to this Section 8 if Buyer does not receive all necessary Governmental Approvals in connection with such transaction. Seller shall put any Person with which it enters into discussions or negotiations regarding a Restricted Transaction on notice of the rights of Buyer set forth in this Section 8. Buyer shall be permitted to file a notice of the rights contained in this Section 8 with respect to the Premises.

8.8 Termination of Agreement. Upon the acquisition of the Facility or Offered Interests by Buyer pursuant to this Section 8, this Agreement shall terminate and neither Party shall have any obligation to the other under this Agreement, except with respect to the terms and provisions hereof that expressly survive the termination of this Agreement.

SECTION 9
SECURITY AND CREDIT SUPPORT

9.1 Project Development Security. Seller shall provide within five (5) Business Days from receipt of a written request from Idaho Power all reasonable financial records necessary for Idaho Power to confirm Seller satisfies the Credit Requirements.

9.1.1 Form and Amount of Project Development Security. On or before thirty (30) days of the date of the Effective Date, Seller shall post and maintain in favor of Idaho Power (a) a guaranty from a party that satisfies the Credit Requirements, in substantially the form attached hereto as Exhibit 8, or (b) a Letter of Credit in favor of Idaho Power, in a form acceptable to Idaho Power in its reasonable discretion, equal in each case to ninety thousand dollars ($90,000) per MW of Nameplate Capacity Rating (the "Project Development Security"). Seller and any person or entity providing a guaranty shall provide within five (5) Business Days from receipt of a written request from Idaho Power all reasonable financial records necessary for Idaho Power to confirm the guarantor satisfies the Credit Requirements.

9.1.2 Use of Project Development Security to Pay Delay Damages. If the Commercial Operation Date occurs after the Scheduled Commercial Operation Date and Seller has failed to pay any Delay Damages when due under Section 4.4, Idaho Power shall be entitled to and shall draw upon the Project Development Security an amount equal to the Delay Damages. Idaho Power shall also be entitled to draw upon the Project Development Security for other damages if this Agreement is terminated under Section 12 because of Seller's default.

9.1.3 Termination of Project Development Security. Seller shall no longer be required to maintain the Project Development Security after the Commercial Operation Date, if at such time no damages are owed to Idaho Power under this Agreement. However, as of the Commercial Operation Date, Seller may elect to apply the Project Development Security toward the Default Security required by Section 9.2, including by the automatic continuation (as opposed to the replacement) thereof.

9.2 Default Security.

9.2.1 Duty to Post Default Security. On the date specified in Section 4.2.1, Seller shall post and maintain in favor of Idaho Power (a) a guaranty from an entity that satisfies the Credit Requirements, in substantially the form attached hereto as Exhibit 8, or (b) a Letter of Credit, each in the amount specified in Section 9.2.2 (the "Default Security"), as provided in this Section 9.2. Seller and any person or entity providing a guaranty shall provide within five (5) Business Days from receipt of a written request from Idaho Power all reasonable financial records necessary for Idaho Power to confirm the guarantor satisfies the Credit Requirements.

9.2.2 Amount of Default Security. The amount of the Default Security required by Section 9.2.1 shall be forty five thousand dollars ($45,000) per MW of Nameplate

Capacity Rating and will be held until this Agreement expires. The amount of Default Security required shall be thirty-five thousand dollars ($35,000) per MW of Nameplate Capacity Rating beginning with Contract Year eleven (11).

9.2.3 Use of Default Security to Pay Deficit Damages. If the Seller has failed to pay any Deficit Damages when due under Section 4.4, Idaho Power shall be entitled to and shall draw upon the Default Security an amount equal to the Deficit Damages until such time as the Default Security is exhausted. Idaho Power shall also be entitled to draw upon the Default Security for other damages if this Agreement is terminated under Section 12 because of Seller's default.

9.3 Senior Lenders. If Seller collaterally assigns this Agreement to Seller's Lenders in a manner permitted under this Agreement, Buyer, at Seller's sole cost and expense, if requested shall enter into a Lender Consent with Seller's Lenders substantially in the form of Exhibit 21. If Seller enters into a Tax Equity Financing, Buyer, at Seller's sole cost and expense, if requested shall provide an Estoppel Certificate to Seller's Tax Equity Investors substantially in the form of Exhibit 22. Seller will within five (5) Business Days of written demand reimburse Buyer all Buyer's costs and expenses, including legal fees and costs of due diligence, incurred in connection with any action or exercise of rights or remedies by any of Seller's Lenders against Seller, including any proceeding or foreclosure against Seller or this Agreement.

9.4 Change of Control. Seller may not suffer any Change of Control, whether voluntary or by operation of law, without Buyer's prior written consent, granted or withheld in Buyer's reasonable discretion. Seller may not suffer a Change of Control or any other change of ownership or control, whether direct or indirect, voluntary or by operation of law, such that Seller becomes a Sanctioned Person. Seller shall give Buyer notice of any Change of Control within ten (10) Business Days following the effectiveness thereof

9.5 Security is Not a Limit on Seller's Liability. The security contemplated by this Section 9 (a) constitutes security for, but is not a limitation of, Seller's obligations hereunder and (b) shall not be Idaho Power's exclusive remedy for Seller's failure to perform in accordance with this Agreement. Seller shall maintain security as required by Sections 9.1 and 9.2, as applicable per this Agreement. To the extent that Idaho Power draws on any security, Seller shall, within five (5) Business Days following such draw, replenish or reinstate the security to the full amount then required under this Section 9. If at any time the Seller or Seller's credit support provider(s) fails to meet the Credit Requirements, then Seller shall provide replacement security meeting the requirements set forth in Section 9 within ten (10) Business Days after the earlier of (x) Seller's receipt of notice from any source that Seller or the credit support provider(s), as applicable, no longer meets the Credit Requirements or (y) Seller's receipt of written notice from Idaho Power requesting the posting of alternate security.

SECTION 10
METERING, METERING COMMUNICATIONS AND SCADA TELEMETRY

10.1 Metering. Idaho Power shall, provide, install, and maintain metering equipment needed for metering the electrical energy production from the Facility. The metering equipment will be

capable of measuring, recording, retrieving and reporting the Facility's hourly gross electrical energy production, station use, maximum energy deliveries (MW) and any other energy measurements at the Point of Delivery that Idaho Power needs to administer this Agreement and integrate this Facility's energy production into the Idaho Power electrical system. Specific equipment, installation details and requirements for this metering equipment will be established in the GIA process and documented in the GIA. Seller shall be responsible for all initial and ongoing costs of this equipment as specified in Schedule 72 of the Tariff and the GIA. Seller shall cause the Facility to implement all necessary generation information communications in WREGIS, and report generation information to WREGIS pursuant to a WREGIS-approved meter that is dedicated to the Facility and only the Facility.

10.2 Metering Communications. Seller shall, at the Seller's sole initial and ongoing expense, arrange for, provide, install, and maintain dedicated metering communications equipment capable of transmitting the metering data specified in Section10.1 to Idaho Power in a frequency, manner and form acceptable to Idaho Power. Seller shall grant Idaho Power sole control and use of this dedicated metering communications equipment. Specific details and requirements for this metering communications equipment will be established in the GIA process and documented in the GIA.

10.3 Supervisory Control and Data Acquisition (SCADA) Telemetry. If the Facility's Nameplate Capacity exceeds 3 MW, in addition to the requirements of Section 10.1 and 10.2, Idaho Power may require telemetry equipment and telecommunications which will be capable of providing Idaho Power with continuous instantaneous SCADA telemetry of the Seller's Net Output and Inadvertent Energy production in a form acceptable to Idaho Power. Seller shall grant Idaho Power sole control and use of this dedicated SCADA and telecommunications equipment. Specific details and requirements for this SCADA Telemetry and telecommunications equipment will be established in the GIA process and documented in the GIA. Seller shall be responsible for all initial and ongoing costs of this equipment as specified in Schedule 72 of the Tariff and the GIA.

10.4 Metering Costs. To the extent not otherwise provided in the Generation Interconnection Agreement, Seller shall bear all costs (including Idaho Power's costs) relating to all metering equipment installed to accommodate Seller's Facility.

10.5 Losses. If the Idaho Power Metering equipment is capable of measuring the exact energy deliveries by the Seller to the Idaho Power electrical system at the Point of Delivery, no Losses will be calculated for this Facility. If the Idaho Power Metering Equipment is unable to measure the exact electric energy deliveries by the Seller to the Idaho Power electrical system at the Point of Delivery, a Losses calculation will be established to measure the energy losses (MWh) between the Seller's Facility and the Idaho Power Point of Delivery. This loss calculation will be initially set at two percent (2%) of the MWh energy production recorded on the Facility generation metering equipment. At such time as Seller provides Idaho Power with the electrical equipment specifications (transformer loss specifications, conductor sizes, etc.) of all of the electrical equipment between the Facility and the Idaho Power electrical system, Idaho Power will configure a revised loss calculation formula to be agreed to by both parties and used to calculate the MWh Losses for the remaining term of the Agreement. If at any time during the

term of this Agreement, Idaho Power determines that the loss calculation does not correctly reflect the actual MWh losses attributed to the electrical equipment between the Facility and the Idaho Power electrical system, Idaho Power may adjust the calculation and retroactively adjust the previous month's MWh loss calculations.

SECTION 11
BILLINGS, COMPUTATIONS AND PAYMENTS

11.1 Monthly Invoices. On or before the tenth (10^{th}) day following the end of each calendar month, Seller shall deliver to Idaho Power a proper invoice showing Seller's computation of Net Output delivered to the Point of Delivery during such month in the form of Exhibit 1. When calculating the invoice, Seller shall provide computations showing the portion of Net Output that was delivered during On-Peak Hours and the portion of Net Output that was delivered during Off-Peak Hours. If such invoice is delivered by Seller to Idaho Power, then Idaho Power shall send to Seller, on or before the later of the twentieth (20^{th}) day following receipt of such invoice or the thirtieth (30^{th}) day following the end of each month, payment for Seller's deliveries of Net Output and associated Green Tags to Idaho Power.

11.2 Offsets. Either Party may offset any payment due hereunder against amounts owed by the other Party pursuant hereto. Either Party's exercise of recoupment and set off rights shall not limit the other remedies available to such Party hereunder.

11.3 Interest on Late Payments. Any amounts that are not paid when due hereunder shall bear interest at the Contract Interest Rate from the date due until paid.

11.4 Disputed Amounts. If either Party, in good faith, disputes any amount due pursuant to an invoice rendered hereunder, such Party shall notify the other Party of the specific basis for the dispute and, if the invoice shows an amount due, shall pay that portion of the statement that is undisputed, on or before the due date. Except with respect to invoices provided under Section 11.1, any such notice shall be provided within two (2) years of the date of the invoice in which the error first occurred. If any amount disputed by such Party is determined to be due the other Party, or if the Parties resolve the payment dispute, the amount due shall be paid within five (5) Business Days after such determination or resolution, along with interest at the Contract Interest Rate from the date due until the date paid.

11.5 Audit Rights. Each Party, through its authorized representatives, shall have the right, at its sole expense upon reasonable written notice and during normal business hours, to examine and copy the records of the other Party to the extent reasonably necessary to verify the accuracy of any statement, charge or computation made hereunder or to verify the other Party's performance of its obligations hereunder. Upon request, each Party shall provide to the other Party statements evidencing the quantities of Net Output delivered at the Point of Delivery. If any statement is found to be inaccurate, a corrected statement shall be issued and any amount due thereunder will be promptly paid and shall bear interest at the Contract Interest Rate from the date of the overpayment or underpayment to the date of receipt of the reconciling payment.

Notwithstanding the foregoing, no adjustment shall be made with respect to any statement or payment hereunder unless a Party questions the accuracy of such payment or statement within two (2) years after the date of such statement or payment.

SECTION 12
DEFAULTS AND REMEDIES

12.1 Defaults. The following events are defaults (each a "default" before the passing of applicable notice and cure periods, and an "Event of Default" thereafter) hereunder:

12.1.1 Defaults by Either Party:

12.1.1.1 A Party fails to make a payment when due hereunder if the failure is not cured within ten (10) Business Days after the non-defaulting Party gives the defaulting Party a notice of the default.

12.1.1.2 A Party (i) makes a general assignment for the benefit of its creditors; (ii) files a petition or otherwise commences, authorizes or acquiesces in the commencement of a proceeding or cause of action under any bankruptcy or similar law for the protection of creditors, or has such a petition filed against it and such petition is not withdrawn or dismissed within sixty (60) days after such filing; (iii) becomes insolvent; or (iv) is unable to pay its debts when due.

12.1.1.3 A Party breaches a representation or warranty made by it herein if the breach is not cured within thirty (30) days after the non-defaulting Party gives the defaulting Party a written notice of the default; provided that if such default is not reasonably capable of being cured within the thirty (30) day cure period but is reasonably capable of being cured within a ninety (90) day cure period, the defaulting Party will have such additional time (not exceeding an additional sixty (60) days) as is reasonably necessary to cure, if, prior to the end of the thirty (30) day cure period the defaulting Party provides the non-defaulting Party a remediation plan, the non-defaulting Party approves such remediation plan, and the defaulting Party promptly commences and diligently pursues the remediation plan.

12.1.1.4 A Party otherwise fails to perform any material obligation hereunder for which an exclusive remedy is not provided hereunder and which is not addressed in any other default described in Section 12.1, if the failure is not cured within thirty (30) days after the non-defaulting Party gives the defaulting Party written notice of the default; provided that if such default is not reasonably capable of being cured within the thirty (30) day cure period but is reasonably capable of being cured within a ninety (90) day cure period, the defaulting Party will have such additional time (not exceeding an additional sixty (60) days) as is reasonably necessary to cure, if, prior to the end of the thirty (30) day cure period the defaulting Party provides the non-defaulting Party a remediation plan, the non-defaulting Party approves such remediation plan, and the defaulting Party

promptly commences and diligently pursues the remediation plan.

12.1.2 Defaults by Seller.

12.1.2.1 Seller fails to post, increase, or maintain the Project Development Security or Default Security as required under, and by the applicable dates set forth in, Section 9.1 and Section 9.2 and such failure is not cured within ten (10) Business Days after Idaho Power gives Seller notice of default.

12.1.2.2 Seller fails to (i) cause the Facility to achieve Commercial Operation on or before the Guaranteed Commercial Operation Date, or (ii) complete all items included on the Final Completion Schedule within ninety (90) days after the Commercial Operation Date.

12.1.2.3 Seller sells Output, Green Tags or Capacity Rights from the Facility to a party other than Idaho Power in breach of Section 5.2, Seller diverts any Environmental Attributes for any use other than sale to Buyer, or Seller makes a public statement or otherwise takes an action that any Governmental Authority or the Center for Resource Solutions determines is a retirement, double counting, double sale, double use or double claim of Green Tags.

12.1.2.4 Idaho Power receives notice of foreclosure of the Facility or any part thereof by a Lender, mechanic or materialman, or any other holder, of an unpaid lien or other charge or encumbrance, if the same has not been stayed, paid, or bonded around within ten (10) days of the date of the notice received by Idaho Power.

12.1.2.5 After the Commercial Operation Date, Seller fails to maintain any Required Facility Documents or Permits necessary to own, operate, or maintain the Facility and such failure continues for thirty (30) days after Seller's receipt of written notice thereof from Idaho Power; provided, however, that, upon written notice from Seller, the thirty (30) day period shall be extended by an additional sixty (60) days if (i) the failure cannot reasonably be cured within the thirty (30) day period despite diligent efforts, (ii) the default is capable of being cured within the additional sixty (60) day period, and (iii) Seller commences the cure within the original thirty (30) day period and is at all times thereafter diligently and continuously proceeding to cure the failure.

12.1.2.6 Seller's Abandonment of construction or operation of the Facility and such failure continues for thirty (30) days after Seller's receipt of written notice thereof from Idaho Power.

12.1.2.7 Seller fails to maintain insurance as required by the Agreement and such failure continues for fifteen (15) days after Seller's receipt of written notice thereof from Idaho Power.

12.1.2.8 Seller fails to meet the Output Guarantee for two (2) consecutive years.

12.1.2.9 Every three (3) years after the Commercial Operation Date, Seller will supply Idaho Power with a Certification of Ongoing Operations and Maintenance (O&M) from a Registered Professional Engineer licensed in the State of Idaho, which Certification of Ongoing O&M shall be in the form specified in Exhibit 11. Seller's failure to supply the required certificate will be an event of default. Such a default may only be cured by Seller providing the required certificate; and

12.1.2.10 During the full Term of this Agreement, Seller shall maintain compliance with all Required Facility Documents and determinations described in Exhibit 9 of this Agreement. In addition, Seller will supply Idaho Power with copies of any new or additional Required Facility Documents or determinations. At least every fifth (5^{th}) Contract Year, Seller will update the documentation described in Exhibit 9. If at any time Seller fails to maintain compliance with the Required Facility Documents and determinations described in Section 2.2.3 or to provide the documentation required by this paragraph, such failure will be a default of Seller and may only be cured by Seller submitting to Idaho Power evidence of compliance from the permitting agency.

12.1.2.11 Seller is or becomes a Sanctioned Person.

12.1.2.12 Seller breaches any obligation in Section 27.2, or any representation or warranty made by Seller in Section 27.2 is or becomes false or misleading in any material respect (provided that if the falsity or misleading nature of the representation or breach of the obligation is capable of being cured, an Event of Default will be deemed to occur only if the falsity or misleading nature of the representation or breach of obligation is not remedied within five (5) days after notice);

12.2 Remedies for Failure to Deliver/Receive.

12.2.1 Remedy for Seller's Failure to Deliver. Upon the occurrence and during the continuation of a default of Seller under Section 12.1.3, Seller shall pay Idaho Power within five (5) Business Days after invoice receipt, an amount equal to the sum of (a) Idaho Power's Cost to Cover multiplied by the Net Output delivered to a party other than Idaho Power, (b) additional transmission charges, if any, reasonably incurred by Idaho Power in moving replacement energy to the Point of Delivery or if not there, to such points in Idaho Power's control area as are determined by Idaho Power, and (c) any additional cost or expense incurred as a result of Seller's default under Section 12.1.3, as determined by Idaho Power in a commercially reasonable manner. The invoice for such amount shall include a written statement explaining in reasonable detail the calculation of such amount.

12.2.2 Remedy for Idaho Power's Failure to Purchase. If Idaho Power fails to receive or purchase all or part of the Net Output and Green Tags required to be purchased pursuant hereto and such failure is not excused under the terms hereof or by Seller's failure to perform, then Seller shall first satisfy its obligations under Section 12.7 and then Idaho Power shall pay Seller, on the earlier of the date payment would otherwise be due in respect of the month in which the failure occurred or within five (5) Business Days after invoice receipt, an amount equal to Seller's Cost to Cover multiplied by the amount of Net Output so not purchased, less amounts received by Seller pursuant to Section 12.7. The invoice for such amount shall include a written statement explaining in reasonable detail the calculation thereof.

12.2.3 Remedy for Seller's Failure to Sell/Deliver Capacity Rights. Seller shall be liable for Idaho Power's actual damages in the event Seller fails to sell or deliver all or any portion of the Capacity Rights to Idaho Power.

12.3 Termination and Remedies. From and during the continuance of an Event of Default, the non-defaulting Party shall be entitled to all remedies available at law or in equity, and may terminate this Agreement by written notice to the other Party designating the date of termination and delivered to the defaulting Party no less than one (1) Business Day before such termination date. The notice required by this Section 12.3 may be provided in the notice of default (and does not have to be a separate notice) so long as it complies with all other terms of this Section 12.3. As a precondition to Seller's exercise of this termination right, Seller must also provide copies of such notice to the notice addresses of the then-current President and General Counsel of Idaho Power. Such copies shall be sent by registered overnight delivery service or by certified or registered mail, return receipt requested. In addition, Seller's termination notice shall state prominently therein in type font no smaller than 14-point all-capital letters that "THIS IS A TERMINATION NOTICE UNDER A PPA. YOU MUST CURE A DEFAULT, OR THE PPA WILL BE TERMINATED," and shall state therein any amount purported to be owed and wiring instructions. Notwithstanding any other provision of this Agreement to the contrary, Seller will not have any right to terminate this Agreement if the default that gave rise to the termination right is cured within fifteen (15) Business Days of Idaho Power's receipt of such notice. Further, from and after the date upon which Seller fails to remedy a default within the time periods provided in Section 12.1, and until Idaho Power has recovered all damages incurred on account of such default by Seller, without exercising its termination right, Idaho Power may offset its damages against any payment due Seller. Except in circumstances in which a remedy provided for in this Agreement is described as a Party's sole or exclusive remedy, upon termination, the non-defaulting Party may pursue any and all legal or equitable remedies provided by law, equity or this Agreement. The rights contemplated by this Section 12 are cumulative such that the exercise of one or more rights shall not constitute a waiver of any other rights. In the event of a termination hereof:

12.3.1 Each Party shall pay to the other all amounts due the other hereunder for all periods prior to termination, subject to offset by the non-defaulting Party against damages incurred by such Party.

12.3.2 The amounts due pursuant to Section 12.3.1 shall be calculated and paid within

thirty (30) days after the billing date for such charges and shall bear interest thereon at the Contract Interest Rate from the date of termination until the date paid. The foregoing does not extend the due date of, or provide an interest holiday for any payments otherwise due hereunder.

12.3.3 Before and after the effective date of termination, the non-defaulting Party may pursue, to the extent permitted by this Agreement, any and all legal or equitable remedies provided by law, equity or this Agreement.

12.3.4 Without limiting the generality of the foregoing, the provisions of Sections 6.4, 6.5, 7.10.4, 7.10.5, 7.10.7, 11.3, 11.4, 11.5, and Section 12, Section 13, Section 14.1, Section 17, Section 23, Section 24, Section 25, and Section 26 shall survive the termination hereof.

12.4 Termination Damages. If this Agreement is terminated as a result of an Event of Default by one of the Parties, termination damages shall be determined. The amount of termination damages shall be calculated by the non-defaulting Party within a reasonable period after termination of the Agreement. In the event of a default by Seller before the Commercial Operation Date, the termination payment shall be the Pre-COD Damages Payment. In the event of default by Seller on or after the Commercial Operation Date, or any default by Buyer, the termination payment shall be the Forward Settlement Amount. Amounts owed pursuant to this section shall be due within five (5) Business Days after the non-defaulting Party gives the defaulting Party written notice of the amount due. The non-defaulting Party shall under no circumstances be required to account for or otherwise credit or pay the defaulting Party for economic benefits accruing to the non-defaulting Party as a result of the defaulting Party's default.

12.5 [Omitted]

12.6 Duty/Right to Mitigate. Each Party agrees that it has a duty to mitigate damages and covenants that it will use commercially reasonable efforts to minimize any damages it may incur as a result of the other Party's performance or non-performance hereof; provided, however, that this duty to mitigate shall not limit the amounts payable by the defaulting Party to the non-defaulting Party pursuant to Section 12.4. "Commercially reasonable efforts" (a) by Seller shall include requiring Seller to use commercially reasonable efforts to maximize the price for Net Output and associated Green Tags received by Seller from third parties, including entering into an enabling agreement with, or being affiliated with, one or more power marketers of nationally recognized standing to market such Net Output and associated Green Tags not purchased or accepted by Idaho Power (only during a period Idaho Power is in default), in each case only to the extent any of the foregoing actions are permitted under Requirements of Law and the Interconnection Agreement; and (b) by Idaho Power shall include requiring Idaho Power to use commercially reasonable efforts to minimize the price paid to third parties for energy and Green Tags purchased to replace Net Output and Green Tags not delivered by Seller as required hereunder.

12.7 Security. If this Agreement is terminated because of Seller's default, Idaho Power may, in addition to pursuing any and all other remedies available at law or in equity, proceed against any Seller security held by Idaho Power in whatever form to reduce any amounts that Seller owes Idaho Power arising from such default.

12.8 Cumulative Remedies. Except in circumstances in which a remedy provided for in this Agreement is described as a sole or exclusive remedy, the rights and remedies provided to Idaho Power hereunder are cumulative and not exclusive of any rights or remedies of Idaho Power.

SECTION 13
INDEMNIFICATION AND LIABILITY

13.1 Indemnities.

13.1.1 Indemnity by Seller. To the extent permitted by Requirements of Law and subject to Section 13.1.5, Seller shall release, indemnify and hold harmless Idaho Power and Customer, and each of its divisions, Affiliates, and each of its and their respective directors, officers, employees, agents, and representatives (collectively, the "Idaho Power Indemnitees") against and from any and all losses, fines, penalties, claims, demands, damages, liabilities, actions or suits of any nature whatsoever (including legal costs and attorneys' fees, both at trial and on appeal, whether or not suit is brought) (collectively, "Liabilities") actually or allegedly resulting from, or arising out of, or in any way connected with, the performance by Seller of its obligations hereunder, or relating to the Facility or Premises, for or on account of injury, bodily or otherwise, to, or death of, or damage to or destruction of property of, any person or entity, or for or on account of violation of environmental or criminal law, excepting only to the extent such Liabilities as may be caused by the gross negligence or willful misconduct of any person or entity within the Idaho Power Indemnitees. Seller shall be solely responsible for (and shall defend and hold Idaho Power harmless against) any damage that may occur as a direct result of Seller's breach of the Generation Interconnection Agreement.

13.1.2 Indemnity by Idaho Power. To the extent permitted by Requirements of Law and subject to Section 13.1.5, Idaho Power shall release, indemnify and hold harmless Seller, its Affiliates, and each of its and their respective directors, officers, employees, agents, and representatives (collectively, the "Seller Indemnitees") against and from any and all Liabilities actually or allegedly resulting from, or arising out of, or in any way connected with, the performance by Idaho Power of its obligations hereunder for or on account of (a) injury, bodily or otherwise, to, or death of, or (b) for damage to, or destruction of property of, any person or entity within the Seller Indemnitees, excepting only to the extent such Liabilities as may be caused by the negligence or willful misconduct of any person or entity within the Seller Indemnitees.

13.1.3 Additional Cross Indemnity. Without limiting Sections 13.1.1 and 13.1.2, Seller shall release, indemnify and hold harmless the Idaho Power indemnitees from and against all Liabilities related to Net Output prior to its delivery by Seller at the Point of Delivery, and Idaho Power shall release, indemnify and hold harmless the Seller Indemnitees from

and against all Liabilities related to Net Output once delivered to Idaho Power at the Point of Delivery as provided herein, except in each case to the extent such Liabilities are attributable to the gross negligence or willful misconduct or a breach of this Agreement by any member of the Idaho Power Indemnitees or the Seller Indemnitees, respectively, seeking indemnification hereunder.

13.1.4 No Dedication. Nothing herein shall be construed to create any duty to, any standard of care with reference to, or any liability to any person not a Party. No undertaking by one Party to the other under any provision hereof shall constitute the dedication of Idaho Power's facilities or any portion thereof to Seller or to the public, nor affect the status of Idaho Power as an independent public utility corporation or Seller as an independent individual or entity.

13.1.5 Consequential Damages. **NEITHER PARTY SHALL BE LIABLE TO THE OTHER PARTY FOR SPECIAL, PUNITIVE, INDIRECT, EXEMPLARY OR CONSEQUENTIAL DAMAGES, WHETHER SUCH DAMAGES ARE ALLOWED OR PROVIDED BY CONTRACT, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY, STATUTE OR OTHERWISE. THE PARTIES AGREE THAT ANY LIQUIDATED DAMAGES, SECURITY, INDEMNIFIED CLAIMS OR DAMAGES, DELAY DAMAGES, IDAHO POWER AND SELLER COST TO COVER DAMAGES, SECTION 12.2.3 CAPACITY RIGHTS LOSS DAMAGES, OR OTHER SPECIFIED MEASURE OF DAMAGES EXPRESSLY PROVIDED FOR HEREIN, ARE NOT INTENDED BY THEM TO REPRESENT AND WILL NOT BE DEEMED SPECIAL, PUNITIVE, INDIRECT, EXEMPLARY OR CONSEQUENTIAL DAMAGES AND SHALL NOT BE LIMITED IN AMOUNT BY THIS SECTION 13.1.5.**

SECTION 14
INSURANCE

14.1 Required Policies and Coverages. Without limiting any liabilities or any other obligations of Seller hereunder, Seller shall secure and continuously carry the insurance coverage specified on Exhibit 13 during the Term or longer period if specified in Exhibit 13.

14.2 Certificates of insurance. Seller shall provide Idaho Power with certificates of insurance within ten (10) days after the date by which such policies are required to be obtained (as set forth in Exhibit 13). Seller shall provide a certificate of insurance (in ACORD or similar industry form) to Idaho Power within ten (10) days of the effective date of any insurance policy required under this Agreement.

SECTION 15
FORCE MAJEURE

15.1 Definition of Force Majeure. "Force Majeure" or "an event of Force Majeure" means an event that (a) is not reasonably anticipated as of the Effective Date hereof, (b) is not within the reasonable control of the Party affected by the event, (c) is not the result of such Party's

negligence or failure to act, and (d) could not be overcome by the affected Party's use of due diligence in the circumstances. Force Majeure includes, but is not restricted to, events of the following types (but only to the extent that such an event, in consideration of the circumstances, satisfies the tests set forth in the preceding sentence): acts of God; civil disturbance; sabotage; strikes; lock-outs; work stoppages; and action or restraint by court order or public or Governmental Authority (as long as the affected Party has not applied for or assisted in the application for, and has opposed to the extent reasonable, such court or government action). Notwithstanding the foregoing, none of the following constitute Force Majeure: (i) Seller's ability to sell, or Idaho Power's ability to purchase energy, capacity or Green Tags at a more advantageous price than is provided hereunder; (ii) the cost or availability of fuel or motive force to operate the Facility; (iii) economic hardship, including lack of money; (iv) any breakdown or malfunction of the Facility's equipment (including any serial equipment defect) that is not caused by an independent event of Force Majeure, (v) the imposition upon a Party of costs or taxes allocated to such Party under Section 6.4, (vi) delay or failure of Seller to obtain or perform any Required Facility Document unless due to a Force Majeure event, (vii) any delay, alleged breach of contract, or failure by the Transmission Provider, Network Service Provider or Interconnection Provider unless due to a Force Majeure event, (viii) maintenance upgrade or repair of any facilities or right of way corridors constituting part of or involving the Interconnection Facilities, whether performed by or for Seller, or other third parties (except for repairs made necessary as a result of an event of Force Majeure); (ix) Seller's failure to obtain, or perform under, the Generation Interconnection Agreement, or its other contracts and obligations to transmission owner, Transmission Provider or Interconnection Provider, unless due to a Force Majeure event; (x) Seller's inability to obtain any supply of any good or service, unless due to an independent event of Force Majeure; or (xi) any event attributable to the use of Interconnection Facilities for deliveries of Net Output to any party other than Idaho Power. Notwithstanding anything to the contrary herein, in no event will the increased cost of electricity, steel, labor, or transportation constitute an event of Force Majeure.

15.2 Suspension of Performance. Neither Party shall be liable for any delay or failure in its performance under this Agreement, nor shall any delay, failure, or other occurrence or event become a default, to the extent such delay, failure, occurrence or event is substantially caused by conditions or events of Force Majeure during the continuation of the event of Force Majeure, for the same number of days that the event of Force Majeure has prevailed, provided that:

15.2.1 the Party affected by the Force Majeure, shall, within five (5) days after the occurrence of the event of Force Majeure, give the other Party written notice describing the particulars of the event; and

15.2.2 the suspension of performance shall be of no greater scope and of no longer duration than is required to remedy the effect of the Force Majeure; and

15.2.3 the affected Party shall use diligent efforts to remedy its inability to perform and shall provide prompt notice to the other Party of the cessation of the event or condition giving rise to its excuse from performance.

15.3 Force Majeure Does Not Affect Other Obligations. No obligations of either Party that arose before the Force Majeure causing the suspension of performance or that arise after the cessation of the Force Majeure shall be excused by the Force Majeure. No obligation of Seller arising before the Commercial Operation Date may be excused by Force Majeure.

15.4 Strikes. Notwithstanding any other provision hereof, neither Party shall be required to settle any strike, walkout, lockout or other labor dispute on terms which, in the sole judgment of the Party involved in the dispute, are contrary to the Party's best interests.

15.5 Right to Terminate. If a Force Majeure event prevents a Party from substantially performing its obligations hereunder for a period exceeding one hundred and eighty (180) consecutive days (despite the affected Party's effort to take all reasonable steps to remedy the effects of the Force Majeure with all reasonable dispatch), then the Party not affected by the Force Majeure event, with respect to its obligations hereunder, may terminate this Agreement by giving ten (10) days prior written notice to the other Party. Upon such termination, neither Party will have any liability to the other with respect to the period following the effective date of such termination; provided, however, that this Agreement will remain in effect to the extent necessary to facilitate the settlement of all liabilities and obligations arising hereunder before the effective date of such termination.

SECTION 16
SEVERAL OBLIGATIONS; THIRD PARTY BENEFICIARIES

Nothing contained herein shall be construed to create an association, trust, partnership or joint venture or to impose a trust, partnership or fiduciary duty, obligation or liability on or between the Parties. Nothing in this Agreement shall be construed to create any duty, obligation or liability of Seller or Buyer to any Person not a Party to this Agreement. Notwithstanding the foregoing sentence, Customer is an intended third party beneficiary of this Agreement and entitled to indemnification hereunder under the terms of this Agreement.

SECTION 17
CHOICE OF LAW

This Agreement shall be interpreted and enforced in accordance with the laws of the State of Idaho, applying any choice of law rules that may direct the application of the laws of another jurisdiction.

SECTION 18
PARTIAL INVALIDITY

The Parties do not intend to violate any laws governing the subject matter hereof. If any of the terms hereof are finally held or determined to be invalid, illegal or void as being contrary to any Requirements of Law or public policy, all other terms hereof shall remain in effect. The Parties shall use best efforts to amend this Agreement to reform or replace any terms determined to be invalid, illegal or void, such that the amended terms (a) comply with and are enforceable under

Requirements of Law, (b) give effect to the intent of the Parties under this Agreement, and (c) preserve the balance of the economics and equities contemplated by this Agreement in all material respects.

SECTION 19
NON-WAIVER

No waiver of any provision hereof shall be effective unless the waiver is set forth in a writing that (a) expressly identifies the provision being waived, and (b) is executed by the Party waiving the provision. A Party's waiver of one or more failures by the other Party in the performance of any of the provisions hereof shall not be construed as a waiver of any other failure or failures, whether of a like kind or different nature.

SECTION 20
GOVERNMENTAL JURISDICTION AND AUTHORIZATIONS

This Agreement is subject to the jurisdiction of those Governmental Authorities having control over either Party, the Facility, or this Agreement. During the Term, Seller shall maintain all Permits required, as applicable, for the construction, operation, or ownership of the Facility.

SECTION 21

[INTENTIONALLY OMITTED]

SECTION 22
SUCCESSORS AND ASSIGNS

22.1 Restriction on Assignments. Except as expressly provided in this Section 20, neither Party may assign this Agreement or any of its rights or obligations hereunder without the prior written consent of the other Party, which consent shall not be unreasonably withheld.

22.2 Permitted Assignments. Notwithstanding Section 22.1, either Party may, without the need for consent from the other Party (but with written notice to the other Party, including the names of the assignees): (a) transfer, sell, pledge, encumber or assign this Agreement or the accounts, revenues or proceeds therefrom in connection with project financing for the Facility; or (b) transfer or assign this Agreement to an Affiliate meeting the requirements of this Agreement; provided, however, that Seller shall not transfer, sell, encumber or assign this Agreement or any interest herein to any Affiliate of Idaho Power without the prior written consent of Idaho Power and Buyer may, without the consent of Seller, assign this Agreement and its obligations hereunder to [Customer's ultimate parent entity] or Customer. Except with respect to collateral assignments for financing purposes in every assignment permitted under this Section 22.2, the assignee must not be a Sanctioned Person, must agree in writing to be bound by the terms and conditions hereof and must possess the same or similar experience, and possess the same or better creditworthiness, as the assignor. Idaho Power may assign this Agreement in whole or in part without the consent of Seller to any person or entity in the event that Idaho Power ceases to

be a load-serving entity, in which event Idaho Power shall be released from liability hereunder upon approval of Idaho Power ceasing to be a load-serving entity by the IPUC and OPUC. The Party seeking to assign or transfer this Agreement shall be solely responsible for paying all costs of assignment.

SECTION 23
ENTIRE AGREEMENT

This Agreement supersedes all prior agreements, proposals, representations, negotiations, discussions or letters, whether oral or in writing, regarding the subject matter hereof. No modification hereof shall be effective unless it is in writing and executed by both Parties.

SECTION 24
NOTICES

24.1 Addresses and Delivery Methods. All notices, requests, statements or payments shall be made to the addresses set out below. In addition, copies of a notice of termination of this Agreement under Section 12.3 shall contain the information required by Section 12.3 and shall be sent to the then-current President and General Counsel of Idaho Power. Notices required to be in writing shall be delivered by letter, facsimile or other tangible documentary form. Notice by overnight mail or courier shall be deemed to have been given on the date and time evidenced by the delivery receipt. Notice by hand delivery shall be deemed to have been given when received or hand delivered. Notice by facsimile is effective as of transmission to each and all of the telefacsimile numbers provided below for a Party, but must be followed up by notice by registered mail or overnight carrier to be effective. Notice by overnight mail shall be deemed to have been given the Business Day after it is sent, if sent for next day delivery to a domestic address by a recognized overnight delivery service (e.g., Federal Express or UPS). Notice by certified or registered mail, return receipt requested, shall be deemed to have been given upon receipt.

To Seller:

To Idaho Power:
Idaho Power
1221 W Idaho St
Boise, ID 83702
Attn: Vice President, Power Supply
Email: energycontracts@idahopower.com

with a copy to:
Idaho Power
1221 W Idaho St
Boise, ID 83702
Attn: Energy Contracts
Email: energycontracts@idahopower.com

and termination notices to Idaho Power: Idaho Power
1221 W Idaho St
Boise, ID 83702
Attn: Vice President, Power Supply
Email: energycontracts@idahopower.com

and to: Idaho Power
1221 W Idaho St
Boise, ID 83702
Attn: Energy Contracts
Email: energycontracts@idahopower.com

[Notice address for Customer to be added.]

24.2 Changes of Address. The Parties may change any of the persons to whom notices are addressed, or their addresses, by providing written notice in accordance with this section.

SECTION 25
CONFIDENTIALITY

25.1 Confidential Business Information. The following constitutes "Confidential Business Information," whether oral or written: (a) the Parties' proposals and negotiations concerning this Agreement, made or conducted prior to the Effective Date, (b) the actual charges billed to Idaho Power hereunder, and (c) any information delivered by Idaho Power to Seller prior to the Effective Date relating to the market prices of energy or Green Tags and methodologies for their determination or estimation. Seller and Idaho Power each agree to hold such Confidential Business Information wholly confidential, except as otherwise expressly provided in this Agreement. "Confidential Business Information" shall not include information that (x) is in or enters the public domain through no fault of the Party receiving such information, or (y) was in the possession of a Party prior to the Effective Date, other than through delivery thereof as specified in subsections (a) and (c) above. A Party providing any written Confidential Business Information under this Agreement shall clearly mark all pages of all documents and materials to be treated as Confidential Business information with the term "Confidential" on the front of each page, document or material. If the Confidential Business Information is transmitted by electronic means the title or subject line shall indicate the information is Confidential Business Information. All Confidential Business Information shall be maintained as confidential, pursuant to the terms of this Section 25.1, for a period of two (2) years from the date it is received by the receiving Party unless otherwise agreed to in writing by the Parties.

25.2 Duty to Maintain Confidentiality. Each Party agrees not to disclose Confidential Business Information to any other person (other than its Affiliates, accountants, auditors, counsel, consultants, lenders, prospective lenders, employees, officers and directors, and Customer), without the prior written consent of the other Party, provided that: (a) either Party may disclose Confidential Business Information, if and to the extent such disclosure is required (i) by Requirements of Law, (ii) in order for Idaho Power to receive regulatory approval and recovery of expenses related to this Agreement, (iii) pursuant to an order of a court or regulatory agency,

or (iv) in order to enforce this Agreement or to seek approval hereof, and (b) notwithstanding any other provision hereof, Idaho Power may in its sole discretion disclose or otherwise use for any purpose in its sole discretion the Confidential Business Information described in Sections 25.1(b) or 25.1(c). In the event a Party is required by Requirements of Law to disclose Confidential Business Information, such Party shall to the extent possible promptly notify the other Party of the obligation to disclose such information.

25.3 Idaho Power Regulatory Compliance. The Parties acknowledge that Idaho Power is required by Requirements of Law to report certain information that is or could otherwise embody Confidential Business Information from time to time. Such reports include models, filings, reports of Idaho Power's net power costs, general rate case filings, power cost adjustment mechanisms, FERC-required reporting such as those made on FERC Form 1 or Form 714, market power and market monitoring reports, annual state reports that include resources and loads, integrated resource planning reports, reports to entities such as NERC, WECC, Pacific Northwest Utility Coordinating Committee, WREGIS, or similar or successor organizations, forms, filings, or reports, the specific names of which may vary by jurisdiction, along with supporting documentation. Additionally, in regulatory proceedings in all state and federal jurisdictions in which it does business, Idaho Power will from time to time be required to produce Confidential Business Information. Idaho Power may use its business judgment in its compliance with all of the foregoing and the appropriate level of confidentiality it seeks for such disclosures. Idaho Power may submit Confidential Business Information in regulatory proceedings without notice to Seller.

25.4 Irreparable Injury; Remedies. Each Party agrees that violation of the terms of this Section 25 constitutes irreparable harm to the other, and that the harmed Party may seek any and all remedies available to it at law or in equity, including injunctive relief.

25.5 News Releases and Publicity. Except as otherwise provided in Section 7.14, before either Party issues any news release or publicly distributed promotional material regarding the Facility that mentions the Facility, such Party shall first provide a copy thereof to the other Party for its review and approval. Any use of either Party's name in such news release or promotional material must adhere to such Party's publicity guidelines then in effect; any use of Idaho Power's name requires Idaho Power's prior written consent.

SECTION 26
DISAGREEMENTS

26.1 Negotiations. Prior to proceeding with formal dispute resolution procedures as provided below in this Section 26, the Parties must first attempt in good faith to resolve all disputes arising out of, related to or in connection with this Agreement promptly by negotiation, as follows. Any Party may give the other Party written notice of any dispute not resolved in the normal course of business. Executives of both Parties at levels one level above those employees who have previously been involved in the dispute must meet at a mutually acceptable time and place within ten (10) days after delivery of such notice, and thereafter as often as they reasonably deem necessary, to exchange relevant information and to attempt to resolve the dispute. If the matter has not been resolved within thirty (30) days after the referral of the dispute to such senior executives, or if no meeting of such senior executives has taken place within fifteen (15) days after such referral, either Party may initiate any legal remedies available to the Party. All negotiations pursuant to this clause are confidential.

26.2 Choice of Forum. Each Party irrevocably consents and agrees that any legal action or proceeding arising out of this Agreement or the actions of the Parties leading up to this Agreement shall be brought exclusively in the United States District Court for the District of Idaho in Boise, Idaho, or if such court does not have jurisdiction, in the 4th Judicial District (Ada County) Court of the State of Idaho. By execution and delivery hereof, each Party (a) accepts the exclusive jurisdiction of such court and waives any objection that it may now or hereafter have to the exercise of personal jurisdiction by such court over each Party for the purpose of any proceeding related to this Agreement, (b) irrevocably agrees to be bound by any final judgment (after any and all appeals) of any such court arising out of such documents or actions, (c) irrevocably waives, to the fullest extent permitted by law, any objection that it may now or hereafter have to the laying of venue of any suit, action or proceedings arising out of such documents brought in such court (including any claim that any such suit, action or proceeding has been brought in an inconvenient forum) in connection herewith, (d) agrees that service of process in any such action may be effected by mailing a copy thereof by registered or certified mail, postage prepaid, to such Party at its address as set forth herein, and (e) agrees that nothing herein shall affect the right to effect service of process in any other manner permitted by law.

26.3 Settlement Discussions. No statements of position or offers of settlement made in the course of the dispute process described in this Section 26 will be offered into evidence for any purpose in any litigation between the Parties, nor will any such statements or offers of settlement be used in any manner against either Party in any such litigation. Further, no such statements or offers of settlement shall constitute an admission or waiver of rights by either Party in connection with any such litigation. At the request of either Party, any such statements and offers of settlement, and all copies thereof, shall be promptly returned to the Party providing the same.

26.4 Waiver of Jury Trial. EACH PARTY KNOWINGLY, VOLUNTARILY, INTENTIONALLY AND IRREVOCABLY WAIVES THE RIGHT TO A TRIAL BY JURY IN RESPECT OF ANY LITIGATION BASED ON THIS AGREEMENT, OR ARISING OUT OF, UNDER OR IN CONNECTION WITH THIS AGREEMENT AND ANY AGREEMENT EXECUTED OR CONTEMPLATED TO BE EXECUTED IN CONJUNCTION WITH THIS AGREEMENT, OR ANY COURSE OF CONDUCT, COURSE OF DEALING, STATEMENTS (WHETHER VERBAL OR WRITTEN) OR ACTIONS OF ANY PARTY HERETO. THIS PROVISION IS A MATERIAL INDUCEMENT TO EACH OF THE PARTIES FOR ENTERING HEREINTO. EACH PARTY HEREBY WAIVES ANY RIGHT TO CONSOLIDATE ANY ACTION, PROCEEDING OR COUNTERCLAIM ARISING OUT OF OR IN CONNECTION WITH THIS AGREEMENT OR ANY OTHER AGREEMENT EXECUTED OR CONTEMPLATED TO BE EXECUTED IN CONJUNCTION WITH THIS AGREEMENT, OR ANY MATTER ARISING HEREUNDER OR THEREUNDER, WITH ANY PROCEEDING IN WHICH A JURY TRIAL HAS NOT OR CANNOT BE WAIVED. THIS SECTION WILL SURVIVE THE EXPIRATION OR TERMINATION OF THIS AGREEMENT.

SECTION 27
COMPLIANCE

27.1 Nondiscrimination. Customer or its Affiliates is a federal contractor and maintains an equal opportunity/affirmative action program in accordance with Applicable Law. As a result, Seller must, to the extent required by Applicable Law, afford equal employment opportunity to all of its applicants and employees, regardless of their race, color, national origin, sex, age, religion, marital status, sexual orientation, gender identity and gender expression, protected veteran status, disability, or other basis protected by law. Also as a result, but only if required by Applicable Law, Seller shall abide by the requirements of 41 CFR 60-1.4(a), 60-300.5(a) and 60-741.5(a). These regulations prohibit discrimination against qualified individuals based on their status as protected veterans or individuals with disabilities and prohibit discrimination against all individuals based on their race, color, religion, sex, sexual orientation, gender identity, or national origin. Moreover, these regulations require that covered prime contractors and subcontractors take affirmative action to employ and advance in employment individuals without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, disability, or veteran status. In connection with this Agreement and the Facility, Seller will comply with, and cause all of its direct and indirect contractors and subcontractors to expressly agree to comply with, all laws and regulations relating to forced, bonded (including debt bondage) or indentured labor, involuntary or exploitative prison labor, slavery or trafficking of persons.

27.2 Anti-Corruption. In connection with the negotiation and performance of this Agreement and the development, construction, and operation of the Facility or the Premises, Seller, on behalf of itself, Seller's Parent Entity and any other direct or indirect upstream equity owners that, notwithstanding percentage of equity ownership interest, have the voting power or otherwise have the power to control the day-to-day management, operations and policies of Seller, and such Affiliates that Seller contractually or otherwise controls or directs in the management or operation of the Facility, and in each case, including the officers, directors, employees and agents of such entities, represents and warrants that it has not engaged in, and that

it shall refrain from, offering, promising, paying, giving, authorizing the paying or giving of, soliciting, or accepting money or Anything of Value, directly or indirectly, to or from (a) any Government Official to (i) influence any act or decision of a Government Official in his or her official capacity, (ii) induce a Government Official to act in violation of his or her lawful duty, (iii) induce a Government Official to use his or her influence with a government or instrumentality thereof, or (iv) otherwise secure any improper advantage, in each case to the extent prohibited by applicable anti-corruption laws; or (b) any person in any manner that would constitute bribery or an illegal kickback, or would otherwise violate applicable anti-corruption laws. If Seller fails to comply with this Section 27.2 then Buyer may terminate this Agreement in accordance with Section 12.1.2.12 . In connection with the performance of this Agreement and all fees charged Buyer, Seller shall maintain books and records practices and internal controls to ensure (a) that receipts and expenses are accurately recorded with reasonable detail and are based on accurate and sufficient supporting documentation and (b) that no "off the books" accounts are created or maintained. Unless otherwise required by law, such books and records will be maintained for five (5) years after termination or expiration of this Agreement. Seller will immediately report to Buyer any breach of this Section 27.2 by Seller or its representatives. Seller will ensure that the contractors and subcontractors it retains in connection with this Agreement expressly agree to anti-corruption undertakings, representations, and warranties substantially similar to the provisions herein. If Buyer has reason to believe that a breach of this Section 27.2 has occurred or will occur, Buyer shall have the right to audit Seller's books and records insofar as they relate to performance of this Agreement and to withhold further payments without any liability to Seller until reasonably satisfied that no breach has occurred. If the Agreement is terminated pursuant to an Event of Default under Section 12.1.2.12, Buyer shall have no obligation to make further payments hereunder. Buyer's rights and Seller's obligations under this Section 27.2 shall survive the termination or expiration of the Agreement.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed in their respective names as of the date last written below.

By:	_____	By:	_____
Name:	_____	Name:	_____
Title:	_____	Title:	_____
Date:	_____	Date:	_____

EXHIBIT 1

MONTHLY POWER PRODUCTION AND SWITCHING REPORT

Month _____ **Year** _____

Project Name _____ **Project Number:** _____

Address _____ **Phone Number:** _____

City _____ **State** _____ **Zip** _____ **State** _____

	Facility Output	Station Usage		Metered Maximum Generation
Meter Number:				
End of Month MWh Meter Reading:				**MW**
Beginning of Month MWh Meter:				
Difference:				
Times Meter Constant:				**Net Generation**
MWh for the Month:		-	=	
Metered Demand:				

Breaker Opening Record

Date	Time	Meter	*	Reason

Breaker Closing Record

Date	Time	Meter

*** Breaker Opening Reason Codes**

1 **Lack of Adequate Prime Mover**
2 **Forced Outage of Facility**
3 **Disturbance of IPCo System**
4 **Scheduled Maintenance**
5 **Testing of Protection Systems**
6 **Cause Unknown**
7 **Other (Explain)**

I hereby certify that the above meter readings are true and correct as of Midnight on the last day of the above month and that the switching record is accurate and complete as required by the Energy Sales Agreement to which I am a Party.

_____ _____
Signature **Date**

A-2 AUTOMATED METER READING COLLECTION PROCESS

Monthly, Idaho Power will use the provided Metering and Telemetry equipment and processes to collect the meter reading information from the Idaho Power provided Metering Equipment that measures the Net Energy and energy delivered to supply Station Use for the Facility recorded at 12:00 AM (Midnight) of the last day of the month.

The meter information collected will include but not be limited to energy production, Station Use, the maximum generated power (MW) and any other required energy measurements to adequately administer this Agreement.

A-3 SELLER CONTACT INFORMATION

Seller's Contact Information

Name:
Telephone Number:
Cell Phone:
E-Mail:

24-Hour Project Operational Contact

Name:
Telephone Number:
Cell Phone:
E-Mail:

Project On-site Contact information

Name:
Telephone Number:
Cell Phone:
E-Mail:

EXHIBIT 2

DESCRIPTION OF FACILITY

Project Name: _____

Project Number: _____

B-1 DESCRIPTION OF FACILITY

(Must include the Nameplate Capacity rating and VAR capability (both leading and lagging) of all Generation Units to be included in the Facility.)

_____
_____
_____
_____
_____

Var Capability (Both leading and lagging) Leading is _____Lagging is _____.

B-2 LOCATION OF FACILITY

Near: _____

Actual or nearest physical street address: _____

GPS Coordinates: Latitude Decimal Degrees: _____

Longitude Decimal Degrees: _____

State: _____ County: _____

EXHIBIT 3

POINT OF DELIVERY/INTERCONNECTION FACILITIES

Instructions to Seller:

1. Include description of point of metering, and Point of Interconnection

2. Include description of Point of Delivery

3. Provide interconnection single line drawing of Facility including any transmission facilities on Seller's side of the Point of Interconnection.

5. Describe Seller's arrangements for station service to the Facility and show on one-line diagram how station service will be provided and metered.

6. Specify the maximum hourly rate (MW) at which Seller is permitted to deliver energy to the Point of Delivery and in compliance with Seller's transmission rights between the Point of Interconnection and the Point of Delivery ("Maximum Transmission Rate"):

_____MW.

Seller to provide to Buyer with a copy of the final Generator Interconnection Agreement

EXHIBIT 4

ESTIMATED MONTHLY NET OUTPUT

EXPECTED ENERGY - FIRST FULL CONTRACT YEAR			
PERIOD	**ON-PEAK (MWh)**	**OFF-PEAK (MWh)**	**TOTAL (MWh)**
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			
First Year Total			

EXPECTED ENERGY - ANNUAL REDUCTION	
PERIOD	**EXPECTED ENERGY (MWh)**
Year 0-1	
Year 1-2	
Year 2-3	
Year 3-4	
Year 4-5	
Year 5-6	
Year 6-7	
Year 7-8	
Year 8-9	
Year 9-10	
Year 10-11	
Year 11-12	
Year 12-13	
Year 13-14	
Year 14-15	
Year 15-16	
Year 16-17	
Year 17-18	
Year 18-19	
Year 19-20	

Under separate cover, Seller will also provide Idaho Power one (1) electronic and hard copy of the solar plant performance estimation report using a Solar Performance Modeling Program no later than ninety (90) days prior to the start of construction. This report will include, at a minimum, estimated hourly MW generation output in MWh/h for the Premises and Facility, and shall set forth additional losses related to availability, AC-side collection, transformers, substation and no-load/overnight losses. On or prior to the Commercial Operation Date, Seller shall provide an updated Exhibit A and solar plant performance estimation report based on completed construction.

Upon the date of Final Completion, if different than the Commercial Operation Date, Seller shall provide an updated Exhibit A and solar plant performance estimation report based on the final completed construction.

EXHIBIT 5

CONTRACT PRICE

Contract Price	
Contract Year	$/MWh
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

EXHIBIT 6

NERC EVENT TYPES

Event Type	**Description of Outages**
U1	Unplanned (Forced) Outage—Immediate – An outage that requires immediate removal of a unit from service, another outage state or a Reserve Shutdown state. This type of outage results from immediate mechanical/electrical/hydraulic control systems trips and operator-initiated trips in response to unit alarms.
U2	Unplanned (Forced) Outage—Delayed – An outage that does not require immediate removal of a unit from the in-service state but requires removal within six (6) hours. This type of outage can only occur while the unit is in service.
U3	Unplanned (Forced) Outage—Postponed – An outage that can be postponed beyond six hours but requires that a unit be removed from the in-service state before the end of the next weekend. This type of outage can only occur while the unit is in service.
SF	Startup Failure – An outage that results from the inability to synchronize a unit within a specified startup time period following an outage or Reserve Shutdown. A startup period begins with the command to start and ends when the unit is synchronized. An SF begins when the problem preventing the unit from synchronizing occurs. The SF ends when the unit is synchronized or another SF occurs.
MO	Maintenance Outage – An outage that can be deferred beyond the end of the next weekend, but requires that the unit be removed from service before the next planned outage. (Characteristically, a MO can occur any time during the year, has a flexible start date, may or may not have a predetermined duration and is usually much shorter than a PO.)
ME	Maintenance Outage Extension – An extension of a maintenance outage (MO) beyond its estimated completion date. This is typically used where the original scope of work requires more time to complete than originally scheduled. Do not use this where unexpected problems or delays render the unit out of service beyond the estimated end date of the MO.
PO	Planned Outage – An outage that is scheduled well in advance and is of a predetermined duration, lasts for several weeks and occurs only once or twice a year. (Boiler overhauls, turbine replacement or inspections are typical planned outages.)
PE	Planned Outage Extension – An extension of a planned outage (PO) beyond its estimated completion date. This is typically used where the original scope of work requires more time to complete than originally scheduled. Do not use this where unexpected problems or delays render the unit out of service beyond the estimated end date of the PO.

EXHIBIT 7

START-UP TESTING

(Seller to provide to Buyer before the First Generation Date)

EXHIBIT 8

FORM OF GUARANTY — CREDIT SUPPORT OBLIGATION

FORMS OF LIQUID SECURITY

The Seller shall provide Idaho Power with commercially reasonable security instruments such as Cash, Cash Escrow Security, Guarantee or Letter of Credit as those terms are defined below or other forms of liquid financial security that would provide readily available cash to Idaho Power to satisfy the security requirements within this Agreement.

For the purpose of this Appendix D, the term "Credit Requirements" shall mean acceptable financial creditworthiness of the entity providing the security instrument in relation to the term of the obligation in the reasonable judgment of Idaho Power, provided that any guarantee and/or Letter of Credit issued by any other entity with a short-term or long-term investment grade credit rating by Standard & Poor's Corporation or Moody's Investor Services, Inc. or any successors shall be deemed to have acceptable financial creditworthiness.

1. Cash – Seller shall deposit cash in the amount of the required security with Idaho Power. Idaho Power will not be responsible to calculate or pay any interest on these funds deposited with Idaho Power.

2. Cash Escrow Security – Seller shall deposit funds in an escrow account established by the Seller in a banking institution acceptable to both Parties equal to the required security. The Seller shall be responsible for all costs, and receive any interest earned associated with establishing and maintaining the escrow account(s).

3. Guarantee or Letter of Credit Security – Seller shall post and maintain in an amount equal to the required security: (a) a guaranty from a party that satisfies the Credit Requirements, in a form acceptable to Idaho Power at its discretion, or (b) an irrevocable Letter of Credit in a form acceptable to Idaho Power, in favor of Idaho Power. The Letter of Credit will be issued by a financial institution acceptable to both parties. The Seller shall be responsible for all costs associated with establishing and maintaining the Guarantee(s) or Letter(s) of Credit.

EXHIBIT 9

REQUIRED FACILITY DOCUMENTS

1. Obtained Required Facility Documents:

Permits:

Conditional Use Permits from Twin Falls County for the construction and operation of the Facility

Land Rights:

Solar Park Lease Agreement for the land, access, and interconnection of the Facility.

2. To Be Obtained (Prior to Commercial Operation) Required Facility Documents:

Licenses, Permits and Authorizations:

Evidence of market-based rate authority under Section 205 of the Federal Power Act or evidence of qualifying facility certification under the Public Utility Regulatory Policies Act

Access road easement

Electrical Permit

Building Permit

Interconnection approval

Utility easement

Crossing Agreement

Construction and Operations and Maintenance:

Contract for the Sale of Power Generation Equipment and Related Services between vendors and engineering, procurement, and construction contractor and Seller

Generator Interconnection Agreement

Retail Electric Service Agreement

Proof of Insurance

Construction Agreements:

Balance of Plant/Construction Services Agreement
Operations and Maintenance Agreements:

Warranty, Service and Maintenance Agreement

SUCH LIST MAY BE UPDATED PURSUANT TO SECTION 2.2.3

EXHIBIT 10

LEASES

(Seller to provide to Buyer before the Commercial Operation Date)

Memorandum of Solar Park Lease Agreement 1

Memorandum of Solar Park Lease Agreement 2

EXHIBIT 11

ENGINEER'S CERTIFICATIONS

ENGINEER'S CERTIFICATION

OF

OPERATIONS & MAINTENANCE POLICY

The undersigned _____, on behalf of himself/herself and _____ , hereinafter collectively referred to as "Engineer," hereby states and certifies to the Seller as follows:

1. That Engineer is a Licensed Professional Engineer in good standing in the State of Idaho.

2. That Engineer has reviewed the Energy Sales Agreement, hereinafter referred to as the "Agreement," between Idaho Power as Buyer, and _____as Seller, dated _____.

3. That the cogeneration or small power production project which is the subject of the Agreement and this Statement is identified as Idaho Power Company Facility No. _____ and is hereinafter referred to as the "Project."

4. That the Project, which is commonly known as the _____Project, is located in Section _____ Township _____ Range _____, Boise Meridian, _____ County, Idaho.

5. That Engineer recognizes that the Agreement provides for the Project to furnish electrical energy to Idaho Power for a _____ year period.

6. That Engineer has substantial experience in the design, construction and operation of electric power plants of the same type as this Project.

7. That Engineer has no economic relationship to the Design Engineer of this Project.

8. That Engineer has reviewed and/or supervised the review of the Policy for Operation and Maintenance ("O&M") for this Project and it is his professional opinion that, said Project has been designed and built to appropriate standards, and adherence to said O&M Policy will result in the Project's producing at or near the design electrical output, efficiency and plant factor for the full Contact Term of _____ years.

9. That Engineer recognizes that Idaho Power, in accordance with paragraph 5.2 of the Agreement, is relying on Engineer's representations and opinions contained in this Statement.

10. That Engineer certifies that the above statements are complete, true and accurate to the best of his/her knowledge and therefore sets his/her hand and seal below.

By _____

(P.E. Stamp)

Date _____

ENGINEER'S CERTIFICATION

OF

ONGOING OPERATIONS AND MAINTENANCE

The undersigned _____, on behalf of himself/herself and _____ hereinafter collectively referred to as "Engineer," hereby states and certifies to the Seller as follows:

1. That Engineer is a Licensed Professional Engineer in good standing in the State of Idaho.

2. That Engineer has reviewed the Energy Sales Agreement, hereinafter referred to as the "Agreement," between Idaho Power as Buyer, and _____ as Seller, dated _____.

3. That the cogeneration or small power production project which is the subject of the Agreement and this Statement is identified as Idaho Power Company Facility No. _____ and hereinafter referred to as the "Project".

4. That the Project, which is commonly known as the _____Project, is located in Section _____ Township _____ Range _____, Boise Meridian, _____ County, Idaho.

5. That Engineer recognizes that the Agreement provides for the Project to furnish electrical energy to Idaho Power for a _____ year period.

6. That Engineer has substantial experience in the design, construction and operation of electric power plants of the same type as this Project.

7. That Engineer has no economic relationship to the Design Engineer of this Project.

8. That Engineer has made a physical inspection of said Project, its operations and maintenance records since the last previous certified inspection. The Engineer certifies, based on the Project's appearance and the information provided by the Project, that the Project's ongoing O&M has been completed in accordance with said O&M Policy; that it is in reasonably good operating condition; and it is in the Engineer's professional opinion that if adherence to said O&M Policy continues, the Project will continue producing at or near its design electrical output, efficiency and plant factor for the remaining _____ years of the Agreement.

9. That Engineer recognizes that Idaho Power, in accordance with paragraph 5.2 of the Agreement, is relying on Engineer's representations and opinions contained in this Statement.

10. That Engineer certifies that the above statements are complete, true and accurate to the best of his/her knowledge and therefore sets his/her hand and seal below.

By _____

(P.E. Stamp)

Date _____

ENGINEER'S CERTIFICATION

OF

DESIGN & CONSTRUCTION ADEQUACY

The undersigned _____, on behalf of himself/herself and _____ hereinafter collectively referred to as "Engineer", hereby states and certifies to Idaho Power as follows:

1. That Engineer is a Licensed Professional Engineer in good standing in the State of Idaho.

2. That Engineer has reviewed the Energy Sales Agreement, hereinafter referred to as the "Agreement", between Idaho Power as Buyer, and _____as Seller, dated _____,_____.

3. That the cogeneration or small power production project, which is the subject of the Agreement and this Statement, is identified as Idaho Power Company Facility No _____ and is hereinafter referred to as the "Project".

4. That the Project, which is commonly known as the _____Project is located in Section _____ Township _____ Range _____, Boise Meridian, _____ County, Idaho.

5. That Engineer recognizes that the Agreement provides for the Project to furnish electrical energy to Idaho Power for a _____ year period.

6. That Engineer has substantial experience in the design, construction and operation of electric power plants of the same type as this Project.

7. That Engineer has no economic relationship to the Design Engineer of this Project and has made the analysis of the plans and specifications independently.

8. That Engineer has reviewed the engineering design and construction of the Project, including the civil work, electrical work, generating equipment, prime mover conveyance system, Seller furnished Interconnection Facilities and other Project facilities and equipment.

9. That the Project has been constructed in accordance with said plans and specifications, all

applicable codes and consistent with Prudent Electrical Practices as that term is described in the Agreement.

10. That the design and construction of the Project is such that with reasonable and prudent operation and maintenance practices by Seller, the Project is capable of performing in accordance with the terms of the Agreement and with Prudent Electrical Practices for a _____ year period.

11. That Engineer recognizes that Idaho Power, in accordance with paragraph 5.2 of the Agreement, in interconnecting the Project with its system, is relying on Engineer's representations and opinions contained in this Statement.

12. That Engineer certifies that the above statements are complete, true and accurate to the best of his/her knowledge and therefore sets his/her hand and seal below.

By _____

(P.E. Stamp)

Date _____

EXHIBIT 12

[RESERVED]

EXHIBIT 13

REQUIRED INSURANCE

The Seller shall secure and continuously carry insurance as specified within this Appendix for the term of the Agreement.

Insurance Requirements:

1. All insurance required by this Agreement shall be placed with an insurance company with an A.M. Best Company rating of A- or better.

2. If the insurance coverage required in this Appendix is cancelled, materially changed or lapses for any reason, the Seller will immediately notify Idaho Power in writing. This notice will advise Idaho Power of the specific reason for cancellation, material change or lapse and the steps being taken to comply with these Insurance Requirements. Failure to provide this notice and to comply with these Insurance Requirements within 5 days of the cancellation, material change or lapse will constitute a material breach and Idaho Power may terminate this Agreement.

3. Prior to the First Energy date and subsequently within 10 days of the annual anniversary of the Operation Date, the Seller shall provide a Certificate of Insurance in the name of Idaho Power Company and list Idaho Power Company as an Additional Insured Endorsement and Waiver of Subrogation Endorsement.

4. The Certificate of Insurance shall evidence the appropriate insurance coverage of Comprehensive General Liability Insurance for both bodily injury and property damage with limits equal to $1,000,000, each occurrence, combined single limit. The deductible for such insurance shall be consistent with current Insurance Industry Utility practices for similar property.

Seller shall be entitled to self-insure these coverages with approval of Idaho Power, which shall not be unreasonable withheld, delayed or conditioned.

1.5 Periodic Review. Idaho Power may review this schedule of insurance as often as once every two (2) years. Idaho Power may in its discretion require Seller to make reasonable changes to the policies and coverages described in this Exhibit to the extent reasonably necessary to cause such policies and coverages to conform to the insurance policies and coverages typically obtained or required for power generation facilities comparable to the Facility at the time Idaho Power's review takes place.

EXHIBIT 14

SELLER AUTHORIZATION TO RELEASE GENERATION DATA TO IDAHO POWER

[DATE]

Idaho Power
1221 W Idaho St
Boise, ID 83702
Email: energycontracts@idahopower.com

To Whom it May Concern:

_____ ("Seller") hereby voluntarily authorizes Idaho Power's Transmission business unit to share Seller's interconnection information with marketing function employees of Idaho Power, including but not limited to those in Power Supply. Seller acknowledges that Idaho Power did not provide it any preferences, either operational or rate-related, in exchange for this voluntary consent.

_____

EXHIBIT 15

ATTACHMENTS

(Seller to provide to Buyer before the First Generation Date)

1. Site Map
2. As-Builts
3. Manufacturer’s performance warranties
5. [Other]

EXHIBIT 16

AS-BUILT SUPPLEMENT

EXHIBIT 17

MARKETING COMMUNICATIONS AGREEMENT

This MARKETING COMMUNICATIONS AGREEMENT (this "Agreement") is made and entered into as of the date of the last to be made signature below (the "Effective Date"), by and among [_____] ("Customer"), Idaho Power Company ("Idaho Power"), and [_____] ("Developer"). Customer, Idaho Power and Developer are together sometimes hereinafter referred to as the "Parties" and individually as a "Party."

WHEREAS, in furtherance of the Retail Agreement entered into by Idaho Power and Customer in order to support Customer's renewable energy goals, Idaho Power and Developer have entered into the PPA (as "PPA" and the initially capitalized terms in these Recitals are hereinafter defined);

WHEREAS, the Parties intend to hereinafter engage in public communications concerning RECs and electrical output from the Facility; and

WHEREAS, the Parties wish to comport with best practices for communications concerning RECs, and to comply with the REC Communication Rules.

NOW, THEREFORE, in consideration of the mutual promises herein contained and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree as follows:

1. Definitions.

"Applicable Law" means, in relation to any person, entity, transaction or event, all federal, state, provincial, local or municipal laws, statutes, codes, acts, treaties, ordinances, orders, judgments, writs, decrees, injunctions, rules, regulations, governmental approvals, licenses, permits, directives, and requirements of all regulatory and other Governmental Authorities, by which such person or entity is bound or having application to the transaction or event in question.

"Idaho REC Communication Rules" means any laws, rules or regulations promulgated in the future by the State of Idaho or agency or department thereof with respect to the public communications concerning RECs, as the same may change from time to time.

"Business Day" means any day other than a Saturday, Sunday or federal holiday.

"Facility" means the solar photovoltaic electrical generating facility and other related electrical equipment, defined in the PPA as the "[Project]."

"Federal REC Communication Rules" means those portions of the Federal Trade Commission rules, regulations and guidances relating to communications concerning RECs, including 16 Code of Federal Regulations § 260.15, 77 Federal Register 62131-32, and the

Federal Trade Commission Feb. 5, 2015, staff letter,1 as the same may change from time to time.

"Governmental Authority" means any national, state, provincial, local, tribal or municipal government, any political subdivision thereof or any other governmental, regulatory, quasi-governmental, judicial, public or statutory instrumentality, authority, body, agency, department, bureau, or entity with authority to bind a Party at law; however, "Governmental Authority" shall not in any event include any Party.

"PPA" means that Power Purchase Agreement between Idaho Power and Developer dated xxxx.

"REC" means the Environmental Attributes, as defined in the Renewable Resource PPA.

"REC Claims" means any claims or public communications concerning RECs or otherwise covered by REC Communication Standards.

"REC Communication Standards" means the Federal REC Communications Rules and the Idaho REC Communication Rules.

"Retail Agreement" means that certain Special Contract dated _____, 2021 between Idaho Power and Customer.

2. Term. The term of this Agreement will commence on the Effective Date and, unless sooner terminated, will continue until the earlier of (a) the expiration or termination date of the PPA, or (b) the expiration or termination date of the Retail Agreement. [This Agreement will automatically terminate if the Retail Agreement is not fully executed by [xxxx]].

3. Marketing Rights; News Releases and Publicity.

(a) Customer will have a unilateral right to determine the timing of any press release in which the execution of this Agreement or the PPA is initially disclosed. The Parties must mutually agree upon the content of any initial press release or other initial public disclosure with respect to the existence or execution of this Agreement or the PPA and of the terms, conditions or other content herein or therein. No Party will unreasonably withhold, delay or condition its consent and agreement to the content of such press releases or public disclosures.

(b) Without limiting the effect of Section 3(a), or any agreement concerning public communications between Idaho Power and Customer in the Retail Agreement, Idaho Power and Developer each hereby grant to Customer the right to advertise, market, and promote to the general public the existence, implications and benefits of this Agreement, the PPA and the RECs associated with the PPA, and the exclusive right to associate Customer with any claimed or actual environmental or sociological benefits arising from this Agreement or the PPA and the creation, sale or retirement of RECs,

(c) This Agreement implements and supersedes any provisions to the contrary concerning public communications in the PPA. As between Idaho Power and Customer (and not

Developer), in the event of any contradiction between this Agreement and the Retail Agreement, the Retail Agreement controls. As between Idaho Power and Developer (and not Customer), in the event of any contradiction between this Agreement and the PPA, this Agreement controls. Notwithstanding anything in this Agreement to the contrary, this Agreement does not limit or otherwise modify Idaho Power's rights to disclose any information that Idaho Power is expressly permitted to disclose to its Board of Directors, or in response to a public records request, under and in accordance with the PPA or the Retail Agreement.

(d) Except as otherwise provided above in this Section 3, no Party shall issue any press or publicity release or otherwise release, distribute or disseminate any information to the public, or respond to any inquiry from the media, or publicly confirm or comment on any information, public or otherwise, concerning the Retail Agreement, this Agreement or the PPA or the participation of the other Party in the transactions contemplated hereby without the prior written approval of Customer, which approval shall not be unreasonably withheld, delayed or conditioned. This provision shall not prevent the Parties from releasing information (i) which is required to be disclosed in order to obtain permits, licenses, releases and other approvals; (ii) as necessary to fulfill such Party's obligations under this Agreement, the PPA, the Retail Agreement or as otherwise required by Applicable Laws; or (iii) if the Party seeking approval makes prompt and commercially reasonable efforts to obtain such approval but the other Party fails to give a definitive response within ten (10) Business Days.

(e) The Parties shall work together in good faith to (i) cause the correction of any claim or public communications that conflicts with this Agreement or that, in a Party's reasonable judgment, is otherwise likely to mislead any third party acting reasonably under the circumstances and (ii) respond to, and mitigate the effects of, any claim on RECs made by a third party.

(f) Except as expressly set forth herein, nothing in this Agreement grants to any Party the right to use any names or logos or other intellectual property of any other Party or its affiliates.

(g) This Section 3 will survive any termination of this Agreement for a period of three years.

(h) Idaho Power and Developer acknowledge and agree that Customer has no obligations of payment or performance to the Developer under, pursuant to, in connection with, or due to the PPA, for any reason, including on account of this Agreement, the Retail Agreement, or otherwise.

4. REC Claims.

(a) During and after the term of this Agreement, each Party will comply with the REC Communication Standards, with respect to the each of the PPA and the Facility, and the RECs associated therewith.

(b) This Section 4 will survive any termination of this Agreement for a period of

three (3) years.

5. Compliance. Notwithstanding anything to the contrary in this Agreement, a Party may make such filings, reports, and public statements that it believes are required to comply with Applicable Law.

6. Facility Images. Upon request from Customer, Developer shall promptly provide to Customer copies of digital images of the Facility showing the Facility during construction and as constructed. The promotional rights granted to Customer herein include the right to use and distribute Facility images.

7. Authority. Each Party represents and warrants to the other that it has full power and authority to enter into and perform this Agreement.

8. Governing Law; Venue. The validity, interpretation and effect of this Agreement are governed by and will be construed in accordance with the laws of the State of Idaho.

9. Waiver of Right to Jury Trial. TO THE FULLEST EXTENT PERMITTED BY LAW, EACH OF THE PARTIES HERETO WAIVES ANY RIGHT IT MAY HAVE TO A TRIAL BY JURY IN RESPECT OF LITIGATION DIRECTLY OR INDIRECTLY ARISING OUT OF, UNDER OR IN CONNECTION WITH THIS AGREEMENT. EACH PARTY FURTHER WAIVES ANY RIGHT TO CONSOLIDATE ANY ACTION IN WHICH A JURY TRIAL HAS BEEN WAIVED WITH ANY OTHER ACTION IN WHICH A JURY TRIAL CANNOT BE OR HAS NOT BEEN WAIVED.

10. Further Assurances. The Parties agree to cooperate in good faith, take additional actions, and execute documents as may be reasonably required to implement this Agreement. Notwithstanding the foregoing sentence, each Party's obligations and liability hereunder is separate, the obligations of the Parties are not joint and several, and no Party shall be liable for any other Party's breach or performance hereof.

11. Limitations on Damages. NO PARTY WILL BE LIABLE TO ANY OTHER PARTY UNDER THIS AGREEMENT FOR SPECIAL, PUNITIVE, INDIRECT, EXEMPLARY OR CONSEQUENTIAL DAMAGES, WHETHER SUCH DAMAGES ARE ALLOWED OR PROVIDED BY CONTRACT, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY, STATUTE OR OTHERWISE.

12. Notices. All notices, demands, requests, or other communications required or permitted under this Agreement shall be delivered to the addresses set forth beneath the parties' signatures below. Notices required to be in writing shall be delivered by hand delivery, U.S. Mail, or express courier, and in all cases also by email (on the same day as delivery to the courier or deposit in the U.S. Mail) at the email address provided on the signature line or as updated by giving notice. Except as may otherwise be specified in this Agreement, all notices, requests, statements and other communications shall be deemed to have been duly given (a) on the date of delivery if delivered by hand or by express courier, or (b) five days after deposit in the U.S. Mail. A Party may change its respective notice information upon giving the other Parties at least 10

days' prior notice thereof.

13. Miscellaneous. This Agreement may only be amended by a writing signed by all Parties. This Agreement is not assignable by a Party without the prior written consent of the non-assigning Parties, which consent shall not be unreasonably withheld; provided, however, that any Party may assign this Agreement to any permitted assignee of the Retail Agreement or PPA, as applicable. The assigning Party must provide notice of the assignment to the non-assigning Parties within 10 days following such assignment. This Agreement will be binding upon and inure to the benefit of the Parties' successors and permitted assigns. Nothing contained in this Agreement creates a joint venture or partnership between the Parties. There are no intended third-party beneficiaries hereof, and the Parties do not intend to create or confer any right or interest in or to, or to grant any remedies to, any third party as a beneficiary hereof or of any duty, obligation, or undertaking established herein.

14. Counterpart; Signatures. This Agreement may be executed in one or more counterparts, each of which is an original, but all of which together constitute one and the same instrument. Delivery of a PDF copy of an original signature, or executing using a digital or electronic signature, shall have the same force and effect as execution of an original.

IN WITNESS WHEREOF the Parties hereto have executed this Agreement as of the Effective Date.

[_____]

By _____
Name _____
Title _____
Date _____

Address for Notices:

Attn:
Email Address:

Idaho Power

By _____
Name _____
Title _____
Date _____

Address for Notices:

Attn:
Email Address:

[Developer]

By _____
Name _____
Title _____
Date _____

Address for Notices:

Attn:
Email Address:

EXHIBIT 18

FORM OF CONSTRUCTION PROGRESS REPORT

Construction Progress Report
of
_____
("Seller")
provided to
[BUYER ENTITY]
("Buyer")
[Date]

Instructions.
Any capitalized terms used in this report which are not defined herein are defined in the Power Purchase Agreement by and between , ("Seller") and [BUYER ENTITY] dated _____, (the "Agreement").

Seller shall review the status of each milestone of the construction schedule for the Facility and Seller shall identify such matters referenced in clauses (i)-(v) below as known to Seller and which in Seller's reasonable judgment are expected to adversely affect the schedule, and with respect to any such matters, shall state the actions which Seller intends to take to ensure that the milestones will be attained by their required dates. Such matters may include:

(i) Any material matter or issue arising in connection with a Permit, or compliance therewith, with respect to which there is an actual or threatened dispute over the interpretation of an Applicable Law, actual or threatened opposition to the granting of a necessary Permit, any organized public opposition, any action or expenditure required for compliance or obtaining approval that Seller is unwilling to take or make, or in each case which could reasonably be expected to materially threaten or prevent financing of the Facility, attaining any milestone, or obtaining any contemplated agreements with other parties which are necessary for attaining any milestone or which otherwise reasonably could be expected to materially threaten Seller's ability to attain any milestone.

(ii) Any development or event in the financial markets or the independent power industry, any change in taxation or accounting standards or practices or in Seller's business or prospects which reasonably could be expected to materially threaten financing of the Facility, attainment of any milestone or materially threaten any contemplated agreements with other parties which are necessary for attaining any Milestone or could otherwise reasonably be expected to materially threaten Seller's ability to attain any milestone;

(iii) A change in, or discovery by Seller of, any legal or regulatory requirement which would reasonably be expected to materially threaten Seller's ability to attain any milestone;

(iv) Any material change in Seller's schedule for initiating or completing any material aspect of Facility;

(v) The status of any matter or issue identified as outstanding in any prior Construction Progress Report and any material change in Seller's proposed actions to remedy or overcome such matter or issue.

For guidance, each "overview" subsection shall include a summary of the status and progress of major activities associated with that section, whether planned, in progress, or completed, including relevant dates. Each "recent activities" subsection shall include details of activities during the previous month. Each "expected activities" subsection shall include a brief list of major activities planned for the current month.

Seller shall complete, certify, and deliver this form of Construction Progress Report to [_____], together with all attachments and exhibits, with copies of this report delivered to [_____].

1. Executive Summary

Please provide an overview of the Facility, including technology, size, location, and ownership. Please provide a brief chronological cumulative summary of the major activities completed for each of the following aspects of the Facility. Include the date each item was added to the summary:

1.1 Milestones

1.2 Permits

1.3 Financing

1.4 Property Acquisition

1.5 Design and Engineering

1.6 Major Equipment procurement

1.7 Construction

1.8 Interconnection

1.9 Startup

2. Milestones

In this section, please include information on each significant milestone related to the Facility.

2.1 Milestone schedule

Please state the status and progress of each milestone. Provide the date of completion of completed milestone(s) and the expected date of completion of uncompleted milestone(s). The expected date is the current best estimate, and may change from time to time as better information becomes available.

2.2 Remedial Action Plan (applicable if Seller fails to achieve a milestone by the anticipated milestone date)

Please describe in detail any delays (actual or anticipated) beyond the scheduled milestone dates. Describe the cause of the delay (e.g., governmental approvals, financing, property acquisition, design activities, equipment procurement, Facility construction, interconnection, or any other factor). Describe Seller's remedial action plan which shall include detailed plans to achieve the missed milestone and subsequent milestones.

3. Permits

In this section, please include information on each of the Permits required for the construction of the Facility and the status thereof. List the applicable government agency, the type of application/approval requested, and the dates (expected or actual) of significant activity. Significant activity includes application submission, notice of complete application, notice of preparation, public hearing or comment period, draft documents or approvals, final documents or approvals, notice of determination, or issuance of permit. If the government agency maintains a website with information on the approval process for the Facility, please provide a link.

3.1 Environmental Impact Report/Statement (EIR/EIS) of Conditional Use Permit (CUP)

Please describe the environmental review process and each of the Permit(s) to be obtained for the Facility. Provide the status and completion date (expected or actual) of each significant activity in the process.

3.2 Other Permits

Please describe each of the other Permits to be obtained for the Facility. Provide the status and completion date (expected or actual) of each significant activity.

3.3 Recent Permit activities

Please describe in detail the Permit activities that occurred during the previous calendar month.

3.4 Expected Permit activities

Please list all Permit activities that are expected to be performed during the current calendar month.

4. Financing Activities

In this section, please include information on each separate phase of financing for the Facility. Include information on debt, equity, or federal or state loans or grants.

4.1 Overview of financing activities

Please provide a summary of the status and progress of each major financing activity, including the date of execution of significant documents, and information on the expected timing of future significant activities.

4.2 Recent financing activities

Please describe in detail the financing activities that occurred during the previous calendar month.

4.3 Expected financing activities

Please list the financing activities that are expected to be performed during the current calendar month.

5. Property Acquisition Activities

In this section, please include information on property acquisition or site control activities for the Facility.

5.1 Overview of property acquisition activities

Please provide a summary of the status and progress of each major property acquisition activity, including the date of execution of significant documents, and information on the expected timing of future significant activities.

5.2 Recent property acquisition activities

Please describe in detail the property acquisition activities that occurred during the previous calendar month.

5.3 Expected property acquisition activities

Please list the property acquisition activities that are expected to be performed during the current calendar month.

6. Design and Engineering Activities

In this section, please include information on the status of design and engineering for the Facility.

6.1 Overview of design activities

Please provide a summary of the status and progress of each major design or engineering activity, including dates of completion of significant activities and expected timing of future activities.

6.2 Recent design activities

Please describe in detail the design activities that occurred during the previous calendar month.

6.3 Expected design activities

Please list the design activities that are expected to be performed during the current calendar month.

7. Major Equipment Procurement

In this section, please include information on all major equipment to be procured for all portions of the Facility to be completed by Seller, including switchyards, substations and any other interconnection equipment, in addition to generating and auxiliary equipment.

7.1 Overview of major equipment procurement activities

For each type of equipment, list the number of each major item to be procured, the manufacturer, model number (if applicable), and rating. List the delivery schedule (expected or actual as applicable), breaking out the number of each item (to be) procured or delivered in each month.

7.2 Recent major equipment procurement activities

Please describe in detail the major equipment procurement activities that occurred during the previous calendar month.

7.3 Expected major equipment procurement activities

Please list the major equipment procurement activities that are expected to be performed during the current calendar month.

8. Construction Activities

In this section, please include information on the status of any construction-related factors that may affect the ability of the Facility to deliver the Facility Energy. Include information on the Facility infrastructure, generating equipment, and major auxiliary equipment. Also include information on the substations, switchyards, gen-ties, telecommunications equipment or other interconnection facilities that are the direct responsibility of the Facility.

8.1 Overview of major construction activities

Please provide a summary of the status and progress of each major construction activity for all portions of the Facility, including a schedule showing expected or actual dates as applicable. Provide the name of the EPC Contractor, the date of execution of the EPC Contract, and the date of issuance of a Notice to Proceed (or equivalent). For each major type of equipment, break out the number of each item (to be) installed or commissioned in each month.

8.2 Recent construction activities

Please describe in detail the construction activities that occurred during the previous calendar month.

8.3 Expected construction activities

Please list the interconnection activities that are expected to be performed during the current calendar month.

8.4 EPC Contractor Progress Report

Please attach a copy of the progress reports received during the previous calendar month from the EPC Contractor pursuant to the construction contract between Seller and EPC Contractor, certified by the EPC Contractor as being true and correct as of the date issued.

8.5 Look-ahead construction schedule

Please provide a look-ahead construction schedule covering at least three months.

8.6 OSHA Recordables

Please list all OSHA recordables from the previous calendar month.

8.7 Work stoppages

Please describe any work stoppage from the previous calendar month and its effect on the construction schedule.

9. Interconnection Activities

In this section, please include information on interconnection-related factors that may affect the ability of the Facility to deliver Facility Energy. Include information on the status of interconnection studies, Interconnection Agreements, design and construction of interconnection facilities (e.g., substations, switchyards, gen-ties, system protection schemes, telecommunications equipment to the extent not already covered in the Facility construction information in Section 8), network upgrades, and grid outage or interconnection schedules.

9.1 Overview of interconnection activities

Please provide a summary of the status and progress of each major interconnection activity including dates of completion of significant activities and expected timing of future activities.

9.2 Recent interconnection activities

Please describe in detail the interconnection activities that occurred during the previous calendar month.

9.3 Expected interconnection activities

Please list the interconnection activities that are expected to be performed during the current calendar month.

10. Startup

In this section, please include information on the status of activities related to preparation for Commercial Operation, including equipment testing, commissioning, release to operations, requirements of the grid operator, and any other activities that must be conducted before the Facility may deliver Energy to the grid or declare Commercial Operation.

10.1 Overview of startup activities

Please provide a summary of the status and progress of each major startup activity including dates of completion of significant activities and expected timing of future activities.

10.2 Recent startup activities

Please describe in detail the startup activities that occurred during the previous calendar month.

10.3 Expected startup activities

Please list the startup activities that are expected to be performed during the current calendar month.

11. Other Information Reasonably Requested by Buyer

11.1 Litigation

Please list any communication received directly or indirectly from any third party that is in the nature of a threat of litigation, a litigation hold notice, a summons and complaint, or a commencement of a judicial, regulatory, or arbitration proceeding or investigation against Seller or concerning the Facility

11.2 [_____]

I, _____, on behalf of and as an authorized representative of _____, do hereby certify that any and all information contained in this Seller's Construction Progress Report is true and accurate, and reflects, to the best of my knowledge, the current status of the construction of the Facility as of the date specified below.

By:_____
Name:_____
Title:_____
Date:_____

EXHIBIT 19

FORM OF OPERATIONS REPORT

EXHBIT 20

[IDAHO POWER FORM OF WREGIS QRE AGREEMENT]

EXHIBIT 21

FORM OF LENDER CONSENT

CONSENT AND AGREEMENT

This Consent and Agreement (this "Consent") is made and entered into as of ___ _, 20__, by and between Idaho Power Corporation ("Buyer"), and _____ ("Lender").

RECITALS

A. _____ ("Seller"), has entered into that certain Loan Agreement, dated as of ___ __, 20__ (as amended, restated, supplemented, or otherwise modified from time to time, the "Loan Agreement"), with Lender in order to finance construction of a photovoltaic solar electric energy generating facility owned by Seller and located at ____ (the "Solar Project").

B. Seller and Buyer have entered into that certain Power Purchase Agreement, dated as of ____ (as amended, restated, supplemented or otherwise modified from time to time, the "PPA"), relating to the energy generated by the Solar Project to supply the needs of Buyer's customer under a Special Contract, [_____] ("Customer").

C. As part of the transactions contemplated by the Loan Agreement, Lender has received a pledge of all the limited liability company interests in Seller (the "Pledged Equity"), and Seller has collaterally assigned all of its rights, title and interests in, to and under the PPA (the "Pledged PPA", collectively with the Pledged Equity, the "Assigned Interest") to Lender.

AGREEMENTS

NOW, THEREFORE, for and in consideration of the premises and the mutual covenants contained herein, and for other good and valuable consideration, the receipt, adequacy and legal sufficiency of which are hereby acknowledged, and intending to be legally bound hereby, the parties hereby agree as follows:

1. Consent to Assignment. Buyer hereby consents to the collateral assignment by Seller to Lender of the Pledged PPA and the pledge to Lender of the Pledged Equity and acknowledges the right of Lender to exercise Lender's rights and remedies as a secured creditor with respect to the Assigned Interest.

2. Pledged PPA Step-In. "Subsequent Seller Requirements" means an entity that (a) is acceptable to Buyer; (b) is not involved, and has no Affiliate involved, in any state or federal litigation or regulatory proceeding adverse to Buyer or any Affiliate of Buyer, or Customer or any Affiliate of Customer; (c) has, or has retained, a reputable entity acceptable to Buyer that has, at least five (5) years' experience in the operation and maintenance of solar energy facilities of comparable size to the Facility and the ability perform all aspects of the PPA; (d) has agreed in writing to be bound by the PPA and to assume all of Seller's obligations under the PPA; and (e) is not a Sanctioned Person. Buyer agrees that, if Lender has elected to exercise its rights and

remedies to proceed against the Pledged PPA, and has so notified Buyer, then, if and only if (i) the hereinafter-defined Subsequent Seller meets all of the Subsequent Seller Requirements, (ii) Buyer is holding, and will be holding as of and after the date of assignment, the Project Development Security or Default Security, as applicable, and (iii) Buyer has not terminated this PPA pursuant to the terms thereof and of this Consent, then Lender or any assignee or designee of Lender, including Lender or any purchaser in a foreclosure sale or in lieu of foreclosure of the Pledged PPA (a "Subsequent Seller"), may be substituted for Seller under the PPA and Buyer shall recognize such Subsequent Seller as its counterparty under the PPA and, subject to all rights and remedies of Buyer under the PPA, continue to perform its obligations under the PPA in favor of such Subsequent Seller. Lender shall have no liability or obligation under the PPA as a result of this Consent except if Lender becomes a Subsequent Seller. Any Subsequent Seller succeeds to the interests and obligations of Seller and must comply with the PPA. The transfer of the PPA from Seller to a Subsequent Seller does not relieve or discharge Seller of its obligations and liabilities to Buyer which accrued prior to the date of such transfer.

3. Change of Control. Buyer hereby consents to both (i) the pledge of the Pledged Equity to Lender as part of the transactions contemplated by the Loan Agreement, and (ii) the transfer of such Pledged Equity, in connection with such an exercise of Lender's remedies against the Pledged Equity, to a Subsequent Seller that meets the Subsequent Seller Requirements, provided that Lender provides written notice to Buyer in advance of any such transfer.

4. Notice of Default. If Seller defaults in the performance of any of its obligations under the PPA, Lender may cure such default by the deadline provided therefor in the PPA. Buyer will not terminate the PPA before providing notice to Lender and giving Lender the opportunity to cure such default as follows: (a) with respect to payment defaults, or a default under Section 11.1(l) of the PPA, before the later of (i) ten (10) business days after Buyer's delivery of notice to Lender of such default or (ii) five (5) business days plus the number of days in the applicable cure period provided Seller in the PPA, and (b) with respect to other defaults (except those set forth in Section 11.1(e)-(j) of the PPA, for which no notice or extension is promised by Buyer herein), within the greater of (i) ninety (90) days or (ii) thirty (30) days plus the number of days in the applicable cure period provided Seller in the PPA following delivery of such notice from Buyer to Lender; provided, however, that such cure period in clause (b) may be extended by a reasonable period of time, not to exceed an additional ninety (90) days (or, with respect to an Event of Default under Section 11.1(c) of the PPA, to a date that is no greater than ninety (90) days after Buyer's delivery of notice to Lender of such default), if Lender has commenced and is diligently pursuing appropriate action to cure such non-monetary default; provided further, that to the extent that such default permits Lender to foreclose on its security interests in the Assigned Interest and Lender needs to gain possession of the Solar Project in order to perform such cure, Buyer will allow an additional reasonable amount of time, not to exceed sixty (60) days, to permit Lender to do so.

5. PPA Termination. Buyer agrees that it shall not, without Lender's prior written consent, mutually agree with Seller to a voluntary termination of the PPA; provided that notwithstanding the foregoing, Buyer may terminate the PPA without Lender consent due to an uncured Event of Default under the PPA after the expiration of Lender's rights to cure under

Section 4 hereof.

6. No Setoff. Notwithstanding any provision to the contrary set forth in this Consent, Lender may not use the Consent or any other setoff or other right set forth in the PPA as a basis for any action under, or nonperformance of, its obligations under any letter of credit naming Buyer or any affiliate as beneficiary, with respect to which the terms of such letter of credit shall control.

7. Certifications of Buyer. Buyer hereby certifies to Lender, as of the date hereof, that (i) the execution, delivery and performance by Buyer of this Consent and the PPA have been duly authorized by all necessary corporate action on the part of Buyer, (ii) each of this Consent and the PPA is in full force and effect and constitutes the legal, valid and binding obligation of Buyer, enforceable against Buyer in accordance with its terms, except as the enforceability thereof may be limited by bankruptcy, insolvency, reorganization or other similar laws affecting the enforcement of creditors' rights generally and general equitable principles, (iii) the PPA and the Acknowledgment of Consent and Agreement (attached hereto) with respect to this Consent are the only agreements between Seller and Buyer, (iv) a true and correct copy of the PPA is attached hereto as Exhibit A and the PPA has not been further amended, (v) Buyer is not in default of any of its obligations under the PPA, (vi) solely to the best of the actual knowledge of its employees with responsibility for administering the PPA, Seller is not in default of any of its obligations under the PPA, (vii) solely to the best of the actual knowledge of its employees with responsibility for administering the PPA, there are no material disputes between Buyer and Seller under the PPA, (viii) Buyer has not assigned any interest it has in the PPA, and Buyer has no notice of, and has not consented to, any previous assignment by Seller of all or any part of its rights under the PPA, (ix) there are no actions pending against Buyer as a debtor under any federal or state bankruptcy or insolvency laws, (x) there are no proceedings pending or, to Buyer's knowledge, threatened against or affecting Buyer before any court, governmental authority, or arbitration board or tribunal which could reasonably be expected to have a material adverse effect on the ability of Buyer to perform its obligations under the PPA, (xi) solely to the best of the actual knowledge of its employees with responsibility for administering the PPA, no event of Force Majeure has occurred, and (xii) subject to Seller's obligation to declare the Commercial Operation Date on or before the Guaranteed Commercial Operation date, solely to the best of the actual knowledge of Buyer's employees with responsibility for administering the PPA, no event or condition exists that would either immediately or with the passage of any applicable grace period or giving of notice, or both, enable either Buyer or Seller to terminate or suspend its obligations under the PPA.

8. Replacement Agreement. If the PPA is rejected or terminated as a result of any bankruptcy, insolvency, reorganization or similar proceeding affecting Seller, Buyer will, at the option of Lender exercised by providing written notice thereof to Buyer within forty-five (45) days after such rejection or termination, enter into a new agreement with Lender (or its designee or assignee) having identical terms as the PPA (subject to any conforming changes (none of which may include limitation of Buyer's remedies) necessitated by the substitution of the seller entity); provided that the following conditions shall apply: (i) the seller under the new agreement must meet the Subsequent Seller Requirements; (ii) the term under such new agreement shall be equal to the remaining balance of the term specified in the PPA and (iii) Lender (or its designee

or assignee) shall have cured any then-existing payment or performance defaults by Seller under the PPA (other than the bankruptcy of Seller or a transfer of the Facility to Lender, or of Seller to Lender, that was in connection with Lender's foreclosure thereupon and in compliance with this Consent but that was not in compliance with Section 9.2 of the PPA).

9. Notices. All notices given under this Consent shall be in writing and shall be deemed effectively given: (a) upon personal delivery to the party to be notified; (b) one business day after deposit with a reputable overnight courier, prepaid for overnight delivery and addressed as set forth below, with a copy of the notice simultaneously emailed to each applicable recipient at the email address shown below; provided that the sending party receives a confirmation of delivery from the overnight courier service; or (c) three (3) business days after deposit with the U.S. Post Office, postage prepaid, certified with return receipt requested and addressed to the party to be notified at the address indicated for such party below with a copy of the notice simultaneously emailed to each applicable recipient at the email address shown below. The parties may designate alternative notice addresses upon ten (10) days' advance written notice to the other parties:

If to Seller:

With a copy to:

If to Buyer:

With copies to all of:

If to Lender:

With a copy to:

10. Successors and Assigns. This Consent shall be binding upon Buyer and Seller and their permitted successors and assigns.

11. Termination. Upon the satisfaction in full of Seller's obligations under the Loan Agreement (other than contingent indemnification and reimbursement obligations that survive repayment of the loans and advances, interest fees and other amounts owed under the Loan Documents): (a) Lender shall notify Buyer of such fact and (b) this Consent shall terminate without further action of the parties hereto. Additionally, upon Lender's consummation of all of its remedies available under this Consent, this Consent shall terminate without further action of the parties hereto.

12. Waiver of Right to Jury Trial. TO THE FULLEST EXTENT PERMITTED BY LAW, EACH OF THE PARTIES HERETO WAIVES ANY RIGHT IT MAY HAVE TO A

TRIAL BY JURY IN RESPECT OF LITIGATION DIRECTLY OR INDIRECTLY ARISING OUT OF, UNDER OR IN CONNECTION WITH THIS CONSENT. EACH PARTY FURTHER WAIVES ANY RIGHT TO CONSOLIDATE ANY ACTION IN WHICH A JURY TRIAL HAS BEEN WAIVED WITH ANY OTHER ACTION IN WHICH A JURY TRIAL CANNOT BE OR HAS NOT BEEN WAIVED.

13. Governing Law. This Consent will be governed by and construed in accordance with the laws of the State of New York, without giving effect to principles of conflicts of law.

14. Severability. If any provision of this Consent or the application thereof is determined by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions hereof, or the application of such provision to the parties hereto or circumstances other than those as to which it has been held invalid or unenforceable, shall remain in full force and effect and shall in no way be affected, impaired or invalidated thereby, so long as the economic or legal substance of the transactions contemplated hereby is not affected in any manner materially adverse to any party by the invalidity, unenforceability or nullification of the offensive provisions.

15. Amendment. This Consent may not be amended, modified, or changed in any respect except by an agreement in writing signed by Lender and Buyer. Nothing in this Consent amends or modifies the PPA.

16. Counterparts; Rules of Construction; Definitions. This Consent may be executed in one or more counterparts, each of which will be an original and all of which, when taken together, will constitute one and the same original agreement. All references made (a) in the neuter, masculine, or feminine gender are made in all such genders, and (b) in the singular or plural includes the plural or singular number as well. Any capitalized term used but not defined herein is defined in the PPA.

17. Third Party Rights. Nothing in this Consent, expressed or implied, is intended or shall be construed to confer upon, or give to any Person, other than Buyer and Lender, respectively, rights, remedies or claims, legal or equitable, under or by reason hereof, or any covenant or condition hereof; and this Consent and the covenants and agreements, here contained are and shall be held for the sole and exclusive benefit of Buyer and Lender.

18. Seller Acknowledgement of Consent and Agreement. Buyer's obligations under this Consent are conditioned upon the execution and delivery by Seller to Buyer of the Acknowledgment of Consent and Agreement attached hereto.

[REMAINDER OF PAGE LEFT INTENTIONALLY BLANK]

IN WITNESS WHEREOF, the parties hereto have caused this Consent to be duly executed and delivered by their duly authorized signatories as of the date first above written.

IDAHO POWER COPRPORATION

By: _____
Name:_____
Title:_____

[LENDER]

By _____
Its _____

ACKNOWLEDGEMENT OF CONSENT AND AGREEMENT

Reference is made to the Consent and Agreement dated as of _____ (the "Consent and Agreement") between Idaho Power Corporation (as "Buyer"), and _____ (as "Lender"). _____ as "Seller" under the PPA (as defined in the Consent and Agreement) hereby directs Buyer to pay any amounts payable by Buyer under the PPA, as and when required under the PPA, pursuant to the payment instructions delivered and effective as of or proximate to the date hereof, from Seller to Buyer, or as may otherwise be specified from time to time by Lender or Seller to Buyer in writing. Any payment made to Seller or as Buyer in good faith believes to have been directed by Seller or Lender shall discharge any obligation of Buyer to Seller with respect to the making of such payment. Seller, by its execution of this Acknowledgment of Consent and Agreement, acknowledges and agrees that, notwithstanding any term to the contrary in the PPA, Buyer and Lender may perform all acts or obligations as set forth in the Consent and Agreement, and Buyer may perform as set forth herein or as otherwise purportedly instructed by Lender, including, without limitation, the manner and place of any payments to be made by Buyer that would otherwise be required pursuant to the PPA, and further agrees and consents to the various agreements made by Buyer in the Consent and Agreement, issues or confirms the instructions contained in the Consent and Agreement or herein or as hereafter issued by Seller or Lender, agrees to indemnify Buyer for any damages or liabilities suffered in the performance of the Consent and Agreement or such instruction; and further agrees that none of the execution of the Consent and Agreement, the performance by Buyer or Lender of any of their respective obligations thereunder, the exercise of any of the rights of Buyer or Lender thereunder, or the acceptance by Buyer of performance of the PPA by any party acting at the direction of Seller, Lender, or a Subsequent Seller shall subject Buyer to liability to Seller or release Seller from any obligation of Seller under the PPA. Seller acknowledges that Buyer need not enter into any agreement in the nature of the Consent and Agreement with any of Seller's other lenders prior to the termination of the Consent and Agreement. Nothing in this Acknowledgment of Consent and Agreement or in the Consent and Agreement amends or modifies the PPA. Seller shall have no rights against Buyer, under the PPA or otherwise, arising out of or on account of the Consent and Agreement or Buyer's performance (or nonperformance) thereunder or of the instruction.

Agreed to and Accepted:

By:
Its:
Date:

EXHIBIT 22

FORM OF ESTOPPEL CERTIFICATE

ESTOPPEL CERTIFICATE

This Estoppel Certificate ("Estoppel") is dated _____ __, 20__. Reference is made to that certain Renewable Energy Purchase Agreement, dated as of _____ (the "PPA"), by and between Idaho Power Corporation ("Buyer"), and _____ ("Seller") concerning output of a [wind/solar] energy generating facility owned by Seller and located in ____ (the "Project"). This certificate is delivered by Buyer to _____ ("Investor") and _____ as Administrative Agent (as defined in the Consent defined below) ("Administrative Agent"). Capitalized terms used but not defined herein are defined in the PPA.

Buyer certifies that, as of the date hereof, that (i) the execution, delivery and performance by Buyer of this Estoppel and the PPA have been duly authorized by all necessary action on the part of Buyer, (ii) each of this Estoppel and the PPA is in full force and effect and constitutes the legal, valid and binding obligation of Buyer, enforceable against Buyer in accordance with its terms, except as the enforceability thereof may be limited by bankruptcy, insolvency, reorganization or other similar laws affecting the enforcement of creditors' rights generally and general equitable principles, (iii) the PPA and the Acknowledgment of Consent and Agreement dated _____ are the only agreements between Seller and Buyer, (iv) a true and correct copy of the PPA is attached hereto as Exhibit A and the PPA has not been further amended, (v) solely to the best of the actual knowledge of its employees responsible for administering the PPA, Buyer is not in default of any of its obligations under the PPA, (vi) solely to the best of the actual knowledge of its employees with responsibility for administering the PPA, Seller is not in default of any of its obligations under the PPA, (vii) solely to the best of the actual knowledge of its employees with responsibility for administering the PPA, there are no material disputes between Buyer and Seller under the PPA, (viii) Buyer has not assigned any interest it has in the PPA, and Buyer has no notice of, and has not consented to, any previous assignment by Seller of all or any part of its rights under the PPA, (ix) there are no actions pending against Buyer as a debtor under any federal or state bankruptcy or any other similar laws, (x) there are no proceedings pending or, to Buyer's knowledge, threatened against or affecting Buyer before any court, governmental authority, or arbitration board or tribunal which could reasonably be expected to have a material adverse effect on the ability of Buyer to perform its obligations under the PPA, (xi) solely to the best of the actual knowledge of its employees with responsibility for administering the PPA, no event of Force Majeure has occurred, and [(xii) subject to Seller's obligation to declare the Commercial Operation Date on or before the Guaranteed Commercial Operation Date, solely to the best of the actual knowledge of Buyer's employees with responsibility for administering the PPA][omit if estoppel delivered after COD], no event or condition exists that would either immediately or with the passage of any applicable grace period or giving of notice, or both, enable either Buyer or Seller to terminate or suspend its obligations under the PPA. Buyer disclaims any obligation to advise Investor or Administrative Agent of any changes to the foregoing.

IN WITNESS WHEREOF, the undersigned has caused this Estoppel to be signed by its

authorized signatory as of the date first set forth above.

IDAHO POWER CORPORATION

By: _____
Name:_____
Title:_____

Minimum Requirements for Battery Energy Storage System (BESS)

Engineering, Procurement, and Construction Technical Specification

409298.65.7500

THIS GENERIC SPECIFICATION IS DESIGNED TO PROVIDE A BASIS FOR A VARIETY OF BATTERY ENERGY STORAGE SYSTEMS (BESS) APPLICATIONS AND MUST BE CUSTOMIZED FOR THE SPECIFIC PROJECT REQUIREMENTS AND SITE CONDITIONS BY THE ENGINEER OF RECORD PRIOR TO FINALIZING THEIR DESIGN.

Rev. A

28 June 2021

Table of Contents

LIST OF ATTACHMENTS

1.0 GENERAL

1.1 General Description

A. The Scope of Work of this project is for the Engineering, Procurement, and Construction (EPC) of a 80 MW / 320 MWhr grid connected, battery energy storage project including (MV / HV) interconnect to an adjacent (Distribution / Transmission) switchyard or interconnection point.
B. Contractor shall implement the project using a non-occupiable, containerized solution specified in 6.0 *Non-Occupiable Container Requirements*.
C. Contractor shall provide pricing options to implement the project based upon the following:
    1. Contractor to furnish all project equipment

1.2 Work Included in Contractors Scope

Contractor's scope shall include but not be limited to the following:

A. Site Preparation and Utility tie-ins
B. All required foundations & civil work
C. Design, Furnish and install Battery Energy Storage System (BESS) non-occupiable equipment enclosures including:
    1. Lighting, raceway, and auxiliary systems
    2. HVAC/Cooling system
    3. Off-gas detection, Fire detection & suppression system as applicable
D. Design, Furnish and install Battery Energy Storage System (BESS) equipment including:
    1. Batteries, Racks, and BMS equipment
    2. DC main disconnects
    3. DC bus / cable interconnections between racks and disconnect
    4. Bi-directional inverters
    5. Metering, Relaying and Protection Panels, as required
    6. Auxiliary electrical distribution system and cabling
    7. Grounding Transformers (As Required)
E. Design, Furnish, and Install an AC collection system including cable, raceway and transformers.
F. Design, Furnish and Install a new utility switchyard/substation or the modifications that are required to interconnect the BESS to an existing switchyard/substation including [but not limited to] MV or HV breakers and disconnects, surge arresters, grounding transformers, CTs and VTs, etc.
G. Design, Furnish and Install all required metering, telemetry, and Site Controller equipment including any required modifications to the existing telemetry hardware and software.
H. Perform start-up checks utilizing OEM factory representatives as required and commission the facility.
I. Complete, perform & provide all applicable NERC testing and compliance reports for review by Owner. Reports shall provide NERC related support documentation in a manner that is thorough, well organized, complete, and include explanations that support the conclusions reached. Reports shall be suitable for use in presenting to NERC audit personnel.

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J. Complying with all requirements of the local Utilities' interconnection requirements.

1.3 Work Not in Contractor's scope

The basis of Contractor's bid shall be to provide a turnkey installation including main power transformers, batteries, racks, and the Battery Management System (BMS).

Contractor shall also provide pricing to implement the project incorporating Owner-furnished main power transformers, batteries, racks, and BMS.

1.4 Permits and Agreements

A. Owner will obtain --
   1. Operating permits
B. Contractor shall obtain and pay for –
   1. Building Permits
   2. Construction Permits
   3. Local Permits
   4. Licenses as required for engineering and construction activities
   5. Utility Interconnection Agreement
   6. Land Use and Rights-of-Way
   7. Environmental permits

1.5 Equipment

A. Design equipment in accordance with generally accepted industry standards for energy storage facilities.
B. Systems and operations shall be designed in compliance with equipment OEM's requirements and applicable industry standards.
C. Equipment shall be of proven design. Experimental, prototype, or one of a kind designs are not acceptable.
D. Permanent equipment shall be new and unused.
E. OEM shall be able to demonstrate at least 5 installations of comparable size within the Continental United States of America which have achieved commercial operation as defined by the owning utility or Power Purchase Agreement (PPA) off-taker.
F. Contractor shall verify that all equipment procured as part of this contract shall comply with Department of Energy regulations.

1.6 Use and Operation

A. Method of usage to be one full charge/discharge cycle per day, proposal to outline number of full cycles per year. Up to two and a half (2.5) times as many recommended cycles can be expected in any 48-hour period, i.e. two full cycles in one day with rest to finish out 48-hour period.
B. Project to be designed for full nameplate capacity at Commercial Operation Date. Contractor shall provide the OEM's annual battery life degradation schedule and curves for expected use scenario and an additional schedule and curves based on 10% over cycling per year, and 20 periods of 10% over cycling per 48-hour period over a year (396 cycles per year).

C. Project to maintain a minimum rating of 80 / 320 MWh throughout the life of the project. Contractor to initially size the system to account for any expected derating and degradation that can be expected in order to maintain this minimum rating.

2.0 PROJECT DESIGN CONDITIONS

2.1 Site Location / Interconnecting Provisions

Project Name	To be identified through RFP process
Owner	
Project Location	
Latitude / Longitude	
Elevation	
Energy Storage Capability at POI	
HV/MV Interconnection Voltage	
LV Auxiliary Service Voltage	
Collection System Voltage	
Point of Interconnection (POI)	

2.2 Site Conditions

Parameter	Data
Nearest ASHRAE weather data location	To be identified through RFP process
Temperature Range (10yr Extreme, Max/Min)	
Relative Humidity Range	
Heating Dry Bulb Temperature Design, 99% occurrence	
Cooling Temperature Design, 1% occurrence, DB/WB	
Design Wind Speed	
Rainfall	
Seismic	

2.3 Site Arrangement

2.4 Seismic Loads

Seismic loads and element design criteria shall be in accordance with applicable sections of the IBC, ASCE 7, AISC, and related or referenced documents for equipment, buildings, and structures.

2.5 Dead Loads

A. Dead loads shall be considered as being the weight of the structure and supported equipment of a permanent or semi-permanent nature including tanks, wall panels, partitions, roofing, piping, drains, electrical trays, and the contents of tanks measured at full capacity. However, the contents of tanks shall not be considered effective in resisting uplift.

B. Dead loads shall be determined using the minimum design dead loads and unit weights from the International Building Code (IBC and ASCE 7)

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2.6 Live Loads

A. Live loads are produced by the use and occupancy of the building or structure including movable and transitory loads such as the weight of people, portable equipment, and tools; and mobile equipment or parts which may be moved over or placed on floors during maintenance operations.

B. The live loads used in the design of buildings and structures shall be the maximum loads likely to be imposed by the intended use or occupancy but shall not be less than the minimum live loads prescribed in the IBC and ASCE 7.

2.7 Soil and Hydrostatic Loads

A. The design of below-grade structures shall consider the effects of lateral soil pressures considering also appropriate allowances for possible surcharges due to adjacent fixed or moving loads.

B. Structures below the water table shall also be designed to resist the effects of hydrostatic pressure and buoyancy based on expected extreme groundwater conditions.

2.8 Wind Loads

A. Wind loads shall be computed in accordance with International Building Code (IBC and ASCE 7. A step function of pressure with height shall be used.

B. Design wind pressures shall be determined by applying velocity pressures for the design wind speed to the appropriate design equations for, respectively, the building or structure's main wind-force resisting system, other buildings, components and cladding, and for other construction considering the appropriate design coefficients and factors.

2.9 Snow Loads

A. The effects of drifting sliding, partial, and imbalanced snow loads shall be considered as set forth in IBC and ASCE 7.

B. Rain-on-snow surcharge shall also be considered as set forth herein except where locally adopted requirements are more stringent.

2.10 Rain Loads

A. Roofs and similar nearly horizontal surfaces shall be designed considering the potential ponding instability according to IBC and ASCE 7.

2.11 Construction Loads

A. The integrity of structures shall be maintained during construction without use of temporary framing struts, ties, or cable bracing insofar as possible.

B. Should construction or crane access considerations dictate the use of temporary structural systems; identify such situations and provide criteria that it intends to use to determine requirements for the temporary system.

C. Special consideration shall be given to ensure the stability and integrity of structures during any periods involving temporary bracing systems.

D. Assumed construction loads shall not be less stringent than those recommended in ASCE 7, International Building Code (IBC) or other generally recognized structure design agencies.

3.0 SCOPE OF WORK/DIVISION OF RESPONSIBILITY

3.1 General Description

A. Contractor's Scope of Work includes design, engineering, procurement, construction, construction management, commissioning, startup, testing, demonstration testing and operator training.
B. For any Owner furnished equipment, the Contractor shall be responsible for receiving, unloading, storing, installing, checkout, commissioning, startup, and testing unless expressly stated otherwise.
C. For the avoidance of doubt, Contractor's scope includes all work necessary to provide a fully operational BESS facility except where explicitly noted otherwise.

3.2 Items Provided by Others

Items furnished by others and not in this scope of supply include the following:

A. Conceptual/Basic Layout
B. Option price for Owner to directly purchase equipment stated in Section 1.1.**Error! Reference source not found.**.
C. Permits as described in Section 1.0.

3.3 Safety Requirements

A. The Contractor shall comply with the Owner's site safety requirements.
B. Contractor shall be responsible for site control as well as site safety training for any personnel that come onto the work site.
C. Report weekly on safety statistics including the number of safety walks, job safety assessments, and any incidents.

3.4 Electrical and Control

A. The electric system should be configured in a manner similar to the conceptual One-Line Diagram. The one-line should be considered conceptual in nature and is not intended to show all details required. The conceptual One-Line diagram is not intended to limit Contractor's flexibility in design.
B. Contractor's scope includes engineering, procurement, installation, and commissioning of the BESS scope including (MV or HV) interconnect to an adjacent switchyard or interconnection point.

3.5 Civil / Structural

A. Contractor shall contract a 3rd party to perform a geotechnical investigation of the site. The design and installation of the facility shall be pursuant to the geotechnical report findings. A copy of the geotechnical report shall be made available to the Owner.
B. Contractor is responsible to prepare the site as required. Contractor shall clear, grub, and perform earthwork activities as necessary to create a site that is suitable for construction.
C. Contractor is responsible to develop a site-specific storm water runoff plan and to protect the site against erosion during construction. The Contractor shall be

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responsible for final grading of site, maintaining the storm water drainage system, and completion of storm water drainage system in accordance with the site permits. Contractor shall obtain the stormwater permit and is responsible for closure of the stormwater permit.

D. Costs for the handling and disposal of any existing contaminated soils or other materials not identified in the soils report shall not be included in the Contract Price. Unforeseen conditions shall be treated as additional scope of work in accordance with the Contract documents.

E. Contractor is responsible to survey the site and establish site control geometry as necessary to perform the work. The survey data shall be provided as on-ground (surface) values with an equation to convert from ellipsoidal heights (State Plane Ground) to orthometric heights (State Plane Grid). Horizontal and vertical accuracy shall be Second Order Class II per the National Map Accuracy Standards (NMAS).

F. Dewatering and shoring of excavation works shall be the responsibility of the Contractor.

3.6 Engineering

A. Perform all engineering and design work required for a complete and operating facility, unless noted otherwise. Construction design documents shall be sealed by registered Professional Engineers licensed in the state where the project is located.

B. Contractor shall provide a complete list of design deliverables with delivery dates to the Owner.

3.7 Procurement

A. Except for equipment specifically listed as Owner furnished, Contractor shall be responsible for the procurement of non-engineered equipment and engineered equipment, including freight to the site, unloading, and storage that is required to complete the project. Contractor shall also be responsible for unloading and onsite storage of any Owner-furnished equipment.

B. Contractor shall procure all bulk materials whether intended for permanent installation or temporary installation that is needed for the erection of the systems and components.

C. The Contractor shall be responsible for performing the vendor shop inspections for the Contractor-furnished equipment. The Contractor's standard shop inspection reports shall be utilized and distributed to the Owner. Notify Owner of Factory Acceptance Tests (FAT) for equipment at least two weeks in advance of start of the FAT tests. The Owner may elect to attend such tests at their cost and sole discretion, unless stipulated otherwise.

D. Submit to Owner a binder and corresponding electronic files containing recommended operating spare parts lists including pricing, lead times, and contact information for equipment supplied by the Contractor. Owner shall be able to purchase these spare parts from the Contractor or suppliers for the prices noted during the first year of operation.

3.8 Construction

A. Perform construction and erection work required for a complete operating facility, including management and responsibility for quality and time of performance for subcontracted work.

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B. The Contractor shall be responsible for all indirect construction costs such as supervision, equipment, taxes, utilities, facilities, and other indirect items needed. This includes costs for personnel, construction equipment, including mobilization and demobilization, temporary buildings, temporary utilities, scaffolding, project job office expenses, employee travel and per diem expenses, and quality control testing, such as for concrete and welding.

C. Temporary construction office facilities, furnishings, janitorial services, and supplies shall be furnished by the Contractor.

D. Contractor shall provide temporary office space for two persons for use by Owner and/or Owner's representative during the period of site construction.

3.9 Special Inspections

A. The Owner may engage one or more qualified Special Inspectors to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with other document requirements.

B. Requirements for the Contractor to provide quality-assurance and quality-control services are not limited by provisions of this Section.

C. The Contractor shall coordinate the inspection and testing services with the progress of the work. The Contractor shall provide notice to the testing agency to allow scheduling of personnel such that it does not create delays in work.

D. The Contractor shall be responsible for scheduling and coordinating the review and acceptance by the Authority Having Jurisdiction (AHJ).

E. The Contractor shall be responsible for providing a BESS Hazard Mitigation analysis in accordance with NFPA-855 requirements for installations that meet Hazard Mitigation analysis criteria as described but not limited to NFPA-855 section 4.1.4.1.

F. The Contractor shall be responsible for costs of:
   1. Re-testing and re-inspection of materials, work, or products that do not meet the requirements of the Contract Documents and shop drawings / submittal data.
   2. Review of proposed repair and / or replacement procedures by the inspectors and testing agencies.
   3. Repair or replacement of work that does not meet the requirements of the Contract Documents, Special Inspector's, or AHJ's requirements.

3.10 Commissioning and Startup

A. Startup shall include activities, procedures, and tests required to bring installed systems and equipment to a state of readiness for Owner acceptance and commercial operation. It is the Contractor's responsibility to comply with the battery manufacturer's requirements as well as any applicable NERC/FERC requirements.

B. Contractor shall prepare written commissioning and testing procedures and submit for Owner review and acceptance a minimum of 30 days prior to commencement of pre-commissioning tests.

C. Contractor shall comply with all interconnecting Utility requirements and/or system conditions that may be present.

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3.11 Training

A. Contractor is responsible for training plant staff on the operation, maintenance, and repair of equipment furnished as part of the Works.

B. Training shall include both classroom and hands-on training for at least ten (10) persons.

C. Contractor shall allow Owner representatives to shadow Contractor's startup personnel during commissioning activities. Participation by Owner's trainees is at Owner's option and does not relieve Contractor of responsibility to properly commission the facility.

3.12 Specifications and Standards

A. Reference to standards or manuals of any society, organization, or association, whether such reference be specific or by implication, shall mean the latest standard, manual, or code in effect as of the time of the Contractor's performance of the Work, unless specifically stated otherwise.

B. References to any standard or code and specifically to the International Building Code (IBC) shall mean the version of that code or standards adopted and modified by the local Authority Having Jurisdiction (AHJ).

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4.0 SITE WORK

4.1 General

A. This section covers initial site work, maintenance of drainage systems during construction, and final site work.
B. The site grading and drainage plan shall conform to the requirements of the permits.
C. Site drainage facilities shall be designed to convey the runoff from a 4 percent probability (25 year) 24-hour storm event unless specific federal, state, or local regulations are more stringent.

4.2 Codes and Standards

Erosion and sediment control, grading, drainage, and storm water management; design, construction, and maintenance shall be in accordance with requirements set forth by state and local environmental management agencies and Environmental Protection Agency (EPA).

4.3 Fencing

A. A security fence at least 6 ft high with suitable gates shall be provided around the project site boundary during construction. Temporary or permanent fencing may be provided at Contractor's option.
B. Fencing shall be isolated or grounded at Contractor's option to ensure safety with respect to touch potentials. Special precautions shall be taken where fence abuts an existing electrical substation fence and near overhead transmission lines.
C. The permanent security fence shall have an overall height of approximately 8 feet including 3 strands of barbed wire mounted on 45-degree extension arms at top extending outward.
D. Other Applicable Owner Standards

4.4 Dewatering

A. Contractor shall provide temporary dewatering if required for any work requiring excavation below the groundwater table.
B. The dewatering plan must be approved by the reviewing agencies prior to any dewatering activities being undertaken.

4.5 Grading and Drainage

A. The site shall be graded to convey storm water runoff away from permanent facilities. Minimum slopes shall be based on surface type. Provide a minimum 1 percent overall slope.
B. Areas that do not lend themselves to grading for surface drainage shall be provided with catch basins and underground piping. Maximum earth slopes shall be set based on slope stability and maintainability requirements. The steepest unimproved slope shall be limited to 3:1 height to vertical ratio.
C. Channels and ditches shall be designed and shown on the drawings.
D. Culverts shall generally be reinforced concrete, corrugated metal, or smooth-lined corrugated HDPE pipes.
E. Grating and guards shall be provided for fall protection at channels and ditches.

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4.6 Heavy Loads

A. Roadway sub grades, pavements, and structures shall be designed for HS20 loads.
B. Contractor shall be responsible for repair of damage to any existing roads caused by hauling of battery containers, mobilization / demobilization of cranes, or other heavy loads.

4.7 Compaction

Unless the Contractor's geotechnical report allows for lower compaction requirements, the following minimums shall be adhered to. Submit for Owner review any requests for alternative values.

	Minimum Compaction in Accordance with ASTM D6981557 Standard Modified Proctor (%)
Unauthorized excavation	95
Fills and embankments	90
Trench subgrades	90
Trench subgrades beneath roads	95
Subgrades beneath roads	95
Structure backfill (around walls and structures)	95
Compacted sand fill	95
Trench backfill (crushed rock)	75 (relative density)
Trench backfill (cohesive and sand material)	90
Trench backfill (traversing paved areas)	95
Compacted rock fill	75 (relative density)
Structural fill (beneath structures)	98

4.8 Roads

A. Contractor shall be responsible for the cost, construction, maintenance, and improvement of all facilities and improvements necessary for access to and from the Facility Site and for performance of the work. Contractor shall be responsible for providing Buyer sufficient access to the site for the performance of routine maintenance and sufficient space within the facility during such times as not to interfere with Owner activities.
B. Road construction shall be similar to existing access road unless greater load carrying capability is required due to battery / container loads.
C. Horizontal and vertical alignment shall be based on anticipated traffic and design speed for each road.
D. The minimum road design criteria to be considered are as follows:
    1. Intersection Radius: 40 ft (12 m) from radius to inside edge or trafficked surface

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2. Maximum Grade: 3% primary access routes; 6% for limited length secondary routes

4.9 Landscaping and Restoration

A. Provide finish landscaping for the site according to local ordinances and practices applicable to typical industrial facilities.

B. Areas of the site, including lay-down areas not specifically addressed by a landscaping plan or other requirements shall be restored to a condition acceptable to the Owner as part of the demobilization from the site. This condition should also allow for closure of the Stormwater Permit.

4.10 Existing Conditions

A. This project may have below grade pre-existing conditions not indicated on any drawings, maps or other documents, or in locations different than where indicated.

B. Prior to any excavation activities, all known underground utilities shall be positively located using "soft dig" techniques to minimize the likelihood of a utility strike.

5.0 SUBSTRUCTURE REQUIREMENTS

5.1 General

Design and construct of reinforced concrete or other acceptable method to resist the loadings imposed by the building, structure, or equipment being supported.

5.2 Considerations

Foundation design shall consider the following:

1. Soil bearing capacities
2. Pile or pier capacities
3. Active, at-rest, and passive lateral earth pressures
4. Allowable settlements
5. Building, structure, equipment, and environmental loading
6. Equipment operating characteristics and performance criteria
7. Access and maintenance
8. Temporary construction loading

5.3 Analysis

A. Minimum factors of safety against overturning and sliding shall be 1.5 and 1.25, respectively, but in no case less than those prescribed by the International Building Code (IBC).

B. Geotechnical exploration, testing, and analysis information shall be used to determine the most suitable foundation system. Elastic (short-term) and consolidation (long-term) foundation settlements shall be calculated and limited to the following design values:
   1. Total settlement: 1.5 in
   2. Differential settlement: 0.1 percent slope between column support points

5.4 Slab-on-Grade

A. Care shall be taken to provide suitable base construction and to align and locate expansion and control joints as recommended in these references to minimize uncontrolled cracking.

B. Slabs-on-grade that are open or generally exposed to the environment shall be sloped to prevent the accumulation of standing water. Interior slabs do not require sloping.

5.5 Foundations

A. Prepare detailed foundation design criteria for each foundation type on the basis of on an independent geotechnical exploration program, performed by Contractor.

B. Interpretation or use of any preliminary boring information is solely the responsibility of the Contractor.

C. Foundations may be either cast in place or precast. All foundations shall be reinforced at a minimum to the temperature and shrinkage requirements of ACI 318.

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D. Pile, post, or earth screw type equipment base foundations typically found in the renewable energy industry are acceptable alternatives to concrete foundations. Contactor shall provide safe access provisions to any equipment bases elevated above grade by more than the height of the equipment base.

5.6 Equipment Bases

A. Equipment bases may be site constructed of concrete, pre-fabricated concrete, or may be a structural metal skid furnished as part of the equipment.
B. Equipment bases shall consider all additional loads encountered during transport to the site and placement into final position.

6.0 NON-OCCUPIABLE CONTAINER REQUIREMENTS

6.1 General

A. This section covers the minimum requirements for containerized Battery Energy Storage Systems.
B. Containers should be shipped fully assembled to the extent practical, except for loading of the battery modules in the field.
C. Air conditioning units may be removed for shipment if required.

6.2 Materials

A. Container foundations may be formed in place concrete, pre-cast concrete, piers, or earth augers at the engineer of records option.
B. Foundations shall meet local building codes with respect to frost depth. Placement of containers directly on compacted fill is not allowed.
C. Container structural base may be pre-cast concrete or a structural steel system with steel decking.
D. Container walls and roof may be pre-cast concrete, steel, or hybrid construction.
E. All materials shall be non-flammable
F. Materials shall be suitable for a minimum 20-year lifetime.

6.3 Occupancy Class

A. It is the intent that containerized systems be classified as equipment enclosures rather than occupiable buildings.
B. The layout of equipment in containerized systems shall be such that personnel cannot occupy the enclosure. Containerized systems arranged to provide interior working space are strongly discouraged. If central aisle containers are provided, aisle width shall meet NEC required working space.
C. Access to battery modules and other equipment should be via doors arranged along the length of the container such that personnel are not required to enter the container to perform maintenance.

6.4 Partition Walls

A. If a skid assembly includes “central inverter” power conversion equipment and battery racks on a single skid, designs which include a fire-rated partition wall between batteries and power conversion equipment are preferred.

6.5 Windows

A. Windows are not required. Arrangements that allow the main DC disconnect position to be viewed or operated without opening doors are preferred.

6.6 Doors

A. Doors are not required for personnel ingress/egress.
B. Doors for equipment access should be provided along the long sides of the container. Doors arranged in “French Door” fashion are preferred.
C. Door opening width shall be as required to provide access to battery racks for module installation and removal.

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D. Doors shall be lockable and keyed alike.
E. Exterior hardware shall be stainless steel.

6.7 Floor Coverings

A. Floors shall be non-combustible.

6.8 Fire Detection and Suppression

A. Containerized BESS systems shall be provided with fire detection systems as specified in 9.0 Fire Detection and Suppression.
B. Containerized BESS systems shall be provided with clean agent fire suppression systems as specified in 9.0 Fire Detection and Suppression.
C. Fire detection schemes incorporating early off-gas detection and interlock to shut down affected BESS equipment prior to fire or smoke detection are encouraged.

6.9 HVAC

A. HVAC systems shall be in accordance with 11.0 HVAC.

6.10 Security System

A. Security cameras shall be provided and located such that the entire site area is visible.
B. Security cameras shall be able to be monitored remotely at Owner's operations center

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7.0 CONCRETE

7.1 General

Design and construct concrete structures in accordance with Building Code Requirements for Structural Concrete.

7.2 Codes and Standards

A. Specifications for materials shall generally conform to the standard specifications of the American Society for Testing and Materials (ASTM) and American Concrete Institute (ACI).
B. Field and laboratory testing procedures for materials shall follow standard ASTM specifications and the American Society for Nondestructive Testing (ASNT) procedures and practices.
C. Design loadings shall be in accordance with the loading criteria as stipulated in International Building Code (IBC).
D. Design and placement of structural concrete shall follow the recommended practices and the latest specifications and standards of the International Building Code (IBC).
E. Other recognized standards shall be followed where required to serve as guidelines for design, fabrication, and construction when not in conflict with the listed standards.
F. Other Applicable Owner Standards

7.3 Design Criteria

A. Controlled Low-Strength Material (CLSM) can be used in nonstructural applications where limited strength is acceptable, its use would not be detrimental to the finished or adjacent construction and involves materials and placement methods commonly used and accepted in the region where the project is located.
B. Design concrete structures based on the following mix class:

Mix Class	Usage	f'c - 28 Day Strength psi (bar)	Maximum Coarse Aggregate Size in. (mm)	Maximum Water to Cement Ratio
A-1	Lean concrete for work slabs (mud mats), fill, duct banks	2,000 (138)	3/8 (9.5)	0.55
B-1	General usage	4,000 [1](276)	3/4 (19.1)	0.48
Grout		5,000 (345)	-	-
CLSM	Selected nonstructural applications	300 max (21)	-	-

Note 1 – Strength shall be greater if required for durability per Chapter 4 of ACI 318

7.4 Materials

A. Refer to table for the material, application, and requirements that must be met:

Material	Application	Requirements
Cement	In accordance with mix design, local supply	ASTM C150, (Type as required by soil condition and exposure conditions).
Water	In accordance with mix design, local supply	Potable or Non-potable
Aggregate	In accordance with mix design, local supply	ASTM C33.
Fly Ash	In accordance with mix design, local supply	ASTM C618.
Reinforcing steel, main reinforcing	No. 4 through No. 10	ASTM A615, Grade 60.
Reinforcing steel, ties and stirrups	No. 4	ASTM A615, Grade 60.
Forms	For exposed concrete surfaces except flatwork	Plywood or modular steel dimensions to nearest inch.

B. Ready-mixed concrete shall conform to ASTM C94.
C. Hot and cold weather concreting shall be in accordance with the recommendations of ACI.

7.5 Reinforced Applications

A. Suspended slabs shall be two-way reinforced; 0.75 in (19 mm) minimum cover; 6 in (150 mm) minimum thickness; steel trowel finish; sprayed with curing compound.
B. Structural Beams shall be singly or doubly reinforced; 0.75 in (19 mm) minimum cover for interior locations, 1.5 in (38 mm) cover for exterior locations; beam width in 2 in (50 mm) increments, minimum 8 in (200 mm); beam depth in 2 in (50 mm) increments, minimum 12 in (300 mm); cured at least 72-hours in forms.
C. Grade Beams shall be singly or doubly reinforced; 1.5 in (38 mm) cover; beam width coordinated with excavator characteristics, minimum 8 in (200 mm); 4 in (100 mm) minimum thickness void form below elements spanning between piers or piles.
D. Spread footings shall be 6 in (150 mm) increments for footing dimensions less than 9 ft (2.8 m); 3 in (75 mm) cover for sides and bottoms cast against soil; 1.5 in (38 mm) bottom cover when cast against working slab or mud mat.
E. Concrete strength determination shall be in accordance with ASTM C39.
F. Use Type V cement when high-sulfate resistance concrete is required. If not available provide written documentation of the unavailability, and then use of concrete Type I or Type II cement with a maximum tricalcium aluminate (C_3A) content of 6 percent or less will be acceptable.

7.6 Finishes

A. Exposed Concrete Pads – Float Finish
B. Door Landing Stoops – Medium Broom Finish
C. Equipment Bases – Steel Trowel Finish
D. Steel troweled, surface hardened concrete shall be provided for exposed concrete construction in such areas as battery equipment areas, storage rooms, switchgear rooms, and mechanical rooms. Surface shall be non-slip; wet or dry.

7.7 Air-Entraining

A. Air-entraining agent shall be in accordance with ASTM C260.
B. Outdoor concrete shall include entrained air.

7.8 Grout

A. Use Portland, non-shrink cement for grout.
B. Metal shims shall be stainless steel.

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8.0 METAL STRUCTURES

8.1 General

This section covers the minimum requirements for the design of metal framed structures and systems.

8.2 Codes and Standards

A. Design, fabrication, and erection of structural steel shall be in accordance with the recommended practices and specifications of:
   1. American National Standards Institute (ANSI)
   2. American Iron and Steel Institute (AISI)
   3. American Welding Society (AWS)
   4. American Society for Testing and Materials (ASTM)
   5. National Association of Corrosion Engineers (NACE)
   6. International Building Code (IBC)
   7. Occupational Safety and Health Association (OSHA)
   8. Other Applicable Owner Standards

B. Other recognized standards shall be followed where required to serve as guidelines for design, fabrication, and construction when not in conflict with the listed standards.

C. The standards listed shall mean the latest version adopted by the state or local authorities including any amendments to, or modifications of the original document.

8.3 Design Criteria

A. Limit use of rigid frames to less critical applications such as pre-engineered metal buildings used primarily for enclosure purposes.

B. Utilize simple framing for such things as framed structures supporting equipment and utilities, either alone or in conjunction with enclosure materials.

C. Lateral forces imposed on buildings and structures shall be resisted through a system of horizontal and vertical bracing or horizontal diaphragms, and vertical bracing, shear walls or rigid frames.

D. Design member end connections for the forces and moments determined by engineering analysis.

E. Bolted connections shall be designed as bearing type with threads included in the shear plane except where slip-critical connections are required.

F. Bolted connections shall use 3/4 in (19 mm), 7/8 in (22 mm), or 1 in (25 mm) ASTM A325 (ISO R898 Class 8.8, or higher) bolts.

G. Large diameter or ASTM A490 (ISO R898 Class 10.9 or 12.9) bolts may be considered only when necessary to resist unusually large forces or reduce connection size.

H. Wedge anchors and epoxy or polymer mortared anchors shall be zinc plated or galvanized anchors are acceptable for interior applications; and stainless steel for exterior.

I. Anchor bolts installed during concrete placement shall be galvanized for their full length. Other materials may be used only as specifically approved by the Owner.

J. Diagonal bracing that may impede equipment/material access is unacceptable.

8.4 Deflection Guidelines

A. Floor or roof members supporting plaster ceilings or masonry walls; 1/360 times the span considering live load only.
B. Isolated structural members supporting masonry walls; the lesser of 1/600 times the span or 0.3 in (8 mm) considering dead plus live load.
C. For other members; 1/240 times the span, considering live load only.
D. Metal wall panel girts:
    1. Vertical; 1/240 times the span except the lesser of 1/960 times the span or 3/8 in (9.5 mm) where located under or over glass or masonry walls where clearance and load bearing capabilities are a consideration.
    2. Horizontal; 1/180 times the span except the lesser of 1/360 times the span or 1.33 in (33 .8 mm) when located under or over glass.

8.5 Lateral Drift Guidelines

A. The following guidelines for lateral drift of major structures shall be followed unless more stringent criteria are required by local building codes.
B. Braced frames shall be designed to resist the specified lateral environmental loads while limiting lateral deflection to 1/200 of the story or building height.
C. Moment resisting frames, such as those commonly used in pre-engineered metal buildings, shall be designed to resist 75 percent (corresponding to a 10 year recurrence interval) of the specified lateral environmental loads while limiting lateral deflections to 1/120 of the story or building height.
D. In structures without interior walls or other nonstructural components in contact with or supported by a building frame, lateral deflection may be increased to 1/50 of the story or building height considering the allowed reduction in lateral environmental loads.

8.6 Materials

A. Structural steel shapes, plates, and appurtenances for general use shall conform to the multi-certification requirements for ASTM A36/ASTM A572, Grade 50, or ASTM A992.
B. High strength connection bolts shall conform to ASTM A325. Other bolts shall conform to ASTM A307, Grade A.
C. Coat bolts for resistance to rusting for a minimum of 30 years.
D. Bolted connections shall conform to Specification for Structural Joints; ASTM A-325 or A-490 Bolts, current edition.
E. Bolt tightening/pre-tensioning shall be accomplished by use of load indicating washers or the turn-of-nut method. For bolts tightened by the turn-of-nut method, a minimum of 10 percent shall be checked using a calibrated torque wrench.
F. Anchor bolts shall conform to ASTM F1554, Grade 36 and shall be galvanized for their full length. Embedded shapes and plates shall be of ASTM A36 material and shall be galvanized.
G. Expansion and chemically bonded anchors shall be stainless steel conforming to ASTM A276 or ASTM A493.
H. Welding electrodes shall have a minimum specified tensile strength of 70,000 psi (4827 bar).

I. Outdoor structural steel shall be hot-dip galvanized. Galvanizing shall be in accordance with the requirements of ASTM A123, ASTM A153, and/or ASTM A525 as applicable.

J. Galvanized steel fabrication or modification performed on site shall be sent out for re-galvanizing whenever the work process can be revised to permit doing so without resulting in an unacceptable construction delay.

K. When offsite re-galvanizing is not feasible, field application of galvanizing material will be acceptable, subject to the Owner acceptance and provided the effective thickness, adhesion, and durability of the field applied galvanizing method proposed can be shown to be at least equal to that of undamaged adjacent areas.

L. Field applied galvanizing paint will be acceptable for installation touchup and will be acceptable for galvanizing of field fabrication repairs or modifications only if conformance with the above requirements can be demonstrated.

M. Galvanizing of nuts, washers, and bolts shall be in accordance with ASTM B695.

N. Corrosion-resistant steel shall be used where corrosion or abrasion may be expected, thus requiring the use of special steels. Corrosion-resistant stainless steels shall conform to ASTM A213, Type 316L, 2.75 percent minimum molybdenum content; or ASTM 240, Type 304 / 304L as appropriate for the application.

8.7 Grating, Guards, Handrails, and Toe Plates

A. Steel grating shall be welded rectangular steel bar with bearing bars at least 3/16 in wide by not less than 1-1/4 in (32 mm) deep.

B. Guards, handrails, and toe plates for exterior shall be constructed of galvanized steel. Interior may be painted steel or galvanized. Steel guards and handrails shall be fabricated from 1-1/2 in (38 mm) nominal diameter, ASTM A53, round steel pipe with joints mitered and welded to form a continuous railing system.

C. Grating shall be hot dip galvanized steel except in corrosive environments; which shall be of fiberglass reinforced plastic construction. Grating ends shall be banded.

D. Guards for non-public locations shall be a two-rail system with the top rail 42 in (1067 mm) above the walkway surface and the intermediate rail 21 in (533 mm) below the top rail.

E. Guard post spacing shall be proportional to the length of the protected horizontal opening and shall consider the specified lateral loading but shall not exceed 6 ft (1800 mm) center-to-center.

F. Handrail for open sides of stairs in non-public locations shall be a combination guardrail/handrail system in which the top and intermediate rails are provided in accordance with the preceding and, in addition, with a handrail, offset from the plane of the guards toward the center of the stair run by distance required for hand clearance and with its top 34 in (860 mm) above the nose of the treads.

G. Provide toe-plates for platforms and stairways.

8.8 Stairs, Ladders, and Deck

A. Stair treads shall be galvanized assemblies of steel grating with cast abrasive nosing. Treads and riser proportions shall be in accordance with the IBC.

B. Exterior ladders shall be galvanized, interior may be painted steel; fabricated from ASTM A36 bar rails, 2-1/2 in by 1/2 in (64 x 13 mm), with 0.75 in (19 mm) diameter rungs inserted and plug welded into holes punched or drilled through the ladder

rails. Ladder supports shall be spaced not more than 12 in (300 mm) vertically center-to-center.

C. Metal deck form shall conform to ASTM A446, Grade A or ASTM A611, Grade C. Metal deck shall be galvanized with a uniform coating having a weight of not less than 6 oz/sqft (316 g/sqm) on each surface.

8.9 Stenciling and Marking

A. Column identification by row letter and number shall be stenciled on four faces of exposed steel columns.

B. Letters and numbers shall be a minimum of 12 in (300 mm) tall.

9.0 FIRE DETECTION AND SUPPRESSION

9.1 General

A. Contractor shall be responsible to comply with all applicable fire and building Codes, including NFPA 855.
B. Contractor is advised that no source of water is available at the project site. If a water-based fire suppression system is required to meet local AHJ or Owner's insurance requirements. Contractor shall design and install tankage and pumps as requirement
C. This section covers the minimum requirements for the fixed suppression systems, early warning detection systems, alarm systems, and portable fire protection equipment.
D. Contractor shall provide design, approvals, permits, installation, testing, and training for a complete, operational, and code compliant fire detection, alarm, and protection system(s). The design and record documents shall be sealed by a professional fire protection engineer registered in the jurisdiction in which construction occurs.
E. The fire protection and alarm systems and design requirements shall be based upon each BESS area being H3 occupancy per International Building Code (IBC). Contractor shall confirm with code enforcement that this is the correct design.

9.2 Codes and Standards

A. Unless otherwise specified, the governing edition and addenda used shall be interpreted as the jurisdictionally approved edition and addenda. If a code or standard is not jurisdictionally mandated, then the current edition and addenda in effect at the date of this document shall apply.
B. Any conflict between referenced codes or standards, or between the standards and these specifications, shall be referred in writing to Purchaser to determine which standard or specification requirements shall govern.
C. In addition to other codes and standards, design in accordance with Occupational Safety and Health Association (OSHA) and Americans Disabilities Act (ADA).
D. If not omitted by the local AHJ per allowance in NFPA-855, water-based system shall be in accordance with NFPA 13; the design occupancy classification shall be Extra Hazard Group 2 (EH2).
E. Clean Agent systems shall be in accordance with NFPA 2001 2018 and NFPA 855 200.
F. Other Applicable Owner Standards

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G. The following shall be followed:

	Codes and Standards				
Description	**Local & State Fire Code**	**Local & State Building Code**	**AHJ**	**NFPA**	**UL, FM, ANSI, ASME, ASTM, NEMA, IEEE, AWS, AWWA, and DOT**
Overall design	X	X	X	X	
Fire detection system equipment components	X	X		X	X
Smoke/gas detection	X	X		X	
Heat detection	X	X		X	
Manual pull stations	X	X		X	
Notification/Indicating devices	X	X		X	
Sprinkler system	X	X	X	X	
Control panel initiating and indicating devices	X	X		X	
Pipe thread tolerances	X	X		X	
Hydrant flow tests	X	X	X	X	
Extinguishers	X	X		X	
Hose systems	X	X	X	X	
Fire alarm system wiring, initiating devices, notification appliances, solenoids, and signaling line circuits	X	X		X	
Testing of complete fire suppression and detection system	X	X	X	X	
Portable fire extinguishers	X	X		X	

9.3 Water-Based Systems

A. Water-based suppression requirements shall be provided in accordance with AHJ requirements, as NFPA-855 allows water-based suppression requirements to be omitted only if approved by the AHJ.

B. The sprinkler system shall be a double-interlock pre-action dry pipe sprinkler system with a minimum design density of 0.3 gpm/ft^2 over 2500 ft^2.

C. Piping systems shall be pressurized using air or nitrogen; and shall be constantly monitored. One of the following methods shall be employed.

1. Method 1: K-factor of K-8.0 fused sprinkler heads with temperature rating of 135^{o}F for heat detection. Activation of sprinkler head shall result in loss of pressure in the pipe, thereby providing one of the two signals needed at the fire alarm panel. Photoelectric smoke detection shall provide the other needed signal, thus allowing water to flow into the piping system.

2. Method 2: 135°F fixed electric temperature heat detectors will provide the initial signal as well as provide one of the two initiating signals needed to activate the pre-action sprinkler system. A K-factor of K-8.0 fused sprinkler heads with temperature rating of 145°F to 155°F shall provide the other required signal, thus allowing water to flow into the piping system. Water shall not be discharged into the area until the fixed heat detector and sprinkler head have activated. To ensure prompt recognition of a fire condition, the fixed electric heat detectors shall be spaced at half of their listed spacing (i.e.: A detector listed for 30ft spacing shall be installed at 15ft spacing).
3. Method 3: Use of Very Early Warning Air Sampling Smoke Detection System(i.e.: VESDA) with capability of providing two alarm points; one would be an initial general warning but it would not initiate the interlock system, the second alarm would be set equivalent to the set-point of a photoelectric smoke detector; which would be one of the initiating signals of the double interlock system. The second initiating signal shall be from K-factor of K-8.0 fused sprinkler head with a set-point of 135°F. Linear heat detection may be considered if its use and installation is acceptable to the Authority Having Jurisdiction (AHJ).
4. Method 4: Use of Off-gas detection system as alternative to smoke detection as the pre-action signal if acceptable to the Authority Having Jurisdiction.

D. All methods shall be provided with manual pull (MP) stations. MPs shall act as an alternative for one of the input signals for the pre-action system. MPs shall be located and spaced per applicable codes, standards, and local requirements.

E. Contractor shall include all wiring necessary to provide a complete system fire protection system. Wiring shall include power wiring to connect the specified termination points on the fire protection and detection systems to the plant electrical power, tie-ins to plant systems, and tie-ins to outside agencies.

F. Contractor shall verify the fire water supply is adequate for the new fire protection system(s) by performing flow testing.

G. In areas that are not continuously occupied, automatic smoke detection shall be provided at the location of each fire alarm control unit(s). Where ambient conditions prohibit installation of automatic smoke detection, automatic heat detection shall be permitted.

H. Detailed drawings and calculations shall be provided for each system. Drawings and calculations shall be updated at the completion of the job to show as-built configuration. All drawing, calculations and submitted documents shall bear the seal of a registered professional engineer, in the state constructed.

9.4 Clean Agent System

A. Clean agent fire suppression system shall be FM200, NOVEC 1230, or equal. CO2 systems are not acceptable.

B. Non-occupiable container solution specified in Section 6.0 shall include a clean agent fire suppression system.

9.5 Valves

A. If valves are required as part of a water-based suppression system, valves installed between alarm initiating devices intended to signal activation of a system and the fire suppression system shall be electrically supervised.

B. Contractor shall verify that the design and physical locations of automatic or manual valves and piping network are acceptable to avoid hydraulic shock when the valves are actuated.

C. A permanently attached placard shall be provided on each valve indicating the location and hydraulic information.

9.6 Local Addressable Fire Alarm Control Panel

A. Local control panel(s) shall be furnished and installed to monitor systems. A minimum of one addressable local control panel shall be provided. A main fire control panel shall be located near facility main entrance. The main fire control panel shall monitor and annunciate all fire signals. The main fire control panel shall include as a minimum a distinctive Alarm, Trouble and Supervisory LED for each suppression and detection system.

B. Main fire panel shall remotely transmit and annunciate all Fire, Trouble and Supervisory conditions to a manned location as designated by Owner and as required per applicable codes, standards, and local requirements

C. Each local control panel shall be tagged and be capable of operation as a stand-alone system with its own internal secondary power via battery backup. Panel(s) shall communicate together via OEM's internal network communication system. Each initiating device shall be addressable and communicate to local panel via SLC circuit

D. The addressable local control panel(s) shall monitor and annunciate; alarms, trouble, and supervisory signals for each of the fire protection and detection devices and systems. The panel shall be of modular construction, front accessible, and wall mounted. In addition, the panel shall have a minimum of two spare alarm zones requiring only field wiring for future use.

E. Automatic pre-action valves shall be actuated (opened) electrically upon receipt at the panel of fire indication from the detection system for the given hazard, and the control panel shall concurrently produce a fire alarm and initiate any required auxiliary shutdown functions that may be specified or required per applicable codes, standards, and local requirements.

F. The panel for each clean agent or pre-action sprinkler system shall also continuously monitor the off-normal conditions necessary to ensure the availability and proper operation of each system and to annunciate distinctly supervisory and trouble alarms as appropriate.

G. The following distinctive alarms, as a minimum, shall be provided as applicable at the local panel for each pre-action sprinkler system: (Equivalent shall be provided for Clean Agent system and detection systems)

Alarm Condition	Source	Type of Alarm
Fire detected	Heat detectors, smoke detectors, Very Early Air Sampling Smoke Detection, or Manual Pulls (Style D)	Fire
Solenoid energized (for automatic or remote manual systems only)	Local panel (Style B)	Fire

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Alarm Condition	Source	Type of Alarm
Water flow	Water pressure switch (Style B)	Fire
System isolation gate valve (or alarm isolation valve) not fully open	Tamper switches (Style B)	Supervisory
Header isolation gate valve not fully open*	Tamper switch (Style B)	Supervisory
Low air pressure in sprinkler piping	Air pressure switch (Style B)	Supervisory
High air pressure in sprinkler piping	Air pressure switch (Style B)	Supervisory
Solenoid trouble (automatic or remote manual systems only)	Open or ground in wiring to solenoid (Style B)	Trouble
Strobe or Fire alarm bell/horn circuit trouble*	Open or ground in wiring to notification device (Style Y)	Trouble
Water pressure switch circuit trouble	Open or ground in wiring to switch (Style B)	Trouble
Low air pressure switch circuit trouble	Open or ground in wiring to switch (Style B)	Trouble
High air pressure switch circuit trouble	Open or ground in wiring to switch (Style B)	Trouble
Fire detector or MP circuit trouble	Open or ground in detector wiring (Style D)	Trouble
System isolation valve tamper switch circuit trouble	Open or ground in wiring to switch (Style B)	Trouble
Header isolation valve tamper switch circuit trouble	Open or ground in wiring to switch (Style B)	Trouble
Loss of primary power at panel/battery in use*	Local panel	Trouble
Battery voltage low	Low voltage in battery	Trouble
Battery short, charger, or wiring trouble	Open or ground in circuits	Trouble
System normal	Local panel	N/A
Lamp test	N/A	Switch
Acknowledge	N/A	Switch
System reset	N/A	Switch
*These alarms need not be duplicated when two or more suppression systems are controlled by one panel.		

H. Actuating devices and relays shall be furnished to provide annunciation per applicable codes, standards, and local requirements. Spare capacity shall be provided and internally wired.

I. Each local control panel shall continuously monitor its associated fire suppression and/or detection system(s) for fire alarms, supervisory signals, and circuit trouble signals.
   1. Upon receipt of a fire alarm, the given panel shall activate appropriate system valves, auxiliary relay, strobes and fire alarm bells throughout the building.
   2. Upon receipt of a trouble or supervisory signal, the panel shall activate individual indicating LEDs on the panel and a trouble horn at or near the

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panel. Trouble and supervisory signals shall be distinctive, i.e., the mixing of two or more signals on one circuit is not allowed.

J. Auxiliary shutdown functions, where required, shall be designed, furnished, and installed, as a minimum, per applicable codes, standards, and local requirements.

K. New panels shall include 10 percent spare I/O of each type. Indicated potential future expansion out cannot be considered as part of the spare capacity to meet this requirement.

L. Wiring and raceway between local panel(s) and remote relay, where required for such things as HVAC systems for auxiliary contacts, will be furnished and installed. Remote shutdown devices shall be located within 3 ft from device/system being shut down. Fire Contractor shall clearly note termination points and wiring on the drawings so other Contractors will be able to land wiring on shutdown relays.

M. Fire protection wiring shall include surge protection, per applicable codes, standards, and local requirements.

N. Upon receipt of any fire alarm signal from a fire detector, suppression system, flow switch, or pull station, the local alarm panel shall activate interior and exterior fire alarm horns/strobes.

9.7 Fire Detection and Alarm

A. Each independent fire detection system shall be designed to provide fire detection, MP and annunciation in each of the areas protected.

B. Each detection control panel shall continuously monitor its detection systems for fire or trouble condition and activate the appropriate fire or trouble alarm(s). These detection and alarm functions shall be performed independently of any other plant equipment or facility. All signals shall be annunciated on main fire control panel.

C. Airflow, ceiling height and slope, and ceiling constructions of the protected area shall be evaluated when selecting spacing and location of detectors. Refer to NFPA 72 for location criteria.

D. HVAC duct detectors shall be provided in the duct and wired to the local fire protection panel to initiate the appropriate response per applicable codes, standards, and local requirements. The fire alarm shutdown contacts shall be installed in a junction box next to the HVAC controller. Refer to NFPA 90A.

E. All wiring shall be installed in ridged metallic conduit.

F. As a minimum, the following shall be provided:
   1. Smoke, heat, and HVAC duct detectors.
   2. Manual Pull Stations
   3. Early Warning Air Sampling Smoke detectors and sampling pipe network, if this is the method utilized.
   4. Fire detection circuits, wiring, raceway, conduit and supports as required for a complete system.
   5. Local control panel with distinctive alarm, trouble and supervisory LED's.
   6. Remote shutdown relays i and junction boxes.
   7. Notification devices (i.e.: Strobes, horns and bells).
   8. Connecting wire and raceway for electrical devices.
   9. All field devices shall be installed in a junction box.

G. Each fire detection and alarm control panel shall be provided with the capability to send alarms for remote annunciation of fire and trouble alarms. The following distinctive alarms shall be provided for remote monitoring purposes from each of the local panel, as required.

Alarm Condition	Source	Type of Alarm
Fire detected*	Area or duct smoke detector (Style B)*	Fire
Detector circuit trouble (short, open, or ground fault)	Panel (Style B)*	Trouble
Loss of ac power (battery in use)	Local panel	Trouble
Low or missing batteries	Low voltage in batteries/panel	Trouble
Battery short, charger, or wiring trouble	Open or ground in circuits	Trouble
Notification circuit trouble	Open or ground in wiring to indicating appliance	Trouble
System normal	Panel	N/A
Lamp test	N/A	Switch
Acknowledge	N/A	Switch
System reset	N/A	Switch
*NFPA Style D circuit, when detection is used as releasing device		

9.8 Fire Equipment

A. Fire hose stations shall be provided only if required by local AHJ or applicable codes, standards, and local requirements.
B. The Contractor shall furnish fire hose stations with fire hose, hose racks, and accessories per applicable codes, standards, and local requirements
C. Portable fire extinguishers shall be provided. Refer to NFPA 10 for extinguisher locations and spacing.
D. Submit certified drawings of fire hose stations, as applicable and portable fire extinguishers including dimensional data.

9.9 Materials

Component	Material
PIPING	
Sprinkler piping (downstream of isolation gate valve)	ASTM A53, Grade A or B, galvanized, seamless or welded (ERW); or ASTM A106, Grade B, galvanized. Minimum Schedule 40
Pre-action systems (downstream of isolation gate valve)	ASTM A53, Grade A or B, galvanized; seamless or welded (ERW); ASTM A106, Grade B, galvanized (no copper or brass tubing or piping). Minimum Schedule 40
Piping (upstream of the sprinkler and spray systems)	Black steel, ASTM A53, Grade B, seamless; or ASTM A106, Grade B, seamless. Minimum Schedule 40
FLANGES	
Flanges	Hot-dip galvanized following welding when connected to galvanized pipe
Piping 2 in (50.8 mm) and smaller	Screwed or shop welded.
Piping larger than 2 in (50.8 mm)	Welded flanges or shop welded connections
Pipe Accessories	

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Component	Material
Sprinkler fittings - threaded or flanged; tees, couplings, elbows, caps, and reducers	Malleable iron, Class 150. Mitered fittings are not acceptable.
Sprinkler fittings	Galvanized, ASTM A153; no bushing, slip type, or clamp-on rubber gasketed fittings
Gaskets	Red rubber sheets, 1/16 in (1.6 mm) thick, full face, ASTM D2000, No. 2AA705A13L14
Thread sealant	Teflon ribbon, Optional for gas suppression piping: Loctite 592 sealant and primer NF-73656
Thread tolerances	Local Fire Code and standard pipe threads
Bolts and nuts	Steel machine bolts
Plugs	Square heads and of a metal dissimilar to fitting to which they are attached
Piping supports	Per State and Local Fire Code
Supplementary support beams (pipe support)	ASTM A36, fireproof construction
Riser lugs	ASME B31.1
Hanger rods	Per Fire Code
Water shields	Viking model B-1, or equivalent.
Valves	
Gate valves	OS&Y type, flanged ends
Control panels (local)	NEMA 4 or IP56

9.10 Testing

A. Contractor shall be present during testing. Contractor shall be responsible for costs associated with initial testing as well as costs to correct deficiencies and retest.

B. Contractor shall notify Owner and AHJ (if required) at least 5 days in advance of beginning of each test. Final acceptance shall be determined by the Owner.

C. Documentation of the inspections and tests shall be maintained by Contractor and furnished to Owner. Defects found by these inspections and tests shall be re-inspected following repair by the same method and technique which originally identified the defect. Acceptance shall be based on identical acceptance criteria. Inspection and tests shall be in accordance with NFPA as a minimum. All parties necessary to sign off on test shall be obtained.

D. Testing shall be done by Contractor for:
   1. Testing and system acceptance of water-based fire protection systems
   2. Testing and system acceptance of fire alarm system
   3. Entire System
   4. Testing shall be performed on all piping and valves.

E. Piping and valves; each test shall be conducted for 2 hours at 200 psi (13.8 bar) or at 50 psi (3.5 bar) above the maximum static pressure, whichever is greater. The systems shall be visually inspected during the tests. There shall be no visible leakage or drop in gauge pressure during the tests.

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F. The valves shall be tested along with the piping. Any blind flanges or removable plugs required for openings not closed by the valves and piping provided shall be furnished.

G. The pressurization equipment including water piping from the supply shall be furnished.

H. In addition to hydrostatic tests, perform air pressure tests on air pressurized piping and valves. Air pressure of 40 psi shall be established, and the pressure drop shall be measured. The pressure drop shall not exceed 1.5 psi (0.11 bar) in 24 hr.

I. The time to exhaust air and achieve continuous water flow shall not exceed 60 seconds.

J. Systems shall be tested in accordance with the manufacturer's recommendations and to verify proper alarm and annunciation.

K. Each control panel and independent detection system shall be tested in accordance with NFPA 72 after installation has been completed. Each initiating and notification device shall be checked for operation. Remote annunciation to main panel and to remote location shall be tested.

L. Testing of the detectors shall be by manufacturer's recommendations. Upon detector actuation, visual and audible annunciation of the independent detection system at the local and main fire control panel shall be verified. Each alarm circuit at the local and main fire control panel shall be tested to verify proper operation.

10.0 SPILL CONTAINMENT AND FIRE WALLS

10.1 General

A. This section covers the requirements for spill containment and transformer fire walls.
B. At Owner's option, transformers may be supplied with environmentally friendly less-flammable fluid (FR3, MIDEL 7131 or engineer approved equal) which may reduce spill containment and firewall requirements if approved by environmental permit. Contractor to verify fluid characteristics are appropriate for site environmental conditions.

10.2 Codes and Standards

A. Equipment, material, design, fabrication, erection, and testing shall conform to governing codes and standards, and minimum requirements of:
   1. International Building Code (IBC)
   2. Occupational Safety and Health Association (OSHA)
   3. American Society of Mechanical Engineers (ASME)
   4. American Society for Testing and Materials (ASTM)
   5. American Concrete Institute (ACI)
   6. American National Standards Institute (ANSI)
   7. State and Local Fire Code
   8. Environmental Protection Agency (EPA)
   9. Other Applicable Owner Standards
B. The standards listed shall mean the latest version adopted by the state or local authorities including any amendments to, or modifications of the original document.

10.3 Design Requirements

A. Design shall comply with requirements for civil, structural, piping, and fire protection systems.

10.4 Transformer Spill Containment

A. Spill containment for transformers shall be based on the number of gallons (liters) of oil/fluid in the transformer.
B. Design shall comply with requirements for environmental, civil, structural, and fire protection systems.
C. Containment shall be sized to retain any fluid that may be accidentally spilled from the transformer plus a specified storm event rainfall depth, plus any applicable fire water.
D. Containment may be combined to include multiple transformers or transformer areas; such that the containment meets requirements for the maximum containment needed for a single event.

10.5 Transformer Fire Walls

A. Refer to NFPA 850 for location and configuration of firewalls.
B. A minimum 2-hour fire barrier of appropriate height shall be provided between any transformer of sufficient oil volume and any building in accordance with applicable Codes or insurance requirements.
C. Adequate physical separation distance may be provided in lieu of fire barriers.

D. Transformers utilizing approved less-flammable fluids (e.g. FR3) shall follow minimum separation requirements of FM Global Loss Prevention Data Sheet 5-4.

11.0 HEATING, VENTILATION, AND AIR CONDITIONING

11.1 General

A. Heating, ventilating, and air conditioning (HVAC) systems shall be provided to ensure equipment OEMs' recommended environmental conditions are met at all times.

B. HVAC equipment and systems shall be heavy-duty, industrial grade design, construction, and installation designed to provide a minimum 20-year life expectancy.

C. Design calculations shall include air conditioning load calculations, heating load calculations, ventilation calculations, psychometric calculations, and pressure drop calculations.

11.2 Codes and Standards

A. Equipment, material, design, fabrication, erection, startup, and testing shall conform to governing codes and standards, and minimum requirements of:

1. State Energy Conservation Codes
2. International Building Code (IBC)
3. Occupational Safety and Health Association (OSHA)
4. American Society of Mechanical Engineers (ASME)
5. American Society for Testing and Materials (ASTM)
6. American National Standards Institute (ANSI)
7. State and Local Fire Codes
8. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
9. Other Applicable Owner Standards

11.3 Design Requirements

A. Cooling equipment capacity shall be sized based on end-of-life battery state-of-health (70-80%) heat dissipation coincident with maximum design ambient heat gain.

B. Building or enclosure areas housing batteries shall be segregated into hot and cold aisles. Supply air measured at the battery rack cold aisle shall be maintained at 23C +/- 5C at all times, unless battery OEM specifically requires a different operating temperature. Each battery cold aisle temperature shall be measured at three locations equally spaced along the length of the row. Temperature sensors shall be located approximately 5 feet above the floor. All temperature measurements shall be recorded in the site data historian at 1-minute resolution. Data shall be stored a minimum of 6 months.

C. High efficiency filtration (80%, MERV 13) is required for HVAC units that provide a mixture of outside air and return air. For 100% recirculation style units only 30%, MERV 7 filters may be provided.

D. HVAC systems should be designed to operate in economizer (free cooling) mode whenever outdoor air temperature is within specified supply air temperature range.

E. Filter banks shall have differential pressure transmitters to monitor filter loading.

F. Heating calculations shall include a minimum 10% margin on capacity. Cooling calculations shall include a minimum 15% margin on sensible and latent capacity.

G. HVAC equipment shall be arranged to provide for maximum efficiency of operation and to provide easy access for performing routine maintenance.

H. System design shall be headered such that each HVAC unit is able to provide conditioned air to the entire space within a fire partition.

I. Equipment redundancy shall be provided such that failure of a single HVAC unit does not result in loss of more than 50% cooling capacity.

J. The HVAC control system shall monitor any equipment failures resulting in loss of cooling capacity. Diminished cooling capacity shall be interlocked with the Site Controller to limit battery charging/discharging rate as necessary to avoid cooling system overload. Battery state of health should be taken into consideration when developing charge/discharge rate limit.

K. The HVAC systems shall interface with fire protection systems in accordance with NFPA and other applicable codes. HVAC systems shall shut down and fire/smoke dampers shall close upon fire or smoke detection. Fire-fighting personnel shall be able to override system shutdown to ventilate the building space if required.

11.4 Testing

A. After installation, HVAC systems shall be functionally tested by NEBB certified technicians to verify proper operation.

B. Emphasis shall be placed on ensuring that cooling airflow is properly balanced to maintain cold aisle temperature within specified limits.

C. All temperature data points recorded in site data historian shall be functionally verified for proper operation.

12.0 GENERAL ELECTRICAL

12.1 General

A. This section describes the design criteria which shall be used for general electrical work related to this project.

B. Equipment and systems covered in this section are:
   1. Cable
   2. Earthing and Bonding
   3. Lightning Protection
   4. Conduit and Raceway
   5. Lighting and Wiring Devices

12.2 Codes and Standards

A. The Work shall be in accordance with applicable laws and regulations of the federal government and the state, local utility requirements for interconnection, and applicable local codes and ordinances. A partial listing of the codes and industry standards used for design and construction follow:
   1. National Electrical Code (NEC)
   2. International Building Code (IBC)
   3. American National Standards Institute (ANSI)
   4. Institute of Electrical and Electronics Engineers (IEEE)
   5. American Society for Testing and Materials (ASTM)
   6. State Energy Conservation Code
   7. Illuminating Engineering Society (IES)
   8. State and Local Fire Code
   9. Occupational Safety and Health Association (OSHA)

B. Other recognized standards shall be utilized as required to serve as design, fabrication, and construction guidelines when not in conflict with the above listed standards.

C. The codes and industry standards used for design, fabrication, and construction shall be the codes and industry standards in effect at the date of this Contract.

D. The Owner may be exempt from certain NEC requirements. The system electrical design shall be NEC compliant to the greatest extent possible and in accordance with all applicable standards. Deviations from the NEC must be approved by Owner.

12.3 Cable Basic Requirements

A. Cable requirements are applicable to general (field) wiring only. Manufacturer's standard wiring practices are acceptable for equipment wiring.

B. Medium voltage cables shall be fully shielded, and shields shall be grounded in accordance with IEEE 422.

C. Instrument cable shall be fully shielded to minimize electrical noise attenuation. Each pair of instrument conductors shall be shielded, and each multi-pair cable assembly shall include an additional overall shield. Cable shields shall be electrically continuous. When two lengths of shielded cable are connected together at a terminal block, a point on the terminal block shall be used for connecting the shields. Instrument cable shields shall be grounded on one end only.

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D. Medium voltage cable feeders along with their shields and equipment ground conductors shall be sized so that a short-circuit fault shall not result in cable damage prior to normal operation of fault interrupting devices.
E. Insulated conductors installed in cable tray shall have non-propagating and self-extinguishing characteristics. Cables shall meet the vertical cable tray flame test requirements of IEEE 383.
F. Thermocouple extension cable shall be used for extension leads from thermocouples to junction boxes and to instruments for measurements of temperature. Cables may be routed in trays, conduits, or ducts.
G. All cables shall be identified on each end with a unique cable ID and permanent cable tag.
H. Cable data such as year of manufacturing, manufacturer name, insulation material, rated voltage, and cross section shall be printed on the cable jacket at even spacing.
I. Cable conductor colors shall be in accordance with Owner standards.

12.4 Power Cable

A. Medium voltage power cable shall be MV-105, 133% insulation, single copper or aluminum conductor, Class B stranded, shielded power cable. Cable shall meet AEIC CS8 and ICEA S-97-682 requirements and shall be UL listed for cable tray use. Cable shall meet the flame test requirements of IEEE 383.
B. Low voltage power cable shall supply power to loads at voltage levels of 480 volts ac and below and 250 volts dc and below. Power cable shall be Class B stranded copper conductor. Cable shall meet ICEA S-95-658 and shall meet the flame test requirements of UL VW-1 (8 AWG and smaller) and IEEE 383 (6 AWG and larger).
C. No MV cable splices are permitted unless explicitly approved by the Owner.

12.5 Control and Instrumentation Cable

A. Control cable shall be used for control, metering, and relaying. Control cable shall have Class B stranded copper conductor, flame retardant insulation, flame and ultraviolet retardant overall jacket and shall be UL listed Type TC. Cable shall meet ICEA S-95-658 and UL 1277. The cable shall meet the flame test requirements of IEEE 383.
B. Control shall be multi-conductor and shall be UL listed Type TC.
C. Instrumentation cable shall be single or multi twisted pair or triad and shall be UL listed Type PLTC.
D. Metering and Relaying panel conductors shall be type SIS #14 AWG minimum or #12 AWG minimum for CT circuits.

12.6 Lighting and General Use Conductors

A. Insulation shall be rated 600 volt. Circuit runs shall be in conduit. Minimum conductor size shall be #12 AWG (4.0 mm^2).
B. Type THHN or THWN single conductor with copper conductor for low voltage general use circuits indoor or conditioned areas.
C. Lighting conductors in areas not normally accessible after construction may utilize properly supported type MC cable.
D. Grounding cable shall be Class B or C, Type THWN or THHN insulated and un-insulated soft drawn copper conductors sized as required.

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12.7 Cable Connectors and Terminations

A. Power cables shall utilize standard two-hole pressure crimped connectors except when terminating to devices which are provided with clamp type connectors, such as molded case circuit breakers. Hole spacing shall be NEMA standard.

B. Medium voltage shielded cables shall not be spliced. Medium voltage terminations shall have stress relief system applied at the termination of the cables. Stress relief system shall be of the pre-formed cone type, cold shrink type suitable for the cable to which they are to be applied; Manufacturer shall be 3M.

C. Control and Instrument Terminations may utilize Contractor's / Manufacturers' standard.

D. Current Transformer (CT) terminations shall utilize ring lug terminals. Field CT circuits terminating in control and protection cabinets shall be terminated on shorting-type terminal blocks prior to continuation to protective devices.

12.8 Earthing and Bonding Requirements

A. The BESS earthing system shall be an interconnected network of bare copper conductor, copper-clad ground rods, foundation reinforcing steel, and other grounding electrodes present as defined by the NEC. The BESS facility earthing system shall be connected to any adjacent grounding grids. (As applicable)

B. Contractor shall perform calculations in accordance with IEEE 80 methods to demonstrate the BESS facility is safe from the perspective of touch, step, and transferred potentials. Calculations shall be submitted for Owner review.

12.9 Lightning Protection Criteria

A. The requirement for lightning protection shall be evaluated based on a risk-based assessment such as that provided in NFPA 780 Annex L. If required, lightning protection shall be designed and installed in accordance with NFPA 780.

B. Lightning protection equipment shall conform to the requirements of Underwriters Laboratories Standards 96.

12.10 Conduit and Raceway

A. Cable tray design shall be based on the loads to be carried plus the dead weight of the tray system. In addition to, and concurrent with the load specified above, the tray shall be designed to withstand a concentrated load of 200 lbs. (90kg) at the mid-span, at the center of the rung or on either side rail. The safety factor for this load condition shall be at least 1.5 based on the ultimate capacity of the tray or any of its components as determined by test in accordance with NEMA load test VE-1-Sect 4.

B. Cable trays and fittings shall be the standardized products of a single manufacturer designed to permit easy assembly in the field.

C. Aluminum cable trays shall be manufactured of heat-treated ASTM B221 6063 aluminum alloy for extruded parts and ASTM B209 5052 alloy for parts fabricated from sheets. Rungs shall not be movable.

D. Minimum radius for tray bends and fittings shall be eight times the diameter of the largest non-shielded cable or 12 times the diameter of the largest shielded cable to be installed, whichever is the larger. Dropout fittings shall be provided where required to maintain the minimum cable bending radius.

E. In general, trays for cables of different voltage levels shall be stacked in descending order with the higher voltage at the highest elevation. Individual tray systems shall be established for the following services. Trays may be divided into multiple services by the use of continuous, metallic barriers.
   1. Medium voltage power cables
   2. Low voltage power cables
   3. Low voltage control cable
   4. Shielded instrumentation cables
   5. Communication cables

F. Fire stops shall be provided where trays penetrate exterior walls or fire separation areas.

G. Except for indoor lighting and communications circuits, exposed conduit shall be rigid steel, hot-dipped galvanized.

H. Conduits for lighting, power, and general convenience circuits, and communications circuits in indoor areas may utilize Electrical Metallic Tubing (EMT), hot-dipped galvanized inside and outside. EMT shall not be used in hazardous areas or where subject to physical damage during and after installation.

I. Minimum conduit size shall be 3/4 in (20 mm) nominal diameter except for lighting fixture stems, which may be 1/2 in (16 mm) nominal diameter.

J. Conduits shall be routed such that they do not create a trip hazard.

K. Liquid tight flexible metallic conduit shall be used for connections to accessory devices, for connections to vibrating equipment, and across areas where expansion or movement of the conduit is required. Lengths shall not exceed 3 ft (900 mm).

12.11 Lighting, Convenience Receptacles, and Wiring Devices

A. The lighting system shall provide personnel with illumination for operation under normal conditions and means of egress under emergency conditions.

B. Interior and exterior luminaries shall be LED type, mounted so they are easily accessible for maintenance to the maximum extent practical.

C. Emergency lighting shall be self-contained emergency lighting units including batteries and battery charger.

D. Lighting levels shall be designed in accordance with the Illuminating Engineering Society (IES) recommendations.

E. Outdoor fixtures shall include photoelectric sensors and motion detectors to keep lights off when not required.

F. Convenience receptacles shall be spaced in the battery storage area such that there is a maximum 100 ft (30.0 m) distance to a receptacle outlet, unless codes require otherwise. An accessible receptacle outlet shall be provided within 25 ft (7.6 m) of each HVAC unit.

12.12 Emergency Stop Switches (E-Stop)

A. Containerized BESS systems shall incorporate an E-stop function into the inverter control panel or local HMI. Containerized BESS system E-stops shall shut down only the affected BESS equipment train.

12.13 Earthing and Bonding Installation and Testing

A. Earthing conductors shall be copper and have a minimum cross-sectional area of #2/0 AWG.

B. Cable trays shall include a bare copper earthed conductor installed the entire length and connected to each section of tray and to station earth grid.
C. Major items of equipment, such as transformers, relay and control panels, and panelboards, shall contain copper earthed buses connected to the primary earthing system. Equipment with multiple sections such as low voltage switchboards shall connect earth bus to station grid at both ends.
D. Each row of battery racks shall be earthed at each end.
E. Metallic structures and equipment housings located on the roof of the building shall be connected to earthing system.
F. The site perimeter fence may be earthed or isolated at Contractor's option, subject to safe touch potential analysis. If the site fence is not earthed, then isolating sections shall be installed where the BESS site fence abuts the existing substation fence.
G. BESS container lightning protection system downcomers shall be terminated to the BESS earthing grid.
H. Earthing system connections shall be made with exothermic welds or non-reversible compression type fittings. Mechanical bolted connections are not permitted.
I. Earthing connections at the substation shall be exothermic weld. Earthing connections on the collection system may be irreversible crimp or exothermic weld.

12.14 Arc Flash Mitigation

A. Contractor shall perform an Arc Flash hazard analysis in accordance with IEEE 1584 for voltages up to 15kV. For voltages above 15kV, Kinectrics ARCPRO software must be utilized.
B. The system shall be designed such that a PPE level of no higher than Level 4 (40 cal/cm2) is required.
C. All electrical equipment shall be labeled in accordance with NFPA 70E. At a minimum, the following information shall be shown on equipment labels:
    1. Nominal system voltage
    2. Arc Flash Boundary
    3. Working distance
    4. Available incident energy at working distance
D. Methods shall be employed to reduce the arc flash hazards including:
    1. Maintenance Mode relay settings and a maintenance mode selector switch (Normal / Maintenance) with blue indicating light for medium voltage switchgear breakers.
    2. Bus differential relay protection.
    3. Transformer differential relay protection on the main power transformer.
    4. Provide remote racking systems for medium voltage draw-out circuit breakers. Remote racking system shall be Safe-T-Rack or Owner approved equal.
    5. Provide actuator to remotely operate pistol grip type breaker Open / Close switches. CBS Arc Safe Chicken Switch or Owner approved equal.

13.0 PADMOUNTED TRANSFORMERS

13.1 General

A. This document specifies the scope of supply and the major design and performance parameters for the Step-Up transformers and the facility station service transformer.
B. Basic design shall be outdoor oil-immersed 3-phase pad mounted distribution transformers designed for daisy-chain or loop feed on the HV side (As Applicable)

13.2 Applicable Standards

A. Characteristics, definitions, and terminology, except as specifically covered in this specification, shall be in accordance with the latest revision of ANSI, IEEE, NEMA, and Department of Energy standards, as applicable.
B. Specifically, but not limited to:
   1. IEEE C57.12.00, and associated applicable parts
   2. C57.12.28
   3. C57.12.34
   4. C57.12.90 for standard testing
   5. C57.12.91
   6. C57.154
   7. NEMA TR1
   8. NEMA 260

13.3 Design Requirements

A. Inverter step-up transformers shall be naturally cooled. Cooling fans shall not be required for continuous operation to achieve maximum rating.
B. Transformers shall be suitable for bi-directional operation.
C. Transformers shall be sized to continuously accept inverter rated kVA output between .9 leading and .9 lagging power factor without overload.
D. Inverter step-up transformers shall be suitable for operation at up to 5% harmonics on both the HV and LV winding at the transformer full load rating.
E. As applicable, loop feed or daisy chain transformers shall be provided with six high voltage bushings, 600A minimum. HV connections shall be made via elbow disconnects.
F. For HV/Substation Interconnections, the Power Conversion System (PCS) step-up transformer voltage ratio shall be selected to match the substation interconnection voltage without use of intermediate step-up transformers
G. For intermittent generating sources, during detailed design, Contractor shall perform an electrical harmonics study to confirm that the proposed PCS system does not cause harmonic resonance when paralleled with the Owner's existing equipment. If required, the addition of air core tuning reactors or other mitigating measures shall be engineered and provided by Contractor.

13.4 Testing

A. Perform standard factory tests in accordance with IEEE C57.12.90. Furnish tests reports per submittal requirements.

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13.5 Loss Evaluation

A. Transformers will be continuously energized when BESS facility is in standby mode. No-load losses should be minimized to extent practical. Bidders shall include no-load and load loss data for BESS transformers. Owner will evaluate the transformer losses using values of $4000/KW for no-load losses and $2000/KW at rated full load output.

13.6 Transformer Data Sheets

Contractor shall submit information in "Vendor Data" column with Proposal.

14.0 METERING AND PROTECTION

14.1 General

A. This section covers the basic system protection requirements.
B. Contractor shall coordinate with interconnection work to ensure equipment is provided which meets the overall intent of the project and utility interconnection requirements.

14.2 Codes and Standards

A. The design and specification of work shall be in accordance with applicable laws and regulations of the governing bodies, local utility requirements for interconnection, and applicable local codes and ordinances.
B. A listing of the codes and industry standards to be used in design and construction:
   1. American National Standards institute (ANSI)
   2. American Society for Testing and Materials (ASTM)
   3. Institute of Electrical and Electronic Engineers (IEEE)
   4. National Electrical Manufacturers Association (NEMA)
   5. National Fire Protection Association (NFPA)
   6. State and Local Fire Code
   7. National Electrical Safety Code (NESC)
   8. Occupational Safety and Health Act (OSHA)
   9. Underwriters Laboratories, Inc. (UL)
   10. National Electrical Code (NEC)
   11. Other Applicable Owner Standards
C. Other recognized standards shall be utilized as required to serve as design, fabrication, and construction guidelines when not in conflict with the above listed standards.
D. The Owner may be exempt from certain NEC guidelines. The system electrical design shall be NEC compliant to the greatest extent possible and in accordance with all applicable legal requirements.
E. The codes and industry standards used for design, fabrication, and construction shall be the codes and industry standards in effect at the date of this Contract.

14.3 Overall System Protection

A. Contractor shall perform system analysis from the point of interconnection (POI) down to the BESS inverters and station auxiliary LV buses. Where system information is not available, Contractor shall assume an infinite bus at the Substation high voltage bus. Relay settings shall be based on actual system interconnection values which will be provided prior to setting relays.
B. Contractor shall perform initial and final electrical system studies. The scope shall include studies required to design and specify the plant auxiliary electric system within the site boundaries. Studies include, but are not limited to, load flow, feeder and equipment sizing duty calculations, short circuit and protective device coordination, harmonics and arc flash.
C. Contractor shall develop relay settings for protection and control devices within Contractor's supply scope. Protection and control settings for the breaker at the POI shall be coordinated with Owner's existing protection and control scheme. Contractor shall implement settings into relays and test all relays prior to operation.

D. Protective relays shall be solid-state microprocessor type, flush mounted.

E. Each item of the electrical system shall be provided with a back-up protection that is responsive to electrical faults thus allowing isolation of the faulted item in a timely manner, before major damage is sustained. This is not required to be a separate relay and may form part of the transformer or feeder protection, e.g. over-current and earth fault.

F. Alarm/trouble contacts from each breaker and relay shall be remotely alarmed via SCADA. All protective devices shall be synchronized to the substation same time source via IRIG-B signal.

G. Any devices used to isolate electrical equipment for maintenance shall have a visible airgap or means of visual disconnect.

H. Contractor shall provide a means of detecting a ground fault occurrence either via a neutral grounding transformer or a Zig-Zag grounding transformer. If a Zig-Zag grounding transformer is utilized, it shall be provided as required on each Bus to facilitate ground fault detection. BESS protection shall trip and prevent further operation of BESS if grounding system is unavailable. Grounding transformers shall be automatically removed from service when BESS is not in service and shall be interlocked with any other grounding system to ensure only one grounding system is active at any given time.

   i. KVA Rating as required for effective grounding of AC collection circuits. All grounding transformers to have the same KVA rating, etc. and be interchangeable.
   ii. KVA Rating as required for effective grounding of AC collection circuits. All grounding transformers to have the same KVA rating, etc. and be interchangeable.
   iii. Pedestals for padmount transformers shall be fiberglass, pre-cast, or poured concrete.
   iv. Grounding transformers shall be sized to keep the collection feeder voltage rise during a fault to less than 1.39pu voltage as per IEEE C62.92.1-2000.

14.4 Metering

Contractor shall provide bi-directional, revenue grade metering at each point of interconnection in the form of a SEL-735 Power Quality and Revenue Meter. Contractor shall also provide provisions for an Owner supplied revenue meter (Schneider Electric ION-8500) or Owner approved alternate.

BESS facility auxiliary power consumption shall be separately metered, also with an SEL-735 revenue grade meter.

15.0 LOW VOLTAGE ELECTRICAL DISTRIBUTION

15.1 General

This section covers the low voltage distribution equipment

15.2 Codes and Standards

A. The design and specification of work shall be in accordance with applicable laws and regulations of the governing bodies, local utility requirements for interconnection, and applicable local codes and ordinances.

B. A listing of the codes and industry standards to be used in design and construction:
   1. American National Standards institute (ANSI)
   2. American Society for Testing and Materials (ASTM)
   3. Institute of Electrical and Electronic Engineers (IEEE)
   4. National Electrical Manufacturers Association (NEMA)
   5. National Fire Protection Association (NFPA)
   6. State and Local Fire Codes
   7. National Electrical Safety Code (NESC)
   8. National Electrical Code (NEC)
   9. Occupational Safety and Health Act (OSHA)
   10. Underwriters Laboratories, Inc. (UL)
   11. Other Applicable Owner Standards

C. Other recognized standards shall be utilized as required to serve as design, fabrication, and construction guidelines when not in conflict with the above listed standards.

F. The codes and industry standards used for design, fabrication, and construction shall be the codes and industry standards in effect at the date of this Contract.

G. The Owner may be exempt from certain NEC requirements. The system electrical design shall be NEC compliant to the greatest extent possible and in accordance with all applicable standards. Deviations from the NEC must be approved by Owner.

15.3 Design Requirements

A. The LV distribution system shall be fed from a dedicated station service transformer. The LV system capacity shall be primarily determined by Contractor's BESS HVAC design. See Oneline diagram for additional information.

B. Auxiliary power consumption shall be metered separately.

15.4 Low Voltage Panelboards

A. Panelboards shall be dead-front, fixed mounted circuit breaker type.

B. Breaker operating handles shall be accessible through a door that can latch and lock. A panel directory shall be placed inside the panelboard door. Circuit breaker assignments shall be consistent with design drawings.

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16.0 MEDIUM AND HIGH VOLTAGE EQUIPMENT AND INTERCONNECTION

16.1 General

A. This section covers the scope of work associated with the interconnection of the BESS to the Owner's substation. The Contractor shall be responsible for ensuring compliance with the utility and system operator interface requirements.

B. Work shall include Engineering, Procurement, and Construction and shall include:
   1. Site Work
   2. Grounding
   3. Steel Structures
   4. MV and HV Equipment
   5. Metering and Protection
   6. Instrument Transformers
   7. Overhead Lines and Underground Lines
   8. Foundations
   9. Commissioning and Start-up

C. Coordinate ratings and design requirements with interconnection utility. Equipment shall meet at least the minimum requirements. Single-line diagram (s) are provided for reference to show the limits of the anticipated work.

D. The codes and industry standards used for the design, fabrication, and construction shall be the codes and industry standards in effect at the start date of the work.

16.2 Codes and Standards

A. The design and specification of work shall be in accordance with applicable laws and regulations of the governing bodies, local utility requirements for interconnection, and applicable local codes and ordinances.

B. A listing of the codes and industry standards to be used in design and construction:
   1. American National Standards institute (ANSI)
   2. American Society for Testing and Materials (ASTM)
   3. Institute of Electrical and Electronic Engineers (IEEE)
   4. National Electrical Manufacturers Association (NEMA)
   5. National Fire Protection Association (NFPA)
   6. State and Local Fire Codes
   7. National Electrical Safety Code (NESC)
   8. National Electrical Code (NEC)
   9. Occupational Safety and Health Act (OSHA)
   10. Underwriters Laboratories, Inc. (UL)
   11. Other Applicable Owner Standards

C. Other recognized standards shall be utilized as required to serve as design, fabrication, and construction guidelines when not in conflict with the above listed standards.

D. The codes and industry standards used for design, fabrication, and construction shall be the codes and industry standards in effect at the date of this Contract.

E. The Owner may be exempt from certain NEC requirements. The system electrical design shall be NEC compliant to the greatest extent possible and in accordance with all applicable standards. Deviations from the NEC must be approved by Owner.

16.3 Submittals

A. Provide submittals in accordance with project submittal requirements.
B. Preliminary and detail design engineering and construction documents, to include:
   1. Nameplate data.
   2. Schematic design drawings for Owner review.
   3. Detailed construction drawings for Owner review.
   4. Protection coordination study, selectivity, and settings.
   5. Final sealed and signed conform to construction record drawings at the completion of the project.
   6. Test Reports
   7. Operation and Maintenance Manuals.
C. Relay protection shall include such things as the study report, time coordination curves, settings, setting manuals, setting files for downloading into relays, and programming of protection devices.
D. Documentation for each relay, meter, or programmable controller furnished or altered under this contract shall include supporting calculations and/or methodology for each setting that differs from the relay vendor's factory default settings. In addition, a logic drawing shall be provided that clearly documents all custom logic and the logic driving all relay output. Relay output includes; contact outputs, virtual outputs, LED targets, and LCD display message.

16.4 Site Work

A. Excavate as required for new breaker and takeoff structure foundations.
B. After completion of foundations, structures, ground grid; underground duct bank/precast cable trench and conduits, and other permanently installed equipment, the areas shall be backfilled and compacted to 95% modified proctor to an elevation of 6 in below finished grade.
C. All areas within the substation shall be finished with 6 in of cleaned, crushed rock to match existing substation surfacing. The rock must have a minimum of 3 fractured faces and must meet the minimum requirements for appropriate step/touch potentials.

16.5 Grounding

A. All new above grade structures shall be connected to the grounding grid with #4/0 AWG bare copper conductors.
B. Manual disconnect switch operators shall have a potential equalizing (switching) mat installed. Switching mats shall be constructed from galvanized 4 ft x 6 ft metal grating set level on top of the stone yard surface and connected to the ground grid and to the switch handle / operator ground.

16.6 SF6 Circuit Breakers

A. Provide three phase, freestanding, SF6 dead tank breaker, complete.
B. Install breakers on new concrete foundation.
C. Equip breakers with the number of multi-ratio current transformers (MRCT) required for use in protective relaying or metering.

16.7 Islanding Switchgear

A. Provide three phase, freestanding, metal clad switchgear lineup.
B. Switchgear shall be outdoor and arc-flash rated.
C. Switchgear shall include vacuum circuit breakers, instrument transformers, and protective relaying.

16.8 Instrument Transformers

A. Current and voltage transformers are required for protection and metering. High accuracy CTs shall be required for revenue metering.
B. Current and voltage transformers shall meet the utility interconnection requirements for both type and accuracy class. Accuracy class shall be maintained for any tap position on a multi-ratio CT, specifically for metering applications during lightly loaded conditions.

16.9 Underground Raceway

A. All underground circuits shall be encased in conduit, ductbank, or a cable trench.
B. Duct banks shall be concrete encased. Cable trench shall have covers rated for the appropriate loads that may be encountered.
C. The AC collection circuits from the BESS to the substation may be direct buried after exiting the substation.

16.10 Foundations

A. Foundations shall be provided as specified in other Sections of this specification.
B. Substation foundations shall extend at least 12 in (300 mm) above finished grade.

17.0 BATTERIES, RACKS, AND BMS

17.1 General

A. This section establishes the minimum functional specifications for the Batteries, Racks, and Battery Management System (BMS).

17.2 Batteries

A. Battery cell/module design shall be of proven technology and shall have been installed in similar applications for a minimum of one year. It is expected that battery cells/modules are sourced from recognized "Tier 1" manufacturers. It is expected that replacement modules of the same design or of a directly compatible design will be readily available from the manufacturer for a minimum of 10 years such that rack modifications are not required.

B. Battery racks shall be factory pre-assembled into vertical sections. Rack dimensions shall be manufacturer's standard, designed for installation into a building or environmental enclosure arranged in back-to-back rows. Racks shall include all bracing required for the site seismic conditions and to ensure racks cannot tip during module installation. Racks shall be suitable for installation directly onto a finished concrete floor with tolerances specified in other sections of this specification. Racks shall be anchored using drilled concrete anchors and leveling shims as required. Rack design shall include provisions to protect personnel from inadvertent contact with exposed energized parts, such as ventilated doors or insulated covers over live parts.

Table 1- Minimum Battery Functional Specifications

Description	Requirements
Intended Use	Energy-Shifting
Applications / Use Cases	Primary application is energy time-shift and arbitrage (C = 0.25) (See below for description of "C" rating) Battery is to be 80 MW / 320 MWhr (0.25 C). (C-rate is a measure of the rate at which a battery is discharged relative to its maximum capacity. The C rate is calculated as the inverse of battery discharge rate in hours. i.e. a battery that discharges in 4 hours would have a C rate of 1/4 = 0.25.)
End of Life Power	80 MW
End of Life Energy	320 MWhr useable depth of discharge (DOD)
Minimum End of Life Energy	EPC to provide expected degradation curves based on specified Duty Cycle with proposal.
Duty Cycle	200 cycles of full depth of charge/discharge per year at 0.25C, plus 10 cycles per day within +/- 15 percent range DOD (of 50% nominal SOC) at 0.5C

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Charging Method	Constant Current / Constant Voltage
Discharging Method	Constant Current
Design Life	Component life 20 years.
Inverter Nominal Voltage Range	1500 VDC nominal
Warranty requirements	Manufacturer Standard
Installation	
Design Ambient (battery enclosure)	23C +/- 5C
Design Humidity (battery enclosure)	20 – 100%, non-condensing
Seismic Data	Refer to Section 2.4

17.3 Racks

A. Each rack section (or pair of sections for long duration systems) shall include a load-break disconnecting means to allow isolation of the rack's modules from the DC bus by the Battery Management System.

17.4 Battery Management System

A. The Battery Management System (BMS) shall be the battery OEM's standard product, providing the following functions at a minimum:
   1. Measurement of Battery operating parameters
   2. Measurement of battery cell voltages
   3. Measurement of battery cell temperatures
   4. Measurement of battery string current
   5. Measurement of battery string voltage
   6. Calculation of battery string State of Charge (SOC)
   7. Calculation of battery string State of Health (SOH).
   8. Cell Balancing
   9. Battery Protection from the following:
      a. Cell under voltage
      b. Cell over temperature
      c. Cell under temperature
      d. Cell over current
   10. Pre-charge protection

B. At a minimum, the BMS shall monitor the data points listed in **Table 2**. The BMS shall monitor all data points required and store data a minimum of 24 hours of pre- and post- event (or as required by the battery OEM) for root cause / post mortem analysis and warranty claim disposition. Data points shall also be transmitted to the Site Controller / Historian for long term data storage and retrieval.

C. Rack BMS to System BMS communication protocol shall be manufacturer standard.

D. System BMS to Site Controller communication protocol shall be Modbus TCP/IP or alternate as approved by Purchaser.

Table 2- Minimum BMS Functional Specifications	
Description	**Points to be Monitored.** *Sample interval 1 second.*
System Level	Fault Status
	Alarm Status
	System Current
	System Voltage
Each Rack or String	Rack Voltage
	Rack Current
	Rack SOC
	Rack SOH
	Rack Fault Status
	Rack Alarm Status
	Maximum Cell Voltage Value
	Maximum Cell Voltage Position
	Minimum Cell Voltage Value
	Minimum Cell Voltage Position
	Maximum Cell Temperature Value
	Maximum Cell Temperature Position
	Minimum Cell Temperature Value
	Minimum Cell Temperature Position
	Rack DC Switch Status

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18.0 POWER CONVERSION SYSTEM

18.1 General

A. This section establishes the minimum functional specifications for the BESS Power Conversion Systems (PCS).
B. The PCS, in conjunction with the BESS Site Controller, shall be capable of automatic, unattended operation. The PCS shall include all necessary self-protective and self-diagnostic features to protect itself from damage in the event of component failure or from operating beyond equipment ratings, whether due to internal or external causes.
C. The PCS system shall include provisions for isolation on both the AC and DC terminals. Disconnecting provisions shall be capable of being locked out to facilitate Owner's LOTO process for maintenance work. Filter capacitors shall be provided with bleeder resistors or other means of discharging to less than 50 volts within approximately one minute of de-energization.

18.2 Codes and Standards

A. UL 1741
B. IEEE 1547
C. IEEE 519
D. NFPA 855
E. Other Applicable Owner Standards

18.3 Inverters

A. Operating in conjunction with the Site Controller, the PCS shall be able to operate in all modes specified in Section 20.0.
B. Inverters shall be of proven technology and shall have been installed in similar applications for a minimum of one year. The PCS must be sourced from recognized "Tier 1" manufacturers such as those provided in the approved supplier list.
C. Inverters shall have a design life of not less than 20 years and shall be suitable for installation in an outdoor environment. It is expected that replacement components will be readily available from the manufacturer for the design lifetime.

18.4 PCS Specifications

A. The PCS internal cooling system design may be the manufacturer's standard, provided that failure of a single cooling fan does not cause more than 50% derating of the affected PCS's power rating.
B. The PCS transformer shall meet the requirements of Section 13.0- Pad Mounted Transformers.
C. The PCS shall meet the requirements of the following:

Table 3- Minimum PCS Functional Specifications

Description	Requirements
Intended use	Energy-Shifting
Project Power Rating	80 MW across power factor range of .95 lagging to .95 leading without active power de-rating

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Reactive Capability	Inverters shall be capable of operation between 0.8 lagging to 0.8 leading power factor with active power de-rating
Inverter Form Factor	Central or distributed (rack / string) are acceptable.
Charging Method	Constant Current / Constant Voltage
Discharging Method	Constant Current
Design Life	Component life 20 years.
Inverter Nominal Voltage Range, DC	To be coordinated with Owner-furnished battery
Inverter Nominal Voltage, AC	As selected by EPC
Warranty requirements	Manufacturer Standard
Installation	
Design Ambient	See Section 2.0.
Design Humidity	See Section 2.0.
Seismic Data	See Section 2.0.

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19.0 Bi-Directional Inverters/ DC-DC Converters

19.1 General

A. Operating in conjunction with the Site Controller, the PCS shall be able to operate in all modes specified in Section 20.0.

B. Inverters/converters shall be of proven technology and shall have been installed in similar applications for a minimum of one year. It is expected that PCS are sourced from recognized manufacturers as listed in Attachment .

C. Inverters/converters shall have a design life of not less than 20 years and shall be suitable for installation in an outdoor environment. It is expected that replacement components will be readily available from the manufacturer for the design lifetime.

20.0 SITE CONTROLLER

20.1 General

A. This section establishes the minimum functional specifications for the BESS Site Controller.

B. The Site Controller shall coordinate with the PCS and BMS to perform the functions specified in this section.

C. The Site Controller shall interface with the Owner's remote dispatch system. Contractor may coordinate revisions to the Owner's existing SCADA remote interface gateway or may furnish a new gateway. The remote interface gateway shall be a SEL RTAC 3530 or equal. Communication with Owner's remote dispatch system shall utilize DNP3 Ethernet protocol.

D. The Site Controller shall aggregate the operation of the individual Power Conversion Systems such that the BESS may be remotely operated as if a single asset. The Site Controller shall include a data historian function able to store a minimum of 1 month of required BESS operating data locally. The Site Controller shall include a local HMI station and shall be located in a separate control enclosure. .

E. The Site Controller hardware and application software shall be of proven technology and shall have been installed in similar applications for a minimum of one year.

20.2 Operating Modes

A. At a minimum, the Site Controller shall provide the following BESS operating modes:

1. ***Direct Remote Control (Modular Energy System Architecture (MESA) function 9)*.** In the Direct Remote Control mode, the BESS responds directly to signals from a remote dispatch system in the same way a conventional dispatchable generation asset is controlled. Because a BESS is a bi-directional generation asset, the remote dispatch system must provide a real-time "signed" dispatch signal commanding the BESS to charge (negative value), discharge (positive value), or remain idle (0) as necessary. The rate of charge/discharge is determined by the magnitude of the dispatch signal. Both the real power output (MW) and reactive power output (controllable as power factor) may be adjusted; operating at power factors less than unity reduce the BESS MW output rating to maintain inverter MVA within its rating.
   In this mode, the BESS relies upon the remote system to determine the optimum operating mode of the BESS in consideration of real time price signals, battery state-of-charge, and any upcoming scheduled operating modes having higher priority.

2. ***Scheduled Charge/Discharge Mode (MESA function 23)*** -- Charging and discharging direction and magnitude is controlled according to a fixed time schedule. The local site controller shall store at least 20 user-defined schedules, any of which may be selected locally or via SCADA command. For each schedule, the user shall have the ability to set the time of day at which the charge or discharge is to begin and desired charge or discharge rate vs. time.

3. ***Frequency Bias (droop) Mode (MESA function 18)*** -- The local site controller shall contain a droop control function with adjustable proportional gain (droop) and dead band settings. When Frequency Bias is enabled, the present charge or discharge setting is biased by an amount proportional to measured system frequency. For example, with the droop controller set at 5%, a 5% drop in system frequency (3 Hz) would cause a control bias of 100% of discharge rating (80 MW), assuming the battery is at a sufficient state-of-charge. Frequency fluctuations within an adjustable dead band range shall have no effect. The Frequency Bias mode can be enabled or disabled, and when enabled shall operate concurrently with any other active control mode.

4. ***Frequency Response Mode (MESA function 8)*** --(need to discuss whether the battery will be controlled directly by the remote dispatch system for this mode or operate autonomously. If autonomously, the Frequency Bias mode above would provide the same functionality. Another possibility is to add a feature such that the amount of power and/or energy that the BESS provides autonomously to support system frequency is limited (for example, limit MW to xx% of rating, or limit the amount of discharged energy to xx% DOD.

5. ***Power Smoothing mode (MESA function 16)*** --This function is intended to decrease the rate of change and smooth the output of intermittent generation resources. The BESS charges or discharges in proportion to the error between the moving average generation and the instantaneous generation at the POI, subject to an adjustable deadband. The degree of response (gain) is Operator adjustable to allow matching the amount of smoothing possible given the relative capacity of the battery based upon its real time state of charge vs. the variation in intermittent generation.

6. ***Ramp Rate Limiter mode (similar to MESA function 16)*** – The BESS is used to limit the rate of change of generation output from intermittent generation resources. The BESS is operated at a selected nominal state of charge, such that it can be charged to limit the "ramp up" and discharged to limit "ramp down" rate of change in intermittent generation respectively. The intermittent generation ramp rate is continuously calculated by comparing the current intermittent generation against the previous 1-minute average generation. If the intermittent generation ramp rate exceeds the setpoint value, the controller commands the BESS to charge or discharge only as required to limit the up or down ramp to the setpoint value. No action is taken for intermittent generation ramp rates less than the setpoint value.

7. ***Automatic Voltage Regulation (AVR) (MESA function 20)***- The BESS operates autonomously to maintain the substation bus voltage at setpoint by adjusting the BESS power factor setting. Setpoint voltage and high/low voltage dead band range are adjustable. The Voltage Regulation mode does not have a direct control on the BESS MW setting and may be operated simultaneously with other control modes. When the local AVR mode is disabled, the BESS active and reactive power output are separately controllable via SCADA dispatch commands within the BESS's MVA rating (Direct Remote Control function 9).

20.3 SCADA Interface

20.3.1 Remote Control Interface

The BESS control system mode selection shall be possible locally via the site controller HMI or via the remote SCADA system.

The Site Controller shall locally store the data points listed in Section 17.0, **Table 2** at a collection interval of once per second.

The Site Controller shall aggregate the rack / string level data listed in **Table 2** and transmit to the remote dispatch system via SCADA RTAC at a two second intervals.

The SCADA interface must be fully capable of communicating with all required Owner energy management systems.

Full list of required SCADA control points and data points to be transmitted from/to remote dispatch to be provided during detailed design.

21.0 TELECOMMUNICATIONS AND NETWORK

21.1 General

A. Contractor's scope includes design, equipment, and installation of a complete local area network to allow monitoring of the BESS facility from a remote location.

B. System and subsystems provided by Contractor shall be designed and configured for unmanned operation of the facility.

C. communication connections to the remote System Operator shall connect serially via DNP 3.0 or Modbus TCP to the switchgear SEL-3530 (RTAC).

D. Network media internal to equipment enclosures may be implemented via CAT 6 cables.

E. Terminations to equipment shall be made using pre-fabricated patch cables. CAT 6 cables exiting equipment shall first terminate on a patch panel.

F. Fiber installed underground on the premises shall be installed in conduit. Bends and risers extending above ground shall be metallic conduit.

G. Fiber installed in buildings or enclosures may be routed in inner-duct supported in instrument and control trays.

H. Network communications leaving the project site shall be implemented using fiber optic cable installed in HDPE or similar underground conduit following regional practices for telecommunications installations.

22.0 SUBMITTALS

22.1 General

A. This section defines the requirements for engineering design and vendor submittals.
B. Submittals shall be in English.
C. Contractor has sole responsibility to meet completion date requirements and to supply material and equipment that conforms to Contract. Owner's review does not constitute a waiver of Owner rights with respect to nonconforming Work.
D. Contractor shall furnish expected document submittal list and schedule to Owner within 60 days of award.
E. All design documents must use Owner drawing templates & follow all Owner drawing standards.

22.2 Drawings

A. Project-specific drawings shall be submitted including the following information as applicable:
   1. Type
   2. Ratings
   3. Size
   4. Quantities
   5. Physical arrangement
   6. Weights
   7. Shipping breakdown / splits
   8. Operation of components and systems
   9. Materials and coatings
   10. External connections
   11. Interconnection with other services
   12. Anchorages, supports and fastening
   13. Installation and coordination with other equipment and materials.

22.3 Catalog Pages / Manufacturer Cut Sheets

A. Manufacturer catalog pages, i.e. cut sheets, are not an acceptable substitute for engineering design documents, except for standard non-engineered products.
B. Catalog pages must be submitted with a cover page clearly indicating the tag number and description of the item(s) covered by the catalog sheet.
C. If multiple components are shown on same page, the applicable line items shall be clearly identified.

22.4 Formats and Quantities

A. Electronic copies of documents and drawings shall be in .PDF format.
B. Final, record copy of project-specific design drawings shall be submitted in .PDF and native CAD format.
C. Contractor shall submit electronic copies plus one hard copy of the "*Issued For Construction"*, drawings to Owner at the same time they are issued to the field. *"Issued For Construction"* documents and any subsequent revision shall be signed and sealed by the engineer of record.

D. Final "Conformed to Construction Record" (As-built) documents shall be provided to Owner. These documents shall be sealed by the engineer of record; and shall be considered the final record set. Each document issued "For Construction", whether any changes were made during construction or not; shall be revised and sealed for the record set.

22.5 Operation and Maintenance Manuals

A. Prior to final acceptance, prepare and submit three hard copies and one editable electronic file copies of the operations and maintenance manuals that adequately describe the installed equipment and systems.
B. An initial draft of this manual shall be available for review and acceptance prior to the start of testing and commissioning, in order that it may be used for that purpose.
C. As a minimum, such manuals shall include recommended procedures for operation, maintenance, and inspection of the equipment; present pertinent safety considerations; and provide descriptions of major systems, including major equipment, normal operating parameters, and significant control logic.

22.6 Equipment Lists

A. Submit one electronic file of equipment lists, piping lists, valve lists, cable, circuit, and raceway lists, and instrument lists.
B. Resubmit electronic file of any list as revisions are made and issue for construction.
C. Lists shall be electronic sortable data files in either MS-Excel or MS-Access formats.

22.7 Design Calculations

A. Engineering and design calculations prepared during the design are required as submittals.
B. Such calculations include architectural, structural, civil, electrical, and mechanical.

22.8 Bid Submittal List

The contractor is asked to submit the following items with their bid

A. General outline drawing showing overall estimated size and configuration of the BESS container
B. Description, manufacturer's name, and standard descriptive literature for all major BESS system components
C. List of components with lead times longer than 30 days that will be ordered and shipped from another manufacturing facility for assembly in the final plant
D. List of origin of major components, factory manufactured or assembled
E. Location of factory providing the BESS container assembly
F. List of recommended spare parts
G. List of special and maintenance tools to be furnished
H. Supplier's previous experience with proposed equipment
I. List of factory tests
J. Complete description of the extent of shop assembly of components
K. Battery cell data sheet (dimensions, weight, float, and charging voltages etc.)

L. Description of any field assembly work required, including sectional shipments and accessories shipped loose. Include an estimate of man-hours required to complete the field assembly per container
M. Special storage requirements, if applicable
N. Subcontractor list, if applicable
O. Preliminary milestone schedule
P. Staggered shipping schedule, if applicable
Q. Current projected shop loading and shop capacity curves
R. Description of Owner overview, history, and qualifications
S. Project key team members and org chart
T. Information on bidders Information Security Program
U. Information on the Bidder's Safety program
V. Information on the Bidder's QA/QC program
W. Craft labor rate sheets
X. Financial information such as balance sheet, income statement, sales volume, etc.
Y. Itemized EPC budgetary cost estimate
Z. Overall Bill of Materials
AA. Details of continuing service contracts available to support BESS system after installation
BB. Complete Datasheets provided below

List of Attachments

Attachment A	Contractor Data
Attachment B	Approved Supplier List

Attachment A – Supplied Equipment and Contractor Fill-in Data

Provided for Information Only

Table 1- Vendor Supplied Data		
Description	**Data**	**Units**
System Specification		
Aux Power Requirement per rack		kW
Beginning of Life Number of Battery Racks		each
Rack Dimensions		ft, L x W x H each rack
Communication Methodology, BMS to Site Controller		Provide Description
DC Roundtrip Efficiency @ 0.5C, BOL		%, Roundtrip
DC Roundtrip Efficiency @ 0.5C, EOL		%, Roundtrip
DC Roundtrip Efficiency @ 0.25C, BOL		%, Roundtrip
DC Roundtrip Efficiency @ 0.25C, EOL		%, Roundtrip
Cycle Life at 10% useable DOD		Cycles
Cycle Life at 50% useable DOD		Cycles
Cycle Life at 80% useable DOD		Cycles
Cycle Life at 100% useable DOD		Cycles
Capacity vs. C-Rate		Provide Curve
Operating Temperature Range		Deg. C
Storage Temperature Range		Deg. C
Self-Discharge Rate		%/month
Cell/ Module Specification		
Cell / Module Manufacturer		
Model Number		
Module / Tray Dimensions		W x H x D, in (mm)
Module / Tray Weight		Lb (kg)
Nominal Capacity		Ah
Nominal Voltage		V
Energy		Wh
Operating Voltage Range		V
Specific Energy Density (@ 1C, 25 deg C)		Wh/lbs (Kg)
Chemistry		
Battery Rack Specification		

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Table 1- Vendor Supplied Data		
Description	**Data**	**Units**
Rack Mfg./Part/Configuration Number		
Modules per Rack		each
Number of Racks supplied		each
Dimensions		W x H x D, in (mm)
Weight		Lbs (kg)
Voltage Operating Range		V
Power, nominal		W
Energy @ BOL		kWhr
DC Short Circuit Current at rack disconnect		A
Heat dissipation per rack @ C/2		kW
Heat dissipation per rack @ C/4		kW

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Table 1- Vendor Supplied Data		
Description	**Data**	**Units**
System Specification		
PCS Manufacturer		N/A
Model Number		N/A
Operating efficiency		%
Standby power consumption		watts
Auxiliary power supply requirements		describe
AC Parameters		
AC Power @ 40C		kVA / kW
Max AC Current		Amps
Frequency		Hz
Short term Overload capability		describe
Short Circuit capability		P.U.. Amps / mS
AC Voltage		Volts
Current Harmonic Distortion (per IEEE 519)		%
Power Factor operating range		Leading / Lagging
Isolating Provisions		describe
Method of Connection to Inverter Transformer		describe
DC Parameters		
DC Voltage Range		Volts
Maximum DC Voltage		Volts
Maximum DC continuous current		Amps
Battery connection provisions		describe
Isolating Provisions		describe
Physical Parameters		
Cabinet Dimensions		W x D x H inches (mm)
Cabinet Weight		Lbs (kg)
Cooling System		describe
Cabinet Degree of Protection		NEMA / IP
Permissible Ambient Temperature		C
Permissible Humidity Range		%
Noise Level		dBA @ 3 feet

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Table 1- Vendor Supplied Data		
Description	**Data**	**Units**
Communications Interface		
Local HMI		describe
PCS to BMS protocol		describe
PCS to Site Controller		Describe available options
Physical I/O		Describe available options
Certifications		
UL 1741		Yes/no
IEEE 1547		Yes/no
Other, list		describe
Other Data to be submitted with Proposal		
Active / Reactive Power "D" Curve		
Temperature De-rating Curve		
Outline Drawing		
List of Recommended Preventative Maintenance Inspections / schedule		

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Idaho Power 2026 All Source RFP
Exhibit I – BESS Technical Specifications

VENDOR DATA SHEETS PAD MOUNTED TRANSFORMER		Equipment Name: Inverter Step-Up Transformers	
DESCRIPTION	**UNITS**	**SPEC DATA**	**VENDOR DATA**
Manufacturer	n/a	By manufacturer	
Catalog/Serial No.	n/a	By manufacturer	
Operating Frequency	Hz	60	
Capacity	KVA	XXXX	
Cooling Class	-	KNAN	
Design Base Temperature Measured by Thermometer	Deg. C	XX	
Rise Temperature Measured by Thermometer	Deg. C	XX	
Impedance @ nominal Voltage on Base Rating	Z%	X.XX%	
X/R Ratio	-	By manufacturer	
Bi-Directional Power Flow	Y/N	Y	
Design Altitude	Ft.	Per Section **Error! Reference source not found.**	
Guaranteed Efficiency:			
@ 100% of Maximum MVA 65°C Rating	%	By manufacturer	
@ 75% of Maximum MVA 65°C Rating	%	By manufacturer	
@ 50% of Maximum MVA 65°C Rating	%	By manufacturer	
Voltage Regulation @ 100% of MVA Rating:			
@ Unity Power factor	%	By manufacturer	
@ 80% lagging power factor	%	By manufacturer	
@ 80% leading power factor	%	By manufacturer	
Excitation Current @ 100% Rated Voltage, based on Max. MVA 65°C Rating	%	By manufacturer	
Maximum Guaranteed Losses @ 100% Rated Voltage:			
No Load Losses	KW	By Manufacturer	
Load Loss Max. MVA 65°C Rating	KW	By Manufacturer	
Auxiliary Losses at Max. MVA, and 65°C Rating	KW	0	
Total losses at Max. MVA; cannot exceed	%	0.8	
Loss Evaluation (By Owner)	$/kW	Proprietary	
Winding Data:			
Rated Voltage of HV Terminals (Nominal)	KV	XX.X	
Rated Voltage of LV Terminals (At Full Load)	V	XXX, 3ph/3W	
Basic Impulse Level HV Terminals	KVBIL	XXX KVBIL	
Connection HV Terminals (2 cables per phase)	Delta/wye	XXX	
Connection LV Terminals (9 cables per phase)	Delta/wye	XXX	
HV Taps:			

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Idaho Power 2026 All Source RFP
Exhibit I – BESS Technical Specifications

VENDOR DATA SHEETS PAD MOUNTED TRANSFORMER		Equipment Name: Inverter Step-Up Transformers	
DESCRIPTION	**UNITS**	**SPEC DATA**	**VENDOR DATA**
No. of Steps Above Nominal	Qty / %	2 @ + 2.5%	
No. of Steps Below Nominal	Qty / %	2 @ - 2.5%	
Oil/Fluid – FM Approved	Type	Less Flammable Fluid or Mineral Oil	
Total Gallons of Fluid in System	gal	By manufacturer	
Core and Coil Construction Type	-	By manufacturer	
Type of Material Used in Coils	-	By manufacturer	
Approximate Weights:			
Fluid	lbs.	By manufacturer	
Total Transformer With Fluid	lbs.	By manufacturer	
Total Shipping Weight	lbs.	By manufacturer	
Weight of Largest Piece for Handling	lbs.	By manufacturer	
Method of Shipment	-	By manufacturer	
Approximate Dimensions:			
Overall Height	in	By manufacturer	
Overall Width	in	By manufacturer	
Overall Depth	in	By manufacturer	
Loop or Radial System Design (Deadfront)	-	Loop/Deadfront	
Standard Features and Accessories:			
Nameplate	-	Y	
Dial-type thermometer	-	Y	
Liquid level gauge	-	Y	
Pressure-vacuum gauge	-	Y	
1 in drain valve with sample valve	-	Y	
Pressure relief valve	-	Y	
Non-PCB label	-	Y	
1 in upper fill/filter press connection	-	Y	
Options:			
Surge Arrester-MOV Type	Y/N	N	
High Voltage Switch; Under Oil w/ Window	Y/N	N	
Primary Fuse Overcurrent Protection	Y/N	Y	
Shielding Between HV and LV Windings	Y/N	Y	
CTs on LV Bushings – Protection Class	Y/N	Y	

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VENDOR DATA SHEETS PAD MOUNTED TRANSFORMER		**Equipment Name: Inverter Step-Up Transformers**	
DESCRIPTION	**UNITS**	**SPEC DATA**	**VENDOR DATA**
Alarm Contacts for Temp, Liquid Level, and pressure and vacuum gauges	Y/N	Y	
List any Special Considerations System Power Flow will be such that transformer will charge and discharge Energy Storage Batteries through IGBT inverters with filters; meeting IEEE 1547	-	Watt and Var Bi-directional power flow	
List parts Requiring Field Assembly	-	By manufacturer	
Required Maintenance Tools Furnished	-	By manufacturer	

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Attachment B - Approved Supplier List

EQUIPMENT	MANUFACTURER
HV Circuit Breaker	ABB, Alstom, Mitsubishi Electric, Siemens
MV Circuit Breaker	ABB, Alstom, Mitsubishi Electric, Siemens
Power Transformers	ABB, Ethosenergy, Fortune Elec., GE, Hico, Shihlin Electric, Siemens
OHL Insulators	Hubbell Power, MD Henry Lapp Insulators, Maclean Power, MD Henry, NGK Locke
T-line Hardware	Bekaert, Southeast Power
Steel T-line/Substation pole	Trinity, Distran Steel, MD Henry, Meyer Utility, Nello, Pelco, Southland Grid, Valmont
Electrical Equipment Enclosure	Powell, ABB, ESS Metron,
Grounding Transformers	GE Prolec, ABB
Lighting	Crouse Hinds, Lithonia, Holophane, General Electric
Auxiliary Relays	Allen-Bradley, Cutler-Hammer, General Electric
Protective Relays	SEL, Basler, General Electric
Relay Panels	Kemco, Norhtern Star, Electrical Power, Relay & Power Systems
600V Cable	American Wire Group, Belden, General Cable, Kerite, Okonite, Southwire
Panelboards	Cutler-Hammer, General Electric, Square-D, ABB
Cable Tray	B-Line, MP Husky, Summit Elec.
Fiber Optic Cable	Aria Tech, Belden, Cable Management, General Cable, Norhtwire
MV Cable	Aethna, American Wire Group, General Cable, Kerite, Okonite, Southwire, USA Wire & Cable
Junction Boxes	City Elec, Westburne Electric
Battery Energy Storage System	ABB Inc., BYD, CATL, Sungrow, Dynapower, Greensmith, Flexgen, LG Chem, Panasonic, Primus, S&C Elec. Samsung SDI, Schneider, Samsung, Sumitomo, Tesla, Tesvolt, Toshiba, Younicos
Inverters/ Converters	Dynapower, Emerson, GE Energy, Schneider, Siemens, SMA Solar Tech, Sungrow, Fronius.
Medium Voltage Switchgear	ABB, Crown, Siemens, Eaton, Schneider Elec., GE, ESSMetron, Powell

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IDAHO POWER CO.
SOLAR PV TECHNICAL SPECIFICATION

THIS GENERIC SPECIFICATION IS DESIGNED TO PROVIDE A BASIS FOR A VARIETY OF SOLAR PV SYSTEMS (PV) APPLICATIONS AND MUST BE CUSTOMIZED FOR THE SPECIFIC PROJECT REQUIREMENTS AND SITE CONDITIONS BY THE ENGINEER OF RECORD PRIOR TO FINALIZING THEIR DESIGN.

PREPARED FOR

Idaho Power Co.

28 JUNE 2021

BLACK & VEATCH

Idaho Power 2026 All Source RFP
Exhibit J – Solar Technical Specifications

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1.0 General

1.1 DESCRIPTION

This Technical Specification (Specification) sets forth Owner technical requirements for the design, procurement, and construction of a complete, fully functional, and operational solar photovoltaic (PV) facility that is in full compliance with Owner requirements, project Interconnection Agreement, project Power Purchase Agreement, applicable codes, standards, laws and regulations; and when completed can perform in accordance with the requirements to be set forth in the Contract to which this Specification is attached.

1.1.1 Defined Terms

A. The terms below used in this Specification shall have the following meanings:

- **Contractor** shall mean – the party with whom Owner executes the Contract.
- The **Contract** shall mean – the Contract between Owner and Contractor for Contractor to construct the Facility.
- **Effective Date** shall mean – the date upon the codes or standards considered to take effect,
- The **Facility** shall mean – the solar PV generating facility and project substation (if applicable) described in this Specification
- **LOCAL Electrical Code** shall mean – the State of Idaho Division Electrical Specialty Code
- **Local Electric Utility** shall mean – Idaho Power Company
- **Owner** shall mean – Idaho Power Company
- **Owner's Representatives** shall mean – Owner's designated representatives and affiliates
- **Owner's Point of Metering (POM)** shall mean – one or more point(s) between the last transformation and POI
- **Point of Interconnection (POI)** shall mean – the primary side of the interconnection breaker provided by Idaho Power located at Project Site
- **Specification** shall mean – this Technical Specification document
- **System Impact Study (SIS)** shall mean – the system impact study performed by the Transmission Provider for the Facility.
- **Transmission Provider** shall mean – Idaho Power Company is the owner of transmission line that Facility interconnects to.]
- **Utility Electric Service Requirements** shall mean – the latest revision of the local utility Requirements

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1.1.2 Description of Facility

A. The Facility shall be a grid interactive solar PV power generating facility located at Owner's project Site.

B. Contractor shall ensure that the execution of the Facility and its Interconnection will be completed per the terms set forth in Owner's Project Schedule.

C. The Facility shall have a nameplate AC Capacity of up to 80 MWac.

D. The Facility shall interconnect to the grid at the POI.

E. The Facility shall interconnect to the POI in accordance with all applicable requirements set forth in the Section 1.5 Interconnection Requirements and approved by Owner.

F. The interconnection voltage shall be as set forth in Section 1.5 Interconnection Requirements.

G. The energy production Facility shall be metered at the specified POM.

H. The Facility shall be designed to operate autonomously and capable of delivering electrical power to the POI whenever sufficient sunlight is available.

I. The Facility shall be designed to be controlled and monitored remotely.

J. The Facility shall include any or all of the following as defined in the project contract:

1. Earthworks, civil engineering structures, and roadways
2. Site lighting and security systems
3. PV modules
4. Tracking PV module mounting system
5. Solar PV inverters
6. Isolation transformers, if required
7. Medium voltage step-up transformer(s)
8. Main step-up transformer(s), if required]
9. Interconnection Package
10. DC cabling, AC cabling, control cabling, conduits, and raceways
11. DC combiners, disconnect switch and recombiners
    a. As an option for Owner's selection, all recombiners shall include electrical monitoring on each input port]

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b. Recombiner monitoring functions shall be connected to the SCADA System of the Facility.

12. An interconnection to the POI
13. A Supervisory Control And Data Acquisition (SCADA) system
14. Meteorological Monitoring Station(s)
15. Voice and data connectivity
16. Communications cabling and hardware
17. Storage facility, if applicable
18. Site fence
19. Signage
20. Switchgear/Switchboard
21. All fixtures required for a complete and operational Facility compliant with this Specification

1.2 GENERAL REQUIREMENTS

A. Work performed under the Contract shall be performed in accordance with all of the requirements set forth therein, and:

1. All applicable codes and standards
2. All requirements set forth in this Specification
3. Industry-standard engineering and quality assurance practices

B. The Facility shall be designed for a 30 year operating life based on normal operation, and the performance of maintenance, repairs, and the replacement of parts according to manufacturers' recommendations and standard industry practices.

1.2.1 Codes and Standards

A. The codes and standards applicable to the work performed under the Contract shall include any or all of the following. It is incumbent upon the contractor to be knowledgeable of and implement all applicable codes and standards:

1. MIOSHA Standards
2. Local building codes and amendments
3. Local energy codes and amendments

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4. Local Electric Utility requirements
5. Transmission Provider interconnection requirements
6. Federal, State, and Local environmental protection agency rules and regulations
7. State and Local soil erosion and sediment control regulations
8. Federal, State, County and Local Authorities Having Jurisdiction (AHJ) requirements.
9. United States Code of Federal Regulations (CFR)
10. Occupational Safety and Health Administration (OSHA)
11. Idaho Building Code (IBC)
12. National Fire Protection Association (NFPA)
13. International Fire Code (IFC)
14. National Electrical Code (NEC)
15. National Electrical Safety Code (NESC)
16. Underwriters Laboratories Inc. (UL)
17. National Electrical Manufacturer's Association (NEMA)
18. InterNational Electrical Testing Association Inc. (NETA)
19. Aluminum Association (AA)
20. American Association of State Highway and Transportation Officials (AASHTO)
21. American Concrete Institute (ACI)
22. American Institute of Steel Construction (AISC)
23. American Society of Mechanical Engineers (ASME)
24. American Society for Nondestructive Testing (ASNT)
25. American Society for Testing and Materials (ASTM)
26. American National Standards Institute (ANSI)
27. American Railway Engineering and Maintenance Association (AREMA)
28. American Society of Civil Engineers (ASCE)
29. American Welding Society (AWS)

30. Association of Iron and Steel Engineers (AISE)
31. Concrete Reinforce Steel Institute (CRSI)
32. Environmental Protection Agency (EPA)
33. Institute of Electrical and Electronics Engineers (IEEE)
34. Insulated Cable Engineers Association (ICEA)
35. International Electrotechnical Commission (IEC)
36. Instrumentation Society of America (ISA)
37. The International Organization for Standardization (ISO)
38. National Association of Corrosion Engineers (NACE)
39. Nation Environmental Balancing Bureau (NEBB)
40. North American Electric Reliability Council (NERC)
41. Structural Steel Painting Council (SSPC)

B. Unless otherwise specified, the applicable governing edition and addenda to be used for all references to codes or standards specified herein shall be interpreted to be the jurisdictionally approved edition and addenda.

C. If a code or standard is not jurisdictionally mandated, then the current edition and addenda in effect on the Effective Date shall apply.

D. The referenced codes and standards shall govern the minimum standards for the work.

E. If an Owner's requirement is in conflict with the requirements in the applicable codes and standards, it shall be brought to the Owner's attention using request for information (RFI) to resolve.

F. Contractor shall provide document and evidence to prove that the design and PV plant facility is NERC compliance.

1.2.2 Equipment

A. All equipment shall be new and unused when procured by the Contractor, undamaged at the time of Substantial Completion, and manufactured by reputable manufacturers with experience in the manufacture of the particular Equipment supplied by them.

B. All equipment shall be installed in a neat and workmanlike manner with adequate staying, bracing, and anchoring.

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C. Original OEM warranty shall be actionable for the owner, following close of development (COD)

D. Contractor shall use calibrated and verified equipment. Contractor shall maintain records and shall provide to Owner upon request.

1.3 CONTRACTOR'S SCOPE OF WORK

A. Contractor's scope of work shall include:

1. Project management, including but not limited to:
    a. Host daily meetings to discuss status of tasks with subcontractor.
    b. Prepare, review and monitor time schedules and milestone dates established by Contractor. This shall be done on a weekly basis.
    c. Host weekly meetings to discuss status of tasks with Owner.
    d. Prepare and review shop drawings, documents and reports as appropriate.
    e. Prepare and submit Requests for Information and submittals if questions or conflicts arise.
    f. Contactor request to Owner for design changes shall be completed in a timely manner per the Contract.
    g. Witness vendor tests of major equipment.
    h. Daily Safety Meeting during construction (JSA)
2. Obtaining topographical surveys of the Site that meets the owner's requirements regarding content, layout, and scale.
3. Land acquisition
4. Rights of way
5. Design engineering, engineering calculations and studies, as specified in Section 1.3.4.
6. Site preparation, including grubbing, grading and drainage, which meets owner's storm requirement.
7. Obtaining required building, construction and other permits
    a. Existing permits may require modification by Contractor to reflect the design specified by Contractor
8. Procurement of equipment and materials

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a. Inverter, Pad-mount Transformers and Skid[1]

b. SCADA System

c. PV Modules

d. PV Mounting Systems

e. Main step-up transformer(s), as required

f. MV switchgear, if required

g. Meteorological Monitoring Station(s)

h. All ancillary equipment necessary to operate the PV facility

9. Construction of the Facility, project management and construction management, including but not limited to:

a. Receipt and secure storage of all procured equipment and materials

b. Procuring construction consumables, including power and water

c. Machinery and tools

d. Labor and labor management

e. Transportation

f. Removal of construction debris and other rubbish

10. Commissioning of the Facility

11. Acceptance testing of the Facility

12. Project closeout

13. Complete training and instruction of Owner's personnel in the operation, maintenance and repair of all equipment and systems in the Facility

14. Warranty service

B. Contractor shall cooperate with Owner and Owner's representatives.

C. Owner and Owner's representatives shall be provided with unrestrained opportunity to monitor Contractor's work.

[1] [Reference datasheets or other relevant information pertaining to this equipment.]

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D. Contractor shall coordinate its actions and cooperate with other contractors, Owner and Owner's representatives, the Local Electric Utility and local permitting agencies.

E. Contractor shall include licensed Professional Engineer (State of Idaho) personnel in the design and installation team.

1.3.1 Owner-Furnished Equipment

F. Owner responsible for all hardware up to the primary (low voltage side) of the breaker at the POI

1.3.2 Permitting

A. Contractor shall be responsible for obtaining and expediting, as necessary, all permits and all permit modifications, as applicable.

B. No construction, including disturbing soils or vegetation, shall be allowed on Site without the issuance of approved permits by the permitting agencies or approval from Owner.

C. Contractor shall be responsible for submittal of all necessary drawings and calculations to the AHJ for the purpose of obtaining construction Permit approval.

D. Prior to or in parallel with such submission, Contractor shall provide Owner with complete sets of all documents intended for inclusion in the submission.

E. To the extent required by applicable agencies, Contractor shall provide access to an archeologist approved by the responsible agency to address any concerns regarding historic preservation.

1.3.3 Engineering Drawings and Specifications

A. An up-to-date printable index listing all previously issued Contractor drawings and specifications by number and title, showing the revision status of each drawing, shall be maintained and shall be available to Owner at all times.

B. Contractor shall provide an internet-accessible secure file share service that contains all drawings and specifications and be made available to Owner at all times.

C. Contractor shall develop a Design Package with Idaho registered Professional Engineer sealed drawings for the Project containing the following. The package may be submitted in stages as agreed to with the Owner:

1. Index
2. General notes and symbols
3. Electrical specifications
4. Circuit and raceway list

5. Equipment schedule
6. Equipment datasheets
7. Major subcontractor equipment drawings
8. Site arrangement drawings
9. Module, inverter, combiner and recombiner location & identification number maps
10. Inverter plans and details
11. Module mounting system plans, Details, and Structural Calculations
12. Pre-engineered building plans and details, as applicable
13. Substation Control Building plans and details
14. Foundation plans and details
15. Fencing, gate, signage, grounding, and label details
16. Road plans and profiles, as applicable
17. Electrical one-line diagrams, both AC and DC, including all voltage.
18. Switchgear plans and elevations, as applicable
19. Switchgear elementary diagrams, as applicable
20. Protective relay calibration tests
21. One-Line and Three-Line system diagrams
22. Trenching drawings, with both in-plan and cross-section views
23. Grounding plans and details
24. Lighting plans and details
25. Lightning protection plans and details
26. Security infrastructure of electrical equipment, hardware and software
27. Fire alarm & detection drawings, as applicable
28. SCADA communication block diagram
29. SCADA point list and index of vendor drawings
30. Factory test reports on new equipment

31. Manufacturer field service reports
32. Instrument list
33. Installation details
34. Calculations
    a. AC/DC Cable sizing calculations
    b. AC/DC Cable total loss calculations
    c. Conduit sizing calculations
    d. AC/DC Load calculations
    e. Voltage drop calculations
    f. Short circuit calculations and labels
    g. Overcurrent device coordination
    h. Grounding study, if applicable
    i. HVAC calculations, if applicable
    j. Structural calculations
35. Civil Studies (Studies shall be in accordance with AHJ and additionally the Civil & Structural: Section 2.0, if the study is specified in Section 2.0)
    a. Surveys (geotechnical, topographic, recordable easement exhibit, other)
    b. Grading plans & hydrology study, if applicable
    c. Utility investigation and identify property easements, if applicable
    d. Erosion control plans, if applicable
    e. Storm Water Pollution Prevention Plan (SWPPP), if applicable
    f. Road and railroad crossing plans for underground or overhead transmission line crossings of public and private Right-of-way, if applicable
    g. Offsite road improvement plans, if applicable
    h. Utility improvement plans, if applicable
36. Noise-level Study

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37. Glare/FAA study

38. Shading study

39. Engineering drawing checklist

40. Commissioning, normal operation, shutdown and emergency shutdown procedures

41. All drawings, specifications, studies, and calculations shall be sealed by a Professional Engineer in good standing, licensed in the State of Idaho for the applicable discipline.

42. Subcontractor redlines shall be included in the main contractor redlines and given to Owner for review. Contractor shall coordinate with Subcontractors the turnover of redlines on a daily basis throughout the duration of project. Redline drawing turnover coordination meeting shall be led by the Contractor.

D. Contractor shall utilize Owner's drafting standards in the development of engineering drawings for the Facility as noted in this specification's Appendices

1.3.4 Project Control Submittals

A. Contractor shall provide the following submittals within 30 days upon receiving Notice To Proceed (NTP) or Contract signing.

1. Project Execution Plan

2. Drawing list

3. Specification list

4. Safety, accident, health program

5. Engineering submissions for construction permit

6. Contractor permit applications and permits

7. Project schedule

1.3.5 Engineering Submittals

A. Engineering submittals shall include the design package described in Section 1.3.4 as well as a progress report.

B. Engineering submittals shall be provided by Contractor in electronic form (PDF format) as a minimum. Contractor shall provide 1 hard copy and 1 PDF format of each revision of each Approved for Construction design drawing. The final As-Built drawing set shall be provided in both PDF and DWG format. Owner reserves the right to request additional documents. Manufacturer field service representative shall be on site during commissioning to provide accurate commissioning report.

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C. Contractor shall provide drawing and associated document submittals at the following design stages:

1. 30 percent, within 30 days of the Contract being executed
2. 60 percent, within 45 days of the Contract being executed
3. 90 percent, within 60 days of the Contract being executed
4. 100 percent, within 90 days of the Contract being executed
5. Construction, within 115 days of the Contract being executed
6. As Built, within 30 days of the commercial operation of Project

D. Refer to Section 1.7 for the list of Constructor's submittals to Owner.

E. Owner's review of drawings and other submittals shall cover only general conformity of the data to the technical specifications, external connections, interfaces with equipment and materials furnished under separate specifications, and dimensions that affect system arrangements.

F. Owner's review will not include a thorough review of all dimensions, quantities, and details of the equipment, material, device, or item indicated or the accuracy of the information or calculations submitted.

1. Review and comment by Owner of Contractor's drawings or other submittals shall not relieve Contractor of its sole responsibility to meet the requirement of the Contract and to supply work that conforms to the requirements of the Contract.
2. Owner shall be allowed a 14 calendar day review period.
3. Contractor shall provide responses to Owner's review at least one week prior to scheduled review meetings.

1.3.6 Engineering Completion

A. Contractor shall prepare and deliver to Owner, at least one week prior to the start of commissioning activities:

1. Two electronic copies of all engineering drawings, all engineering submittals, and the Operations and Maintenance (O&M) manual for the Facility
2. Three hard copies of the O&M manual for the Facility.

B. Within one week of completion of commissioning and testing, the following submittals shall be provided to Owner.

1. Protective relay calibration tests

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2. Trial operation of equipment - summary report
3. Manufacturer field service reports
4. Performance test report
5. Flash Test Data

C. Contractor shall provide [two] closeout binders in hard copy at project completion (with associated electronic files).

D. The binder shall also be provided electronically in PDF format.

E. This binder shall include the following:

1. As-built drawings
2. CAD & PDF versions of all drawings
3. Interconnection approvals
4. Revenue grade meter calibration certificate
5. Functional testing results
6. Transformer completed test reports
7. Commissioning results
8. O&M manual
9. Installation manuals
10. Completed warranty cards
11. Registration cards
12. Operation manuals (manufacturer)
13. Maintenance schedules
14. Spare parts list
15. Letter from manufacturer, if required, – indicating they have inspected the installation, it conforms to their installation guidelines, and the full warranty is in effect.
16. Point of Contact (POC) list for all subcontractors, vendors, suppliers
17. Municipal permits

18. Point of contact for warranty service

F. Contractor-furnished materials shall include bound O&M information and system descriptions for each system that shall be incorporated in the Facility.

G. The system descriptions shall include text describing normal and abnormal control for system components.

1. This manual shall include detailed Facility operating procedures including detailed step-by-step commissioning/shutdown sequences or troubleshooting procedures.

2. This manual shall also include maintenance schedules.

3. Separate stand-alone O&M manuals shall be provided for the SCADA system and inverters.

1.3.7 Quality Assurance

A. Unless specifically named in the Specifications, a manufacturer shall have furnished equipment of the type and size specified which has been in successful operation for not less than the past 5 years.

B. Contractor shall select equipment manufacturers with sufficient capacity to produce and deliver required materials without causing delay in work.

1.3.8 Delivery Storage and Handling

1.3.8.1 Delivery

A. Contractor shall bear the responsibility for delivery of equipment, spare parts, special tools, and materials to the Site and shall comply with the requirements specified herein and shall provide required information concerning the shipment and delivery of the materials specified in this Contract.

B. These requirements also apply to any sub-suppliers making direct shipments to the jobsite.

C. Contractor shall, either directly or through contractual arrangements with others, accept responsibility for the safe handling and protection of the equipment and materials furnished under this Contract before and after receipt at the port of entry.

D. Acceptance of the equipment shall be made after it is installed, tested, commissioned, placed in operation and found to comply with all the specified requirements.

E. All items shall be checked against packing lists immediately on delivery to the Site for damage and for shortages by contractor.

F. Damage and shortages shall be remedied with the minimum of delay, at no additional cost to Owner.

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G. Delivery of portions of the equipment in several individual shipments shall be subject to review of Contractor before shipment.

H. When permitted, all such partial shipments shall be plainly marked to identify, to permit easy accumulation, and to facilitate eventual installation.

1.3.8.2 Storage

A. Contractor shall bear the responsibility for storage of equipment, spare parts, special tools, and materials to the Site and shall comply with the requirements specified herein.

B. Upon delivery, all equipment and materials shall immediately be stored and protected from damage, theft, vandalism and the elements until installed.

C. Stacked items shall be suitably protected from damage by spacers or load distributing supports that are safely arranged.

D. No metalwork (miscellaneous steel shapes and reinforcing steel) shall be stored directly on the ground.

E. Masonry products shall be handled and stored in a manner to hold breakage, chipping, cracking, and spalling to a minimum.

F. Cement, lime, and similar products shall be stored off the ground on pallets and shall be covered and kept completely dry at all times.

G. Pipe, fittings, and valves may be stored outdoors, but shall be placed on wooden blocking.

H. PVC pipe, geomembranes, plastic liner, and other plastic materials shall be stored off the ground on pallets and protected from direct sunlight.

I. Pumps, motors, electrical equipment, and all equipment with antifriction or sleeve bearings shall be stored in weather tight structures maintained at a temperature above 60 °F (16 °C).

J. Electrical equipment insulation shall be protected against moisture and water damage.

K. All space heaters furnished in equipment shall be connected and operated continuously.

L. Equipment having moving parts, such as gears, bearings, and seals, shall be stored fully lubricated with oil, grease, etc., unless otherwise instructed by the manufacturer.

M. Manufacturer's storage instructions shall be carefully followed by Contractor.

N. When required by the equipment manufacturer, moving parts shall be rotated a minimum of twice a month to ensure proper lubrication and to avoid metal to metal "welding." Upon installation of the equipment, Contractor shall, at the discretion of its engineer, start the equipment at one-half load for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.

O. When required by the equipment manufacturer, lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance.

P. New lubricants shall be put into the equipment by Contractor at the time of acceptance.

Q. Equipment and materials shall not show any pitting, rust, decay, soiling, stains, or other deleterious effects of storage when installed in the work.

R. In addition to the protection specified for prolonged storage, the packaging of spare units and spare parts shall be for export packing and shall be suitable for long-term storage in a damp location.

S. Each spare item shall be packed separately and shall be completely identified on the outside of the container.

1.3.8.3 Handling

A. Stored items shall be laid out to facilitate their retrieval for use in the work.

B. Care shall be taken when removing the equipment for use to ensure the precise piece of equipment is removed and that it is handled in a manner that does not damage the equipment.

1.3.9 Required Manufacturer's Warranties

A. Contractor shall submit manufacturers' warranties for Owner's acceptance, manufacturer's standard/extended warranty document executed by authorized company official.

B. Manufacturers' warranties are in addition to, and do not limit, other rights Owner may have under the Contract.

1.3.10 Miscellaneous

A. Contractor shall be responsible to any damage to the Site.

B. Contractor shall be responsible for repair and/or replacement of all damaged equipment and materials whether provided by Contractor or by others.

1.4 GENERAL INSTALLATION REQUIREMENTS

This Section describes Owner's requirements for the methods and means of installation for the Facility.

A. Contractor is responsible for construction of a fully operational and functional Facility as set forth in this Specification, unless otherwise approved by Owner.

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1.4.1 Construction Management

1.4.1.1 Construction Management

A. Contractor shall have an onsite Construction Manager when work is being done at the Site.

B. Contractor's Construction Manager shall provide oversight to staff and subcontractors.

C. Contractor shall develop a site specific safety plan that shall be reviewed by Owner.

1. If the maximum emergency personnel response time to the Site is greater than thirty (30) minutes, the Contractor shall provide an onsite EMT and ambulance during all working hours or detail plan to have access for Life Flight helicopter access near the project site.

2. An urgent care facility shall be contracted to set up nonemergency physician referrals. First aid kits shall be provided around the Site and regularly maintained.

3. At least one person trained in first aid shall be part of the construction crew. In addition, all foremen and supervisors shall be given first aid training.

D. Contractor shall ensure that all subcontractors abide by this safety plan.

E. The safety plan shall include a Contractor assigned point of contact that shall be available 24 hours a day, 7 days a week.

F. Contractor shall ensure all staff and subcontractors have proper OSHA/IDOSHA training.

G. Contractor shall ensure that all visitors to the Site are briefed on safety procedures and wear the proper PPE, as applicable.

H. Contractor shall maintain a current set of drawings, red-line set of drawings, and a filing system consisting of meeting minutes, safety training, visitor log, photo log, test reports, RFIs, shop drawings, change orders, schedules, etc.

I. All materials, workmanship, and testing shall be in accordance with the appropriate specifications, standards, and codes of practice.

J. Methods of Contractor's quality control shall be clearly established and documented.

K. Working methods shall ensure the construction of stable structures able to withstand all applied loadings during construction and for the operating life of the Facility without collapse, failure, or excessive deformation such as to cause any damage, loss of function, or durability problems.

1.4.1.2 Waste Management

A. Contractor shall manage construction waste such that it does not disturb surrounding neighbors or construction progress.

B. Waste shall be removed from the Site at Contractor's expense.

C. Waste disposal shall meet local requirements.

1.4.1.3 Dust Control

A. Contractor shall implement dust control measures at the Site during construction as required by local AHJ and site Host.

B. Dust levels shall be kept at a minimum at all times during construction.

1.4.1.4 Housekeeping

A. Contractor shall maintain the Site in a neat and orderly manner, including providing street sweeping, and mud control mat.

B. Walkways and work areas shall be clear of debris and shall be maintained on a daily basis.

1.4.2 Project Closeout Procedure

A. Contractor shall perform the following tasks as part of the project closeout procedures:

1. Provide approved submittals specified in Section 1.3.7
2. Respond to all Requests for Information (RFIs)
3. Complete all change orders
4. Provide copies of all required O&M manuals
5. Assign all applicable warranties
6. Provide copies of all punch list inspection records
7. Provide copies of all required construction documents, as compiled
8. Provide form of job books
9. Permit closeout document

1.4.3 Temporary Utilities

1.4.3.1 Trailers

A. Contractor shall be responsible for required onsite storage.

B. Storage facilities shall meet AHJ requirements.

C. Contractor shall provide owner with a trailer at the Site suitable for 6 full time onsite personnel and furnished with work desks, chairs, electrical power, lighting, air conditioning, heating, a telephone connection and internet connection.

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1.4.3.2 Electric Power

A. Contractor shall determine the type and amount of power necessary and make arrangements for obtaining temporary electric service, metering, and shall bear the costs for electric power used during the construction period.

1.4.3.3 Lighting

A. Contractor shall provide temporary lighting during construction to meet applicable safety requirements.

1.4.3.4 Water

A. Contractor shall provide potable water for construction and drinking by construction personnel during construction.

1.4.3.5 Sanitary Facilities

A. Contractor shall provide and maintain sanitary facilities on Site during construction.

B. Separate male and female facilities with hand wash stations shall be provided on Site during construction.

1.4.3.6 Phone and Communication Facilities

A. Contractor shall provide phone lines, or ensure cell phone coverage and contact during the entire construction process.

1.4.3.7 Parking

A. Areas within the Site shall be used for construction parking. If necessary, buses shall be used to transport workers from the parking areas to the construction Site. These areas shall provide adequate parking space for construction personnel and visitors during construction and shall be maintained for stability and safety.

1.4.3.8 Offload and Staging Areas

A. Areas within the Site boundary shall be used as offload and staging areas. If additional lay-down space is required offsite to temporarily store construction materials and Project equipment prior to installation, the Contractor shall obtain all permits and approvals for such offsite areas.

1.4.3.9 Other Utilities

A. Other necessary utilities for construction shall be provided by Contractor, as applicable.

1.4.4 Site Security and Access

A. Contractor shall ensure the Site (including any offsite areas specified in section 1.4.3) is secured, limiting access to construction workers, Owner, and AHJ during construction.

1.4.5 As-Built Drawings

A. During construction, Contractor shall keep on file one set of current as-built drawings with green and red lined reflecting all field deviations from the design drawings.

B. As a condition to Final Acceptance, Contractor shall submit to Owner a set of as-built drawings which have been fully conformed to the construction records as of the completion of the work.

1.4.6 Electrical Equipment Installation

A. Installation work shall include receiving, unloading, inventorying assemblies and all sub-system assemblies, storage, removal from storage, hauling, cleaning, installation on foundations, and other work necessary to place all equipment into successful operation.

B. Factory test reports shall be filed and stored onsite.

C. In addition, installation work shall include complete assembly of equipment shipped unassembled; dismantling and reassembly of equipment to make adjustments and provisions of personnel, equipment, and assistance in testing and placing the equipment into operation.

D. Contractor shall submit detailed installation procedures, detailed manpower allocation and an installation schedule for approval by Owner prior to starting installation work.

E. Equipment shall be checked prior to its installation to ensure that it is in conformance with the purchase documents and manufacturer's drawings.

F. Any discrepancies shall be reported to Owner.

1.5 INTERCONNECTION REQUIREMENTS

A. As set forth in General Interconnection Agreement which will be obtained by the Owner.

B. Contractor shall be responsible for the work up to thpoint of interconnection.

C. The interconnection for the Facility shall comply with all applicable codes, standards and requirements.

D. The interconnection for the Facility shall be approved by Owner.

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1.6 ACRONYMS AND ABBREVIATIONS REFERENCE TECHNICAL

ACRONYM/ABBREVIATION	MEANING
AASHTO	American Association of State Highway and Transportation Officials
AC	Alternating Current
ACI	American Concrete Institute
AHJ	Authority(ies) Having Jurisdiction
AISC	American Institute of Steel Construction
ALTA	American Land Trust Association
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASD	Allowable strength design
ASTM	American Society for Testing and Materials
ATS	Acceptance Testing Specifications
AWG	American Wire Gauge
AWS	American Welding Society
CAD	Computer-Aided Drawing
CAT6e	Category 6 Cable (enhanced)
CCH	Communication and Control House
CCTV	Closed-circuit Television
CE	Conformité Européenne (European Economic Area Conformity Marking)
CEC	California Energy Commission
CFR	Code of Federal Regulations (USA)
CSV	Comma Separated Value file format
DAQ	Data Acquisition
dBA	Decibels Acoustic
DC	Direct Current
DRW	Drawing file format
EIA	Electronic Industries Alliance
EMT	Electrical Metallic Tubing
EPC	Engineering, Procurement and Construction contractor
FC’	Minimum specified compressive strength of concrete
FEMA	Federal Emergency Management Administration
FF	Fill Factor (of an IV curve for a PV cell/module/string/array)
GFCI	Ground Fault Circuit Interrupt
GHI	Global Horizontal Irradiance
HMI	Human-Machine Interface
HVAC	Heating, Ventilation and Air Conditioning

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ACRONYM/ABBREVIATION	MEANING
IBC	International Building Code
ICEA	Insulated Cable Engineers Association
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
Imp	Current at Maximum Power (of an IV curve for a PV cell/module/string/array)
Isc	Short Circuit Current (of an IV curve for a PV cell/module/string/array)
IV	Current-Voltage curve for a PV cell/module/string/array
kV	kilovolt(s)
kVA	kilovolt-ampere(s)
kVAr	kilovolt-ampere(s)-reactive
kW	kilowatt(s)
kWac	kilowatts AC
kWh	kilowatthour(s)
LED	Light-Emitting Diode
LFMC	Liquidtight Flexible Metallic Conduit
LRFD	Load and Resistance Factor Design
LV	Low Voltage
MHz	megahertz
MPPT	Maximum Power Point Tracking
MV	Medium Voltage
MVAr	megavolt-ampere(s)-reactive
MW	megawatt(s)
MWac	megawatt(s) AC
NEC	National Electrical Code (USA)
NEMA	National Electrical Manufacturer's Association
NESC	National Electrical Safety Code
NETA	InterNational Electrical Testing Association Inc.
NFPA	National Fire Protection Association
NOCT	Normal Operating Cell Temperature (of a PV module)
NTP	Notice To Proceed
O&M	Operations and Maintenance
OS	Operating System (of a computer)
OSHA	Occupational Safety and Health Administration
PDF	Portable Document Format
PGE	Portland General Electric
PLC	Programmable Logic Circuit

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ACRONYM/ABBREVIATION	MEANING
Pmpp	Power at Maximum Power Point (of an IV curve for a PV cell/module/string/array)
POA	Plane-of-Array (of PV modules)
POC	Point of Connection
POI	Point of Interconnection
POM	Point of Metering
PPE	Personal Protective Equipment
PSI	Pounds per Square Inch
PV	Photovoltaic
PVC	Poly-vinyl Chloride
RGS	Rigid Galvanized Steel
SCADA	Supervisory Control and Data Acquisition
SPPWC	Standard Plans for Public works Construction
SSPC	Society for Protective Coatings
SSPWC	Standard Specifications for Public Works Construction
STC	Standard Test Conditions (for PV modules)
SWPPP	Storm Water Pollution Prevention Plan
TBD	To Be Determined
THD	Total Harmonic Distortion
THHN	Thermoplastic High Heat-resistant Nylon-coated
THWN	Thermoplastic Heat and Water-resistant Nylon-coated
TIA	Telecommunications Industry Association
TW	Thermoplastic Moisture-Resistant Wire
UBC	United Building Code
UL	Underwriters Laboratories
UPS	Uninterruptable Power Supply
VA	volt-ampere
Vdc	volts DC
Vmp	Voltage at Maximum Power (of an IV curve for a PV cell/module/string/array)
Voc	Open-Circuit Voltage (of an IV curve for a PV cell/module/string/array)
XHHW	Cross-Linked High Heat Water Resistant Insulated Wire
XLPE	Cross-linked polyethylene

Internal Use Only

1.7 SUBMITTALS AND DOCUMENTATION

1.7.1 General Information

1.7.1.1 Definition

A. Submittals are defined below or in other sections of this document:

1. Construction drawings include the documents used to construct the project. These shall follow the Owner's standards and be created on the Owner's standard drawing sizes and title blocks.

2. Shop drawings include custom-prepared data of all types including drawings, diagrams, specifications, performance curves, material schedules, weld schedules, templates, instructions, and similar information.

3. Product data includes standard printed information on materials, products, and systems; not custom-prepared for this project, other than the designation of selections from available choices.

4. Samples include both fabricated and unfabricated physical examples of materials, products, and Work; both as complete units and as smaller portions of units of Work; either for limited visual inspection or (where indicated) for more detailed testing and analysis. Mock-ups are a special form of samples which are too large to be handled in the specified manner for transmittal of sample submittals.

B. Miscellaneous submittals are those technical reports, administrative submittals, certificates, and guarantees not defined as shop drawings, product data, or samples.

1. Technical reports include laboratory reports, tests, technical procedures, technical records, and Contractor's design analysis. Also included are environmental planning and compliance documents, reports, and other submittals for Idaho Department of Environmental Quality (MDEQ) or other governing agencies.

2. Administrative submittals are those non-technical submittals required by this document or deemed necessary for administrative records. These submittals include maintenance agreements, bonds, Project photographs, physical work records, statements of applicability, Project record data, schedules, security/protection/safety data, and similar type submittals.

3. Certificates and guarantees are those submittals on equipment and materials where a written certificate or guarantee from the Supplier is called for in the specifications.

C. Refer to the Master Appendix List which lists the minimum required submittals.

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1.7.1.2 Quality Requirements

A. Submittals such as shop drawings and product data shall be of suitable quality for legibility and reproduction purposes. Every line, character, and letter shall be clearly legible. Drawings issued by electronic media shall be useable for further reproduction to yield legible hard copy.

B. Documents submitted to Owner that do not conform to specified requirements shall be subject to rejection by Owner, and upon request by Owner, Contractor shall resubmit conforming documents. If conforming submittals cannot be obtained, such documents shall be retraced, redrawn, or photographically restored as may be necessary to meet such requirements. Contractor's (or his Subcontractor's) failure to initially satisfy the legibility quality requirements will not relieve Contractor (or his Subcontractors) from meeting the required schedule for submittal of shop drawings and product data.

1.7.1.3 Language and Dimensions

A. All primary dimensional units shall be shown in the English units, in addition to any other units.

B. All words shall be in the English language in addition to any other language, for use at the construction site.

1.7.1.4 Submittal Completeness

A. Submittals shall be complete with respect to dimensions, design criteria, materials of construction, and other information specified to enable Owner to review the information effectively.

B. Where standard drawings are furnished which cover a number of variations of the general class of equipment, each such drawing shall be individually annotated to describe exactly which parts of the drawing apply to the equipment being furnished. Use hatch marks to indicate variations that do not apply to the submittal. The use of "highlighting markers" is not an acceptable means of annotating submittals. Such annotation shall also include proper identification of the Submittal permanently attached to the drawing.

C. Reproductions or copies of drawings or portions thereof will not be accepted as complete fabrication or erection drawings.

1.7.1.5 Form of Submittals

A. Submittals and other Project documents shall be transmitted in electronic format as specified.

1. Selected submittals may be provided in paper ("hardcopy") copies with advance approval of Owner, and using the procedures specified herein.

2. Equipment instruction books and operating manuals shall be provided in paper copies in addition to specified electronic format.

B. Electronic Format

1. When practicable, scanned submittals and documents shall not be used. Transmit submittals and Project documents in:

- Nonproprietary, native electronic format incorporating any necessary reference files, or
- Adobe Portable Document Format (PDF) files created directly from native electronic format, or
- TIFF file format, or
- Owner-approved equal.
- For any given submittal, the filename and format shall be consistent for initial submission and subsequent revisions of the same. Use consistent naming convention throughout.
- Nonconforming Submittals are subject to rejection by Owner.

Provide "Construction Record" submittals, including drawings, documents, equipment instruction books and operating manuals, and other documents to the Owner. Construction Record drawings shall be submitted in formats specified in Section 1.7.8 below.

C. Digital delivery media may be transferred through Owner established file structure via the FTP site Box.com unless Contractor and Owner agree upon an alternative means.

D. Contractor shall provide and support a hosted submittal management system and facilitate access by all Owner reviewers. Software platform (Contract Management, Expedition, etc.) to be coordinated with and approved by Owner.

1.7.1.6 Conforming to Construction Records or As-Built Requirements

A. Submittals and Owner-supplied Project documentation including submittals and drawings shall be conformed to construction record conditions. Delivery format is detailed above.

B. Construction Record drawings shall be submitted for Owner approval following completion of the construction and no later than at time of Final Completion.

1.7.1.7 Engineering Change Notice

Contractor shall use the Owner's engineering change notice process, GA-304 for changes to approved drawings, unless Contractor has existing engineering change process which is accepted by Owner. GA-304 can be found in the Master Appendix List, Generation Design Drawing Standards.

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1.7.2 Submittals

Submittals shall be broken down into two categories: "Approval Required Submittals" and "Other Submittals."

A. Approval Required Submittals:

1. Shall be approved by the Owner prior to Contractor proceeding with design or release for fabrication or manufacture.

2. Shall be resubmitted on each revision for the number of times required to obtain approval. However, any need for re-submittals in excess of the number set forth in the accepted schedule, or any other delay under Contractor's responsibility, will not be grounds for extension of the Project Schedule.

3. Shall be as defined in the Deliverables List.

4. Shall be so marked on the transmittal to the Owner.

The approval of submittals by Owner does not relieve the Contractor or Supplier of the responsibility to meet requirements of the EPC Agreement or any legal responsibility for such designs.

B. Work relative to Approval Required Submittals, if commenced or shipped prior to the submittal having been stamped "AAS" (or "Approved as Submitted") or "AAN" (or "Approved as Noted") by Owner shall be performed at Contractor's risk. A copy or sample of each submittal shall be kept in good order by Contractor at the Site.

C. The remaining submittals, the Other Submittals, shall include the data included in Sections 1.7.4 and 1.7.5 and information as applicable to the particular equipment and materials and in accordance with applicable codes and standards.

1.7.2.1 Schedule of Submittals

A. Prepare for Owner's concurrence, a schedule for submission of all submittals specified or necessary for Owner's approval of the use of equipment and materials proposed for incorporation in the Work or needed for proper installation, operation, or maintenance. Submit the schedule with the procurement schedule and Work progress schedule. Schedule submission of all submittals to permit review, fabrication, and delivery in time to not cause a delay in the Work of Contractor or his Subcontractors or any other contractors as described herein.

B. In establishing schedule for submittals, allow fifteen (15) working days in Owner's office for reviewing original submittals and ten (10) working days in Owner's office for reviewing re-submittals. In the event a submittal contains an abnormally large amount of documents or a rapid sequence of submittals amounts to an abnormally large amount of documents, more than fifteen (15) working days should be allowed for Owner review.

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C. Submittals requiring revision shall be resubmitted within ten (10) working days after receipt of Owner's review notations.

D. The schedule shall indicate the anticipated dates of original submission for each item and Owner's approval thereof, and shall be based upon at least one resubmission of each item. A list of submittals (Submittal Schedule) with the schedule to be submitted shall also be submitted to Owner thirty (30) days after Limited Notice to Proceed.

E. Schedule all Approval Required Submittals required prior to fabrication or manufacture. Schedule submittals pertaining to storage, installation and operation at the site for Owner's acceptance prior to delivery of the equipment and materials.

F. Resubmit submittals the number of times required for Owner's "AAS" or "AAN." However, any need for re-submittals in excess of the number set forth in the accepted schedule, or any other delay in obtaining approval of Submittals, will not be grounds for extension of the schedule, provided Owner completes its reviews within the times specified.

G. Where a submittal is required by the EPC Agreement or the accepted Deliverable Schedule, any related Work performed prior to Owner's review and approval of the pertaining submittal will be at the sole expense and responsibility of Contractor.

1.7.2.2 Transmittal of Submittals

A. Submittals of equipment and materials furnished by Subcontractors, manufacturers, and suppliers shall be submitted to Owner by Contractor.

B. Owner shall supply submittal naming conventions prior to beginning the submittal process.

C. Contractor shall utilize Owner's electronic document management system (ProjectWise) to facilitate all drawings, submittal reviews, RFI, PCN etc. Contractor shall procure any necessary software.

D. All submittals shall be in an electronic format (PDF is preferred). The file name and type shall be the same for all revisions and shall include the revision number at the end of the title.

E. All submittals shall be accompanied with a transmittal with the following information:

1. Contractor's file name/drawing number.
2. Contractor's revision number/letter.
3. Description of file/drawing title. (individual for each drawing)
4. Supplier/Sub-Supplier's name (if applicable).
5. Supplier/Sub-Supplier's drawing number (if applicable).
6. Supplier/Sub-Supplier's revision number (if applicable).

F. Each drawing sheet to be reviewed shall be in separate files to align with ProjectWise setup.

G. After checking and verifying, Contractor shall transmit submittals to Owner for acceptance as follows:

Identify each submittal by Project name and number, EPC Agreement title and number, and the specification section or drawing and article number attached to the file and in the letter of transmittal file. Unidentifiable submittals will be returned for proper identification.

H. Each submittal shall have its own cover sheet. Unidentifiable submittals will be returned for proper identification.

I. Check and annotate submittals of Subcontractors, suppliers, and manufacturers with Contractor's approval prior to transmitting them to Owner. Contractor's stamp of approval shall constitute a representation to Owner that Contractor has both determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, or Contractor assumes full responsibility for doing so, and that Contractor has coordinated each submittal with the requirements of the Work and the EPC Agreement.

J. Any deviations from the requirements of the EPC Agreement shall be called to the attention of Owner in the letter of transmittal document file.

K. Make all modifications noted or indicated by Owner and reissue revised document, copies, or samples until accepted. Direct specific attention in the document file, or on revised submittals, to changes other than the modifications called for by Owner on previous submittals. After submittals have been accepted, issue copies thereof for record. Files of accepted drawings transmitted for final distribution will not be further reviewed and are not to be revised. If errors are discovered during manufacture or fabrication, correct the submittal and resubmit for review.

L. Following completion of the Work and prior to final payment, furnish record documents and approved samples and shop drawings revised as necessary to indicate "conformed to construction record" conditions, updated to include all field modifications.

M. Keep a copy of each submittal or sample in good order at the Site.

N. Quantity Requirements:

1. Except as otherwise specified, transmit all Contractor's, Subcontractor's, manufacturer's, or fabricator's shop drawing submittals in the quantity as follows:

- Initial submittal: One electronic file plus one hard copy to Owner. Comments will be returned to Contractor in PDF format.

- Re-submittals: One electronic file to Owner. Comments will be returned to Contractor in PDF format.

- Submittal for Final Distribution: Electronic media plus one hard copy to Owner unless otherwise approved in writing by Owner.
- As-Constructed Prints: Electronic file plus one hard copy unless otherwise approved in writing by Owner.

2. Transmit Submittals of product data as follows:
   - Initial Submittal: Electronic file plus one hard copy to Owner. Comments will be returned to Contractor in PDF format.
   - Re-submittals: Electronic file plus one hard copy to Owner. Comments will be returned to Contractor in PDF format.
   - Submittal for Final Distribution: Electronic file plus one hard copy to Owner. Comments will be returned to Contractor in PDF format.
3. Transmit Submittals of material samples, color charts, and similar items as follows:
   - Initial Submittal: three (3) to Owner.
   - Re-submittals: three (3) to Owner.
   - Upon approval, one (1) Sample will be returned to Contractor.
4. Transmit submittals of equipment instruction books and operating manuals as follows:
   - Initial submittal: One (1) hard copy plus electronic file copies to Owner. Comments will be returned to Contractor in PDF format.
   - Re-submittals: One (1) hard copy plus electronic file copies to Owner. Comments will be returned to Contractor in PDF format.
5. Submittal for final distribution:
   - One (1) electronic media copy to Owner unless otherwise approved in writing by Owner.
6. Submittals for Reference Only
   - One (1) electronic copy and one hard copy to Owner.

O. Owner may copy and use for internal operations and staff training purposes any and all document submittals required by this document, whether or not such documents are copyrighted, at no additional cost to Owner.

P. Copies of the equipment erection drawings and other submittals required for the installation of equipment furnished by others under separate Agreement for installation under this

document, if any, will be transmitted to Contractor by Owner' in the final distribution of such Submittals.

1.7.2.3 Owner's Review

A. Owner will review and take appropriate action on Submittals in accordance with the accepted schedule of submittals. Owner's review and approval will be only to determine if the items of equipment and materials covered by the submittals will, after installation or incorporation in the Work, conform to the EPC Agreement and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Agreement.

B. Owner's review and approval will not extend to design data reflected in submittals which is peculiarly within the special expertise of Contractor or Contractor's Subcontractors or Suppliers. Review and approval of a component item as such will not indicate approval of the assembly in which the item functions.

C. Owner's review and approval of shop drawings, product data, or samples will not relieve Contractor of responsibility for any deviation from requirements of the EPC Agreement unless Contractor has in writing called Owner's attention to such deviation at the time of submission, and Owner has given written concurrence in and approval of the specific deviation. Approval by Owner shall not relieve Contractor from responsibility for errors or omissions in submittals.

1.7.2.4 Submittal Action Stamp

A. Owner's review action stamp, appropriately completed, will appear on all Submittals of Contractor when returned by Owner. Review status designations listed on Owner action stamp are defined as follows:

AAS – APPROVED AS SUBMITTED: Signifies that equipment or material represented by the submittal conforms to the design concept and complies with the intent of the EPC Agreement and is approved for incorporation in the Work. Contractor is to proceed with fabrication or procurement of the items and with related Work. All submittals shall be resubmitted until an Approved as Submitted status is achieved.

AAN – APPROVED AS NOTED: Signifies that equipment and material represented by the submittal conforms to the design concept and complies with the intent of the EPC Agreement and is approved for incorporation in the Work in accordance with Owner's notations. Contractor is to proceed with fabrication or procurement of the items and with related Work in accordance with Owner's notations and is to submit a revised submittal responsive to notations marked on the returned submittal or written in the letter of transmittal.

R&R – REVISE AND RESUBMIT (RESUBMIT): Signifies that equipment and material represented by the submittal does not conform to the design concept or comply with the intent of the EPC Agreement and is disapproved for use in the Work. R&R may also signify information is either insufficient in detail or contains discrepancies which prevent Owner from completing his review. Contractor is to resubmit revised information responsive to

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Owner's annotations on the returned submittal or written in the letter of transmittal. Fabrication or procurement of items represented by the submittal and related Work is not to proceed until the submittal is approved. IFI – ISSUED FOR INFORMATION – (For Reference, No Approval Required): Signifies submittals which are for supplementary information only; pamphlets, general information sheets, catalog cuts, standard sheets, bulletins and similar data, all of which are useful to Owner in design, operation, or maintenance, but which by their nature do not constitute a basis for determining that items represented thereby conform with the design concept or comply with the intent of the EPC Agreement. Owner reviews such submittals for general content but not for basic details.

PRELIMINARY - PRELIMINARY SUBMITTAL: Signifies submittals of such preliminary nature that a determination of conformance with the design concept or compliance with the intent of the EPC Agreement shall be deferred until additional information is furnished. Contractor is to submit such additional information to permit layout and related activities to proceed. Submittals may have data missing which is required to complete the review. Further submittal(s) to Owner once the submittal is complete is required by Contractor to fulfill Contractual obligations.

1.7.3 Miscellaneous Submittals

"Miscellaneous Submittals" are comprised of technical reports, administrative submittals, and guarantees which relate to the Work, but do not require Owner approval prior to proceeding with the Work. Miscellaneous submittals will be submitted in electronic media and one hard copy.

1.7.3.1 Transmittal of Miscellaneous Submittals

A. All Miscellaneous Submittals furnished by Subcontractors, manufacturers, and Suppliers shall be submitted to Owner by Contractor in electronic media with one hard copy unless otherwise specified.

1. Complete the Consumers Energy Submittal Form for each initial submittal issue and each submittal re-issue. Each submittal shall have its own cover sheet. Unidentifiable submittals will be returned for proper identification.

2. At the time of each submission, call to the attention of Owner in the transmittal files any deviations from requirements of this document

B. Quantity Requirements:

Technical reports and administrative submittals except as otherwise specified:

- Owner: One (1) electronic file and one (1) hard copy.

C. Written certificates and guarantees:

- Owner: One (1) electronic file and one (1) hard copy.

D. Test Reports:

1. Responsibilities of Contractor and Owner regarding tests and inspections of equipment and materials and completed Work are set forth elsewhere in this Scope of Work document.

2. The party specified responsible for testing or inspection shall in each case, unless otherwise specified, arrange for the testing laboratory or reporting agency to distribute test reports by electronic media and in addition as follows:

   - Owner: One (1) electronic copy plus one (1) hard copy.
   - Resident Project Representative: One (1) copy.
   - Contractor: As Required.
   - Manufacturer or supplier: As Required.

1.7.3.2 Owner's Review

A. Owner will review Miscellaneous Submittals for indications of Work or material deficiencies.

B. Owner will respond to Contractor on those Miscellaneous Submittals which indicate Work or material deficiency.

1.7.4 Submittal Drawing and Data Requirements

The following documents, as a minimum unless additional documents are specified by the Owner, shall be submitted to the Owner in accordance with the Submittal Schedule.

1. Technical Submittals/Equipment Data Sheets for all engineered equipment items to be provided as part of the Project. Data sheets shall include a concise description of performance rating, materials, and design data.

2. Test Procedures (functional and acceptance test procedures) including but not limited to concrete testing, subgrade testing, access road and crane pad suitability tests, substation power and control testing, and collection system PD testing.;

3. Operation and Maintenance Manuals for all Contractor supplied equipment;

4. Major equipment specifications;

5. Outline drawings with dimensions, weights, and foundation loading information, performance data, seating and bolting arrangement, and clearance for maintenance;

6. Sectional drawings showing materials and construction;

7. Characteristic equipment curves as available;

8. Electrical one-line and three line diagrams, control schematic diagrams, control wiring diagrams and cable schedule;

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9. Calculated total unit weights of large components of items of machinery and equipment as provided by equipment vendors (weights on drawings shall reflect dry and full weights).

10. Manufacturers' recommendations on types and quantities of lubricants to be used for each piece of equipment and list of consumables used during normal operation, such as filter elements, chemicals, oil, and other items as applicable. This data shall be compiled into a plant lubrication schedule, which shall summarize all lubricants required for ordering, indicating frequency of lubrication required;

11. Layout of custom fabricated panels and switchboards sufficient to review for human engineering features;

12. Minimum clearances for maintenance capability;

13. Lists of special tools furnished with the equipment (all special tools, except those supplied by PV Module supplier, for erection and maintenance are to be provided by the Contractor);

14. Requirements for storage and protection of equipment upon receipt and following installation, but prior to start-up.

15. System descriptions suitable for operations and maintenance training;

16. Short circuit calculations;

17. Load flow and equipment ratings calculations, including substation bus design calculations;

18. Grounding calculations;

19. Cable ampacity calculations;

20. Power loss calculations;

21. Other calculations as required by the Owner (including geotechnical and foundation calculations)

22. Spare parts list

23. Schematic drawings and detailed wiring drawings of control, protection, monitoring, and data acquisition schemes.

24. Communications block diagram and nameplate list for all systems and equipment utilizing any communications protocols and/or networks.

25. Process and Instrument Diagrams (P&ID's)

26. PV Module Installation Check Lists

27. PV Module Installation Inspection Procedure

28. Programmable device programs, configuration data, source code and settings, including that for SCADA, PV Module control and generator and system protection
29. Protection and Relay Coordination Study
30. Foundation designs, public road improvement designs, access road design including prism, cross section and profiles and other such civil designs for items in Contractor scope of work.

1.7.5 Submittal Document Review

The following classes of documents, as a minimum unless additional documents are requested by the Owner, shall be submitted for review.

1. Geotechnical Engineering Reports
2. Access road layout design and detail
3. Route Improvement design and detail
4. Erosion and sediment control plan
5. Storm Water Pollution Prevention Plan
6. Foundation design and details
7. Civil infrastructure design and details
8. Concrete specifications
9. Structural steel specifications
10. High Voltage equipment specifications and layout drawings
11. Medium Voltage equipment specifications and layout drawings
12. High Voltage cable plans and specifications
13. Medium Voltage cable plans and specifications
14. Low voltage (e.g. less than 1,000 V) cable specifications
15. Fiber optic cable design and specifications
16. Engineered equipment specifications
17. All electrical one-line, three line and schematic diagrams
18. Electrical grounding system calculations and details (PV Module sites and substation)
19. Site Plan

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20. General arrangement drawings
21. Test procedures
22. Rigging plans
23. Crane Management Plan
24. Job Book Table of Contents

1.7.6 Operating Manuals

Contractor shall submit a draft of the Operating Manual for the Owner's approval. The Operating Manual shall include manufacturers' instruction books for all electrical, mechanical, hydraulic, pneumatic, and electronic equipment incorporated into the Work. The Operating Manual to be supplied by Contractor will not include PV Module operating instructions. All manufacturers manuals shall be incorporated into the project Operating Manual with multiple volumes, indexed and placed in three ring binders, with volume and content clearly identified on the spine.

Commercial manuals are acceptable for inclusion in Operating Manuals. Contractor shall request the following information to be included in vendors' commercial manuals:

1. Installation, start-up and initial test instructions;
2. Operating instructions, including safety precautions; Maintenance procedures and routine adjustments; including detailed maintenance plans;
3. Parts illustrations, including parts lists adequate for the purpose of identifying and ordering replacement parts with designation of the number required per component, and lists of recommended spare parts for three (3) years of operation of any component;
4. Wiring diagrams for electrical equipment;
5. Hydraulic diagrams for hydraulic equipment;
6. Detailed descriptions of the functions of each principal component of a system;
7. Performance and nameplate data;
8. Alignment instructions;
9. Safety precautions;
10. Maintenance instructions, which shall include detailed assembly drawings with part numbers, parts lists, instructions for ordering spare parts, and complete preventative maintenance instructions required to ensure satisfactory performance and longevity of the equipment involved;

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11. Lubrication instructions, which shall list points to be greased or oiled, shall recommend type, grade, and temperature range of lubricants, and shall recommend frequency of lubrication; and

12. Lists of electrical relay settings and control and alarm contact settings.

1.7.7 Job Books

Job Books shall be supplied by the Contractor in the form specified in the Master Appendix List. Minimum expectations for the Job Books include the following items.

1. Completed Contractor's QA/QC Exhibits

2. Completed PV Module Supplier QA/QC checklists

3. Material certifications and testing information (mill certs, concrete compressive strength results, equipment factory test reports, etc.)

1.7.8 Record Drawings

A. Contractor shall provide to Owner, a complete set of "Record" drawings consisting, as a minimum, instrument lists, electrical schematics, one-line and three line electrical drawings, control logic diagrams, schematics, wiring diagrams, cable and conduit, underground or embedded conduit drawings, civil design drawings, and electrical studies at the completion of the project. Contractor shall also modify existing drawings that are affected by the Scope of Work.

   1. Contractor shall provide Record drawings locating all underground utilities dimensioned from permanent identifiable benchmarks or GIS location-controlled information may be substituted. Record drawings shall be provided using English customary units and the English language.

   2. All Record drawings shall be sealed by the Contractor's engineer registered in the State of Idaho. The Record drawings shall be provided to the Owner within eight (8) weeks after Substantial Completion.

   3. All record drawings shall be submitted in electronic format via ProjectWise.

   4. Record drawings shall also be submitted in CAD format for use in AutoCAD using Owner provided AutoCAD .dwg borders. CAD files and their associated PDF viewing files shall bear the same name with the exception of the file extension. These shall be issued as independent, stand-alone files which use only AutoCAD default fonts with no more than one reference file. Reference files shall be a single TIFF file unless determined necessary for the integrity of the drawing and is agreed upon by Owner and its Record Center representatives.

B. In addition, as-built collector system routing, junction box locations, bore locations, drain tile repair locations, and permanent civil infrastructure locations shall be provided in GIS format.

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Contractor shall provide coordinates Idaho State Plane Coordinates NAD83 of the project site(s), installed collector line at a minimum frequency of every one hundred (100) feet along tangents and every twenty-five (25) feet along the curves. Data shall be collected with GPS equipment capable of achieving an accuracy of 10 cm +/- (horizontal). Contractor shall provide make and model of GPS equipment to be used to Owner. A known survey control point shall be surveyed and checked against prior to each day's survey. Survey control points shall be provided by Owner or Owner's surveyor. Contractor deliverables shall include:

1. A shape file (.shp) with line work connecting the survey points.

2. A shape file (.shp)with survey points for all collection system splice locations, grounding locations and drain tile repairs locations.

1.8 ENVIRONMENTAL CONDITIONS

The BOP shall be designed by the Contractor to operate satisfactorily throughout the range of temperature and climatological conditions expected at the site. See section 2.0 Civil Structural for additional requirements. Approximate environmental design conditions for the site include the following:

1. Minimum low ambient temperature: Normal and extreme for Project Location per IEC 61400-1

2. Maximum high ambient temperature: Normal and extreme for Project Location per IEC 61400-1

3. Normal Humidity: Range of up to 95% relative humidity (IEC 61400-1).

4. Ice Accumulation – 0.75-inches at 10 meters shall be scaled up to the appropriate dimensions using the height, importance and topographic factors detailed in ASCE 7-10 section 10.4.

5. Combination wind load on ice covered structure – (50-year mean recurrence interval uniform ice thickness due to freezing rain with concurrent 3-second gust speed) gust speed of 40 mph, shall be scaled up to the appropriate dimensions using the height, importance and topographic factors detailed in ASCE 7-05 section 10.5

6. Lightning – Up to four (4) flashes per square kilometer per year (Vaisala-GAI, Inc. 1996-2000 Flash Density map). Lightning frequency estimates for each PV Module in the wind farm and component design to prevent lightening damage shall be in accordance the methods recommended in the current versions of NFPA 780 and IEC 61400-24.

7. NCDC Climate Records

    a) Average annual temperature: Per NDC Climate Normals for Project Location closest weather station

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b) Extreme low temperature (30 year dataset): Per NDC Climate Normals for Project Location closest weather station

c) Average days per year below -20° C (-4° F): Per NDC Climate Normals for Project Location closest weather station

d) Extreme high temperature (30 year dataset): Per NDC Climate Normals for Project Location closest weather station

1.9 SCHEDULE, MEETINGS, AND PROGRESS REPORTS

The Contractor, prior to commencement of work, shall furnish to the Owner for review and approval, an integrated Detailed Critical Path Method ("CPM") Network Diagram conforming to the dates specified in EPC Agreement Exhibit E and in accordance with EPC Agreement Exhibit DD, with a supporting CPM printout covering all Work. Allowances shall be made in this Detailed CPM Schedule for occurrences such as holidays, possible strikes, and inclement weather. The "by area" report shall have activities for engineering work (including submittal of preliminary and final documents and drawings), fabrication and delivery of equipment/material, installation, and shop testing. The "by start-up system" aspect of the report shall have activities for installation, inspection, examination, testing, and turnover on a system basis. The Contractor shall use Primavera 6 in the Owner's LoadSpring environment. Access to Primavera 6 will be provided upon approval of the Detailed CPM Network Diagram and Owner receipt of the native version of the schedule to uploaded into the database.

The Contractor's Detailed CPM Schedule shall be the basis for planning, scheduling, and executing the Work in accordance with the following guidelines:

- Each activity item shall be identified by a work activity description and number.
- Each activity shall indicate Contractor engineering and design document submittal dates, if applicable.
- Each activity shall indicate Contractor release for fabrication dates, if applicable.
- Each activity shall indicate Contractor's fabrication sequences, if applicable.
- Each activity shall indicate material and/or equipment on Jobsite dates for both Owner-furnished items and Contractor-furnished items. Delivery dates for Contractor stored material for which Contractor expects payment prior to installation shall also be identified on Contractor's detailed schedule.
- Each activity shall indicate any outage requirements for tie-in to existing systems as applicable.
- Each activity shall indicate any restraint placed upon its starting and/or, completion whether it is Contractor or Owner furnished and/or controlled.

- Each activity shall provide information concerning labor-hours, bulk quantities such that this information can be cross referenced and balanced with the information provided on the SOV.
- Activities for periodic testing and hold points for inspections.
- Schedules in support of outages or other specified projects will require further levels of detail as described in the Contract documents.
- Include Owner review period for all submittals pertaining to activities such as engineering, design, shop fabrication, construction, testing, or other submittals as noted in section 1.3.6.
- Depending on the scope of the Contract, Contractor may be required to furnish two schedules, one for pre-outage Work and one for outage Work.
- Each Activity shall roll-up to the SOV and the man-hours/cost shall equal that of the original bid (unless otherwise approved by Owner).

The critical paths for the Work shall be identified and highlighted.

The Detailed CPM Schedule shall show the work activity descriptions and logic as a minimum. The requirements of this section shall be shown on the Detailed CPM Schedule or, at the Contractor's option, on supporting CPM printouts.

The Detailed CPM Schedule indicating the construction "by area", including supporting CPM printouts, shall be revised and provided to the Owner by the Contractor weekly to reflect the status of Work through the end of the previous calendar week. The start-up activities report output of the Detailed CPM Schedule will be issued weekly after a date specified by the Owner. Weekly updates shall be in tabular report format and shall provide the following information by activity:

- Activity Number
- Activity Number Description
- Original Duration
- Remaining Duration
- Current Early Start (Actual Start)
- Current Early Finish (Actual Finish)
- Total Float
- Percent Complete
- Productivity Rates

The critical paths for the Work shall be updated, as required. Any changes shall be subject to approval by Owner. Updates for certain portions of the Work (such as start-up activities or complex construction activities) and outage support will be required more frequently and may be a detailed frag-net or a detailed system or subsystem schedule. Such updates may be required on a daily basis during intense construction and start-up periods.

Changes in the Work that affect existing activities, schedule or milestone dates, or duration of activities of the detailed CPM schedules or changes as specifically requested by Owner shall be added by Contractor to the detailed CPM schedule, including the CPM printout, within ten (10) calendar days after notification by Owner that such change shall be implemented. Any revision to Owner approved Baseline Schedule shall only occur after Owner issues the corresponding PCN.

Once Work has started on an activity, it shall not be modified into additional activities unless reviewed and approved by the Owner.

Changes or modifications to activities not started shall be submitted no less than one (1) month prior to starting Work on the activity.

Should Contractor complete a milestone prior to the scheduled date, the "float" shall be credited to Owner. Any such "float" may, at Owner's sole discretion, be used by Owner to accelerate other areas of the Project schedule. It is understood Owner and Contractor will work together to apply any "float" gained over the course of the Project whether through the efforts of Owner, Contractor, or other Contractors to the area that best fits the Project's needs.

The Contractor shall provide to the Owner for review, when requested, its daily/weekly Work activity or planning schedule which supports the Detailed CPM Schedules. The two week work plan CPM Schedule float reports, updates, and any special requested reports shall be submitted on a weekly basis.

Contractor shall participate in regular meeting and submit progress reports to Owner, including Plan of the Day (POD) reports, monthly status reports, and schedule progress reports, in accordance with the Master Appendix List.

1.10 REQUEST FOR INFORMATION

The Contractor shall follow Owner's Request for Information (RFI) Procedure and use Owner's RFI Form for any and all information requests. The RFI Form is included as the Master Appendix List.

Owner shall supply Contractor with the required forms in electronic format. The Contractor shall provide sufficient detail in RFIs such that the Owner can respond to the request appropriately and timely.

Contractor shall provide Owner sufficient time to review and respond to RFIs. Contractor shall provide and support a hosted submittal/RFI management system and facilitate access by all Owner reviewers. Software platform (Contract Manager, Expedition, etc.) shall be coordinated with and approved by Owner.

1.11 HEALTH AND SAFETY PLAN

The Contractor shall prepare and deliver to Owner the Safety Plan and erect and maintain all necessary safeguards for the safety and protection of life and property at the Project Site, as required by the condition and progress of the Work and in accordance with the Safety Plan, Contractor shall ensure Contractor and Subcontractor compliance with the Safety Plan and any other Owner issued regulations and rules delivered to Contractor with respect to the Project Site.

1.12 ENVIRONMENTAL PLAN

The Contractor shall comply with all environmental requirements as set forth for the Project and included in different Project Permits. The Contractor shall not discharge any toxic, poisonous or polluted effluents onto the Project Site or into any running or stagnant water at any time.

The Contractor shall develop and submit to Owner for review an Environmental Plan for the construction phase of the Project. The Environmental Plan shall to reflect the terms of all permits, the land lease agreement, and Prudent Wind Industry Practices. Aspects of the plan should include, but not be limited to:

- Storm water control and erosion protection
- Waste management (including hazardous wastes)
- Spill prevention, control, and countermeasure
- Wetland protection
- Dust control

The Environmental Plan shall be completed by the Contractor and approved by the Owner prior to the start of any work at the Site.

Contractor shall utilize dust suppression procedures per the project Dust Control Plan to reduce the impact of dust at the Project Site.

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2.0 Civil Structural

2.1 CIVIL, STRUCTURAL, AND ARCHITECTURAL DESIGN AND EQUIPMENT REQUIREMENTS

2.1.1 General

A. The design shall consider all applied loads including dead, live, impact, thermal, dynamic, settlement, movement, wind, seismic, and other loading conditions where appropriate.

A. Temporary loads during maintenance and erection shall be considered.

B. All structures and structural elements, including array structures, shall be designed in accordance with all applicable local Building Codes and standards pertaining to the erection of such structures.

C. All structural components, including array structures shall be designed in a manner commensurate with attaining a minimum 30 year design life.

D. The design shall mitigate corrosion issues at the connections between dissimilar metals, especially at grounding points.

E. The design shall mitigate issues of corrosion of the racking and foundation at the ground interface level.

F. All design drawings and specifications produced shall be sealed by a Professional or Structural Engineer licensed to practice in the State of Idaho

G. Steel structures shall be designed by either the allowable strength design (ASD) method or load and resistance factor design (LRFD) method.

H. Reinforced concrete structures shall be designed by the strength design (SD) method.

2.1.2 Wind Loads

A. The design wind speed for the Facility shall be as required by the local Authorities Having Jurisdiction (AHJ).

B. All structures shall be designed per the design codes and standards listed in Section 1.2.1 with local amendments, or as required by the AHJ based on Contractor's overall system design components, at no additional cost to Owner, but in all cases, Contractor is ultimately responsible for system survivability.

C. PV Module support frames and foundation support systems shall be designed to allow the modules to function normally after a design wind event as indicated above.

D. Calculations documenting the design, deflection, and functionality shall be submitted for review and approval prior to construction of any systems in the field.

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E. For PV module support structure design only, Risk Category II shall be utilized to determine Basic Wind Speed and related importance factors, unless specified otherwise by the AHJ.

2.1.3 Seismic Loads

A. Structures shall be seismically designed in accordance with the design codes and standards listed in Section 1.2.1 with local amendments.

B. Contractor shall determine the appropriate Seismic Zone for the Site based on design codes and standards listed in Section 1.2.1 and design the structures accordingly.

C. For PV module support structure design only, Risk Category II shall be utilized to determine seismic importance factors, unless specified otherwise by the AHJ.

2.1.4 Factors of Safety

A. Minimum factors of safety for all structures, tanks, and equipment supports shall be as shown in Table 2.1.

Table 2.1. Factors of Safety

PARAMETER	FACTOR OF SAFETY
Overturning	1.50
Sliding	1.10 for seismic loads 1.50 for wind loads
Buoyancy at Design Water-Level	1.25
Uplift due to wind Frost Heave	1.50 2.50 or as specified by the Geotechnical Engineer

2.2 HYDROLOGY

A. The Site shall be designed to handle runoff from a 25-year storm and mitigate flood risks from a 25-year storm event, or as required by the AHJ, whichever is more stringent.

B. Contractor shall prepare a hydrology study for the pre- and post-development conditions of the Site in accordance with the requirements of the local jurisdiction.

C. The hydrology study shall evaluate any potential flooding for various storm events and make recommendations for flood mitigation and permitting if necessary.

D. The hydrology study shall identify any existing drainages within the Site and provide information on incoming storm water flows for various storm water events.

E. Increased imperviousness, diversion of existing drainage, and concentrating of storm water flows resulting from the development shall be studied for any potential impacts on the

downstream properties and mitigated as necessary. Such mitigation measures shall include the construction of storm water retention/infiltration basins, perforated pipes, dry wells, energy dissipator structures, etc.

F. Contractor shall be responsible for identifying and obtaining all permits as a result of water retention, detention, alteration within jurisdictional waters or discharge to surface waters.

2.2.1 Earthwork

A. Contractor shall prepare a grading and drainage plan for the proposed development in accordance with the hydrology study and pertinent recommendations in the Geotechnical Report.

B. The grading design for the Site shall follow the existing topographical features of the Site as much as possible to minimize the drainage impact.

C. The Contractor shall design and construct drainage mitigation measures, such as retention basin, detention basin, or similar structures to mitigate any increased drainage runoffs due to the post-development condition

D. Contractor shall design and construct compacted soil pads for the proposed control house building as applicable, and for various electrical equipment, including inverters, transformers, and switchgears. Pads shall be constructed in conformance with recommendations of the project geotechnical report.

E. The pads shall be designed to allow storm water to drain away from the structures and provide a finished surface elevation raised a minimum 12 inches above 100-year flood elevations, or as required by the AHJ.

F. Contractor shall consider soil budgeting during the grading design.

G. Contractor shall submit the grading and drainage plan to the Owner for review prior to construction activities.

2.2.2 Geotechnical Report

A. The results of a detailed subsurface investigation shall be documented in a geotechnical engineering report certified by a qualified Geotechnical Engineer.

B. The Geotechnical Engineer shall be familiar with the various types of soil that exist in the area of the development, including the geologic and seismic conditions.

C. The geotechnical report shall outline the following:

1. General subsurface conditions, including:
    a. Subsoil description
    b. Soil classification

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c. Physical/engineering properties of soil
d. Ground surface and groundwater elevations
e. Infiltration rates for drainage retention facilities, where applicable
f. Representative soil profiles (cross sections)

2. Geological hazards and considerations, including:
   a. Fault surface rupture
   b. Seismic shaking
   c. Seismic zone site class and related seismic parameters
   d. Liquefaction potential and related impacts
   e. Lateral spreading
   f. Erosion
   g. Expansive soil
   h. Subsidence
   i. Bearing capacities
   j. Settlement – gross and differential
   k. Corrosion – corrosivity and resistivity
   l. Scouring
   m. Frost heave
   n. Soil's resistivity and thermal conductivity

3. Earthwork recommendations, including:
   a. Clearing and site preparation
   b. Subgrade preparation
   c. Material for structural and non-structural fill
   d. Compaction requirements
   e. Wet/cold weather construction conditions and considerations
   f. Trench backfill
   g. Trench excavations
   h. Surface drainage considerations – temporary (during construction) and permanent

4. Conclusions and recommendations, including:
   a. Seismic design
   b. Foundation design recommendations including, but not limited to, allowable bearing pressure, settlement, friction coefficient, soil friction, soil passive

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pressure, depths, uplift and lateral loads and recommended in-situ field tests for verification of design parameters

c. Limitations

d. Soil resistivity and corrosion potential of anticipated foundation systems and underground utility materials used on Project

e. Paving and road section recommendations

5. Exhibits, including:

a. Site location map

b. Boring location map

c. Soil classification chart

d. Rock classification chart

e. Boring logs

6. The soils investigation shall also determine whether the soils are corrosive to buried concrete and ferrous metals, to support materials selection for foundations, underground piping and/or design of corrosion protection systems, as applicable.

7. The Contractor shall perform pile load tests for driven steel piles, where applicable. The pile load tests shall be in performed in accordance with ASTM D3966 and D3689.

8. The Contractor is responsible for furnishing all materials, products, accessories, tools, equipment, services, transportation, labor and supervision, and manufacturing techniques required for installation and testing of piles for this project.

9. The Contractor shall install piles that will develop the load (compression, uplift, and lateral) capacities specified by the racking system manufacturer.

10. The pile load capacities shall be verified by performance lateral load testing as required and must meet the test acceptance criteria specified by the racking system manufacturer.

2.2.3 Roads, Parking Lots, and other Surfacing

A. Contractor shall design and construct access roads connecting the Site to existing public roadways.

B. When applicable, access roads and interior roads shall also be provided for the substation, control building, along the perimeter of the Site (if required by the AHJ), and to all equipment pads in order to provide vehicular access for operation and maintenance of the system.

C. Access road and interior road width, turning radius and turn-around design requirements shall be verified with the Owner and AHJ, and shall be sufficient to allow access for

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anticipated deliveries, construction and maintenance vehicles and emergency personnel per applicable codes and regulations.

D. Aggregate roads shall be designed and constructed to provide year-round access for Facilities Operation and Maintenance.

E. Roads shall be designed to withstand loading from anticipated delivery, construction, and maintenance vehicles. Structural section of the access road shall conform to the Geotechnical Engineer recommendations.

F. All road surfaces shall be designed to allow for proper drainage (ponding of water is not acceptable) and to allow transportation of normal maintenance equipment and materials throughout the Site.

G. All roads shall be designed to meet Owner's insurance requirements.

H. Bollards shall be placed to provide protection to people and equipment. Contractor to verify placement of bollards with the Owner prior to installation.

I. Contractor-provided temporary roads within the Site as required for construction activities shall be removed as required or upgraded to meet the final Site requirements.

J. Hammerhead turn-around or Owner-approved alternate turn-around facility shall be provided at the terminus of a dead-end access road.

K. Road locations shall minimize the risk of materials entering public waters and minimize disturbance to stream channels, lakes, wetlands, and floodplains. Where viable alternatives exist, roads shall not be located on steep slopes, slide areas, or high-risk sites, or in wetlands, riparian management areas, channels, and floodplains.

L. When possible, locations of roads parallel to and in close proximity to streams shall be avoided because such locations have a higher than normal potential to deliver sediments directly into the channel. Stream and ditch crossings shall be as close to a right angle with the stream as possible in order to enter and exit the stream with minimal intrusion.

M. Alternative road locations shall be considered where natural resources are impacted. The most favorable road locations are those that provide the best combination of meeting objectives and minimizing economic and environmental costs.

N. Prior to the start of construction, the condition of the public roads to be used for hauling equipment and delivery of materials shall be documented by the Contractor with the AHJ, if required by the AHJ.

O. Unimproved public roads within the Project may require improvements to carry the vehicles likely to be used during construction and throughout the life of the Project. These improvements shall be coordinated with the AHJ. Any design and construction of these public roads by the Contractor shall be in accordance with local codes and regulations.

2.2.4 Solar Field Fencing and Signage

A. Security fencing shall be provided around the entire Site. Perimeter fence shall follow as close as possible the property boundary of the Project Site.

B. A separate security fence shall be provided around the substation (if applicable).

C. Contractor shall furnish and install a permanent fence around the entire Site and substation (if applicable) to provide for public safety in accordance with AHJ and Good Utility Industry Practices.

D. Fencing shall be chain-link with a minimum total height of 6 feet, unless specified otherwise by the AHJ.

E. Chain link fence member sizes and materials shall conform to Standard Specifications for Public Works Construction (SSPWC or the "Green Book"), latest edition.

F. Fence design shall also comply with the specifications from the latest version of the National Electric Code.

G. At a minimum, one personnel gate and one vehicle gate shall be provided at each project entrance, with an additional personnel gate at the control house, if applicable.

H. All gates shall have tamper proof gate hinges and hardware.

I. Gates along the perimeter shall have heavy duty bolt cutter resistant padlocks, except for gates with motorized access.

J. Gates shall be equipped with knox box, or as required by the local Fire Department.

K. Signage shall meet Owner’s insurance requirements and any local regulations.

L. Signage shall be per code requirements and provide adequate safety and property protection information.

M. At minimum every 100-foot interval on the perimeter shall have “Danger / High Voltage / Keep Out” warning signs, as shown in Figure 2.1, posted on the fence.

N. The sign should also indicate that trespassers will be prosecuted and cite applicable ordinance/laws and penalties that will be imposed on violators.

O. Text shall read in English.

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Figure 2.1. Example Warning Sign

P. Owner signage shall be provided at all gate entrances.

2.2.5 Hazard Warning Labels

A. The labels shall be in accordance with the NFPA, IEEE, the NEC, and the National Electric Safety Code.

B. Flash hazard markings shall be furnished for all medium voltage (MV) and low voltage (LV) switchgear, panel boards, control panels, and motor control centers.

C. The labels shall be located in a clearly visible area at each point of access to the equipment.

D. Equipment access includes but is not limited to breaker, starter, rear access, panel board, and auxiliary compartment doors.

E. Labels provided shall be in accordance with applicable ANSI codes and standards, and either one of the examples shown in Figure 2.2.

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Figure 2.2. Example Arc Flash Hazard Warning Labels

F. Signs shall use black lettering and border on white background.

G. The top banner background shall be orange for Warning signs and red for Danger signs, in accordance with safety colors defined in applicable ANSI codes and standards.

2.2.6 Foundation for Equipment and Structures

A. Foundations for equipment and structures shall as applicable comply with the following:

1. All concrete foundations and reinforcing steel shall be designed in accordance with applicable ACI and ASTM standards.

2. All concrete foundations for Owner-supplied equipment must meet Owner's requirements and specifications, as applicable.

3. All foundations shall be designed and built in accordance with the equipment to be mounted on the foundation considering design loads, dimensions, weight distribution, height, seismic, etc.

4. Contractor shall provide a detailed structural analysis of the foundations and demonstrate that the design conforms to the applicable standards and codes.

5. Foundations shall be designed per the geotechnical report.

6. Contractor shall drill enough borings to determine the existing subsurface conditions.

7. Change orders related to unforeseen subsurface conditions shall be negotiated by the terms and conditions of the EPC Agreement. Contractor shall provide unit price for anticipated change order items related to unforeseen subsurface conditions.

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8. For ground-mounted systems, Contractor is responsible for designing foundations and supports as appropriate to withstand the 100-year storm conditions and associated scour and/or frost heave, as applicable.

9. Grade floor elevations of buildings and the tops of foundations for major outdoor equipment at grade shall be at a minimum six inches above the high point of the finished grade elevation.

10. Minimum strength of concrete shall conform to the requirements shown in Table 2.2.

11. Concrete finish shall be broom swept with a ¾" chamfered edge

12. Reinforcing steel shall be ASTM A 615/A 615M Grade 60 (420) deformed billet-steel bar, unfinished.

13. Steel welded wire reinforcement shall be ASTM A 185/A 185M, plain type, flat sheets with 6x6 minimum mesh size and W5xW5 minimum wire gage, unless otherwise indicated in the construction documents.

14. Tie wire shall be annealed, minimum 18 gage.

15. Chairs, bolsters, bar supports, and spacers for the reinforcing steel shall be sized and shaped for adequate support of reinforcement during concrete placement.

16. Mechanical couplers shall be capable of developing 160 percent of the specified yield strength of the bar and shall develop a minimum of 10 times the yield point strain in the connected reinforcing bars.

17. All oil-filled step-up transformer and medium voltage pad-mount transformer foundations shall be reinforced concrete and shall have an integral spill containment area as per IEEE 980, or alternative spill remediation measures as set out by 40CFR 112. Containment area shall contain a sump for removal of liquids by portable pump.

18. Ground wires shall be embedded in foundations and stubbed up at their final location to prevent a tripping hazard.

2.2.7 Module Mounting System

A. The design specifications for the foundations of the module mounting system ("mounting system") shall be provided by Contractor as part of the mounting system design specifications.

B. The mounting system foundation shall be designed to withstand the soil chemistry of the Site location for a minimum of years without replacement

C. The mounting system including foundation design and support design shall be in compliance with the recommendations of the Geotechnical Report

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D. The foundation shall be designed to comply with all of the environmental conditions of the Site, including, but not limited to, corrosion and frost heave.

E. The mounting system shall be certified by UL or another approved testing agency to meet the requirements of UL Subject 2703.

F. Contractor shall provide detailed information on the material and design of the mounting system.

G. Contractor shall provide a detailed structural analysis of the foundations and demonstrate that the design conforms to the applicable standards and codes.

H. Contractor shall demonstrate that the modules will stay attached to the mounting structure under all environmental conditions specified by applicable codes, by providing wind load tests (either wind tunnel tests or computational fluid dynamics tests) and structural finite element analysis tests.

I. As part of the design review process (50%, 90%), the contractor shall submit all structural designs and calculations for the mounting system to Owner for review and approval prior to purchase of any mounting system equipment.

J. Contractor shall prepare a design to mitigate the effects of corrosive soils on the structural support system, which includes adding a sacrificial layer to the structural steel members, galvanizing and/or coating the structural steel members with additional epoxy coating.

K. The mounting system and modules shall have provisions to be continuously bonded and grounded to the ground grid system of the array.

L. Contractor shall install PV modules that comply with all requirements set forth in these Technical Specifications.

M. The mounting system shall be able to support a ground coverage ratio between 0.30 and 0.50.

N. Contractor shall warrant the following:

1. The PV module mounting system, with the PV modules attached thereto, shall be capable of withstanding all wind and weather conditions defined by the local building code without damage over its required 25-year operating lifetime.

2. The PV modules shall be installed and attached to the PV module mounting system according to the specifications and requirements defined by the PV module manufacturer.

3. The PV modules as installed and attached to the PV module mounting system shall not be exposed to a loading pressure in excess of the maximum loading pressure rating specified by the PV module manufacturer, when subjected to any wind and weather conditions over the entire range defined by the local building code.

2.2.8 Concrete Work

A. Reinforced concrete structures shall be designed and constructed in accordance with ACI 318, Building Code Requirements for Reinforced concrete.

B. Concrete work shall conform to the requirements of ACI 301, Specifications for Structural Concrete.

C. Concrete production, proportioning, and placing as well as the formwork, reinforcing, joints and embedded items, repair, curing, and protection shall all be in accordance with the applicable ACI standards and specifications.

D. The testing and frequency of testing shall be provided by Contractor in accordance with the requirements of the ACI and applicable ASTM standards.

E. Grout shall be prepackaged, non-shrinking grout requiring water only, suitable for the service.

F. Proportioning, mixing, placing temperature, surface preparation, and curing of grout shall be in accordance with manufacturer's requirements.

G. Contractor shall provide the required quality assurance testing.

H. Minimum concrete strength classes for the various structures shall be as shown in Table 2.2.

Table 2.2. Minimum Concrete Strength Classes

ITEM	MINIMUM ULTIMATE COMPRESSIVE STRENGTH FC' (PSI) (AT 28 DAYS)
Sub-grade leveling slab	2,000
Electrical duct bank encasement	2,000
Paving concrete	4,000
Foundations and structural concrete	4,000

I. Reinforcing bars shall be deformed bars conforming to ASTM A615, Grade 60.

J. Welded wire fabric shall conform to ASTM A185.

K. Cement shall be Portland cement conforming to ASTM C150, type as required by soil conditions.

L. Aggregates for normal weight concrete shall conform to ASTM C33.

M. Exposed concrete floors shall have a trowel or broom finish as appropriate for intended use and be sealed to provide chemical resistance where such exposure is possible.

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N. Concrete mix proportioning shall meet minimum ACI requirements based on exposure and class.

2.2.9 Steel Work

A. Steel structures for buildings and equipment support shall be designed, fabricated, and erected in accordance with ANSI/AISC 360 Specification for Structural Steel Building and ANSI/AISC 341, Seismic Provisions for Structural Steel Buildings.

B. Steel structures shall also conform to the applicable ASTM standards, the AWS codes, and the Research Council on Structural Connections' Specification for Structural Joints Using ASTM A325 or A490 bolts.

C. Materials for structural steel and miscellaneous steel shall conform to the requirements of the ASTM's Standard Specification for Structural Steel.

D. W-shapes and WT-shapes shall conform to ASTM A992 Grade 50.

E. M-shapes, S-shapes, HP-shapes, L-shapes, and C-shapes shall conform to ASTM A36.

F. All structural and miscellaneous steel shall be primed with a full 2.5 mils dry film thickness of an inorganic zinc primer or hot-dip galvanized.

G. Anchor bolts shall conform to ASTM F1554.

2.2.10 General Structural Welding

A. The Supplier is ultimately responsible for the qualification of welders or welding operators, whether his own or his sub-suppliers. Welder or welding operator performance qualification testing shall be performed under the full supervision and control of Supplier.

B. The welder and welding operator qualification records shall be available at the shop facility or construction site and shall be made available to the Purchaser for review when requested.

C. Owner reserves the right to review and inspect welds. Contractor is responsible for coordinating the review and inspection of welds with Owner

D. Fabrication, assembly, and erection shall be in accordance with the applicable AWS code.

E. Welding shall not be performed when surfaces of the parts to be welded are wet. The parts to be welded shall be protected from deleterious contamination and from rain, snow, and excessive wind during welding.

F. Prior to welding, the weld preparation and adjacent base material surfaces shall be cleaned and kept free from paint, oil, grease, dirt, scale, rust, and other foreign materials.

G. Acceptable cleaning solvents include new or redistilled acetone (acetone reclaimed by other methods shall not be used), alcohol (ethyl, methanol, or isopropanol), methyl ethyl ketone, or toluene (toluol). Halogenated cleaning solvents shall not be used for cleaning or degreasing.

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H. Tack welds that are to remain in the completed weld shall have their stopping and starting ends prepared by grinding or other suitable means for satisfactory incorporation into the completed weld. Tack welds that are to become part of the completed weld shall be visually examined; defective tack welds, including cracked tack welds, shall be removed.

I. Welded surfaces shall be uniform in width and size throughout their full length. The cover pass shall be free from coarse ripples, grooves, overlaps, abrupt ridges, and valleys. The surface condition of the finished welds shall be suitable for the proper interpretation of nondestructive examination. If the surface of the weld requires grinding to meet the above criteria, care shall be taken to avoid reducing the weld or base material below the minimum required thickness.

J. Fillet weld sizes greater than 5/16 inch (8 mm) shall require a minimum of two weld layers, except for those fillet weld joints welded with a mechanized or automatic welding process.

K. Welding slag and spatter shall be removed from all welds.

L. The responsible Supplier's welding inspector shall perform in-process visual inspections at suitable intervals during the fabrication and erection process to ensure the applicable requirements of the referenced code, design specification, and WPS are met. Such inspections, on a sampling basis, shall be performed prior to assembly, during assembly, and during welding.

M. All completed welds shall receive 100 percent VE.

N. Visual inspection of welds shall be performed prior to any painting, coating, or galvanizing. Visual weld examination acceptance criteria shall be in accordance with AWS D1.1 or D1.3.

2.2.11 Painting and Coatings

A. All outdoor structural and miscellaneous structural steel shall be galvanized in accordance with ASTM A123, ASTM A153, and ASTM A385.

B. All painting and coatings shall meet a minimum design life of 30 years.

C. Owner shall review Contractor's galvanization specification and approve all outdoor structural designs.

D. Surface preparation shall conform to SSPC-SP5 white metal blasting, with 2-3 mils surface profile.

E. A minimum corrosion allowance of 3/32-inch shall be added to both the flange and web of the steel posts.

F. For ground-mounted systems, depending on the corrosivity of the soils, additional coatings, such as high-performance epoxy with inert flake additive/reinforcement, high-performance

epoxy prime with polyurethane top coat, or inorganic zinc coat with polyamide epoxy and polyurethane top coat may be required to prevent corrosion.

G. Contractor shall touchup all paintings and coatings prior to project completion.

2.3 CIVIL, STRUCTURAL AND ARCHITECTURAL INSTALLATION REQUIREMENTS

This Section describes Owner's requirements for the methods and means of installation for the Facility.

A. Contractor is responsible for construction of a fully operational and functional Facility as set forth in this Specification, unless otherwise approved by Owner.

2.3.1 Site Development and Earthwork

A. Environmentally and culturally sensitive areas shall be identified and protected during construction.

B. Contractor shall comply with permits and instructions from the local AHJs with respect to the required archeological surveys.

C. Contractor shall coordinate the grading activity with the onsite Archeologist and Biologist on a daily basis or as required by the AHJ.

D. Contractor is responsible for landscaping plans, tree mitigation, floodplain mitigation and wetland mitigation, if required by the AHJ. Contractor to verify with the Owner the plans and mitigations prior to construction.

E. Site grading shall be avoided or minimized wherever possible.

2.3.2 Clearing and Grubbing

A. Areas to be graded shall be cleared of vegetation as required for proper installation of roads and electrical equipment.

B. Additional clearing outside of graded areas may be required to avoid shading of the solar PV modules.

C. Grubbing shall be performed to remove organic materials and roots greater than 1 inch thick to a minimum depth of 6-inches below grade.

D. In select locations to be identified by the Geotechnical Engineer of record, grubbing to greater depths may be required.

E. In select locations individual trees, groups of trees, shrubs or other vegetation shall be protected during construction as indicated on the drawings or Owner request.

2.3.3 Disposal of Unusable Soils

A. Where possible, excavated materials usable for fills shall be spread across the Site.

B. These materials shall be graded so as to not interfere with proper drainage from the Site.

C. Unused materials shall be disposed of on the Site at a location approved by Owner.

2.3.4 Erosion Control

A. Temporary facilities shall be provided for control of wind and water erosion and turbid runoff during earthwork operations and from graded areas until they are stabilized.

B. Temporary facilities shall be acceptable to local AHJ.

C. Contractor shall be responsible for obtaining any necessary erosion control and dust control permits.

D. Permanent erosion control facilities for surface runoff as required for ditches and and stormwater control features such as riprap, headwalls, permanent vegetation,, rock surfacing, and slope pavement shall be provided and be acceptable to the AHJ.

2.3.5 Dust Control

A. Contractor shall be responsible for dust control during construction operations and shall adhere to all applicable codes and requirements of the local AHJ.

B. Water shall be used to control dust as required.

C. Dust palliatives, if allowed by applicable law and permits shall be used to control dust on all unpaved roads and any other non-vegetated areas if required by any approved dust control plans and environmental permits.

2.3.6 Existing Underground Facilities

A. Contractor shall be responsible for identification, protection, redesign, relocation, or removal of underground lines, services, obstructions, or other facilities present at the Site.

B. Contractor shall provide a utility improvement plan to the AHJ, if required.

C. Contractor shall be responsible for obtaining all existing utility drawings and contacting Miss Dig a minimum of three business days before earth disturbing activities commence at the Site.

D. Contractor shall be responsible for inspecting, cleaning, and filling of municipal/county drains, if applicable

2.3.7 Excavation

A. All excavations, sheeting, shoring, and temporary excavation support shall be performed in accordance with OSHA 29 CFR Part 1926 Subpart P, “Excavations.”

B. The stability of previously constructed structures and facilities shall not be impaired or endangered by excavation work.

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C. Contractor shall be responsible for dewatering and shoring of excavation Works.

D. All excavation shall be carried out and supported in such a manner as to prevent flooding or ponding of water and damage or interference to structure services, or stored equipment/materials.

E. The work shall include removing and disposing of unsuitable materials, such as organic matter, from areas on which fill is to be placed, and excavating and disposing of materials from area where existing grade is to be raised.

F. Unsuitable or unmitigated material shall be disposed of properly, as defined by the AHJ and Owner requirements.

G. Grading of cuts, fills, and drainage ditches shall be provided in accordance with approved grading plan.

2.3.8 Grading

A. Finish grading at the Site shall be sloped to prevent surface pooling and promote surface drainage away from equipment and structures and to provide drainage.

B. Grading shall meet the requirements specified by the manufacturer of the module mounting system.

C. Under no circumstances shall an increase in storm water rate or quantity be directed toward adjacent residential areas.

D. Contractor shall provide the Owner with an as-built survey drawing of grading and drainage prior to site construction.

2.3.9 Fill

A. Fill material shall be approved material in accordance with the soils report and suitable for the intended purpose. It shall not include materials hazardous to health, materials susceptible to attack by ground or ground water chemicals, materials susceptible to swelling or shrinkage under changes in moisture content, highly organic or chemically contaminated materials, rocks larger than three (3) inches, or any other unacceptable materials.

B. Areas to be backfilled shall be prepared by removing unsuitable materials.

C. The bottom of excavations shall be examined for loose or soft areas. Such areas shall be excavated fully and backfilled with compacted fill.

D. Areas below foundations shall be over excavated to the depth below the bottom of foundations specified by the Geotechnical Engineer and backfilled with approved engineered fill.

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E. Areas below pavement shall be over excavated to the depth below the bottom of pavement specified by the Geotechnical Engineer and backfilled with engineered soil type A-2 or better (AASHTO Soil Classification System).

F. Backfilling shall be done in the layers of uniform thickness of six (6) to eight (8) inches or as recommended by the Geotechnical Engineer.

G. Soil in each layer shall be properly moistened to facilitate compaction to achieve the specified density, within -2 percent to +2 percent of optimum moisture content or as directed by the project's Geotechnical Engineer.

H. To verify compaction, representative field density and moisture-content tests shall be performed during compaction operations.

I. Granular load-bearing backfill shall be sound, durable coral rock, crushed rock, clean sand, and/or gravel.

J. Contractor is responsible for verifying acceptability of excavated soils for fill and for providing suitable fill material from other sources.

K. Trench bedding material shall be clean sand, as required.

L. If suitable for use, Contractor may use excavated material for trench bedding, free of organic material, compacted in eight-inch lifts, at optimum moisture content of standard proctor density, or as specified by the Geotechnical Engineer. Bedding material shall be free of rocks with any single dimension greater than half inch.

M. Where it is necessary to remove only a portion of the unsuitable materials and backfill, the backfilling operation shall begin by stabilizing the existing materials to enable proof rolling or normal construction equipment to operate thereon.

2.3.10 Compaction

A. Compaction of fill materials shall be carried out as soon as practicable after deposition of fill materials.

B. Fill shall be compacted to the densities appropriate to the design requirements, fill type, and depths of layers.

C. Structural fill supporting foundations, roads, and parking areas shall be compacted to a minimum of 95 percent of the modified proctor maximum dry density, in accordance with ASTM D1557, unless noted otherwise by the project Geotechnical Engineer.

D. Embankments, dikes, and backfill surrounding structures shall be compacted to a minimum of 95 percent, unless noted otherwise by the project Geotechnical Engineer.

E. General backfill shall be compacted to at least 90 percent, unless noted otherwise by the project Geotechnical Engineer.

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2.3.11 Site Restoration

A. All Site development areas disturbed during construction shall be stabilized and re-vegetated with an appropriate MDOT specified seed mixture and restored in accordance with the Site Grading Plan and Storm Water Pollution Prevention Plan (SWPPP) prepared by Contractor. All areas occupied by solar modules shall be planted with a grass seed mixture specifically intended for solar facilities and with a maximum growth height of 24 inches. Existing vegetation shall be disked or chemically treated to eliminate regrowth and allow the specified seed mixture to thrive. Minimum vegetation coverage by the specified seed mixture shall be 70% prior to acceptance by the Owner.

B. Contractor shall submit site restoration plan to Owner for approval.

2.4 TESTING AND INSPECTIONS

A. A program shall be utilized for testing soils during earthwork and when underground utilities and foundations are installed.

B. The program shall include the following:

1. In-place representative field density tests shall be performed, preferably at the frequencies specified in Table 2.3, in accordance with ASTM D2922.

2. The following frequencies shall be increased in areas where apparent difficulties exist:

Table 2.3. Testing Frequencies

FILL CLASS	TESTING AREA	FREQUENCY / CUBIC YARDS PER TEST
A	Structural Fill and Foundation Subgrades	250 (or 1600 ft2 of each lift, once per work shift, or one per foundation, whichever is more frequent)
B	Backfill Surrounding Structures	(Same as Class A)
B	Roads, Shoulders, and Parking Lots	650
C	General Backfill	1800

3. If a compacted area fails to meet the specified compaction requirements, two additional tests shall be performed for that area.

4. If the results of either of the two additional tests prove unsatisfactory, the area shall undergo additional compaction and testing until test results meet the minimum compaction requirements.

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5. Records of inspection and testing of soils to ensure compliance with design assumptions shall be turned over to Owner and shall comply with Prudent Industry Practices and the requirements of applicable Law and the local authority regarding notification and inspection.

6. Testing and inspections of structures shall be in accordance with the state building codes and other licensing requirements.

7. Concrete test cylinder sets shall be taken at the minimum rate of one set per day, but not less than once for each 150 cubic yards for slabs, foundations, or walls.

8. Concrete test cylinder sets for paving shall be taken at the minimum rate of one set per day, but not less than once for each 150 cubic yards, nor less than once for every 5,000 square feet.

9. As a minimum, one set of cylinders shall be taken for each equipment foundation, with the exception that one set of cylinders may be made for each concrete truck load where multiple small foundations are poured from a single load.

10. Test procedures shall be in accordance with the appropriate ASTM standards.

11. Copies of test data shall be provided to Owner.

12. Contractor shall utilize a system to validate type and grade of high-strength bolts by sampling and metallurgical testing.

13. A testing program of high-strength bolts and nuts shall be conducted by Contractor to ensure that each bolt shipment meets the appropriate ASTM standards for dimensional tolerances and material quality.

3.0 Major Equipment

3.1 GENERAL REQUIREMENTS

3.1.1 Facility Operating Noise Level Requirements

A. Contractor shall provide a Noise Level Study indicating that the Facility will not exceed a sound level of the lower of 65 dBA or the most restrictive local ordinance during the worst-case (i.e. when all equipment is in full operation), at any point along the site boundary that borders a residential structure or property that is designated as residential per local zoning ordinances.

1. Contractor's Noise Level Study shall include all site equipment including the local electric utility provided transformers.
2. Owner shall review and approve this Contractor's Noise Level Study.

3.1.2 Equipment Certifications

B. All utility-related items shall be furnished and installed in accordance with Local Electric Utility requirements. All required equipment certifications shall be verified prior to shipment.

C. All PV modules shall be listed under UL 1703 for not less than the maximum DC voltage of the solar PV array.

D. All Solar PV inverters shall be listed under UL 1741. Inverters designed to operate at greater than 1,000 Vdc shall also be listed under UL 62109.

E. All other equipment shall be listed or certified by UL or another Nationally Recognized Testing Laboratory (NRTL) as required by the applicable AHJs.

3.1.3 Solar PV Field

A. All equipment specified by Contractor shall be approved by Owner.

B. Design parameters other than those specified in this document shall be defined by Contractor and subject to approval by Owner.

C. PV module row pitch (post-to-post) shall be adequate to allow access for customary maintenance vehicles, such as a side by side ATV.

D. PV module strings – groups of PV modules electrically connected in series – shall be designed in accordance with the inverter manufacturer's maximum DC voltage input specifications and applicable code requirements for maximum operating DC voltage.

E. PV module arrays – groups of PV arrays electrically connected in parallel – shall be designed in accordance with the inverter manufacturer's maximum DC current and power input specifications and applicable code requirements for maximum operating DC current and power.

F. The maximum overall DC cable voltage drop shall be 2 percent.

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3.2 MAJOR EQUIPMENT REQUIREMENT

3.2.1 Photovoltaic Modules

A. PV modules shall be designed to produce electricity for a minimum of 30 years under the environmental conditions of the Site.

B. All PV modules shall have a minimum wattage rating of 320 W or greater.

C. The electricity generation capabilities of the PV modules shall meet or exceed the capabilities defined by the PV module electrical data sheet of the product.

D. Annual degradation shall be specified by the manufacturer.

E. PV modules shall comply with the following parameters to ensure maximum quality and performance.

1. Manufacturer.
    a. The PV module manufacturer shall be as agreed upon by Contractor and Owner or Owner's engineer.
2. All PV modules shall be listed as Tier 1 equipment as described by latest Bloomberg tiering report (BNEF).Manufacturer Experience.
    a. The manufacturer shall have at least five (5) years of experience manufacturing photovoltaic modules.
3. Manufacturing Capacity.
    a. The manufacturer shall have a current minimum manufacturing capacity of at least 100 MW per year.
4. Specification Sheet.
    a. The manufacturer/supplier shall provide detailed electrical and mechanical specification sheets for the PV module.
    b. The manufacturer shall provide the estimated annual degradation of the PV module and justify the value provided with historical production data.
    c. The maximum allowable annual degradation for PV modules used on this Facility shall be 0.5 percent or less per year.
5. Technology.
    a. The cell technology for the PV module shall be crystalline silicon (C-Si).
6. Codes and Standards.

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a. PV modules shall be listed under UL 1703 for not less than the maximum DC voltage of the solar PV array.

i. The certificates of factory/laboratories tests and compliance to the codes and standards referenced by the manufacturer shall be provided to Owner.

7. Labeling.

a. The PV modules shall be provided with a permanent label indicating, at a minimum, the following information:

i. Make/model

ii. Electrical characteristics, including open circuit voltage (Voc); short circuit current (Isc); maximum power point voltage (Vmpp); maximum power point current (Impp); nameplate power (W), and maximum series fuse size

iii. Temperature coefficients of Isc, Voc and nameplate power

iv. Nominal power conditions (e.g. STC, NOCT, etc.)

v. Environmental operating conditions

vi. Compliances with applicable standards (UL, IEC, CE, etc)

vii. Warnings of electrical hazard

viii. Maximum system voltage

ix. Date and location of manufacture, manufacturing code

x. Serial number

F. PV module Design and Construction.

1. The PV modules shall be new and, in order to maintain the homogeneity of the system, all cells and PV modules used throughout the Facility shall be supplied by the same manufacturer, be of the same make and model types, and shall have the same nameplate power rating.

2. The PV modules shall include factory installed power conductors and connectors.

a. 12 AWG or 4 mm^2 copper conductors, rated at 2,000 Vdc, with clearly defined and labeled polarities, PV WIRE type insulation, weather-proofed, UV resistant/outdoor rated and with locking-type plug-in connectors of single polarity with same environmental and electrical ratings as the power conductors.

b. PV module power conductors shall be of sufficient length to directly interconnect two adjacent PV modules (with 1” separation) in either landscape or portrait orientation.

c. PV module connector shall be listed under UL 6703 for not less than the maximum DC voltage of the solar PV array.

d. All PV modules shall have the same make and model number connectors.

3. The PV modules shall include a grounding lug, grounding hole, or some other tested grounding attachment mechanism (applicable for framed PV modules only).

4. Grounding attachment must specifically be approved by the AHJ.

5. The PV module framing, where provided, shall be corrosion-resistant, resistant to damage from snow, wind, hail and windblown dust and sand.

3.2.2 Required Manufacturer's Warranties

A. PV modules, at minimum, shall be supplied with a 10 year defects warranty and a 30 year performance warranty.

3.2.3 Required Spare Parts

A. Contractor shall provide an additional 0.1 percent or two pallets, whichever is greater, of the PV modules installed to be kept as spares.

B. Contractor shall provide storage on site for these panels in an Owner-approved weather-proof permanent storage enclosure.

3.2.4 PV Module Mounting System

A. The PV Module Mounting System shall meet the following specifications:

1. The design specifications for the foundations of the PV module mounting system ("Mounting System") shall be provided by Contractor as part of the mounting system design specifications.

2. The Mounting System foundation shall be designed to withstand the soil chemistry of the Site location (ground-mounted system) for a minimum of 30 years without replacement.

3. The foundation shall be designed to comply with all the environmental conditions of the Site.

4. The Mounting System shall be designed to withstand wind speeds up to the maximums specified by applicable codes, over its specified operating lifetime, without compromising its structural integrity for a minimum of 30 years.

5. The Mounting System and PV modules shall have provisions to be continuously bonded and grounded to the ground grid system of the array.

a. The Mounting System shall be certified to meet the requirements of UL 2703.

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6. The Mount System design shall ensure a minimum of 48" clearance between bottom of modules and ground, or a clearance to maintain bottom of module above site flood level, whichever is greater, unless otherwise approved by Owner.

7. The Mounting System shall be designed to be in compliance with the design criteria of the geotechnical report.

B. In addition to meeting the requirements of the Mounting System, Contractor shall:

1. Provide detailed information on the materials and design of the Mounting System.

2. Provide a detailed structural analysis of the foundations and demonstrate that the design conforms to the applicable standards and codes.

3. Demonstrate that the PV modules will stay attached to the Mounting System under all environmental conditions specified by applicable codes.

4. Ensure that the design of the Mounting System specifies the attachment of the PV modules to Mounting System in accordance with the mounting specifications provided by the PV module manufacturer.

5. Submit all structural designs and calculations for the Mounting System to Owner for review prior to purchase of any mounting system equipment.

   a. 50 percent, within 45 days of the Contract being executed

   b. 90 percent, within 90 days of the Contract being executed

   c. 100 percent, within 115 days of the Contract being executed

6. Contractor shall prepare a design to mitigate the effects of corrosive soils on the structural support system, which includes adding a sacrificial layer to the structural steel members, galvanizing and/or coating the structural steel members with additional epoxy coating as specified in the civil and structural sections of this specification.

7. Provide a detailed description of the method of installation for the Mounting System.

C. The Tracker system shall meet the following specifications:

1. The Tracker system shall withstand wind speeds up per Idaho Building Code, Exposure C (project specific) or the maximums specified by applicable codes, whichever are more conservative, over its specified operating lifetime, without compromising its structural integrity for a minimum of 30 years.

2. The Tracker system shall operate normally after high wind conditions have been cleared. Supplier shall provide for backup power if required for wind stowage.

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3. For single axis tracker, the system shall provide a tracking range of motion of at least 52°.

4. The Tracker system shall have provisions to be continuously bonded and grounded to the grounding electrode system of the array.

   a. The SAT system shall be certified to meet the requirements of UL 2703.

5. The Tracker system shall provide backtracking capabilities (optional).

6. The Tracker system shall provide communications and control capabilities that will communicate using a common protocol with commercially available third party plant monitoring or SCADA systems.

7. The control and communications system shall recover automatically (without human intervention) from a loss of power event.

8. The control and communications system shall provide for local manual control at the individual actuator motor level for manual stow and maintenance activities.

9. The Tracker system supplier shall submit all structural designs and calculations for the Tracker system for review prior to purchase of equipment but only after supplier has been given a Limited Notice to Proceed. Supplier shall provide structural calculation package for the Tracker system, including foundation design loads, signed and sealed by a Professional Engineer in the state of Idaho, to be submitted to the Authorities Having Jurisdiction (AHJ) for permitting. Supplier is responsible for addressing any comments and/or questions from the AHJ related to the permitting of the Tracker system and obtaining permit approval from the AHJ.

3.2.5 Required Manufacturer's Warranties

A. The PV module mounting manufacturer shall provide a product warranty of at least 25 years.

3.2.6 Required Spare Parts

A. All necessary hardware for at least two PV module racks shall be provided as spare parts.

3.2.7 Combiner Boxes

A. Each combiner shall include a fused connection between all ungrounded DC circuit wiring from PV strings to provide over-current and short-circuit protection.

B. The grounded DC circuit wiring from PV strings (if any) shall be connected to a terminal block and bus bar.

C. The combiner output circuit (homerun) shall be provided with a load-break disconnect switch with exterior lockable handle, rated for the voltage and current of the combined PV strings.

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D. The string fuses and fuse holders shall be finger-safe and rated according to the string DC current and voltage, and environmental conditions.

E. The power terminal blocks shall be rated for use with copper conductors and rated for continuous duty at 2,000 V DC and 90°C conductor and terminal temperature ratings.

F. The combiner shall be equipped with a mechanical ground lug and bus, rated for terminations with copper grounding conductors.

G. The combiner enclosure shall be outdoor-rated, weatherproof, fiberglass, NEMA 3R or NEMA 4 or NEMA 4X, and the doors shall be easily interchangeable.

H. The manufacturer shall supply a fully assembled combiner and shall provide detailed drawings, specifications sheets, mounting instructions, and maintenance requirements of its product.

I. Each combiner shall provide "touch-safe" power circuit terminations and include provisions for bolted terminations of the output power circuit to the inverter.

J. Surge protective devices shall be installed at the PV module side of the main disconnect switch.

K. Conduit entries into the combiner shall be from the side or bottom to prevent water ingress.

L. Each combiner shall include a provision for a padlock, including a padlock and key.

1. All padlocks shall be keyed the same.
2. Master Lock 1C444 or as specified by the Owner

M. The combiner door shall be interlocked with a load-break disconnect switch in such a manner that the door cannot be opened when the switch is "closed." In addition, the switch shall not be capable of being placed in the "closed" position unless the combiner door is fully closed.

1. An external door interlock defeat mechanism shall be provided to allow authorized personnel access to the interior of the combiner while the switch is in the closed position for periodic inspection, troubleshooting, and electrical field measurements.

N. The combiner shall be listed to UL 1741 for not less than the maximum DC voltage of the solar PV array, and rated for an operating temperature range of -40°C to +50°C.

O. Each combiner shall be suitable for application of permanent labels in the field and shall include electrical warning labels.

P. All information and warnings required by the National Electrical Code sections 690 and 705 shall be provided on a permanent label attached to each combiner.

Q. Arc Flash warning label not to include PPE requirements. The label shall be provided on a permanent label attached to each combiner.

3.2.8 Required Manufacturer's Warranties

A. Combiners shall have a manufacturer's warranty of at least 5 years.

3.2.9 Required Spare Parts

A. Contractor shall provide at least 1 spare combiner for every 2 MWac of installed capacity.

B. Each combiner shall include 4 spare fuses of each size and type.

3.2.10 Recombiner Boxes

A. Each recombiner shall provide a main DC disconnecting means.

B. Each recombiner shall be connected directly before the inverter input via throat connection.

C. Each recombiner shall also meet the following requirements:

1. The recombiner shall be listed to UL 1741 for not less than the maximum DC voltage of the solar PV array, and rated for an operating temperature range of -40°C to +50°C.
2. Up to 12 input circuits with configurations up to 1200 A
3. Overcurrent protection (fuses or breakers)
4. If fuses are used, load break disconnects shall be provided that meet the provisions of NFPA702014 (NEC) 690.16(A) and (B) (fuses: disconnecting means and fuse servicing).
5. 90°C rated terminals
6. Continuous duty rated
7. NEMA 3R or NEMA 4 or NEMA 4X
8. Each recombiner shall include a provision for a padlock, including a padlock and key.
9. All padlocks shall be keyed the same.
10. Ground bus
11. As an alternate, provide monitoring of PV output circuit currents.

D. Each recombiner shall be suitable for application of permanent labels in the field and shall include electrical warning labels.

E. All information and warnings required by the National Electrical Code sections 690 and 705 shall be provided on a permanent label attached to each recombiner.

3.2.11 Required Manufacturer's Warranties

A. Recombiners shall have a manufacturer's warranty of at least 5 years.

3.2.12 Required Spare Parts

A. Each recombiner shall include 4 spare overcurrent protection device of each size and type.

3.2.13 Solar PV Inverters

A. Inverters shall meet the following requirements:

1. The inverters shall include the necessary DC circuit breakers/disconnect switches, AC circuit breakers/disconnect switches, local controls, remote SCADA system interface,

grid operator control interfaces, and accessories necessary for the inverter to meet all code requirements and function properly as part of a power generation facility.

2. The AC disconnect switch if applicable shall be visible for its “open” and “close” position.
3. Environmental ratings: 20° to +50°C (4° to 122°F), Humidity: 15 % - 95%, non-condensing, 6,500 ft. elevation with derating.
4. >0.99 power factor above 20% rated power and adjustable.
5. Power factor capability at the point of interconnection shall be at least 0.9 leading and lagging and able to be actively controlled.
6. Power factor capability shall be compliant with the Connection Requirements.
7. Upon preliminary selection of the inverter make and model, Contractor will deliver to owner a location where this inverter in operation.
    a. Inverter manufacturer shall provide access for a site visit at this location by Owner or Owner’s Representative to perform sound level testing.
    b. Inverter must meet sound level requirements prior to proceeding with this equipment selection.
8. Inverter maximum input voltage shall be 1500 VDC unless otherwise approved by Owner.
9. Inverters shall be compliant with the most recent IEEE 1547standards.
10. Output current harmonics shall contain <3% total harmonic distortion (THD) at rated power output, per IEEE 519.
11. Inverter CEC efficiency shall be >97% without medium voltage step-up transformer.
12. Inverters located outdoors shall be enclosed in lockable, NEMA 3R enclosures.
13. Inverters shall be equipped with a ground fault detection and protection system that meets the requirements of the applicable version of NFPA 70 (NEC) section 690.5.
14. The Supplier's design shall include an analysis of the maximum anticipated operating temperature to ensure that the manufacturer's recommended operating temperature is not exceeded.
15. Enclosure shall have a door interlock system to prohibit the door(s) from being opened while energized.
16. Inverters shall incorporate a non-load break, lockable disconnect switch for main DC power disconnect for maintenance personnel safety.
17. Inverter output shall be protected by an AC output circuit breaker with short and long time adjustable over current protection.
18. This circuit breaker shall be externally operated or the inverter shall be equipped with an external on/off (start/stop) switch.

19. Inverters shall be capable of rated output at 40°C ambient or higher without derating.
20. Inverters shall employ a maximum power point tracking (MPPT) scheme to optimize inverter efficiency over the entire range of PV panel output for the given Site design conditions.
21. Inverters shall be equipped with all hardware for data collection and communication to the central SCADA server, including the ability to write to the control registers to reset inverter and modify AC output parameters, including power factor and maximum power.
22. Data collection points shall be integrated into the inverter monitoring and communications package with DNP3 protocol.
23. DC input shall have monitoring capability via DNP3.
24. Data collection points included shall be (at a minimum):
    a. AC Voltage
    b. DC Voltage
    c. AC Current
    d. DC current
    e. Real Power (kW)
    f. Reactive Power (kVAr)
    g. Apparent Power (kVA)
    h. Energy (kWh)
    i. Alarms
    j. Inverter status and faults (including ground fault interrupts)
    k. Met Station data

3.2.14 Required Manufacturer's Warranties

A. The inverter manufacturer shall provide a warranty of at least 5 years.

3.2.15 Required Spare Parts

A. If a repair is needed, the manufacturer shall provide the necessary spare parts and assume responsibility for the repair service under the warranty.

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3.3 INSTALLATION REQUIREMENTS

3.3.1 Photovoltaic Modules

A. PV modules shall be provided with the following information:

1. The PV module manufacturer shall provide results from flash testing of PV modules being provided.
2. This flash test shall be conducted with an AM1.5G calibrated solar filter to approximate the sun's true spectral distribution following ASTM E927-97(1997) Class A and IEC-904-9 ANSI standards and be made available to the Owner in electronic, CSV format.
3. The results of the flash test shall include, at a minimum, the following measured values: Isc, Voc, Impp, Vmpp, and Pmpp, solar irradiance and cell temperature.
4. The flash test data shall also include the PV module serial numbers and associated pallet numbers.
5. PV modules shall be shipped and delivered in clearly identified bins that indicate the number of PV modules and nominal power per PV module with a manifest of each serial number contained within.

B. Contractor shall clean debris off equipment by wiping down with a damp cloth. Contractor shall touchup rust spots.

3.3.2 PV Module Mounting System

A. The PV module mounting system shall be installed in accordance with the Mounting System manufacturer's written installation instructions.

B. The PV module mounting system shall be installed to meet the following requirements:

1. The PV modules as installed and attached to the PV module mounting system shall not be exposed to a loading pressure in excess of the maximum loading pressure rating specified by the PV module manufacturer, when subjected to any wind and weather conditions over the entire range defined by the local building code.

C. Contractor shall clean debris off equipment by wiping down with a damp cloth. Contractor shall touchup rust spots.

3.3.3 Recombiner and Combiner Box

A. Adequate room for wiring slack shall be provided inside of each combiner to allow for both PV module string wiring and PV output cable electrical voltage and current field measurements.

B. Contractor shall secure combiners such that the centerline is 48 inches above grade, unless otherwise accepted by the Owner.

C. Contractor shall install combiners to be plumb and level.

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D. Contractor shall permanently secure combiners on unistrut, piperack, pile, steel pier, or any other suitable means of permanent attachment, subject to the approval of the Owner.

E. Contractor shall clean debris off equipment by wiping down with a damp cloth. Contractor shall touchup rust spots.

3.3.4 Solar PV Inverters

A. Inverters shall be installed in accordance with the equipment manufacturer's installation instructions.

B. Contractor shall coordinate with inverter manufacturer to perform commissioning of the inverter when back-feed power is available.

C. Contractor shall clean debris off equipment by wiping down with a damp cloth. Contractor shall touchup rust spots.

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4.0 Collection System

4.1 ELECTRICAL DESIGN AND EQUIPMENT REQUIREMENTS

4.1.1 Inverter AC Disconnect Switches

A. Disconnect switches shall meet the following requirements:

1. Voltage and continuous current ratings as specified on the drawings.
2. Three-pole.
3. NEMA 3R, 4, or 4X rated enclosure as specified on the drawings.
4. Operating handle whose position is easily recognizable and which can be locked in the OFF position with multiple padlocks.
5. The ON and OFF positions shall be clearly marked.
6. The disconnect door shall be interlocked with the switch in such a manner that the door cannot be opened when the switch is "closed."
7. An external door interlock defeat mechanism shall be provided to allow authorized personnel access to the interior of disconnect while the switch is in the closed position for periodic inspection and troubleshooting.
8. NEMA rated.
9. UL listed.

4.1.2 Junction Boxes

A. Junction boxes shall meet the following requirements:

1. Indoor boxes (larger than switch, receptacle, or fixture type) and gutters shall be constructed of galvanized steel.
2. Outdoor boxes shall be NEMA 3R, 4 or 4X as required with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
3. Bolt-on junction box covers 915 mm (3 feet) square or larger or heavier than 11 kg (25 pounds) shall have rigid handles.
4. Covers larger than 915 by 1220 mm (3 by 4 feet) shall be split.
5. Boxes shall be sized in accordance with the minimum requirements of the National Electrical Code.

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4.1.3 Concrete Pull Boxes

A. Concrete pull boxes shall meet the following requirements:

1. Pre-cast reinforced concrete body.
2. Pre-cast reinforced cover.
3. Extensions, as necessary.

4.1.4 Low Voltage Dry-Type Transformers

A. Low voltage dry-type transformers shall meet the following requirements:

1. KVA, voltage and number of phases as indicated on the drawings.
2. Transformers shall have copper or aluminum windings.
3. Transformers shall be air-cooled, dry type, wall or floor mounted, self-ventilated and shall be class AA.
4. Transformer enclosures shall be NEMA 3R, 4, or 4X as specified on the drawings.
5. Transformers shall have a minimum of four 2-1/2 percent taps, two full-capacity above normal (FCAN) and two full-capacity below normal (FCBN).
6. Transformers shall be UL listed.
7. Transformers shall emit sound no greater than 40 dBA, under any operating condition.
    a. If a transformer emits sound greater than 40 dBA, supplier shall provide a means of reducing the sound level to the required level

4.1.5 Low Voltage Panelboards

A. Low voltage panelboards shall meet the following requirements:

1. Panels shall be designed and constructed to NEC and NEMA requirements and standards.
2. Panels shall be UL listed.
3. Panelboards shall be dead front with molded case circuit breakers of the size and type as specified on the drawings.
4. Panelboards shall be of voltage, current and phase ratings as indicated on the drawings.
5. Panelboards shall have a surface-mounted enclosure.
6. Enclosures shall be NEMA 1 for installations indoors, or NEMA 3R, 4 or 4X for installations outdoors as specified on the drawings.

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7. The enclosure shall have a hinged trim (cover).

8. Breaker operating handles shall be accessible via latched, lockable doors.

9. Circuit breakers shall be thermal magnetic, bolt-on and shall indicate "On," "Off," and "Tripped" positions.

10. Breakers with multiple poles shall be common trip.

11. Breakers shall have interrupting ratings as specified in the drawings and, if not specified, not less than 10kilo amperes.

12. Handle clips to prevent casual operation of breakers shall be provided for 10 percent (at least two) of the breakers and applied to the circuits directed.

13. Breakers and provisions for future breakers shall be provided in the quantities, number of poles, and ampere ratings indicated on the drawings.

14. The panel shall have copper phase, ground and neutral buses with ratings as specified on the drawings.

15. The panel shall have main lugs only or main circuit breaker as indicated on the drawings.

16. Surge protection devices (SPD) shall be included as indicated on the drawings.

17. Panelboard designed as distribution panel shall equip visible disconnect switch to identify the open and close position of the switch.

4.1.6 Medium Voltage, Pad-Mounted Transformers

A. This section covers compartmented, tamper-resistant, weatherproof, medium voltage, pad-mounted transformers. Transformers shall be designed, constructed, and tested in accordance with the applicable standards of ANSI C57, ANSI C57.12, NEMA, UL, and NEC, with the following list of specific standards.

B. Medium voltage, pad-mounted transformers shall meet the following requirements:

1. Labeling and signage requirements:

   a. A nameplate with unit description shall be provided on the interior and exterior of each transformer.

   b. An instruction nameplate shall be mounted in the low-voltage compartment and shall be readable with cables in place.

   c. All doors giving access to high-voltage parts shall be posted with DANGER - HIGH VOLTAGE - KEEP OUT signs.

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d. The signs shall be constructed of heavy gage aluminum, with red letters on a white background.

2. Transformers shall be rated for step-up operation with the direction of nominal power flow originating from the low voltage windings to the high voltage windings.

3. Transformer high voltage winding configuration shall be as indicated on the drawings and shall be compatible with the inverter(s) to be connected to the transformer.

4. Transformer low voltage winding configuration shall be as indicated on the drawings and compatible with the inverter(s) to be connected to the transformer.

5. Transformer secondary low voltage winding configuration shall have two or more windings if necessary for galvanic isolation as required for the inverter(s) to be connected to the transformer.

6. Frequency shall be 60 Hz.

7. For multiple transformers to be connected in a daisy-chain configuration transformer primary windings shall be loop type with feed-through inserts, integral fused disconnect switch and surge suppression as shown on the drawings.

8. The transformer shall be completely enclosed, with one high-voltage and one low-voltage compartment door.

9. The high-voltage side and low-voltage side compartment door shall be equipped with interlocking mechanism.

10. The enclosure shall be of tamper-resistant design.

11. The low-voltage compartment door shall have a 3-point latching mechanism with vault type handle and provisions for a single padlock.

12. If the low-voltage compartment contains exposed live parts the transformer shall be equipped with a removable protective insulating barrier to allow the low-voltage compartment door to be opened while the transformer is energized.

13. The doorsills shall be removable to permit the transformer to be rolled or skidded into place over conduit stubs.

14. A tank-grounding pad shall be furnished in each compartment.

15. Transformer shall be self-cooled type with less-flammable liquid-insulated type (KNAN).

16. Transformers shall meet efficiency standards set forth in the Department of Energy "Energy Conservation Program for Commercial Equipment: Distribution Transformers Energy Conservation Standards; Final Rule," latest edition.

17. Transformers shall be rated for inverter source operation.

18. The average temperature rise of the windings, measured by resistance, shall not exceed 65°C when the transformer is operated at rated kVA output at an average ambient temperature of 40°C or maximum site temperature, whichever is higher, over 24 hours, with a maximum of 50°C.

19. The primary winding shall have four 2 1/2 percent fully rated taps, two above and two below rated voltage.

20. The transformer tank shall be of sealed construction, with a welded cover.

21. The tank shall have provisions for installation by lifting, jacking, or rolling into position.

22. The transformer shall be equipped with a liquid level indicator; a pressure gauge; a temperature gauge; a pressure relief device; and standard provisions for filling, draining, and sampling. The oil sampling valve and pressure relief device shall be designed outside of electrical compartment so that operating of these devices will not require opening the transformer compartment door.

23. The high-voltage terminations and equipment shall be dead-front type conforming to ANSI C57.12.26.

24. Dead-front construction bushings shall be either universal bushing wells or one-piece integrated bushings for use with separable connectors.

25. Six bushing wells shall be provided with ratings as shown on the drawings.

26. Bushings shall be externally clamped and front removable.

27. Each bushing shall have an adjacent parking stand.

28. Transformer primary fuse and disconnect switches shall be furnished to isolate the transformer in case of an internal fault.

29. The transformer and switch configuration shall be designed for loop feed.

30. Switches shall be internal, liquid-immersed four-position load break type.

31. Switches shall be rated at 600 A continuous.

32. Bayonet type fuses shall be provided and shall be liquid-immersed, expulsion fuses accessible through the primary compartment.

33. The fuses shall be removable for external replacement of fuse links using a hot-stick tool without disassembly of the primary cabinet.

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34. The low voltage bushings shall be of molded epoxy, and shall be provided with blade-type spade terminals with NEMA standard hole spacing arranged for vertical takeoff.

35. The low voltage neutral shall be an insulated bushing, grounded to the tank by a removable link.

36. Each transformer shall have alarm contacts for the following conditions: oil level, oil pressure, and temperature. Terminal blocks for external connection shall be mounted in the low voltage compartment of the transformer.

37. All iron and steel surfaces, except stainless steel and machined surfaces, shall be shop painted with the manufacturer's standard coating to a minimum thickness of 3 mils.

38. Finish color shall be ANSI 61 for indoor and outdoor equipment.

39. A sufficient quantity of additional coating material and thinner shall be furnished to permit field touchup painting of damaged coatings. Contractor shall be responsible for any touchup painting of damaged coatings prior to final completion.

40. All standard factory tests required by the ANSI/IEEE C57.12.90 standard shall be performed.

41. Completed test reports shall be provided.

42. Transformer shall utilize a coal tar corrosion resistive coating, or equivalent, on the bottom 3 inches of the transformer base flanges.

4.1.7 Medium Voltage Switchgear

A. Medium voltage switchgear shall meet the following requirements:

1. Medium voltage switchgear shall be metal-clad or metal-enclosed of the configuration, size and type as specified on the drawings.

2. Switchgear shall conform to the applicable standards of the IEEE C37.20 series, ANSI/IEEE C37.100.1, NEMA SG4 and, SG5 and other relevant ANSI and IEEE C37 Series standards, UL, and NEC.

3. Nameplates:

   a. A master nameplate shall be attached to the switchgear giving switchgear designation, voltage and ampere rating, short circuit rating, manufacturer's name, general order number and item number.

   b. Each circuit breaker and instrument on the front of the switchgear shall have a suitable nameplate.

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c. Each control device and each control wire terminal block connection inside the units shall be identified with permanent nameplates or painted legends to match the identification on the manufacturer's wiring diagram.

4. Frequency rating shall be 60 Hz.

5. Switchgear enclosure shall be NEMA 1 for indoor locations, or NEMA 3R, 4 or 4X as indicated on the drawings for outdoor locations.

6. The lock for the enclosure shall be placed minimum 36 inches above grade level.

7. Switchgear lights, receptacles, heaters, and fans shall be served by an integral control power transformer.

8. The switchgear assembly shall consist of individual vertical sections housing various combinations of circuit breakers and auxiliaries, bolted together to form a rigid metal clad switchgear assembly. Metal side sheets shall serve as grounded barriers between adjacent structures.

9. The switchgear shall equip visible disconnect switch and observation window to identify the open and close position of the switch.

10. Circuit Breakers:

    a. The circuit breakers shall be three-pole, single-throw, and shall be furnished complete with all equipment on a draw-out carriage.

    b. The breakers shall be operated by a stored energy mechanism consisting of a heavy-duty spring, charged normally by a universal electric motor, and, in an emergency, by a manual handle.

    c. Each circuit breaker shall contain three vacuum interrupters, separately mounted in a self-contained, self-aligning housing which can be removed as a complete unit.

    d. Each vacuum interrupter shall be provided with a contact wear gap indicator which requires no tools to indicate available contact life, and is easily visible when the breaker is withdrawn on the extension rails.

11. Bus:

    a. The main bus shall consist of rigidly supported, tin-plated copper bars of suitable design and cross-sectional area to satisfactorily carry the rated current without exceeding the specified temperature rise.

    b. Bus supports shall be glass polyester inserts.

    c. The bus shall be capable of withstanding the magnetic forces imposed by short-circuit currents equal to the close and latch rating of the largest circuit breakers.

d. The current-carrying capacity shall be based on actual service conditions, including skin and proximity effect, insulation, steel enclosure, and an ambient temperature of 40°C.

e. The bus shall be de-rated in accordance with NEMA SG 5 for ambient temperatures higher than 40°C.

f. The bus shall be supplied in unit lengths that will permit the reassembly of the units in the field.

12. Grounding:

a. An uninsulated ground bus of tin-plated high conductivity copper, with momentary and short time ratings at least equal to those of the largest circuit breaker shall be furnished through the entire length of the switchgear.

b. A clamp type connector shall be provided on each end of the ground bus for external connection of a maximum 500 kcmil [240 mm^2] stranded copper grounding cable to the grounding system.

c. Provide a grounding disconnecting device between each circuit breaker removable element and the equipment ground bus which shall maintain contact at all times, except when the primary disconnecting devices are separated at a safe distance.

13. Auxiliary Contacts:

a. Each breaker shall be furnished with a sufficient number of auxiliary contacts and auxiliary switch contacts to provide all necessary interlocks for proper operation of the equipment.

b. Not less than two spare NO and two spare NC auxiliary contacts shall be furnished on each breaker.

c. All auxiliary contacts and auxiliary switch contacts, including spare contacts, shall be wired to terminal blocks for use with control circuits.

14. Potential Transformers and Current Transformers:

a. Insulated cable connections shall be furnished for the potential transformers and control power transformers.

b. The thermal and mechanical ratings of the current transformers shall be coordinated with the circuit breakers. Shorting terminal blocks shall be furnished on the secondary of all current transformers. Current transformers rated 600 amperes and smaller shall be of the wound type, with tin-plated primary

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terminals and insulated to withstand ANSI standard test voltages for the switchgear.

c. The accuracy of these current transformers shall be suitable for the meters and relays specified with the normal burdens of the various devices, and not less than ANSI standard accuracy classification of 0.3 with burdens B 0.1 and B 0.5, and 1.2 with burden B 2.0.

d. A compartment enclosed by metal plates shall be provided to house separately the current transformers in each unit.

e. Metal barriers shall isolate each current transformer from other component parts and adjacent circuits.

f. Potential and control power transformers shall be supplied in the quantities and of the ratings specified herein or specified on the drawings.

g. Potential or control power transformers up to 15 kVA single phase shall be mounted in a drawer or a tilt-out carriage in an auxiliary compartment.

15. Opening the drawer shall ground the primary fuses of the transformer and permit easy inspection, testing, and fuse replacement.

16. Shutters shall isolate primary bus stabs when drawers are withdrawn.

17. All circuit breaker control switches mounted on the front instrument panels shall be equipped with red, amber, and green indicating lights.

18. Green lights shall indicate breaker trip and shall be wired in series with a breaker auxiliary normally closed contact and control switch slip contacts, so the light will not be energized when the breaker is operated by the control switch.

19. Each electrically operated breaker shall be provided with a two-pole control power disconnecting and protective device in the closing circuit and another in the tripping circuit.

20. The disconnecting and protective device shall be either a molded-case circuit breaker or an enclosed fuse pullout.

21. Additional control devices shall consist of auxiliary relays and switches, control wiring and operating mechanism required for the particular breaker, an operation counter, a manually operated trip bar or lever, and provisions for manual closing.

22. Switchgear protective relays shall be of the draw-out type in a semi-flush mounting case, with test switches and devices incorporated in the relay unit.

23. Relays shall have hand reset indicators.

24. Relays shall have low burden, microprocessor based circuitry and shall meet or exceed ANSI/IEEE standards.

25. All settings shall be stored in non-volatile memory.

26. Relays shall be manufactured by Schweitzer, or Owner-approved alternate.

27. Microprocessor based metering and protection units shall be capable of monitoring and displaying values of phase amperes, phase voltage, watts, VARs, power factor, frequency, watt-hours, and watt demand shall be provided where shown on Drawings.

28. The protection functions shall include voltage phase loss, current phase loss, phase voltage unbalance, phase voltage reversal, over voltage and under voltage.

29. The protection functions shall comply with all ENEE, CREE, and CND requirements.

30. Microprocessor based multiphase and ground, instantaneous and time overcurrent relay (devices 50/51 and 50N/51N) shall have programmable trip parameters (time curve, time dial, timed pickup and instantaneous) accessible from the front of the unit.

31. Fault records for at least four faults shall be stored in memory for use in trouble-shooting and system analysis.

32. A lockout relay(s) (device 86), shall be wired to trip and close-block the bus tie and the associated incoming feeder breakers.

33. Owner Metering sections shall consist of a sheet steel enclosed stationary cubicle of sufficient width to provide the specified spacing and clearance required by the owner.

34. Utility Metering sections shall be included if required.

35. Control wiring shall terminate in approved, molded, screw type terminal blocks.

36. All secondary and control wiring within the high voltage compartment shall be completely shielded in a protective grounded metal covering and shall be stranded.

37. A separate direct current power system shall be provided for the control circuits and shall have ample capacity for the control functions indicated and shall be maintenance-free, lead-calcium alloy grid type assembly in polypropylene – heat sealed case, complete with inter-cell connectors and electrolyte.

38. The DC system shall provide 125 volts direct current for operation of the circuit breakers and any controls deemed necessary for the safe operation of the switchgear in accordance with all codes.

39. The battery system shall consist of individual cells with all interconnections, mounted on a rack suitable for Seismic for the seismic condition of the area they are to be installed.

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40. The battery rack shall be painted with two coats of acid-resistant paint before assembly.

41. The batteries shall have a minimum 240 ampere-hour capacity unless otherwise needed for the equipment as shown on the drawings.

42. The battery system shall be sized in accordance with IEEE Standard 485. Calculations shall be based on a 2-hour outage of the battery charger system with all the breakers tripping at the end of the 2-hour period.

43. The battery system shall be provided with complete hardware and software, Battery Monitoring System capable of automatically monitoring, displaying, recording all the battery parameters.

44. The charger shall be static type silicon rectifier with no moving parts and shall be equipped with automatic regulation and provision for adjusting the charging rate.

45. The output voltage shall be maintained within 1 percent from no-load to charger rated output amperes with AC input voltage variation of plus or minus 10 percent and input frequency variation of plus or minus 5-Hz.

46. Output voltage shall be provided with a suitable filter to allow the charger to be used as a DC power supply without battery.

47. The charger shall have sufficient capacity in order to provide the following:

    a. Supply the steady state load and float charge the battery between 2.20/2.24 volts per cell.

    b. Supply periodically and equalizing charge at 2.33 volts per cell.

    c. Supply the load demand without being connected to batteries

    d. Recharge the batteries from a 20 percent discharge condition to 80 percent of capacity within 2 hours.

48. Special tools, instruments, and accessories required for proper maintenance; and special devices for lifting or handling shall be furnished. The following accessories shall be supplied with the metal-clad switchgear.

    a. One set of special wrenches or tools required for installation, operation, or maintenance of the equipment.

    b. One test cabinet with test jumper for testing breakers out of the housing, for mounting on the wall, and wired for a power source separate from the switchgear control bus.

    c. One breaker lifting device and transfer truck for moving the circuit breaker into and out of the breaker housing.

d. One set of extension rails.

e. One maintenance closing lever for closing the circuit breakers.

f. One manual operating lever for moving the breaker element into and out of the operating position.

g. One set of test plugs suitable for testing the relays.

4.1.8 Lightning Protection

A. Lightning protection shall be determined in accordance with risk calculations included in NFPA 780-2014 using lightning flash density maps, or as specifically required by Owner.

B. Lightning protection with traditional air terminals shall be provided atop the following structures, as applicable:

1. Inverter/transformer canopies
2. Inverter walk-in enclosures
3. Control building
4. Meteorological Stations.
5. Other similar structures

C. Lightning protection equipment shall be either Class 1 or Class 2, depending on the height of the structure to be protected in accordance with NFPA 780 or UL 96.

D. Lightning protection equipment shall include, but not be limited to, the following:

1. Air terminals
2. Air terminal supports
3. Main conductor
4. Bonding conductor

E. Air terminals or other strike termination devices shall not be secured directly to the PV modules or the module mounting system.

F. Lightning protection equipment design and installation shall comply fully with the applicable requirements of NFPA 780-2014 Chapter 12.

G. All lightning protection equipment shall be UL listed.

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4.1.9 Raceways

A. Contractor shall design, provide, and install a complete electrical raceway, duct bank, or trench system as required by applicable codes and as specified herein.

B. Contractor shall separate conductors by voltage as required by applicable codes and standards.

C. Cables supported in free air as approved by the NEC are acceptable for installation of module wiring and harnesses to the combiner boxes as applicable. Fencing will be required to ensure not-readily accessible for the site.

D. Conduits shall be as specified in Section 4.1.11.

E. Conduit entrances shall be sealed.

4.1.10 Conduit

4.1.10.1 Rigid Metallic Conduit

A. RGS conduit shall meet the following requirements:

1. Hot dipped galvanized, corrosion resistant
2. Listed to UL 6 and UL 514B
3. Conform to ANSI C80.1
4. Fittings shall be threaded type and watertight
5. Used above grade or concrete encased

4.1.10.2 PVC Schedule 40 and Schedule 80 Conduit

A. PVC Schedule 40 and Schedule 80 conduit shall meet the following requirements:

1. Sunlight and UV Resistant
2. Listed for UL 651
3. Conform to NEMA TC-2

B. PVC Schedule 40 conduit can be used below grade.

C. Ridged galvanized conduit shall be used to transition from below grade to above grade and in locations exposed to physical damage. Schedule 80 shall not be used without Owner approval.

4.1.10.3 Liquid-tight Flexible Metallic Conduit (LFMC)

A. LFMC conduit shall meet the following requirements:

1. Hot dipped galvanized steel core
2. Flame retardant PVC jacket
3. Sunlight or UV resistant
4. Moisture and oil resistant
5. Listed to UL 360

B. Fittings shall be threaded type and watertight.

C. Shall be used above grade only and only where specifically allowed in these specifications.

4.1.11 Grounding Systems

Owner Grounding Specs shall be considered in the grounding design. The contractor shall compare the information in this section to the Owner Grounding Specs. The more stringent requirement shall prevail in the design.

A. All grounding systems shall be designed and provided as required by NEC, NESC, IEEE, and local code requirements.

B. All grounding systems shall comply with the following:

1. Ground loops shall be provided under/around major electrical equipment.
2. The grounding system shall consist of bare copper conductor and copper-clad steel as indicated on the drawings.
3. The system shall be designed to protect personnel and equipment at the Facility from the hazards that occur during power system faults and lightning strikes.
4. For ground grids below grade, each junction of the grid shall be bonded with exothermic weld.
5. Major items of equipment such as inverters and transformers shall have integral ground buses connected to the grounding electrode system.
6. Contractor shall route a grounding conductor parallel to all power conductors operating above 50 volts.
7. The module DC system grounding electrode(s) shall be common with, or bonded to, the AC grounding electrode as indicated in NEC Article 690.
8. All metal framed modules shall be grounded to meet the requirements of applicable codes and UL subject 2703.

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9. Module grounding shall be in compliance with module manufacturer recommendations for grounding.

4.1.12 Power and Control Wiring

4.1.12.1 General

A. Cables shall be selected with an insulation level applicable to the system voltage for which they are used and ampacities suitable for the load being served.

B. The type of cable used shall be determined by individual circuit requirements, temperature, and individual equipment manufacturer's recommendations.

C. Current carrying conductors shall be copper only.

D. All exposed wiring shall be clearly indicated as sunlight or UV resistant.

4.1.12.2 DC Power Cable

A. DC conductor in grounded and underground systems over 600V shall be listed and identified as 1000V or 2000V rated PV wire. The conductors shall meet the requirements of UL4703 and UL 854. The conductor shall be rated 90 degree C for wet or dry locations and be sunlight resistant.

B. DC conductors in ungrounded systems shall be rated for the voltage noted on the drawing.

C. The wire type shall be rated as sunlight resistant PV wire, insulated or jacketed with cross linked polyethylene (XLPE)

D. The conductor shall be stranded copper or aluminum.

4.1.12.3 Low Voltage AC Power Cable

A. Copper conductor.

B. All power and control cables shall be UL listed.

C. Cables shall be routed in UL listed wireway, conduit, direct buried PVC conduit, or underground duct banks, as required.

D. A maximum of 2 percent average ac voltage drop is acceptable in other ac circuits not associated with solar power production.

E. Less than 600 V ac applications:

1. Cable insulation levels shall be rated 600 V.

2. Conductors installed in PVC conduit are acceptable.

3. Low voltage power cables for loads up to 480 volts ac and control cables (i.e., 120 volts ac) shall have copper conductor with 600 volt class insulation.

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4. Power cables shall be Type XHHW-2 with concentric-lay, uncoated copper, strand B conductor, rated for normal maximum operating temperature of 90°C in wet and dry applications, cross-linked thermosetting polyethylene insulation, and conforming to ICEA S-95-658 (NEMA WC 70).

F. Between 600 V ac and 1000 V ac applications:

1. Cable insulation levels shall be rated 1000 V or higher.

2. Conductors installed in PVC conduit are acceptable.

3. Insulation and jacket materials on all conductors, regardless of location, shall be made from thermoset materials such as XLPE. No thermoplastic insulation or jacket materials are permitted for conductors. Cable insulation type shall be rated for wet locations, and have a temperature rating of 90° C or better.

4.1.12.4 Medium Voltage AC Power Cables

A. Medium voltage cable shall be rated for voltage noted on the drawings. Typically 15 kV, 25 kV and 35 kV. The cable shall be suitable for environment in which they are to be installed.

B. The cable shall be rated 90 or 105 degrees C for normal condition, 140 degrees C for emergency overload operation and 250 degrees C for short circuit condition.

C. The conductor shall be class B compress soft or annealed copper. Conductor shall meet electrical resistance requirement of UL 1072.

D. The conductor shield shall be an extruded layer of black-colored, semi conductive ethylene ethyl acrylate copolymer resin having allowable operating temperatures equal to or greater than those of the insulation.

E. The insulation shall be discharge – free no lead EPR, white colored flexible thermosetting dielectric based on an ethylene propylene elastomer.

F. The insulation shall be an extrude semi-conductive ethylene vinyl acetate copolymer resin.

G. A copper tape shall be included over the semi-conductive thermosetting material. The overall jacket shall be black no lead polyvinyl-chloride.

H. Termination kits shall be cold shrink stress control and outer insulation tubes along with stress relief mastic and rain shields if required.

I. Splices are not allowed without Owner' written approval.

J. Ground shields of cables at terminations. Ground metal bodies of terminators, cable, and separable insulated connector fitting and hardware.

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K. Ground concentric conductors of shielded cable as shown on the drawings. Maintain shield continuity and connector to metal connector hardware at all connection points.

4.1.12.5 Control System Cables

A. Control cables shall include those used for:

1. System control, alarms, contacts, etc.

B. Shall be Type THHN/THWN 600 volt rated with stranded, uncoated copper conductor, rated for normal maximum operating temperature of 90° C dry and 75° C wet applications, polyvinyl chloride insulation, jacket thickness of 4 mils minimum, and conforming to ICEA S-95-658 (NEMA WC 70) and UL 83.

4.1.12.6 Analog Instrumentation Cables

A. Analog instrumentation cables shall meet the following requirements:

1. Twisted Shielded Pair type
2. No less than16 AWG seven-strand
3. Concentric-lay
4. Uncoated copper conductor
5. Rated for normal maximum operating temperature of 90° C dry and 75° C wet applications
6. Polyvinyl chloride insulation not less 15 mils average thickness
7. Twisted pair of 1-1/2 inch to 2-1/2 inch (38.10 mm - 63.5 mm) lay
8. Shield consisting of combination aluminum-polyester tape and seven-strand
9. 20 AWG minimum tinned copper drain wire
10. With shield applied to achieve 100 percent cover over insulated conductors
11. Jacket thickness of 4 mils minimum
12. Conductor color identification with one black conductor and one white conductor
13. Conforming to UL 62 for Type TFN, and UL 1277 for vertical-tray flame test requirements.

4.1.12.7 Fiber Optic Cables

A. Fiber optic cable shall meet the following requirements:

1. 12 strand minimum multimode OM4

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2. Single armor (corrugated steel tape), single jacket when installed in conduit
3. Black polyethylene inner and outer jacket.
4. Nominal wall thickness of 0.06 inches.
5. Overall water swellable barrier tape with 25 percent overlap
6. Tensile load (installation) of 600 lbs.
7. Minimum bending radius 20 times cable diameter
8. Operating temperature -40 °C to 70 °C
9. Wet location sunlight resistant

4.1.12.8 Category 6 Cables

A. Category 6 cable shall meet the following requirements:

1. Sunlight, oil, and gas resistant.
2. Industrial grade.
3. Solid copper conductor.
4. Polyolefin insulation.
5. Black PVC jacket, 0.03 inches.
6. UL listed.
7. Operating temperature of -25° C to 75° C.
8. Cat6 or higher is also acceptable.
9. Wet location sunlight resistant

4.1.13 GFCI Receptacles

A. Ground fault circuit interrupting (GFCI) receptacles shall meet the following requirements:

1. Duplex type.
2. 125 volts.
3. 20 amperes.
4. Differential tripping at 5 mA.
5. NEMA configuration 5-20R.

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6. Interrupting rating of 1,000 amperes without damage.
7. 12 AWG copper TW wire insulated pigtails.
8. Conform to NEMA WD 1.
9. UL listed.

4.1.14 Light Switches

A. Light switches for standard lighting systems shall meet the following requirements:

1. 120 or 277 volts.
2. 20 amperes.
3. Screw terminals.
4. One-way or three-way switches, as required.
5. Totally-enclosed.
6. AC type.
7. Quiet tumbler.
8. Suitable for 100 percent tungsten filament or fluorescent lamp loads.
9. Weatherproof, gasketed enclosure
10. High conductivity copper.
11. Operating handles color selected by Owner.
12. Conform to NEMA WD 1.
13. UL listed.

4.1.15 Site Lighting

A. Site lighting shall be provided at the following locations:

1. Main system entrance
2. Entry doorways to all buildings
3. As an option, at all inverter / transformer pads.

B. Site lighting shall meet the following requirements:

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1. Site lighting shall include light fixture, mounting poles, lighting controls, etc., as applicable.
2. Light fixtures shall be suitable for outdoor locations.
3. Light fixtures shall be light emitting diode (LED) type and shall meet dark sky requirements if applicable to local codes and standards.
4. All site lighting equipment shall be UL listed.
5. Lighting control shall consist of a HAND-OFF-AUTO switch.
6. Photocells shall be used for automatic control.
7. Photocells shall be weatherproof, swivel adjustable, with built-in time delay to prevent accidental turnoff by momentary brightness.
8. Photocells shall be rated at 1800 VA, 120 volts ac.
9. Photocells shall be field adjustable from 1 ft./c turn-on to 15 ft./c turn-off.

C. Interior lighting shall be provided for all buildings and structures as applicable, to include emergency and exit lights with battery backup.

4.2 INSTALLATION REQUIREMENTS

This Section describes Owner's requirements for the methods and means of installation of the Solar PV Collection System for the Facility.

A. Contractor is responsible for construction of a fully operational and functional Facility as set forth in this Specification.

4.2.1 Lightning Protection

A. The lightning protection system shall be installed per NFPA 780, and UL 96A.

B. The lightning protection system shall be installed per the applicable standards and the National Electrical Code, including NFPA 780-2014 chapter 12.

4.2.2 Raceways

A. Conduits shall be installed as follows:

1. RGS only in any exterior application unless specified otherwise below.
2. LFMC for short runs of less than 3 feet to combiner if approved in advance by Owner.
3. PVC schedule 40 for underground and direct buried conduit.
4. RGS for above ground application or place exposed to physical damage.

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5. Raceway shall be concrete-encased where subject to vehicle traffic, as shown on the drawings.

6. Conduit, trench, and raceway sweeps and radius bends shall conform to the NEC for each type of conduit and size, as applicable

7. Conduit couplings that transition from one type of conduit to another shall be watertight and compatible with all materials in contact with the couplings

8. Trenching shall be required to meet all applicable codes and standards including IEEE 399 and 142, and minimum cover per the NEC and NESC.

9. Only clean, screened, sand or native backfill less than ½ inch diameter, free of any rocks and debris which are capable of harming cable jacketing shall be permitted for back-filling of trenches within 4 inches of direct buried conduit.

10. Backfill between 1 and 2 inches in diameter may be used for the remainder up to finished grade, compacted to 95 percent minimum.

11. Underground duct banks subject to vehicular traffic shall be concrete-encased, 3000 psi minimum, with PVC schedule 40 conduits buried at the depth required for direct buried conduits. Underground duct banks shall be dyed red.

12. Direct buried conductors shall not be utilized.

13. Conduit shall be used to route lighting, telephone, and communication circuits where installed above grade.

14. All raceway fittings in outdoor locations shall be rain-tight compression type, unless specified by Engineering in Record.

15. Where conduit terminates in a cabinet or box, the conductors shall be protected by an insulating bushing. The insulating fitting shall be suitable for bonding to ground in accordance with NEC 250.92.

4.2.3 Grounding Systems

A. All materials required for a complete grounding installation shall be furnished.

B. Grounding components shall include ground rods, ground conductor, ground bus, above and below grade grounding connections, grounding lugs, and any other hardware required for a complete grounding system.

C. Grounding shall be compliant with NEC, IEEE 80, and local AHJ.

D. Suitable grounding facilities shall be furnished on electrical equipment not so equipped.

Internal Use Only

E. The grounding facilities shall consist of irreversible compression type terminal connectors bolted to the equipment frame or enclosure.

F. The conduit and raceway system are not considered to be a grounding conductor.

G. No equipment grounding conductor shall be smaller in size than 12 AWG unless it is a part of an acceptable cable assembly.

H. All metallic equipment shall be connected to the equipment grounding network using appropriate bushings or other connectors.

I. All metallic raceway shall be bonded at both ends of the raceway.

J. Metallic raceway shall not be relied upon as the sole equipment ground connector. All circuits shall have a green or bare equipment ground conductor installed in the same raceway or trench.

4.2.3.1 Ground Rods

A. Ground rods shall be copper clad manufactured in accordance with UL 467 or approved by owner

B. The copper cladding shall be electrolytically bonded to the steel rod or bonded by a molten welding process.

C. Individual ground rods shall be 3/4 inch diameter and 10 feet long.

D. Stainless steel ground rods shall be installed where soils conditions are considered to be corrosive upon owner approval.

4.2.3.2 Conductors

A. Not required.

4.2.3.3 Bus Bars

A. Not required.

4.2.3.4 Compression Connection

A. Compression style lugs and terminations shall be rated for the maximum DC and AC voltage of the system.

B. The fitting must be pre-filled with oxide inhibitor.

C. Wire stripping and brushing of conductor in accordance with vendor specs is required immediately prior to lug installation.

D. Oxide inhibitor shall be applied to exposed conductor immediately after stripping and brushing and immediately prior to installation of the lug.

E. Used compression tool listed for use with selected compression connector.

F. A minimum 9 inches length of cold or heat shrink with a voltage rating equal to conductor shall be applied to cover the connection between crimp and the conductor beginning at the straight section of the crimp.

G. All connectors and corresponding crimping tools shall be UL listed for their specific application.

4.2.3.5 Exothermic Connections

A. Exothermal connections shall be a standard duty copper molten weld conforming to the requirements of IEEE 80.

B. Molds and powder cartridges used for making exothermal connections shall be furnished by the same manufacturer.

C. Exothermal connections shall be similar to Type CADWELD as manufactured by Erico, or an equivalent approved by Owner.

4.2.3.6 Ground Lugs

A. Ground lugs shall be two-hole type. Single-hole type (technical documentation required) can be used upon approval by Owner. The ground lugs shall be compliant with NEC based on the application, and compliant with the commissioning criteria for dissimilar metals.

B. Copper bars conforming to the requirements of IEEE 837 and UL 467.

C. Ground lugs used with the exothermal weld process shall be similar to Type LA as manufactured by Erico, or an Owner acceptable equal.

D. Ground lugs used with the compression process shall be similar to Type YGHA as manufactured by Burndy Electrical, or an Owner acceptable equal.

4.2.3.7 Grounding Installation

A. Grounding system components shall be installed as required by IEEE, NEC, NESC and applicable local codes.

4.2.4 Power and Control Cabling

4.2.4.1 Cable Installation

A. Cable installation shall be in accordance with the following general rules:

1. The contractor shall provide a demo DC cable management plan on site. The proposed DC cable management plan shall be approved by Owner prior to site-wide installation.

Internal Use Only

2. Cables shall be installed in accordance with the cable manufacturers' recommendations, circuit lists, raceway lists, the drawings, and these Technical Specifications and Scope of work.

3. Each circuit shall be assigned a unique number.

4. Cables shall be separated by voltage as required by NEC, regulation, and AHJ requirements.

5. All cable supports and securing devices shall be installed to provide adequate support without deformation of the cable jackets or insulation.

6. Oversized sunlight resistant nylon wire ties shall be utilized for bundling conductors for all exposed wiring.

7. Wire ties shall be snug but allow for thermal expansion.

8. Contractor shall identify both ends of the circuits with number and color-coding matching the drawings.

9. Contractor shall also identify all circuits at manholes and hand-holes.

10. Insulation should be color-coded and incorporated into a wire schedule.

11. All exposed wiring shall be neatly bundled so that exposed wiring is securely fastened.

12. PV string steel wire clips can be used upon Owner approval.

13. Exposed wiring running along metal surfaces shall be secured to prevent rubbing and damage from the metal surface or wire tie.

14. Maximum spacing of 24 inches on center between fastening locations shall be such that secured wiring is not free to move due to wind, snow, or other environmental conditions.

15. Use insulating foam spiral wrap, or other means to prevent contact with exposed bolt threads and sharp surfaces.

16. Phase tape shall be applied to each conductor at the terminations of all power and lighting circuits that are not already properly color coded.

    a. Green or bare copper shall be used for ground at every voltage level.

    b. Phase taping circuits shall not be required if cable with colored insulation is installed.

17. All energized conductors, connectors, and parts shall not be readily accessible

Table 4.2.1 Insulation Color Chart (Per Owner Approval)

CIRCUIT	COLOR CODE
208Y/120 V Circuits	Black – Phase A Red – Phase B Blue – Phase C White – Neutral
480Y/277 V Circuits	Brown – Phase A Orange – Phase B Yellow – Phase C Gray/White - Neutral
4160V Circuits and Above	Black – Phase A Red – Phase B Blue – Phase C
DC Circuits (Negatively Grounded System)	Black - DC Positive White – DC Negative
DC Circuits (Positively Grounded System)	White – DC Positive Black – DC Negative
DC Circuits (Floating System)	Red – DC Positive Black – DC Negative

B. Cable placement shall be in accordance with the following general rules:

1. Cable shall not be handled when the temperature is below the minimum temperature recommended by the manufacturer.
2. If cable heating is required prior to placement, the cable shall be stored in a heated building in accordance with the manufacturer's recommendations for at least 24 hours.
3. Cable shall be placed the same day it is removed from heated storage.
4. The pulling tension of any cable shall not exceed the maximum tension recommended by the cable manufacturer.
5. Pulling mechanisms of both the manual and power types used by Contractor shall have the rated capacity in tons clearly marked on the mechanism.
6. If any excessive strain develops, the pulling operation shall be stopped at once and the difficulty determined and corrected.
7. Cable shall not be pulled using trucks, forklifts, cranes, or other devices where the tension of the cable pull cannot be easily controlled.

Internal Use Only

8. Cable Grips: When pulling loops are used, the entire loop shall be cut off, discarded and recycled when the pull is completed.

9. Inspection: The outside of each cable reel shall be carefully inspected and protruding nails, fastenings, or other objects which might damage the cable shall be removed.

10. A thorough visual inspection for flaws, breaks, or abrasions in the cable sheath shall be made as the cable leaves the reel, and the pulling speed shall be slow enough to permit this inspection.

11. Damage to the sheath or finish of the cable shall be sufficient cause for rejecting the cable.

12. Cable damaged in any way during installation shall be replaced.

13. Cable Bends: Tape shielded, flat tape armored, and wire armored cable shall not be bent to a radius of less than 12 times the overall cable diameter.

14. All other cables shall not be bent to a radius of less than eight times the cable diameter.

15. Spare Conductors: All spare conductors of a multi-conductor cable shall be left at their maximum lengths for possible replacement of any other conductors in the cable.

16. Each spare conductor shall be neatly dressed for future use and marked as "spare <<number>>".

17. Lacing: UV rated ties shall be used to neatly lace together conductors entering switchboards and similar locations after the conductors have emerged from their supporting raceway and before they are attached to terminals.

18. Cable Identification

    a. Both ends of all circuits listed in the circuit list shall be identified with a circuit tag.

    b. Each marker shall bear the number of the circuit according to the Circuit List and drawings.

    c. At terminations, Contractor shall identify each circuit.

    d. Each phase of multiphase power circuits shall be individually identified.

    e. The circuit tag shall be so attached that it is readily visible for circuit identification.

4.2.4.2 Direct Buried Cables

A. None

4.2.4.3 Connectors

This Section defines methods of connecting cable between electrical systems and equipment.

Internal Use Only

In this section, the term "connector" is applied to devices that join two or more conductors or are used to terminate conductors at equipment terminals for the purpose of providing a continuous electrical path.

A. Connectors shall be installed as follows:

1. Connector material shall be compatible with the conductor material to avoid the occurrence of electrolytic action between metals.
2. All medium voltage and low voltage connectors shall be pressure type and secured by using a crimping tool.
3. The tool shall produce a crimp without damage to the conductor, but shall ensure a firm metal-to-metal contact.
4. The tool should be calibrated and approved by the manufacturer.
5. Low voltage terminations shall be permitted to be screw-down lugs where only screw-down lugs are available, such as molded case circuit breakers and control/instrument terminal blocks.
6. Medium voltage cables require stress cones at the termination of the cables.
7. Stress cones shall be of the preformed type suitable for the cable to which they are to be applied.
8. Cables shall not be spliced.
9. Joints and connections in cable other than cable terminations at equipment shall not be made.
10. Ring type connector shall be used for control wire.

4.2.4.4 Fiber Optic Cables

A. Contractor shall install fiber-optic cable and terminations as specified and in accordance with the cable and equipment manufacturer's recommendations.

B. All fiber-optic accessories required for a complete installation shall be supplied and installed by Contractor.

C. Examples of fiber-optic accessories include fan-out kits, end connections, dust caps, cleaving tools, polishing equipment, etc.

D. Fiber-optic cable furnished may be 62.5 micron multi-mode, 50 micron multi-mode.

Internal Use Only

4.2.4.5 Required Experience

A. Contractor personnel performing fiber-optic work shall be certified to perform termination for fiber-optic work, and shall use the connectors, tools, or other special equipment by the same Contractor as the equipment being installed.

B. Contractor shall furnish all required special tools.

C. Dust caps shall be installed on any un-terminated fiber-optic connectors.

4.2.4.6 Redundancy

A. A minimum of two spare fibers shall be terminated at each patch panel.

B. 3 loops of the extra fiber cable at each end.

4.2.4.7 Splicing

A. Splicing of fiber-optic cables shall not be allowed.

4.2.5 Site Lighting

A. Site lighting fixtures shall be installed in accordance with the equipment manufacturer's installation instructions.

B. Lighting fixtures shall be installed plumb and level and aimed as specified on the drawings, as applicable.

4.2.6 Low Voltage Dry-Type Transformer

A. Low voltage dry-type transformers shall be installed in accordance with the equipment manufacturer's installation instructions.

B. Mount transformers approximately where indicated on the drawings.

C. Load any vibration isolators external to the unit properly and provide complete isolation with no direct transformer unit metal in contact with the mounting surface.

D. Connect electrical circuits to transformers by means of moisture proof, flexible metallic conduit in a manner that prevents transformer vibrations from being transmitted to the building or other equipment.

E. Ground neutrals (when required) and enclosures of all transformers and all moisture proof flexible conduits in accordance with applicable codes and as otherwise may be indicated.

F. Connect voltage taps on all transformers to give as close as possible to rated output voltage under normal system load conditions.

G. Contractor shall clean debris off equipment by wiping down with a damp cloth. Contractor shall touchup rust spots.

4.2.7 Low Voltage Panelboards

A. Low voltage panelboards shall be installed in accordance with the equipment manufacturer's installation instructions.

B. Mount panelboards securely where indicated, plumb, in-line, and square with walls.

C. Unless otherwise indicated, mount panelboard with top of its cabinet approximately 6-feet above the finished floor.

D. Provide a typewritten circuit directory under a metal-framed transparent plastic cover inside each panelboard.

E. Provide an engraved, laminated plastic nameplate on the outside of the panelboard showing the panelboard designation, voltage, and phases.

F. Contractor shall clean debris off equipment by wiping down with a damp cloth. Contractor shall touchup rust spots.

4.2.8 Medium Voltage Pad-Mounted Transformers

A. Medium voltage, pad-mounted transformers shall be installed as specified on the drawings.

B. Transformers shall be installed in accordance with the equipment manufacturer’s installation instructions.

C. Contractor shall clean debris off equipment by wiping down with a damp cloth. Contractor shall touchup rust spots.

4.2.9 Medium Voltage Switchgear

A. Medium voltage switchgear shall be installed in accordance with the equipment manufacturer’s installation

B. All equipment requiring anchor bolts shall be provided with the anchor materials, complete with bolts, nuts, and washers.

C. Sills and anchor materials shall be shipped ahead of the scheduled equipment delivery to permit installation before concrete is placed.

D. The anchor bolts shall be designed for continued operation following a seismic event.

E. Anchor bolt calculations shall be provided and be signed/sealed by a Structural Professional Engineer.

F. Contractor shall clean debris off equipment by wiping down with a damp cloth. Contractor shall touchup rust spots.

Internal Use Only

4.2.10 GFCI Receptacles

A. GFCI receptacles shall be installed in accordance with the equipment manufacturer's installation instructions.

B. Mount receptacles with grounding slot down except where horizontal mounting is indicated, in which case mount with neutral slot up.

C. Ground receptacles to boxes with grounding wire, not by yoke or screw contact.

D. Mount weatherproof receptacles with the hinge for the protective cover above the receptacle opening.

E. GRCI design shall be individual connection. Daisy chained design is not acceptable.

4.2.11 Light Switches

A. Light switches shall be installed in accordance with the equipment manufacturer's installation instructions.

B. Mount switches for switch operation in the vertical position.

4.2.12 Disconnect Switches

A. Disconnect switches shall be installed in accordance with the equipment manufacturer's installation instructions.

B. Mount switches for switch operation in the vertical position.

C. Mount the associated surge protective device in accordance with the equipment manufacturer's installation instructions.

D. Mount the device so that the indicating panel is in the upright vertical position and can be easily seen.

E. Use the conductors supplied with the surge protective device.

F. Do not extend the length of the conductors for the surge protective device.

G. Contractor shall clean debris off equipment by wiping down with a damp cloth. Contractor shall touchup rust spots.

4.2.13 Equipment Location Tolerances

A. Equipment shall be located within +/- 0.5 inch of the dimensional location indicated on the drawing unless otherwise permitted by Owner.

B. Some equipment is indicated schematically without dimensions.

C. Contractor shall coordinate the location of this equipment with all other equipment or materials to be installed.

Internal Use Only

4.2.14 Alignment

A. Rigid components such as bus, bus duct, throat connections, and enclosures shall be aligned and connected with special care to prevent excessive stress in joints, supports, and connections.

B. Correct "spacing" hardware necessary for "turning" of field assemblies, usually tracker dampener shocks shall be used.

4.2.15 Bolted Electrical Connections

A. Where bolted connections are made between copper or brass surfaces, the metal surfaces shall be thoroughly cleaned and coated with a suitable anti-oxidizing compound.

B. It shall be Contractor's responsibility to certify that the tightness of each bolt in all bolted electrical connections is in accordance with the manufacturer's recommendations and the NEC.

C. Factory bolt torques shall be verified as part of the equipment checkout and test procedures.

D. Mark with torque scribe lines.

E. Bolted electrical connections shall be tightened with manual torque wrenches.

F. Torque wrenches shall be constructed and calibrated, so that they will visually or audibly indicate when the proper torque is reached.

G. Mark with scribe lines.

H. The tightened bolts in electrical connections shall be checked at random; 10 percent of the connections shall be reviewed and documented.

I. Contractor shall be responsible for coordinating the checking of bolt tightness, so that minimum interference with equipment installation and connections will be experienced.

J. If 1 percent of the 10 percent samplings fail, all connections should be re-torqued and witnessed.

4.2.16 Equipment Finishes

A. Surfaces of most electrical equipment, such as panels, switchgear, transformers, and circuit breakers are finished at the factory.

B. Care shall be exercised to prevent damage to this original finish during equipment installation and during construction work.

C. If factory finish is damaged during the course of construction, the damaged component shall be touched-up or refinished to the satisfaction of Owner, at no additional cost to Owner.

Internal Use Only

D. Refinishing paint, if furnished with the equipment, may be used; otherwise the paint shall be obtained from the equipment manufacture.

E. Procedure for paint application should be in accordance with the manufacturers' recommendation, including surface preparation and application of a primer coat.

4.3 EQUIPMENT TESTING

4.3.1 Ground System Testing

A. All ground resistance measurements shall be made with the Fall of Potential or slope methods as defined in IEEE 81.

B. After connection of ground rods to the ground system, Contractor shall obtain a ground resistance measurement from a selected location on the grounding electrode system, using methods approved by Owner. The racking grounding resistance shall be less than 25 ohms and the grounding grid around the transformer, service rack, major electrical gear, etc., shall be less than 5 ohms.

C. This data shall be obtained, identified, and recorded.

D. The ground resistance measurement data may indicate that additional ground rods are required.

E. Contractor shall furnish, install, and connect additional ground rods as necessary.

4.3.2 Electrical Testing

A. Contractor shall provide a third party electrical testing firm to perform testing of the electrical installation.

B. Electrical testing firm shall perform electrical testing in accordance with NETA Acceptance Testing Specifications (ATS) procedures and test forms.

C. Electrical testing field test personnel shall have a minimum of five years of experience performing the type of electrical tests, as required.

D. Electrical testing shall include, but not be limited to, the following equipment:

1. All electrical cables, including

    a. Low voltage AC power cables

    b. Medium voltage AC power cables

    c. Auxiliary power cables

    d. Control cables

    e. Analog Instrumentation cables

Internal Use Only

f. Fiber optic cables

2. Grounding systems

3. Dry-type transformers

4. Pad-mount transformers

5. Pad-mount switchgears

6. Panelboards

7. Relays

8. Metering devices

4.3.3 Testing

A. Contractor shall provide field-testing of all wire, cable, electrical devices and equipment, and electrical systems delivered and installed at the Facility.

B. The following items shall be performed, and procedures shall be followed:

1. Test protocol and forms shall conform to NETA Acceptance Testing Specifications.

2. Contractor shall prepare and submit an electrical testing plan to Owner for review and approval.

3. Owner shall be informed in writing a minimum of three days in advance of all scheduled testing in order to witness any such electrical testing.

4. Written records of all electrical tests showing date of test, test equipment used, personnel making test, equipment or material tested, tests performed, and results, including any deficiencies found shall be created and maintained by Contractor and shall be submitted for review by Owner.

5. All test reports shall include nameplate data of equipment being tested.

6. All tests on electrical equipment and systems shall be undertaken as directed by the manufacturer's field service representatives.

7. Contractor shall provide all necessary test equipment, labor, materials, and subcontracted testing services.

8. Contractor shall be responsible for any damage to equipment or material due to improper test procedures or test apparatus handling, and shall replace, or restore to original condition at Owner's discretion, any damaged equipment or material, at no additional cost to Owner.

Internal Use Only

9. Contractor shall provide and utilize safety devices during electrical testing including rubber gloves and blankets, protective screens and barriers, barricade tape, danger signs, etc., to adequately protect and warn personnel in the vicinity in which tests are being undertaken.

4.3.3.1 After Placement

A. Preoperational tests shall be performed on insulated conductors after installation, as follows:

1. Low voltage cables shall be either insulation resistance tested before connecting to equipment or functionally tested (at equipment operation voltage) as part of the checkout of the equipment and/or system.

2. Insulated conductors shall be continuity tested for correct conductor identification.

3. Direct buried cable shall be tested prior to and following backfill.

B. All circuits, including lighting circuits, shall be tested with the circuit complete except for connections to equipment.

C. All splices, stress cones on shielded cable, and terminal connector attachments shall be complete prior to testing. All splicing kit, tracking vault, protection jacket, and splicing coordinates shall be approved by Owner prior to installation.

D. Splice technician shall have experience in cable splicing of given voltage class and shall provide certificate of qualifications.

E. In addition to the tests performed after cable placement is complete, continuity tests shall be performed on all supervisory and communication cable before and after each splice is made.

F. Any circuit failing to test satisfactorily shall be replaced and then retested, at no additional cost to Owner.

G. All equipment and labor required for testing shall be furnished by Contractor.

4.3.3.2 Identification Testing

A. Identification tests shall include all tests necessary to confirm that the conductor being investigated originates and terminates at the locations designated in the Circuit List or indicated on the drawings.

4.3.3.3 Insulation Resistance Testing

A. All cables rated less than 5000 volts shall be insulation resistance tested, including:

1. Low voltage AC power cables

2. Medium Voltage power cables

3. Dry-type transformers

Internal Use Only

4. Pad-mount transformers

5. Pad-mount switchgears

B. Medium voltage power cable rated higher than 5000 volts shall be tested for Very Low Frequency (VLF) cable testing.

C. Insulation resistance testing shall be performed with a 1000-volt megger or an equivalent testing device.

D. Insulation resistance measurements shall be made between each conductor and ground and between each conductor and all other conductors of the same circuit.

E. The minimum acceptable resistance value shall be 500 megohms.

4.3.3.4 Continuity Testing

A. Continuity tests shall include all tests necessary to confirm that each conductor is continuous throughout its entire length.

4.3.3.5 Category 6 Cable Testing

A. All insulated conductors of communication cable shall be tested for continuity.

B. High performance cable certification shall be performed for the permanent link configuration and documented for all CAT6 cables.

C. Testing shall be accomplished with a Level II (CAT6e) compliant test set with a minimum spectral frequency range of 1 to 100 MHz (CAT6e).

D. The test specifications for all installed cables shall meet or exceed the specifications for CAT6e cabling, respectively, that are documented within the TIA/EIA-568-B.2.

E. Cables not achieving a PASS rating shall be corrected and re-certified.

F. Cables that cannot achieve a PASS rating shall be replaced and re-certified.

G. A rating of *PASS (marginally pass) or *FAIL (marginally fail) is not acceptable.

4.3.3.6 Fiber-Optic Testing

A. As a minimum, all testing shall conform to the requirements of ANSI/TIA/EIA-568B, optical fiber link performance testing, and TIA/EIA-526-14A, end-to-end attenuation testing.

B. Contractor shall submit test documentation to Owner that includes the circuit number, type of test, date of test, test results, etc.

C. In addition, Contractor shall submit installation, termination and as-built documentation to Owner as follows:

1. Circuit installation documentation shall include circuit number; origin and destination; routing; cable type, size, length; date of installation, etc.

2. Circuit termination documentation shall include circuit number; equipment termination locations; date(s) terminated; etc.

3. Modifications to the fiber-optic routing, if any.

4. Locations and details of any splice points not included in original Design Documentation, if any.

5.0 HV Substation (If Applicable)

5.1 GENERAL

Conceptual Collection Phase System Substation system one-line diagram and general arrangement drawings are included in the Master Appendix List. The Contractor is responsible for verifying the assumptions and completing the design.

Contractor shall engineer, procure and construct one (1) substation (voltage levels dependent on POI) including all grading and excavation work, crushed rock surfacing, foundations, ground grid, control building, bus work, bus supports, breakers, switches, station auxiliary transformer, surge arrestors, lightning protection, instrumentation and relays, programming, testing, and commissioning in accordance with Section 4 and 5. Such substation shall be at the location identified in the Master Appendix List.

- The Collection System Substation shall be an outdoor air-insulated conventional utility substation.

The Contractor shall procure equipment and services from reputable manufacturers or subcontractors who have supplied similar equipment and services for at least eight (8) years in the United States of America with proven designs, manufacturing and quality control processes and who are ISO registered, certified and compliant and accept Owner witness testing. All equipment to be used in the Collection System Substation shall be new and shall be subject to review and approval by Owner for compatibility with the existing electric system and ensure that the Collection System Substation can be operated safely, reliably and economically by Consumers operations and maintenance personnel.

- It is the responsibility of the Contractor to protect the materials and equipment against damage and theft until the Owner accepts the project.

The information provided herein shall be the minimum requirements for the engineering, design and installation of the substation. The Contractor shall be responsible for the complete design and supply of the fully functional Collection System Substation in accordance with the Agreement and the applicable standards and requirements.

5.2 DESIGN AND INSTALLATION REQUIREMENTS

5.2.1 Codes and Standards

The Collection System Substation shall be designed and installed to meet or exceed the requirements of the latest revisions of the National Electric Safety Code (NESC), American National Standards Institute (ANSI), Institute of Electrical and Electronic Engineers (IEEE) and all other applicable industry standards organizations that are applicable to electric utility substations and equipment included therein. The design and installation of the Collection System Substation shall comply with all federal, state and local regulations and codes and the specific requirements of the interconnecting utility. The Collection System Substation as designed and installed shall allow for

safe operation and maintenance of the facility in accordance with MIOSHA and OSHA regulations and Owner's operating policies and procedures.

5.2.2 Arrangement

The arrangement of the Collection System Substation shall provide for access by personnel, equipment, and vehicles as required to operate, inspect, maintain, repair and replace all substation equipment and materials. Whenever practical, the arrangement shall also allow the safe maintenance of equipment while the remainder of the Collection System Substation remains energized.

The arrangement design shall incorporate sufficient cutouts for maintenance and NERC required protective relay testing to be performed while the Collection System Substation is energized. Cutouts shall include CT, VT and a common cutout switch for relay inputs and outputs.

5.2.3 System Voltage

5.2.4 The Contractor shall determine the appropriate system voltage for the facility. Electrical Clearances

Preferred normal and minimal electrical clearances from energized parts shall be in accordance with the latest editions of IEEE, ANSI, NEC, and NEMA.

5.2.5 Noise Study

Contractor shall provide a noise study for the Collection System Substation demonstrating less than 45 dBA at the property line.

5.3 EQUIPMENT AND MATERIALS

5.3.1 Bus Conductors and Fittings

Collection System Substation buses shall be rigid. Each bus and all equipment connection conductors shall have a rated ampacity at least as great as that of the connected equipment and as required to carry the maximum load over the life of the facility.

Hot line taps (aluminum extension studs) shall be installed on a per phase basis for grounding purposes on all exiting bus structures.

Flexible connections for all equipment supplied shall be provided as required, ensuring continuity of service during thermal expansion or contraction, vibration and seismic activities. Contractor shall design the Collection System Substation buses in accordance with IEEE 605, IEEE Guide for Design of Substation Rigid-Bus Structures. Owner shall review the Collection System Substation bus design and calculations.

5.3.2 Main Power Transformer

The main power transformers will be provided by the Owner. Specifications for the main power transformers are included in the Master Appendix List.

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Contractor shall review and verify that equipment vendors' (e.g. main power transformer) drawings and documentations are appropriate for the successful interconnections and equipment arrangements.

Contractor shall inspect and receive equipment and materials delivered to the job site to ensure that the equipment and materials are undamaged and are in compliance with specifications.

Contractor shall off load (in a timely manner to avoid demurrage) and install the Collection System Substation transformer and develop Crane Management Plan for the Work including the maintenance, inspection, and pre-lift requirements. Contractor shall supply a Critical Lift Plan for each critical piece of equipment; the Critical Lift Plan shall include PE stamped drawings and calculations for the specific piece of equipment and crane type. Crane Management Plan shall be provided to Owner for review and acceptance. Copies of the Crane Management Plan and each Critical Lift Plan shall be included in the Job Books.

The list of Owner-furnished engineering drawings and specifications for the Collection System Substation transformers are in the Master Appendix List. Transformer manufacturer representative shall be present during the offloading and installation process. Contractor's scope does not include assembly, dressout, and acceptance testing of main transformers.

Contractor shall submit transformer energization plans to Owner for review fourteen (14) days before energization, and coordinate energization with Owner. Owner shall authorize Contractor to proceed before Contractor proceeds with the energization.

The transformer foundation containment pit shall be filled with river stone and include any MIOSHA required handrail, if applicable (on the substation transformer foundations and oil containment vault) to provide convenient access to the instruments and control equipment on the transformer.

5.3.3 HV Circuit Breakers

HV circuit breaker shall match circuit breakers as specified in the Master Appendix List unless otherwise approved by Owner.

5.3.4 HV Disconnect Switches

HV disconnect switches shall match HV disconnect switches as specified in the Master Appendix List, unless otherwise approved by Owner.

5.3.5 High Voltage (HV) and Medium Voltage (MV) Surge Arresters

Medium Voltage (MV) Surge Arresters shall be station class metal-oxide, polymer housing arresters with appropriate voltage and energy ratings. Contractor to match Surge Arrestor manufacturer as specified in the Master Appendix List unless otherwise approved by Owner.

5.3.6 MV Circuit Breakers

MV breakers shall match the Master Appendix List unless otherwise approved by Owner

Medium voltage circuit breakers shall include an integrated grounding switch if on a Wye circuit in accordance with Section 4.1.11.

Contractor shall provide permanent working platforms for MV Circuit Breakers to allow for maintenance and operation of the equipment without use of a ladder.

5.3.7 MV Disconnect Switches

Disconnect switches shall match Master Appendix List or Owner approved alternate.

5.3.8 Instrument Transformers

5.3.8.1 Current Transformers

Relaying type current transformers shall have ANSI standard ranges and accuracy classification.. Relaying type current transformers shall have a thermal rating of 2.0 for all ratios. The thermal rating shall be shown on the current transformer nameplate.

Revenue metering type current transformers shall have ANSI standard ranges and accuracy classification of 0.3 at a minimum burden of 1.5. For dual ratio metering current transformers, both ratios shall meet the accuracy and burden requirements. Revenue metering type current transformers shall have a minimum rating factor of 2.0 for all ratios. The thermal rating shall be shown on the current transformer nameplate.

All current leads shall be wired to the terminal blocks. Terminal blocks shall be States NT type blocks with sliding links. Splices in the current transformer secondary leads are not acceptable. The current transformers shall be shorted and tied to a ground reference at the terminal blocks during shipment.

Current transformer sets shall be identified with polarity markings and secondary lead designations as specified by NEMA SG 4.

Current transformer housing covers that prevent birds from building nests in or on the current transformer shall be supplied as necessary.

The following shall be provided: complete ratio, accuracy, burden, thermal factor, and secondary resistance information on all current transformers furnished with the circuit breaker. This information shall include excitation and ratio correction factor curves for each type of current transformer furnished. When revenue metering CT's are supplied, metering accuracy tests for each CT unit are required including a ratio and angle correction chart over the normal IEEE meter CT testing range in addition to relay accuracy tests (saturation and ratio) are required. Also when revenue metering CT's are supplied, tracking paperwork that identifies which bushing the CT is in is required. Certified factory test reports shall be provided for all CT’s supplied.

5.3.8.2 Potential Transformers

The electrical characteristics and mechanical features of the equipment supplied shall be capable of meeting all the requirements specified within the latest revisions of ANSI C57.13. Certified factory test reports shall be provided for all PT’s supplied.

5.3.8.3 Automatic Voltage Regulator

The Contractor's design shall incorporate Automatic Voltage Regulation (AVR). Contractor shall submit the AVR for Owners approval and shall install any hardware necessary for a functional system.

5.3.9 Switchboards

Switchboards shall match equipment manufacturers and shall be provided in accordance with the specification included in Master Appendix List.

5.3.10 Metering

Contractor shall install high side revenue metering for the Solar PV farm at the substation in accordance with the interconnection requirements included in the Master Appendix List. Owner shall supply Meter for Contractor installation.

5.3.11 Reactive Power Compensation and MV Capacitor/Reactor Banks (If Needed)

The reactive power compensation system, if required, shall meet all the Owner's requirements per the interconnection requirements included in the Master Appendix List. The project shall deliver +/- 0.95 PF at rated output at the POI. The step change caused by switching any elements of the reactive power compensation system shall cause a maximum voltage step change of 3%. To achieve this end the Contractor shall provide a price for option to design, procure, install and test the appropriate equipment and controllers. The Contractor shall undertake the necessary studies to determine the nature, size and location of the reactive power compensation equipment, the results, along with a proposed control scheme, shall be provided to the Owner.

5.4 AUXILIARY POWER

The auxiliary power distribution system for the substation control building will be provided by the substation control house vendor and shall be analyzed by the Contractor.

Substation auxiliary power shall be supplied from two (2) sources with an automatic change over switch to switch from one to the other. One source shall be via a step-down transformer powered from the LV substation bus, the other from the local distribution line.

The design of the auxiliary power distribution System shall be coordinated and optimized to make certain that the bus voltage level sections, transformer ratings, and impedances, switchgear interrupting ratings, bus duct short circuit ratings, cable sizes and load equipment ratings to meet the applicable codes and standards.

5.4.1 DC and AC Systems

Contractor shall provide 125 VDC to all controls, protective relays, and instrumentation fed from battery and charger system. For all other equipment not compatible with this power source, Contractor shall provide a 120 volt AC Uninterruptible Power Supply (UPS) system to power critical loads, including controls and instrumentation for the control, fire alarm, communication, and security system. The UPS shall include a complete system and shall have twenty (20) percent spare capacity.

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The DC system for the substation control building shall be provided by the Contractor. Batteries shall provide the emergency DC power required for switchgear controls and critical DC loads as well as the UPS. Batteries shall be flooded cell lead-acid type for stationary applications.

The duty cycle shall include a minimum of 30 minutes of power for the UPS and switchgear breakers control power at the end of the 8 hour duty cycle.

Battery chargers shall be sized to fully recharge the batteries from a fully discharged state in not more than twelve (12) hours while supplying normal continuous DC load.

Contractor shall provide 20% spare breakers in AC and DC panels.

5.4.2 Station Batteries and Charger

Contractor shall provide a 125 VDC Power System at the substation.

Batteries shall be flooded cell lead acid type for stationary applications and capable of eight (8) hours of operation under normal load without intermittent charging or any supplemental form of station power and shall have sufficient charge remaining after eight (8) hours to operate all breakers' trip coils and any additional tripping loads at least one time. All battery racks shall be accessible from floor level, without use of a ladder, for visual inspection and maintenance activities. The substation shall be equipped with redundant battery charging systems. All chargers supplied under this specification shall be low ripple chargers.

Battery system shall have a monitoring system in compliance with NERC PRC-005-3 Table 1-4(f). This includes but is not limited to voltage monitoring and alarming, electrolyte level monitoring and alarming, unintentional DC ground monitoring and alarming, charger float voltage monitoring and alarming, intercell and/or terminal connection resistance monitoring and alarming, and internal ohmic value or float current monitoring and alarming. Additional requirements as reflected in Brown Book (IEEE 399).

The Battery room shall have temperature and hydrogen monitoring with communications through the substation SCADA system. The battery room shall have an eye wash system as well as ventilation systems that provide external ventilation for gases generated by the lead-acid batteries in accordance with NFPA 70 Article 320. Grounding, Lightning, Lighting, Security, and Operation

5.4.3 Grounding

The ground grid system shall be designed per the latest version of IEEE 80 to limit step and touch potentials to safe levels for personnel both inside and outside the Collection System Substation for the maximum available fault current. The grounding system shall be designed for a low grounding resistance to minimize the maximum ground potential rise during line to ground faults. The Collection System Substation ground grid shall be designed and installed to achieve an isolated (i.e. the fully installed ground grid prior to any connection/bonding of the ground grid to the collection system ground conductors and overhead line grounding conductors) tested resistance to true earth of less than 0.5 ohm. The design fault current duration shall be 0.5 seconds.

The ground grid system shall be 4/0 AWG copper conductor and copper-clad ground rods. The modified grounding grid at the Collection System Substation shall consist of a number of interconnected, bare conductors buried horizontally at a minimum depth of 18". The grid shall be supplemented by a number of driven ground rods as required. Ground rods shall be a minimum of ten (10) feet in length, with the top of the rod buried eighteen (18) inches below the finished surface. Grounding wells or other ground resistance enhancements may be used to meet the maximum ground resistance specified above.

All metal structures, apparatus and equipment which are to remain at ground potential shall be solidly connected to the ground grid by 4/0 AWG copper conductors. Individual ground mats (on grade platforms) shall be provided at all high voltage disconnect switch locations and shall be connected to the station ground grid. Below grade connections shall be made with an exothermic welding process. Above grade connections may be welded, bolted or compression. Bolted connections shall be used to connect the ground grid to substation galvanized steel structures and equipment. All other connections shall be made in such a manner that the resistance of the connection does not exceed that of the equivalent conductor.

All metallic grating shall be grounded by Contractor, and any material to ground it shall be provided by the Contractor.

Communication cables, except for all-dielectric fiber optic, exiting the substation area shall be adequately protected from the ground potential rise during ground faults by provision of suitable protective devices. All-dielectric fiber optic cables do not require any of the foregoing protective devices as they are not subjected to ground potential rise during faults. Any shielded cables shall be grounded as required to control circuit transients and minimize noise.

The Collection System Substation ground grid shall be connected to the substation fence and the grid shall be extended 3 feet beyond the fence line.

Collection System Substation grounding shall be designed in accordance with IEEE Standard 80 based upon the following conditions

A. MV circuit breaker total clearing times:

   1. Normal: 6 cycles unless specific clearing times are based on procured equipment and relaying used.

   2. Breaker failure: 12 cycles

   3. Line end fault clearing: 30 cycles (maximum) for MV system.

B. For substation EHV voltages below 345kV, touch and step potentials shall be in accordance with IEEE Standard 80, calculated without considering the crushed stone layer.

C. Isolated personnel ground mat resistance: 5 ohms or less

Provisions shall be made for temporary grounding of Collection System Substation buses and equipment.

Ground grid testing shall be in accordance with ANSI/IEEE Standards.

The grounding system shall exceed the minimum of the above Owner requirements, Interconnecting Transmission Owner standards, NESC requirements and other applicable codes and standards.

5.4.4 Lightning Protection

The Collection System Substation shall be protected from direct stroke lightning strikes by shield wires and/or masts which are connected directly to the ground grid. The lightning protection system shall be designed for an expected failure rate of no more than one (1) per hundred years.

The lightning protection system for the substation shall not have conductor crossings above live power equipment or bus-work. All equipment/structural metallic surfaces shall be bonded at least at two points. However, in all cases the Collection System Substation direct lightning stroke protection shall meet or exceed the level of protection provide by IEEE Standard 998.

5.4.5 Lighting

Substation shall include permanently installed external lighting capable of illuminating all equipment within the Substation. Collection System Substation lighting shall meet the minimum lighting levels for the appropriate circumstances of indoor, outdoor, and roadway areas given in the latest editions of NFPA 70 and ANSI C2. A substation lighting study and plan shall be submitted for Owner review and approval.

If allowed by the local codes: infra-red motion detectors shall be used to control the outdoor lighting when the substation is unattended, a bypass switch shall be provided for when the substation is attended.

Emergency lighting shall be provided in attended areas in accordance with local codes and regulations.

5.4.6 Security

All access gates to the Collection System Substation shall be padlocked with a standard issue lock.

Warning signs shall be installed in accordance with the National Electric Safety Code, and shall also include a “no trespassing” sign.

Refer to Section 5.5.5 for perimeter fencing requirements.

5.4.7 Operating and Maintenance

The Contractor shall provide equipment manufacturer’s recommended list of operating equipment such as tongs, insulating sticks, rubber gloves, grounds, voltage detection equipment, etc. needed

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for the safe performance of operating functions. The Contractor shall provide a proper inventory of spare parts for the substation.

The Collection System Substation will be operated and maintained as an integral part of the Owner Generation Assets and as such the substation bus, switch and equipment nomenclature system (and correct coloring) including for control and relay panels, shall be compatible. Contractor shall obtain from Owner all required nomenclature (and correct coloring) for the substation and attached circuits at an appropriate time prior to energization.

The Control building shall be fitted with security sensors that provide indication of entry via the SCADA system.

5.5 SUBSTATION CIVIL/STRUCTURAL DESIGN CRITERIA

5.5.1 General

This area of work consists of civil design of the substation with respect to grading, drainage and structural design of structures and foundations for support of the air-insulated bus-work, power transformer, switchgear and related electrical equipment.

5.5.2 Civil

Tree and vegetation removal, clearing, grubbing, grading, and compacting as necessary shall be performed by the Contractor.

Contractor shall strip and stockpile topsoil for use during re-vegetation.

Clear, grade, and compact the area for the substation foundations. Substation final grade shall be comprised of 6 inches of MDOT 6AA Crushed Limestone. Road surfaces internal to the substation fence shall be of the same surface material as the wind farm site access roads, and be constructed of at least the same structural section thickness as the wind farm site access roads.

5.5.3 Structures

The Contractor shall design, procure and install dead-end structures that will be used to connect the Collection System Substation to the Radial Line designed and constructed by the Contractor (refer to Master Appendix List for interconnect requirements). Contractor shall coordinate dead-end structure design with METC under the generator interconnection agreement.

Collection System Substation bus and switch support structures shall be low profile (non-lattice) type. Provisions shall be made for grounding the structures, disconnect switch operating mechanisms, surge arresters and other equipment that require grounding in accordance with industry standards.

5.5.4 Foundations

All foundations shall be designed and installed as described in Section 2 and Section 5.3.2.

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Contractor will provide the concrete foundations and oil containment pit and make all connections and terminations to the power transformer. The foundation and oil containment shall be of suitable strength to allow jack and slide installation of the main step transformer described more fully in the Master Appendix List. The transformer foundation oil containment shall include an outlet to an oil water separator detailed in the Master Appendix List, which allows storm water to drain out of the system by gravity after passing through the oil-water separator.

5.5.5 Substation Fencing

Contractor shall fence the entire Collection System Substation in accordance with IEEE, NESC, and Idaho Power design requirements. The fence shall prevent the entrance of unauthorized personnel into the Collection System Substation and be separated from exposed energized parts so as to prevent unsafe contact by objects inserted through or over the fence.

The Collection System Substation fence shall be standard galvanized steel chain link security fence with gate and not less than seven (7) feet in height with an additional one (1) foot high barbed wire topping and three (3) strands of barbed wire. In addition, the perimeter fencing shall contain double "V" three-stranded barbed wire as well as a stiffener bar at the bottom of the mesh to prevent lifting or undermining the mesh for entrance into the station.

Perimeter fencing shall be placed in accordance with the requirements of NESC, IEEE Standard 1119 and Idaho Power SEM standards. Fence setback from property line shall not be less than three (3) feet to accommodate the installation of a buried perimeter ground wire.

Contractor shall install an outward opening, 20 feet wide, double leaf gates on the perimeter fence for vehicle access to the substation. Perimeter warning signs shall be installed at all gates and at a minimum of seventy-five (75) feet intervals along the fence. Contractor shall refer to the Master Appendix List for fence, gate and animal barrier details.

5.5.6 Raceway

Contractor shall provide raceway for all electrical, control and optical fiber cables. Below grade raceway shall be direct buried PVC conduit (Schedule 40 or heavier wall). If cable trench is used design shall be drivable over all sections to allow for movement of operating and maintenance vehicles throughout the substation. Above grade conduits shall be PVC or rigid galvanized steel. AC and DC station power conductors shall be installed in dedicated conduits that are separate from the instrumentation and control wiring. Contractor shall submit a conduit schedule and plan drawing to Owner for review and approval.

5.5.7 Drainage

The site grading and drainage shall be designed to comply with all federal, state and local regulations. The site shall be graded to convey storm water runoff away from permanent facilities. Site drainage shall be designed to convey the runoff from a 4 percent probability (25 year) storm event unless specific federal, state, local or utility regulations or utility easement requirements are more stringent. Aggregate surfacing shall be provided and installed within and three (3) ft. outside of the fenced area in a manner that allows the free movement of personnel, vehicles and equipment

throughout the Collection System Substation under all weather conditions and is incorporated into the grounding design for the substation.

Contractor shall backfill with a minimum of 6" of 1-1/2" gravel and shall slope the gravel such that water drains away from major equipment.

5.5.8 Collection System Substation Vehicle Access (Outside Substation Fence)

Contractor shall provide access to the Collection System Substation site for installation, maintenance and removal of all major equipment shall be provided. Typical maintenance vehicles of up to 40 feet long by 8 feet wide with a turning radius of 30 feet and equipment delivery vehicles up to 11 feet long by 10 feet wide with a turning radius of 50 feet require access to the substation sites. Associated unloading equipment shall be accommodated as well.

5.5.9 Restoration and Landscaping

Upon completion of the Collection System Substation, Contractor shall restore the unused disturbed land in accordance with requirements dictated by the Owner, and the Owner Permits. Temporary structures and facilities supplied by the Contractor for use during construction shall be removed. All temporary buildings, structures, concrete slabs and footings, tools, facilities, and other Contractor property shall be removed from the site and the areas involved shall be restored to their original or intended condition.

5.6 COLLECTION SYSTEM SUBSTATION CONTROL BUILDING

5.6.1 Design and Construction

Contractor shall adequately size and configure the Substation Control building to comply with Owner's standards and requirements and shall be complete with required equipment, foundation, normal and emergency lighting, emergency egress, fire protection, heating and ventilation. The heating and ventilation shall be designed and installed to maintain temperature and humidity within the limitations of the control, communication, and protection equipment. The building shall be 20 x 40 feet in size and designed in accordance with Owner's standard control building layout as included in the Master Appendix List.

The control building shall be a free-standing building provided complete with framing, or self-framing panels, roofing, siding, insulation, doors, windows, hardware, fasteners, flashing, weather-stripping, caulking, HVAC and other components as required or specified. All materials shall be new, free from defects and fabricated with quality workmanship. The building design as a whole shall result in a rigid structure that will maintain its shape and alignment against all design loads and shall conform to ASCE 7.

Major equipment to be housed in the Collection System Substation control building include:

1. AC Panels
2. DC Panels

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3. Termination Cabinet(s)
4. Battery Charger(s)
5. Battery Bank(s)
6. DC Disconnect Switch
7. Modular Steel Racks for all SCADA, Relay, protection and controls equipment including but not limited to transformer rack, feeder rack, line rack, communication rack, RTU rack, MV breaker racks, cap bank rack (If required), and other control and relay systems necessary for a completely functional wind farm.
8. Eyewash Station(s)
9. AC Safety Switches
10. Transfer Switch
11. Telco Board with room for Telco Line Isolation (as needed)
12. HVAC Unit
13. Exhaust Fan
14. Fiber Optic Patch Panel
15. Fire Extinguisher
16. Desk
17. Miscellaneous equipment

In addition, the control building shall include adequate space for all other equipment including spare parts necessary for a fully functional Collection System Substation in accordance with the Agreement and the applicable standards and requirements.

5.7 COLLECTION SYSTEM SUBSTATION PROTECTION AND CONTROL

5.7.1 General

The Contractor shall be responsible for the detailed design and implementation of the protection schemes necessary to satisfy Interconnection Agreement, ITC, MISO, and Owner's recommendations (Master Appendix List) and provide appropriate equipment protection commensurate with normal Prudent Wind Industry Practices. All relay systems shall include dual-primary protection in case of component failure in the primary protection system.

The Contractor shall be responsible for the detailed design and implementation of the Breaker Failure protection schemes necessary to satisfy the Interconnection Agreement and Owner's

requirements (i.e. BF detection trip paths, coordinating time delays, etc.). The Contractor shall ensure the design is suitable for the substation and radial line interface to the Transmission Owner (METC) according to the Interconnection Agreement attached in the Master Appendix List. Subsections 5.8.2 through 5.8.6 provide general relaying and protection requirements. Owner supplied Preliminary Relay Recommendations and Monitoring Recommendations are attached in the Master Appendix List. Final relaying and monitoring recommendations are dependent upon final PV Solar Field and design. In the event of any discrepancies, the Master Appendix List shall be the definitive source for relaying requirements.

Contractor shall design protection schemes and supply all necessary electrical protection equipment including, but not limited to, (i) primary 1 and primary 2 line protection, (ii) primary 1and primary 2 protection for the main step-up transformer, (iii) (iii) primary 1 and primary 2 bus protection, (iiii) feeder protection.

5.7.2 HV Breaker and HV/MV Main Power Transformer Protection

HV breaker protection shall include dual-primary relays, including all Point of Interconnection requirements, phase, ground, and neutral overcurrent protection. Lockout relays for the breaker and breaker failure functions. Lockouts shall trip and close-block all appropriate upstream and downstream breakers.

Primary protection of the HV/MV Main Power Transformers shall be provided by a current differential relays with built-in backup overcurrent protection for the transformer. On transformer trip, lockout relays shall be asserted which opens and close-blocks all feeder breakers served from that transformer and opens and close-blocks the associated HV breaker(s). Contractor shall design an appropriate protection scheme to be reviewed by the Owner.

5.7.3 MV Bus Protection

Backup protection of the MV bus shall include phase, ground and neutral overcurrent protection measured on the low-side of the transformer. More detailed MV bus protection and tie-in breaker protection and monitoring requirements are included in the Master Appendix List.

5.7.4 MV Switchgear Protection

Contractor shall design an appropriate protection scheme for the MV switchgear.

5.7.5 MV Collector Circuit Protection

The primary protection of additional collector circuits shall, as a minimum, include relaying with the following protection capabilities:

- Phase and ground time-overcurrent
- Directional control
- Voltage supervision and tripping
- Breaker failure logic

5.7.6 MV Capacitor Protection

The protection of each capacitor bank, if required, shall include one or two relays that comply with IEEE 37.99-2000 Guide for Protection of Shunt Capacitor Banks. The protection is dependent on the final capacitor bank design. Unbalance protection shall be included to detect evolving faults and prevent damage to unfaulted capacitor units.

The primary protection of each capacitor circuit shall include a single relay with the following protection capabilities:

- Unbalance
- Phase and ground time-overcurrent
- Voltage supervision and tripping
- Breaker failure logic

5.7.7 Capacitor Bank Control

Should a capacitor bank be required, the control of each capacitor switch, shall be provided in the capacitor bank protection and control relays. At a minimum the control scheme shall include the following capabilities:

- Voltage and pf/Var measurement on the HV or MV bus as appropriate
- An Auto/Manual switch
- Thresholds to accommodate the necessary switching steps
- Switching control to rotate the duty of the capacitor banks evenly
- Time delay logic to accommodate safety time limits before closing and to ride through momentary system fluctuations
- Zero voltage closing control if required due to step size and or duty
- Undervoltage tripping
- Overvoltage tripping

The Contractor shall be responsible for programming the reactive power controllers. Several hard copy printouts and CDs of settings and programs shall be provided to the Owner.

5.7.8 Interconnection Protection

Collection System Substation protection shall meet all protection requirements of the Interconnection Agreement included in the Master Appendix List.

5.7.9 Wiring

The wiring of all control and protection devices shall be consistent with good wiring practices and in accordance with the Master Appendix List. All wiring shall be adequately sized for its specific application. All terminations shall be made using non-insulated solid Burndy barrel compression ring lug terminals. No more than two terminations may be made to a single terminal point.

Control circuits shall be fused together with a fuse for the positive and negative legs. There will be no individual circuit voltage monitoring.

Loss of DC to the Collection System Substation controls or other over voltage/under voltage conditions shall provide an alarm to the Substation SCADA System.

The DC supplied to each panel, from the DC distribution panel, shall be terminated on an appropriately sized terminal block located in the rear of that panel. Both positive and negative supplies shall be fused using panel mounted fuse holders.

All lock-out circuits shall be monitored with blue indicating lamps.

AC supplies shall be fused using the same type fuse holder as indicated above. Only the hot leg needs to be fused. A solid neutral for fuse block or "shorting lug" shall be supplied in the neutral leg to provide an isolation point for maintenance purposes.

CT cables associated with redundant protective relaying systems shall be routed in a manner to prevent common mode failure.

Wiring to the devices, which are removable from the front, shall be provided with enough slack (12 inches minimum) to permit removal of the item without disconnecting any wire. Wiring to control (CSR) switches shall be adequate to remove switch from panel for work or further wiring without disconnecting existing wires (see Appendix C).

Wires shall be neatly arranged and properly supported throughout the panels to prevent sagging and breaking. Suitable raceways equivalent to 1-1/ 2 times the space required for wiring shall be provided to permit the safe and accessible installation of wiring. All wiring shall be secured using screws, nuts, and bolts or Panduit wiring duct. Adhesive mounting of wiring clamps is not permitted.

A bladed disconnect with visible open shall be included in all non-CT circuits between the substation yard and the substation control houses to enable safe switching and tagging procedures.

Wire identification/numbers shall be provided on all AC and DC schematics according to the Owner's standards. Circuit numbers shall be labeled on the cables and on the wire at the termination points.

5.7.10 Control Panels

All control and protection equipment shall be installed on modular steel panels located in the control building. Modular steel panels shall be fabricated and installed in conformance with

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Owner's standards included in the Master Appendix List. All equipment mounted on the rear of the panels shall be located in a manner to permit easy access. Each item of equipment shall be readily removable without removal of other items. All terminal blocks shall include States NT type sliding-link terminals or Owner approved alternative.

Panels shall be of standard sizes painted light gray (ANSI No. 61).

Panels shall be bonded to an adequately sized copper ground bus.

All equipment installed on the panels shall be labeled using black lamacoids with appropriately sized white lettering, in accordance with the Owner provided naming scheduled.

All NERC relays shall be labeled using yellow lamacoids with appropriately sized black lettering in accordance with the Owner provided naming schedule.

5.7.11 Relays

Relays shall be provided in accordance with the specification included in the Master Appendix List. No relay substitutions are allowed.

5.7.12 Communications

1. Telephone circuits or appropriate Owner-approved alternative shall be provided for all Collection System Substation communications including but not limited to voice, metering, relay communication and interrogation and data transfer to and from disturbance monitoring equipment or other equipment installed within the Collection System Substation.
2. All ordering and acquiring of the circuits shall be provided by Contractor.
3. The incoming telephone shall have a minimum of 25 pairs of conductors.
4. The incoming telephone cable shall be installed in the PVC conduit to the nearest roadway or Telco trunk-line unless a reduced distance is approved by Consumers.
5. As a minimum, conduit extends 10' beyond the substation fence or as required by the local exchange carrier. The telephone cable may be direct buried from end of conduit to telephone company termination point.
6. Stack end of telephone conduit.
7. Choose the precise location to provide ample space for operation and maintenance.
8. Install equipment in accordance with manufacturer's, Telco, and Owner's recommendations.
9. Install pull rope in telephone conduit.
10. As a minimum, one dedicated 4-wire, non-IP data circuit shall be provided to support RTU communications.

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11. A dial-up voice-grade circuit (POTS line) is required for metering access by Owner and transmission provider in accordance with the interconnection requirements in EPC Agreement, Exhibit D. POTS line shall be equipped with a Contractor supplied Teltone Gauntlet line sharing switch or an Owner approved alternative.

12. Collection System Substation phone circuits will be installed with the proper high voltage interface (HVI) protection. Contractor shall perform all necessary studies and shall coordinate with telecom provider in design and installation.

13. No IP or routable protocols are currently permitted.

14. Any additional communications circuits or equipment necessary to support the Owner relay recommendations and monitoring recommendations included in the Master Appendix List.

5.8 COLLECTION SYSTEM SUBSTATION BUS, SWITCH AND EQUIPMENT NOMENCLATURE SYSTEM

Owner will provide all required nomenclature for the Collection System Substation and attached circuits at an appropriate time prior to energization.

5.9 SUBMITTAL REQUIREMENTS

The Owner and the Contractor shall identify in the project schedule, drawing submittal, review and comment, and final approved submittal activities. Typical review times for Owner review and comment shall be 30 days after receipt, but additional time may be requested based on the volume or complexity of the submittal.

It is anticipated that initial submittal shall be of a conceptual nature and include as a minimum, One-Line Diagrams of the:

- Substation, including station power and any alternate sources
- Farm interconnection/gathering system
- Typical PV Module site, including station power

Complete drawing submittal of all project details shall occur following approval of conceptual drawings and the detailed design process. Drawings shall be of engineering quality and conform to the drafting procedure. Free hand sketches are not acceptable. The engineering drawings shall include the following:

- The location and ratios of the current and potential transformers used for the isolation protection.
- The connection of relay terminals in current, potential, and control circuits.
- Relays identified by their IEEE device numbers and Owner-provided NERC identification numbers.

- All RTU sequence of events monitoring with the IEEE device numbers.
- The location of the current and potential transformers used for telemetering.
- Breaker status contacts used for telemetering.
- RTU location (note on drawing).
- Power source for all protective relays, control equipment and RTU (note on drawing).
- The Contractor shall provide information on those relays to be used for the protection of the electric system, including the manufacturer of the relays, the relay types and calibration range(s), and the model or style number of the relay.
- The One-Line Diagram (described above) - A one-line representation of the three-phase electrical system shall be provided. The one-line diagram shall indicate those electrical system components (e.g. buses, feeders, transformers, and generators) that are necessary to show how the wind farm will be built and how it will connect with the electric system. The following information on these system components shall appear on the one-line diagram:

    1. Breakers - Rating, location, and normal operating status (open or closed)
    2. Buses - Operating voltage
    3. Capacitors – Size of bank in kVAR
    4. Circuit Switchers - Rating, location, and normal operating status (open or closed)
    5. Current Transformers - Overall ratio, connected ratio
    6. Fuses - Normal operating status, rating (Amps), type
    7. Generators - Capacity rating (kVA), location, type, method of grounding
    8. Grounding Resistors - Size (ohms), current (Amps)
    9. Isolating transformers - Capacity Rating (kVA), location, impedance, voltage ratings, primary and secondary connections, and method of grounding
    10. Potential Transformers - Ratio, connection
    11. Reactors - Ohms/phase
    12. Relays - Types, quantity, IEEE device number, operator lines indicating the device initiated by the relays
    13. Switches - Location and normal operating status (open or closed), type, rating
    14. Tagging Point - Location, identification.

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15. Rotation and Phasing

- Detailed wiring drawings (point-to-point) shall be provided. These drawings shall depict all panel and field-device terminations and interconnections. Wiring tables are not permitted on either the Contractor-provided or equipment provider (supplier/shop) drawings. In addition, the connections and wiring of supplier/shop drawings shall be transferred and depicted in detail on the Contractor drawings so that a complete wiring package is shown without referral to the supplier drawings.

- Contractor shall perform point-to-point wiring verification of wiring prepared by Contractor on-site as well as by subcontractors off-site (including but not limited to relay panels).

5.10 TESTING

5.10.1 General

The Owner will self-perform substation testing. The Contractor shall provide a deduction Option price for Owner to perform Substation testing as specified in the sections below.

Contractor's base price shall include all tests as may be deemed necessary to demonstrate that the equipment, as installed, complies with these requirements. All labor, instruments and apparatus required for such tests shall be provided completely by the Contractor. If any of the equipment fails, under test, the defects shall be rectified by readjusting, or removing and replacing, the faulty equipment until, under test, all requirements are met.

Testing shall include, but is not limited to:

- Point to point testing. Continuity shall be verified at every termination and jumper and also from circuit end to circuit end. The schematics shall be highlighted as each termination is verified and turned over to the Owner prior to energization.

- Relay testing. Settings shall be programmed and verified.

- Functionally test all equipment to verify relay settings and modifications to protective scheme operate as designed. .

Load testing CT and PT circuits. Prior to energization, all CT and PT circuits shall be checked for continuity as well as testing continuity with actual designed voltage.

Any testing of substation equipment performed by Contractor, including relays, instrumentation transformers, AC and DC circuits and DC battery systems, shall be delivered in a format and substance comparable to Owner's typical testing documentation.

Contractor shall submit an initial draft commissioning plan and functional test procedures, including proposed documentation format, for Owner review no less than one hundred twenty (120) days prior to the tests. The final commissioning plan and functional test procedures shall be

submitted for Owner's review and comment no less than sixty (60) days prior to the tests. Contractor shall coordinate testing/commissioning activities with Owner.

Owner representative will be notified for witness functional and acceptance tests two weeks prior to test schedule. Owner will witness test all testing.

Results of tests shall be formally transmitted for review and approval no later than 10 working days prior to energization.

NERC protection testing procedure shall be transmitted for review no later than 60 working days prior to the planned energization date. NERC protection testing shall not commence prior to Owner approval of the testing procedure. Owner reserves the right to self-perform NERC protection testing on the Collection System Substation

The Contractor shall make available appropriate staff during Owner testing of the HV systems relaying and SCADA for assistance. The Contractor shall be responsible for testing and commissioning all the work under this contract. All testing shall be performed in coordination with METC and MISO under the interconnection requirements.

5.10.2 General Testing and Commissioning

The Contractor shall perform:

1. DC charger commissioning.
2. Substation Services commissioning.
3. Phase rotation checks.
4. Voltage test and tap change settings.
5. Operational switching and control during commissioning of MV equipment prior to Owner acceptance of the substation. Contractor shall plan and coordinate all switch and tagging requirements in advance with Owner.

HV Transformers, Circuit Breakers, CT's, VT's, disconnect switches and MV Switchgear and reactive power support equipment at the Project Site affected or modified by the Scope of Work shall be fully tested and commissioned.

5.10.3 Transformers Over 600V

The following tests shall be performed as a minimum:

1. Turns Ratio,
2. Voltage test tap change settings.
3. Insulation power factor, polarity, excitation, winding resistance (>10MVA only);

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4. Oil quality and Dissolved gas-in-oil analysis,
5. Fan controls and all device alarm points, as applicable;
6. Current transformer turns ratio, saturation, polarity, circuit loop checks, as applicable;
7. Bushing insulation power factor (>10MVA only),
8. Doble

5.10.4 Circuit Breakers Over 600V

The following tests shall be performed as a minimum:

1. Insulation power factor, contact resistance, operator controls and interlocks, travel/timing where equipped with test attachments,
2. Gas pressure check,
3. Current transformer turns ratio, polarity, and circuit loop checks,
4. Bushing insulation power factor.

5.10.5 Switches Over 600V

The following tests shall be performed as a minimum: (1)

1. Contact resistance and operator adjustment.

5.10.6 Station Bus Systems

The following tests shall be performed as a minimum:

1. Low resistance continuity check at bus joints.

5.10.7 Protective Relays

The following tests shall be performed as a minimum:

1. Calibrate as required and test by current and voltage injection using Doble or equal relay test equipment to ensure proper operate and restraint characteristics for in-zone and out-of-zone faults. .

5.10.8 2. Functionally test to demonstrate circuit breaker and/or lockout actuation. Owner/utility may witness test portions of the protective relays Station Control Wiring

The following tests shall be performed as a minimum:

1. Perform point to point wiring checks of field control wiring and relay panel wiring, complete functional check of the schematics (both AC and DC), functionally verifying every circuit and termination point and highlighting the schematic diagram to

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document the verification of each circuit. Highlighted schematics shall be turned over to the Owner as part of testing results as specified in 5.11.1

2. Verify all remote monitoring, indication, and alarm points,

3. Perform loop checks on all current and potential circuits.

5.10.9 Grounding

The following tests shall be performed as a minimum:

1. Perform initial earth resistivity tests as part of ground grid design,

2. Perform completed grid tests per IEEE. 81

5.10.10 NERC Protection System Testing

Equipment to be included in the Owner's NERC protection system shall be identified by the Owner, and shall be tested by the Contractor according to the Owner's NERC compliance program documentation. Testing forms are unique for NERC devices, and will be provided by the Owner prior to commissioning testing.

1. Protective relays which respond to electrical quantities

2. Communications systems necessary for correct operation of protective functions

3. Voltage and current sensing devices providing inputs to protective relays

4. Station dc supply associated with protective functions (including batteries, battery chargers, and non-battery-based dc supply)

5. Control circuitry associated with protective functions through the trip coil(s) of the circuit breakers or other interrupting devices

5.10.11 Maintenance and Testing

1. In addition to the commissioning and testing that the Contractor will provide, Owner will likely perform testing of any of the relaying and control equipment that involves protection of the Owner's electric system

2. Testing records shall include both an exact calibration check and an actual trip of the circuit breaker or contactor from the device being tested. For each test, a report shall be submitted to the Utility indicating the results of the tests made and the "as found" and "as left" relay calibration values.

3. Visually setting, without verification, a calibration dial or tap is not considered an adequate relay calibration check.

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6.0 SCADA System

6.1 GENERAL

The Substation SCADA System is required for the purpose of providing substation supervisory control and data acquisition and aggregate control of the wind farm to the Owner/operator as well as providing information about the wind farm and substation to the control area system operator. The Substation SCADA System is also required to accept data (e.g. equipment status at the POI and metering) from the Owner and provide such to the PV Module Supplier SCADA System. The conceptual SCADA diagram for the Project is included in the Master Appendix List.

6.1.1 Contractor Scope of Work

The Contractor will analyze, design, coordinate and install the SCADA system for the Collection System Substation, referred to hereafter as the "Substation SCADA System". Contractor shall provide the equipment and software to integrate all equipment as specified in Section 5 with the PV Module Supplier SCADA System into a fully functional SCADA System.

6.1.2 General Design Philosophy

The following general design philosophy and requirements shall be complied with for the Substation SCADA System. Information shall be collected utilizing Intelligent Electronic Devices (IEDs) where available (example microprocessor based protective relays or intelligent meters) through the RTU's serial connection. An RTU shall be provided to collect the required information from the IEDs or I/O modules. The RTU shall also provide required wind farm functionality to the transmission service operator, and Owner. The RTU shall also interface with the PV Module SCADA system and provide functional inputs and outputs to and from the Owner's PV Module Supplier SCADA System as needed. All data points listed in the "PV Solar Farm SCADA Points List" included in the Master Appendix List shall be included in this system. At a minimum the following communication protocols shall be supported: DNP 3.0 and Modbus.

6.1.3 System Layout

The Conceptual SCADA Diagram provided in the Master Appendix List shows a preliminary layout of the SCADA system for the Project. The Contractor is responsible for finalizing the system configuration and layout in coordination with the Owner.

6.1.4 SCADA Integration

The Contractor is responsible for providing a fully integrated SCADA system for the Scope of Work, that is, the Contractor shall provide a fully functional system to connect all data points of the SCADA system (e.g. communication, RTU, the Substation SCADA System, and the PV Module Supplier SCADA system) together in a reliable cost effective manner.

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6.2 TELEPHONE AND TELECOMMUNICATIONS SYSTEM

6.2.1 Communications Requirements

The Contractor shall be responsible to determine specific equipment required by the Owner and the Transmission System Operator, specifically relating to SCADA, metering and telemetering due to the Interconnection Agreement as well as equipment required to complete the indicated control and protection requirements.

Communications facilities shall be provided between the:

1. Substation and the Transmission System Operator systems for transfer trip relay and protection applications as required by the Interconnection Agreement.

2. Substation and Owner systems for Substation SCADA, RTU, telemetering, metering and voice communications. Dedicated communications services (Multipoint DS0, DS1 or Analog) are required for the Substation RTU, disturbance monitoring equipment and for remote relay interrogation.

3. Substation and the System Operator for SCADA, telemetering, and voice communications.

The Contractor shall provide arrange and manage the delivery of the necessary telephone lines/communication links for operation and maintenance of the facility, including those listed above. The Contractor shall provide high speed internet access line(s) for communication with the PV Module Supplier SCADA system by the Owner and the PV Module Supplier which will be brought to the substation control building by others. The Contractor shall procure and install the necessary isolation equipment and backer boards not supplied by the telecom provider, provide the required isolation between the Project systems and the telecom provider's systems if not provided by the telecom provider; conduits from the communication panel and/or room inside the substation control room to a point outside the foot print of the yard/building which shall be provided with pull strings to be utilized by the connecting telecom utility.

The communications systems for the substation shall be coordinated with Owner to ensure compatibility and cost effectiveness

6.3 SCADA SYSTEM SCOPE

The Contractor shall provide a complete working SCADA System for the substation including a DNP 3.0 serial interface with the PV Module Supplier SCADA system. The system shall include but not be limited to the following items;

6.3.1 PV Module Supplier SCADA System

The PV Module Supplier SCADA system will be installed in a dedicated telecommunications/network equipment room in the Substation Control House.

1. Install and maintain communications circuits in accordance with the Project Schedule terminated to the Substation Control House

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2. Supply fiber optic cable in accordance with Installation Instructions as included in the Master Appendix List.

3. Install fiber optic network cable in conjunction with Collection System Circuits and junction boxes

4. Install fiber optic cable at Tower base providing appropriate amount for terminations

5. Provide one Digital Private Line Multi Point DS3 service for Owner's IP network communications

6. Provide power supply and communication links for PV Module Supplier SCADA System server

7. Supply and install fiber cable to PV Module Supplier SCADA System server location

6.3.2 Telemetry, Disturbance Monitoring and Substation SCADA System

1. Telemetry and disturbance monitoring is required at the substation. Owner relay recommendations and monitoring recommendations included in the Master Appendix List shall be used in the design of Telemetry, Disturbance Monitoring and Substation SCADA system including the RTU points list.

2. In the substation, the equipment shall be located in a suitable switchboard panel location, generally in the same panel row as other switchboard panels

3. The equipment shall be designed to operate on 125 V DC power.

4. All RTU I/O shall be real-time (update < 4 seconds)

5. Protected phone and data circuits shall be provided for the equipment.

6. The following will be telemetered at the substation (when available). Contractor shall coordinate with Owner to develop complete list of data and control to be included in the Substation SCADA System.

    a. Real and reactive power flow

    b. Voltage at the PCCT

    c. Transformer MWatts

    d. Transformer MVARS

    e. Transformer low side voltage

    f. Loss of station power AC

    g. Loss of RTU DC power

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h. Loss of metering potential

i. Pulses for Kwatt-hours in and out

j. Pulses for KVAR-hours in and out

k. Total Capacity Avail – MW/MVAR

l. Number available

m. Number online

n. Dispatch Setpoint

o. AGC Status

p. Mandatory Control

q. The status (normal/fail) of protective relay Communication Channels. A status indication of "FAIL" indicates the Communication Channel used for relaying (i.e. transfer trip) is unable to perform its protective function

r. The status (open/closed) of the main isolating breaker and any other substation breakers.

7. The RTU will be equipped with “sequence of events” recording

8. The RTU configuration file should be provided to the Owner in the proper file type for Owner review (.shp). Contractor shall allow Owner three weeks to review the RTU configuration.

9. Digital inputs of:

a. An output contact of an instantaneous relay to act as a ground fault detector for faults on the electric system. This relay shall be connected into the same sensing source as the ground fault protective relay

b. Every trip of an interconnection isolation device, which is initiated by any of the generator interconnection relaying schemes

c. Every trip of an interconnection isolation device, which is initiated by any of the protective systems for the generator

d. Every trip or opening of an interconnecting isolation device, which is initiated by any other manual or electrical means

e. A contact indicating the position of the Project’s primary-side main breaker

f. A contact indicating operation of the over/under voltage relays

g. A contact indicating operation of the under/over frequency relay or the Utility's ground fault relay. A contact indicating operation of the Project provided transformer bank relaying

h. A contact indicating operation of any of the (51V) relaying

i. A contact indicating the position of the high-side fault-clearing device

j. A contact indicating the position of the reverse power relay

k. The following individual contact from each individual Direct Transfer Trip receiver

   i. Loss-of-guard (LOG) alarm

   ii. Receive-trip relay (RTX)

   iii. Lockout relay

l. If any of the functions indicated the above items are combined into a multi-functional device:

   i. Each of those functions shall be monitored independently on the RTU, or;

   ii. Provisions acceptable to the Utility shall be provided to interrogate the multi-functional device such that the operation of the individual functions may be evaluated separately

10. RTU Hardware

D. At the substation location, RTU hardware shall be comprised of a GE Harris D20 TRU and associated I/O boards.

The RTU device shall be fed from the 125 VDC station/site power supply only.

Configuration/programming of RTU hardware at the substation shall be performed by Contractor in coordination with Owner.

Preliminary RTU input/output (I/O) list shall be submitted by Contractor to Owner no later than 120 days before substation is to be placed in service.

Final RTU I/O and subsequent programming files shall be submitted by Contractor to Owner no later than 60 days before substation is to be placed in service.

All RTU I/O points shall be provided with scaling data.

To the extent possible, communication to the Collection System Substation IEDs for alarm and status points shall be analog.

Where Collection System Substation IEDs require digital communication, the RTU protocol shall be DNP 3.0 serial over RS 485.

All circuits going to the RTU shall be terminated on terminal blocks in the RTU cabinet.

All RTU circuits shall use shielded cable and the shields shall be grounded only at the RTU. Remote end shields shall be properly terminated and insulated to prevent inadvertent contact with ground.

RTU shall be installed in a panel, not on the wall of the control building.

1. GPS Time Synchronization

E. The substation shall be equipped with an Owner's standard (SEL or Arbiter) GPS time clock. The clock will be connected to the RTU and connected to or distributed to all relays and similar protective, or data acquisition devices and the PV Module SCADA System.

6.3.3 Substation Communication System Design

Contractor shall prepare a communication block diagram of the substation illustrating the interconnection of SCADA devices at the substation. The block diagram shall identify devices, port numbers, communication cable type, protocols and device addresses. Contractor shall also provide a cable list detailing communication cable type, number of conductors, wire size, length, and destinations. If special connections are required, a cable wiring diagram should be created.

Deliverables include: Communication Block Diagram, Communication Cable List as part of master substation cable (circuit) list, Cable schematic drawings as needed.

6.3.4 SCADA Points Lists

Contractor shall work with the various parties involved and prepare a points list for each entity listing the points being provided. A typical points list has been provided in the Master Appendix List as a base document from which a complete points list can be developed. The Contractor shall co-ordinate the review and approval of the points lists by the all the relevant parties. The points list will be of sufficient detail to allow programming of the various slaves and masters. All digital points shall be provided by "dry contacts" when not coming from an IED. Digital point wetting voltage shall be 125 VDC. Status points which can change state multiple times between polls from the SCADA system (typically 2 seconds) shall require a change detect status card (i.e. breakers). Wires from metering systems, and for communication, shall be twisted shielded pairs, and the shields shall be grounded in the substation SCADA cabinet only.

Expected deliverables include: Owner Points List, Owner Interconnect Points List, System/Area Operator Points List.

6.3.5 Substation Device Configuration

The SCADA RTU shall interface with the Owner's Master Station. Contractor will coordinate with Owner to develop the configuration files for the Substation SCADA System devices based on the

system design and points lists. Devices include, but are not limited to, communication processors/RTUs, Ethernet Switches/Firewalls, meters (communication settings only), protective relays (communication settings only).

Expected Deliverables include: Configuration files on CD and thumb drive.

6.3.6 Material Specification

Contractor shall prepare material lists containing an identifier, quantity, brief description and part number for each item. Provide catalog cut sheets of each item on the material lists and referenced with the same identifier.

Expected deliverables include: material lists and catalog cut sheets for communication processors/ RTUs and any other equipment required for a complete SCADA system.

6.3.7 Procurement, Installation and Implementation

Contractor shall procure, install, program and implement the design.

6.3.8 Commissioning

Contractor shall prepare a site acceptance procedure and submit for approval. Using the accepted procedure, Contractor shall perform the tests to check for proper operation of the Substation SCADA System including all analog information and digital status for both the substation and wind farm. In addition the Contractor shall perform tests to check for proper integration of the SCADA system and demonstrate appropriate functionality between the PV Module Supplier SCADA System, Substation SCADA, Owner, and the System/Area Operator. The Contractor is only required, under the SCADA scope, to demonstrate that the data points are supplied to the correct memory/port locations for information being transferred to/from other parties, such that their masters can read/write the data.

Commissioning and start-up of the PV Module Supplier SCADA system will be carried out by the PV Module Supplier.

Expected deliverables include: Site acceptance procedure, onsite personnel for SCADA system commissioning, completed acceptance test documentation demonstrating the appropriate collection and distribution of all the data points.

6.4 FIBER OPTIC NETWORK DESIGN

6.4.1 Design Requirements

Contractor shall prepare fiber optic overview design drawings; specifically including all transitions from OPGW to underground cable and the connections to the substation. Fiber Optic Network Drawings

Contractor shall prepare fiber optic network drawings showing the fiber loop connections to the PV Modules, meteorological towers, and substation. A minimum of (24) fibers shall be installed to each

PV Module. This design shall be based on that supplied by the PV Module Supplier and shall be reviewed and approved by PV Module Supplier.

Prepare fiber optic network drawings as required for substation and radial line connections.

The fiber optic network design shall have sufficient capacity to support the installation of the PV Module Supplier SCADA system. The Contractor shall submit for Owner's review a complete set of project Fiber Optic Network Drawings.

6.4.2 Fiber Optic Splice and Distribution Panel Details

Contractor shall prepare drawings detailing the splicing/connections required at all OPGW to underground transitions, the substation fiber optic distribution panel, and Substation Control House fiber optic distribution panel. Expected deliverables include: Fiber Optic Splicing Drawings, Fiber Optic Distribution Panel Drawings.

6.5 FIBER OPTIC INSTALLATION

6.5.1 General Installation

Contractor shall furnish and install fiber optic cable interconnecting the PV Modules, meteorological towers, the substation, and other locations as required. All cables shall be appropriately labeled with a permanently attached label. Contractor shall provide spare fiber optic cable to accommodate the addition of security card access, camera surveillance, etc., at all PV Module locations at a future date.

The Contractor shall provide conduits as required for any fiber entry into the substation control building including that associated with the Radial Line (e.g. OPGW). Conduit shall have a pull string for pulling the cable. Fiber optic cables may be routed through substation control cable trenches with other control wiring (subject to Applicable Laws, codes, and regulations) provided that a high-visibility color inner duct is used for identification and protection of the fiber optic cables.

Contractor shall furnish and install fiber optic splice and distribution panels as required, including, overhead to underground transitions and the project substation. All distribution panels shall be neatly labeled with each fiber pair denoting the source and destination information. Fiber optic distribution panels in the inverters shall be provided and installed by Contactor unless supplied and installed by the inverter Supplier.

Contractor shall furnish and install above ground communications cable junction boxes as required.

6.5.2 Fiber Terminations

Contractor shall terminate all fiber optic cable utilized in the collection system, substation, and other necessary locations. The cables shall be terminated with SC or ST connectors as required and shall be in compliance with the inverter Supplier's specifications. Connectors, break-out kits, and other miscellaneous materials required for terminating shall be provided by the Contractor. Each fiber pair shall be labeled with a permanently attached label.

Expected deliverables include: Terminated fiber optic cables, Test reports.

Fiber patch cables from the fiber distribution panels to end devices shall be provided by others.

7.0 Generator Lead Line

7.1 GENERAL

7.1.1 Definitions

Terms as found in this Scope of Work shall carry the definition as found in the General section.

Generator Lead Line shall include overhead or underground interconnection line from the project substation to the POI.

7.1.2 General Specifications

Owner has prepared a conceptual Project design for the purpose of permit applications and interconnection negotiations and specifying the minimum scope requirements for EPC of the Project. Conceptual design drawings and equipment specifications shall be developed by the contractor and shall verify all aspects of the conceptual design and shall provide final design, final detailed specifications, and drawings for the Project in conformance with this Specification. Contractor shall be responsible for design of the system based upon this conceptual design. All conceptual drawings shall become the Contractor's responsibility, and Contractor shall modify or recreate all conceptual drawings to reflect actual design throughout the design and construction phases of the Work. Modifications to the specifications within this Specification shall require Owner review and approval.

Contractor shall design, complete all necessary studies, fabricate, furnish, install, test and commission a complete, functional, and operating Project. All Contractor's tasks shall be in compliance with the applicable utility and all available utility business practice manuals, LGIA/SGIA, PPA, Real Property Requirements, good utility practices, and in accordance with all permits, federal, state and local regulations.

Contractor shall provide the appropriate personnel to manage all aspects of the work.

Contractor shall permanently assign the project management team upon authorization by Owner. Any changes to Contractor's management team will require prior approval by Owner. Contractor's Key Personnel (Project Manager, Site Construction Manager, and Project Engineering Manager, at a minimum) shall be approved by Owner.

Contractor may use a sub-consultant for engineering design and studies work for this Scope of Work; however, Contractor shall be the single point of contact for all of sub-consultant's work and deliverables. If Contractor plans to use specialized consultant to support any engineering/design task in this Scope of Work, Contractor shall include name of the consultant and resumes for all consultant team members for Owner's approval with the original bid package submittal.

Contractor will organize monthly meetings to fit Owner's needs. Monthly meetings may consist of conference calls with file-sharing technology, 'Face-to Face' meetings at Owner's facility , or meetings held at the Project site. These monthly meetings will serve as the weekly meetings for

those particular weeks. It is anticipated that design work will be completed prior to mobilization at the site. After mobilization meetings can be facilitated at the project site.

A. Contractor shall schedule the meetings with regular intervals to allow proper advance planning by all participants.

B. Contractor shall provide a suitable meeting space for all participants with telephone and internet WIFI connections available to all participants.

C. Contractor shall prepare and distribute an agenda for regularly occurring meetings, facilitate the meetings, and prepare and distribute meeting notes following the meeting within 2 business days.

Contractor, and at Contractor's discretion and as needed to support the project Contractor's sub-consultants and sub-contractors, and all other parties involved in the construction of the Project shall attend preconstruction meetings as requested by Owner. Prior to mobilization, or as specified below, Contractor shall present a construction plan including, but not limited to, the following:

A. Master project schedule (within XX days of the Effective Date),

B. Site specific safety plans,

C. Procurement plan (within XX days of the Effective Date),

D. Major equipment receipt, inventory and storage plan,

E. Construction sequence,

F. Methods and equipment to be used in all phases,

G. Tentative access and right-of-way roads,

H. Locations of staging areas,

I. Re-grading of roads,

J. Moving of equipment/property that will interfere or impact construction, and

K. Task-level construction schedule in MS Project format, showing all activities for the entire duration of the Project from the first authorization through Final Completion.

Contractor shall be responsible for contacting all utility companies impacted by, or involved with, the Project prior to starting any work to determine schedule of work and location of all temporary and permanent facilities in the Project area.

Except as specified otherwise, Contractor shall provide all equipment, materials, transportation services, labor, labor supervision, technical field assistance, scheduling, consumables, construction equipment, construction tools, special tools, construction utilities, permanent utilities, testing

services, instruments, spare parts, and other services and items required for, or incidental to the engineering, design, procurement, installation, construction, startup, testing, commissioning, energization, and training for the Project. The supply of construction equipment shall include lubricants, spare parts, and any other elements required for operation and maintenance. Spare parts for Owner's use after turnover are not included in the priced proposal unless specifically listed.

Contractor shall include schedule and budget allowance for plan submittal to the authority having jurisdiction for plan review and comment turn-around. All fees associated with plan submittals or permit application fees are the responsibility of the Contractor. Contractor shall assume permitting fees as normally expected.

Contractor shall include schedule and budget allowance for plans/studies submittals to Owner for plans/studies review and comment turn-around to support Contractor's Project schedule. The minimum review time allotted for Owner reviews shall be 14 working days].

Contractor shall abide by the working hours established by Owner or by Project permits whichever is more restrictive.

A. In general, work at the Project shall not be allowed on Saturdays, Sundays and federally recognized holidays without prior approval by Owner.

B. Work hours shall be in compliance with the CUP for this Project.

7.1.3 Contractor Design Deliverables

A. Owner reserves 14 Business Days to review all design, procurement, and construction deliverables (except where otherwise provided in the Agreement). Contractor shall build a minimum review time as described here into all project schedules and scheduling documents. Owner will make best efforts to review and comment on certain submittals with reduced review and comment time provided Contractor requests accelerated review and comments from Owner.

B. Contractor shall, at a minimum, provide all documents described in Section 7.1.2

C. Contractor shall provide design deliverables according to the Owner's requirements as well as the requirements of the Interconnecting Utility.

D. All drawings, specifications, studies, and calculations shall be sealed by a Professional Engineer in good standing and licensed in the State of Idaho for the applicable discipline.

E. Contractor shall provide a 30 percent Generator Lead Line design deliverable to include, but not be limited to, the following:

1. Environment loading criteria to include weather cases as specified by applicable codes and standards with specific wind speed, wind load, ice thickness, wire temperature, etc. for each weather case.

2. Mechanical conductor loading criteria

3. Plan/Profile drawings and PLS-CADD model to include the entire Generator Lead Line and final spans into the Substation

4. All material and construction specifications

5. Detailed pole-top configuration drawings for all anticipated structure types

F. Contractor shall provide a 60 percent Generator Lead Line design deliverable to include, but not be limited to, the following:

1. Structure loading calculation details

2. Structure embedment calculations and designs

3. Insulation/Grounding design calculations

4. Steel pole procurement documents

5. Assembly detail drawings

6. Updated plan/profile drawings and PLS-CADD model to include the entire Generator Lead Line and final spans into the Substation

G. Contractor shall provide an 90 percent Generator Lead Line design deliverable to include, but not be limited to, the following:

1. All design drawings, calculations, specifications, etc. previously submitted updated based upon Owner comments from previous submittals

2. Staking Sheets

3. Bid Schedules

4. Sag/Tension Report

5. Conductor Stringing Charts

6. All remaining design drawings, calculations, specifications, etc. usual and customary for EPC of this Project

H. Design-period submittals shall conform to the following:

1. Deliverables shall be provided electronically via along with one printed copy to Owner's office .

2. Drawings shall be formatted as "full-size" sheets.

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3. Drawings shall be provided in Microstation unless otherwise agreed upon by Owner.

4. Generator Lead Line Interconnection design models shall be in PSSE, Aspen and PLS-CADD format, v13.x, with SAPS structure analysis.

5. Text documents shall be in MSWord, latest version.

6. Spreadsheets shall be in MSExcel, latest version.

7. Project schedules shall be in Primavera P6, latest version.

I. Construction-Period Deliverables

1. Construction-period deliverables shall be provided, in hard-copy format, to Owner's site representative located at the project site and electronically

2. Contractor shall maintain, at the job-site, an up-to-date copy of all design deliverables with "red-line" markups of any changes to the documents.

3. Material requisition proposals for Key Equipment as defined in the Specification.

J. Project Close-Out Deliverables

1. Contractor shall provide a copy of all final "red-line" design documents in hard-copy format to Owner's office in XXX and electronically via XX.

2. Contractor shall provide an as-built PLS-CADD, PSSE and Aspen Generator Lead Line model,.

3. Contractor shall provide all detail drawings, assembly drawings, and equipment drawings in Microstation.

4. Contractor shall abide by the requirements defined elsewhere in the Agreement for Job Book submittal schedules and contents.

7.1.4 Owner Provided Facilities and Services

Owner-provided studies, equipment, etc.

7.1.5 Codes, Regulations, and Standards

Contractor shall design and construct the Project in accordance with, but not limited to, the standards or organizations as shown below.

AA	Aluminum Association
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
AISE	Association of Iron and Steel Engineers

ANSI	American National Standards Institute
API	American Petroleum Institute
AREMA	American Railway Engineering and Maintenance Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASNT	American Society for Nondestructive Testing
ASTM	American Society for Testing and Materials
AWS	American Welding Society
CMAA	Crane Manufacturer Association of America
CRSI	Concrete Reinforce Steel Institute
EPA	Environmental Protection Agency
HMI	Hoist Manufacturer's Institute
IBC	International Building Code
ICEA	Insulated Cable Engineers Association
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
ISA	Instrument Society of America
ISO	The International Organization for Standardization
NACE	National Association of Corrosion Engineers
NBS	National Bureau of Standards
NEBB	Nation Environmental Balancing Bureau
NEMA	National Electrical Manufacturers Association
NERC	North American Electric Reliability Council
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
SAE	Society of Automotive Engineers
SDI	Steel Deck Institute
SSPC	Structural Steel Painting Council
UL	Underwriters Laboratories, Inc

Contractor shall design and construct the Project in accordance with but not limited to the latest versions of the standards or organizations as listed in this Section as well as any other Owner's contract documents.

In the case where standards have conflicting requirements, Contractor may select the most stringent standards with Owner approval.

7.2 GENERATOR LEAD LINE MATERIAL AND DESIGN CRITERIA

7.2.1 General Requirements

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A. There will be a redundant fiber-optic communication conductor buried or installed overhead within the Generator Lead Line right-of-way from a splice vault, installed under this scope of work, outside of Utility Operator's facilities to a splice vault, installed under this scope of work, outside of the Project Substation.

7.2.2 Generator Lead Line Design Criteria

A. Contractor shall design the Generator Lead Line according to the design criteria provided in this Specification.

B. Contractor's final design shall confirm all structure locations are in compliance with all permitting requirements and/or all property requirements.

C. Contractor shall be responsible for the following:

1. Perform Generator Lead Line engineering, analysis, and design.
2. Prepare a complete construction package per the Scope of Work.
3. Procure equipment and material.
4. Receive, inventory, store, and protect equipment and material.
5. Construct the line.
6. Construct the Gen-Tie maintenance road.
7. Test and commission the Project.
8. Prepare as-constructed documents per the Scope of Work, which shall at a minimum include the Gen-Tie facilities, right-of-way widths, easement areas, fences and gates, and labeling of all major roads and points of interest in AutoCAD format.
9. It shall be the Contractor's responsibility to complete all tasks necessary to provide Owner with a complete and fully functional Generator Lead Line that meets all Owner's standards and specifications and meets generally acceptable industry standards.

7.2.3 Design Requirements

A. The Generator Lead Line must be designed and constructed in accordance with Owner's requirements and Interconnecting Utility's requirements for the last structure outside of the Utility's substation.

B. The design specifications and drawing requirements provided or referenced in this document are to be considered as minimum requirements. Any criteria not specifically addressed in this specification shall as a minimum meet or exceed the requirement of the current edition of the National Electric Safety Code (NESC) C2, and Owner's specifications and requirements.

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C. Contractor shall use PLS-CADD, PESS and Aspen software to spot and perform detailed analysis and design of the Generator Lead Line.

D. Phasing

1. Phasing shall be determined via coordination with the Facility design and Interconnecting Utility's requirements.

2. If it is determined that phase-swapping is required, the swap must occur on the Generator Lead Line as close to the Interconnecting Utility's substation and outside the Project Substation as feasible. Final location must be approved by Owner.

E. OPGW and / or Fiber Optic Cable

1. The Generator Lead Line fiber optic design, installation, and testing shall meet Interconnecting Utility's requirements, LGIA requirements, and IEEE Guide to the Installation of Overhead Transmission Line Conductors, Standard No. 824.

2. Contractor will coordinate OPGW and/or buried fiber optic cable termination design at the Interconnecting Utility's Switchyard with Owner and Interconnecting Utility to ensure that the design is compatible with Interconnecting Utility design. [This could require a splice box at the last structure, or it could require that sufficient surplus OPGW and / or buried fiber cable be coiled at a below-grade structure leaving sufficient length to allow Interconnecting Utility to pull the fiber-optic cables into Interconnecting Utility's substation for termination at their splice box, with Owner approval.]

3. For overhead fiber optic installations, the fiber-optic conductor installed as a shield conductor at the top of the structure, with Owner approval.

4. For underground fiber optic installations, a redundant fiber optic communication line shall be buried, and is assumed to follow the Generator Lead Line alignment to a common fiber-optic splice box as installed by Contractor or Interconnecting Utility adjacent to Interconnecting Utility's Substation.

5. Splicing shall be done according to manufacturer's recommendations. The contractor shall record all final sag measurements. This report shall contain the following information:

a. Date of the measurements

b. Span and span lengths

c. Ruling span

d. Wire temperature

e. Ambient temperature

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f. Initial sag for the span

g. Time in blocks

h. Time of day

i. Sag measurements.

F. Conductor and Shield Wire

1. Contractor shall ensure that the selected conductor for the conductor and shield wire to be used for the Generator Lead Line will meet the project technical requirements, with Owner Approval.

2. The installation of the conductor and shield wire as well as the sizing of the stringing sheaves and bullywheels to be utilized shall be in accordance with to the IEEE Guide to the Installation of Overhead Transmission Conductors, Standard No. 524.

3. The contractor shall record all final sag measurements. This report shall contain the following information:

a. Date of the measurements

b. Span and span lengths

c. Ruling span

d. Wire temperature

e. Ambient temperature

f. Initial sag for the span

g. Time in blocks

h. Time of day

i. Sag measurements.

7.2.4 Structure Types and Configurations

A. Contractor shall be responsible for establishing the configuration of every structure such that electrical clearance requirements are met as well as any easement/permitting/right of way requirements.

B. Contractor shall determine the ideal structure material for the structures in the event that the owner does not specify. The material utilized shall be corrosion resistant or painted, galvanized, or otherwise suitably protected in order to withstand the environmental conditions for the design life of the structure.

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C. All structures shall be designed to withstand, without failure or permanent deformation, the load cases required for the project. Structures shall be designed with methods to provide for safe climbing.

D. All material/equipment is to be tested per the applicable clauses in the ASCE, ASTM, and ANSI requirements, and certified test reports are to be provided.

E. Calculation of the design loads (load trees) is the responsibility of Contractor.

F. The last structure outside of Utility Owner's Facility on the Generator Lead Line shall be designed to Interconnecting Utility's standards.

7.2.5 Generator Lead Line Foundation Design

A. Contractor shall interpret, evaluate, and apply all geotechnical reports, as provided by Owner or as obtained by Contractor, and shall design the structure foundations taking into account the structure loads, soil conditions, constructability, and other required factors.

B. Contractor shall design Generator Lead Line tower foundations to withstand hydrological flows per drainage reports, as provided by Owner or as obtained by Contractor, including depth, velocity, and scour potential.

C. Material used for the foundations shall be approved by the Owner.

D. All formwork used shall be according to ACI 301 and ACI 347. All reinforcement and accessories used shall be according to ACI 301 and 315. The conveying, placement, and vibration of the concrete shall be according to ACI 301.

E. All voids in the foundation shall be filled and all form ridges as well as other projections shall be removed.

F. Contractor shall provide and maintain all bracing and shoring according to all applicable safety regulations.

G. Contractor shall provide foundation according to owner requirements with appropriate backfill material.

H. Contractor shall install permanent or temporary casing when it is apparent that the shaft cannot be maintained due to sloughing or caving. The casing shall be installed as required to counteract the sloughing or caving. In areas with a high water table where the excavation cannot be pumped dry and the casing cannot restrict the flow of water into the excavation, the shaft shall be augured under water or slurry. A detailed procedure and specification describing the slurry displacement method for placing concrete shall be provided.

7.2.6 Material

A. Material shall be of new manufacture and unused and be free of defects and irregularities that could cause corona.

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B. Contractor shall provide witnessing of factory acceptance tests for all key Equipment, as defined in the Contract. Owner shall be given the opportunity, with a minimum of 21 calendar day's notification, to attend all factory acceptance tests and shop visits for equipment procured by Contractor.

C. Contractor shall bear the responsibility for delivery of equipment, spare parts, special tools, and materials to the site and shall comply with the requirements specified in the Owner's documents as well as requirements in this Specification. All material shall be secured on site in order to prevent, damage, theft, and to ensure protection from the elements.

D. These requirements also apply to any sub-suppliers making direct shipments to the jobsite.

E. Conductor surfaces shall be free of any and all defects that compromise the smoothness and uniformity of the conductor's contour, including die marks, dirt points, sharp edges, abrasions, humped wires, or any other defect.

F. All material shall be packaged in weather-resistant cartons or crates that are suitable for outdoor storage. Insulators shall be protected with material capable of preventing damage to the sheds, connections, or end fittings during shipment. Storage shall be in compliance with manufacturer's requirements as well as the Owner's requirements.

G. All items shall be checked against packing lists immediately on delivery to the site for damage and for shortages. Damage and shortages shall be remedied with a minimum of delay at no additional cost to the Owner.

H. Partial shipments shall be subject to review of Contractor before shipment, and, when permitted, shall be plainly marked in such a manner to allow identification, accumulation, and facilitation of eventual installation.

I. All assemblies, hardware, and components of assemblies shall be designed to meet the requirements of the latest versions of ANSI, ASTEM, IEEE, NEMA, ASTM, and the NEC. The material shall be made of steel, aluminum, malleable iron, or a combination of these materials, material shall be chosen according to best performance. All ferrous metal components shall be galvanized in accordance with ASTM A123, ASTM 153 or NEC G164.

J. Contractor shall verify that all material, assemblies, hardware, and components of assemblies meet the strength requirements for the application and intended use as well as be designed to avoid failure from fatigue.

K. Any piece of hardware in an insulator assembly must, at a minimum, match the ultimate strength of the insulator. Each piece of hardware shall be marked with the specified mechanical load, routine test load, assembly date code, and the manufacturer's identification/part/catalog number.

L. All assemblies must assemble properly and be sized such that binding or overstressing of the parts shall not occur during wire motion. The workmanship of all parts (threading, tapping, etc.) shall be according to the Owner's requirements as well as all applicable standards.

M. Contractor shall be responsible for design of the jumper assemblies such that all electrical clearances are maintained.

N. All line hardware shall include all parts necessary in order to attach the conductors to the insulators and to connect the insulators to the overhead line structure. This includes clamps, links, clevises, shackles, pins, bolts, locking devices, etc.

O. All steel structures and support arms shall be hot dipped galvanized.

P. The Generator Lead Line conductors shall be non-specular and nonreflective, and the insulators shall be nonreflective and nonrefractive.

Q. Contractor shall produce a complete bill of material (BOM) for all equipment.

7.3 GENERATOR LEAD LINE SITE REQUIREMENTS

7.3.1 Site and Environmental Criteria

Contractor shall procure, obtain, and maintain all Contractor Acquired Permits, which includes those permits required for the construction of the Project.

Contractor provided all permits required Some permits are clarified to be provided by others but will require support from Contractor.

7.3.2 Fire Water during Construction/Fire Protection

Contractor is responsible for providing and permitting fire water and related systems at the Project trailer complex, if required by applicable codes.

A. Fire Protection

1. Only work procedures which minimize fire hazards to the extent practicable shall be used. Combustible debris and waste materials shall be collected and removed from the work area each day. Fuels, solvents, and other volatile or flammable materials shall be stored away from the construction and storage areas in well-marked, safe containers. Good housekeeping is essential to fire prevention and shall be practiced by the Contractor throughout the construction period.

2. Formwork, scaffolding, planking, cabling, and similar materials which are combustible but which are essential to execution of the work shall be protected against combustion resulting from welding sparks, cutting flames, and similar fire sources.

3. Contractor shall provide qualified personnel for fire control as appropriate. Contractor shall provide adequate fire protection equipment in each warehouse, office and other

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temporary structures, and in each work area for which Contractor is responsible. Access to sources of fire water shall be kept open at all times. Suitable fire extinguishers shall be provided in enclosed areas, in areas that are not accessible to fire water, or in areas that may be exposed to fire that cannot be safely extinguished with water. Each fire extinguisher shall be of a type suitable for extinguishing fires that might occur in the area in which it is located. In areas where more than one type of fire might occur, the type of fire extinguisher required in each case shall be provided. Each extinguisher shall be placed in a convenient, clearly identified location that will most likely be accessible in the event of fire.

4. Contractor, alone, shall be responsible for providing adequate fire protection of all construction areas. Failure of the Contractor to comply or the Owner to enforce, the above requirements shall not relieve Contractor from any responsibility or obligation under the Contract.

7.3.3 Environmental Compliance

All design and construction shall comply with the EIS, EIR, and all other documents provided by Owner

Reference Contract for definition of responsibility regarding environmental compliance by Contractor.

7.3.4 Preserved Areas

Owner will identify areas designated as naturally preserved within the boundaries of the project site and Contractor shall comply with Owner plans and restrictions.

7.3.5 Site Access

A. Contractor shall ensure that all of its employees, agents, guests, invitees, and other workers under its direct or indirect control receive an access identification badge to be provided by Contractor. Access identification badges shall be used to enter and exit the Project. Access of personal vehicles to the Project will be limited to ingress egress, and parking at an employee parking area to be designated by Owner. Contractor shall ensure that any vehicles driven by Contractor's employees, agents, guests, invitees, or other workers under its direct or indirect control, are registered with Contractor prior to entering the Project and display Contractor information on such vehicle. Personal vehicles of any kind are prohibited from entering areas of the Project.

B. Contractor shall install a secured fence per approved design and permit drawings before Contractor commences construction. If, in Contractor's opinion and Owner's concurrence, a planned permanent fence can be installed in lieu of a temporary site fence, Contractor may forego the temporary site fence and install the permanent fence to adequately protect the Work area, any laydown areas, and prevent unauthorized access.

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7.3.6 Site Management

Contractor shall provide all necessary construction, safety, quality, and site management.

7.3.7 SWPP Plan

Contractor shall provide all materials, labor and equipment necessary to ensure compliance with the requirements of the applicable permits and applicable laws. Compliance with the SWPP plan and applicable laws is mandatory and will be verified by the Owner's Site Representative. Contractor agrees to be bound by Owner's Site Representative's findings.

7.3.8 Unloading and Staging

Contractor shall provide all equipment and labor to unload and stage materials and equipment delivered to the Project related to this Scope of Work. Contractor shall receive all materials at the laydown area unless an alternative location has been directed or approved by Owner. For materials supplied by Owner, Contractor shall provide signed packing slips to Owner by the end of each work day, which signed packing slip shall serve as evidence of Contractor acceptance of all materials listed on packing slip. Contractor shall be responsible for all Owner-provided materials and equipment after delivery to the Project or laydown area.

7.3.9 Site Facilities

Contractor shall provide all Project facilities, including all utilities and sanitary facilities, to be cleaned and restocked daily, for Contractor's own use. Contractor shall provide temporary above-ground toilet facilities. Contractor shall provide all additional facilities as may be necessary to support completion of this Scope of Work, including, but not limited to, any change trailers, lunch rooms, hand washing facilities, shade tents, and drinking water. Contractor shall be responsible for maintaining all Project facilities provided by Contractor. Daily cleaning of Project facilities is mandatory and will be verified by random Owner inspection.

7.3.10 Cleanup

A. Contractor shall comply with all requirements herein, contractor's Clean-up Plan (CUP) requirements, or permitting requirements, whichever is more stringent.

B. Contractor shall be responsible, at its own expense, for daily cleanup of all areas and equipment in which Work is performed under this Scope of Work. Contractor shall provide waste facilities and dumpster and shall be responsible for off-site disposal of construction-generated waste materials. Contractor shall be responsible for daily road cleaning of all exterior roads used to access the Project. Contractor shall ensure that no mud or debris remains on the roads. Compliance with daily cleanup is mandatory and will be verified by random Owner inspection.

C. Special attention shall be given to keeping the Project and surrounding grounds clean and free from trash and debris. Contractor shall require all disciplines under Contractor's control to thoroughly clean their work areas each working day. Contractor's on-site manager shall be responsible for site maintenance and cleanliness. This shall include sweeping the floor, collecting and disposing of trash, and all other functions required to keep the Project, storage

areas, and temporary offices clean. All hoses, cables, extension cords, and similar materials shall be located, arranged, and grouped so they will not block any access way and will permit easy cleaning and maintenance.

D. Contractor shall be responsible for waste disposal on a regular basis to prevent waste build-up at the Project and in all work areas under Contractor's control. Contractor shall be responsible for removal and lawful disposal of all discarded material, debris, rubbish, unusable excavated material, and waste, including Hazardous Materials, if any, generated by Contractor and its subcontractors and suppliers during construction of the Project.

7.3.11 Site Restoration

Contractor shall stabilize and restore all areas of the Project disturbed during execution of this Scope of Work including taking all steps necessary to comply with the Dust Control Plan, SWPP Plan, Revegetation Plan, applicable laws, and applicable permits. Contractor is responsible for demobilizing and restoring the area disturbed as a result of its activities to Owner-acceptable conditions, and is required to take all steps necessary to ensure that there are no conditions at the Project at the conclusion of this Scope of Work that violate the Dust Control Plan, SWPP Plan, Revegetation Plan, Applicable Laws, and Applicable Permits.

7.3.12 Trenches/Excavations

Contractor shall ensure all open trenches and/or excavations are cordoned off with approved delineation means and signage. Contractor shall also closely coordinate with all of Contractor's Subcontractors to ensure that trenches and/or excavations minimally impede flow of pedestrian and vehicular traffic through the Project. Road plate shall be used to ensure emergency vehicles can cross trenches at all access roads. Contractor shall, at its own expense, remedy trench cave-ins and water infiltration.

7.3.13 Equipment Condition

Contractor off-road, on-road and portable combustion equipment shall be delivered to the Site clean of vegetation, soiling, and with no visible oil, grease, fuel staining or active leaks. Documentation of the equipment to be delivered to the work area and used by Contractor shall be provided to Owner, in a format to be specified by Owner, no later than two days prior to delivery. Undocumented equipment shall only be allowed on Site with approval from Owner. Prior to equipment leaving, documentation of equipment usage in hours or miles shall be provided to the Owner.

7.3.14 Fuel Storage

A. Contractor shall abide by all applicable permits and local regulations pertaining to the fueling of vehicles and equipment required while performing this Scope of Work. This may include the requirement to refuel equipment at the Project Site for the purpose of minimizing overall vehicle emissions caused by traveling away from the Project to refuel or resupply equipment.

B. Contractor may use mobile refueling or may provide stationary fuel storage tanks for refueling Contractor's vehicles. Owner will negotiate other scopes of work related to the

Project in which fuel storage tanks may be permitted. Contractor is allowed to negotiate fuel purchase agreements with contractors awarded other scopes of work for either mobile refueling or refueling via fixed fuel storage tanks for other scopes of work.

7.3.15 Equipment Leaks and Spills

A. Contractor shall immediately report to Owner all equipment leaks and spills, other than 'drips' (by Owner's definition), that occur. Clean-up of spills/leaks, accumulation of wastes from the clean-up, and disposal of this waste by the Contractor shall be conducted under the direction of Owner.

B. Contractor shall mitigate all fuel spills, at a minimum, according to requirements in the CUP or as found in the permitting requirements, whichever is more stringent.

7.3.16 Work or Travel Violations of Marked Boundaries

Owner will establish and mark work area limits, buffers or boundaries by fence, rope, staking or documents provided to Contractor. Contractor shall not move markers unless at the direction of the Owner. Contractor shall not perform work or travel beyond work area limits. Contractor shall immediately notify Owner when work or travel occurs beyond work area limits.

7.3.17 Recycling

Contractor shall ensure compliance with Owner's goal of zero waste discharge such that all materials that come onto the Project that are not incorporated into the Work shall be collected and recycled. All materials that are not incorporated into the Work shall be recycled through Contractor provided, and Owner approved containers. Contractor shall be responsible for properly separating waste materials into the appropriate recycling containers. Contractor shall provide proof of recycling at Owner's request.

7.3.18 Site Connectivity and Communications

A. Contractor shall ensure that it has sufficient on-site internet and telephone connectivity necessary for performance of the tasks under this Scope of Work.

B. Communication facilities to be installed on the Generator Lead Line for the permanent installation shall be provided by Contractor. This includes the fiber-optic communication lines from the Transmission Owner's Substation to the Project Substation and connection from the commercial telecom point of service to the Project Substation.

C. Contractor will contract with the local Telecom provider to connect service and will provide the phone line isolation equipment as specified by the Telecom provider and shall be responsible for any fees associated.

D. Contractor shall:

1. Provide the ground potential rise, fault values, X/R data etc. required by the local telecom company for installation.

2. Verify with the telecom provider the telecom point of Demarcation for the telecom service.

3. Install the telecom pedestal in a manner approved by the telecom provider in the approved location.

4. Install all ducting required to and from the telecom pedestal location as well as all cabling not provided by the telecom provider.

7.3.19 Transportation

Contractor shall be responsible for transportation of Contractor's employees, agents, guests, invitees, and all other workers under its direct or indirect control, and all material and equipment necessary for performing the tasks under this Scope of Work. To the extent possible, Contractor and Contractor's Subcontractor's vehicular traffic shall remain on designated roadways.

7.3.20 Lighting

Contractor shall provide all necessary artificial lighting for tasks performed under this Scope of Work where artificial lighting is necessary.

7.3.21 Water

The Contractor shall supply potable water or bottled water required for Contractor's construction personnel as required throughout the construction period.

7.3.22 Dust Control/Non-Potable Water for Construction

A. Contractor shall provide a construction water source for use. Contractor shall be responsible for transportation of construction water from the source throughout the Project as required for soil conditioning and dust control.

B. Contractor is responsible for all fugitive dust emissions with respect to this Scope of Work, including compliance with Applicable Permits and Applicable Laws and the requirements identified in this Specification.

C. Contractor compliance with dust mitigation requirements (including the requirements described in the Applicable Permits and Applicable Laws and this Specification will be verified by Owner. Contractor agrees to be bound to Owner's findings. Contractor is solely responsible for any fees incurred or fines issued by any Governmental Authority related to violations of Applicable Permits and Applicable Laws.

7.4 CONSTRUCTION

7.4.1 General

A. Contractor shall prepare, compile, issue, and update a construction specification for the work described in this chapter.

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B. Contractor shall procure material and construct the Generator Lead Line such that, when in operation, it does not cause nuisance audible noise or radio or television interference. Contractor shall calculate estimated audible noise, radio interference, and television interference levels and provide those results to Owner.

C. Contractor shall make all reasonable efforts to minimize all damages due to construction activities. Damages to private property, of any type, are the responsibility of Contractor.

D. Contractor shall be responsible for preparing and acquiring all storm water construction permits.

E. All temporary openings in fences created by Contractor shall be removed and the fence repaired when access is no longer required. Contractor shall be held responsible for damage to crops, livestock, or other property resulting from failure to keep fences, gates, or fence gaps in proper condition.

F. Contractor shall be responsible for grounding all fences and structures along the Generator Lead Line route according to applicable codes and standards.

G. Contractor shall repair and restore the right-of-way and clean up each structure location to the satisfaction of Owner and according to all permitting requirements or landowner agreements. All earthwork, culverts, bridges, and drainage structures constructed by Contractor shall be removed when no longer required.

H. Contractor shall be responsible for preserving the operating capability of all active utility infrastructure crossing or located within the project site. Any damage to the infrastructure shall be promptly repaired to the satisfaction of the owner(s) of the infrastructure.

I. Contractor is responsible for staking structure foundations prior to excavation.

J. All excavated/displaced material as a result of foundation construction shall be removed from site and disposed of by Contractor in compliance with all federal, state and local regulations and applicable permits.

K. Site dewatering during construction is the responsibility of Contractor.

L. All parts of the structures shall be purchased and installed by Contractor.

M. Interconnecting Utility will install conductor from the last Generator Lead Line structure (POI) to Interconnecting Utility's facilities

N. Conductor and OPGW shall be installed in accordance with "IEEE Guide to the Installation of Overhead Transmission Line Conductors", Std. No. 524.

7.4.2 Surveying

A. Contractor shall employ a registered professional land surveyor for all survey work on this project.

B. Contractor is responsible for performing a survey of the Owner-established corridors according to the Owner's requirements.

C. Contractor is responsible for obtaining all necessary geotechnical data for final design of the Generator Lead Line structure foundations.

D. Contractor's survey firm is responsible for establishing a ground control network and collecting controlled, color, digital, ortho-rectified photography and terrain data. Contractor's survey firm is also responsible for processing the raw data and delivering a digital elevation model in a format readily imported into PLS-CADD.

7.4.3 Access

Site access shall be in accordance with local requirements and as described in Owner's requirements. The Contractor is responsible for the heavy haul route and for any necessary improvements. The Contractor shall coordinate this work with other entities as required.

7.4.4 Outages

A. Contractor shall coordinate outages with the Transmission Provider (if applicable) and the Owner, and submit an outage plan as required by the Owner and Transmission Planner. The outage plan shall contain all scheduled interruptions of electrical power or other utilities- and detail any interference that would affect the Project or any PV Project or third parties. This plan shall be submitted by Contractor to Owner and affected parties for Owner's review and approval.

B. Contractor shall take reasonable efforts to schedule construction activities so that required outages are minimized or can be scheduled during off-peak hours for the Transmission Provider's system.

7.4.5 Temporary Power

A. Contractor shall prepare a document detailing the temporary power that will be required for the project. This document shall include the location of the temporary power facilities, labor required to install the facilities, equipment and material needed, laydown/storage requirements, outage requirements, construction activity required, safety procedures and any other relevant information.

B. Contractor shall be responsible for arranging temporary power as needed for construction.

C. Contractor shall be responsible for the removal and disposal of any temporary power facilities once construction is completed.

D. Contractor shall be responsible for any required permits, if required.

7.5 CLOSE OUT

At the time of substantial completion, all of the following documentation shall be provided by the EPC provider:

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A. Owner's manual including all equipment manufacturers' manuals.

B. As-built drawings.

C. Test reports for all material/structures.

D. Startup and shutdown protocol for maintenance.

E. Safety protocol for maintenance.

F. Emergency response protocol.

G. Any other documentation deemed appropriate by the Owner/project requirements.

Orientation and training shall be provided by the Contractor at the time of substantial completion for Operator participants.

8.0 Commissioning

8.1 COMMISSIONING REQUIREMENTS

8.1.1 General Requirements

A. The Contractor shall be responsible for conducting a Commissioning Plan for the Facility that includes all Commissioning Inspections and Tests outlined in this Specification, except for an interconnecting substation when included in the Facility. The Commissioning Plan shall comply with all of the requirements set forth by this Specification.

B. The Contractor shall include in the Commissioning Plan any additional tests or measurements required by applicable Standards, Codes or the requirements of all AHJ, which may include the Local Electric Utility and equipment manufacturers.

C. The Commissioning Plan shall include a safety plan.

D. All labor, materials, equipment, and tools used to complete the Commissioning Plan shall be qualified and suitable for the assigned task.

E. All tests shall meet the requirements presented in this Specification and all referenced industry standards.

F. All tests shall be performed in accordance with any applicable manufacturer's instructions and requirements.

G. The Contractor shall submit an initial draft of the Commissioning Plan to the Owner for review a minimum of four weeks prior to the scheduled start of commissioning. The Owner shall return comments to Contractor and Contractor shall amend and resubmit the Commissioning Plan to Owner no more than ten business days after comments were received.

H. Contractor shall be responsible for finalizing the Commissioning Plan with Owner.

I. The Commissioning Plan shall include a proposed commissioning schedule that is consistent with the overall project schedule (including start and end dates) and presents the following in detail:

1. Each test to be performed
2. Expected duration of each test,
3. Plans for submission of test data and final test report

J. The Contractor's Commissioning Plan shall include the Contractor's standard punch list to track progress in resolving issues identified during the execution of the Contractor's Commissioning Plan.

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1. The Owner and Contractor shall agree upon when the punch list is reviewed that in no case shall exceed one week without written consent of the Owner.

2. The Contractor shall provide the punch list to the Owner as updates are made in progress in resolving issues.

3. When issues can be rectified immediately, the Contractor shall record the issue on the punch list as being closed.

8.1.2 Testing Requirements

A. The test procedures defined in the Commissioning Plan shall include, at a minimum, the following information:

1. Prerequisites to the tests

2. Make and model of equipment to be used for measuring data

3. List of the data that will be collected

4. Test procedures which shall be used

5. Successful acceptance criteria

6. Any differences between tests in the Plan and this Specification

7. Test report templates, which are examples of all proposed inspection, responsible party and test reporting forms

B. When conducting tests, the Contractor shall comply with the following requirements:

1. Provide at least ten business day notice to Owner prior to the commencement of any inspections and/or tests

2. When all tests are successfully completed, the Contractor shall provide a Commissioning Report to the Owner per section 8.1.6

3. All testing shall comply with all applicable pre-operational requirements set forth by the local AHJs, and Owner approved Commissioning Plan

4. All testing equipment shall be calibrated in accordance with to the applicable manufacturer's requirements and industry standards and be conducted by a certified and recognized equipment testing authority

5. Provide equipment calibration certificates for all installed instrumentation as part of submission of test documentation

C. Testing Personnel/Technicians performing these electrical tests and inspections shall be trained and experienced concerning the apparatus and systems being evaluated. These

individuals shall be capable of conducting the test in a safe manner and with complete knowledge of the hazards involved. They must evaluate the test data and make a judgment on the serviceability of the specific equipment

Technicians shall be certified in accordance with ANSI/NETA ETT-2010, Standard for Certification of Electrical Testing Technicians. Each on site crew leader shall hold a current certification, Level III or higher, in electrical testing.

8.1.3 Testing Conditions

A. All equipment required for normal operation of the Facility shall be operated in normal, automatic, or emergency, manual modes, as applicable.

B. During all tests, the Owner or Owner representative shall have access to the Facility and all operating data for purposes of monitoring and calculating performance.

8.1.4 Calculations

A. All calculations prescribed within this Specification shall be carried out by the Contractor and submitted to Owner for approval.

8.1.5 Required Inspections, Tests and Verifications

8.1.5.1 General Inspections

A. The General Inspections shall be performed by the Contractor with Owner or Owner Representative prior to any Commissioning tests.

B. Any issues identified by the General Inspections shall be added to the Contractor's punch list, upon Owner agreement

C. The General Inspections shall be repeated for all issues on the punch list associated with the General Inspections until each one is resolved.

8.1.5.1.1 Visual inspection

A. The General Inspections shall include the visual inspection of the constructed Facilities against the design drawings for possible issues. The General Inspections shall identify any issues and/or irregularities, including but not limited to the following:

1. All cables, modules, racking, inverters and other system components shall be visually inspected to be free of physical damage

2. All electrical and communication wires and cables shall be visually inspected to ensure that they are installed in a clean and workmanlike manner with no loosely hanging wires

3. All connectors and ground connections will be inspected to make sure they are tight and correct

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4. All system components shall be visually inspected to be free of corrosion or oxidation issues such as rusting

5. The Site shall be visually inspected for unforeseen obstructions which may cause unexpected shading on modules

6. All welds performed in the field shall be visually inspected by a certified welding inspector for issues

7. Visual torque marks shall be visually inspected on all lug and bolt heads.

8. Torque marks shall extend for the center of the bolt head continuously to the surface on which the bolt is secured

9. The alignment of post shall be visually inspected.

10. Soil compaction and depth of embedded post for ground mounted systems shall be tested against design.

11. The underground cable arrangement shall be inspected prior to the trench backfill. Trench evacuated correctly.

12. Underground cable bending, Cable spacing, fiber cable and motor cable installed properly, warning tape installed in proper depth, backfill material are free from debris and rocks, all cable are free from stress, defect and visible physical damage.

13. Contractor shall repair major equipment components if damaged from Factory.

14. Contractor shall exclude any foreign material.

8.1.5.1.2 Design compliance verifications

A. The General Inspection shall verify the installation of system components complies with the Facility design and include a review of the following are as required by these Specifications:

1. Markings and labels of all cables, circuits, protective devices, switches and terminals, and all other equipment are suitably affixed and durable

2. Equipment ratings

3. Wire sizing

4. Module flash test review

5. Mounting or racking components

6. Tracker components (if applicable)

7. Equipment physical location and arrangement

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8.1.5.2 Grounding Systems Inspections

A. The General Inspection shall include an inspection of the grounding systems to ensure that all components are properly grounded according to design and specifications. The Grounding System shall be inspected in accordance with NETA-ATS Section 7.13.

B. Grounding connections shall be inspected by an AHJ or other independent quality control inspector to verify proper installation of all compression clamps, CAD welds, and mechanical connections.

C. All groundings (DC and AC system, communication cables with grounded metallic components, etc.) shall conform to all applicable codes and standards.

D. Visual inspection of the grounding systems shall at a minimum verify: All underground work shall be documented and reviewed by Owner or Owner Representative during construction.

1. Racking posts grounded per specifications and connected to system grid
2. All connections
3. Mechanical attachment
4. Anti-oxidation coatings applied, as required
5. Lugs fully seated
6. Whip installed per manufacturer's requirements
7. Connections to grounding grid
8. Exothermic welds
9. Compression clamps
10. Grounding rods
    a. Rods set to depth per drawings
    b. Clamp fully engaged
    c. Whip/cable fully engaged

8.1.5.3 Grounding Systems Testing

A. The Grounding System shall be tested in accordance with NETA-ATS Section 7.13 and E-11-01 “Grounding”.

B. The three point and two point test values shall be in accordance with NETA-ATS Section 7.3.2.3.

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C. Ground resistance testing shall be by the fall-of-potential method in accordance with IEEE 81.

8.1.5.4 PV String Open-Circuit Voltage Testing

A. Open-circuit voltage (Voc) string testing shall be conducted in order to assess overall module and string performance.

B. The test shall be conducted and witnessed by at least one qualified technicians using best practices and the following procedure:

1. The test shall be conducted during periods of irradiance greater than 700 W/m2 and between the hours of 10:00 am and 2:00 pm solar time.
2. Inspect string fuses for appropriate use and correct sizing
3. Measure and record the following for every string:
4. String number and combiner box location (or similar relevant string identification)
5. Time of test and weather conditions
6. Module backsheet temperature at a location representative of the strings being tested
7. Plane-of-Array (POA) irradiance measurement for area of strings being tested
8. Open-circuit voltage (Voc) measurement of every string within each combiner box.
9. Measurement shall be made using a voltmeter with the suitable voltage rating and accuracy of at least 0.5%
10. Each measured string Voc shall be within 5% from the expected Voc (Voc-expected) and within 5% of adjacent strings under identical temperature and irradiance conditions.

C. The expected V_oc shall be calculated using the following equation:

$$V_{oc-expected} = \eta \cdot V_{oc-ref} \cdot \left[1 + \beta \cdot \left(T_{mod} - T_{mod-ref}\right)\right]$$

where:

$V_{oc-expected}$ = expected open-circuit voltage of the string

V_{oc-ref} = module open-circuit voltage at reference conditions

η = number of modules in series in tested string

β = module open-circuit temperature coefficient ($°C^{-1}$)

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T_{mod} = measured module backsheet temperature (°C)

$T_{mod-ref}$ = back of module temperature at reference conditions

D. Comparisons between all measured and expected Voc shall be analyzed in a spreadsheet which shall include the following PASS/FAIL tests for each string:

1. String Voc-measured is within 5% of Voc-expected
2. String Voc-measured is within 5% of the Voc-measured of adjacent strings
3. Strings that fail either test shall be investigated for module defects, loose connections, disconnected modules, or other possible defects

8.1.5.5 PV String IV Curve Testing

A. Contractor shall perform IV Curve Tests for all strings of modules connected to combiner boxes at each combiner box location, unless specified by Owner.

B. The test shall be conducted and witnessed by at least two qualified technicians using best practices and the following procedure:

1. The test shall be conducted during periods when irradiance is greater than 700 W/m2 and between the hours of 10:00am and 2:00pm solar time
2. Verify that the module and IV Curve Tracer are compatible
3. Shut down the inverter associated with the string and combiner box being tested
4. Disconnect the combiner box (or relevant DC disconnect switch) from the inverter and all other DC systems
    a. Measure, record and verify the following for every string:
    b. String number and combiner box location (or similar relevant string identification)
    c. Date and time
    d. POA irradiance at precise time of test
    e. Module backsheet temperature (use a string representative of all others being tested)
    f. Ambient temperature
    g. Wind speed
    h. Weather conditions

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i. Correct polarity shall be verified

5. Using an IV Curve Tracer, perform the curve trace using the manufacturer's instructions.

6. The Curve Tracer shall be configured to record at least 10 current-voltage data points and record the following values:

a. Maximum power (Pmax)

b. Voltage at maximum power (Vmp)

c. Current at maximum power (Imp)

d. Open circuit voltage (Voc)

e. Short circuit current (Isc)

f. Fill Factor (FF)

C. Short-circuit current test: Each measured string short-circuit current shall be greater than the expected short-circuit current (Isc-expected) derived using the following equation:

$$I_{sc-expected} = \kappa \cdot I_{sc-ref} \cdot \left(\frac{G}{G_{ref}}\right)$$

where:

$I_{sc-expected}$ = expected short-circuit current of the string

I_{sc-ref} = short-circuit current at Standard Test Conditions (STC) as shown on module datasheet

κ = 0.95 (uncertainty and soiling factor)

G = measured irradiance (W/m²)

G_{ref} = 1000 W/m²

8.1.5.6 Low Voltage Insulation Resistance Testing

A. All low voltage (LV) direct current (DC) and alternating current (AC) cables shall be tested for insulation resistance in accordance with the NETA-ATS.

B. Measured insulation resistance values shall be adjusted to a 20°C reference in order to determine acceptance with NETA-ATS Tables 100.1 and 100.14.

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C. All insulation resistance acceptance criteria shall be proposed by Contractor for approval by Owner.

D. Any test results that fail to be in accordance with the NETA-ATS or do not meet the accepted criteria, shall be documented as a deficiency on the test report.

E. Corrective action shall follow the identification of a failed test, followed by re-testing.

8.1.5.7 Low Voltage Cable Inspection and Testing

A. Low voltage cables shall include only those designed to operate at or below 1000 V.

B. All low voltage cables shall be inspected and tested in accordance with NETA-ATS Section 7.3.2.

C. Test Values shall be in accordance with NETA-ATS Section 7.3.2.3.

1. Note: NETA-ATS states that Section 7.3.2 is for low-voltage cables up to a 600 Volt Maximum.

2. This section shall also be used for cables with voltages up to 1000 Volts

D. Test voltages applied in the field shall not exceed the maximum test voltage of NETA-ATS Table 100.1

E. Verify uniform resistance for all parallel conductors

8.1.5.8 Medium Voltage Cable Inspection and Testing

A. Inspection and testing shall be performed after all splices and cable terminations have been installed.

B. All medium voltage cables shall be inspected and tested in accordance with NETA-ATS Section 7.3.3. Test Values shall be in accordance with NETA-ATS Section 7.3.3.3.

C. The preferred test method for Section 7.3.3.2.4 is by partial discharge analysis. Test methods other than those listed in NETA-ATS 7.3.3.2.4 may be used only with approval by the Owner.

D. Test voltages applied in the field shall not exceed 80% of the factory test value, and shall not exceed the maximum test voltage shown in NETA-ATS Table 100.6.

E. Verify proper installation of faulted-cable indicators as shown in the project drawings, as applicable.

8.1.5.9 Polarity Verification

A. All circuits shall be verified to have the correct polarity according to the design drawings and Local Electric Utility.

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8.1.5.10 Low-Voltage Insulated/Molded-Case Air Circuit Breaker Inspection and Testing

A. Inspect and test each circuit breaker in accordance with NETA-ATS Section 7.6.1.1.

B. Confirm that if a breaker is being back-fed, it is rated accordingly.

C. Verify that the test values are in accordance with NETA-ATS Section 7.6.1.1.3.

8.1.5.11 Low-Voltage Power Air Circuit Breaker Testing

A. Inspect and test circuit breakers in accordance with NETA-ATS Section 7.6.1.2.

B. Confirm that if a Breaker is being back-fed, it is rated accordingly.

C. Verify that Test Values are in accordance with NETA-ATS Section 7.6.1.2.3.

8.1.5.12 Low Voltage DC and AC Switch Testing

A. Inspect and test each low voltage switch in accordance with NETA-ATS Section 7.5.1.1.

B. Confirm and document correct electrically-bonded equipment ground.

C. Confirm and document that metal-enclosed switches are clean and that any debris has been removed.

D. Verify that switches used in DC applications are rated and installed accordingly.

E. Verify that warning signs (where provided) are in accordance with the National Electrical Code (NEC), or equivalent electrical code that is applicable to the Facility.

F. Verify that Test Values are in accordance with NETA-ATS Section 7.5.1.1.3.

8.1.5.13 Switchgear Equipment Inspections

A. Contractor shall review factory testing and field testing documentation to confirm that all MV and HV (as applicable) switchgear assemblies have passed all factory tests including, but not limited to:

1. Insulation Resistance
2. AC High Voltage Withstand
3. Main Contact Resistance (Ductor Tests)
4. Earth Switch Resistance (Ductor Tests)
5. Oil Dielectric Strength
6. Functional Tests
7. Type Tests

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B. Contactor shall review factory test and field test documentation to confirm that all LV switchgear has passed all factory tests including, but not limited to:

1. Insulation Resistance
2. Contact Resistance
3. Functional Tests
4. Type Tests

8.1.5.14 Small and Large Dry-Type Transformer Testing

A. Inspect and test each Transformer in accordance with NETA-ATS Section 7.2.1.1 or 7.2.1.2 (small or large transformers).

B. Verify that Test Values are in accordance with NETA-ATS Section 7.2.1.1.3 or 7.2.1.2.3.

1. Proof and documentation of equivalent factory testing, if applicable, may be provided in place of Contractor performing the tests described above.

C. Dry-Type Transformer noise level test.

8.1.5.15 Inverter Commissioning

A. Inverters shall be commissioned by the inverter manufacturer, or an authorized representative of the manufacturer, using the manufacturer's specified procedures.

B. Commissioning reports shall be in a format provided by the manufacturer.

C. At a minimum, inverter commissioning shall meet the following requirements:

1. Inverters shall be fully operational after commissioning completion
2. All shipping and packing materials shall be removed from inverter cabinets
3. Fuses and air filters shall be checked, verified as correct and in place
4. Torque wrench marks shall be recorded
5. Software updates and data acquisition (DAQ) communication shall be tested and functional
6. If applicable, Noise Level Study shall indicate inverter meets requirements specified in this Specification.

8.1.5.16 Pad-Mount Liquid Filled Transformer Commissioning

A. At a minimum, Pad-mounted liquid filled transformer commissioning shall meet the following requirements:

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1. Transformer shall be fully operational after commissioning completion.
2. All shipping bracing materials shall be removed from transformer after placement.
3. PCB content labeling shall be presented.
4. Operation shall be normal for alarm, control, and trip circuits from temperature and level indicators, pressure relief device, gas accumulator, and fault pressure relay if applicable
5. Cooling fans and pumps shall operate correctly and have appropriate overcurrent protection.
6. Verify correct liquid level in tanks and bushings.
7. Positive pressure is maintained on gas-blanketed transformers.
8. De-energized tap-changer position is left as specified.
9. The Contractor shall perform resistance measurements through bolted connections with a low-resistance ohmmeter, if applicable.
10. Perform insulation-resistance tests, all winding-to-winding and each winding-to-ground. Apply in accordance with manufacturer's published data.
11. Perform turns-ratio tests at all tap positions. With the last test being on the selected position
12. Perform insulation power-factor or dissipation-factor tests on all windings in accordance with test equipment manufacturer's published data.
13. Perform power-factor or dissipation-factor tests on each bushing equipped with a power-factor/ capacitance tap. In the absence of a power-factor/ capacitance tap, perform hot-collar tests.
14. Perform excitation-current tests in accordance with test equipment manufacturer's published data.
15. Measure the resistance of each high-voltage winding in each de-energized tap-changer position. Measure the resistance of each low-voltage winding in each de-energized tap-changer position
16. Collect a sample of insulating liquid in accordance with ASTM D 923. Sample shall be tested for the following:
    a. Dielectric breakdown voltage: ASTM D 877 and/or ASTM D 1816
    b. Acid neutralization number: ANSI/ASTM D 974

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c. Specific gravity: ANSI/ASTM D 1298

d. Interfacial tension: ANSI/ASTM D 971 or ANSI/ASTM D 2285

e. Color: ANSI/ASTM D 1500

f. Visual Condition: ASTM D 1524

g. Water in insulating liquids: ASTM D 1533.

h. Power factor or dissipation factor in accordance with ASTM D 924.

17. Collect a sample of insulating liquid in accordance with ASTM D 3613 and perform dissolved-gas analysis (DGA) in accordance with ANSI/IEEE C57.104 or ASTM D3612.

8.1.5.17 Meteorological Monitoring Station Testing

A. All meteorological monitoring station equipment shall be commissioned, calibrated and tested using the manufacturer's specified procedures with performance being compared to the manufacturer's specifications.

B. Current calibration certificates for each installed instrument shall be provided to Owner.

C. The following instrumentation, if it is part of the metrology equipment specified by Owner, shall be tested, at a minimum:

1. Solar irradiance measurement device, as applicable, e.g.:

   a. Global horizontal irradiance (GHI)

   b. Plane of array (POA) irradiance

2. Anemometer (wind speed), as applicable

3. Module backsheet temperature, as applicable

4. Ambient temperature, as applicable

5. Rainfall gauge, as applicable

6. Data-logger and communications equipment, as applicable

8.1.5.18 Protective Relay Equipment Inspection and Testing

A. Protective relay equipment not part of an interconnecting or solar collector substation at the Facility shall be inspected and tested in accordance with NETA-ATS Section 7.9.

B. Each equipment device shall be programmed with the specified relay settings provided by, or approved by, the Local Electrical Utility or Owner.

C. The following shall be performed at a minimum:

1. Verify that all grounding pins have been removed from all shorting-type terminal blocks in non-spare current transformer circuits

2. Verify that all spare current transformers are properly shorted

3. Perform functional testing of each protection and control scheme, including breaker trip tests, close inhibit tests, lockout relays, alarm functions, communication functions, and breaker-failure schemes

8.1.5.19 Metering Equipment Inspection and Testing

A. Metering equipment not part of an interconnecting or solar collector substation at the Facility shall be inspected and tested in accordance with NETA-ATS Section 7.11.

8.1.5.20 Surge Arrestor Inspection and Testing

A. Surge arrestors shall be inspected and tested in accordance with NETA-ATS Sections 7.19.1 and 7.19.2.

B. Test Values shall be in accordance with NETA-ATS Section 7.19.2.3.

8.1.5.21 Thermographic Surveys

A. Perform a thermographic (infrared) survey in accordance with NETA-ATS Section 9.

B. All thermo graphic images shall be provided to Owner and the survey shall meet the following requirements:

1. The survey shall be performed after all other commissioning tests are complete and while the Facility is operational

2. An infrared (IR) camera shall be used to detect areas of non-uniform temperature

3. The test shall be conducted during a minimum POA irradiance of 700 W/m2

4. The survey shall include the following equipment:

   a. All combiner and recombiner boxes

   b. All AC power distribution equipment

   c. All inverters (if infrared test window is available)

   d. All transformers (if infrared test window is available)

   e. Ten (10) percent of all PV modules from the front (optional)

   f. Ten (10) percent of all PV modules from the rear (optional)

5. Any covers, shields, or doors on equipment shall be opened, moved or removed during testing of equipment to ensure the survey is free of obstructions to a clear IR image.

6. Investigate and comment on the results of the thermographic survey in a report that states either no issues were identified or comments on temperature differences greater than:

    a. Three degrees Celsius (3°C) between similar components in the same enclosure

    b. Fifteen degrees Celsius (15°C) between components and ambient air

8.1.5.22 Communications System Inspection and Testing

A. Inspection and testing of optical fiber cables shall be in accordance with NETA-ATS Section 7.25.

B. The Contractor shall test the communication system to demonstrate its ability to support the systems and communications connectivity dependent upon its proper functioning prior to the testing of those dependent systems (i.e., the Solar PV Facility SCADA System).

C. Testing shall be done twice as applicable for each complete cable run between active devices: when each cable segment is installed and when the final system interconnections between active devices have been made.

1. All Ethernet communication cables shall be tested for proper installation according to TIA-568-C and/or TIA-1005-A

2. Testing of optical fiber cables shall be performed using Tier 2 testing in TIA-568-C, which includes the Optical Loss Test Set (OLTS) testing method and the Optical Time Domain Reflectometer (OTDR) testing method

A. All communication system cable tests shall be successfully completed prior to starting the testing of any systems being supported by the communications cables.

8.1.5.23 Instrumentation Testing

A. All instrumentation furnished by the Contractor and recommended or required by the manufacturer for calibration shall be field calibrated and tested by the Contractor with performance compared to the manufacturer's specifications.

B. The Contractor shall furnish all material, tools, skilled labor, administrative and technical assistance, test instruments, calibration equipment and calibration standards and devices.

C. Testing of instrumentation shall be as directed by manufacturer's field service representatives.

8.1.5.24 Solar PV Facility SCADA System Testing

A. A Site Acceptance Test (SAT) shall be performed for verification of all data points and SCADA System performance.

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1. Tests shall verify the correct operation of the Solar PV Facility SCADA System and its associated meters, sensors, meteorological instruments, inverters, etc., while verifying the correct data input logging from trackers, breakers, and other components monitored and controlled by the system (as required by the Solar PV Facility SCADA System Specification).

2. All data points collected by the Solar PV Facility SCADA System shall be verified for consistency from the field device to the master device and, if applicable, to all remote monitoring facilities.

B. The SAT should include all tests from the Factory Acceptance Test (FAT) included in the Solar PV Facility SCADA System Specification.

C. All Solar PV Facility SCADA System equipment shall be commissioned and tested using the manufacturer's specified procedures.

D. Tests shall verify that the data collected is correctly received by the Solar PV Facility SCADA System and can be used to produce any required performance or operation reports.

8.1.5.25 Security System Testing

A. Security system equipment shall be commissioned, tested and calibrated by a certified installer of the equipment manufacturer using the manufacturer's specified procedures.

B. Security system testing shall include testing of all operating modes and alarm conditions.

C. If applicable, camera coverage shall demonstrate the ability to observe any location within the Facility area.

D. If available, security system commissioning reports shall use a reporting format or forms provided by the security system provider.

8.1.5.26 Sound Level Testing

A. If applicable, verify noise levels of inverters, dry transformers and medium voltage transformers.

B. Perform analysis and comparison of baseline sound study with post-construction sound levels.

C. Measure sound levels at all property lines.

8.1.6 Commissioning Report Requirements

A. The Contractor shall prepare and submit to the Owner for approval a Commissioning Report ten business days prior to Substantial Completion as defined in Contract. The Commissioning Report shall include:

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1. Documentation of any discrepancy between this Specification and the tests/inspections conducted in the field.
2. Documentation of each test and inspection from the Commissioning Plan showing at least the test/inspection period, test/inspection conditions and the Contractor's personnel responsible for test/inspection
3. A statement of whether each of the Commissioning tests/inspections either passed or failed
4. If one or more test/inspections failed, a detailed explanation shall be documented in the punch list, including resolution
5. A signed statement from Contractor and Commissioning Manager certifying that the Facility complies with all of the Commissioning requirements set forth in this Specification
6. The punch list showing all issues successfully resolved

B. The Commissioning Report shall include for each test:

1. Any mutually agreed upon deviations
2. A copy of the calibration certificate for all measurement instrumentation used
3. Field notes (weather conditions, observations, etc.)
4. Test data, including corrected test data
5. Test calculations, including expected results
6. Any deficiencies or issues identified during, or as a result, of testing
7. Any corrective actions taken shall be documented, and shall include any subsequent retesting results, as applicable
8. Conclusions
9. Signatures of testing personnel and the Contractor’s witness

C. All Commissioning Report documentation containing numerical test data, calculated results, and related information shall be included in the report in Comma Separated Value (CSV) format.

D. All Commissioning Report files submitted to Owner shall be named in accordance with the Commissioning Plan as applicable. For example:

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1. The Open-Circuit Voltage (Voc) String Test found in Section 8.1.5 shall have a corresponding test report labeled "VocStringTestReport.pdf" and associated data files labeled "VocStringTestData.csv"

8.1.6.1 Grounding Systems Inspection and Test Reporting

A. The grounding systems report shall document all inspections and tests in accordance with NETA-ATS Section 7.13 and that the test values are in accordance with NETA-ATS Section 7.13.3.

8.1.6.2 PV String Open-Circuit Voltage Test Reporting

A. The PV string open-circuit voltage report shall include:

1. String number and combiner box location(s)
2. Date and time of test and weather conditions
3. Module backsheet temperature [°C]
4. POA Irradiance [W/m2], >=700 W/m2], at time of test
5. Measured open-circuit voltage (Voc-measured) [V], for each string
6. Expected Voc calculation (Voc-expected) [V], for each string
7. Percent difference between Voc-expected and Voc-measured

8.1.6.3 PV String IV Curve Test Reporting

A. The PV String IV curve test report shall include:

1. String number and combiner box location
2. Date and time of test and weather conditions
3. Ambient temperature [°C]
4. Module backsheet temperature [°C]
5. POA Irradiance [W/m2], >=700 W/m2], at time of test
6. Wind speed [m/s]
7. Verification of correct polarity
8. Measured short-circuit current (Isc-measured) [A], for each string tested
9. Expected short-circuit current calculation (Isc-expected) [A], for each string tested
10. Verification that Isc-measured is larger than Isc-expected

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8.1.6.4 Low Voltage Insulation Resistance Test Reporting

A. The low voltage insulation resistance test report shall include:

1. Measured insulation resistance for each low voltage cable (in Megohms)
2. Verification that measured resistance exceeds recommended minimum insulation resistances presented in NETA-ATS
3. Identification of replaced cables that fail the insulation test
4. Cable tests (low voltage)
    a. Visual and mechanical inspections in accordance with NETA-ATS Section 7.3.2
    b. Electrical tests in accordance with NETA-ATS Section 7.3.2

8.1.6.5 Low Voltage Cable Test Reporting

A. The low voltage cable test report shall document the results from all low voltage cable inspections and tests in accordance with NETA-ATS Section 7.3.2.

8.1.6.6 Medium Voltage Cable Test Reporting

A. The medium voltage cable test report shall document the results from all medium voltage cable inspections and tests shall in accordance with NETA-ATS Section 7.3.3.

8.1.6.7 Polarity Test Reporting

A. The polarity test report shall document that all circuits have the correct polarity according to the design drawings.

8.1.6.8 Circuit Breaker Test Reporting

A. The circuit breaker test report shall document all inspections and tests in accordance with NETA-ATS Section 7.6.

8.1.6.9 Switch Test Reporting

A. The switch test report shall document all inspections and tests in accordance with NETA-ATS Section 7.5.1.

8.1.6.10 Switchgear Equipment Inspection Reporting

A. The switchgear equipment test report shall document the passing of the following factory tests for low voltage switchgear assemblies:

1. Insulation resistance
2. AC high voltage withstand
3. Main contact resistance

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4. Earth switch resistance

5. Functional tests

6. Type tests

8.1.6.11 Small and Large Dry-Type Transformer Test Reporting

A. The transformer test report shall document all inspections and tests in accordance with NETA-ATS Section 7.2.1.

8.1.6.12 Inverter Test Reporting

A. The inverter test report shall be from the manufacturer or authorized manufacturer representative.

B. The inverter test report shall document at least the following:

1. Inverters are fully functional

2. Fuses and air filters have been checked and verified as correctly installed

3. Torque wrench marks have been recorded and mechanically verified

4. Software is tested, up-to-date, and functional

5. Noise level is within specified levels and all power output levels

8.1.6.13 Meteorological Station Test Reporting

A. The meteorological station test report shall document at least the following:

1. Provision of calibration certificates for all meteorological monitoring station instruments

2. Verification that all meteorological monitoring station equipment has been tested and verified as to the manufacturer's specifications and is functional

8.1.6.14 Protective Relay Equipment Test Reporting

A. The protective relay equipment test report shall document all inspections and tests in accordance with NETA-ATS Section 7.9.

B. The following shall be documented at a minimum:

1. All grounding pins have been removed from all shorting-type terminal blocks in non-spare current transformer circuits

2. All spare current transformers are properly shorted

3. Functional testing of each protection and control scheme, including breaker trip tests, close inhibit tests, lockout relays, alarm functions, communication functions, and breaker-failure schemes

8.1.6.15 Metering Equipment Test Reporting

A. The metering equipment test report shall document all inspections and tests in accordance with NETA-ATS Section 7.11.

8.1.6.16 Surge Arrestor Test Reporting

A. The surge arrestor test report shall document all inspections and tests in accordance with NETA-ATS Section 7.19.1 and 7.19.2 and that the test values were in accordance with Section 7.19.2.3.

8.1.6.17 Thermographic Survey Reporting

A. The thermographic survey test report includes the results and analysis of the thermographic (infrared) survey in accordance with NETA-ATS Section 9.

B. The test report includes submission of infrared scans for:

1. All combiner boxes
2. All recombiner boxes
3. All AC power distribution equipment
4. All inverters and transformers (if infrared test window is available)
5. Ten percent (10%) of all PV modules, both front and back scan (Optional)

C. The thermographic survey report shall comment on the results of the thermographic survey and document any issues identified.

8.1.6.18 Communications System Test Reporting

A. The communications system test report documents that the all components of the communications cabling are properly installed.

8.1.6.19 Solar PV Facility SCADA System Verification Reporting

A. The Solar PV Facility SCADA System test report documents that data collected by the Solar PV Facility SCADA System from meters, sensors, weather station instruments, trackers, breakers, inverters and other components monitored by the system is correctly received and meets the requirements of the Solar PV Facility SCADA Specification.

8.1.6.20 Instrumentation Test Reporting

A. The instrumentation test report shall document at least the following:

1. Provision of calibration certificates for all instrumentation

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2. Verification that all instrumentation equipment has been tested and verified as to the manufacturer's specifications and is functional

8.1.6.21 Security System Test Reporting

A. The security system test report includes the installer's verification of the completed commissioning, testing and calibration of the security system.

B. The security system test report shall show that all operating modes and alarm conditions have been tested.

8.1.6.22 Sound Level Reporting

A. If applicable, the sound level test report shall document the noise levels of inverters, dry transformers and medium voltage transformers.

B. The sound level test report shall document how the post-construction sound levels compare to the baseline sound study.

C. The sound level test report shall document the sound levels at all property lines.

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9.0 Performance Testing

9.1 FUNCTIONAL TEST

A functional test of 72 hours of uninterrupted operation of the Facility shall be designed to demonstrate and document the items below. Prior to commencement of this test, all Facility equipment shall be operable:

A. Facility functionality. The test will demonstrate that the Facility is capable of operating through daily generation cycles.

B. Data collection. Facility information will be collected and logged, demonstrating operability of the SCADA system and communication/monitoring systems.

C. Reporting. Demonstrate that the SCADA system is capable of producing any operational reports required to document Facility performance.

D. Design parameters. Monitoring of the Facility and components will permit verification of Facility operation within expected ranges of design parameters. Contractor shall use data from the 72-hour test to demonstrate that the Facility is producing a minimum of 95% of the energy output expected of the Facility based on input irradiance, temperature and wind speed conditions. Performance results below 100% shall be accompanied by a written explanation of the deficiency.

E. Compliance. The ability of the Facility to comply with all material safety, system reliability, environmental, and other applicable Laws, Governmental Approvals, the EPC Agreement, the Power Purchase Agreement, and the Interconnection Agreement.

9.2 SHORT TERM PERFORMANCE RATIO TEST

9.2.1 Purpose

The Performance Ratio of a solar photovoltaic (PV) power generating facility (the Facility) is defined as its energy production (kWh) divided by the product of: its DC capacity (MWp), and the normalized irradiance and a temperature correction factor over the Test Period.

The purpose of a Performance Ratio Test is to compare the Measured Performance Ratio of the Facility to its Expected Performance Ratio.

The Performance Ratio Test in this Specification is an application of the methodology recommended by the US National Renewable Energy Laboratory (NREL).

Prior to the Short Term Performance Ratio Test, contractor shall successfully complete the 72 hours functional test listed in Section 9.1 Functional Test.

9.2.2 Measurement Requirements

9.2.2.1 Measurement Instrumentation Requirements

The following measurement instrumentation shall be used during the Test Period:

A. Plane of Array Solar Irradiance [W/m2]:

1. The Plane of Array (POA) shall mean the plane defined by the (array of) PV modules.
2. POA irradiance shall be measured using ISO 9060 secondary standard rated pyranometers installed so that they are co-planar with the POA of the PV modules.
3. A minimum of two of secondary standard grade pyranometers shall be installed for every 20 MWp of Facility capacity.
4. Three (or more) pyranometers shall be installed proximate to the PV array (up to 20 MWp) that they are monitoring.

B. PV Module Backsheet Temperature [°C]:

1. PV module backsheet temperature shall be measured using platinum resistance temperature detectors (RTDs) that are adhered to the back of operational PV modules using a thermally conductive compound consistent with the PV module manufacturer's recommendations.
2. The accuracy of the RTDs shall meet or exceed IEC 751-95 Class A.
3. A minimum of three RTDs shall be installed for every 20 MWp of Facility capacity.
4. The RTDs shall be attached to PV modules that are located near the center of the PV array (up to 20 MWp) that they are monitoring.

C. Inverter Output Power [Wac]:

1. Each inverter under test shall report its output power.

D. AC Energy Production [kWh]:

1. The energy production of the Facility shall be measured at the Point of Metering using an AC watthour meter that meets or exceeds the accuracy standards set forth in ANSI C12.1.

E. Copies of current calibration certificates for all required instruments shall be submitted to Owner for review and acceptance.

F. All required instruments shall be installed and maintained in accordance with their respective manufacturer's specifications and recommendations.

G. All pyranometers shall be cleaned daily in accordance with the manufacturer's recommendations.

H. All required instruments shall be connected to a Data Acquisition System (DAS) that supports the requirements of this Specification, in accordance with the manufacturer's specifications, and that complies with the instrumentation manufacturers' specifications and recommendations.

9.2.2.2 Measurement Data Record Requirements

A. All required measurement data shall be collected and recorded at one-minute intervals.

B. Each measurement data record shall include the date and time, with one-minute resolution, when it was recorded.

9.2.2.3 Required Measurement Data Fields

Each data record shall include the following data fields:

A. Date-Time Stamp: Date (Month, Day, Year) and Time (Hour, Minute).

B. Each required pyranometer.

C. Each required RTD.

D. The output power of each inverter.

E. The watthour meter.

9.2.2.4 Required Channel-Averaged Measured Data Fields

Each measurement data record shall include the following channel-averaged measured data fields:

A. The channel-averaged measured POA irradiance, shall be calculated as the average over all of the individual POA irradiance readings.

B. The channel-averaged measured RTD temperature, shall be calculated as the average over all of the individual RTD temperature readings.

9.2.3 Test Period

The Test Period is the period of time during which the required data for the Performance Ratio Test is collected for the purposes of analysis. The duration of the Test Period shall be sufficient to include a minimum number of Eligible Measurement Averaging Intervals (EMAIs).

9.2.3.1 Minimum Number of Eligible Measurement Averaging Intervals

The minimum number of EMAIs for the Performance Ratio Test shall be 150.

9.2.3.2 Eligible Measurement Averaging Intervals

A. An Eligible Measurement Averaging Interval (EMAI) shall:

1. Be a contiguous five-minute interval.
2. Not overlap any other EMAI.
3. Meet or exceed the Minimum Irradiance Requirement.
4. Only include measurements when the PV arrays do not experience any significant Shading Loss.
5. Only include measurements when the output of each inverter is below its Clipping Limit.
6. Exclude times when snow, ice or any other obstructions cover a portion of the array.
7. Exclude time periods when force majeure events beyond the control of the Facility Operator impact the energy production of the Facility.
8. Not have any missing or flawed required measurement data.

9.2.3.3 Minimum Irradiance Requirement

A. The Minimum Irradiance Requirement for an EMAI is an average POA irradiance of 700 [W/m2] in the Plane of Array over the interval.

9.2.3.4 Shading Loss

A. Shading Loss is significant if it is greater than 1 percent.

9.2.3.5 Inverter Clipping Limit

A. The Clipping Limit of an inverter is defined as 98 percent of its nameplate output rating.

9.2.3.6 Interval-Averaged Measured Data

The following measured 1 minute data entries within each EMAI shall be averaged over the interval to produce an EMAI data record of interval-averaged value for that EMAI:

A. Channel-averaged measured POA irradiance.

B. Channel-averaged measured RTD temperature.

C. The watthour meter.

9.2.3.7 Date-Time Stamps for EMAI Data Records

Each EMAI data record shall be stamped with the date and time to at least 1 minute resolution of the earliest-occurring data record included in that EMAI.

9.2.4 Calculation of Expected Performance Ratio

The Performance Ratio Test compares the Measured Performance Ratio, PR_m of a solar PV facility to its Expected Performance Ratio, PR_e.

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9.2.4.1 Performance Model, Expected Solar Resource and Energy Production Estimate

Calculation of the Expected Performance Ratio, PR_e utilizes the following items, which shall have been mutually agreed to by The Parties prior to the commencement of the Performance Ratio Test:

A. A representative Performance Model for the Facility.

B. A complete Typical Year of hourly-resolution (8,760 hours/year) solar resource and weather dataset for the Facility location.

C. A complete-year of hourly-resolution (8,760 hours/year) Expected Energy Production Estimate using the above.

Furthermore, the Performance Model for the Facility must also report for each hour of the Typical Year (8,760 hours/year):

A. Expected POA irradiance.

B. Expected PV module backsheet temperature.

9.2.4.1.1 Losses Excluded From the Energy Production Estimate

The following losses shall be excluded from the PE used in the Performance Ratio Test:

A. Long-term degradation in PV module performance.

B. Long-term soiling loss.

C. System availability loss (Availability shall be 100 percent).

D. Production losses due to snow.

9.2.4.2 Use of the Results from the Energy Production Estimate

The Expected Average Irradiance-weighted PV Module Temperature, $\overline{T_{e,k}}$ and the Expected Performance Ratio, $PR_{e,k}$ for each month, k are calculated using the hourly results, j from the PE; specifically:

A. Expected POA irradiance, $G_{e,j}$ [W/m2].

B. Expected PV module temperature, $T_{e,j}$ [oC].

C. Energy production at the point of metering, $E_{e,j}$ [kWh].

D. Hours in the PE where one or more inverters operating at or above their Clipping Limit shall be excluded.

E. The remaining hourly results in the PE shall be grouped by month, k.

9.2.4.3 Monthly Expected PV Module Temperatures and Performance Ratios

A. Expected irradiance-weighted average PV module backsheet temperature for the kth month, $\overline{T_{e,k}}$ shall be calculated as:

$$\overline{T_{e,k}} = \frac{\sum_{j=1}^{M_k} T_{e,j} \cdot G_{e,j}}{\sum_{j=1}^{M_k} G_{e,j}}$$

B. The Expected Performance Ratio for the kth month, $PR_{e,k}$ shall be calculated as:

$$PR_{e,k} = \frac{\sum_{j=1}^{M_k} E_{e,j}}{\left(\frac{P_0 \cdot \Delta\tau_e}{G_0}\right) \cdot \sum_{j=1}^{M_k} G_{e,j}}$$

where any hours excluded per Section 9.1.4, $E_{e,j}$ and $G_{e,j}$ are set equal to zero:

$E_{e,j} = G_{e,j} = 0$ for any excluded hours

and where:

VARIABLE	UNITS	DESCRIPTION
$\overline{T_{e,k}}$	[°C]	Expected irradiance-weighted average PV module backsheet temperature for the k^{th} month (see Table 9.4.1)
$T_{e,j}$	[°C]	Expected PV module backsheet temperature for the j^{th} hour in a given month
$PR_{e,k}$	[%]	Expected Performance Ratio for the k^{th} month (see Table 9.4.1)
$E_{e,j}$	[kWh]	Expected Energy Production in the j^{th} hour of the PE
P_0	[kWp]	Contracted DC Capacity of the Facility at STC[A]
$\Delta\tau_e = 1.0$	[hours]	Hourly time step in the PE
G_0	[W/m²]	Irradiance at STC(1)
$G_{e,j}$	[W/m²]	Expected POA irradiance in the j^{th} hour of the PE
k		Index running over all months, $k = \{1 \dots 12\}$
M_k		Total number of hours in the k^{th} month
j		Index running over all hours within a given month, $j = \{1 \dots M_k\}$

(1)Standard Test Conditions (STC): 1000 [W/m²] POA irradiance, 25 [°C] cell temperature.

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9.2.4.4 Table of Expected Monthly Values

Table 9.4.1 provides places for the monthly Expected Performance Ratios, $PR_{e,k}$ and monthly Expected Average Irradiance-weighted PV Module Temperatures, $\overline{T_{e,k}}$ for each month, k to be entered.

A. The values shall be entered in Table 4-1 prior to the start of the Test Period in accordance with this Specification, as part of the terms of agreement between the Owner of the Facility and the Party that is responsible for its performance.

Table 9.4.1 Monthly Expected Performance Ratios and Expected Average Irradiance-Weighted PV Module Temperatures

k	Month	$PR_{e,k}$ [%]	$\overline{T_{e,k}}$ [°C]
1	January	To Be Identified through RFP Process	
2	February		
3	March		
4	April		
5	May		
6	June		
7	July		
8	August		
9	September		
10	October		
11	November		
12	December		

9.2.4.5 Expected Values for the Performance Ratio Test

A. If n EMAIs occur in month k, and m = (N − m) EMAIs occur in month (k + 1), then PR_e and $\overline{T}_e$ shall be calculated from Table 9.4.1 as:

$$\overline{T_e} = \frac{1}{N}\left(n \cdot \overline{T_{e,k}} + m \cdot \overline{T_{e,k+1}} \right)$$

$$PR_e = \frac{1}{N}\left(n \cdot PR_{e,k} + m \cdot PR_{e,k+1} \right)$$

9.2.5 Calculation of Measured Performance Ratio

The Expected Performance Ratio, PR_m shall be calculated as:

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$$PR_m = \frac{\sum_{i=1}^{N} E_{m,i}}{\left(\frac{P_0 \cdot \Delta\tau_m}{G_0}\right) \cdot \sum_{i=1}^{N} G_{m,i} \cdot \alpha_{T,m,i}}$$

$$\alpha_{T,m,i} = 1 + \beta_T \cdot \left(T_{m,i} - \overline{T_e}\right)$$

where:

VARIABLE	UNITS	DESCRIPTION
PR_m	[%]	Measured Performance Ratio
$E_{m,i}$	[kWh]	Measured Energy Production over the i^{th} EMAI
P_0	[kWp]	Contracted DC Capacity of the Facility at STC[A]
$\Delta\tau_m$	[hours]	Time duration of the EMAIs (held constant over the Test Period)
G_0	[W/m^2]	Irradiance at STC[(1)]
$G_{m,i}$	[W/m^2]	Measured POA irradiance over the i^{th} EMAI
$\alpha_{T,m,i}$		PV module temperature correction factor for the i^{th} EMAI
β_T	[%/°C]	Temperature coefficient of Power (negative) for the PV modules
$T_{m,i}$	[°C]	Measured PV module backsheet temperature over the i^{th} EMAI
$\overline{T_e}$	[°C]	Expected irradiance-weighted average PV module backsheet temperature for the Test Period (see Section 9.1.4)
N		Total number of EMAIs
i		Index running over all EMAIs, $i = \{1 \ldots N\}$

[(1)]Standard Test Conditions (STC): 1000 [W/m^2] POA irradiance, 25 [°C] cell temperature.

9.2.6 Performance Ratio Test

The Performance Ratio Test compares the Measured Performance Ratio, PR_m of the facility to its Expected Performance Ratio, PR_e reduced by the Measurement Uncertainty Allowance (MUA).

9.2.6.1 Measurement Uncertainty Allowance

The Measurement Uncertainty Allowance (MUA) allows for the inherent uncertainty in the measurement equipment.

A. The MUA shall be 2 percent.

9.2.6.2 Acceptance Threshold of the Performance Ratio Test

A. The result from a Performance Ratio Test is acceptable if:

$$PR_m \geq PR_e \cdot (1 - MUA)$$

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9.2.7 Reporting Requirements

The following data and calculations shall be provided to Owner in the Performance Ratio Test Report and associated documents.

9.2.7.1 General Requirements

A. The Performance Ratio Test Report shall include:

1. Dates of the Test Period, test conditions and Contractor's personnel responsible for The Performance Ratio Test.

2. A statement of whether the Performance Ratio Test either passed or failed.

3. If the Performance Ratio Test failed, a detailed explanation shall be submitted to Owner for review.

4. A signed statement from Contractor that the Project complies with all of the requirements set forth in this Specification.

9.2.7.2 Requirements for Reporting Measured Data

A. A copy of all required measurement data collected throughout the entire Test Period shall be submitted to Owner for review and acceptance.

9.2.7.3 Requirements for Reporting Test Results

The result from the calculation in Section 9.1.6 shall be submitted to Owner for review and acceptance.

9.3 ONE YEAR ADJUSTED ENERGY TEST

9.3.1 Purpose

The Adjusted Energy Production [kWh] of a solar photovoltaic (PV) power generating facility (the Facility) is calculated by inputting the measured solar irradiance and weather conditions (Measured Conditions), collected over the Test Period, into the Performance Model of The Facility.

The purpose of an Adjusted Energy Test is to compare the Measured Energy Production of the Facility over the Test Period to the Adjusted Energy Production.

9.3.2 Measurement Requirements

9.3.2.1 Measurement Instrumentation Requirements

The following measurement instrumentation shall be used during the Test Period:

A. Solar Irradiance [W/m2]:

1. Solar Irradiance shall be measured using ISO 9060 secondary standard rated pyranometers.

2. The Plane of Array (POA) shall mean the plane defined by the (array of) PV modules.

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3. The pyranometers shall be installed in accordance with irradiance input requirement of the Performance Model for The Facility, typically either:

   So that they are co-planar with the POA of the PV modules (POA Irradiance).

   or

   On a horizontal plane (Global Horizontal Irradiance, GHI).

4. A minimum of three of secondary standard grade pyranometers shall be installed for every 20 MWp of Facility capacity.

5. Three pyranometers shall be installed proximate to the PV array (up to 20 MWp) that they are monitoring.

B. Temperature [°C]:

1. Temperature shall be measured in accordance with irradiance input requirement of the Performance Model for The Facility, typically either:

   PV module backsheet temperature.

   or

   Ambient air temperature.

2. If PV module backsheet temperature is to be measured.

   PV module backsheet temperature shall be measured using platinum resistance temperature detectors (RTDs) that are adhered to the back of operational PV modules using a thermally conductive compound consistent with the PV module manufacturer's recommendations.

   The accuracy of the RTDs shall meet or exceed IEC 751-95 Class A.

   A minimum of three of RTDs shall be installed for every 20 MWp of Facility capacity.

   The RTDs shall be attached to PV modules that are located near the center of the PV array (up to 20 MWp) that they are monitoring.

3. If ambient air temperature is to be measured.

   An ambient air temperature sensor with ±0.1 [°C] accuracy or better shall be used.

C. Wind Speed [m/s], if required as an input to the Performance Model for The Facility:

1. A non-directional anemometer with ±0.5 [m/s] accuracy or better shall be used.

2. A minimum of one anemometer shall be installed for every 20 MWp of Facility capacity.

D. Inverter Output Power [Wac]:

1. Each inverter under test shall report its output power.

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E. AC Energy Production [kWh]:

1. The energy production of The Facility shall be measured at the Point of Metering using an AC watthour meter that is appropriately sized according to the manufacturer's specifications for the generating capacity being metered, and meets or exceeds the accuracy standards set forth in ANSI C12.1.

F. Copies of current calibration certificates for all required instruments shall be submitted to Owner for review and acceptance.

G. All required instruments shall be installed and maintained in accordance with their respective manufacturer's specifications and recommendations.

H. All pyranometers shall be cleaned at least once per week in accordance with the manufacturer's recommendations.

I. All required instruments shall be connected to a Data Acquisition System (DAS) that supports the requirements of this Specification, in accordance with the manufacturer's specifications, and that complies with the instrumentation manufacturers' specifications and recommendations.

9.3.2.2 Measurement Data Record Requirements

A. All required measurement data shall be collected and recorded at 1 minute intervals.

B. Each measurement data record shall include the date and time, with 1 minute resolution, when it was recorded.

9.3.2.3 Required Measurement Data Fields

Each data record shall include the following data fields:

A. Date-Time Stamp: Date (Month, Day, Year) and Time (Hour, Minute).

B. Each required pyranometer.

C. Each temperature sensor.

D. Each wind speed sensor, if required.

E. The output power of each inverter.

F. The watthour meter.

9.3.2.4 Required Channel-Averaged Measured Data Fields

Each measurement data record shall include the following channel-averaged measured data fields:

A. The channel-averaged measured irradiance, for each type of irradiance measured, shall be calculated as the average over all of the individual irradiance readings of the same type.

B. The channel-averaged measured temperature, for each type of temperature measured, shall be calculated as the average over all of the individual temperature readings of the same type.

C. The channel-averaged measured wind speed, if required, shall be calculated as the average over all of the individual wind speed readings.

9.3.3 Test Period

The Test Period is the period of time during which the required data for the Adjusted Energy Test is collected for the purposes of analysis.

A. The Test Period shall be one calendar year (365 days)

B. The Test Period shall be divided into 5 minute Measurement Averaging Intervals

9.3.3.1 Eligible Measurement Averaging Intervals

A. An Eligible Measurement Averaging Interval (EMAI) shall:

1. Be a contiguous 5 minute interval.
2. Not overlap any other EMAI.
3. Meet or exceed the Minimum Irradiance Requirement.
4. Only include measurements when the PV arrays do not experience any significant Shading Loss from obstructions not included in The Model.
5. Exclude times when snow, ice or any other obstructions cover a portion of the array.
6. Exclude time periods when force majeure events beyond the control of the Facility Operator impact the energy production of the Facility.
7. Not have any missing or flawed required measurement data.

9.3.3.2 Shading Loss

A. Shading Loss is significant if it is greater than 1 percent.

9.3.3.3 Inverter Clipping Limit

A. Not applicable.

9.3.3.4 Minimum Irradiance Requirement

A. The Minimum Irradiance Requirement for an EMAI is an average POA irradiance of 500 [W/m2] over the interval.

9.3.3.5 Interval-Averaged Measured Data

The following measured 1 minute data entries within each EMAI shall be averaged over the interval to produce an EMAI data record of interval-averaged value for that EMAI:

A. Channel-averaged measured irradiance, for each type of irradiance measured.

B. Channel-averaged measured temperature, for each type of temperature measured.

C. Channel-averaged measured wind speed, if required.

D. The watthour meter.

9.3.3.5.1 Date-time stamps for EMAI data records

A. Each EMAI data record shall be date-time stamped with the Date-Time Stamp of the earliest occurring data record included in that EMAI.

9.3.3.6 Hour-Averaged Measured Data

A. The year in which the Test Period occurs shall be sub-divided into 8,760 (=365*24) hourly intervals.

B. Any EMAI data records collected on February 29 (leap year) shall be excluded.

C. Each EMAI data record within each hour of the Test Period shall be averaged the hour to produce a hourly data record for that hour.

9.3.3.6.1 Date-time stamps for hourly data records

A. Each hourly data record shall be date-time stamped with the date of the earliest occurring EMAI data record included in that hour, and the ending hour of that hourly interval.

9.3.4 Adjusted Energy Calculation

The Adjusted Energy Test compares:

A. The Measured Energy Production, E_m(Test Period) [MWh] of The Facility over the Test Period.

B. To its Expected Energy Production, E_e(Test Period) [MWh].

to calculate an energy production adjustment factor that is then applied to:

A. The original Expected Annual Energy Production Estimate, $E_{e,O}$(TMY) [MWh/yr] for the Facility.

B. To produce an adjusted Annual Energy Production Estimate, $E_{e,A}$(TMY) [MWh/yr] for the Facility.

9.3.4.1 Performance Model for the Facility

A. There shall be a performance model (The Model) for The Facility that has been mutually agreed to by The Parties prior to the commencement of the Adjusted Energy Test.

B. The Model shall:

1. Include all information necessary to fully describe the performance characteristics of the Facility.

2. Specify the performance modeling software (the Software) package it is used by.

3. Specify the software version (the Version) to be used.

9.3.4.2 Losses Excluded from the Model

The following losses shall be excluded from the Model used in the Adjusted Energy Test:

A. Long-term degradation in PV module performance.

B. System availability loss (Availability shall be 100%).

C. Production losses due to snow.

9.3.4.3 Expected Solar Resource and Weather Dataset

A. There shall be a typical year solar resource and weather dataset (TMY), with at least hourly resolution, for the location of the Facility that has been mutually agreed to by all parties.

9.3.4.4 Original Expected Annual Energy Production

A. $E_{e,O}$(TMY) shall be calculated by inputting the TMY dataset into The Model and run by the Version of the Software.

B. $E_{e,O}$(TMY) shall be calculated prior to the start of the Test Period in accordance with this Specification, as part of the terms of agreement between the Owner of the Facility and the Party that is responsible for its performance.

9.3.4.5 Measured Energy Production During the Test Period

A. E_m(Test Period) shall be calculated as the difference between the measured (hourly) watthour meter readings taken at the start and at the end of the Test Period, exclusive of any excluded hours.

9.3.4.6 Expected Energy Production During the Test Period

A. E_e(Test Period) shall be calculated by inputting the channel-averaged, hourly-averaged measured data into The Model in accordance with the requirements of the Software Version and run through The Model, exclusive of any excluded hours.

9.3.4.7 Adjusted Expected Annual Energy Production

A. $E_{e,A}$(TMY) shall be calculated as:

$$A_E = \left[\frac{E_m(Test\ Period)}{E_e(Test\ Period)} \right]$$

$$E_{e,A}(TMY) = A_E \cdot E_{e,O}(TMY)$$

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9.3.5 Adjusted Energy Test

The Adjusted Energy Test compares the Adjusted Annual Energy Production Estimate, $E_{e,A}$ [MWh/yr] for the Facility to a Minimum Annual Energy Production Criteria, E_c [MWh/yr] that has been mutually agreed to by The Parties.

9.3.5.1 Measurement Uncertainty Allowance

The MUA allows for the inherent uncertainty in the measurement equipment.

A. The MUA shall be 3 percent.

9.3.5.2 Acceptance Threshold of the Adjusted Energy Test

A. The result from a Adjusted Energy Test is acceptable if:

$$E_{e,A} \geq E_c \cdot (1 - MUA)$$

9.3.6 Reporting Requirements

9.3.6.1 Reporting Requirement for Measured Data

A. A copy of all required measurement data collected throughout the entire Test Period shall be submitted to Owner for review and acceptance.

9.3.6.2 Reporting Requirement for Modeling and Calculations

A. The results from each required modeling runs and calculations in Section 9.2.4 shall be submitted to Owner for review and acceptance.

9.3.6.3 Reporting Requirement for Test Results

A. The result from the calculation in Section 9.2.5 shall be submitted to Owner for review and acceptance.

9.4 SHORT TERM CAPACITY TEST

9.4.1 Purpose

The purpose of a Capacity Test of a solar photovoltaic (PV) facility (the Facility) is to compare the Measured AC Capacity (Wac) of the Facility to its Expected AC Capacity (Wac).

The Capacity Test described in this Specification is an application of method standards[2,3] published by ASTM International.

[2]ASTM Standard E2848-13, "Standard Test Method for Reporting Photovoltaic Non-Concentrator System Performance."
[3]ASTM Standard E2939-13, "Standard Practice for Determining Reporting Conditions and Expected Capacity for Photovoltaic Non-Concentrator Systems."

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9.4.2 Measurement Requirements

9.4.2.1 Measurement Instrumentation Requirements

The following measurement instrumentation shall be used during the Test Period:

A. Plane of Array Solar Irradiance [W/m2]:

1. The Plane of Array (POA) shall mean the plane defined by the (array of) PV modules.
2. POA irradiance shall be measured using ISO 9060 secondary standard rated pyranometers installed so that they are co-planar with the POA of the PV modules.
3. A minimum of two of secondary standard grade pyranometers shall be installed for every 20 MWp of Facility capacity.
4. Each pair (or more) of pyranometers shall be installed proximate to the PV array (up to 20 MWp) that they are monitoring.

B. Ambient Air Temperature [°C]:

1. Ambient Air temperature shall be measured using a temperature sensing instrument that has a resolution of 0.1 [°C] or smaller and is accurate to within ±1 [°C].
2. The instrument shall include a radiation shield compliant with ASTM D6176.
3. The instrument shall be placed close to the array without interfering with the array's thermal boundary layer.
4. At least one ambient air temperature sensing instrument shall be installed for every 20 MWp of Facility capacity.

C. Wind Speed [m/s]:

1. Wind speed shall be measured by an anemometer that has an accuracy of ±0.5 [m/s] or better.
2. The instrument shall be placed close the array but away from any wind flow interference caused by the solar PV array or other obstacles.
3. At least one anemometer shall be installed for every 20 MWp of Facility capacity.

D. Inverter Output Power [Wac]:

1. Each inverter under test shall report its output power.

E. AC Capacity of the Facility [Wac]:

1. The AC Capacity of the Facility shall be measured at the Point of Metering using an AC watthour meter that meets or exceeds the accuracy standards set forth in ANSI C12.1.

F. Copies of current calibration certificates for all required instruments shall be submitted to Owner for review and acceptance.

G. All required instruments shall be installed and maintained in accordance with their respective manufacturer's specifications and recommendations.

H. All pyranometers shall be cleaned daily in accordance with the manufacturer's recommendations.

I. All required instruments shall be connected to a Data Acquisition System (DAS) that supports the requirements of this Specification, in accordance with the manufacturer's specifications, and that complies with the instrumentation manufacturers' specifications and recommendations.

9.4.2.2 Measurement Data Record Requirements

A. All required measurement data shall be collected and recorded at one-minute intervals.

B. Each measurement data record shall include the date and time, with one-minute resolution, when it was recorded.

9.4.2.3 Required Measurement Data Fields

Each data record shall include the following data fields:

A. Date-Time Stamp: Date (Month, Day, Year) and Time (Hour, Minute).

B. Each required pyranometer.

C. Each required ambient air temperature sensing instrument.

D. Each required anemometer.

E. The output power of each inverter.

F. AC Capacity of the Facility.

9.4.2.4 Required Channel-Averaged Measured Data Fields

Each measurement data record shall include the following channel-averaged measured data fields:

A. The channel-averaged measured POA irradiance, shall be calculated as the average over all of the individual POA irradiance readings.

B. The channel-averaged measured RTD temperature, shall be calculated as the average over all of the individual RTD temperature readings.

9.4.3 Test Period

The Test Period is the period of time during which the required data for the Capacity Test is collected for the purposes of analysis. The duration of the Test Period shall be sufficient to include a minimum number of Eligible Measurements.

9.4.3.1 Minimum Number of Eligible Measurements

Post-filtered data shall represent a dataset covering at least 1500 minutes of operation:

A. If using 5 minute averaging intervals, at least 300 data intervals are required.

B. If using 15 minute averaging intervals, at least 100 data intervals are required.

9.4.3.2 Eligible Measurements

A. An Eligible Measurement shall:

1. Meet or exceed the Minimum Irradiance Requirement.
2. Only include measurements when the output of each inverter is below its Clipping Limit.
3. Exclude times when snow, ice or any other obstructions cover a portion of the array.
4. Exclude time periods when force majeure events beyond the control of the Facility Operator impact the energy production of the Facility.
5. Not have any missing or flawed required measurement data.

9.4.3.3 Minimum Irradiance Requirement

A. The Minimum Irradiance Requirement shall be 500 [W/m2] in the Plane of Array.

9.4.3.4 Shading Loss

A. Shading Loss is significant if it is greater than 1 percent.

9.4.3.5 Inverter Clipping Limit

A. The Clipping Limit of an inverter is defined as 98 percent of its nameplate output rating.

9.4.3.6 Date-Time Stamps for Measured Data

A. Each measured data record shall be stamped with the date and time to at least one-minute resolution when it was collected.

9.4.4 Determination the Reporting Conditions (RC)

9.4.4.1 Performance Model of Record

A Performance Model of Record (the Model) shall be used to calculate the expected performance of the solar. At a minimum, the Model shall use as inputs: POA irradiance (Irr), ambient temperature (T_{amb}), and wind speed (WS) to calculate a modeled power output.

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9.4.4.2 Historical Meteorological Dataset of Record

A Historical Meteorological Dataset of Record (H) shall include typical values of the following, for each hour over an entire year, $i = \{1, \dots, 8760\}$:

A. POA irradiance ($\mathrm{Irr_{H,i}}$).

B. Ambient temperature ($\mathrm{T_{amb,H,i}}$).

C. Wind speed ($\mathrm{WS_{H,i}}$).

The historical meteorological dataset shall be used determine the Reporting Conditions (RC_j) for each month of a typical year, $j = \{1, \dots, 12\}$.

9.4.4.3 Calculating the Reporting Conditions

The Reporting Conditions (RC_j) shall be calculated for each month over a calendar year, by following the procedure outlined below in accordance with the test method outlined in ASTM E2939. The *RCs* will be monthly averages of POA Irradiance, Ambient Temperature, and Wind Speed, calculated using the filtered datasets.

A. Calculate the median POA Irradiance for each month ($\mathrm{Irr_{RC,j}}$):

   1. $\mathrm{Irr_{RC,j}}$ shall be the median irradiance of the filtered data for each month and shall not be less than 500 W/m2.

B. Calculate average ambient air temperature for each month ($\mathrm{T_{amb,RC,j}}$):

   1. $\mathrm{T_{amb,RC,j}}$ shall be the average ambient temperature of the filtered data for the relevant time period.

C. Calculate average wind speed each month ($\mathrm{WS_{RC,j}}$):

   1. $\mathrm{WS_{RC,j}}$ shall be the average wind speed of the filtered data for each month.

9.4.4.4 Reporting Conditions Table

Table 9.3.1 shall be filled in prior to Contract signing. The Reporting Conditions presented in Table 9.3.1 shall be used to calculate Expected Capacity in Section 9.3.5 of this Specification.

Table 9.3.1 Monthly Reporting Conditions and Expected Capacity

MONTH (J)	EXPECTED CAPACITY $C_{exp,j}$ [KW]	REPORTING CONDITIONS		
		POA IRRADIANCE $Irr_{RC,j}$ [W/M²]	AMBIENT TEMPERATURE $T_{amb,RC,j}$ [°C]	WIND SPEED $WS_{RC,j}$ [M/S]
January	XX	XX	XX	XX
February	XX	XX	XX	XX
March	XX	XX	XX	XX
April	XX	XX	XX	XX
May	XX	XX	XX	XX
June	XX	XX	XX	XX
July	XX	XX	XX	XX
August	XX	XX	XX	XX
September	XX	XX	XX	XX
October	XX	XX	XX	XX
November	XX	XX	XX	XX
December	XX	XX	XX	XX

Note: in the event that the Test Period spans across the boundary between two months, the Reporting Conditions (RC) shall be calculated as a weighted average of the RCs from each of the two months, where the weighting coefficients are based on the percentage of filtered measured data that falls within each month.

9.4.5 Determination of Expected Capacity

Expected Capacity shall be calculated for each month over a complete calendar year (12 months) at the corresponding Reporting Conditions, as determined in Section 9.3.4 of this Specification.

9.4.5.1 Calculate "From Historical" Regression Coefficients

Use the filtered modeled power output, filtered plane of array irradiance (Irr_H), filtered ambient temperature ($T_{amb,H}$), and filtered wind speed data (WS_H) to fit the four "from historical" regression coefficients $\{A_H, B_H, C_H, and\ D_H\}$ using the following equation, as specified in ASTM E2848, Section 4.1:

$$Modeled\ Power\ Output\ = Irr_H\ \times (A_H + B_H * Irr_H + C_H * T_{amb,H} + D_H * WS_H)$$

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9.4.5.2 Calculate Expected Capacity

The Expected Capacity is then calculated by substituting the "from historical" metrology data $\{Irr_H, T_{amb,H}, WS_H\}$ with the corresponding Reporting conditions (RC) for each month $\{Irr_{RC,j}, T_{amb,RC,j}, WS_{RC,j}\}$ into the following equations:

$$Expected\ Capacity_j = Irr_{RC,j} \times (A_H + B_H * Irr_{RC,j} + C_H * T_{amb,RC,j} + D_H * WS_{RC,j})$$

9.4.5.3 Expected Capacity Table

Table 9.3.1 shall be filled in prior to Contract signing. The Expected Capacity recorded in Table 9.3.1 shall be used in comparison with the Measured Capacity, as determined per Section 9.3.6 of this Specification.

9.4.6 Measured Capacity

Measured Capacity shall be determined using ASTM E2848, Section 4 using data collected over the Test Period.

9.4.6.1 Filtered Measured Data

Filter the measured energy production data, measured plane of array irradiance, measured ambient temperature, and measured wind speed in accordance with ASTM E2848, Section 9.1.

9.4.6.2 Calculate "From-Measured" Regression Coefficients

Use the filtered dataset of measured (M) POA irradiance (Irr_M), ambient temperature ($T_{amb,M}$), and wind speed (WS_M) data, as described in Section 9.3.2 of this Specification, to calculate the "From-Measured" regression coefficients $\{A_M, B_M, C_M, and\ D_M\}$ using the following equation, as specified in ASTM E2848, Section 4.1:

$$Measured\ Power\ Output\ = Irr_M \times (A_M + B_M * Irr_M + C_M * T_{amb,M} + D_M * WS_M)$$

9.4.6.3 Calculate Measured Capacity

Calculate Measured Capacity by substituting using the regression coefficients from the Measured (M) Power Output $\{A_M, B_M, C_M, and\ D_M\}$, as obtained per Section 9.3.6 of this Specification, and the corresponding metrology values for Reporting Conditions (RC) $\{Irr_{RC}, T_{amb,RC}, and\ WS_{RC},\}$ for the Test Period into the following equation:

$$Measured\ Capacity\ = Irr_{RC} \times (A_M + B_M * Irr_{RC} + C_M * T_{amb,RC} + D_M * WS_{RC})$$

9.4.7 Capacity Test

The Capacity Test compares the Measured Capacity, C_m [Wac] of the Facility to its Expected Capacity, C_e [Wac], reduced by the Measurement Uncertainty Allowance (MUA).

9.4.7.1 Measurement Uncertainty Allowance

The Measurement Uncertainty Allowance (MUA) allows for the inherent uncertainty in the measurement equipment.

A. The MUA shall be 3 percent.

9.4.7.2 Acceptance Threshold of the Capacity Test

The result from a Capacity Test is acceptable if:

$$C_m \geq C_e \cdot (1 - MUA)$$

9.4.8 Reporting Requirements

The following data and calculations shall be provided to Owner in the Capacity Test Report and associated documents.

9.4.8.1 General Requirements

A. The Capacity Test Report shall include:

1. Dates of the Test Period, test conditions and Contractor's personnel responsible for test.
2. A statement of whether the Capacity Test either passed or failed.
3. If the Capacity Test failed, a detailed explanation shall be submitted to Owner for review.
4. A signed statement from Contractor that the Project complies with all of the Capacity Test requirements set forth in this Specification.

9.4.8.2 Data required for entire Project

A. Owner-Approved Historical Meteorological Dataset, including for each hour of a calendar year (8760 hours/year):

1. POA Irradiance [W/m2].
2. Ambient Temperature [°C].
3. Wind Speed [m/s].

B. Owner-Approved Energy Production Model of Record.

C. One calendar year of modeling results at hourly resolution (8760 hours/year) from using the Owner-Approved Historical Meteorological Dataset as input into the Owner-Approved Energy Production Model of Record, including:

1. Energy [kWh].
2. Calculations and results used to determine the "From Historical" fitting coefficients, for each month: $\{A_H, B_H, C_H, \text{and } D_H\}$.
3. Calculations and results used to determine the Reporting Conditions, for each month: $\{Irr_{RC,j}, T_{amb,RC,j}, WS_{RC,j}\}$.

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4. Calculations and results used to determine the Expected Capacity, for each month: Expected Capacity$_j$.

5. A completed version of Table 9.4.1.

D. Unfiltered measurements for the entire project, for each averaging interval:

1. Energy [kWh] from revenue meter.

2. POA Irradiance [W/m2], for each solar irradiance measurement device.

3. Ambient Temperature [°C], for each temperature sensor.

4. Wind Speed [m/s], for each wind speed sensor.

E. Filtered measurements for the entire project, for each averaging interval:

1. Energy [kWh] from revenue meter.

2. POA Irradiance [W/m2], for each solar irradiance measurement device.

3. Ambient Temperature [°C], for each temperature sensor.

4. Wind Speed [m/s], for each wind speed sensor.

F. Calculations used to determine the "From-Measured" regression coefficients: $\{A_M, B_M, C_M, \text{and } D_M\}$.

G. Calculations used to determine the Measured Capacity.

APPENDIX A. Approved Vendor List

IDAHO POWER COMPANY
WIND SPECIFICATION

PREPARED FOR

Idaho Power Co.

28 JUNE 2021

BLACK & VEATCH

Idaho Power 2026 All Source RFP
Exhibit K – Wind Technical Specifications

Table of Contents

1.0 General

1.1 CONTRACTOR SCOPE OF WORK AND SUPPLY

The purpose of this document is to provide a general description of scope. The Contractor shall be responsible for filling any scope gaps between the Contractor, Owner, and Turbine Supplier. The Contractor shall perform all work in accordance with Turbine Supplier's requirements. The work and requirements of the Contractor shall include, but not be limited to, the following:

1.1.1 General

- All necessary labor and materials, commodities, software/hardware and licenses, construction equipment, facilities, temporary works, utilities, auxiliaries, accessories, lifting equipment, and specialty tools needed to perform all studies, testing, operations, material handling, and work required for design, procurement, fabrication, furnishing, delivery, equipment erection, storage, maintenance, material transportation, offloading, installation, refurbishing, cleaning, finishing, painting, testing, commissioning and completion of the balance-of-plant work portion of the Project. Contractor shall be responsible for all commissioning and testing on this Project (including, but not limited to, Owner, Turbine Supplier, and Transmission Owner systems).

- Lead an initial project kick-off and regular progress report meetings. Contractor shall distribute meeting minutes after submitting to Owner for approval and receiving said approval. Meetings will be hosted by Owner at agreed upon site.

- Contractor shall develop project schedule including engineering, procurement, construction, and startup.

- Construction and project turnover plan, including QA/QC program and WTG erection plan. All necessary QA/QC plans, procedures, programs, audits, and documentation shall be in accordance with the requirements set forth in the Contract.

- All necessary safety and security plans, procedures, programs, audits, inspections, and documentation. Safety training and orientation for all site personnel. All operations shall be conducted in accordance with the Contract.

- All construction operations shall be done in a manner to ensure worker safety and be in accordance with current Occupational Safety and Health Administration (OSHA) standards.

- Temporary, separate office facilities for the Owner and Turbine Supplier, including office furniture, equipment, supplies, restrooms, janitorial service, cleaning supplies, sanitation facilities, potable water, and electrical power. Contractor shall provide internet, phone service, and 2-way radio for the Project, including for any Subcontractors. Any facilities or other infrastructure provided to the Turbine Supplier shall be in accordance with Turbine Supplier requirements.

- Preparation of lay-down, parking, storage, and craft change areas including restoration after construction as agreed to between Owner and Contractor.

- Maintain sufficient security in accordance with Section 1.11.
- Construction lighting in accordance with Section 1.10.
- First aid services, fire protection, and drug sampling/testing facilities.
- Coordination with local emergency services.
- Waste removal services for the entire Project, including hazardous and non-hazardous waste.
- Material recycling program during construction.
- Execute construction focused spill prevention, countermeasure, and control plan.
- Provide other construction utilities as described in Section 1.11.
- Perform interference-checking for underground utilities.
- Provide all warning, danger, and arc flash signage for all applicable equipment (except for the WTGs, which shall be provided by Owner).
- All necessary quality reports, scheduling reports, conference calls as necessary with Owner, equipment commissioning / test results and records, and Project closeout reports.
- Job books, project completion/close-out documentation, manuals, training and other submittals. Files shall be in original and editable format.
- Coordination with participating land owners prior to commencement of any field work on landowner's property, as well as any visits to a landowner's property. All Contractor communications with landowners shall be coordinated with the Owner.
- Coordination with state, county and local municipalities.
- Documentation of all communication with all land owners.
- Participation in Owner's design review, oversight, and approval process which shall include pre-engineering planning meetings; 30%, 60%, 90%, and IFC design and calculation reviews; and design update teleconferences and/or meetings. Upon initial completion of each aspect of the Project's design, all Project designs and calculations shall be submitted to the Owner for review and approval prior to construction.
- All planning, engineering, drawings, additional specifications and other information as required for the completion of the balance-of-plant portion of the Project.
- The design, procurement and construction of all above- and belowground site infrastructure and improvements including roads, foundations, structures, buildings collection system, Project Collector Substation, together with the procurement, delivery, erection and installation of all equipment, auxiliaries and accessories including the Main Power Transformer (MPT) (and O&M facility if applicable).

- Document location and repair of all damage to drain tiles.
- Any necessary grubbing and clearing work that is not in the Owner scope of supply.
- Obtaining and maintaining all necessary permits and approvals from local and other authorities, statutory authorities, and in accordance with building and construction regulations. Contractor shall comply with all permits and permit conditions for the Project obtained by either Owner or Contractor, and shall provide copies of all Contractor-obtained permits to Owner.
- Operations, maintenance, and storage during construction in accordance with all original equipment manufacturer (OEM) requirements and standards.
- Supply recommended balance-of-plant spare parts.
- Contractor shall take all reasonable measures to protect the materials including, but not limited to, painting, humidity and temperature control, mechanically exercising, greasing, installing rust-preventive oil, covering or wrapping all materials externally and internally from mechanical damage or damage from the elements. Contractor shall store and maintain the materials in accordance with the local government authority and OEM recommendations. Additionally, Contractor shall protect all instruments and control panels from damage, including corrosion due to humidity, precipitation, temperature, atmospheric and environmental conditions in accordance with the respective OEM recommendations. All equipment procured under this Contract shall be labeled with permanently affixed durable nameplates which will include the OEM's name, equipment model number, equipment serial number, equipment tag number and all appropriate design parameters as agreed between Contractor and Owner during the review process prior to the installation of nameplates.
- Contractor shall construct all Project facilities in a manner such that the Project site drains properly to prevent ponding.
- All grading, drainage, storm water collection, and erosion control specified by the IFC construction plans.
- Project electrical grounding system shall be in accordance with IEEE Std. 80 requirements, local utility requirements, Prudent Wind Industry Practices, and Section 4.
- WTG grounding system shall be in accordance with Turbine Supplier requirements as shown in the requirements of IEEE Std. 80, local utility requirements, Prudent Wind Industry Practices, and Section 4.
- WTG erection staging area sufficiently prepared so as to enable safe staging and assembly of the WTG and its components and to meet the Turbine Supplier’s requirements and Section 2.
- Restoration of all temporarily disturbed areas, such as but not limited to, WTG erection staging areas and crane paths, shall be restored in accordance with all environmental permits.

- Supply permanent service power to Project Collector Substation (and O&M facility if applicable).
- Provide backup generators for pre-commissioning in case grid permanent power is not available. This shall include any necessary permitting to authorize placement and operation of the generators.
- Lead, participate in, and prepare reports for factory inspections and tests.
- Any additional geotechnical and geothermal investigations necessary to complete the design and construction.
- Any additional site surveys.
- Participation in final WTG, site road, and collection system micro-siting including field verification for constructability.
- Contractor permits and support of Owner's permit activities per Section 1.
- Permit and land use permit conditions not outlined as the responsibility of the Owner in Section 1.
- Any temporary utilities connection from the Contractor's facilities to the local utility.
- Additional survey work necessary for the design and construction of the Project including but not limited to aerial, topographic and site surveys.
- Environmental monitoring per requirements set forth in Section 1.
- Crop loss payments for any damage caused by Contractor or its Subcontractors outside of the participating parcels.
- Design, procurement, and construction of the temporary and permanent security facilities.
- Receive, document, inspect, and unload all materials. The Contractor shall keep adequate and convenient records of their location and shall keep a continuously accurate inventory.
- The required receiving documentation shall be completed by the Contractor and copies distributed to Contractor and the Owner. Contractor shall provide a delivery checklist and documentation for non-conformance reporting. Any recorded damage prior to unloading shall be the responsibility of the Contractor. In certain instances where packaging does not readily allow inspection, the Contractor may choose, after unloading part, to open/inspect at a later date as agreed to by the Owner.
- Contractor will provide Owner with at least four (4) radios capable of listening to all channels on all frequencies on which any of Contractor's communications related to the Work are taking place. This is to include, but not be limited to, all turbine erection and crane activity.

1.1.2 Roads

A. Design, construction and maintenance of new access and site roads which meets or exceeds the requirements of Section 2 as well as the Turbine Supplier's requirements

B. Pre- and post-construction road surveys and inspection reports.

C. Construction area signage along onsite and public roads for the duration of the project.

D. Modification, repair and maintenance (including traffic maintenance) of all existing roads to meet WTG and main power transformer delivery specifications, all other specifications of Section 2 and Turbine Supplier's requirements. Contractor shall also satisfy all county road use agreement requirements. Contractor to assume all risk of improving and repairing all roads (public and private) during construction and restoring all roads (public and private) to the county's satisfaction after construction.

E. Install an aggregate maintenance ring/apron around each WTG.

1.1.3 Foundations

A. Furnish, design and construct WTG foundations in accordance with the recommendations of the final geotechnical report for the site, Turbine Supplier loading information. Contractor shall furnish and install WTG anchor bolt template ring, anchor bolts, nuts washers, and shims.

B. Furnish and install WTG ground grids and provide ground strap and hardware in tower base.

C. Design, furnish, and construct all balance-of-plant foundations including (O&M building foundation if applicable) flatwork and MET (meteorological) tower foundation.

D. For concrete required for all foundations, pads, walks, etc., verify capability of local concrete suppliers to provide adequate concrete for the project. If batch plant is deemed necessary, the Contractor shall supply all raw materials necessary including cement, sand, aggregate and water to produce the quantity of concrete necessary for the entire project. Contractor shall also provide batch plant equipment and assembly if batch plant is necessary. The cost for the supply of the raw materials including permitting and drilling a well for water, if needed, shall be included in the Contractor's bid price.

E. Perform concrete and grout testing for each WTG foundation and provide lab test results to Owner.

1.1.4 Wind Turbine Generators

A. Procure and deliver Non-PTC turbines.

B. Offload, store, stage, and inspect WTG components prior to erection.

C. Install/erect WTGs and associated equipment to mechanical completion. Contractor will lead mechanical completion inspections.

D. Provide, install, and operate temporary Federal Aviation Administration (FAA) lighting during construction.

E. Provide and install permanent FAA lighting and brackets.

F. Permanent crane pads adjacent to each WTG foundation sufficient to enable the safe operation of an appropriately sized, crawler crane.

G. Design, construction and restoration of crane walk paths. Any necessary utility crossings shall be the Contractor's responsibility.

H. Turbine erection staging area is Contractor's responsibility.

I. Final level adjustment of tower base section and grouting.

J. Provide WTG anchor bolt corrosion protection plan.

K. Post tension foundation anchor bolts. Grease anchor bolts and install anchor bolt protective caps. Contractor shall include a maintenance plan (schedule) for anchor bolt checks and re-tensioning requirements.

L. Support power performance testing.

M. Provide all special tools not provided by Turbine Supplier and special rigging that are required for WTG erection including but not limited to slings, lifting beams, shackles, chains, turning gear, and bolt torqueing equipment.

1.1.5 O&M Facility (if applicable)

A. Design, procure, construct and install a new, fully functional, O&M facility, security devices and equipment.

B. Support delivery and installation of O&M building computers, IT equipment, furniture, and appliances by Owner.

C. Contractor shall provide for parking, drainage, additional lots after construction, lighting, training, internet and phone connection, and utilities.

1.1.6 Meteorological Towers

A. Furnish, design, and install temporary and permanent power performance MET towers, including booms, sensors, and associated cabling and data loggers which will interface with Project SCADA system.

B. Remove temporary power performance MET towers, if applicable.

C. Furnish and install FAA lighting on the MET Towers and connection to the Project Collector Substation SCADA system.

D. Furnish and install electrical, power and communications systems for permanent MET towers.

E. Program and commission all MET tower data loggers.

1.1.7 Collection System

A. Design and install the collection system between the Project Collector Substation and the WTGs. This includes trenching, laying and splicing of medium voltage (MV) power cables; installing ground cables, furnishing and installing ground rods and fiber optic (FO) cable; terminating the MV power cables at junction boxes, padmount step-up transformers, the Turbines and any other system connection point; terminating FO communication cables at the Project Collector Substation, in the WTGs and meteorological ("MET") towers; furnishing and installing power circuits and termination materials for the MET towers; and installing conduits, grounding rods and grounding at junction boxes. Contractor shall furnish and install padmount step-up transformers at each WTG, directional fault indicators, and junction boxes. The Contractor shall also test all power and communication cables and systems prior to energizing and commissioning and provide a list of recommended spare parts for the collection system. The Contractor must also adhere to Owner's labelling and numbering requirements for equipment.

B. Furnish, install, and terminate low voltage (LV) cables between WTG switchgear and padmount transformers.

C. The Contractor's electrical design shall provide for estimated annual energy losses, calculated between the output terminals of each WTG and the revenue meters.

D. As required, WTG padmount step-up transformers, as well as foundations and/or box pad.

E. Contractor shall place padmount transformer doors out of the wintertime prevailing wind at the site. However, the padmount transformer doors shall not be on the side of the tower opposite the access road. In the cases where the wind comes from the direction of the access road, the padmount transformer doors shall be placed in a direction 90 degrees to the wind.

F. Test, energize, and commission the collection system. Contractor shall also test and commission WTG ground grid.

1.1.8 34.5 kV/345 kV Project Collector Substation

A. Procure and install all equipment and facilities required for the Contractor's design, construction, testing and commissioning of the Project Collector Substation including, but not limited to, foundations, any required reactive power compensation equipment, station service transformers, circuit breakers and/or switchgear, termination materials, disconnect switches, surge arrestors, metering, bus work, protective relaying, Project Collector Substation SCADA System (including all related hardware/software and licenses, equipment, materials and commodities), battery backup power system and Uninterruptible Power Supply (UPS), ground grid, grounding transformers, lightning protection, 34.5 kV/345 kV transformer, dead-end structure, bus and equipment support structures,

the associated termination equipment up to the Point of Change of Ownership (PCO), and control facilities. Per the GIA (Generator Interconnect Agreement) or the E&P (Engineering and Procurement) Agreement, the PCO shall be the point where the Owner's span from the Project Collector Substation connects to the terminals of the 345 kV dead-end structure at the Project Interconnect Substation.

B. Contractor shall perform all above- and belowground site infrastructure, procurement, delivery, installation and on-site testing for the 34.5 kV/345 kV main power transformer(s) (MPT) and associated equipment (including assembly and vacuum fill).

C. Design and build an open (future) bay on each 34.5 kV bus.

D. Design, procure and install revenue metering system in accordance with GIA.

E. Operation of Project Collector Substation upon energization of the interconnection facilities.

F. Contractor shall be required to energize the collection system and Project Collector Substation.

G. Provide access roads and perimeter fences with access gate(s) and signage at the Project Collector Substation.

H. All equipment shall be labeled per Owner's requirements.

I. Grade collection and interconnection substations.

1.1.9 Project Collector Substation SCADA System and Fiber-Optic Network

A. Furnish, design, and install fiber-optic network and communications systems which shall interface with Turbine Supplier's systems as well as Owner's and Transmission Owner's systems. Design of the Project Collector Substation SCADA System shall be performed in cooperation between Turbine Supplier, Contractor, Transmission Owner, Transmission Provider, and Owner to ensure an operational system that meets interconnection requirements. Contractor is responsible for ensuring that all network and Project Collector Substation SCADA Systems integrate properly. The PCO for the fiber-optic wire will be at the splice box on the 345 kV dead-end structure in the Transmission Owner's Project Interconnect Substation.

B. Test all Project Collector Substation SCADA System and fiber-optic network infrastructure on this Project, and as otherwise indicated in this Section.

C. Install Project SCADA system cabinets, servers, and associated fiber, hardware, software, and software licenses.

D. Install Project protection system fiber-optics, including coordination with transmission provider.

E. Support Project SCADA system and Owner SCADA system testing and commissioning.

F. Lead Project Collector Substation SCADA system testing and commissioning.

G. The Project Interconnect Substation is provided by transmission owner. Contractor's scope of work excludes the Project Interconnect Substation.

H. Coordination with transmission owner during construction.

1.2 WIND TURBINE GENERATORS

1.2.1 General

The Turbine Supplier shall ship all WTG components (for both Non-PTC and PTC Turbines) to the Project in coordination with the Contractor and Owner. Contractor shall offload and erect WTGs for the Project. Turbine Supplier will provide the Project Contractor with (a) technical representative(s) to advise on offloading, initial staging, erection, project startup, inspection and related work.

1.2.2 WTG Installation

1.2.2.1 Erection of WTGs

Contractor shall undertake all work associated with erection and installation of all WTG equipment to mechanical completion. The Turbine Supplier's technical representative(s) shall provide oversight and provide the Contractor with any specialized training.

Turbine Supplier will provide qualified blade repair technicians as required to make necessary repairs of damage caused during shipment (while in custody of the Turbine Supplier) and documented upon receipt.

Contractor shall place WTG door out of the wintertime prevailing wind at the site. However, the WTG door shall not be on the side of the tower opposite the access road. In the cases where the wind comes from the direction of the access road, the door shall be placed in the direction 90 degrees to the wind that would hold the door open (i.e., wind will be in the direction of door opening).

1.2.2.2 Cleaning and Painting

The Turbine Supplier will deliver components to the Project with appropriate wrapping and sealing. An inspection by the Contractor at delivery shall be performed to identify excessive grime or tarp damage. Contractor shall clean WTG components by means of pressure washing of towers, nacelle, rotor assembly, and blades to remove loose dirt and debris prior to installation.

Turbine Supplier will supply touch-up paint for tower and other painted surfaces as required. Turbine Supplier will perform all finish painting as required.

1.2.2.3 Tower Wiring

The Contractor shall perform all WTG wiring where required and such wiring. Contractor shall make final connections for lighting inside the tower.

Contractor shall ensure all power, control, and fiber optic equipment and cabling is connected for immediate use from the nacelle to the WTG base. Contractor shall follow Turbine Supplier instructions for completing this work.

1.2.2.4 Commissioning

Commissioning of the WTGs will be completed by the Turbine Supplier in coordination with the Contractor and Owner.

1.2.2.5 Aviation Obstruction Lighting

Contractor shall plan, furnish and install aviation obstruction warning lights and mounting brackets for WTGs. Aviation obstruction warning lights and brackets shall meet Federal Aviation Administration requirements for wind turbine lighting and the project-specific aviation lighting plan (specified on the turbine Determinations of No Hazard from the FAA). The Contractor shall also furnish and install all necessary Project Collector Substation SCADA System connections. The Contractor shall include a material list and unit pricing for the proposed aviation obstruction lighting scheme in their bid.

Contractor shall provide power supply, including temporary connections if required, for MET towers and aviation obstruction lighting. Contractor shall make provisions for the aviation obstruction lighting on the MET towers and WTGs to strobe in unison.

Contractor will include provisions for temporary aviation obstruction lighting of WTGs during construction. For air traffic safety reasons, Contractor acknowledges that WTGs will be lit and that temporary lighting and appropriate forms must be filed with jurisdictional agencies for each WTG for the duration needed.

1.2.2.6 Project SCADA System

Contractor shall supply and install fiber-optic termination cabinets in each WTG base and at each MET tower base, and Project Collector Substation, (and O&M facility if applicable) for easy fiber optic access and troubleshooting. Contractor shall connect the Project SCADA system servers located in the Project Collector Substation's control building to Turbine Supplier's services and equipment. Contractor shall also provide power supply and communication links for Project SCADA system servers. Contractor shall furnish and install the Project Collector Substation SCADA System in accordance with OEM requirements. For terminations at each tower, Contractor shall provide appropriate amount for terminations.

Contractor shall select permanent MET tower instrumentation and data loggers which are approved by Turbine Supplier to interface with Project SCADA system.

1.3 DESIGN AND CONSTRUCTION REQUIREMENTS

1.3.1 Design Requirements

A. Contractor designs shall be prepared in accordance with all applicable laws, applicable standards, permits, Prudent Wind Industry Practices, the Generator Interconnect Agreement (GIA), WTG requirements. Any departure from the referenced codes or specifications, must be fully explained in writing and submitted for the Owner's review and approval.

B. Contractor shall complete all applicable studies and calculations required for the design including but not limited to those specified in Section 2, 3, and 4.

C. The Contractor shall be fully responsible for adhering to the scope of work. The Contractor shall provide a complete design as well as all quality control and design checks.

D. Contractor shall design and construct all permanent Project facilities including but not limited to Turbine foundations, access roads, collection system, Project Collector Substation, and MET towers (and associated MET tower foundation and booms design and engineering) (and O&M facilities if applicable) for a minimum of a 40 year operational life.

E. The Project Collector Substation and the collection system shall be designed and built by the Contractor.

F. The Contractor shall design the Project to complement landowner property use and integrity. Contractor shall ensure minimal disruption to farming activities.

G. Prior to the start of work, the Contractor shall submit to Owner a design plan, or design basis document, which shall serve as the basis for each component of the detailed design. This documentation will summarize the basis of initial design criteria and be kept up to date during the design process. This document will be finalized at the end of the design process as to provide a record of how the design was performed.

1.3.2 Codes and Standards

A. Unless stated elsewhere, all work governed by this Contract shall conform to the most recent version of all applicable standards and codes specified in this Section, as well as Prudent Wind Industry Practices.

B. Contractor shall comply with all safety standards including OSHA regulations and all others where applicable.

C. If any conflicts exist between any codes, standards, regulations, or exhibits, the most stringent document shall apply.

D. Contractor shall comply with all relevant and current standards, including, but not limited to, those from the following governing bodies:

1. OSHA – Occupational Safety and Health Administration
2. ICEA - Insulated Cable Engineers Associated
3. NEC – National Electrical Code
4. ANSI – American National Standards Institute
5. IEEE – Institute of Electrical and Electronics Engineers
6. ASTM International
7. NEMA – National Electrical Manufacturers Association
8. UL

9. AEIC – Association of Edison Illuminating Companies
10. TIA – Telecommunications Industry Association
11. EIC – Electronics Industries Alliance
12. IEC – International Electrotechnical Commission
13. AISC – American Institute of Steel Construction
14. ACI – American Concrete Institute
15. CRSI – Concrete Reinforcing Steel Institute
16. IBC – International Building Code
17. ASCE – American Society of Civil Engineers
18. AASHTO – American Association of State and Highway Transportation Officials
19. ASME - American Society of Mechanical Engineers
20. NESC - National Electrical Safety Code
21. NETA - InterNational Electrical Testing Organization
22. NIST - National Institute of Standards and Technology
23. NERC - North American Electric Reliability Corporation
24. MISO – Midcontinent Independent System Operator

E. Contractor shall adhere to all applicable NERC standards including but not limited to:

1. CIP-002
2. CIP-003
3. EOP-004
4. FAC-008
5. MOD-025
6. MOD-026
7. MOD-027
8. PRC-001
9. PRC-005
10. PRC-019

11. PRC-024

12. PRC-025

13. VAR-001

14. VAR-002

F. Contractor shall assist Owner in filling out all applicable NERC forms, including, but not limited to, the following. This shall require that Contractor provides necessary technical information so that Owner can complete these forms:

1. FAC-008

2. MOD-025

3. PRC-005

a. For the avoidance of doubt, Contractor shall perform point-to-point wiring diagram checks in the field and provide the highlighted drawings to Owner.

4. VAR-002

G. Contractor shall execute applicable scope in accordance with MISO requirements and standards.

1.4 DESIGN SUBMITTALS

1.4.1 Design Documents

All Design Submittals shall be made via Owner's Document Control System, Unifier. In all cases, the Owner may engage an Owner's Engineer to further review and approve design documents and calculations.

The Contractor shall submit all Owner-approved calculations and drawings to the local authority for planning and building regulation approval. Immediately prior to such submission, the Contractor shall provide the Owner with a complete set of all documents intended for inclusion in the submission.

Under all circumstances, construction will not be permitted on-site until the relevant designs and drawings have been reviewed and in all cases the relevant local authority approvals and permits have been obtained.

The Contractor shall submit individual sets of calculations as requested by the Owner. All sets shall be of similar format, self-explanatory and clear to review.

When required, the Contractor shall provide an explanation together with evidence to validate computer programs used for design calculations. Calculations and drawings shall always be submitted with document number, revision suffix and date of issue.

All drawings shall be to scale and fully detailed, dimensioned, and legible.

Deviations from these designs shall be submitted in writing and require Owner approval before implementing. The Contractor shall also submit the design drawings and calculations for the Project's design to the Owner for review and comment at points roughly equivalent to being 30, 60, 90 % complete, and IFC unless otherwise specified in other specifications.

1.4.1.1 As-Built Drawings

The Contractor shall provide the Owner with a complete set of 'as-built' drawings, sealed by the Engineer of Record, incorporating all modifications that may have been made during the construction period. Contractor shall furnish the 'As-Built' drawings in accordance with the Project schedule.

The drawings shall be presented in hard copy and electronic format. Hand-markups will not be accepted.

1.5 DESIGN REVIEWS

The Contractor shall support, cooperate with, and participate in pre-design meetings, design reviews and teleconferences for every aspect and submittal of the Project's design.

Design submittals shall include work performed by the Contractor and Subcontractors. All Subcontractor submittals shall be reviewed and accepted/approved by the Contractor prior to submittal to the Owner and Owner's Engineer.

Owner and Owner's Engineer shall use reasonable effort to accommodate Contractor and the Project schedule during design reviews. All comments and respective resolutions shall be made in writing.

All final drawings and calculations shall be sealed by the Engineer of Record.

1.6 CONSTRUCTION OBSERVATION

The Owner may require the presence of third party inspectors or Owner's representatives at any construction or testing activities. The Contractor shall be responsible for accommodating and cooperating with these personnel, including providing any necessary site-specific safety training. If the presence of third party inspectors or Owner's representatives within the Project site is an issue, or if there are any special requirements related to the presence of third party personnel at Project activities, the Contractor shall detail these in a document for Owner review.

1.7 CONSTRUCTION FACILITIES

1.7.1 General

All temporary construction facilities including buildings, utilities, personnel sanitation facilities, parking, material and equipment storage, vehicle and equipment maintenance, fuel storage, signage, fire safety, Site security, material lay-down areas, spill cleanup kits, refuse containers, and associated construction support facilities shall be provided and maintained by the Contractor.

1.7.1.1 Construction and Temporary Facilities

The Contractor shall furnish all construction and temporary facilities, equipment, materials and supplies required for Project execution.

All temporary structures and facilities provided by the Contractor will remain the property of the Contractor. When the construction is complete, all such temporary structures, buildings, concrete slabs and footings, tools and facilities shall be removed from the site, and the areas involved shall be restored to their original or intended condition unless otherwise requested by Owner.

The Contractor's temporary facilities shall be located within the Project site. The Contractor shall prepare the area to be used during construction for temporary office trailers, parking, laydown, storage, sanitation facilities, fuel tanks, security checkpoint, etc. If additional land is needed for lay-down area Contractor will be responsible for securing land and all necessary permits to utilize additional area.

All facilities shall be regularly and systematically maintained and cleaned by the Contractor throughout Project construction to ensure proper and efficient operation.

1.7.1.2 Site Access and Car Parking

The Contractor shall provide access to the Project during construction through the construction of permanent or temporary roads for the Project. The Contractor shall construct car parking facilities suitable for the use of construction personnel, any Subcontractor's personnel, and as may be required. The Contractor shall enforce back-in, head-out parking at all site parking facilities. Unless otherwise specified by Owner, upon completion of the Project, the Contractor shall restore all areas to original or intended condition.

1.8 LAYDOWN AND STORAGE

An area within or near the Project shall be allocated by Owner for laydown and storage use by the Contractor. The Contractor shall develop this area and shall provide any required security, lighting, and construction power.

The Contractor-provided construction management and lay-down area shall be set up with construction trailers and other temporary facilities to support Project Collector Substation construction. The arrangement of these construction-phase (temporary) facilities will not inhibit the installation nor configuration of temporary or permanent telecommunications, Project Collector Substation SCADA system, relaying, or security hardware in any way. The use of a continuous TCP/IP based web camera system is encouraged for the construction phase as part of physical security.

All platforms, enclosures, shoring, and weatherproof coverings for storage use shall remain the Contractor's property and shall be removed upon completion of the Project and the lay-down and storage area shall be restored to original or intended condition.

1.9 CONSTRUCTION UTILITIES

The Contractor shall obtain construction electrical supplies and shall pay for all construction power required for Project construction including generators, transformers, breakers, disconnects, cables, etc.

The Contractor shall provide and maintain a system of temporary lighting for use in the general construction areas and lay-down yard where required. If work must be accomplished during non-

daylight hours, adequate lighting must be supplied in accordance with applicable NEC, OSHA, and any other Prudent Wind Industry Practices, or safety requirements.

The Contractor shall supply water and distribute water on the Project. The Contractor shall pay for all water required for Project construction.

The Contractor shall supply all fuel required for machinery, vehicles, and all equipment.

The Contractor shall supply a construction communication system as required by the Contractor for control of all construction activities.

The Contractor shall furnish and maintain portable toilets for use by all site construction personnel in accordance with all applicable regulations. Sanitation facilities shall be gender-segregated.

The Contractor shall provide for the disposal of all construction rubbish and waste materials from the Project. The Contractor shall be responsible for obtaining any required permits.

Temporary fences shall be removed after completion of construction.

Contractor shall provide access road and parking area snow removal.

Contractor shall provide weed/grass control at lay-down yard, access roads, turbine areas, and the Project Collector Substation.

Contractor shall provide any workforce housing and transportation.

1.10 SECURITY

During construction, security shall be provided by the Contractor. Any necessary security fence at the Project will be constructed by the Contractor. In addition, the Contractor will provide for the security of all construction, lay-down material, storage, and office and parking area. The Contractor's and Subcontractor's tools, equipment, and materials will be the responsibility of the Contractor. Contractor shall promptly replace all equipment and material lost to theft.

All Contractor and Subcontractor personnel employed at each site location must have a form of personal identification. This identification must be kept in the possession of all site personnel at all times while on the Project site and will be presented for identification upon request. All authorized vehicles will have site stickers or window hangers or other form as agreed to by Owner.

All visitors to the site will report to the main construction office and are required to produce identification upon request and obtain clearance from the party to be visited through the security personnel, and complete and sign the visitor registration upon entering the Project. The visitor will be issued a pass, hardhat, safety glasses, and earplugs and shall be escorted by Contractor or Owner's Representative while on site. At the conclusion of the visit to the site, the visitor will return all items to the security personnel at the main gate.

Security personnel will be assigned assembly and accountability duties for personnel on site in cases of emergencies. A list will be maintained of all personnel on site at any particular time and date.

1.11 CONSTRUCTION TOOLS AND EQUIPMENT

The Contractor shall provide all tools, hoists, cranes, earthmovers, air compressors, trucks, welding machines, power tools, jacks and all other general or special tools, specialty lifting equipment, construction machines, and equipment required for the construction work and WTG erection and lifting. Note that Turbine Supplier will supply special tools to site and is responsible for the cost of shipping these tools from site. Any tools required beyond that shall be supplied by the Contractor.

1.12 SIGNAGE

The Contractor shall install all permanent and temporary signs at each WTG location, clearly indicating the respective WTG number, 911 address and traffic/safety signs. The Contractor shall also provide temporary signs at public and site access road intersections to provide direction to WTG locations, substation, and site exit. In addition, the Contractor shall provide signs indicating which roads shall not be used. Contractor shall also provide fence signage at the Project Collector Substation. All signs shall be weather resistant, and shall remain legible and in place throughout the construction period.

The Contractor shall erect and maintain such danger signs, signals, lights, guards, and notices as may be necessary to adequately protect Contractor's work and personnel against injury or property damage. The Contractor shall provide signage if required by permits.

1.13 SAFETY

Contractor shall prepare a safety plan before construction commences for approval by Owner.

1.13.1 Hazard Prevention and Control

Where feasible, workplace hazards are prevented by effective design of the Site or the Work. Where it is not feasible to eliminate such hazards, they must be controlled to prevent unsafe and unhealthful exposure. Elimination or control must be accomplished in a timely manner once a hazard or potential hazard is recognized. Specifically, as part of the safety plan, Contractor should establish procedures to correct or control present or potential hazards in a timely manner.

Use engineering techniques where feasible and appropriate.

Establish, at the earliest time, safe work practices and procedures that are understood and followed by all affected parties. Understanding and compliance are a result of training, positive reinforcement, correction of unsafe performance and, if necessary, enforcement through a clearly communicated and documented disciplinary system. Contractor shall implement the following safety practices and policies:

- Use of proper work procedures, mechanical guards and personal protective equipment when engineering controls are not feasible.
- Use administrative controls, such as reducing the duration of exposure.
- Maintain the facility and equipment to prevent equipment breakdowns.

- Plan and prepare for emergencies, and conduct training and emergency drills, as needed, to ensure that proper responses to emergencies will be "second nature" for all persons involved.
- Establish a medical program that includes a nurse or nurse practitioner on the Site to reduce the risk of any injury or illness that occurs.

1.14 SITE FIRE PROTECTION

Prior to the start of work, the Contractor shall develop and maintain a fire response plan applicable to the Project in concert with the local authorities as part of the emergency response plan.

1.15 CLEANUP

As a part of the punch list work, the Contractor shall remove all tools, equipment, and surplus materials. All temporary structures, buildings, temporary concrete footings and slabs, and scaffolding furnished by the Contractor in the course of the construction shall be removed and the involved areas shall be left in their intended or original condition. All trash, rubbish, debris, and nonnative materials shall be promptly removed from the Project upon completion of the Project. Site cleanup shall include seeding, landscaping, and other restorative efforts as necessary.

1.16 SERVICES FOR THE PROJECT OWNER

The Contractor shall establish, prior to the commencement of other work, two temporary office facilities at the Project. One shall be for use by the Owner and one for Turbine Supplier's personnel when on site during construction. Such offices for the Owner and Turbine Supplier shall be in close proximity to those of the Contractor. Connection and monthly charges for power shall be the responsibility of the Contractor. The size and number of office trailers shall meet all requirements below and will be agreed upon by the Contractor and Owner.

1.16.1 Owner's Offices and Temporary Facilities Requirements

Contractor shall provide the following temporary facilities for the Owner. Construction trailer complex shall consist of the following:

- Six trailers aligned side-by-side with interconnectivity that provides at least 72 feet by 60 feet of space, windows with drapes
- Multiple stair sets to gain access to exit/egress doors
- Office furniture and hard-walled offices for 12 staff members
- Receptacle power, data circuits, lights, heating/ventilating/air conditioning equipment
- Contractor shall provide telephone and high speed Internet infrastructure
- Computer/IT (Information Technology) office
- Office supplies and equipment
- Conference room space (12 feet by 30 feet minimum)
- Potable (bottled) water
- Sanitation facilities may be shared with the Contractor's facilities if the facilities are in close proximity, gender specific, and maintained clean.

- Lavatory facilities (four internal stalls and water closets) with janitor space
- Janitorial services and cleaning supplies

1.16.2 Turbine Supplier's Offices and Temporary Facilities

Contractor shall furnish Turbine Supplier's offices and temporary facilities in accordance with Turbine Supplier requirements.

1.17 ENVIRONMENTAL

1.17.1 Protection of Sensitive Areas

All identified sensitive areas shall be located on the Project's design drawings and appropriate design action taken to avoid impacts to these areas. The Contractor shall minimize the areas impacted by construction and shall furnish and install temporary low-impact, high-visibility fencing to identify and protect these sensitive areas where they are inside or adjacent to the planned crane paths or other work areas and shall maintain the fencing during the Project's construction. The Contractor shall remove the fencing at the completion of construction. The Contractor shall protect these environmentally sensitive areas and comply with the conditions of related permits during construction.

Contractor shall identify the areas on the Project's design drawings and take appropriate design action to avoid impacts to the areas. If historic, cultural or archaeological areas are discovered during excavation or other construction-related work, the Contractor shall stop work immediately and notify the Owner. The Contractor shall assist the Owner in remediation and mitigation of such discovered areas.

1.17.2 Environmental Constraints During Construction

The Contractor shall not discharge any toxic, poisonous, or polluted effluents onto land at the Project or any streams, creeks, rivers, ponds, or other bodies of water at any time.

Contractor shall develop an Environmental Management Program for the construction phase of the Project. The Environmental Management Program shall reflect the terms of all permits which are applicable to the Project. Contents of the plan should include, but not be limited to, the following:

- Storm Water Pollution Prevention Plan (SWPPP)
- Waste management (including hazardous wastes)
- Spill Prevention, Control, and Countermeasure (SPCC) Plan
- Fugitive dust control
- Measures for protecting sensitive environmental resources

All components of the Environmental Management Program shall be completed by the Contractor and approved by the Owner and the applicable permitting authorities as required prior to the start of any field work. The Environmental Management Program shall be updated to reflect any new, amended, or modified permits that are received or mitigation measures that are developed following production of the initial Environmental Management Program.

1.17.3 Suppression of Dust and Dirt

The Contractor shall develop a fugitive dust control plan sufficient to meet state and local regulations or preferences. Contractor shall indicate how dust plumes will be avoided, and how impacts to nearby residents and public road visibility will be minimized. Calcium chloride or an Owner-approved alternative may be used in place of water for dust control.

2.0 Civil

Civil works shall include the design, detailing, micrositing, material procurement, layout, erection, and construction of foundations, structures, buildings, installations, and services required for the installation, commissioning, operation and maintenance of all equipment and plant which make up the Project.

The Contractor shall locate, design, and construct a crane pad and temporary turbine assembly/erection area at each turbine location in accordance with the Contract, the Turbine Specifications, and these specifications. The Contractor shall also install a permanent aggregate apron around each turbine foundation in accordance with the Contract, the Turbine Specifications, and these specifications. The Owner will furnish the turbine locations to the Contractor. The location, layout, and design of the crane pads and turbine assembly/erection areas shall be reviewed by the Owner.

The Contractor shall cut, fill, and/or grade the crane pads, turbine assembly/erection areas, and turbine foundation sites of the Project as necessary and sufficiently to achieve the finished grades of the Contractor's design. The spoils from this construction shall be utilized as needed to re-grade areas of the Project. If required, fill material shall be provided by the Contractor. The fill material shall be inert, free draining, free from any deleterious materials and placed to a degree of compaction adequate for the use of the fill.

No crane pad, turbine assembly/erection area, or turbine foundation apron fill shall be placed in wetlands. The Contractor shall identify and mark wetland boundaries prior to commencement of construction activities. All Project crane pad, turbine assembly/erection area, and turbine foundation apron construction shall conform to the Storm Water Pollution Prevention Plan (SWPPP).

The Contractor shall undertake all reasonably necessary tests to demonstrate the crane pads, turbine assembly/erection areas, roads, and turbine foundation aprons are fit for purpose. The Contractor shall provide an approved third-party independent testing agency for certification of turbine foundation, crane pads, assembly, and erection sub-base preparation; compaction of backfill around the turbine foundations; any fills associated with the turbine foundation, assembly, or erection areas; and final surfacing of the turbine assembly and erection areas.

2.1 DESIGN BASIS

The design and construction of all turbine areas, lay-down areas, and access roads shall conform to the 2015 International Building Code, federal, state, county and municipal codes and regulations, and the requirements specified below.

The information contained in the Contract, and these specifications, provides a basis for the engineering and design associated with the design and construction of the access and site roads for the Project. Cement-stabilized access roads shall be designed using "Department of the Army Technical Manual 5-822-12, Design of Aggregate Surfaced Roads and Airfields", or an equivalent Owner approved methodology. If the above referenced method is used, calculations must be performed for both the required depth above the natural subgrade and the required depth above the cement stabilized subgrade. For the natural subgrade, a saturated design CBR value of one-

third of the in-situ value shall be used. Calculations shall utilize a design index of 4 or greater. As stated in Sections 4a and 4i of Technical Manual 5-822-12, the aggregate surfacing thickness shall not be less than 4 inches with this method.

The Contractor shall provide permanent roads to and within the Project to provide adequate access to each turbine, the Project Collector Substation, the O&M Facility and Storage Warehouse Buildings, and other Project facilities. The roads shall be designed to be capable of carrying all vehicles likely to be used during construction and throughout the life of the Project.

The Contractor shall cut, fill, and/or grade the access and site roads of the Project, as necessary, and sufficiently to achieve the finished grades of the Contractor's design. The spoils from road construction excavation shall be utilized as needed to re-grade areas of the Project. Excavated or stripped soil must be placed within the same landowner's property, unless written consent is provided by that landowner to remove soil from the property. If required, fill material shall be provided by the Contractor. The fill material shall be inert, free draining, free from any deleterious materials, and placed to a degree of compaction adequate for the use of the roadway.

No road fill shall be placed in wetlands. The Contractor shall mark provided wetland boundaries prior to commencement of construction activities. All Project road construction shall conform to the SWPPP.

2.2 SITE PREPARATION

2.2.1 General

The Contractor shall design and prepare the Project, including all layout, surface grading, clearing, erosion control, earthwork, trenching, material stockpiling and protection as well as avoidance of all environmentally, historically, culturally, and archeologically sensitive areas identified by the Owner or by the Contractor. Prior to the start of construction, the Contractor shall acquire all necessary permits.

2.2.2 Site Survey

The Contractor shall perform all Site survey work necessary for the design and construction of the Project, including topographic data, boundary locations, aerial photography, and the location of existing aboveground and belowground utilities and facilities. The Contractor shall provide all survey information to the Owner for documentation purposes.

2.2.3 Erosion and Sediment Control

The Contractor shall develop a SWPPP to be used during construction in conformance with U.S. Environmental Protection Agency (EPA) National Pollutant Discharge and Elimination System (NPDES) standards. The Contractor is responsible for the design, implementation, management, and maintenance of all erosion control measures required for compliance with applicable regulations (federal, state, and local).

2.2.4 Waste Management

The Contractor shall dispose of all construction solid waste debris into permitted landfills.

2.2.5 Clearing and Grubbing

The Contractor shall clear and grub the construction area of vegetation at the Site. The Contractor shall strip and stockpile the topsoil for re-spreading. Topsoil stockpile areas must be contained by silt fence or equivalent measures to prevent soil migration. Clearing must not unreasonably exceed that necessary to complete the Work. Waste from clearing shall be disposed of off-site in accordance with state and local regulatory requirements.

Clearing work shall include clearing and removing trees within the construction areas; cutting and removal of all brush, shrubs, debris, and vegetation to approximately flush with the ground surface; and disposal of all cuttings and debris. Mowing will be considered adequate for the cutting of light vegetation.

Grubbing work shall include the complete removal and disposal of all stumps and roots larger than approximately 2 inches in diameter, including matted roots, regardless of size. Grubbing shall extend to a minimum depth of approximately 4 inches below the natural surrounding ground surface.

All excavations made by clearing and grubbing work shall be backfilled with compacted earth.

2.2.6 Earthwork

The Contractor shall perform all earthwork activities required to complete the Work, in accordance with federal, state, and municipal regulatory requirements and the requirements specified below.

2.3 PERMANENT FENCES AND GATES

The Contractor shall provide permanent gates in locations where roads must be constructed through existing fencing. The permanent gates shall always be closed as necessary to maintain control. Cattle guards may be used in lieu of permanent gates with notice and approval of Owner. The Contractor shall install fencing as necessary for livestock.

Where overhead and/or underground collection systems pass through a fence, a temporary gate shall be installed. At the completion of construction of the Project, the original fencing will be re-established.

2.4 CONSTRUCTION AND TEMPORARY FACILITIES

All temporary construction facilities, including buildings, utilities, personnel sanitation facilities, parking, material and equipment storage, vehicle and equipment maintenance, fuel storage, signage, fire safety, Site security, turbine erection (crane) mats, material lay-down areas, spill cleanup kits, refuse containers, and associated construction support facilities shall be provided and maintained by the Contractor.

All temporary structures and facilities provided by Contractor will remain the property of Contractor. When the construction is complete, all such temporary structures, buildings, concrete slabs and footings, tools, and facilities shall be removed from the site, and the areas involved shall be restored to their original or intended condition unless otherwise requested by Owner.

Contractor's temporary facilities shall be located within the Project site or at a nearby location. Contractor shall procure and prepare the area to be used during construction for temporary office trailers, parking, laydown, storage, sanitation facilities, fuel tanks, security checkpoint, etc.

All facilities shall be regularly and systematically maintained and cleaned by the Contractor throughout Project construction to ensure proper and efficient operation.

2.5 SITE ACCESS AND PARKING

Contractor shall provide access to the Site during construction through the construction of permanent or temporary roads for the Project. The Contractor shall construct automobile parking facilities suitable for the use of construction personnel, any subcontractor's personnel, and as may be required. Unless otherwise specified by Owner, upon completion of the Project, the Contractor shall restore all areas to original or intended condition.

2.6 LAYDOWN AND STORAGE

The Contractor shall procure, design, and construct an aggregate surfaced area to be used during construction for laydown and storage. The Contractor shall strip and stockpile topsoil prior to surfacing.

The Contractor shall provide any required security, lighting, and construction power. All platforms, enclosures, shoring, and weatherproof coverings for storage use shall remain the Contractor's property and shall be removed upon completion of the Project and Project Collector Substation, and the lay-down and storage area shall be restored to original or intended condition.

2.7 DRAINAGE

Each turbine site, including the crane pad and turbine assembly/erection area, shall be graded such that runoff water will drain away from the site. The top of all permanent foundations shall be placed a minimum of 12 inches above the 100 year flood elevations.

2.8 CRANE PADS

The Contractor shall construct a crane pad at each turbine site in accordance with the Turbine Specifications and these specifications. Topsoil shall be removed and stored on-site during construction for replacement after decompaction and remediation. The access road shall be utilized as a portion of the crane pad in order to limit additional land disturbance. The engineered civil plans shall include detailed crane pad dimensions, position, and orientation at every turbine site.

At a minimum, the crane pad must be able to safely support the combined loading of the erection crane and the maximum anticipated turbine component load.

2.9 TURBINE ASSEMBLY / ERECTION AREA

The Contractor shall construct and compact a sufficient turbine assembly/erection area at each turbine site in accordance with these specifications.

At a minimum, the turbine assembly/erection area must be able to support the assembly and erection activities associated with the installation of the turbine.

If aggregate is used for the surface of the turbine assembly/erection area, it shall be removed after construction.

2.10 TURBINE FOUNDATION APRON

The Contractor shall install a permanent crushed rock apron around the turbine foundation. The apron shall encompass the pedestal foundation, pad mount transformer and junction box, extending a minimum of 10' beyond the outer edge of each, in a manner that enables vehicular access around the perimeter. The apron shall be composed of 8 inches of a 1 inch (maximum size) crushed rock laid on top of a geotextile fabric. After all construction activities at the turbine are completed, an additional 1 inch layer of the same crushed rock shall be installed and compacted.

2.11 EXCAVATION

The Contractor assumes responsibility for knowledge of underground structures and clearances that may be encountered or affected by the BOP Work hereunder.

A maximum variation in depth of excavation of 2 inches above or below established grade will be permitted. All foundations shall be in undisturbed soil.

Excavated material shall be piled so as to be available for backfill; wasting and borrowing will not be permitted except as specifically directed by the Owner. Operations shall be confined to the minimum work area consistent with efficient operation.

Adequate precautions shall be taken to prevent caving of foundation excavations and to assure that walls are kept reasonably vertical. All excavations in loose or unstable soil shall be protected by such means as timbering, lining, or shoring, until the foundation is placed. Excavations shall be kept free of water except where in the sole opinion of the Owner it is impractical to do so. In this event, either the design of the foundation or method of installations, or both, will be modified.

Special care shall be taken to avoid disturbing or loosening the soil below designated grade. Any accumulation of sand, silt, mud, refuse, or other material shall be removed before foundation is placed. Timbering, lining, shoring, and all means of removing water are to be considered as a part of the excavation.

2.12 DEWATERING

Contractor shall provide, maintain, and operate any and all equipment necessary to dispose of water that interferes with foundation construction. Water shall be removed from excavations before depositing concrete, except where under-water concrete placement is allowed for drilled piers as provided for below.

2.13 BACKFILLING

Excavations shall be backfilled in a maximum of 6 inch layers and compacted to 95% of the maximum density as determined by the Standard Method Test for Compaction and Density of Soils. Contractor shall be responsible for the maintenance of all constructed embankments and shall replace at his own expense any portion which may have become displaced or damaged due to his operations. Excavated material in excess of the quantity that can be placed in backfill, and material unsuitable for use as backfill shall be hauled away and wasted (disposed of) by the Contractor at

locations approved by the Owner. Wasted material shall not be left in unsightly piles but shall be leveled off and shaped so as to present a neat appearance and not obstruct drainage. Disposing of surplus waste or unsuitable material, including hauling, shall be considered as part of the BOP Work. All backfill shall be cleaned and free of frozen earth, snow, ice, refuse timber, vegetation, or other foreign matter.

2.14 SIGNAGE

Contractor shall install temporary signs at each turbine location clearly indicating the respective turbine number. Contractor shall also provide temporary signs at public and site access road intersections to provide direction to turbine locations, substation, and site exit. In addition, Contractor shall provide signs indicating which roads shall not be used. All signs shall be weather resistant and shall remain legible and in place throughout the construction period.

Contractor shall erect and maintain such danger signs, signals, lights, guards, and notices as may be necessary to adequately protect Contractor's work and personnel against injury or property damage. Contractor shall provide signage if required by permits.

2.15 PROJECT ENTRANCE & ACCESS ROADS

2.15.1 Reconnaissance and Road Location

The Contractor is responsible for selection of road routes in cooperation with the turbine supplier. Prior to the start of construction, the condition of public roads to be used for hauling equipment and delivery of materials shall be documented by the Contractor with the government authority having jurisdiction. Upon completion of construction or use of public roads, the Contractor and the applicable local authority will perform a final inspection of the public roads to determine if any damage or deterioration of the roads has been caused by the Contractor or the Contractor's Subcontractors. In the event that the damage or deterioration of the roads has been caused by the Contractor or the Contractor's Subcontractors or Suppliers, the Contractor shall make all such repairs.

Variable grades and alignments shall be utilized to locate roads on the most suitable terrain. Road grades shall not exceed those recommended by the turbine supplier and shall be minimized wherever practical to limit potential for erosion.

Road locations shall minimize the risk of materials entering waters of the state and municipality and minimize disturbance to stream channels, lakes, wetlands, and floodplains. Where viable alternatives exist, roads shall not be located on steep slopes, slide areas, or high-risk sites, or in wetlands, riparian management areas, channels, and floodplains.

When possible, locations of roads parallel to and in close proximity to streams shall be avoided because such locations have a higher than normal potential to deliver sediments directly into the channel. Stream crossings shall be as close to a right angle with the stream as possible in order to enter and exit the stream with minimal intrusion.

Alternative road locations shall be considered where natural resources are impacted. The most favorable road locations are those that provide the best combination of meeting objectives and minimizing economic and environmental costs.

Engineer of Record shall provide final road section design along with supporting calculations demonstrating adequacy for anticipated loads. The final design shall meet or exceed the minimum requirements shown below.

2.15.2 Road Subgrade and Surfacing

Roads shall be no wider than necessary to accommodate the anticipated use. Roads shall be designed to be constructed with a balanced cut and fill cross section where possible and where this does not pose a risk of slope instability. Where a balanced cross section is not possible, excess excavation material shall be used in the road design when possible and not wasted. Designs shall call for full bench construction and end-hauling of excess excavation material when roads are located on steep slopes and/or high-risk sites. To prevent fill failures, road designs shall provide for stable fills by using compaction, buttressing, subsurface drainage, rock facing, or other effective means.

Maximum allowable dips and bumps and minimum allowable crest shall be in accordance with the turbine manufacturer's transportation specifications.

Topsoil shall be stripped and stockpiled in windrows to achieve specified road section and provide adequate drainage during construction. When project construction is complete, topsoil shall be placed and compacted to achieve the final section.

The Contractor shall maintain the subgrade and take the necessary precautions to protect the finished subgrade from damage. The Contractor shall ensure that the subgrade has been graded to drain at the end of each day. The routing of traffic over the finished subgrade shall be limited to that which is essential for construction purposes. Any damage resulting from construction operations shall be repaired at the expense of the Contractor.

Roadway aggregate surface course materials shall conform to the requirements of Department of Transportation Class A Crushed stone for the specific state. Aggregate shall be placed on the subgrade in layers of uniform thickness not exceeding 6 inches in loose thickness. Aggregate compaction shall achieve a minimum of 98% of the maximum dry density. Following aggregate placement and compaction, Contractor shall proofroll to verify road bearing capacity is adequate for turbine delivery.

Following Project construction, the final aggregate surface course material shall be added to achieve a smooth, well-draining surface. After delivery and erection of turbines is complete, road shoulders and crane walk paths shall be removed, decompacted and restored. Topsoil windrows shall be replaced and graded to drain.

Crane walk paths shall be used only for tracked crane walks and related activities; paths shall not be used for general construction traffic, including rubber-tired cranes or telehandlers.

2.15.3 Execution

Mixing shall not be performed when the soil aggregate or subgrade is frozen. Soil-cement shall not be mixed or placed when the air temperature is below 40° F, unless the temperature is at least 35° F and rising.

The entire width of the area designated for stabilization shall be processed as a single operation. The cement shall be spread uniformly on the subgrade at the required rate of application by a method acceptable to the Purchaser. Cement that becomes displaced after spreading shall be replaced before mixing is started.

Processing shall be performed in one course. The processing shall result in a uniform distribution of cement and water at the specified density.

After the cement has been applied, mixing shall begin within 30 minutes. The soil and cement shall be mixed until the cement has blended sufficiently with the soil to prevent formation of cement balls when water is applied.

Immediately after soil and cement mixing is complete, the water required to obtain the specified compaction shall be added. If the moisture content exceeds that specified, the mixture shall be worked by remixing or blading to reduce the moisture content to within the specified range. Excessive concentrations of water shall be avoided. During the application of water and after all mixing water has been applied, mixing shall continue until a uniform and intimate mixture of soil, cement, and water is obtained.

2.15.4 Compaction

Compaction of the soil-cement shall begin immediately after mixing is completed. The start of compaction of the soil-cement mixture shall begin within 30 minutes after the last moist-mixing pass is complete.

At the start of the compaction operation, the percentage of moisture in the mixture and in unpulverized soil lumps, based on dry weights, shall be within a tolerance of two percentage points of optimum moisture content.

The optimum moisture content and maximum density shall be determined in the field by the methods prescribed in ASTM D558 on representative samples of the soil-cement mixture obtained from the area being processed.

The loose mixture shall be uniformly compacted to not less than 95 percent of maximum density. Material compacted to less than 95 percent of maximum density shall be recompacted, removed, or replaced as directed by the Purchaser.

2.15.5 Finishing

After compaction is complete, the cement-stabilized soil surface shall be shaped to the required lines, grades, and cross section. The resulting surface shall be compacted to the specified density. Rolling shall continue until the entire grade conforms to the specified density requirements.

During the finishing operation, the moisture content of the surface material shall be maintained at not less than two percentage points below its specified optimum moisture content. Surface compaction and finishing shall produce a smooth, dense surface, free of compaction planes, cracks, ridges, and loose material.

2.15.6 Testing by Contractor

Field and laboratory testing shall be performed by an independent testing laboratory acceptable to the Purchaser.

At least one pair of Dynamic Cone Penetrometer (DCP) determinations shall be performed for each 500 lineal feet of road. At each location, two DCP tests shall be performed, one on each side of the road. The first test for each road shall consist of two points located 4 feet from the road centerline on each side. The second test shall consist of two points located 7.5 feet from the road centerline on each side. The test locations shall continue to alternate between pairs of 4 foot offsets and pairs of 7.5 foot offsets for the remainder of the tests at each access road. Every DCP test shall have results recorded at 3, 6, 9, and 12 inch depths. In areas where DCP tests fail to achieve the required results, additional tests shall be taken every 50 feet on each side of the original test until passing results are achieved.

As part of the final civil engineering design, the Engineer of Record shall specify the required CBR value for the cement stabilized subgrade. Engineer shall also specify a remediation plan for areas with failed DCP tests.

At least one field moisture content and one density determination shall be performed for each 1,500 lineal feet of compacted material with a minimum of one of each test per day, whichever is greater. Field samples shall be taken at locations selected by the Purchaser. If additional field control tests are necessary, in the opinion of the Purchaser, such tests shall be made.

Maximum density for the compacted soil-cement materials shall be determined in accordance with ASTM D558. The terms "maximum density" and "optimum moisture content" shall be as defined in ASTM D558.

The location of each test moisture, density, and DCP test shall be documented by GPS coordinates.

Subgrade adequacy shall be further confirmed by proofrolling with a tandem axle truck. The truck shall be loaded such that the front axle is loaded to a minimum of 18,000 pounds, and the total weight of the truck and load is a minimum of 52,000 pounds. The tire width must not exceed 17 inches for front tires and 11 inches for rear tires. Tires shall be inflated to within 2 psi of tire or vehicle manufacturer's maximum psi rating. The minimum psi rating must be 80 psi.

Each road shall be proof rolled with three complete passes, one on each side of the road centerline and one with the truck in the center of the road. The truck shall be operated at a speed between 2.5 and 5.0 miles per hour. The speed shall be adjusted to allow the Engineer to measure the ruts. For acceptance of the test, the subgrade must not show pumping or rutting in excess of 1.5 inches measured from the top to the bottom of the rut at the outside edges.

A copy of each test result shall be furnished to the Owner within 24 hours of testing.

2.15.7 Maintenance

The cement-stabilized soil shall be maintained in its finished condition until all work is complete and accepted by the Owner. Maintenance shall include immediate repair of any defects. Faulty work shall be replaced for the full depth of the layer.

2.16 TEMPORARY INTERNAL ACCESS ROAD CURVE WIDENING

The Contractor shall design and construct temporary internal access road curve widening at sharp curves in the access roads to allow for turbine deliveries. The Contractor shall strip and stockpile topsoil. The subgrade and aggregate surfacing of the widenings shall be tested to verify that a minimum of 98% of maximum density has been achieved. Widenings also shall meet performance requirements through proof rolling. The widenings will be removed after turbine deliveries. The subgrade base will be de-compacted, and topsoil will be replaced. Upon replacement of topsoil from the temporary stockpiles associated with each landowner (unless otherwise negotiated), the temporary curve widening areas will be restored to pre-construction contours and elevations. Landowners may be contacted to ensure an appropriate seed mix is planted in areas not subject to tilled agriculture.

2.17 TEMPORARY PUBLIC ROAD INTERSECTION WIDENING

The Contractor shall design and construct temporary public road intersection widenings to allow for turbine deliveries. The Contractor shall coordinate with applicable permitting agency for all work within the public road right-of-way. The Contractor shall strip and stockpile topsoil. The subgrade and aggregate surfacing of the widenings shall be tested to verify that a minimum of 98% of maximum density has been achieved. Widenings also shall meet performance requirements through proof rolling. Contractor shall ensure proper road drainage and maintain existing intersection drainage patterns. The widenings will be removed after turbine deliveries, along with any associated temporary drainage features. The subgrade base will be de-compacted, topsoil will be replaced and restored.

2.18 ROAD DRAINAGE

Road drainage shall be designed to limit interruption of the existing topography and drainage patterns. All drainage facilities, such as swales, culverts, and concrete low-water crossings, shall be designed to accept and convey all runoff from a 25 year storm event unless permit requirements are more stringent.

Concrete low-water crossings are the preferred method of drainage conveyance at road crossings, and shall be utilized wherever practical.

Good road surface drainage is required to minimize siltation and to keep subgrades firm and stable to support the designed loads. Surface runoff water intercepted by roads shall be returned to natural flow routes as quickly as practical. Methods of achieving this are listed below:

(a) *Shapes*. The road cross section shall be shaped to move water away from the road. Road surfaces shall be crowned or cross-sloped for drainage. A crowned road surface is preferred since it provides the shortest distance for water to travel off the road surface (from centerline to either road edge). A transverse-sloped road surface shall typically be used as needed in horizontal curves to maintain vehicle stability as the vehicle travels through the curve.

(b) *Grades*. Road grades shall be minimized to the extent possible and shall conform to industry standards and requirements of the turbine manufacturer for permissible maximum grades.

(c) *Drainage Structures*. Ditches, culverts, and low water crossings shall be used as necessary to effectively control and disperse surface runoff water to minimize erosion of the road. Water shall

not be diverted from existing channels except as necessary to construct stream crossings. Drainage shall be provided when roads cross or expose springs, seeps, or wet areas. Road drainage water shall not be discharged into headwalls, slide areas, or high-risk sites.

(d) *Surface*. The surface of the road shall be designed for its anticipated use. Roads shall have rocked surfacing that will provide subgrade reinforcement and resist the erosive effects of water.

2.19 DESIGN OF STREAM CROSSING STRUCTURES

Stream crossing structures shall protect aquatic and riparian habitats and provide fish passage, as well as preserve the stability and use of the road. As a minimum, all new stream crossing installations or replacements of existing crossings shall be sized to pass stream flow levels as predicted by the 24 hour duration, 25 year storm event, unless permit requirements are more stringent.

All permanent stream crossing structures shall be designed and approved by a Licensed Professional Engineer and in accordance with permit.

2.20 MAINTENANCE

The Contractor shall maintain all access and site roads, including associated drainage infrastructure and erosion control measures, in order to ensure suitable conditions for use until such time as all conditions have been met for BOP Final Completion.

The Contractor shall perform the BOP Work required to remedy repairs of any damage to the Project access and site roads occurring during the construction period, including that caused by precipitation. All modification and repair of public roads at the interface of public roads and the Project roads shall be performed in accordance with applicable permits.

The Contractor shall execute the BOP Work required for fugitive dust prevention or suppression in accordance with state and local requirements. The Contractor shall implement measures to minimize the transfer of soil and debris onto public roads from construction activity and clean the public roads of soil and debris as necessary in a timely manner. The Contractor shall provide dust control on roads used for construction during times when construction traffic results in excessive dust which may present a driving safety hazard or otherwise affect residences in the vicinity. Aside from the Contractor's discretion to implement dust control measures, this may also include dust control requests received from Land Owners where the dust is the result of construction traffic.

2.21 EROSION CONTROL

Contractor shall provide temporary and permanent erosion control in accordance with the Project SWPPP. Please note that unless the SWPPP Notice of Intent is transferred from the Contractor to Owner, the Contractor would continue to be responsible for final stabilization of the site. The storm water permit defines final stabilization as:

"all soil disturbing activities at the site have been completed, and that a uniform perennial vegetative cover with a density of 70% for the area has been established or equivalent stabilization measures have been employed or which has been returned to agricultural production." After finishing the roadway to its final design cross section, the Contractor shall prepare a seedbed, fertilize, seed and mulch the slopes, ditch bottom and other disturbed areas. Within a cultivated

field, Contractor shall spread topsoil to blend with surrounding field topography upon final construction completion. Seed shall be locally available and able to thrive in the climate. In the event the seeding occurs at a time (i.e. winter) where seed germination is unlikely, the Contractor shall agree to perform the work at a later date to increase the probability of successful seed germination. Irrigation or watering of the seed is excluded.

2.22 CROP DAMAGE AND TILE REPAIR

Crop damage must not unreasonably exceed that necessary to complete the BOP Work. The Contractor shall coordinate with the Land Agent to reimburse landowners for any additional damage to growing crops to the extent caused by the Contractor's or Subcontractor's operations.

The Contractor shall locate and flag drain tiles along access roads, crane walk paths, and collection system trenches before construction. Where possible, damage to drain tiles shall be avoided. The Contractor shall document, using GPS tools, any drainage tile damaged by the Contractor's or Subcontractor's operations, repair or restore any tile damage before completion of Project construction, and record drain tile locations on the As-Built drawings.

3.0 WTG Foundations

The Contractor shall be responsible for the design, detailing, material procurement, layout, erection, and construction of wind turbine generator (WTG) foundations and structures, as required for the installation and operation of the Project. The Contractor shall take due care to ensure that the WTG foundations are designed and installed with respect to each of the two specific WTGs being utilized in this Project.

The Contractor is responsible for providing Design Documents that meet the turbine supplier's specifications and the requirements described herein.

The Contractor shall design, procure, and construct concrete foundations in accordance with these specifications for all concrete work required for the installation and operation of the Project. Concrete work shall include, as required, slab-on-grade equipment pads, isolated structure support footings, O&M facility foundations and flatwork (if applicable), WTG foundations, deep concrete drilled pier foundations, mudmats, and other miscellaneous flatwork.

3.1 DESIGN BASIS

The design and construction of all WTG foundations and structures shall be in accordance with all federal, state, and municipal codes and regulations, as well the codes and standards listed below:

- International Building Code 2015 (IBC 2015).
- Building Code Requirements for Structural Concrete, American Concrete Institute (ACI 318-14).
- Manual of Steel Construction, American Institute of Steel Construction (AISC, 15th Edition).
- Minimum Design Loads for Buildings and Other Structures, American Society of Civil Engineers (ASCE 7-16).
- International Standard, Wind Turbines-Part 1: Design Requirements (IEC 61400-1, Edition 3.1, 2014-04).

The design operational lifetime of all WTG foundations, including fatigue, shall be forty (40) years. Loading information is provided in the referenced manufacturer specifications and shall be taken into consideration by the Contractor in developing the detailed foundation design(s).

3.2 EXCAVATION, SUBGRADE PREPARATION, BACKFILL, AND COMPACTION

3.2.1 General

The Contractor shall coordinate the excavation, subgrade preparation, backfill, compaction, and grading activities in accordance with the final geotechnical report. The requirements specified herein are based on preliminary geotechnical information and are meant to supplement the aforementioned documents. The soil work shall include all soil requirements specified in the transformer box pad installation instructions (box pad by others).

3.2.2 Execution

The Contractor shall confirm the location of turbine coordinates in the final geotechnical report. If turbine coordinates are offset by more than 50 feet, obtain written instructions from the Owner as

to the means of additional investigation to be undertaken. Obtain written confirmation from the geotechnical engineer that the specified investigation was completed.

Topsoil shall be removed from the plan area and stored in an Owner-designated area. The topsoil shall be used for site restoration on the landowner's property.

Excavate soils or rock using techniques that will minimize disturbance to the subgrade. The Contractor shall be responsible for control of surface water and/or groundwater flows into the excavation.

If granular soils are encountered across the entire footprint of the foundation, surface compact the top of the subgrade to consolidate loose soils created during excavation. Refer to the final geotechnical report for recommended subgrade preparation techniques.

If rocky conditions are encountered across the entire footprint of the foundation, substantially remove all loose rock greater than 3 inches in size from the bottom of the excavation. As practically as possible, remove material below 3 inches in size to expose undisturbed rock. If the bottom of the excavation is of variable elevation, establish a level bench by use of lean concrete fill. Lean concrete fill to be provided under transformer box pad footprint at elevation provided by box pad manufacturer.

Place lean concrete fill for protection of the subgrade and to establish a level working surface. The lean concrete surface should be placed as soon as possible after excavation is complete and must be level and of a uniform thickness. Prior to placing a protective lean concrete surface, have a professional geotechnical engineer inspect the subgrade conditions and record the soil type encountered, groundwater conditions, or other subsurface conditions. A copy of the geotechnical engineer's findings shall be provided to the Owner for review and approval.

Based on preliminary geotechnical information, ground improvement may be required for multiple WTG foundation sites due to the presence of non-competent subgrade materials or shallow groundwater levels. The Contractor should refer to the final geotechnical report for any applicable subgrade preparation requirements and recommended subgrade preparation techniques. The final WTG foundation support design(s) shall be based on the final geotechnical report.

If soil conditions are encountered that are not consistent with the final geotechnical report, or if subgrade uniformity or strength is insufficient, obtain written instructions from the Owner as to the means of correction to be undertaken. Obtain written confirmation from the geotechnical engineer that the specified corrective actions were completed.

Place and compact common fill materials to the limits, depth, and dry density indicated on the referenced drawings. In addition to the dry density requirement, backfill must be compacted to a minimum of 95% standard proctor. Place fill in maximum loose lifts of 12 inches or less to achieve the specified density. Backfill may be placed when the footing and pedestal have reached 2,000 psi.

Grade the site at 1/4 inch per foot to prevent water from ponding over the foundation, while maintaining at least the minimum depth of fill required for the structural stability of the WTG foundation. The WTG foundation design should clearly specify the required in-place unit weight for

any backfill to be used for the WTG foundations. The Contractor shall also install a turbine foundation apron, as specified in Section 2.0.

3.3 STRUCTURAL REQUIREMENTS

3.3.1 Anchor Bolts

All WTG anchor bolts shall be in accordance with the turbine supplier's specifications and the requirements herein.

The bolts shall be all-thread rebar fabricated from ASTM A615 (Grade 75) or ASTM A722 (Grade 150) material. The diameters of the bolts are determined by the turbine supplier and must be followed accordingly. All anchor bolts shall be supplied with heavy hex nuts and washers compatible with the bolts, as required by the design. WTG anchor bolts shall be provided with PVC sleeves conforming to ASTM D1784, Class 10000, and manufactured to ASTM D2241 requirements.

All WTG anchor bolts shall be installed by use of an anchor bolt template provided by the Contractor. Exposed portions of all bolts shall be provided with a corrosion inhibiting wax or grease compound. Bolt projections above top of concrete shall be set per the requirements of the tensioning device used to post-tension the anchors. The Contractor shall specify the required bolt projection length necessary for post-tensioning and take measures to ensure consistent bolt projections across all WTG foundations. Tolerances shall be strictly adhered to during construction.

WTG anchor bolts shall be tensioned using an Owner-approved tensioning procedure. A lock-off force shall be applied to each bolt to achieve a minimum tension force in each anchor, as determined by the detailed WTG foundation design. The lock-off force shall be selected by the Contractor, accounting for tension losses due to the tensioning procedure, to ensure that the specified tension test value is achieved. The tensioning equipment for the anchor bolts shall be calibrated in accordance with the approved procedure on a regular basis to ensure required tensions are achieved.

After all WTG anchor bolts have been tensioned, a minimum of 10% of the total bolts installed per WTG foundation shall be randomly tested to verify that the required tension load has been achieved by use of an approved tension testing procedure. If any of the anchor bolts do not meet the required tension test value, then all bolts of the tower must be re-tensioned and the tension test must be repeated until the required tension load can be verified.

3.3.2 WTG Foundation Concrete and Tower Base Grout

Cast-in-place concrete shall be in accordance with the latest applicable requirements of the federal, state, and municipal specifications, ACI, ASTM, and CRSI, except as modified by these specifications. All references to codes and standards are to the latest edition of each.

Concrete materials shall be in accordance with these requirements:

Table 3-1 Concrete Material Requirements

Cement	ASTM C150, Type I or II.
Fly Ash	ASTM C618, Class C or F.
Water	Clean, potable, and free from injurious amount of oil, acid, alkali, organic matter or other deleterious substances.
Coarse Aggregate	ASTM C33, crushed stone, washed gravel, or other acceptable inert granular material.
Fine Aggregate	ASTM C33, clean natural sand.
Air-Entraining Agent	ASTM C260.
Plasticizing Retarder	ASTM C494, Type B or D.
Plasticizer	ASTM C494, Type A.
Form Oil	Light colored paraffin oil or other acceptable non-staining material.
Membrane curing compound	MasterKure HD 100WB, produced by Master Builders, or approved equivalent.
Floor Sealer	MasterKure HD 300WB, produced by Master Builders, or approved equivalent.
Concrete Repair	MasterEmaco, produced by Master Builders, or approved equivalent.
Compound	MasterEmaco, produced by Master Builders, or approved equivalent.
Joint Sealant	MasterSeal, produced by Master Builders, or approved equivalent.
Non-Shrink, Epoxy Grout	*For WTG tower base grout*: MasterFlow 649, produced by Master Builders, or approved equivalent.
	For all other applications: MasterFlow 648, produced by Master Builders, or approved equivalent.
Pre-Formed Joint Filler	Sonoflex F, produced by Sonneborn, or approved equivalent.

Concrete mix designs shall be in accordance with the conditions of the site, the application purpose, and structural requirements.

Ready-mixed concrete manufacturing and delivery shall conform to ASTM C94.

Use air-entraining admixture in exterior-exposed concrete. Add air-entraining admixture at the manufacturer's prescribed rate to result in concrete at the point of placement having air content in accordance with ACI 318 for concrete exposed to freezing and thawing and shall have a tolerance of +/- 1.5% from the design value.

During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required. When the air temperature is between 85° F and 90° F, reduce the mixing and delivery time from 90 minutes to 75 minutes, and when the air temperature is above 90° F reduce the mixing and delivery time to 60 minutes.

The maximum aggregate size shall not exceed 1-1/2 inches. Smaller maximum aggregate size, such as 3/4 inch, may be necessary for pumped or tremie concrete. Rounded aggregates may be necessary to produce desired workability.

A nominal slump at the point of delivery shall be as follows:

Table 3-2 Concrete Slump Requirements

Reinforced Walls and Footings	6" max., 2" min.
Slabs-on-Grade	4" max., 2" min.
Drilled Piers (Dry, Uncased, or Permanent Casing Drill Method)	6" max., 4" min.
Drilled Piers (Temporary Casing Drill Method, Wet and Dry)	8" max., 6" min.
Drilled Piers (Slurry Displacement Drill Method)	9" max., 7" min.
WTG Foundations	6" max., 2" min.

The Contractor shall select a concrete mixture that meets the design requirements for each structure type and exposure classifications in accordance with ACI 318. The minimum concrete compressive strength at age 28 days shall be 4,000 psi for structural concrete and 2000 psi for non-structural concrete (e.g., lean work slabs, duct banks, and fill concrete). For WTG foundations, the minimum concrete compressive strength at age 28 days shall be 4,500 psi.

A delivery ticket shall be prepared for each load of ready-mixed concrete delivered and handed to the authorized representative of the Contractor by the truck operator at the time of delivery. Tickets shall show the number of cubic yards delivered, the quantities of each material in the batch, the outdoor temperature in the shade, the time at which the cement was added, and the numerical sequence of the delivery. Delivery tickets shall be handed to the authorized representative of the Owner on the agreed schedule.

Additional test specimens shall be taken as follows:

- As a minimum, a set of nine (9) grout cubes for each WTG foundation shall be cast.
- Exposed grout edges shall be tapered.

Table 3-3 Required Grout Test

WTG Tower Base Grout	
Compressive Strength	ASTM C109 Two tests (average of three cube breaks each) shall be conducted at an age of twenty-eight (28) days. An additional three cubes of each set shall be held in reserve at a safe location, on-site or at the laboratory, pending the results of the other tests.

The Contractor shall furnish the Owner certified reports of all tests made by the testing laboratory. The test results shall be prepared and sent to the Owner on the next business day after tests are conducted.

Reports of grout compressive strength tests shall contain the Project identification name and number, date of grout placement, location of grout placement, name of manufacturer, manufacturer's grout product data, manufacturer's approved instructions for grout placement, name of grout testing service, design compressive strength at 28 days, compressive breaking strength, and type of break for 28 day tests.

Additional Tests: Additional tests of in-place WTG tower base grout will be required when test results indicate that the specified strengths and other characteristics have not been attained in the structure, as directed by the Owner. Tests to determine the adequacy of the WTG tower base grout shall be by testing the reserve grout cubes, or by other methods as agreed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable grout is identified.

3.3.3 Steel Reinforcing

All reinforcing steel, including welded wire mesh, shall be accurately located and held in position by the use of proper reinforcing steel supports, spacers, and accessories in accordance with ACI Manual of Concrete Practice.

At time of placing concrete, all reinforcing shall be free of loose rust, scale, oil, paint, mud or other coatings which will destroy or reduce the concrete bond. All reinforcing bars must conform to ASTM A615 and have minimum yield strength of 60 ksi, unless noted otherwise.

The Contractor shall take into consideration any necessary corrosion protection for all reinforcing steel. Where not otherwise specified or shown by the written dimension, the minimum coverage of the concrete over the reinforcing steel shall be as follows:

- Concrete cast against, and permanently exposed to, earth: 3”
- Formed concrete exposed to earth or weather: 2”
- Concrete in beams and columns not exposed to ground or weather: 1-1/2”
- Concrete slabs and walls not exposed to weather: 1”

3.3.4 Miscellaneous Concrete Embedments

The Contractor shall coordinate the location and placement of all miscellaneous concrete embedments, as required for the operation and maintenance of the Project.

The referenced turbine supplier specifications detail the requirements for grounding grids, control conduit, and electrical conduit. The Contractor shall make accommodations for all conduit options, unless noted otherwise by the Owner. The Foundation Design Engineer shall coordinate with the Electrical Design Engineer on the placement of conduits for the LV cables. Conduit placement details shall be submitted to the Owner for approval.

The Contractor shall incorporate a drainage design that will allow for the drainage of water from the top of the pedestal inside the WTG tower. The drain shall empty outside of the pedestal above final grade. The floor drain shall be capped and the drainage outlet shall be equipped with a locking ball valve, or an Owner-approved alternative. Drainage design details shall be included in the WTG Foundation Design Documents and submitted to the Owner for approval.

All miscellaneous embedments shall adhere to the following requirements:

- Miscellaneous embedments will be located as not to interfere with the foundation’s structural reinforcing steel.

- Miscellaneous embedments will be properly secured to prevent movement during concrete placement.
- The top of any embedded conduit must be a minimum of 24 inches below the top of the foundation pedestal.
- Drainage outlets shall be placed in a location outside of the pedestal that does not interfere with other surrounding installations and can be easily accessed by maintenance personnel.
- Any concrete-embedded iron or steel shall be protected from corrosion utilizing the provisions of ACI 318 for clear cover, mix design and place and detailing requirements. Due consideration shall be given to exposure classifications, admixtures, alkali aggregate reactivity and any other deleterious conditions common to the project locations. Refer to the project specific geotechnical report and any applicable manufacturer's specifications for additional corrosion considerations.

3.3.5 Tower Erection and Anchor Tensioning Requirements

The Contractor shall coordinate the erection of WTG towers and tensioning of anchor bolts in manner that shall not affect the structural integrity of the WTG foundations or towers. Tower erection details shall be submitted to the Owner for approval.

- Up to two tower sections may be erected, leveled, and grouted when the concrete strength of the footing and pedestal has reached a minimum of 75% of the 28 day compressive strength and has sufficient strength to support the loads from the erected tower sections.
- Anchors may be tensioned when: (1) the concrete strength of the footing and pedestal have reached 100% of the design 28 day compressive strength, and (2) the grout strength has reached 75% of the design compressive strength and has sufficient strength to resist the loading.
- Additional tower sections, the nacelle, and blades may be erected when: (1) the concrete strength of the footing and pedestal has reached 100% of the design 28 day compressive strength, (2) the grout strength has reached 100% of the design compressive strength, and (3) anchor bolt tensioning and testing has been completed, verifying that the required tension value has been achieved.

3.3.6 Tolerances

WTG foundations, anchor bolts, and towers shall be set carefully and maintained at the lines and elevations within the following tolerances:

- Reinforcing plan spacing: plus or minus 2"
- Reinforcing vertical spacing: plus or minus 1"
- Footing clear concrete cover: minus 0" or plus 3"
- Pedestal clear concrete cover: minus 0" or plus 2"
- Footing plan dimensions: minus 0" or plus 3"
- Footing thickness: minus 0" or plus 3"
- Pedestal plan dimensions: minus 0" or plus 2"
- Pedestal height: minus 1" or plus 0"

- Pedestal centered: within 2” relative to footing
- Horizontal angular alignment (rotation) of anchor bolt group: ±1°
- Anchor bolt plan location: ±1/16”
- Anchor bolt deviation from vertical (out of plumb): ±0.25°
- Template/embedment ring plan dimensions: ±1/16”
- Embedment ring level: ±1/4"
- Embedment ring elevation: ±1/2”

3.4 TESTING AND INSPECTION

Testing shall be the responsibility of the Contractor.

The Contractor shall engage the services of a qualified third party testing/inspection agency to ensure the following construction quality control testing and inspection requirements are executed. All required testing/inspection reports and Submittals shall be issued to the Owner for review and record.

Test specimens shall be taken as follows, unless otherwise directed:

- As a minimum, a set of six (6) 6x12 or set of nine (9) 4x8 concrete compression test cylinders shall be made each day concrete is placed.
- One set for each 150 cubic yards of concrete, or fraction thereof, of each concrete class placed in any one day.
- Each set of concrete compression test cylinders shall be marked or tagged with the date and time of day the cylinders were made, the air content (for pedestals and above grade concrete), and the slump.
- Concrete test cylinders shall be made, cured, stored, and delivered to the laboratory in accordance with ASTM C31. No water may be added to the concrete after the samples have been taken.

Table 3-4 Required Tests

Concrete	
Slump	ASTM C143 One test on concrete taken at point of discharge into the forms for each 25 cubic yards of concrete, or fraction thereof, of each concrete class placed in any one day. Record ambient air temperature and concrete temperature per ASTM C1064.
Air Content	ASTM C231, pressure method One for each 25 cubic yards of concrete, or fraction thereof, for all air entrained concrete mix designs placed in any one day. Record ambient air temperature and concrete temperature per ASTM C1064.

Concrete	
Compressive Strength	ASTM C39 Two (2) 6x12 or three (3) 4x8 cylinders shall be tested at age seven (7) and twenty eight (28) days. An additional two (2) 6x12 or three (3) 4x8 cylinders shall be held in reserve at a safe location, on site or at the laboratory, pending the results of the other tests. Any additional testing required or requested by construction shall be in sets of two (2) for 6x12 and three (3) for 4x8 cylinders.

The Contractor shall furnish the Owner certified reports of all tests made by the testing laboratory. The test results shall be prepared and sent to the Owner on the next business day after tests are conducted.

Reports of concrete compressive strength tests shall contain the wind farm identification name and number, date of concrete placement, name of Contractor or Contractor's representative, name of concrete supplier and truck number, name of concrete testing service, location of concrete pour, design compressive strength at 28 days, compressive breaking strength, and type of break for both seven-day tests and 28-day tests.

Additional Tests: Additional tests of in-place concrete will be required when test results indicate that the specified strengths and other characteristics have not been attained in the structure, as directed by the Owner. Tests to determine the adequacy of the concrete shall be by testing the reserve cylinders and/or by cored cylinders complying with ASTM C42, or by other methods as agreed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is identified.

3.5 CONSTRUCTION CONSIDERATIONS

3.5.1 Placing of Concrete

Concrete shall be placed only in the presence of a duly authorized Contractor's representative. Concrete placement shall not be permitted when weather conditions or other pertinent factors prevent proper placement and consolidation.

Concrete shall be conveyed from mixer to forms as rapidly as practicable without segregation or loss of ingredients. Concrete shall be placed in forms neatly as practicable in final position to avoid re-handling. Concrete shall be discharged within 90 minutes or before 300 drum revolutions after the introduction of the mixing water to cement and aggregates, or the introduction of the cement to wet aggregates. During hot weather or other conditions which contribute to the rapid setting of concrete, discharge times shall be decreased in accordance with Section **Error! Reference source not found.**.

Chutes, if used, must slope sufficiently to insure flow of properly proportioned concrete and must be kept free of hardened or partially set concrete.

Concreting shall be carried in at such a rate that the concrete is at all times plastic and flows readily into the spaces between the bars. No concrete that has partially hardened or been contaminated by poor material shall be utilized for the wind farm, nor shall re-tempered concrete be used.

Immediately after depositing, concrete shall be compacted by agitating thoroughly in approved manner to force out air pockets. Mixture shall be worked into corners around reinforcement and inserts to prevent formation of voids. Tapping or other external vibration of forms will not be permitted. Care shall be used in use of vibrators to prevent segregation of sand pockets or bleeding. Vibrators shall be moved continuously in and out of concrete, keeping stationary only a few seconds in any position. Vibrators shall not be used to transport concrete within forms.

For concrete poured within forms, concrete shall not drop freely over 60 inches in unexposed work or over 36 inches in exposed work. Where greater drops are required, tremies, concrete pump, or other approved methods shall be used. The Contractor shall take care to avoid excessive concrete splatter.

Concrete may be dropped into drilled piers installed using the dry method under the conditions that concrete shall not hit any reinforcing bars or sidewalls and that concrete with all aggregates shall be able to flow freely into the spaces between the reinforcing bars. Vibration of concrete falling more than 20 feet is not required. The concrete shall be placed in the pier in one continuous operation unless agreed otherwise by the Owner.

For mass concrete structures, generally structures with a minimum cross-sectional dimension that approaches or exceeds 36 inches or when cement contents above 600 lb/cy is used, contractor shall provide a mass concrete procedure to mitigate the adverse effects heat produce by hydration. Procedure shall include concrete mix design, placement procedure and thermal control plan in accordance with ACI 301 and ACI 207.2R. Contractor shall insure concrete cools gradually during and at the conclusion of the specified cure period. The maximum drop in concrete surface temperature during the curing period shall not exceed 20° F in a 24 hour period with a thermal gradient between the center and surface no exceeding 35° F. The temperature of concrete when deposited shall be a maximum of 70° F and minimum of 35° F unless an alternative placement plan is approved. Cast-in-place concrete at the Contractor's option may be placed by pumping in accordance with ACI 304; however, it shall use a specifically designed mix for pumping concrete because fine aggregate gradation and water and cement content are more critical and different from the regular concrete mix. Slump may be increased by one inch for individual batches at point of discharge. Do not convey through aluminum or aluminum alloy pipes. The loss of slump in pumping equipment shall not exceed two inches. The mortar used for lubricating the pumping equipment shall be discarded. Slump and air tests shall be taken at point of discharge from the line. Concrete cylinders shall be taken at the point of discharge from the line.

If required, any concrete-embedded iron or steel should be protected from corrosion (e.g., through the use of cathodic protection or a polyethylene wrap). The Contractor shall refer to the geotechnical report and any applicable manufacturer’s specifications for additional corrosion considerations.

3.5.2 Joints

At construction joints, a good bond and watertight joint are required. These shall be obtained by adequately preparing and protecting the surface of the first pour or lower part of the construction joint. This surface should be fairly level and reasonably rough, clean, moist, and some aggregate

particles should be exposed. Any laitance or soft layers shall be removed from the top surface of the hardened concrete.

3.5.3 Cold Weather Requirements

If cold weather is anticipated during the construction of the Project, then the following requirements shall be followed. After the first frost and until the mean daily temperature in the vicinity of the work falls below 40°F for more than one day, the concrete shall be protected against freezing for not less than 48 hours after it is placed. Whenever the mean daily temperature in the vicinity of the work falls below 40°F for more than one day, the concrete shall be maintained at a temperature not lower than 50°F for a least 72 hours after it is placed and shall be protected against freezing for 5 days immediately following the 72 hours of protection at 50°F. This continuance of protection against freezing shall be such that the drop in temperature of any portion of the concrete will be gradual and will not exceed 40°F in 24 hours. When artificial heat is employed, special care shall be taken to prevent the concrete from drying. The use of calcium chloride will not be permitted. A non-corrosive, non-chloride set accelerating admixture may be used when approved by the Owner. Concrete damaged by freezing shall be removed and replaced at the Contractor's expense.

The Contractor shall be cognizant of any cold weather considerations necessary to ensure the proper construction and integrity of any installed concrete work. Ground frost concerns may require subgrade improvements or other site preparations.

3.5.4 Hot Weather Requirements

When hot weather conditions exist that would seriously impair the quality and strength of concrete, place concrete in compliance with ACI 305.1 and as specified herein. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90° F. Mixing water may be chilled, or chopped ice may be used to control the concrete temperature, provided the water equivalent of the ice is calculated to the total amount of mixing water. Cover reinforcing steel with water-soaked-burlap if it becomes too hot, so that the steel temperature will not exceed the ambient air temperature immediately before embedment in concrete. Do not use retarding admixtures unless otherwise accepted in mix designs.

3.5.5 Finishing

All fins and other surface projections shall be removed from all formed surfaces. All surfaces are to be at the specified elevation and left true and level. Surfaces that will be exposed shall be cleaned and rubbed to produce a smooth, uniform surface free of marks, voids, surface glaze, and discolorations. Exposed surfaces shall have a smooth broom finish.

Care shall be taken to see that all excess water is removed before making any finish. The unformed surfaces of concrete shall be screeded and given an initial float finish followed by additional floating and troweling as required. Precaution shall be taken by the Contractor to protect the finished surface from stains and abrasions.

The removable ends of all form ties shall be removed and the recesses resulting from such removal shall be filled with dry patching mortar.

An Owner-approved sealant shall be applied to the outside of all foundations to a depth of 1'-0" below final ground grade.

3.5.6 Cleanup

During the concrete finish and cleanup, the Contractor shall remove concrete adhering to the portions of the anchor bolt extending above finished concrete grade, giving particular attention to concrete at the finish grade line which would prevent base plates from seating fully on the finished concrete elevation.

3.5.7 Curing

Concrete shall be protected from loss of moisture per ACI requirements for membranes. Curing compound may be used in lieu of membrane. The curing medium shall be maintained so as to prevent detrimental loss of water from the concrete for the duration of the entire curing period. Concrete shall not be permitted to freeze for at least seven (7) consecutive days following placement. Unhardened concrete shall be protected from heavy rains, flowing water, excessive heat, or mechanical damage.

3.5.8 Repairing Defective Concrete

Defects in formed concrete surfaces shall be repaired to the satisfaction of the Owner within 24 hours, and defective concrete shall be replaced within 48 hours after the adjacent forms have been removed. All concrete which is porous, honeycombed, and otherwise defective to a depth in excess of 1 inch shall be cut out and removed. Defective concrete shall be repaired by cutting out the unsatisfactory Material and placing new concrete, which shall be formed with keys, dovetails, or anchors to attach it securely in place. The Contractor shall take necessary precaution to protect finished surfaces from stains, abrasions, or physical damage.

Concrete slab surfaces that contain defects which adversely affect durability, strength, or appearance, shall be repaired by a method approved by the Owner or they shall be replaced.

4.0 Collection System

4.1 DOCUMENT OVERVIEW

This specification is for the complete engineering, procurement, installation, testing, and placing into service of a medium voltage (MV) underground collection system, fiber-optic communication system, and other work specified to be completed in accordance with Prudent Wind Industry Practices.

4.2 STANDARDS

Contractor shall follow the current adopted versions of applicable standards, including but not limited to, the following:

- National Electrical Code (NEC)
- ANSI/IEEE C2 - National Electrical Safety Code
- ANSI/IEEE C57.12.00 - General Requirements for Liquid Immersed Distribution, Power, and Regulatory Transformers
- C57.12.70, Terminal Markings and Connections for Distribution and Power Transformers
- ANSI/IEEE 386, Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600 V.
- ANSI/IEEE C57.12.80, Terminology for Distribution and Power Transformers.
- ANSI/IEEE C57.12.90, Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers
- ANSI C57.12.28 - Pad-Mounted Enclosure Integrity
- National Electrical Manufacturers Association (NEMA)
- ANSI C.57.12.10
- ANSI C.57.12.26
- IEEE PC57.106
- ASTM D3487
- ASTM D4059E1
- NEMA TR1
- ANSI Z535.1
- ANSI Z535.2
- ANSI Z535.3
- UL No. 44
- UL No. 1685
- NEMA/ICEA WC-8/ICEA S-68-516
- NEMA/ICEA WC-70/ICEAs-95-658-1999

- ASTM B-33
- ASTM B-172
- ICEA/NEMA WC26
- ICEA S-87-640
- ICEA S-94-649
- UL 1072
- AEIC CS8
- ICEA S-87-640
- TIA/EIA 598B

Note: Where conflicts exist between AEIC CS8 and ICEA S-94-649, the AEIC CS8 requirement will govern. If any other standards or this specification conflict with one another, the most stringent shall apply.

4.3 SYSTEM DESCRIPTION AND GENERAL REQUIREMENTS

4.3.1 General

All collection system components shall be designed to operate at 34.5kV +/- 10% and 38 kV maximum.

Each of the wind turbine generators (WTGs) shall have an appropriately sized and grounded transformer procured by the Contractor with feed-through connection capability located at each turbine.

4.3.2 Standards

The Project shall be designed, manufactured, installed, and tested in accordance with this section and the applicable sections of the latest revision of the accepted standards for electric utility equipment and construction referenced in Section 1.0.

4.3.3 Losses

The total annualized energy losses from the low voltage terminations at the base of all turbines to the revenue meter shall be less than 2.5% based on WTG production frequency.

4.3.4 BIL (Basic Insulation Level)

- System voltage: 34.5 kV
- BIL: 200 kV

4.3.5 Electrical Clearances

Preferred normal and minimal electrical clearances from energized parts shall be in accordance with the latest editions of ANSI C2, IEEE Std. 1119, NESC, and NEC Article 110.34.

4.3.6 Collector System As-Built Location

Contractor shall locate constructed buried power lines, junction boxes, transformers, and all major equipment for the creation of easements and as-built drawings. Lines will be located at approximately 300 linear feet (LF) intervals and deflection points and provided in UTM 15N coordinates in electronic format to a positional accuracy of 1 meter or better, suitable for importing to Microstation and AutoCAD.

4.3.7 Grounding

The collection grounding system consists of the following: WTG grounding, pad mount step-up transformer grounding, junction and splice box grounding, and MET tower (meteorological tower) grounding. These grounding systems are to be designed and installed by the Contractor. The copper concentric neutral on each conductor and the trench ground wire will interconnect these ground systems.

4.3.7.1 WTG Grounding Requirements

All WTG grounding and testing shall be in accordance with the requirements of the turbine manufacturer or IEEE Standard 80, whichever is more stringent. Contractor shall perform a step and touch analysis.

The Contractor shall use the four point fall of potential method per IEEE STD 81 for measuring and testing the ground resistance at the WTGs.

The grounding point shall be connected to any bare copper grounding conductor (e.g., copper ground inside the tower) as the system reference point (E). The minimum distance from E to the current electrode (CE) should be 5-6.5 times the diagonal distance of the grounding system being measured. Resistance measurements shall be taken with the potential electrode (PE) at 1%, 10%, 20%, 30%, 40%, 50%, 60%, 61.8%, 70%, 80%, 90%, and 99% of the diagonal distance. The Contractor shall compare the reading at point (E) to the theoretical value from the step and touch analysis. The test shall be performed with all phase and ground connections lifted so that the equipment being tested is isolated from the rest of the grounding system. Testing direction shall be perpendicular to any parallel conductive path (trench, conduit, fence, overhead or below-grade lines, etc.) A sketch of the testing route shall be provided for each test. Contractor shall ensure that this testing is done in accordance with turbine supplier's requirements, as well as the Engineer of Record's requirements from the step and touch analysis.

4.3.7.2 Grounding Transformer Requirements

Each feeder shall have at least one grounding transformer to ensure that the feeders are effectively grounded. The grounding transformers must provide effective grounding as defined by IEEE C62.92.1 at all points on the collector system. The use of a particular grounding transformer shall be validated in accordance with the analyses and studies.

4.3.8 Testing

The Contractor shall complete the test forms supplied or created for each test and submit them in the "job completion manual" to the Owner. A detailed testing procedure with forms will be supplied by the Contractor. Specific testing to be completed is detailed throughout this document.

4.3.9 Spare Parts

In general, Contractor shall not leave reels of cable MV in excess of the MV cable required as spare parts.

4.4 MV CABLE SPECIFICATION

4.4.1 General

This section describes the requirements, installation, grounding, testing, labeling, and numbering of the MV underground cables. The Contractor shall specify and procure MV cable and quantities. Contractor shall inspect all parts upon receipt to ensure they meet the bill of material, drawings, and equipment specifications. Contractor shall provide receipt inspection checklists and store equipment with all accessories in a safe location.

4.4.2 Equipment Requirements

MV cable shall be jacketed, single-conductor aluminum, concentric-neutral wire, MV underground distribution MV-90 or MV-105 power cable insulated with tree-retardant cross-linked polyethylene (TRXLPE), and rated at 35 kV. This cable shall be of a discharge free design and suitable for direct burial, installation in duct and exposure to sunlight on an alternating current, three-phase, nominal, 60-Hertz power system. Flat strap neutrals are not allowed.

All cable shall meet the requirements of the latest revision of the following documents unless stated otherwise in this document: (a). Association of Edison Illuminating Companies (AEIC) No. CS8, Specification for Extruded Dielectric, Shielded Power Cables Rated 5 through 46 kV, (b). Insulated Cable Engineers Association (ICEA) No. S-94-649, Standard for Concentric Neutral Cables Rated 5,000-46,000 Volts, and (c). Insulated Cable Engineers Association (ICEA)/National Electrical Manufacturers Association (NEMA) No. WC26, Wire and Cable Packaging.

Note: Where conflicts exist between AEIC CS8 and ICEA S-94-649, AEIC CS8 requirements shall govern.

The conductor shield, insulation, and insulation shield shall be applied in a true triple-extrusion (through a common head), continuous single-pass process. Then all three layers shall be simultaneously cross-linked. A dry-cure process shall be used. A water-swellable powder shall be placed between the insulation shield and the jacket to block the progression of moisture.

The allowable conductors are 1/0 AWG, 4/0 AWG, 500 kcmil, 1000 kcmil, and 1250 kcmil. All conductors shall be Class B stranded. The trench ground shall be minimum 2/0 copper or equivalently-sized copper-clad steel. Fiber-optic cable shall be installed in innerduct and in accordance with this section. Owner may approve alternate cable choices not specified above.

Owner preference for concentric shield wire sizes is as follows:

- 1/6 concentric for 1250 kcmil and1000 kcmil, 1/3 concentric for 500 kcmil, 1/2 concentric for 4/0 AWG, and a full concentric for 1/0 AWG.
- Larger neutral sizes may be used if deemed necessary by the Engineer of Record, with Owner approval.

Contractor shall verify that the above concentric sizes are appropriate. The concentric shield conductors shall be sized to withstand the worst-case fault condition for that particular cable segment. Multipoint grounding may be used if deemed necessary by the Engineer of Record.

Power cables shall not be longer than 8,200 feet before entering an above-ground junction box to allow for partial discharge testing.

All underground collection cables shall have appropriate ampacities based on the measured backfill and surrounding native soil rho values while maintaining conductor temperatures at or below the rated temperature of the cable. An ampacity model shall be provided by Contractor showing that the cable temperature will remain below the rated temperature at maximum output.

The central stranded conductor shall be 1% to 3% compressed concentric-lay, Class B stranded and three-quarter hard drawn (H16 or H26) 1350 aluminum. All spaces between conductor strands shall be filled with a sealant to block the progression of moisture. The compound used shall be compatible with the conductor and conductor shield.

The conductor shield shall be black, super smooth, and extra clean.

The insulation thickness for TRXLPE shall be 345 mils (as defined by the 100% insulation level). Diameters shall be as defined by AEIC CS8.

The insulation shield shall be semi-conducting, thermosetting material and shall strip freely and cleanly within the tension limits of 6 pounds minimum to 20 pounds maximum. Diameters shall be as defined by AEIC CS8.

The concentric neutral conductor shall consist of solid round bare copper wires, helically-applied and equally-spaced over and in contact with the insulation shield.

The jacket shall be black, extruded, insulating, linear low density polyethylene or cross-linked polyethylene (LLDPE or XLPE). The jacket shall encapsulate (fill the spaces between) the concentric neutral wires or flat straps and be in contact with, yet strip freely from the insulation shield.

Environmental Requirements:

Jacket will comply with EPA 40CFR, Part 261 for a leachable lead content of less that 5mg/L using the Toxicity Characteristic Leaching Procedure (TCLP).

The jacket shall contain three (3) longitudinally extruded red stripes, approximately 1/4 inch wide, and equally-spaced around the circumference of the cable in accordance with ICEA S-94-649.

The cable will be sequentially marked throughout its length in two foot increments on the outer surface of the cable jacket. Jacket printing will be in accordance with the minimum identification requirements of ICEA-S-94-649.

Each reel shall consist of one continuous run of cable (no splices allowed).

MV cables shall be suitable for direct burial at the depth specified in Subsection 4.5.11, or deeper.

Packaging:

Each reel shall be covered with Class 2 material to detect damage to the cable during transit, storage and handling.

Each cable end shall be suitably sealed to prevent entrance of moisture and contaminants. Ends of cable shall be secured such that they remain inside the reel flange to prevent damage. Inside ends of cable shall be secured such that they do not back out while winding/unwinding cable onto/from the reel.

The reels will be shipped upright on the flanges and securely blocked in position so they will not shift during transit. Reels will be lifted only with a suitable center shaft and sling with a spreader bar to prevent damage to the reels and cable

Reels shall be marked to show beginning and ending sequential footage, in addition to the requirements of AEIC CS8.

A durable label will be securely attached to each reel of cable. The label will indicate:

- The Purchaser's name and address.
- Purchase order number.
- Cable description.
- Reel number.
- Feet of cable on reel.
- Tare and gross weight of the reel.
- Beginning and ending sequential footage numbers.
- Documentation of UL cable approval.

4.5 INSTALLATION

The Contractor shall perform all installation work of the MV cables in accordance with Prudent Wind Industry Practices.

4.5.1 General Installation Requirements

The Contractor shall optimize cable usage to minimize cable waste and the number of cable splice boxes. If at all possible, splice boxes shall be located adjacent to roads or road rights-of-way.

All cable shall be installed direct burial in a prepared trench. The ground wire shall be installed throughout and parallel with the power cable in compliance with the turbine manufacturer specifications. The fiber-optic cable in innerduct shall also be installed in the same trench as the MV power cables where possible. Contractor shall install fiber-optic cable in accordance with Subsection 4.5.11. The configuration of the cables, ground wire and fiber-optic conduit shall be submitted to Owner for review and approval.

All construction shall be done in accordance with the collection system location and routing plans, specification, construction drawings and details, and applicable industry standards.

4.5.2 Cable Routing and Terminal Points

The Contractor shall determine, and the Owner shall approve, the exact cable routing. The collection system design shall be optimized by the Contractor. When practical, the cable trench shall be at a depth to accommodate the agricultural land use to the maximum extent practicable. The cable trench shall be routed between terminating equipment and alongside WTG strings; the preferred route is opposite WTG tower doors. As much as reasonably possible, cables shall be run next to access roads to avoid damaging extra drain tiles. The routing of cables shall be in compliance with county and local township ordinances. Cable shall not be routed through compacted fill areas or crane pads located around WTG towers except to terminate at an individual WTG pad mount step-up transformer. The Contractor shall repair any ground wires, communication circuits or other utilities damaged by the Contractor during trenching or other excavation.

No more than one cable shall be installed in a road right-of-way ditch at one time (i.e., installing parallel cables in one ditch is not allowed). Contractor shall coordinate with the county engineer to ensure that roadside ditches are cleaned out prior to installing cables.

Any cables installed under a slope shall maintain a minimum distance of 4 feet to air in all directions.

Paralleled feeder cables shall be separated by a minimum of 10-feet to avoid reduction in cable current rating due to thermal conduction of the soil.

The Contractor shall terminate the cables at the dead front MV 2-way, 3-way, and 4-way junction boxes, pad mount step-up transformers, and Project Collector Substation as indicated on the drawings. All junction boxes and pad mounted transformers shall be furnished with a 3-phase set of load-break reducing tap plugs to permit easy installation of grounding elbows for maintenance activities. MV cable terminated at the pad mount step-up transformers shall be supported to reduce stress on the transformer bushings. The Contractor shall leave sufficient cable slack to allow installation of elbows and termination of the cable to the appropriate junction box and/or step-up transformer terminal and permit ready disconnection of the elbows and mounting on the parking stands. Where feasible, a minimum of 18 inch excess slack shall be provided to allow re-termination in the event of failure. Cables shall be routed through appropriately sized PVC (polyvinyl chloride) chase nipples or conduit, at a depth of approximately 36-inches below grade. The excess slack at the WTG pad mount step-up transformers shall be in the form of a maintenance loop as indicated on the drawings.

The Contractor shall route the trench ground cables into each junction box and pad mount step-up transformer. Ground cables shall be routed through the PVC conduits or bushings that are used for the MV cables. Cables shall be terminated with 2-hole compression lugs and connected to the ground bus supplied with the junction boxes and pad mount step-up transformers. If no ground bus is supplied by the junction box manufacturer, the Contractor shall supply a ground bus capable of terminating all trench grounds, shield grounds, and pigtails to the grounding grid or ring. Grounding connections at junction boxes and pad mount step-up transformers shall be bolted to facilitate separation of grounds for continuity testing and ground mat testing.

The concentric cable shields of the medium voltage power conductors shall be grounded at the pad mount transformers, junction boxes, and splice points. Concentric neutrals shall be grounded additionally as found necessary by the Engineer of Record. The concentric shields are to be grounded by bonding them to the trench grounding conductor and/or to a grounding rod installed at each location.

The Contractor shall furnish and install stress cone terminations on the MV cable at each of the substation termination structures. Terminations shall be 3M Model 7666-S-8-19-AL-3P-BT or approved equivalent.

4.5.3 Handling of Cable

Cable shall be handled carefully at all times to avoid damage and shall not be dragged across the ground, fences, or sharp projections. Care shall be exercised to avoid excessive bending of the cable. The ends of the cable shall be sealed at all times against moisture with suitable end caps. Where it is necessary to cut the cable, the ends shall be terminated or re-sealed immediately after the cutting operation. Minimum bending radius of primary cable is 12 times the overall diameter of the cable measured from the inside of the bend. Also, the inside of conduits shall be adequately cleaned prior to pulling cables. Cable damaged by Contractor mishandling shall be replaced by the Contractor at Contractor's expense.

4.5.4 Trenching

4.5.4.1 General

The Contractor shall perform all trenching required to install the power, communication, and grounding cables as indicated on the drawings. Details concerning depth, backfill and arrangements shall be indicated on the construction drawings and/or as specified in these technical specifications. It is assumed that as the Project progresses, the Contractor may need to alter the cable routing to avoid obstructions, rock beds or other unforeseen obstacles. The Contractor shall repair any drain tiles that are damaged during trenching or other. Contractor shall prepare as-built drawings for construction record.

Any deviations from the construction trench drawings described below (and in general) need to be approved by the Owner and validated with additional ampacity.

The minimum allowable burial depth for MV cables shall be the minimum depth specified in Subsection 4.5.11or below frost depth, whichever is greater.

4.5.4.2 Crossings

In many cases, the cables will cross roads, wetlands, pipelines, buried utilities, easements, and other feeder cables. All crossings shall be specified on the construction-approved cable layout drawings. However, if additional restricted crossings are encountered, the Contractor shall secure any permits required for the crossing. For crossings involving horizontal directional bores, only one set of feeder cables shall be allowed per bore tube.

4.5.4.3 Difficult Digging

If rock or other difficult digging is involved, the Contractor shall determine nature and extent of the difficulty, and the Contractor will determine whether rerouting, rock trenching, or other changes

are necessary. Loose soil or crumbling rock will not be considered as "difficult digging." The trench widths as specified on design drawings may be increased if necessary to obtain required depths in loose soils.

4.5.4.4 Trench Width and Depth

All excavations shall be measured from the final official grades and/or benchmarks. Minimum excavation depths and widths shall be specified in the construction drawings and/or as specified in these technical specifications. Excavation shall be made to provide the ultimate minimum cover specified in the trench detail drawings. Trench bottoms shall be level, flat and without surface irregularities, and shall be clear of rock and debris.

4.5.4.5 Cable Installation in Trench

The MV power cable, grounding cable, and fiber-optic cable shall be placed in the trench as soon after trenching as feasible. Wherever possible the power cable, grounding cable, and fiber-optic cable shall be played out from a reel mounted on a moving vehicle or trailer. The reels shall be supported so that they can turn easily without undue strain on the cables. The power cable, grounding cable, and fiber-optic cable placement shall be performed under constant supervision to be certain that no damage to the cables occurs.

4.5.4.6 Cable Visual Inspection

The power cable and fiber-optic cable shall be inspected carefully as it is removed from the reel in the laying operation to be certain that it is free from visible defects. The Owner shall decide upon corrective action when defects are discovered.

4.5.4.7 Power Cable Configuration

The MV power cable shall be laid in a trefoil configuration. Contractor shall prove or validate that their trenching method provides consistent placement without the use of cable ties or a spiral binder. Where Contractor is unable to do so, the cables shall be secured with cable ties, or be bound with a spiral binder as necessary to maintain trefoil configuration. The Contractor shall obtain approval by the Owner if a binding installation method other than cable ties is utilized.

If cable ties are used, proper tie-wrap tools shall be used to prevent over-tightening of the cable tie.

4.5.4.8 Erosion Control

In the case of trenching on slopes, erosion control measures shall be implemented.

4.5.4.9 Blasting

Blasting is not allowed under any circumstances.

4.5.5 County, Private Road, and County Drain Crossings (Where Applicable)

All county and private road crossings shall be completed in conformance with the regulations set forth by the local agency having jurisdiction. All road crossings are subject to permit requirements. The horizontal directional boring (HDB) minimum depth will extend for the full length of the bore within road right-of-way and/or easement.

4.5.5.1 Paved Road Power Cable Crossings

Where MV collection feeders cross under paved roads, these cables shall be installed in conduit installed by HDB under the roadway. A ground wire shall be installed with each feeder and routed through a separate conduit if required. Contractor shall verify all horizontal directional bore depths prior to installation. OSHA-approved warning tape shall be installed as detailed in Subsection 4.5.11. The Contractor shall obtain all necessary permits before commencing work.

The Contractor shall prepare drawings or sketched details of the cable crossing as part of the permit application. The Contractor shall be responsible for applying and securing any and all permits and permit payments and/or application fees.

Contractor shall obtain Owner approval for boring plan before the work for the bore commences.

4.5.5.2 Other Road Crossings (Where Applicable)

Cable and conduit may cross under other paved, gravel, or dirt roads in other locations. Contractor shall verify all granular road crossing depths prior to installation. OSHA-approved warning tape shall be installed as detailed in Subsection 4.5.11**.** Disturbed portions of the roadway shall be restored to original condition. The backfill shall be made in 6 inch lifts mechanically tamped and packed, and the last 12 inches of the backfill shall be of stable 3/4 inch minus crushed rock or gravel, or as required by the applicable permits. Care shall be taken not to damage cable during compaction of gravel. The Contractor shall obtain any and all permits, for each county road crossing, before commencing work. The Contractor shall prepare drawings or sketched details of the cable crossing as part of permit application. The Contractor shall be responsible for all permit payments and/or application fees.

4.5.6 Streams and Wetland Crossings

If the Contractor must cross or impact intermittent or permanent streams or other wetland features, the Contractor shall follow all procedures or restrictions made by federal, state, county, and township agencies that regulate streams and wetlands. Most crossings will require HDB. The Contractor shall verify with the Owner which wetland/stream crossings are allowed to be trenched or require HDB.

Restrictions may apply based on local ordinances.

4.5.6.1 Work Window

If intermittent streams are flowing at the time the Project commences, work in and around intermittent streams may be restricted until surface waters are no longer flowing.

4.5.6.2 Erosion Control

In the case of stream and wetland crossings, erosion control measures shall be implemented in accordance with Section 2.0.

4.5.6.3 Restoration

Where trenches cross intermittent streams, the topsoil from the trench shall be temporarily stockpiled on-site. After cables are installed in the trench, the trench shall be filled to pre-

construction conditions with the stockpiled top soil and reseeded with native grasses if the crossing is not tilled for farming.

4.5.6.4 Horizontal Directional Boring

In most cases, restriction by federal, state, and/or county agencies may require that the cables be installed by HDB to prevent disturbing permanent streams. The Contractor shall follow all restrictions for crossing or drilling under any permanent streams.

The specific areas utilizing HDB shall be determined by the local authority. The minimum boundaries for HDB shall be the crossing right of way or otherwise defined by jurisdictional agencies.

4.5.7 Easement Crossings (Where Applicable)

The collection system cables and conduits may cross existing power, communication, and gas line easements. All existing lines shall be located and exposed by hand. The Contractor shall contact the owners of existing utilities and obtain approval and any required permits. The Contractor shall take care in making cable crossings to avoid damage to underground utilities.

When crossing any heat-producing utilities, Contractor shall obtain Owner approval for crossing plan.

4.5.8 Fenced and Irrigation Pipeline Crossings (Where Applicable)

The Contractor shall take reasonable care in locating and identifying crossed facilities such as fences, drain tiles, domestic water lines, and irrigation pipeline. The Contractor shall notify landowner, take reasonable care in crossing landowner's or occupant's facilities, and shall be responsible for damages and repairs to all facilities. The Contractor shall return crossed surfaces to "as found" conditions.

4.5.9 Archeological and Sensitive Animal Species Sites

The Contractor shall avoid all cultural resources, sensitive or protected species habitat to be preserved, and buffer or setback areas to be preserved. When construction activities approach these avoidance areas, setback and buffer boundaries shall be located and clearly marked. The Contractor shall be responsible for ensuring that the areas within the marked boundaries are not disturbed by any of the construction activities.

4.5.10 Feeder Cable Crossings

Feeder cable crossings are not allowed unless approved by Owner. Any feeder cable crossings shall be identified by GPS (Global Positioning System) coordinates on the as-built drawings and by marking tape and crossing locator balls.

4.5.11 Backfill with Select Native Material

4.5.11.1 General

The bedding and padding backfill material for the trench shall be excavated free of rocks (no rocks larger than what would pass through a Number 4 screen) and free of wood, roots, vegetable matter, or other deleterious material. Four to six inches of bedding material shall be placed into the trench

before the MV power cables are placed in the trench. The cable, trench ground, and fiber innerduct, when laid on the bedding material, shall be at least 48 inches below the finished grade to top of cable.

Twelve to 18 inches of padding shall cover the cables and be compacted in lifts with maximum uncompacted thickness of 8 inches unless otherwise approved by the Owner. An OSHA-approved warning tape (Red tracer warning tape marked "DANGER – BURIED HIGH VOLTAGE CABLE") shall be laid on the compacted level at least 24 inches below finished grade. The remaining 24 inches of the trench shall then be backfilled over the warning tape. Final backfill material shall be compacted to eliminate voids with additional backfill added to allow for settling. Topsoil shall be managed in accordance with landowner agreements.

All backfill material shall be compacted to no less than 85 percent of maximum dry density per ASTM D698 or as required by design. Compaction shall be by proven methodology and shall be approved by the Owner. Test reports of backfill from previous wind projects using the same methodology to be used in this Project may be submitted to prove methodology. Field testing of trenches shall be conducted using Owner-approved test equipment to prove methodology. Test reports of trench compaction shall be submitted to the Owner and filed in the job books. Testing of trench compaction shall be performed on each lift at a minimum frequency of 1 test per 500 feet of trench unless otherwise approved by the Owner.

Any nonpaved road crossings shall be compacted in accordance with Section 2.0.

4.5.11.2 Soil Thermal Resistivity Analysis

Soil Thermal Resistivity Analysis shall be performed as a part of the Geotechnical Investigation.

4.5.12 Cable and Trench Markers

Utility markers shall be placed as a minimum on each side of roadway pipeline, telephone, and communication easement crossings. For continuous trench in an easement greater than 1,000 feet, a marker shall be placed every 1,000 feet. Markers shall be installed as shown on construction detail drawings.

4.5.13 Conduits

MV cables shall be installed in conduit at transformers and junction boxes and pulled in accordance with cable supplier's recommended pulling and installation practices. All exposed ends of conduits shall be plugged during construction until cables are installed, sharp projections that might damage cable shall be removed, and the conduit shall be extended beyond the finished base by 6 inches. The conduits shall be sealed to prevent rodent entry. Contractor shall also clean and router the end of conduits and install bell ends.

4.6 GROUNDING

4.6.1 Trenches

An appropriate grounding conductor procured by Contractor shall be installed in all trenches that contain MV power cables. The cable size shall be a minimum of 2/0 AWG bare copper or equivalently sized copper-clad steel. However, Contractor is responsible for sizing the ground wire

based on ampacity, grounding studies, applicable codes and standards, and mechanical strength considerations. The Contractor shall consider the mechanical strength of the grounding conductor throughout the life to the project to ensure protection against handling during installation, minor digging operations, and corrosion.

4.6.2 Junction Boxes

For the MV power cables terminating in 4-way, 3-way, or 2-way junction and splice boxes, all trench ground cables shall be brought into the junction and splice boxes through the MV cable conduits. Each trench ground shall be terminated with a compression type, 2-hole lug and connected to a common ground bus. Each trench ground cable shall be labelled with the corresponding power cable number to facilitate identification, disconnection, and testing if required. If a ground bus is not supplied with the junction box by the material supplier, the Contractor shall supply a ground bus large enough to accommodate terminating all trench ground cables, grounding ring cable and cable shields.

4.6.3 Pad Mount Step-Up Transformers

For the MV power cables terminating at the turbine pad mount step-up transformers, all trench ground cables shall be brought up into the high voltage terminal compartment through the MV cable conduits, terminated with a compression type 2-hole lug, and connected to the transformer tank ground pad. Each trench ground cable shall be labelled with the corresponding power cable number to facilitate identification, disconnection, and testing if required.

MV cables shall maintain minimum depth requirements until they enter the transformer and cable box pad described in Section 3.0.

4.6.4 Substation Riser

The neutral at the ends of the MV cables at the substations shall be bonded to ground.

4.7 TESTING

4.7.1 Factory Testing

Factory testing shall be completed in accordance with ICEA S-94-649 and shall include the “partial discharge test.” A qualification test report shall also be required in accordance with ICEA S-94-649.

Certified test data for all required tests shall be kept on file for a minimum of 5 years and shall be submitted to the Owner upon request. Each reel shipped shall be traceable to certified test data. A certificate of compliance shall be supplied to the Owner for all cables upon request. The certificate of compliance shall show that the cable has passed all required tests and include the following information:

- Manufacturer name.
- Complete description of cable.
- Reel numbers for each lot of cable.
- Length of cable on each reel.
- Copy of packing list.

- Purchase order number.
- Specification number and date.
- Documentation of UL compliance.

Process control charts on the thicknesses of the conductor shield, insulation, insulation shield, and jacket from throughout the cable extrusion run shall be included with the certificate of compliance. These charts should clearly show the limits used for the run.

Packaging, reel marking, and transportation shall be in accordance with AEIC CS8, NEMA WC26, and the following requirements.

4.7.2 Cable Inspection

Contractor shall inspect cables at the time of delivery and during installation.

4.7.3 Installation Inspections

Contractor shall inspect exposed cable sections for physical damage.

Contractor shall also inspect shield grounding, cable supports and terminations for proper installation.

4.7.4 Conductor Continuity

Contractor shall perform tests to verify conductor continuity.

4.7.5 Insulation Resistance Testing

The concentric shields of all MV cables shall be tested to ground with a 1000/500 VDC megohmeter at 1000 VDC to check the integrity of the outer jacket.

The Contractor shall record megohm values over a 10 minute period with recordings every minute. Megohmeter cable tests shall be per "International Electrical Testing Association Acceptance Testing Specifications," NETA ATS-2013.

4.7.6 Cable Testing – Partial Discharge Method / VLF Hi-Pot Method

Each of the MV collection system cables shall be tested by the partial discharge (PD) method in accordance with IEEE 400.3 and ICEA S-94-649. Each completed collection system feeder shall be tested by the "VLF Hi-Pot" method in accordance with IEEE 400.2.

In all cases, the tested sections shall include all cable sizes and shall test the cable insulation, the terminations and the splices (if any) on the cable sections.

The PD method test voltage shall be a minimum 2.0 times rated voltage (2.0Uo), at 60 Hz, with at least 5pC sensitivity and shall include a documented sensitivity assessment performed in accordance with IEEE 400.3 on every cable system to assure the test results are comparable with IEEE and manufacturer levels as specified in the table below. The design of the collection system shall be such that the cables can be sectionalized into lengths of 8,500 feet, maximum, and 1/6th or larger neutral to support PD testing as performed by IMCORP or other service provider who has been previously qualified by the Owner. Cable lengths shall be coordinated with normal splice points and above ground junction boxes with separable connectors used to minimize cable splicing.

Table 4-1 Table of Acceptable PD Threshold Levels

Standard	Thresholds (@50/60Hz)
IEEE 48 Terminations	No PD ≥ 5pC up to 1.5Uo
IEEE 404 Joints	No PD ≥ 5pC up to 1.5Uo
IEEE 386 Separable Connectors	No PD ≥ 3pC up to 1.3Uo
ICEA S-97-683 Metallic Shield MV Cable	No PD ≥ 5pC up to 4Uo*
ICEA S-94-683 Concentric Wire MV Cable	No PD ≥ 5pC up to 4Uo*
*200V/mil	

4.8 NUMBERING AND LABELING

The Contractor shall provide material and labor for installation of cable numbers and labels.

4.8.1 MV Cables Numbering

The MV power cables shall be numbered at each of the following termination points: Turbine pad mount step-up transformers and MV 4-way, 3-way, and 2-way cable junction and splice boxes. Power cables and equipment shall be labeled at each termination point with identification numbers identified by the owner. Each power cable will also be identified for phasing with the following colored tape: red for Phase A, white for Phase B, and blue for Phase C. The phasing will be the same throughout the Project.

4.8.2 MV Cable Labeling at 4-Way, 3-Way, and 2-Way Junction Boxes; Splice Boxes; and Switchgear

Each individual MV cable inside the termination compartment shall have a cable number label installed. These labels shall consist of reflective numbers and letters to correspond to the feeder number to be provided by the Owner. Both ends of these E-Z Tag holders shall be secured to each power cable with nylon cable ties with 0.2 percent carbon filled, locking, black, and weather resistant such as “Pan-Ty” or “Ty-Rap”. Cable ties shall not be tightened excessively to cause deformation of the tag holder. The labels shall be visible when the termination is accessed from a normal access point. To and from information shall be included on cable labels. Phase identification shall be as follows: red for Phase A, white for Phase B, and blue for Phase C.

4.8.3 MV Cable Labeling at Pad Mount Step-Up Transformers

Each MV cable inside the high voltage compartment of the pad mount step-up transformers shall have a cable number label installed. These labels shall consist of reflective numbers and letters installed on the panels to correspond to the feeder number to be provided by the Owner. These aluminum utility panels shall be secured to the cables with nylon cable ties with 0.2% carbon filled, locking, black, and weather resistant such as “Pan-Ty” or “Ty-Rap”. Phase identification for the pad mount step-up transformers is as follows: H1A and H1B is Phase A (red tape), H2A and H2B is Phase B (white tape), and H3A and H3B is Phase C (blue tape).

4.8.4 MV Cable Labeling at Risers

MV cable labeling at the substation risers shall be in accordance with Section 5.0. Phase identification at the risers shall be as follows: Phase A is red tape, Phase B is white tape, and Phase C is blue tape.

4.9 PAD MOUNT STEP-UP TRANSFORMERS

4.9.1 General

This section describes the equipment, installation, testing, labeling and numbering of the pad mount step-up transformers. This equipment is to be specified and installed by Contractor to meet all requirements of the Turbine Supplier and these specifications. Contractor will procure based on engineering specification provided by Contractor and approved by Owner.

Contractor shall inspect all parts upon receipt to ensure they meet the bill of material, drawings, and equipment specifications. Contractor shall provide receipt inspection checklists and store equipment with all accessories in a safe location.

4.9.2 Equipment Requirements

The transformers shall have feed-through connection capability on the MV side. That is, there shall be two sets of high side bushings to allow transformers to be stringed together. They shall also include external MV switch operator handle and external oil sampling valve, both within lockable covers.

4.9.2.1 Transformer Specifications

The pad mount step-up transformers will have the following specifications:

- Oil-filled
  - External oil-sampling and nitrogen filling if necessary
- 3-Phase, 60 Hz
- Contractor shall size transformer kVA rating to accommodate the maximum withstand fault current of the WTG converter
- High side: 34.5 kV delta
- Low side: 690 V wye
  - Low side terminal: NEMA standard 10-hole spade type, including supports, tinned, in accordance with the latest edition of ANSI/IEEE standard C57.12.26.
- BIL: standard value at 690 Volts; 200 kV at 34.5 kV (higher than minimum 150 kV for the project)
- Impedance: 5.75 +/- 7.5%
- Temperature rise: 65°C
- Taps: (2) 2.5% steps above and below (for a total of five taps)
- Instrumentation enclosure shall be externally mounted
- Dead front (high side)

- 600 A bushing arrangement (high side)
- Sectionalizing oil-immersed load break 2 position LBOR switch:
  - Rated 300 amp continuous.
  - Gang-operated rotary, permanently attached, hook stick operable and clearly marked for circuit identification.
- Shielded core
- Fusing shall be sized to ensure less than a Category 4 arc flash blast at appropriate working distance on the low voltage compartment.
- Contractor to include secondary switch on low side
- Transformer shall be painted olive green (Munsell #7GY3.29/1.5)
- Contractor to quote option for ice shield
- Contractor shall furnish and install ground ball studs on the LV bushing spades
- Contractor shall furnish any equipment safety grounds or other equipment required to support Turbine Supplier commissioning activities.
- Prior to manufacturing, a design review shall be conducted between the transformer manufacturer and the Owner. Topics to be included but not limited to are:
  - The addition of a static shield placed between the coil and the core to reduce any partial discharge activity in the core.
  - Location of the load break oil switch after the fuses versus in front of the fuses.
  - Additional sudden pressure relief capability above standard.
  - Partial discharge testing as described by the specification.
- Tank shall have an automatic pressure relief device or valve.
- Tank pressure under rated conditions for sealed transformers shall not exceed two atmospheres (203 kPa) absolute pressure unless requirements of applicable sections of the ASME Boiler and Pressure Vessel Code (BPVC) are met.
- Unit protection:
  - Provide unit protection with a partial-range current limiting fuse on each primary phase (under oil, factory replaceable only).
- Electrical connections inside the LV compartment shall be designed not to exceed 90°C, with an assumed 40°C ambient temperature.

4.9.2.2 Pad Mount Step-Up Transformer MV Terminations

The Contractor shall furnish and install 600 amp dead break elbows as required for all turbine pad mount step-up transformer MV terminations. The elbow connectors shall be 600 A, three-phase rated (21.1/36.6 kV) dead break and shall meet the full requirements of ANSI/IEEE Standard 386.

4.10 INSTALLATION

The Contractor shall perform all installation of the pad mount step-up transformers in accordance with Prudent Wind Industry Practices.

4.10.1 Transformer and Cable Box Pad

This subsection covers the minimum requirements for the furnishing of both a telescoping box pad intended for supporting a generator step up transformer and a box pad intended for supporting a grounding transformer which will be used in a 3-phase 35 kV wind project. The Contractor shall install these box pads per these specifications. Contractor shall install the transformer and box pad on lean concrete to provide a level working surface.

4.10.1.1 Quality Assurance

A top loading test will be performed to mimic the weight displacement of the appropriate transformer that will be used for the specified box pad. This test is performed to verify a robust design that will not fail in the field.

4.10.1.2 All Box Pad Details

A. Box pads shall have appropriate factors of safety. Design using allowable stress design shall have a factor of safety of 2.0. Designs utilizing strength design shall use load factors and strength reduction factors in accordance with the International Building Code.

B. All box pad designs shall account for appropriate side wall loading from the soil and water table as applicable, as well as the weight of the transformer including the ice shield.

C. The telescoping portion will extend 24 inches on the low voltage side with a width of 36 inches. The telescoping portion will extend on the same side that has the provisions for the cable entering the transformer. (For telescoping box pads only.)

D. Each box pad request will be accompanied with a cut sheet of the transformer design to aid the box pad designer. This will be included with the request for proposal.

E. The pad will have a rigid, flat, and stable top surface.

F. The pad will not warp, rust, or be UV degradable.

G. The finished pad will not sustain combustion.

H. The pad will not be affected by asphalt, road salts, fertilizers, transformer oils and heating, other common chemicals, weather or other service conditions that it might be exposed to.

I. The pad will be designed and constructed so that it and any hardware used will not trap or hold water and will be able to withstand repeated seasonal freeze/thaw cycles.

J. The pad will be capable, with equipment installed, of withstanding temperature variations of -40° C to +65 ° C without cracking, splitting, or deforming.

K. Tamper resistant construction.

L. Box pads shall be protected from damage during shipping. Box pads will be shipped on a suitable pallet. When stacking box pads, on a pallet, appropriate provisions for a safe, damage free arrival will be taken.

4.10.1.3 Pad Mount Step-up Transformer and Grounding Transformer Box Pads Details

A. Shall be of concrete construction (no fiberglass allowed).

B. Where equipment installation is not immediate covers shall be installed to prevent damage, unwanted litter, and accidental falling.

4.10.2 Transformer Mounting

The Contractor shall install the pad mount step-up transformers on the box pads and install the high and low voltage cable connections. Transformers shall be properly anchored to prevent movement during short-circuits and seismic events. The Contractor shall furnish and install the 600 A dead break elbows as required for the pad mount step-up transformer MV terminations.

4.10.3 Low Voltage (2000 V) Phase Conductors and Terminations

See Subsection 4.13.4.

4.10.4 Oil Containment Design

The Contractor shall install an oil containment fabric surrounding the pad-mounted transformers. The fabric shall be laid underneath the finished gravel surrounding the transformer, and the area covered shall be from the area where the tank begins to a distance 2 feet beyond the radiators or cooling fins. The material shall be a PIG® MAT 1205 or similar product that absorbs oil and allows water to pass through.

4.11 TESTING

4.11.1 Factory Testing

Factory tests will be performed for the transformer in accordance with ANSI/IEEE C57.12.90:

1. Resistance measurements.
2. Polarity and phase relation.
3. Ratio.
4. No-load losses and excitation current.
5. Load losses and impedance voltage.
6. Dielectric tests.
    a. Impulse test – all units
7. DGA analysis.
    a. Start of the test.
    b. Start of heat run.
    c. Completion of heat run.

d. Completion of dielectric.

e. Completion of all tests.

8. Partial discharge test recording, inception voltage, and drop-out voltage levels using the procedures in IEEE C57.113, C57.12.90, and with voltages as specified in C57.12.00 for 34.5 kV equipment.

   a. Partial discharge test acceptable limit shall be 300 pC, notwithstanding a less stringent requirement by IEEE.

9. A heat run test shall be completed on the first unit of each manufacturing batch.

10. This transformer shall be treated as a "Class I" power transformer.

4.11.2 Testing by Contractor

All pad mount step-up transformers shall be inspected for physical damage by Contractor upon delivery. After transporting a transformer to its final location, Contractor shall complete the following tests and interpret the results:

- Transformer turns ratio test.
- Winding resistance test.
- Insulation resistance test.
- Dissolved gas analysis.
- Analysis of the following chemical properties of the oil:
  - Dielectric strength.
  - Interfacial tension.
  - Power factor at 25° C.
  - Neutralization number.
  - Water content.
  - Specific gravity.
  - Dissolved gas analysis .
  - PCB (polychlorinated biphenyl).
- Final visual inspection of all components, gauges, and controls.

All testing and interpretation of results shall be performed by qualified personnel. Contractor shall record and provide results for the above tests. Tests results shall be traceable to the serial number of the corresponding transformer. If a transformer is moved after the above tests have been completed, Contractor shall repeat these tests.

4.12 NUMBERING AND LABELING

4.12.1 General

The Contractor shall provide identification nameplates. Nameplates shall be approved by the Owner. Edges shall be chamfered. Nameplates shall be mounted to the equipment by using one adhesive and stainless steel screws. These screws can be either the self-drilling or drilled and tapped type. Pop rivets are not acceptable.

4.12.2 Pad Mount Step-Up Transformer

Each of the pad mount step-up transformers shall have an engraved phenolic label with reflective numbering system identifying the transformer. These labels shall be installed on the MV compartment door and shall be approved by the Owner.

Pad mount step-up transformers shall be identified with Owner-provided identification numbers.

4.13 LOW VOLTAGE (LV) CABLE

4.13.1 General

This section describes the requirements, installation, grounding, testing, labeling, and numbering of the LV cables at the WTGs. The Contractor shall specify and procure LV cables. Contractor shall inspect all parts upon receipt to ensure they meet the bill of material, drawings, and equipment specifications. Contractor shall provide receipt inspection checklists and store equipment with all accessories in a safe location. Cable shall be of flexible type similar to DLO (diesel locomotive cable) or equivalent.

4.13.2 Equipment Requirements

The Contractor shall procure 1/C 2000V 777 kcmil DLO copper cables, rated at least 90° C, and suitable for wet and dry locations in conduit or underground duct systems. The cable type, size, and quantities shall be validated through ampacity analysis and meet minimum turbine supplier requirements. Insulation shall meet or exceed all requirements of applicable ICEA, NEMA, and UL Standards. The conductor shall be uncoated copper material in accordance with ASTM B-8. The cables shall be factory tested to ensure compliance with the requirements of the referenced codes and standards. Contractor shall design and coordinate cable sizes, raceway sizes and cable lug terminations to the WTG equipment for a complete installation.

Other requirements:

- Contractor shall ensure that the conduits for the LV cables receive approval from the foundation design engineer.
- The cable will be suitable for an installation temperature of -18° C.
- The conductor will be flexible, stranded, uncoated copper conductor in accordance with ASTM B-33 and ASTM B-172.
- Insulation will be ethylene propylene rubber (EPR).

- Jacket and separator:
  - The copper conductor, insulated with EPR will be cabled together with a separator and jacketed overall with chlorinated polyethylene (CPE). The separator will be a paper or polyester tape.

4.13.3 Shipping Requirements

A durable label will be securely attached to each reel of cable. The label will indicate:

- The Purchaser's name and address.
- Purchase order number.
- Cable description.
- Reel number.
- Feet of cable on reel.
- Tare and gross weight of the reel.
- Beginning and ending sequential footage numbers.
- Recognition of generic cable approval by a national recognized testing laboratory (such as UL).

The final cutting lengths and put-ups must be confirmed with the Contractor prior to winding the cable onto shipping reels.

Each cable end will be suitably sealed to prevent the entrance of moisture and contaminants.

The end of each cable will be secured to remain inside the reel flange to prevent damage.

The inside end of each cable will be secured to not back out while winding/unwinding cable onto/from the reel.

The reels will be lagged or covered with a Class 2 material suitable to provide physical protection to the cable during transit and during ordinary handling and storage.

The reels will be shipped upright on the flanges and securely blocked in position so they will not shift during transit. Reels will be lifted only with a suitable center shaft and sling with a spreader bar to prevent damage to the reels and cable.

4.13.4 Installation

Contractor shall install the LV cables between the terminals of each pad mount step-up transformer and the WTG low voltage distribution panel (LVDP).

The Contractor shall terminate cables (phase and ground conductors) at the transformer bushings or LV breaker terminals and at the turbine LVDP using Burndy compression lugs with NEMA two-hole pads and all associated hardware to accommodate dissimilar metal connections (Al to Cu). Compression lugs shall be installed with tooling specific to the lugs used. In general, any connecting/terminating hardware not provided by the turbine supplier shall be provided by the

Contractor. Contractor shall install cables in accordance with turbine supplier requirements. The cables must be supported to reduce stress on the transformer bushings.

These cables shall be installed in conduit and pulled in accordance with cable supplier's recommended pulling and installation practices. All exposed ends of conduits shall be plugged during construction, sharp projections that might damage cable shall be removed, and the conduit at the transformer shall be extended beyond the finished base by 6 inches. The conduits shall be sealed at the turbine tower end to prevent rodent entry.

4.13.5 Grounding

4.13.5.1 LV Grounding Cable to LVDP

The Contractor shall furnish and install grounding conductors specified by turbine supplier between the pad mount step-up transformer's LV neutral terminal and the turbine's LVDP ground. These grounding conductors shall meet applicable standards and be sized to withstand expected short circuit currents.

4.13.6 Testing

4.13.6.1 Factory Testing

Testing will be done in accordance with the latest edition of ICEA S-94-649 to include the partial discharge test.

1. The cable manufacturer will provide a qualification test report in accordance with ICEA S-94-649.

2. Certified test data for all required tests will be kept on file for a minimum of 5 years and will be submitted to Owner upon request. Each reel shipped will be traceable to certified test data.

3. A certificate of compliance will be supplied to the Owner for all cable within 30 days of each shipment. The certificate of compliance will show that the cable has passed all required tests and include the following information:

    - Manufacturer name.
    - Complete description of cable.
    - Reel numbers for each lot of cable.
    - Length of cable on each reel.
    - Purchase order number.
    - Specification number and date.
    - Copy of packing list.

4.13.6.2 Insulation Resistance Testing

The Contractor shall test all cables rated 2000 V.

The Contractor shall record megohm values over a 10 minute period with recordings every minute. Megohmeter cable tests shall be per International Electrical Testing Association Acceptance Testing Specifications, NETA ATS-2013.

4.13.7 Numbering and Labeling

Contractor shall provide phase identification on each end of the LV cables. Phase color coding shall be as follows: X1 is Phase A (brown tape), X2 is Phase B (orange tape), and X3 is Phase C (yellow tape).

4.14 JUNCTION BOXES

4.14.1 General

Termination of the underground feeders in the Project Collector Substation is by the Contractor.

4.14.2 Equipment Requirements

4.14.2.1 General

All equipment shall be designed and manufactured for the cable to be utilized and rated for outdoor 35kV use.

Dead-front, load-break, and/or dead-break elbows shall be supplied with test ports in addition to directional fault indicators. These accessories shall be installed at intervals in accordance with Subsection 4.15.2 of this document.

No work can be performed without site-specific training for each specific product used.

4.14.2.2 MV 3-Way and 4-Way Junction Boxes

The Contractor shall furnish and install 600 A dead-break elbows to terminate the single conductor aluminum power cables with copper concentric neutrals at Contractor furnished and installed 4-way and 3-way junction boxes. These elbow connectors shall be 600 A, dead-break with a phase to ground rating of 21.1 kV. They shall meet the full requirements of ANSI/IEEE Standard 386. These elbow connectors shall be BOL-T connector system type connectors approved by the owner.

4.14.2.3 MV 2-Way Junction Boxes

The Contractor shall ultimately determine the exact quantity of 2-way junction boxes used as splice locations required to complete the work. The actual quantity shall vary based on as installed field conditions.

The Contractor shall furnish and install 600 A dead-break elbows as required. The elbows shall terminate the single conductor aluminum power cable with copper concentric neutrals when required, at Contractor furnished and installed splice junction boxes. These elbow connectors shall be 600 A dead-break with a phase to ground rating of 21.1 kV. They shall meet the full requirements of ANSI/IEEE Standard 386. Grounding requirements for the shields on each dead-break elbow shall appear in the drawings.

4.14.3 Installation

4.14.3.1 Cable Splicing (Where Applicable)

Underground power cable splices are permitted where the cable run exceeds manufacturer's reel length. In no case may underground runs exceed two reel lengths or a maximum distance of 8,500 feet before cable is spliced in an above ground 2-way junction box. On home runs, only one underground splice shall be allowed between junction boxes. In-line connections shall be 2-way, 600 A junctions or as specified. The Contractor shall determine quantity and location of junction boxes based on cable reel lengths, roadways or easement crossing, etc. Junction boxes shall only be placed near WTGs, access roads, and in road rights-of-way.

- Contractor shall only use shear bolt type (no compression splices).
- Where cables are to be spliced, an area of sufficient size must be excavated to provide environmental controls as needed.
- After cable is cut, a water-tight protective seal must be applied to exposed ends to prevent dirt and moisture from entering cable.
- A plastic tarp shall be placed under the cable and covering an area of at least 8-feet in diameter measured from the splicing location.
- A protective tent must be erected around the splicing location.
- The protective tent shall be large enough to completely cover the tarped area under and around the splice location.
- The protective tent shall have adequate seals to allow no dust or precipitation to blow into the splicing area.
- If the temperature at the splicing location is below 40° F a heat source shall be located at the splicing location to heat the protective tent to 45° F or more.
- The splice shall be installed per manufacturer instructions and training. All personnel installing splices shall complete manufacturer training for the specific splices to be installed.
- Certification documentation for each person installing splices shall be made available to the Owner upon request.
- Personnel installing splices shall have completed training on installing the specific splices within 6-months of installing the splice.
- The Contractor is responsible for replacing terminations, cable or splices that do not pass quality control testing or meet IEEE and IEC Standards as determined by Owner.
- Each installed splice shall be documented/recorded with personnel's name(s) that installed the splice and photographed.
- A splice locator ball shall be buried directly over every splice location. The splice locators must be designed to be located using electronic equipment. The splice locator must be approved by Owner.
- GPS coordinates shall be recorded and documented at each splice location. The location shall be marked on the as-built drawings with coordinates.

4.14.3.2 Junction Box Pads

All junction and splice boxes shall be deep-set fiberglass boxes and be installed on a level crushed rock pad at least 4 inches thick. The pad is intended to provide a solid level base for the box extension.

Cable entry can be through sealed connectors instead of conduits for boxes buried 60 inches. The bottom of the box **must** be below the frost line.

4.14.3.3 Junction Box Locations

All junction and splice boxes shall be located whenever possible near roads or turbine access areas to minimize damage by road maintenance equipment. Under no circumstances shall an aboveground junction or splice box be located in a cultivated field. All junction and splice boxes shall have four concrete barrier posts located around the boxes to minimize damage. Posts shall be set with concrete to provide additional impact resistance. All junction box locations shall be reviewed by the Owner prior to construction.

4.14.4 Grounding

4.14.4.1 Junction Box Grounding

General

The grounding system for the MV junction and splice boxes is designed to achieve a maximum of 10.0 ohms resistance or other maximum resistance specified by the engineer of record. Four point fall-of-potential measurements shall be made after installation. If ground resistance is found to exceed the design resistance, then radial ground leads can be extended from the ground loop and additional ground rods installed. Contractor is responsible for supplying and installing additional materials as required.

Specific Requirements

The grounding system consists of a ground loop and ground rods. All ground loop wire to ground loop wire, and ground rod to ground loop wire connections must be done using exothermic process or using an Owner approved mechanical compression type connection only. The ground loop shall consist of a minimum 2/0 AWG stranded copper ground conductor installed in a 4 inch wide, 3 foot deep trench around each MV junction box. The trench shall be in undisturbed soil approximately 3 feet from the junction box base, under 4 inches of well compacted select native fill. No rocks larger than what would pass through a Number 4 screen shall surround the ground conductor.

At least one 3/4 inch diameter, 10 foot long copper ground rod shall be driven near the ground loop on opposite sides (minimum 10 foot between rods) and connected to the loop. Two 2/0 AWG stranded copper pigtails from the ground loop shall be brought into the junction box and connected to the ground bus.

The Contractor shall verify the adequacy of the above sizes, dimensions and quantities in a grounding study.

4.14.5 Testing

4.14.5.1 Junction Box Grounding Test

The Contractor shall use the four point fall of potential method per IEEE STD 81 for measuring and testing the ground resistance of the junction boxes.

The grounding point shall be connected to any bare copper grounding conductor (e.g. grounding point inside junction box) as the system reference point (E). The minimum distance from E to the current electrode (CE) should be 5-6.5 times the diagonal distance of the grounding system being measured. Resistance measurements shall be taken with the potential electrode (PE) at 1%, 10%, 20%, 30%, 40%, 50%, 60%, 61.8%, 70%, 80%, 90%, and 99% of the diagonal distance. The Contractor shall compare the reading at point (E) to the theoretical value from the step and touch analysis. The test shall be performed with all phase and ground connections lifted so that the equipment being tested is isolated from the rest of the grounding system. Testing direction shall be perpendicular to any parallel conductive path (i.e., trench, conduit, fence, overhead, or below-grade lines) A sketch of the testing route shall be provided for each test. Contractor shall ensure that this testing is done in accordance with Engineer of Record's requirements and recommendations.

4.14.6 Numbering and Labeling

4.14.6.1 General

The Contractor shall provide identification nameplates approved by Owner. Edges shall be chamfered. Nameplates shall be mounted to the equipment by using one adhesive and stainless steel screws. These screws can be either the self-drilling or drilled and tapped type. Pop rivets are not acceptable.

4.14.6.2 MV 4-Way, 3-Way, and 2-Way Cable Junction Boxes

Each of the 4-way, 3-way, and 2-way cable junction and splice boxes shall be labeled with an Owner-approved reflective numbering system identifying the junction or splice box number. These labels and an Owner-approved "Danger High Voltage" sign shall be installed on the side of the enclosure that will be opened for access to the terminals inside.

Junction boxes shall be identified. For example, the J-Box on Feeder 5 furthest from the Project Collector Substation shall be labelled "JB5-1". Labeling is to be located on the access cover of the junction or splice box and on the side facing the road access.

4.15 MISCELLANEOUS EQUIPMENT

4.15.1 General

The miscellaneous power equipment required for the collection system is described in this section.

4.15.2 Equipment Requirements

4.15.2.1 Fault Indicators

Contractor shall install directional fault indicators (DFIs) at all junction boxes and every third turbine, to ensure that a single DFI does not monitor more than three cable segments. The DFIs shall not use LEDs (light-emitting diode) and shall utilize a 24 hour reset time or voltage

restoration. DFIs shall be rated to prevent false tripping (i.e., they shall only trip due to fault current flowing from the grid). Final equipment selection is subject to Owner approval.

Contractor to supply DFIs required. Contractor shall install DFI remote displays external to junction boxes and pad mount step-up transformers. DFI remote displays shall be mounted sufficiently above grade to ensure visibility when snow is on the ground (at least 24-30 inches above grade is preferred). If the external display needs to be installed in a junction box lid, Contractor shall properly manage/organize wires to not interfere with maintenance operations.

4.15.2.2 Surge Arresters

The Contractor shall furnish and install, at a minimum, station class 30kV (24.4 kV MCOV) metal oxide varistor surge arresters in pre-molded rubber elbows for cable terminations and transformers. This voltage rating assumes a grounded wye on the 34.5 kV side of the main power transformer winding at the Project Collector Substation. Contractor shall be responsible for final sizing of the surge arresters. They shall be sized according to insulation coordination and temporary overvoltage analyses. The arresters shall provide overvoltage system protection in an insulated, fully shielded, submersible, dead front device. The arrester housing interface shall conform to ANSI/IEEE Standard 386 with a maximum discharge voltage of 110 kV at 20 kA. The Contractor shall install arresters at the last pad mount step-up transformer in each turbine string. Grounding requirements for these arresters shall appear in the construction drawings. These surge arresters shall be compatible with junction boxes and pad mount step-up transformers. They shall also be removable with live line tools. Once surge arresters are removed, they shall accommodate load-break ground adapters.

4.15.3 Installation

N/A

4.15.4 Grounding

N/A

4.15.5 Testing

N/A

4.15.6 Numbering and Labeling

Numbering and labeling of all equipment shall be per Owner requirements and preferences.

4.16 METEOROLOGICAL (MET) TOWER 120V CABLE

4.16.1 General

The Contractor shall size, furnish, and install direct burial cable from MET towers to the nearest turbine pad mount step-up transformer.

4.16.2 Equipment Requirements

This cable shall provide single-phase power for the MET tower equipment. The cable shall be RHW 600 V, 90° C dry location/75° C wet location, suitable for installation in conduit, underground duct

systems, and direct buried. The insulation shall meet or exceed all requirements of applicable ICEA, NEMA, and UL standards.

4.16.3 Installation

The Contractor shall install the MET tower fiber-optic cable in the same trench as the MET tower's power supply cable. This shall be done in accordance with Subsection 4.17.3. The MET tower fiber-optic cable shall be integrated into the turbine supplier's network.

4.16.4 Grounding

MET tower grounding is to be installed by Contractor.

4.16.5 Testing

Cable shall be tested in the factory to determine its compliance with the requirements of the referenced codes and standards.

4.16.6 Numbering and Labeling

N/A

4.17 FIBER-OPTIC COMMUNICATION CABLE

4.17.1 General

The Contractor shall install and terminate the fiber-optic network in accordance with this specification.

The Contractor shall install a fiber-optic network that shall connect individual turbines with the Project Collector Substation control center. The design of the fiber-optic network will be per WTG technical specifications and will be such that each feeder will create a complete fiber-optic logical ring. The Contractor shall design the fiber-optic network so that turbine supplier can provide loop and termination design. The fiber cable shall be direct buried cable in orange HDPE (high density polyethylene) innerduct. All splicing shall be made at the turbines, Project Collector Substation Building, and the splicing hand holes as specified on the drawings. All splices shall be spliced in a separate location from the electrical conductor splices. Sufficient spare length shall be provided for maintenance provisions. No running splices shall be made.

4.17.2 Equipment Requirements

Contractor is responsible for verifying the compatibility and acceptability of the Owner-preferred items mentioned in this document.

4.17.2.1 Cable Specification

The Contractor shall furnish and install all fiber-optic cable required. Contractor shall verify the fiber cables comply with turbine supplier requirements. Contractor is required to confirm fiber cable lengths in the field before ordering the cable. The fiber-optic cable shall meet or exceed the physical characteristics listed in the table below:

Table 4-2 Required Fiber-Optic Cable Characteristics

Fiber-Optic Type	Single Mode
Fiber quantity	12, 24, and/or 36 as required by final design
Fiber diameter	9/125 Microns
Maximum attenuation	0.4 @ 1300nm dB/km, 0.3 @ 1550nm dB/km
Minimum bandwidth	N/A
Operating temperature range	-40 to +70° C

- Additional requirements:
  - Dual window.
  - Single jacket.
  - All-dielectric loose tube cable.
  - The cable components should be coated with super absorbent polymer (SAP) materials impregnated within the core to prohibit the migration of water.
    - Fiber cable construction will be loose tube gel filled color-coding per TIA/EIA 598B standards. The central strength member will contain no metallic conductors. The overall strength member will be aramid fiber yarn or fiberglass, the jacket will be black UV, and moisture resistant PE (polyethylene) with sequential meter markings.
    - All fiber equipment (switches, converters, etc.) is operating at 1300nm, except long-haul equipment which operates at 1550nm.

4.17.2.2 Cable Manufacturer Requirements

The cable manufacturer shall be responsible for all phases of manufacturing, packaging, and the safe keeping of the fiber-optic cable while at its facility. Prior to shipping, the cable manufacturer shall test each optical fiber to verify conformance to the specification herein and the optical glass fiber manufacturer's specifications. Each of the optical fibers in each of the cable reels shall be completely tested with an optical time domain reflectometer (OTDR) at optical wavelengths specified on an end-to-end basis. A printed hard copy of the final test data completed prior to shipment shall be attached in a waterproof envelope or pouch to each reel of cable provided.

4.17.2.3 Required Drawings and Data

All drawings and technical data required to be furnished by the Contractor shall be in English, and all dimensions on the drawings shall be in feet and inches and all weight in pounds. The drawings shall be complete and accurate in their content. Originals and all copies shall be legible.

The following table summarizes the drawings and data required under these specifications:

Table 4-3 Drawings and Data Schedule for Fiber-Optic Cable

Type of Drawings and Data	Delivery Time	Type of Material
Factory Test Results of Cable	With Shipment	Test Results
Pre-Installation Field Test Results of Cable	14 Days After Receipt of Cable	OTDR Charts and Disk
Post-Installation Field Test Results of Cable	14 Days After Completion of Tests	OTDR Charts and Disk
Certification of Splicing Personnel	14 Days Prior to Fiber Splicing	Copy of Certification

4.17.2.4 Connectors

SC connectors will be used to connect to the fiber patch panels in the wind turbines and in the substation.

4.17.2.5 Innerduct

Fiber shall be installed in orange HDPE 1.25 inch diameter innerduct with wall thickness of 0.151 inches or Owner-approved alternate. The manufacturer shall be Carlon or Owner-approved equivalent.

4.17.2.6 Innerduct Accessories

All innerduct accessories will consist of the following components or Owner-approved equivalent components from approved manufacturer:

- Commscope - 1163600
- Carlon terminating connector part number – TC125
- Neptco MULETAPE part number – DT1250P

4.17.2.7 Hand Holes

The hand holes will be precast polymer concrete for underground construction. The hand hole will consist of the following components or Owner-approved equivalent from an approved manufacturer:

- Box part number – CDR B19304836A
- Heavy duty cover part number – C1C304803A***

4.17.2.8 Above-Ground Splice Housing

The aboveground splice closing will be a Charles multi-purpose housing with fiber-optic bracket or Owner-approved equivalent component from an approved manufacturer:

- Housing part number – CMPH-750FNH

4.17.2.9 Fiber-Optic Splice Enclosure

The fiber-optic splice enclosure will be a single-ended mechanical butt gel-sealed thermoplastic enclosure manufactured by Preformed Line Products or Owner-approved equivalent product from an approved manufacturer:

- Splice enclosure – 8006951

4.17.2.10 Fiber-Optic Patch Panel

Fiber patch panel will be a wall mount enclosure with 4 adapter plate openings with 6 position dual SC connectors manufactured by Optical Cable Corporation and Uniprise Solutions or Owner-approved equivalent products from an approved manufacturer:

- Patch panel part number – ZDMB6B-ALLIANT1
- Adapter panel – Uniprise Solutions - PNL-WH-006-MFA-ST06-BG

4.17.2.11 Fiber-Optic Fan-Out Kit

The fan-out kit will consist of the following components or Owner-approved equivalent component from an approved manufacturer:

- Fan-out cable – Corning FAN-BT25-06
- Splice tray kit – Preformed Line Products LGSTS16

4.17.3 Installation

4.17.3.1 General

The fiber cable shall be directly buried in a trench. The fiber cable may be installed in the same trench as the power cable. The fiber-optic cable configuration shall be shown on the construction drawings. In addition, Contractor shall install markers at 500 foot intervals and any utility and road crossings (this is in addition to the power cable markers discussed in Section 4.4 above).

The Contractor shall install underground warning tape and tracer wire over fiber cable if not routed in the same trench as the power cables.

The Contractor shall install fiber-optic cable between the cable trench and the conduit stub-out at the turbine tower as shown on the construction drawings. The conduits shall be sealed after the fiber-optic cables are installed to prevent rodent entry into the tower. The Contractor shall terminate all fibers into the fiber-optic patch panels.

Contractor shall install hand holes at the field splice locations separate from the electrical conductors. These locations shall be located around turbines, public right away and not in landowner fields.

Contractor shall fusion splice all fiber cables.

All fiber-optic cable sheath lengths shall be recorded at each facility and hand hole entry and exit. The sheath footage recordings shall be considered as part of the as-built drawings upon the completion of the cable installation.

The Contractor shall verify and test the complete fiber-optic network after all connections are made. See Subsection 4.17.2.

4.17.3.2 Fiber-Optic Cable Crossings

Several crossings under paved roads, power cables, drain tiles, and wetlands may be required for the fiber-optic communication cables.

In such instances, the fiber-optic cable conduit shall be installed by HDB. The fiber-optic cable shall be routed through innerduct inside the bore tube with the other cables.

The Contractor shall obtain all necessary permits before commencing work. The Contractor shall prepare drawings or sketched details of the cable crossing as part of permit application if required. The Contractor shall be responsible for all permit payments and/or application fees.

Contractor shall obtain Owner approval for boring plan before the work for the bore commences.

4.17.4 Testing

A. Factory tests shall be performed on each fiber of every reel at the factory. Results shall be recorded and included in the packaging with the cables. Product data sheets showing the cable characteristics including dispersion, dimensional quality, and tensile strength shall be provided by the manufacturer.

B. The Contractor shall test all fibers of each reel prior to taking delivery. Notify the Owner at least 7 days prior to all pre-installation field tests to enable the Owner's representative to be present. Contractor shall submit OTDR charts at both 1310 nm and 1550 nm showing launch conditions and all other parameters used in the setup (including the time and date). A 1 km launch fiber shall be used. These charts shall illustrate and quantify the losses of each length of fiber and stress points in the fiber. Review the traces carefully and explain unusual discontinuities in detail. Photographs of OTDR test results will not be accepted. The OTDR testing and waveforms shall be stored on recordable media and included with the submittal. If the OTDR testing is performed using equipment other than Wavetek or Tektronics, the Contractor shall supply the Owner with the software necessary to view the test results. All pre-installation tests on the fiber-optic cable shall be compared to the factory test results. If the overall attenuation for a fiber increases by more than 1 dB, the reel will be rejected.

C. Contractor shall notify the Owner at least 7 days prior to the post installation field tests to enable the Owner's representative to be present. Contractor will perform end to end tests for each fiber after all splices have been completed and all splice enclosures, except for those required for fiber access during testing, have been returned to their permanent position. The test shall include OTDR charts at both 1310 nm and 1550 nm showing launch conditions and all other parameters used in the setup, time, and date shall be included. OTDR measurements shall be made in both directions, if possible, and the splice loss results bi-directionally averaged. These charts shall illustrate and quantify the losses of each length of fiber and stress points in the fiber. Bi-directional averaged values shall be clearly displayed on a separate chart that identifies each splice location by tower number and direction of measurement. Review the traces carefully and explain unusual discontinuities

in detail. Photographs of OTDR test results will not be accepted. The OTDR testing and waveforms shall be stored on recordable media and included with the submittal. If the OTDR testing is performed using equipment other than Wavetek or Tektronics, the Contractor shall supply Owner with the software necessary to view the test results. All post-installation tests on the fiber-optic cable shall be compared to the pre-installation test results. Bi-directionally averaged splice loss shall not exceed 0.15 dB.

D. All test equipment shall be calibrated with certification traceable to the National Institute of Standards and Technology (NIST) relative to their intended use.

E. The fiber-optic tester shall have a minimum of 1 year testing and operations experience with the OTDR and optical loss test equipment used for tests required in this specification and shall be able to use all necessary test equipment without reference to test equipment instruction books while performing the required tests specified herein. The qualifications of all personnel performing the testing shall be in accordance with the latest version of NETA ATS.

4.17.5 Numbering and Labeling

The Contractor shall label the fiber-optic cables at each termination point with identification numbers to be identified by the Owner.

Each fiber-optic cable pulled into the junction boxes and spliced, terminated at the turbines and terminated at the Project Collector Substation Buildings shall have a Contractor-provided cable number label that corresponds to the cable number to be provided by the Owner. All labeling shall be done in accordance with ANSI/TIA-606-B.

4.18 AMPACITY STUDY

4.18.1 Purpose and Scope

Contractor shall complete ampacity analyses on all Project power cables. These include:

- MV collector power cables.
- LV collector power cables.
- MET tower power cables.
- Other power cables in the Project Collector Substation and O&M Facility (if O&M Facility is in Contractor's scope).

Justification must be provided for all cable sizing. Most cable sizing will require CYMCAP analysis. Where applicable, NEC references may also be used to support cable sizing (such as for LV power cables at the Project Collector Substation and MET tower).

4.18.2 Required Methodology

Contractor shall determine the ampacity for all underground cables using CYMCAP. CYMCAP analysis shall consider the following parameters:

- Accurate soil thermal resistivity (rho) values based on final geothermal and geotechnical investigations.

- Worst case current experienced by each cable during normal (non-fault) operations.
- Cable physical and electrical parameters as defined by the manufacturer.
- Accurate worst case soil temperature assumption for the Project region.
- Trench and bore depths based on the current design drawings.
- Analyses shall ensure that cable temperature does not exceed 90° C (running cables at 105° C may be allowed upon Owner approval).
- Heating from circulating currents in the concentric shields.

Any assumptions made in this study must be enforced/noted in the design drawings (burial depth, compaction, etc.).

At minimum, Contractor shall consider the following configurations in CYMCAP analysis:

- Each cable size individually.
- Parallel cable runs.
- Project Collector Substation entrance(s).
- LV WTG conduit entrance.
- All crossings and bores including, but not limited to:
  - Pipeline (consideration of any mutual heating from the pipeline).
  - Railroad.
  - Road.
  - Stream.
  - Drainage.
  - Wetland.
  - Other feeder cables (consideration of any mutual heating from the cables).

If a different cable burial configuration is required during construction, additional CYMCAP runs shall be required before Contractor is allowed to proceed with the new configuration.

4.18.3 Required Submittals

4.18.3.1 30% Design

The 30% submittal of this study shall include preliminary CYMCAP analyses to generate initial cable sizes. Only the basic and limiting cases need to be considered in CYMCAP at this time.

4.18.3.2 60% Design

The 60% submittal should include most or all required cases.

4.18.3.3 90% Design

The 90% submittal shall include all required cases and considerations, such that cable procurement may follow.

4.18.3.4 IFC Design

Any corrections or additions from the 90% submittal shall be incorporated in the IFC submittal.

All underground collection cables shall have appropriate ampacities based on the final geotechnical and geothermal investigations, while maintaining conductor temperatures at or below 90° C (except where 105° C has been approved by Owner). A CYMCAP model will be provided showing that the cable temperature will remain below the rated temperature at maximum output.

4.18.3.5 As-Built

Contractor shall provide an as-built submittal which has taken any as-built changes since IFC into account.

4.19 REACTIVE POWER FLOW STUDY

4.19.1 Purpose and Scope

Contractor shall complete a reactive power flow study to determine whether the Project meets interconnect requirements, as well as assess the real and reactive capabilities of the Project. This study must also ensure that the elements of the collector system are not overloaded and that acceptable voltages are maintained at the WTG terminals.

4.19.2 Required Methodology

Owner-approved power flow software shall be used to perform the reactive power flow analysis. The power flow model shall include the utility, Project Collector Substation transformer(s), collection cables, pad mount step-up transformers, grounding transformers (if needed), and the WTGs. The Project must satisfy the interconnect requirements, including:

- 0.95 leading to 0.95 lagging power factor at the POI.
- 0.95 pu to 1.05 pu voltage at the POI.
- Voltage schedule at the POI shall be consistent with LGIA.
- Maximum no load reactive power injection (if applicable).
- WTGs shall not trip off due to undervoltage or overvoltage when the park is operating within the above parameters.

At minimum, the following cases shall be considered in this study:

- 0.95 pu voltage at the POI with lagging power factor.
- 1.02 pu voltage at the POI with leading power factor.
- 1.02 pu voltage at the POI with lagging power factor.
- 1.05 pu voltage at the POI with leading power factor.
- Zero generation.
- Any other cases considered in the LGIA.

Each case (except for zero generation) shall be run with WTG output at 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, and 100%. If any of the requirements stated above are not met, the

Contractor shall recommend ways to bring the Project into compliance (capacitor banks, reactive banks, etc.). If capacitor bank(s) are required within the Project Collector Substation, the Contractor shall furnish the equipment per Section 5.0.

If reactive compensation is required, contractor shall perform flicker analysis in accordance with IEEE 1036 to verify that the voltage changes experienced during switching will remain within acceptable levels.

4.19.3 Required Submittals

4.19.3.1 30% Design

The 30% submittal of this study shall include preliminary reactive power analyses to determine whether reactive compensation or other equipment will be required.

4.19.3.2 60% Design

The 60% submittal shall be updated to reflect any design changes since the 30% submittal. Simulation results for the majority of the required cases should be available.

4.19.3.3 90% Design

The 90% submittal shall be updated to reflect any design changes since the 60% submittal. Simulation results for the majority of the required cases should be available.

4.19.3.4 IFC Design

Any corrections or additions from the 90% submittal shall be incorporated in the IFC submittal.

4.19.3.5 As-Built

Contractor shall provide an as-built submittal which has taken any as-built changes since IFC into account.

4.20 VAR CONTROL PHILOSOPHY

4.20.1 Purpose and Scope

Contractor shall recommend a reactive power compensation equipment control algorithm/procedure to be used in switching in and out any capacitor or reactor banks. Contractor shall also review and approve Turbine Supplier's final VAR control philosophy.

This study should include detail on the prioritization and operation of the following pieces of equipment:

- Shunt switched devices (capacitors / reactors)
- Load Tap Changer (if applicable)
- WTG reactive capability

4.20.2 Required Methodology

Contractor shall verify that any switching of reactive compensation equipment at this Project is coordinated with other reactive power equipment on the Transmission Owner's transmission system. Contractor shall also coordinate with Turbine Supplier.

The control algorithm shall be designed to avoid excessively switching reactive compensation equipment on and off. The VAR control philosophy will use voltage control mode and meet voltage schedule requirements (to be provided by Owner).

Contractor shall verify load tap changer (LTC) requirements for the main power transformer(s) within the Project Collector Substation. If load tap changers are required within the Project Collector Substation, the Contractor shall design the LTC location to be on the high side winding and furnish the equipment. The following cases shall be analyzed as part of the VAR control philosophy:

- No load tap changer
- Load tap changer on the high voltage winding

4.20.3 Required Submittals

4.20.3.1 30% Design

No 30% submittal of this study is required.

4.20.3.2 60% Design

No 60% submittal of this study is required.

4.20.3.3 90% Design

Contractor shall provide a draft of the control procedure and algorithm for review. This shall include a detailed description of the algorithm, as well as the basis and assumptions used to design the algorithm.

4.20.3.4 IFC Design

Any corrections or additions from the 90% submittal shall be incorporated in the IFC submittal.

4.20.3.5 As-Built

Contractor shall provide an as-built submittal which has taken any as-built changes since IFC into account.

4.21 SHORT CIRCUIT STUDY

4.21.1 Purpose and Scope

Contractor shall complete a short circuit analysis. The purpose of this analysis is to ensure that the fault currents on various equipment are within the ratings of that equipment, and that they will not be damaged during a fault scenario.

4.21.2 Required Methodology

All possible faults shall be analyzed in power flow software. These include 3-phase, single line-to-ground, double line-to-ground, and line-to-line faults.

Contractor shall compute the worst-case fault condition (combination of fault current and clearing time) of the following equipment if applicable. These worst-case fault conditions shall be compared to the withstand ability of each piece of equipment. ICEA P-32-382 shall be used to determine withstand ability on insulated cables. Contractor shall also ensure that the following equipment will withstand breaker failure clearing scenario.

- MV cables
- LV cables
- Concentric shields
  - Contractor shall clarify the basis for the amount of current on the concentric shields during a fault event that is accurate, reasonable, and generally accepted by the industry.
- Trench ground conductors
- Pad mount step-up transformers (PMT's)
- Main power transformer(s) (MPT('s))
- Switchgear at the Project Collector Substation
- MV terminations
- MPT fuse
- MV breakers
- HV breakers

Contractor shall also report the maximum fault current at the Project Collector Substation.

4.21.3 Required Submittals

4.21.3.1 30% Design

The 30% submittal of this study shall include fault assessments of most equipment.

4.21.3.2 60% Design

The 60% submittal should include fault assessments of most equipment and incorporate any design changes or comments from the 30% submittal.

4.21.3.3 90% Design

The 90% submittal should include fault assessments of all equipment and incorporate any design changes or comments or from the 90% submittal. The results should be finalized to the point that procurement can follow soon after this submittal.

4.21.3.4 IFC Design

Any corrections or additions from the 90% submittal shall be incorporated in the IFC submittal.

4.21.3.5 As-Built

Contractor shall provide an as-built submittal which has taken any as-built changes since IFC into account.

4.22 HARMONICS STUDY

4.22.1 Purpose and Scope

Contractor shall complete a harmonic resonance analysis for the Project's collection system. The purpose of this study is to determine the total voltage and current harmonic distortion at various points in the Project and verify that the Project is compliant with IEEE 519.

4.22.2 Required Methodology

Industry-accepted software shall be used to perform harmonic frequency scans and load flow analyses under various system configurations. The frequency scans at the following buses/locations shall be considered:

- Point of interconnect (POI)
- The MV side of each pad mount step-up transformer
- Project Collector Substation MV buses
- Capacitor bank buses

At minimum, the following system configurations shall be considered:

- Normal operating conditions with:
  - Capacitor/reactor bank(s) ON (including all possible combinations if there is more than one capacitor bank) (if capacitor banks used on Project)
  - Capacitor/reactor bank(s) OFF (including all possible combinations if there is more than one capacitor bank) (if capacitor banks used on Project)
- All combinations of capacitor/reactor bank OFF and different numbers of feeders open
- All capacitor/reactor banks OFF and one MPT open at the Project Collector Substation

The following harmonic sources shall be considered:

- Cables (MV and LV)
- PMT's
- MPT
- Capacitor banks (if used)
- Reactor banks (if used)
- WTG's
- Contributions from the transmission system (consideration of ambient harmonic distortion)

Contractor shall make recommendations with respect to any necessary mitigation or harmonics monitoring.

4.22.3 Required Submittals

4.22.3.1 30% Design

A 30% submittal is not required for the harmonics study.

4.22.3.2 60% Design

A 60% submittal is not required for the harmonics study.

4.22.3.3 90% Design

The 90% submittal shall include all required cases and considerations. It will also contain a recommendation regarding the need for power quality equipment and/or monitoring.

4.22.3.4 IFC Design

Any corrections or additions from the 90% submittal shall be incorporated in the IFC submittal.

4.22.3.5 As-Built

Contractor shall provide an as-built submittal which has taken any as-built changes since IFC into account.

4.23 ELECTRICAL LOSSES STUDY

4.23.1 Purpose and Scope

Contractor shall complete an assessment of the electrical losses associated with the Project. The purpose of this study is to verify that the annualized losses are below the limits required by the Owner. These limits are indicated below:

- Maximum allowable annualized energy loss (from generator terminals to revenue meter): 2.5%

Contractor shall also calculate the energy loss percentage at peak output for informational purposes.

4.23.2 Required Methodology

Contractor shall assess both the annualized losses on the Project, as well as the maximum instantaneous losses. Power flow software shall use accurate 8760 wind data to calculate expected losses for each wind speed.

Losses from the following equipment shall be considered:

- Collection cables (MV and LV)
- PMT's
- MPT's
- Grounding transformers
- Transmission Line (if applicable)

No load losses of all transformers shall be accounted for in the analysis.

Losses at zero percent generation shall be included in the loss calculation.

4.23.3 Required Submittals

4.23.3.1 30% Design

The 30% submittal shall be as thorough and accurate as possible so that any excessive losses can be corrected as early as possible (e.g. by increasing cable sizes).

4.23.3.2 60% Design

A 60% submittal is not required for this study.

4.23.3.3 90% Design

The 90% submittal shall include any design changes since the 30% submittal and identify any excessive losses that need to be corrected.

4.23.3.4 IFC Design

Any corrections or additions from the 90% submittal shall be incorporated in the IFC submittal. The loss percentages shall meet the Owner's requirements.

4.23.3.5 As-Built

Contractor shall provide an as-built submittal which has taken any as-built changes since IFC into account.

4.24 TEMPORARY OVERVOLTAGE (TOV) STUDY

4.24.1 Purpose and Scope

Contractor shall perform TOV analyses to determine the level of temporary overvoltage when the feeder breakers are opened. This analysis shall inform any surge arrester, grounding transformer, and grounding switch breaker recommendations.

4.24.2 Required Methodology

Owner-approved software shall be used to complete this analysis. EMTP, ATP, and PSCAD/EMTDC are approved.

The analysis shall accomplish the following:

- Verify that the temporary overvoltage on the feeder during an open feeder breaker situation stays within acceptable limits (during either a fault scenario or during normal operation). These limits shall be in accordance with the latest edition of IEEE C62.92.1. To meet this requirement, contractor shall make any necessary surge arrester, grounding transformer, or grounding switch breaker recommendations. The study prepared by the Contractor shall provide results with and without any recommended mitigation.
- Verify that the temporary overvoltage does not exceed the TOV withstand capability of the surge arresters.

- Verify that the temporary overvoltage does not exceed the limits of the TOV withstand capability curve of the surge arresters based on the anticipated magnitude and duration of the temporary overvoltage.
- Verify that the temporary overvoltage does not exceed the limits of all equipment associated with the WTG's, inverters, power supplies, etc.
- The energy absorption by the surge arresters shall also be assessed to ensure that they can absorb the required energy.

4.24.3 Required Submittals

4.24.3.1 30% Design

The 30% submittal shall be thorough and accurate in order to determine whether certain grounding equipment is necessary.

4.24.3.2 60% Design

A 60% submittal is not required for this study.

4.24.3.3 90% Design

The 90% submittal shall include any design changes since the 60% submittal and allow for procurement of any necessary grounding equipment.

4.24.3.4 IFC Design

Any corrections or additions from the 90% submittal shall be incorporated in the IFC submittal.

4.24.3.5 As-Built

Contractor shall provide an as-built submittal which has taken any as-built changes since IFC into account.

4.25 INSULATION COORDINATION STUDY

4.25.1 Purpose and Scope

Contractor shall perform a study to ensure that the dielectric strength of equipment on the Project is properly coordinated with the capabilities of the surge arresters.

4.25.2 Required Methodology

Contractor shall verify that the Project is compliant with the requirements of IEEE C62.22.

4.25.3 Required Submittals

4.25.3.1 30% Design

The 30% submittal shall be thorough and accurate in order to determine whether certain grounding equipment is necessary.

4.25.3.2 60% Design

The 60% submittal shall include any design changes since the 30% submittal.

4.25.3.3 90% Design

The 90% submittal shall include any design changes since the 60% submittal and allow for procurement of any necessary grounding equipment.

4.25.3.4 IFC Design

Any corrections or additions from the 90% submittal shall be incorporated in the IFC submittal.

4.25.3.5 As-Built

Contractor shall provide an as-built submittal which has taken any as-built changes since IFC into account.

4.26 STEP AND TOUCH ANALYSIS

4.26.1 Purpose and Scope

The purpose of the study is to determine the worst-case step and touch potentials that could be encountered on the Project.

4.26.2 Required Methodology

Contractor shall use CDEGS or owner-approved equivalent software to verify that the step and touch potentials on the Project are compliant with the latest version of IEEE 80 and NESC. The step and touch voltages on the Project shall not exceed the maximum allowable voltages required by IEEE 80. The following requirements shall also be observed:

- Contractor shall use the worst-case fault current and fault location (based on soil electrical resistivity data) in this analysis.
- If copper telecom infrastructure is used on this Project, ground potential rise evaluation and high voltage isolation equipment design must be included.
- If necessary, Contractor shall recommend changes to the protection system or surface material.
- Contractor shall verify proper ground resistance has been achieved on the Project using the four-point fall of potential method per IEEE STD 81.
- Contractor shall provide grounding system impedance value to Owner prior to startup.

4.26.3 Required Submittals

4.26.3.1 30% Design

The 30% submittal shall be a preliminary analysis based on available geotechnical data.

4.26.3.2 60% Design

The 60% submittal shall incorporate actual site geotechnical data. Any critical step and touch voltage concerns shall be identified at this stage.

4.26.3.3 90% Design

The 90% submittal shall include any design changes since the 60% submittal.

4.26.3.4 IFC Design

Any corrections or additions from the 90% submittal shall be incorporated in the IFC submittal.

4.26.3.5 As-Built

Contractor shall provide an as-built submittal which has taken any as-built changes since IFC into account.

4.27 EFFECTIVE GROUNDING STUDY

4.27.1 Purpose and Scope

The purpose of this study is to verify that the collection system is effectively grounded per IEEE requirements.

4.27.2 Required Methodology

Contractor shall use EMTP software to verify that the collection system is effectively grounded per IEEE C62.92.1. This shall be done by simulating a single line-to-ground fault and verifying that the maximum steady-state peak line-to-ground voltage on the non-faulted phases does not exceed IEEE requirements.

4.27.3 Required Submittals

4.27.3.1 30% Design

The 30% submittal shall be a preliminary analysis and determine whether any critical design changes are needed.

4.27.3.2 60% Design

A 60% submittal is not required for the effective grounding study.

4.27.3.3 90% Design

The 90% submittal shall include any design changes since the 60% submittal.

4.27.3.4 IFC Design

Any corrections or additions from the 90% submittal shall be incorporated in the IFC submittal.

4.27.3.5 As-Built

Contractor shall provide an as-built submittal which has taken any as-built changes since IFC into account.

4.28 RELAY SETTINGS PHILOSOPHY

4.28.1 Purpose and Scope

Contractor shall prepare a relay protection settings and philosophy document for the Project. This document shall describe the relays used, the protection philosophy, and convey all relay settings.

4.28.2 Required Methodology

This study will be reviewed with Owner prior to implementation of relay settings.

Contractor shall use an industry-accepted short circuit and relay coordination software (e.g. Aspen, ETAP, etc.) to develop relay protection settings, as well as any necessary software outputs such as time current curves (TCC's). Any calculations required to determine relay settings shall be included in the report. Schweitzer relays shall be used on this Project. All transmission line relay protection shall be coordinated with the standards from the Transmission Owner as outlined in the GIA. Contractor shall coordinate transmission line protection settings with the Transmission Owner. Separate zones of protection will be required in accordance with Project Collector Substation drawings. The design of the Project will balance minimization of fault clearing times with system coordination. Contractor shall verify the adequacy of the relay design philosophy during the detailed design.

Relay settings and philosophy shall be assessed for all major equipment including but not limited to:

- WTG's
- Collection System circuits
- Substation circuit breakers
- Capacitor/reactor banks
- MPT's
- MPT high side bus
- MPT low side bus
- MPT high side breaker
- MPT low side breaker
- Transmission line

Other requirements:

- Contractor shall implement an "Arc Flash Protection" mode on the feeder relays. This mode is intended to be in service under normal operating conditions and must include a more sensitive directional-overcurrent element. A pushbutton on the front of the relay will allow disabling of the mode to accommodate Wind Turbine pad mount transformer inrush during switching. Only those buses which have a PPE rating greater than hazard risk category 4 shall have the mode available.
- Contractor shall address primary and secondary protections in this philosophy document.
- Contractor shall provide fault locator settings for locating faults on home runs up to the first turbine or 3-way or 4-way junction box on each circuit.
- Contractor shall comply with all applicable NERC standards and requirements.

4.28.3 Required Submittals

4.28.3.1 30% Design

No 30% submittal shall be required.

4.28.3.2 60% Design

The 60% submittal shall include preliminary analyses of all major equipment.

4.28.3.3 90% Design

The 90% submittal shall include analyses of all major equipment and incorporate any comments from the 60% submission.

4.28.3.4 IFC Design

Any corrections or additions from the 90% submittal shall be incorporated in the IFC submittal. This final submittal shall be suitable for use in the final arc flash analysis.

4.28.3.5 As-Built

Contractor shall provide an as-built submittal which has taken any as-built changes since IFC into account.

4.29 ARC FLASH STUDY

4.29.1 Purpose and Scope

Contractor shall perform an assessment of the arc flash risk at each bus in the Project. The purpose of this assessment is to classify the arc flash risk level at each bus based on the worst case incident energy that could occur. Contractor shall also provide all equipment arc flash labels. Prior to equipment purchase, Contractor shall within reason purchase equipment that meets category 4 or less (for example, accessing and operating pad mount transformer low voltage disconnect using category 4 PPE).

4.29.2 Required Methodology

Contractor shall perform the analysis in accordance with the latest adopted version of NFPA 70-E, IEEE 1584 and NESC, as well as Owner's arc flash standards. Where conflicts exist between the above standards, the more stringent shall apply. Contractor shall adhere to the following requirements:

- Contractor shall acquire the following from the Owner:
  - Preferred working distance assumptions for the different voltage levels. Contractor shall also ensure that these assumptions are based on actual and/or practical working distances that will be needed on this Project.
  - Site-specific arc flash hazard classification levels (with PPE (Personal Protective Equipment) requirements).
  - Arc flash label standards, formats, and preferences
- Contractor shall determine the worst case incident energy at every AC and DC bus within the Contractor's design scope (including the low voltage distribution panels (LVDP) in the WTG's if not in Turbine Supplier's or Owner's scope and the AC/DC panels/buses in the Project Collector Substation control building).
- Contractor shall classify each bus based on the above-mentioned site-specific arc flash hazard classification levels.

- Contractor shall perform these analyses in accordance with the latest relay settings that are available when performing each iteration of the study.
- Contractor shall develop maintenance relay settings for the LVDPs in order to reduce the incident energy to hazard category 2. This shall be done in coordination with the "Relay Settings Philosophy" document.
- The design will seek to limit arc flash energy to Hazard/Risk Category 2 at all 690V buses in accordance with the "Relay Settings Philosophy" document. There may be some instances where Hazard/Risk Category 2 is not achievable. The primary acceptable methods for minimizing fault clearing times are to utilize bus differential relay, alternate mode switches and coordination between main and feeder breakers. Fiber-optic arc sensors may be used, only upon approval by Owner, when the primary methods have been exhausted.
- Contractor shall perform an incident energy analysis using ETAP version 12.5.0 or later. Contractor shall provide a summary report which includes tables listing Hazard/Risk category, arc flash boundary distance and incident energy levels for each piece of equipment analyzed. If alternate mode switches are used, the analysis and report must include incident energy levels with the maintenance switches in both the ON and OFF positions. ETAP generated reports should be included as attachments to the Incident Energy Analysis report. Additionally, Contractor shall provide the Buyer with the final ETAP model (.oti and associated .mdb & .lib files) upon completion of the report/project.
- Contractor will perform calculations and provide labeling for all electrical Equipment, as required, to ensure compliance with NFPA 70E. Arc Flash labels will be provided per NFPA 70E.

4.29.3 Required Submittals

4.29.3.1 30% Design

A 30% submittal shall not be required.

4.29.3.2 60% Design

A 60% submittal shall not be required.

4.29.3.3 90% Design

The 90% submittal shall be the first submittal and be based on the latest data and information available at that time.

4.29.3.4 IFC Design

Any corrections or additions from the 90% submittal shall be incorporated in the IFC submittal. This version will be updated with as-built changes from the field.

4.29.3.5 As-Built

Contractor shall provide an as-built submittal which has taken any as-built changes since IFC into account.

4.30 MINIMUM APPROACH DISTANCE (MAD) STUDY

4.30.1 Purpose and Scope

Contractor shall perform an assessment of the Minimum Approach Distance (MAD) for the Project Collector Substation. The purpose of this assessment is to determine minimum approach distance for use by the Owner during maintenance activities as per the OSHA Standard 1910.269(I)(3) and (q)(3). Contractor shall also provide all equipment minimum approach distance labels.

Contractor shall perform a Transient Overvoltage study to determine the expected overvoltage factor (per-unit) to calculate the MAD for the Project Collector Substation.

4.30.2 Required Methodology

- The study shall use EMTP type software program for modeling the transmission network and calculating the per unit Transient Overvoltage.
- For the purpose for the Transient Overvoltage study, the "study area" shall include the system within the radius of up to two (2) substations from Project Collector Substation.
- To accurately capture the switching transient travelling waves, frequency dependent models of the transmission lines in the study area shall be included in the study model.
- This model shall include transmission line tower configuration and conductor and ground wire parameters to calculate the frequency dependent impedance parameters of the transmission circuit. The EMTP software program used should be able to calculate the surge impedance and the travel time of the transient waves.
- Detailed substation data such as transformer data with winding impedances and nameplate rating, shunt connected equipment data, circuit breaker data, surge arrester information are to be included in the Transient Overvoltage study model.
- The rest of the system shall be represented by an equivalent network model.
- The EMTP model built shall be validated against the obtained transmission load flow and short circuit models for power flow, voltage and short circuit parameters.
- The Transient Overvoltage study is to be performed under study under various network configurations (system intact vs. contingency scenarios).
- The Transient Overvoltage must be calculated for the worst case switching transient among the multiple point-on-wave (POW) switching simulations performed via statistically control circuit breaker operation as per OSHA 1910.269.
- The Minimum Approach Distance (MAD) shall be determined based on the worst observed Transient Overvoltage in per unit using the OSHA online calculator available at:

https://www.osha.gov/dsg/mad_calculator/mad_calculator.html

4.30.3 Required Submittals

4.30.3.1 30% Design

A 30% submittal shall not be required.

4.30.3.2 60% Design

A 60% submittal shall not be required.

4.30.3.3 90% Design

The 90% submittal shall be the first submittal and be based on the latest data and information available at that time.

4.30.3.4 IFC Design

Any corrections or additions from the 90% submittal shall be incorporated in the IFC submittal. This version will be updated with as-built changes from the field.

4.30.3.5 As-Built

Contractor shall provide an as-built submittal which has taken any as-built changes since IFC into account.

4.31 PROJECT COLLECTOR SUBSTATION-SPECIFIC STUDIES

4.31.1 AC Station Service Study

4.31.1.1 Purpose and Scope

Contractor shall perform an AC station service study in order to determine the appropriate ratings for the AC auxiliary power system components installed in the Project Collector Substation.

4.31.1.2 Required Methodology

Contractor shall perform the analysis in accordance with the latest version of the National Electrical Code (NEC), National Electrical Safety Code (NESC) and IEEE-141. Contractor shall adhere to the following requirements:

- Voltage drop will be calculated in order to minimize electrical losses and to determine the size of cables required for the auxiliary power system.
- The minimum kVA rating of the auxiliary power transformer will be calculated based on the AC panel loads. The automatic transfer switch (ATS) will be sized according to the maximum amps per phase of the proposed transformer.
- The equipment and material components of station service systems are specified according to manufacturer and industry standards.
- The components are sized and selected for application by manufacturer's data and by industry design guides and standard practices.

4.31.1.3 Required Submittals

30% Design

The 30% submittal shall be thorough and accurate in order to determine the appropriate rating of the required station service transformer and components.

60% Design

A 60% submittal is not required for the AC station service study.

90% Design

The 90% submittal shall include any design changes since the 30% submittal, and allow for procurement of the required station service transformer and components.

IFC Design

Any corrections or additions from the 90% submittal shall be incorporated in the IFC submittal.

As-Built

Contractor shall provide an as-built submittal which has taken any as-built changes since IFC into account.

4.31.2 DC Station Service Study

4.31.2.1 Purpose and Scope

Contractor shall perform a DC station service study in order to ensure appropriate ratings for the battery and battery charger installed in the control building of the Project Collector Substation.

4.31.2.2 Required Methodology

Contractor shall perform the analysis in accordance with the latest version of IEEE-485 and IEEE-946. Contractor shall adhere to the following requirements:

- The continuous and momentary DC loads will be calculated in accordance with the Project Collector Substation one line diagrams and ancillary loads that will be connected to the battery.
- The battery charger shall provide a constant DC load and recharge the battery in a 12 hour period.
- The equipment and material components of station service systems are specified according to manufacturer and industry standards.
- The components are sized and selected for application by manufacturer's data and by industry design guides and standard practices.

4.31.2.3 Required Submittals

30% Design

The 30% submittal shall be thorough and accurate in order to determine the appropriate ratings of the DC battery and charger.

60% Design

A 60% submittal is not required for the DC station service study.

90% Design

The 90% submittal shall include any design changes since the 30% submittal, and allow for procurement of the required battery and battery charger.

IFC Design

Any corrections or additions from the 90% submittal shall be incorporated in the IFC submittal.

As-Built

Contractor shall provide an as-built submittal which has taken any as-built changes since IFC into account.

4.31.3 Lighting Study

4.31.3.1 Purpose and Scope

Contractor shall perform a lighting study in order to properly design the Project Collector Substation exterior area lighting systems.

4.31.3.2 Required Methodology

Contractor shall perform the analysis in accordance with the latest version of the National Electric Safety Code (NESC). Contractor shall adhere to the following requirements:

- Lighting illumination calculations should be performed (on the basis of the selected luminaires and dimensions of the illuminated area) by one of the following methods: computer program (preferred), manual, or spreadsheet. The preferred and verified computer software programs are Visual and Lighting Analysts, Inc., AGI32.
- Two kinds of lighting are required: general illumination for the movement of occupants and directed illumination for viewing fans, bushings, oil gauges, panels, disconnect switch jaws, station bus, and other live parts.
- The IESNA recommends 20 lux (2.0 footcandles) be maintained for general or area illumination and 50 lux (5.0 footcandles) be maintained for directed or task illumination. Depending on the Project Collector Substation size and projected future layout (if large unused areas exist), maintaining 20 lux (2.0 footcandles) for general illumination throughout the Project Collector Substation yard may be an unreasonably high overall illumination level.
- Outdoor control building lights shall remain on during the night. All other Project Collector Substation yard lighting shall be operated by a switch or switches installed in the control building.

4.31.3.3 Required Submittals

30% Design

A 30% submittal is not required for the lighting study.

60% Design

The 60% submittal shall include preliminary analyses of Project Collector Substation exterior area.

90% Design

The 90% submittal shall include analyses of the Project Collector Substation exterior area and incorporate any comments from the 60% submission.

IFC Design

Any corrections or additions from the 90% submittal shall be incorporated in the IFC submittal.

As-Built

Contractor shall provide an as-built submittal which has taken any as-built changes since IFC into account.

4.31.4 Lightning Study

4.31.4.1 Purpose and Scope

Contractor shall perform a lightning study in order to determine the effective striking distance that provides direct stroke shielding for the Project Collector Substation. The effective lightning protection design shall utilize shield masts and/or shield wires.

4.31.4.2 Required Methodology

Contractor shall perform the analysis in accordance with the latest version of IEEE-998. Contractor shall adhere to the following requirements:

- The effective lightning protection design shall utilize shield masts and/or shield wires.
- The resulting shielding system failure rate is calculated to confirm the design adequacy per the rolling sphere method, based on the electro-geometric model.
- The fixed angle method per IEEE-998 may be used to confirm design adequacy.
- These methods apply to electrical switchyard equipment and structures. The protection of transmission lines and buildings is outside the scope of this study.

4.31.4.3 Required Submittals

30% Design

The 30% submittal shall include preliminary analyses of Project Collector Substation lightning protection.

60% Design

A 60% submittal is not required for this study.

90% Design

The 90% submittal shall include any design changes since the 30% submittal, and allow for procurement of required lightning masts and/or shield wires.

IFC Design

Any corrections or additions from the 90% submittal shall be incorporated in the IFC submittal.

As-Built

Contractor shall provide an as-built submittal which has taken any as-built changes since IFC into account.

5.0 Substation

5.1 GENERAL

These general equipment specifications apply in general to all equipment and materials and are supplementary to the detailed specifications. If requirements specified herein are in conflict with requirements specified in the detailed specifications, the more stringent specification shall govern to the extent of such conflict. The Contractor shall furnish all major substation equipment per the Owner's specification data sheet(s) and determine necessary quantities and ratings where applicable.

The Contract shall be based upon the use of equipment and materials complying fully with the requirements specified in this Exhibit. For 345kV equipment, Contractor shall follow Transmission Owner's specifications if specified by Owner and/or Transmission Owner during detailed design. It is recognized that the Contractor may have standardized on the use of certain components, materials, processes, or procedures different than those specified herein. Alternates on the basis of supplying the Contractor's standard components, materials, processes, or procedures will be considered by the Owner. The alternate proposal shall clearly stipulate the alternate proposed, the specific exceptions to the specifications, and the price change applicable for supplying such alternate.

5.1.1 Identification

All correspondence, shipping notices, specifications, engineering data, and other documents pertaining to the equipment and materials furnished under these specifications shall be identified by the Owner's name, the project name, the unit number, and the specification number.

5.1.2 Numbering System

The Owner shall establish an identification numbering system to provide consistent numbering throughout the generating unit. All electrical devices, control and instrumentation equipment, and other items of similar nature shall be permanently identified with the identification number specified on the Contractor's drawings. Except as specified otherwise in these specifications, the identification shall be engraved on stainless steel or laminated phenolic tags or nameplates at the option of, and as acceptable to, the Owner and permanently affixed to the device. The Owner's identification numbers shall be included on the drawings prepared by the Contractor.

5.1.3 Equipment Testing

The Owner reserves the right to witness any or all of the Project Collector Substation equipment testing.

The Contractor shall notify the Owner of the scheduled start date of the factory tests not less than two weeks prior to the start of testing.

A copy of the test report shall also be included in each copy of the instruction manual for substation equipment.

5.1.4 Preshipment Inspection

The Owner reserves the right to inspect the equipment prior to shipment.

The Contractor shall notify the Owner of all shipments not less than 72 hours prior to the date of shipment to allow the Owner to inspect the equipment if so desired, given appropriate notice.

5.1.5 Shipments

Shipments to the Project Collector Substation site shall be consigned to the following locations.

Truck Shipments:

[Insert Site Address]

The Contractor shall discuss with the Owner the routing of shipments and shall route the shipments as indicated by the Owner, provided freight rates are no greater than by other routes.

5.1.6 Shipping Notice

The Contractor shall submit to the Owner two copies of shipping notices describing each shipment of material or equipment. The shipping notices shall be faxes or e-mails to arrive approximately 3 business days ahead of the estimated shipment arrival. The addressee for each shipping notice will be determined later.

5.1.7 Recommended Spare Parts

The Contractor shall provide a complete listing of recommended spare parts with unit prices FOB Project Collector Substation site. The listing shall include the manufacturer of each part, a description of each part (including industry standard part number if available), the assembly or equipment in which each part will be used, and recommended quantities to be stocked; shall classify the relative criticality of parts based on manufacturer's experience; and shall list the lead time required for manufacture and delivery of each part.

Owner will retain the option of purchasing any one or any combination of spare parts listed at the prices quoted until 6 months after the date of commercial operation.

5.1.8 Electronic Material List

Contractor shall provide an electronic material list for their entire scope of work by means of an electronic file in the Excel spreadsheet format. Scanned files or documents are not acceptable. The Excel spreadsheet must list all "receivables", which are items to be shipped as separate components, assemblies, sub-assemblies or spares. For Change Orders/Revisions, the entire original Electronic File does NOT need to be resent; only the changes need to be provided.

As a minimum, the following fields must be provided on the Electronic Material List:

- PO NO. - Owner's Contract Number (15 AN)
- Contractor Name - Contractor's name as shown on Contract (50 AN)
- Current Promise Delivery Date – This is the date Contractor is currently promising delivery by. This must be provided for each deliverable item (10 character N – Date Format is mm/dd/yyyy)

- Field Required Date – This is the delivery date required per the Contract. This must be provided for each deliverable item. (10 character N – Date Format is mm/dd/yyyy)
- Contractor's Tag Number – Enter tag number. Contractor shall use Contractor's or Subcontractor's identification number (i.e. mark, piece, part or serial number, must be shown). Each tag, mark, piece, part, or serial number shall be listed individually. Do not combine them. (30 character AN)
- Quantity – Provide the quantity of each item. (10 character N)
- Size and Description – Provide the description (I.e. nameplate description) and size for all items. (200 character AN)
- Advise if preventative maintenance or storage requirements are required prior to installation – Contractor shall identify the item numbers or specific component types which are to be stored indoors and/or require special storage provisions or require preventative maintenance prior to installation. If Contractor specifies Yes (Y), Contractor shall provide specific details of the requirements. (1 Character A, either Y for Yes or N for No for each deliverable item).
- Unit of Measure – Provide applicable unit of measure
- Additional Fields - Additional fields are required for pre-fabricated materials, such as structural steel. The area, drawing number, sequence or volume, and shop order number are required for all pre-fabricated materials. For structural steel the weight is required.

5.1.9 Codes and Standards

Latest version of all codes and standards listed in this Exhibit shall govern unless otherwise indicated.

5.2 TECHNICAL SCOPE AND SYSTEM PERFORMANCE REQUIREMENTS

5.2.1 Technical Scope of Work

The work under these specifications shall include furnishing all materials listed in this section in accordance with their respective specifications.

5.2.2 Quantity of Supply

Contractor shall supply all structures and materials in sufficient quantity to ensure the Project Collector Substation achieves the operating characteristics described in these specifications.

Contractor shall design and build an open (future) bay on each 34.5 kV bus.

The included conceptual design for the Project Collector Substation is not a final design nor are the quantities thereof accepted to be correct, whether or not such quantities are expressed or implied. All of the conceptual design drawings are for reference only and shall be taken as a guide showing the desired design approach.

5.3 CIVIL REQUIREMENTS

5.3.1 General

The Project Collector Substation civil works shall be developed as required to support the construction of the electrical components of the Project. The earthwork services shall be performed based on the results of the geotechnical investigations and topographical surveys and shall meet all minimum requirements of these technical specifications and as required by the detailed Project layout. Site preparation shall consist of clearing and grubbing and the placing and compaction of fill with slopes and embankments designed in such a fashion as to be stable and capable of carrying anticipated loads from equipment or structures. The Project Collector Substation site shall be graded such that runoff water will drain away from the site. The top of all permanent foundations shall be placed a minimum of 12 inches above the 100-year flood elevations.

5.3.2 Site Preparation

Site preparation requirements shall comply with the specification data sheet(s) completed by Contractor during detailed design.

5.3.3 Fencing

Fencing shall be furnished in accordance with the specification data sheet(s) completed by Contractor during detailed design.

5.3.4 Camera Conduits

The Contractor will design, procure, and install conduits for operating cameras in the substation. The locations will be agreed upon with Owner during design. The Contractor will run (2) 1-inch conduits from the control building to each of the camera locations. At each camera location, will be a hand-hold box installed with the conduit appropriately connected to the hand-hold box. Generally, the locations will be at each corner and next to each gate.

5.4 STRUCTURAL REQUIREMENTS

5.4.1 General

The Contractor shall be responsible for the design, detailing, material procurement, layout, erection, and construction of substation foundations and structures, as required for the installation and operation of the substation.

5.4.2 Codes and Standards

The design and construction of all substation foundations and structures shall be in accordance with all Federal, State, and Municipal codes and regulations, as well the Codes and Standards listed below.

- International Building Code 2015 (IBC 2015).
- Building Code Requirements for Structural Concrete, American Concrete Institute (ACI 318-14).
- Manual of Steel Construction, American Institute of Steel Construction (AISC, 14th Edition).

- Minimum Design Loads for Buildings and Other Structures, American Society of Civil Engineers (ASCE 7-16).
- International Standard, Wind Turbines-Part 1: Design Requirements (IEC 61400-1, Edition 3.1, 2014-04).
- ASCE Manuals and Reports on Engineering Practice No. 113, Substation Structure Design Guide.

5.4.3 Concrete Foundations

All concrete and grout material used for substation foundations shall be in accordance with the requirements specified in Section 3.0.

Anchor bolts, concrete piers, and flat slabs shall be set carefully and maintained at the lines and elevations shown on the drawings within the following tolerances:

- Location of foundation center: ±1/2”
- Distances between bolt centers in the same foundation: ±1/16”
- Elevation at top of anchor bolts and flat slabs: minus 0” to plus 1/4”
- Angular deviation from vertical (out of plumb): 1/16” in 1’
- Distance between anchor bolt centers between adjacent foundations for a structure: ±1/4”
- Horizontal angular alignment (rotation) of anchor bolt group: ±1°
- Flat slab deviation from level: 1/16” in 4’

5.4.4 Miscellaneous Concrete Embedments

The Contractor shall coordinate the location and placement of grounding grids, control conduit, and electrical conduit, as needed. Conduit placement details shall be submitted to the Owner for approval.

Miscellaneous embedments and conduit will be located as not to interfere with a foundation’s structural reinforcing steel.

Miscellaneous embedments will be properly secured to prevent movement during concrete placement.

5.4.5 Structural Steel

Dead-end steel structures shall be single-bay h-frame structures made of tubular steel. Overload factors and shape factors shall be accounted for in the design of these structures. Lightning masts, static wire vangs, grounding lugs, and other lightning-protection design considerations shall be accounted for.

All small substation steel supports shall be made of structural steel members. Seal welds shall be provided between strength welds before galvanizing per ASTM A123. Welding electrodes shall be E70XX per AWS A5.1.

Structural steel design documentation shall be submitted to the Owner as specified in Specification WED 0142 and specification data sheet(s) completed by Contractor during detailed design.

5.5 OUTDOOR DISCONNECT SWITCHES

5.5.1 General

Outdoor Disconnect Switches shall be furnished in accordance with the specification data sheet(s) completed by Contractor during detailed design.

Owner reserves the right to be present during factory testing. Contractor shall give Owner a minimum thirty (30) days' notice so that personnel can make proper arrangements. Presence at factory testing shall be made available to Owner at no additional cost to Owner.

5.5.2 Codes And Standards

Outdoor disconnect switches furnished under these specifications shall be in accordance with the requirements of applicable to ANSI, IEEE, and NEMA standards. All materials and devices shall be in accordance with the applicable requirements of state and local safety standards.

5.5.3 Equipment Required

The Contractor shall furnish disconnect switches and accessories as indicated on the drawings and specified herein.

The quantities of disconnect switches furnished shall be indicated on the drawings.

Per Owner, the following outdoor disconnect switches shall be furnished by the Contractor for the Project Collector Substation:

Table 5-1 Outdoor Disconnect Switches

MFG Description	Approved Vendors
345 kV Double Break Disconnect Switch*	Southern States. LLC
*May need the opportunity to have a right/left hand ground blade option.	

5.5.4 Insulators

Disconnect switch insulators shall be furnished.

5.5.5 Ratings

Disconnect switch ratings shall be furnished in accordance with the specification data sheet(s) completed by Contractor during detailed design.

If Contractor recommends altitude correction, a clear indication should be made to the Owner.

5.5.6 Switch Construction (If Applicable)

Switches shall be complete with switch blades, contacts, terminals, bases, and leveling devices, and with all bolts, nuts, and other hardware required to assemble the switches, mount the insulators,

and mount the switches on steel structures. Switch bases shall be designed to resist all dynamic and static loads imposed by the switch. Switch bases shall be steel channel, hot-dip galvanized after fabrication.

All switch components fabricated of ferrous materials shall be hot-dip galvanized after fabrication or shall be stainless steel.

Switch parts shall be capable of carrying the continuous current required in an ambient temperature of 40ºC without exceeding the temperature rises listed in ANSI C37.30, and shall have sufficient strength for all mechanical requirements.

All switches shall be furnished with copper or aluminum alloy live parts. Copper switch blades shall be hard drawn and tinned after fabrication; aluminum switch blades shall be extruded 6063, T6 alloy. Where disconnect switch terminals are fabricated of copper, the copper shall be tinned. All other switch components which are fabricated of copper and are in contact with aluminum shall have the copper tinned, and shall be provided with electrical joint compound between the contact surfaces.

Switch bearings shall be maintenance free of the sealed, greaseless type.

Switch contacts shall be high-pressure, silver insert, wiping action type. The jaw contact fingers of switches so equipped shall be designed to increase contact pressure with increasing current. Contact finger pressure springs shall be outside of the load current path.

Disconnect switches shall be furnished with terminal pads with 9/16 in. (14.3 mm) diameter bolt holes on 1-3/4 in. (44.45 mm) centers. Both sides of each terminal pad shall be suitable for electrical connection to the bus system. The quantity and arrangement of bolt holes in each terminal pad shall be coordinated with the switch continuous current rating and shall be in accordance with the following table. Contractor shall verify with manufacturer the required bolt size, diameter, and installation torque that ensure these ampere ratings.

Table 5-2 Switch Continuous Current Ratings

Switch Continuous Current Rating, amperes	Quantity of Bolt Holes	Bolt Hole Arrangement
600	2	Parallel to center line of switch
601 through 2,000	4	Square
2,001 through 4,000	6	Rectangular, with longer dimension perpendicular to center line of switch

All bolts, nuts, and other hardware required to attach the disconnect switch bases to the steel structures and the station post insulators, and make the electrical connections to the bus system shall be provided. The quantity of bolts, nuts, and other hardware provided shall include an overage of 5 percent plus ten bolts of each type, size, and length.

5.5.7 Hookstick Operated Switches

Standard blade stops for all hookstick switches shall be set to 90 degrees. Operators shall be able to operate hookstick switches at a 45 degree angle from the switch.

5.5.8 Group Operators (If Applicable)

Group operators shall be complete with interphase shafts, operating rods, couplings, guide bearings, mounting brackets, offsets, manual or motor operators, and all bolts, nuts, and other hardware required to assemble the operators and mount the operators on steel structures.

Operators shall be furnished with multi-revolution grounding devices or braids and with provisions for padlocking in the open and closed positions. Braids shall be tinned copper.

All levers, interphase shafts, and operating rods shall be cut to length and threaded at the factory. All group operator components fabricated of ferrous materials shall be hot-dip galvanized after fabrication or shall be stainless steel.

5.5.8.1 Manual Operators (If Applicable)

Manual operators for switches shall be swing handle type and indicated on the specification data sheet(s) by Contractor during detailed design. Manual operators shall not require an operating force greater than 50 lb (220 N).

Each disconnect switch manual operator shall be provided with an auxiliary switch, with contacts in accordance with the specification data sheet(s), enclosed in a NEMA 4 weatherproof housing equipped for threaded rigid steel conduit connection. The auxiliary switch housing shall contain a 120 VAC space heater. Auxiliary switch contacts shall be field convertible. The auxiliary switch shall be for field mounting on the operating pipe where the operating pipe shall be at 3’6” from top of grade to ensure ease of operating and closing.

5.5.9 Tightening of Connections

The Contractor shall include on the erection and assembly drawings complete information for tightening of all electrical connections secured with bolts or studs. The information furnished shall include torque wrench settings or complete details of other tightening procedures recommended for bus joints, connector attachments, and contact attachments.

5.5.10 Manufacturers

All disconnect switches shall be of a common brand. See Appendix for approved vendors.

5.6 INSULATORS

5.6.1 General

Insulators for use on the substation structures shall be furnished in accordance with this section and indicated on the specification data sheet(s) by Contractor during detailed design.

Owner reserves the right to be present during factory testing. Contractor shall give Owner a minimum thirty (30) days’ notice so that personnel can make proper arrangements. Presence at factory testing shall be made available to Owner at no additional cost to Owner.

5.6.2 Codes and Standards

All insulators furnished under these specifications shall conform to the requirements of the latest applicable standards of ANSI, IEEE, and NEMA.

5.6.3 Equipment Required

Insulators furnished shall be complete with all accessories ready for mounting, assembly, connection, and immediate service.

The quantity and types of insulators furnished shall be indicated on the drawings.

5.6.4 Design Requirements

Insulator design requirements are covered in the following sections. Fittings and clamps shall be hot-dip galvanized, malleable iron or bronze. Aluminum fittings and clamps shall not be used.

5.6.5 Station Post Insulators (If Applicable)

These station post insulators shall be used as rigid bus supports. All mounting hardware for insulator field assembly and mounting to equipment and steel structures shall be furnished with an average of 5 percent plus 10 bolts of each type, size, and length.

5.6.6 Manufacturers

Insulators shall be as manufactured by Lapp Insulator Company, Newell Porcelain, PPC Insulators, and/or NGK Locke unless otherwise approved by the Owner.

5.7 VOLTAGE TRANSFORMERS

5.7.1 General

Voltage transformers shall be furnished in accordance with this section and as indicated on the drawings. For 34.5 kV voltage transformers, see Owner's Specification 0168 included with this Exhibit.

Voltage transformers shall be furnished in accordance with the specification data sheet(s) completed by Contractor during detailed design.

5.7.2 Codes and Standards

Voltage transformers furnished under these specifications shall be in accordance with applicable standards of ANSI, IEEE and NEMA.

All materials and devices shall be in accordance with the applicable requirements of the Federal "Occupational Safety and Health Standards."

5.7.3 Equipment Required

Voltage transformers furnished shall be complete with all accessories ready for mounting, assembly, connection, and immediate service.

The quantity and types of voltage transformers furnished shall be as indicated on the drawings.

5.7.4 Ratings

The voltage transformers shall be rated as indicated in Section 5.0 of Owner's Specification 0168. Additional voltage transformer ratings for 34.5 kV are provided in the table below.

Table 5-3 Voltage Transformer Ratings

Nominal Circuit Voltage, Vpp	34.5 kV
Maximum Continuous Voltage, Vpp	36.5 kV
Continuous Overvoltage, V'pp (1.1 x Vpp)	38 kV
Nominal Circuit Voltage (phase to ground), Vpg	19.9 kV
BIL and Full Wave, (Minimum) 1.2 x 50µs	200 kV
Bushing	
Minimum Creepage Distance Distance based on ≥ 25mm/kV (max)	≥ 37 inches ≥ 934 mm
60 Hz Wet, 10-sec. Withstand	70 kV
Minimum strike distance	16 inches
Windings	
Primary Voltage	20.125 kV
Secondary Voltages (rms)	115/67.08 V
Winding Ratio	175/300:1
Secondary Windings	2
Taps per Winding	3
ANSI Accuracy Class @ Burden **MWXY & Z**	0.15
Thermal Burden (Per Winding)	1000

Where indicated on the drawings, voltage transformer(s) shall be provided. Primary and secondary ratings shall be indicated on the specification data sheet(s).

The voltage transformers shall be suitable for operation at the altitude specified on the specification data sheet(s).

5.7.5 Construction Details

Each voltage transformer shall be designed and fabricated in accordance with the latest revisions of the applicable codes and standards.

Voltage transformers shall be furnished with all field connection hardware for field mounting on supports described in these specifications. All hardware shall be hot-dip galvanized.

Each voltage transformer assembly shall include line connectors and base support assembly.

Voltage transformers rated 230 kV and above shall be equipped with corona shields as required.

The voltage transformers shall be furnished with the following accessories:

- Primary terminal - tin-plated bronze
- Oil level indicator
- Oil drain and filling valves
- Four lifting eyes in base

Porcelain color shall be indicated in the specification data sheet(s).

The number of bushings shall be indicated in the specification data sheet(s).

5.7.6 Base Support Assembly

The base support assembly shall be an outdoor, weatherproof enclosure designed and fabricated to support and house the following equipment:

1	Space heater sized to prevent moisture from condensing on internal components, with the voltage rating specified in the specification data sheet(s)
1	Grounding terminal, bolted clamp type, for up to 127 mm^2 (250 kcmil) copper ground cable size
1	Terminal box, weatherproof with threaded conduit hubs
1	Voltage transformer network factory adjusted, with main and auxiliary secondary windings, each rated in accordance with the specification data sheet(s)

5.7.7 Manufacturers

Voltage transformers manufacturer and type shall be indicated on the specification data sheet(s).

5.8 CAPACITOR VOLTAGE TRANSFORMERS

5.8.1 General

Capacitor voltage transformers (CVTs) shall be furnished in accordance with this section, as indicated on the drawings, and specification data sheet(s) completed by Contractor during detailed design.

5.8.2 Codes and Standards

All equipment furnished under these specifications shall conform to the applicable standards of ANSI, IEEE, and NEMA.

All materials and devices shall be in accordance with the applicable requirements of the Federal "Occupational Safety and Health Standards."

5.8.3 Equipment Required

CVTs furnished shall be complete with all accessories ready for mounting, assembly, connection, and immediate service.

The quantity and types of CVTs furnished shall be as indicated on the drawings.

Per Owner, the following CVTs shall be furnished by the Contractor for the Project Collector Substation:

MFG DESCRIPTION	APPROVED VENDORS	MFG ITEM ID
CVT, Stn Post, 345 kV, 1550 kV BIL	ABB	

5.8.4 Ratings

All CVTs shall be suitable for operation at the altitude and ratings indicated on the specification data sheet(s).

5.8.5 Details of Construction

Each CVT shall be designed and fabricated in accordance with the latest revisions of the applicable Codes and Standards.

Each CVT assembly shall include line connectors, coupling capacitor units, and base support assembly. Each CVT shall be factory adjusted and designed and fabricated in accordance with NEMA.

Porcelain color shall be indicated in the specification data sheet(s).

Each CVT shall be furnished with a 100 mm (4 in.) wide NEMA 4-hole line terminal pad, unless otherwise indicated by Owner.

CVTs rated 230 kV and above shall be equipped with corona shields as required.

CVTs shall be furnished with all field connection hardware for field mounting on steel supports described in these specifications. All hardware shall be hot-dip galvanized.

If required, carrier accessories and wide band filters shall be provided for the CVTs.

The CVTs shall be furnished with the following accessories:

- Primary terminal in accordance with the specification data sheet(s).
- Four lifting eyes in base.

5.8.6 Capacitor Units

The coupling capacitor shall be a standard assembly of capacitor units including a lower coupling unit with such additional upper coupling units as are required to provide the necessary series capacitance between line and ground.

The lower coupling unit shall include one or more insulating bushings projecting through the bottom for connection to the voltage transformer and carrier current networks (if required) and shall be mounted on the base support assembly.

The upper coupling unit shall be standard, arranged for bolting to the lower unit and for supporting other upper bolt-secured units.

5.8.7 Base Support Assembly

The base support assembly shall be an outdoor, weatherproof welded enclosure designed and fabricated to support and mount the coupling capacitors specified above and house the following equipment:

1	CVT factory adjusted, including protective gaps, reactors, potential grounding switch with external hookswitch operator, carrier grounding switch with external hookswitch operator (carrier equipped units only), and a transformer with main and auxiliary secondary windings, each rated in accordance with ANSI C93.2.
1	Space heater sized to prevent moisture from condensing on internal components, with the voltage rating specified on the specification data sheet(s).
1	Carrier lead-in bushing (carrier equipped CVTs only).
1	Grounding terminal, NEMA 2-hole pad, tinned bronze, bolted clamp type, for up to 127 mm^2 (250 kcmil) copper ground cable size.
1	Terminal box, weatherproof with threaded conduit hubs.

5.8.8 Manufacturers

CVTs manufacturer and type shall be indicated on the specification data sheet(s).

5.9 REVENUE METERING

5.9.1 General

Metering units, specifically described as single-phase, oil-filled, combination current/voltage instrument transformers for revenue metering and outdoor use, shall be furnished in accordance with this section.

See Owner's Specification 0167, 0168 and Guideline for Substation Metering Applications included with this Exhibit for metering instructions. The requirements of the specification data sheet(s) and drawings shall govern should conflicts occur between them and the written text of these specifications.

The Contractor shall furnish the metering unit in accordance with the specification data sheet(s) completed by Contractor during detailed design.

5.9.2 Codes and Standards

All equipment furnished under these specifications shall conform to the latest applicable standards of ANSI, IEEE, and NEMA, especially those listed below, with exceptions as may be contained in these specifications:

ANSI C57.13 IEEE	Standard Requirements for Instrument Transformers.
NEMA 107	Methods of Measurement of Radio Influence Voltage (RIV) of High Voltage Apparatus.
ANSI C12.11	American National Standard for Instrument Transformers for Revenue Metering 10 kV BIL through 1050 kV BIL (0.6 kV NSV Through 230 kV NSV).

All materials and devices shall be in accordance with the applicable requirements of the Federal "Occupational Safety and Health Standards."

5.9.3 Equipment Required

The metering units furnished shall be complete with all accessories ready for mounting, assembly, connection, and immediate service.

The quantity and types of metering units furnished shall be indicated on the drawings, and on the specification data sheet(s).

5.9.4 Ratings and Metering Requirements

The metering units shall be suitable for operation at the altitude and ratings indicated on the specification data sheet(s).

The metering requirements shall be:

- Balance Area metering – SEL 735
- Customer Billing metering – SEL 735
- Feeder metering – metering data from relay/control metering functions (preferred) or SEL 735

5.9.5 Construction Details

Each metering unit shall be designed and fabricated in accordance with the latest revisions of the applicable Codes and Standards.

Metering units shall be single-pole type and a hermetically sealed, oil-filled wound device. Metering unit assemblies shall include line connectors and base support assemblies.

Metering units shall be furnished with all hot-dip galvanized hardware to accommodate field mounting on steel supports with a ½ inch thick plate.

Metering units rated 230 kV and above shall be equipped with corona shields as required.

Porcelain color shall be indicted in the specification data sheet(s).

The metering units shall be furnished with the following accessories:

- Primary terminals
- Four lifting eyes in base.
- Oil level indicator.
- Oil drain and filling valves.
- Lifting Sling(s) (one set per order)

5.9.6 Base Support Assembly

The base support assembly shall be an outdoor, weatherproof welded steel enclosure designed and fabricated to support and mount the metering units specified above and house the following equipment:

1	Space heater sized to prevent moisture from condensing on internal components, with the voltage rating specified in the specification data sheet(s).
1	Grounding terminal, NEMA 2-hole pad, bolted clamp type, for up to 127 mm^2 (250 kcmil) copper ground cable size.
1	Voltage transformer network factory adjusted, with main and auxiliary secondary windings, each rated in accordance with the specification data sheet(s).
1	PT terminal box, weatherproof with (3) 1-1/2 inch standard threaded conduit hubs.
1	CT terminal box, weatherproof with (3) 1-1/2 inch standard threaded conduit hubs.
4	1" lifting eyebolts for a four-point lifting sling arrangement.

5.9.7 Grounding

The neutral terminal of the voltage transformer shall exit the tank via a 5kV insulated bushing and be grounded by means of a removable copper strap to a NEMA 2-hole pad.

5.9.8 Terminals

The primary terminals shall be aluminum or tin-plated copper in a NEMA hole-pattern that meets the continuous current carrying requirements. The secondary terminals shall be #10-32 threaded studs. The CT secondary terminals shall be a sliding CT shorting link type.

5.9.9 Paint

Exterior metallic non-current carrying surfaces and parts shall be either corrosion resistant material or painted with a weather-resistant paint system consisting of one primer and two ANSI-70 gray finish coats. As an option, for high-corrosion areas, special corrosion-resistant finishes (e.g., zinc-rich, paint, or stainless steel tank) shall be available.

5.9.10 Insulating Oil

The nameplate shall be of stainless steel material and shall indicate that the dielectric fluid is free of polychlorinated biphenyls by the inscription: "CONTAINS NO PCB AT TIME OF MANUFACTURE".

5.9.11 Lead Markings

Metering unit primary and secondary lead markings shall meet established IEEE, ANSI, industry standard, and/or Owner conventions.

5.9.12 Accessories

Metering units shall be furnished with a magnetic oil level gauge readable from ground level. The oil drain and filling provisions shall be provided with a ½" brass ball drain valve with plug and a 1-inch oil filling opening with nitrogen valve.

Metering units shall be furnished with a primary bypass protector, and four 7/8" x 2-3/8" base mounting slots.

5.9.13 Testing

Before shipment, each transformer shall be subjected to testing as prescribed by NEMA Standard 107 and ANSI C57.13 and other tests as follows:

Applied voltage test	for primary and secondary winding withstand to ground.
Induced voltage test	for proper turn-to-turn insulation.
Accuracy test	for ratio correction factor and phase-angle verification to confirm required metering accuracy per ANSI C57.13.
Leak test	to assure integrity of gaskets and seals.
Partial discharge test	may be done in conjunction with applied voltage testing to assure proper line-to-ground withstand.
Turns ratio test	
Insulation power factor test	
Polarity test	
CT secondary excitation test	

These tests shall be submitted on a formal certified test report, with the required number of copies to be submitted to the Owner at the time of delivery of the units.

5.9.14 Manufacturers

Metering units manufacturer and type shall be indicated on the specification data sheet(s).

5.10 SURGE ARRESTERS

5.10.1 General

Surge arresters for outdoor use shall be furnished in accordance with this section.

The Contractor shall furnish surge arresters in accordance with the specification data sheet(s) completed by Contractor during detailed design.

Owner reserves the right to be present during factory testing. Contractor shall give Owner a minimum thirty (30) days' notice so that personnel can make proper arrangements. Presence at factory testing shall be made available to Owner at no additional cost to Owner.

5.10.2 Codes and Standards

All equipment furnished under these specifications shall conform to the applicable standards of ANSI, IEEE, and NEMA.

The surge arresters shall be designed, fabricated, and tested in accordance with ANSI C62.11 and these specifications

5.10.3 Equipment Required

Surge arresters furnished shall be complete with all accessories ready for immediate service.

The quantity and types of surge arresters furnished shall be indicated on the specification data sheet(s). Per Owner, the following surge arresters shall be furnished by the Contractor for the Project Collector Substation:

Table 5-4 Surge Arresters

MFG Description	Approved Vendors	MFG Item ID
345kV Arrester, Stn Cl, 220kV MCOV, Polymer, MOV, 276kV Duty Rating	Hubbell Power Systems, Inc.	
34.5kV Arrester, Stn Cl, 24.4kV MCOV, Polymer, MOV, 30kV Duty Rating, Std Base Mtg, Metal Top	Cooper Industries	
	Hubbell Power Systems, Inc.	
34.5 Arrester, Stn Cl, 29kV MCOV, Polymer, MOV, 36kV Duty Rating, 10 in. B.C., Sky Gray, Metal Top, Without Brackets	ABB Power T&D Company, Inc.	
	ABB Power T&D Company, Inc.	
	ABB Power T&D Company, Inc.	
	Cooper Industries	
	General Electric	
	Magnetek	
	Hubbell Power Systems, Inc.	

5.10.4 Ratings

Surge arresters shall conform to the requirements indicated by the temporary overvoltage (TOV) study per Exhibit A-3.4.

The arresters shall be suitable for operation at the altitude indicated on the specification data sheet(s).

5.10.5 Construction Details

The surge arresters shall be metal oxide type with polymer housing.

The line terminal shall be indicated on the specification data sheet(s).

Surge arresters shall be corona free when energized at the specified maximum operating system voltage.

Surge arresters shall be furnished with all hot-dip galvanized hardware for field mounting on steel supports.

The arresters shall have a NEMA 2-hole ground connector suitable for connection up to a 250 kcmil (127 mm^2) copper conductor.

The surge arresters shall be furnished with all mounting and connection hardware and be installed ready for service.

5.11 POWER CIRCUIT BREAKERS

5.11.1 General

These specifications cover furnishing of outdoor circuit breaker equipment, materials, and accessories indicated on the specification data sheet(s) completed by Contractor during detailed design. Circuit breakers furnished shall be complete with all accessories ready for mounting, assembly, connection, and immediate service.

The requirements of the Owner's Specification 0135 and 0141, the electrical control scheme, and specification data sheet(s) completed by Contractor during detailed design shall govern should conflicts occur between them and the written text of these specifications.

5.11.2 Codes and Standards

All equipment provided under this specification shall conform to the applicable standards of ANSI, ASME, ASTM, IEC, IEEE, and NEMA. All materials and devices shall be in accordance with the applicable requirements of the Federal "Occupational Safety and Health Standards."

The circuit breakers shall be designed, fabricated, and tested in accordance with ANSI C37 Series, NEMA SG 4, and these specifications.

5.11.3 Equipment Required

The Contractor shall furnish circuit breakers and accessories as indicated on the drawings and specified herein.

The quantities of circuit breakers furnished shall be as indicated on the drawings. See Appendix for Approved Vendor List.

5.11.4 Construction Details

Circuit breakers shall include preinsertion closing resistors, if applicable, current transformers, grading capacitors, puffer interrupters, operating mechanisms, cabinets, support framework, and other components to be erected and tested as a complete breaker at the jobsite. EHV circuit breaker(s) shall be single pressure SF6 gas type.

Each circuit breaker pole shall include separate stored energy operating mechanisms. Each breaker shall be mechanically and electrically suitable for single-pole tripping and reclosing, and electrically ganged 3-pole tripping and reclosing.

5.11.5 Enclosures

The operating mechanism and necessary auxiliary devices shall be furnished in weatherproof, dust resistant enclosures, mounted on the breaker frame.

One breaker control cabinet will provide the internal wiring for the breaker system and the interface between the Owner's control and power circuits to the breaker. The control cabinet shall allow sufficient space for termination of control and power circuits.

Enclosure door handles shall include provisions for padlocking.

All control switches, push buttons, fuses, shorting type terminal blocks, and other devices requiring Owner interface shall be mounted at a height and location to be easily accessible. Such devices shall be located less than 1,500 mm (5 feet) but more than 600 mm (2 feet) above the top of the foundation.

5.11.6 Operating Mechanism

Each operating mechanism shall consist of a pneumatic, hydraulic, or spring charged stored energy mechanism. Each operating mechanism shall include all auxiliary devices and other accessories for the operating mechanism furnished. Each mechanism, regardless of the operating medium utilized, shall be electrically trip-free and shall include anti-pump auxiliary relays and devices.

Each operating mechanism shall include a mechanical position indicator. The indicator shall provide a positive indication of the breaker or breaker pole position by direct mechanical coupling to the operating rod. The indicator shall consist of a suitable sign utilizing green with the word "OPEN" when in the open position, and red with the word "CLOSED" when in the closed position.

Each operating mechanism shall include dual trip coils. The trip coils shall be electrically and magnetically independent. The trip coils shall be located such that heat or fire damage to one trip coil shall not preclude the proper operation of the other trip coil. The trip coils shall be suitable for parallel trip coil operation. Trip coils shall not operate with currents less than 1 ampere DC. Each trip coil shall be wired to allow independent activation and test.

Each separate pneumatic or hydraulic operating mechanism shall include two alarm contacts which close to alarm low air or oil/nitrogen gas pressure. A low-pressure cutout (with two alarm contacts) shall be provided to prevent initiating a close signal should the operating pressure be below the minimum required for a complete close-open operation. The low-pressure cutout device shall not prevent a complete close-open operation should pressure drop after the close-open operation is initiated.

Each stored energy operating mechanism shall operate according to the duty cycle specified on the specification data sheet(s) without auxiliary power available. Each operating mechanism shall store sufficient energy for three close-open operations without the need for running pumps or compressors. If this requirement cannot be met, the breaker shall include an automatic throwover

scheme to alternately supply each mechanism motor from the Owner's DC station service system should normal auxiliary power be lost. The Contractor, in such case, shall clearly state the requirement for emergency DC control power and the duty cycle available without auxiliary power.

The stored energy mechanism recharging time to full operating pressure or condition from a completely discharged condition shall not exceed 1 hour.

Each operating mechanism shall include spare auxiliary switch contacts for use by the Owner. The spare auxiliary switch contacts shall be mechanically linked to the mechanism operating rod and shall be field adjustable as either "a" or "b" contacts.

One permissive control switch (69 device) per breaker pole shall be furnished. It shall be a two-position, manually operated switch that in one position permits the closing of the pole and in the other position prevents the circuit breaker pole from being operated. It shall be mechanically interlocked with a manual trip lever that is accessible from outside the pole operator housing so that, if the breaker is tripped by this lever, the 69 device must be manually reset before the breaker pole can again be operated. The manual trip device on each pole shall electrically trip all three poles, with the 69 device on all three poles being moved to the lockout position. The manual trip lever shall be painted red, shall have a guard to prevent accidental activation, and shall have a plastic engraved label worded "Emergency Trip".

Each breaker close control scheme shall include a field adjustable 0.1 to 1 second time delay pickup close relay, factory preset to provide a 20 cycle automatic reclose time (including breaker close time) after energization of the close circuit.

5.11.7 Auxiliary Power Supply

The Contractor will furnish one auxiliary power supply to each circuit breaker at the voltage specified on the specification data sheet(s). If the Contractor chooses to furnish motors or other auxiliary equipment designed to operate at a different voltage from the specified auxiliary power supply, they shall furnish all equipment required to transform the voltage of auxiliary power to the design voltage of the equipment furnished. The Contractor shall provide suitable branch circuit protection.

5.11.8 Auxiliary Power and Control Power Disconnects

Two power supply disconnects and four knife switches per breaker shall be provided. The close circuit and auxiliary power supply shall be fed from individual disconnects. One knife switch shall be wired in series with each of the disconnects feeding the auxiliary power supply and close coil. The two remaining knife switches shall feed trip coils one and two.

5.11.9 SF_6 Gas System

Temperature compensated pressure switches or gas density switches shall be provided to monitor the SF6 gas density in each breaker pole. Alternately, pressure differential switches may be used to measure the differential pressure of the SF6 gas between poles.

A drop in SF6 gas density, in any pole, shall initiate a low SF6 gas density alarm. A further drop in density shall initiate a trip or block any further breaker operation.

The breaker shall be furnished with sufficient SF6 gas to fill, test, and energize each breaker. The SF6 shall be free of moisture and impurities. SF6/nitrogen gas mixtures shall not be supplied.

The SF6 to air seals and gaskets shall prevent SF6 gas leakage in excess of 2 percent per year of gas weight, through the duration of the guarantee period. Corrosive arc products due to moisture infiltration shall be prevented to the maximum extent possible through the use of desiccant moisture absorbing chambers and an arc product filter.

5.11.10 Arc Containment Chamber

The arc containment chamber (the breaker tank on dead-tank breakers or the puffer interrupter on live-tank breakers) shall be designed to withstand pressure buildup if the breaker fails to interrupt full rated fault current. The use of a pressure relief device is acceptable and shall be so stated in the specification data sheet(s).

5.11.11 Space Heaters

Each operating mechanism and control enclosure shall be provided with space heaters to prevent condensation of moisture within the enclosure. Space heater capacity shall be as required to maintain the enclosure internal temperature above the dew point. The heaters shall be spaced away and thermally insulated from any devices or painted surfaces.

Space heaters shall be sized to provide adequate heating when energized at the applied voltage indicated on the specification data sheet(s). The Contractor shall provide all space heater wiring integral to the breaker and suitable branch circuit protection.

Space heaters shall be controlled by an adjustable thermostat, factory set to close (ON) at 29° C (85° F) and open (OFF) at 35° C (95° F).

5.11.12 Current Transformers

Current transformers shall be provided as specified in accordance with NEMA SG 4 - Section 3.

Current transformers shall be bushing type for dead-tank breakers or free-standing for live-tank breakers, with fully distributed windings for relaying service. They shall be five lead multi-ratio unless otherwise indicated by Owner.

The energized parts of current transformers furnished separately with live tank circuit breakers shall be made of corrosion-resistant material, such as galvanized or stainless steel.

5.11.13 Insulating Oil

Free-standing current transformers supplied with live-tank circuit breakers shall be shipped completely filled with insulating oil. Insulating oil supplied shall be polychlorinated biphenyls (PCBs) free oil and is not to be FR3 fluid. Insulating oil sampling and test procedures at the factory shall conform to the requirements of ASTM D117.

The insulating oil shall meet all the requirements as defined by ANSI/ASTM standards, shall be chemically stable, free from acidity or other corrosive ingredients, shall possess high dielectric strength, and shall test at least 28 kV when tested upon receipt at the job delivery point. The Owner will test samples of the oil furnished. If the dielectric test strength of the oil tests less than 28 kV

when tested in accordance with the procedures of ASTM D1816 using a 1 mm (0.040 inch) gap or the oil contains more than 10 ppm water when tested in accordance with the procedures of ASTM D1533 (Karl Fischer method), then the current transformer insulation system shall be unacceptable. The Contractor shall provide all labor, supervision, material, and equipment to restore the oil to the quality specified.

5.11.14 Oil Preservation System

Separate oil-filled current transformers shall be supplied with a sealed oil preservation system using a bladder to absorb oil volume changes due to temperature. Each current transformer shall include an oil sampling valve to allow small oil samples to be taken for test.

5.11.15 Ground Fault Current Transformers

If required, ground fault current transformers shall be provided and specified on the specification data sheet(s). Each separate live-tank breaker interrupter support insulator stack and each insulator stack for oil-filled current transformers shall be supplied with ground fault current transformers encompassing the insulator stack. The ground fault current transformer shall be five lead, multi-ratio type with ratios and relaying accuracy as specified.

5.11.16 Current Transformer Secondary Terminations

All secondary leads of each current transformer and ground fault current transformer, including all taps of each transformer, shall be wired to shorting type terminal blocks located in either the circuit breaker control cabinet (dead-tank type), or for live-tank breakers, a weatherproof current transformer terminal cabinet located on the center current transformer support structure. Each set of secondary winding taps shall terminate on a 6-pole shorting block, with the sixth pole permanently connected to the shorting bar and to ground. Shorting terminal blocks shall be arranged such that the three shorting terminal blocks associated with three secondary windings, on different poles, but comparably located, shall be grouped together. There shall be no splices in the current transformer leads. All current transformer secondary wiring shall be furnished by the Contractor, cut to length and pre-terminated. All current transformer secondary wiring shall be shielded copper cable, 6 mm^2 (10 AWG) minimum. Complete wiring and connection diagrams shall be furnished, with terminal blocks arranged in the same configuration as physically arranged in cabinets or terminal boxes.

5.11.17 Assembly and Configuration

The circuit breakers shall be factory assembled into integral shipping sections as complete as possible to minimize assembly requirements at the site. A structural steel frame, common to all breaker components on a pole except free-standing current transformers, shall be furnished. Each free-standing current transformer shall include a structural steel support frame. The frames furnished shall maintain a 2,750 mm (9'-0") minimum height from the bottom of porcelain to grade.

Each pole shall include an integral frame mounted operator mechanism enclosure. All wiring, conduit, and pneumatic or hydraulic piping from individual interrupter units to the operator mechanism enclosure on a pole shall be furnished by the Contractor.

All wiring, raceway, and pneumatic or hydraulic piping from individual pole operator mechanism enclosures to the breaker control cabinet, or from separately mounted current transformers to the

current transformer terminal cabinet shall be furnished by the Contractor. The piping and wiring shall be enclosed in Contractor-furnished aboveground metal raceway. The bottom of the raceway, between poles, shall be a minimum of 2,450 mm (8'-0") above top of foundation.

5.11.18 Bushings

All bushings shall be rated in accordance with ANSI and NEMA standards and as specified.

Condenser type bushings shall have a capacitance tap suitable for use with a potential device. The tap shall also be suitable for power factor testing.

5.11.19 Auxiliary Power and Control Circuits

Breaker auxiliary power, control, and alarm circuits shall be provided with terminal blocks for connection to external circuits. The terminal blocks shall have circuit identification and shall be located in the control cabinet to provide external circuit connections from a common raceway entrance.

5.11.20 Pre-insertion Closing Resistors (If Applicable)

The circuit breakers shall include pre-insertion closing resistors as necessary to limit the line closing switching surge factor in accordance with the standard conditions defined in ANSI/IEEE C37.04 and ANSI C37.06. Pre-insertion time shall be approximately 8 milliseconds. Closing resistor heating shall not limit the duty cycle specified.

5.11.21 Grading Capacitors

Grading capacitors shall be furnished as required to limit switching surge voltage across the breaker contacts during interruption.

5.11.22 Spare Parts

The Contractor shall include a list of spare parts for each circuit breaker and an itemized list of spare parts that are recommended, but not included for each circuit breaker. The second list shall indicate the quantity recommended per circuit breaker, and the unit price each.

One complete set of spare gaskets and O-rings shall be furnished. The set shall contain all gaskets and O-rings needed for one complete 3-pole breaker including operating mechanism seals, SF6 gas-to-air seals, and seals used in separately mounted current transformers.

5.11.23 Factory Tests

Each circuit breaker shall undergo the production tests as listed and described in ANSI C37.09. The Owner may require that each circuit breaker be fully assembled at the factory, and remain fully assembled during production testing.

Certified production test reports for each circuit breaker furnished shall be submitted to the Owner within 10 days after completion of the tests. Testing shall include accuracy tests of all current transformers in accordance with ANSI C57.13.

In addition, representative design test reports for the circuit breakers proposed shall be furnished. Design tests shall have been conducted for the specific rated circuit breakers proposed.

5.11.24 Preparation for Breakers for Shipment

Circuit breaker components shall be clean, dry, and sealed when shipped from the factory. Each component not shipped with SF6 gas shall contain a packaged moisture absorbing chemical as required to keep it moisture free during shipment. Tanks, interrupters, support insulators, or other SF6 containers which are found to contain moisture when received at the jobsite shall be dried, and moisture damage shall be repaired at the Contractor's expense.

Complete instructions outlining the Contractor's recommended procedures for inspection upon receipt at the Project Collector Substation site, moisture free maintenance during storage, and preparation for SF6 filling shall accompany each breaker. These instructions shall be shipped inside the breaker control cabinet.

Manufacturer shall test each pole/pole section for moisture content prior to shipment and shall record and attach label to each tested item.

5.12 MAIN POWER TRANSFORMER (SECTIONS AS APPLICABLE)

5.12.1 General

5.12.1.1 Scope of Supply

The 345/34.5 kV main power transformer(s) to be used in the Project Collector Substation shall be in accordance with this specification. The Subcontractors quoting for the transformer must provide a quote which is in strict conformance with this specification. Contractor is responsible for final transformer sizing (MVA ratings). If two main power transformers are used, they shall be of like construction and brand.

5.12.1.2 Performance and Design Requirements

Performance and design requirements for the power transformers shall be indicated on the specification data sheet(s) completed by Contractor during detailed design.

5.12.2 Codes and Standards

Work performed under these specifications shall be done in accordance with the following codes and standards. Unless otherwise specified, the applicable governing edition and addenda to be used for all references to codes or standards specified herein shall be interpreted to be the jurisdictionally approved edition and addenda. If a code or standard is not jurisdictionally mandated, then the current edition and addenda in effect at the date of this document shall apply. These references shall govern the work except where they conflict with the Owner's specification. In case of conflict, the latter shall govern to the extent of such difference:

Work	In Accordance With
Transformer	IEEE C57 Series and all reference documents

All materials and devices shall be in accordance with the applicable requirements of state and local safety standards. ANSI, ASTM, NEC, NESC and NEMA standards shall be applicable as well.

5.12.3 Products

5.12.3.1 General

This specification is intended for procurement of outdoor oil-immersed power transformers. The standard design shall be in accordance with accepted industry practices for electrical power generation.

5.12.3.2 Loading and Ratings

The current carrying capability shall be limited only by the capacity of the core and coils and not by other components such as winding leads, bushings, and tap changers.

The transformer ratings and operating conditions shall be indicated in the specification data sheet(s) completed by Contractor during detailed design.

5.12.3.3 Load Rejection

The main power transformer may be subjected to load rejection conditions that result in an abnormally high voltage from the collection system. Therefore, it shall be designed to withstand, as a minimum, the resulting stresses with 1.4 times the rated voltage for 5 seconds, applied at the transformer terminals to which the collection system is to be connected.

5.12.3.4 Through-Fault Withstand

Transformers furnished under these specifications shall be capable of withstanding, without damage, the mechanical and thermal stresses caused by short-circuit currents limited only by the impedance of the transformer. System impedance shall be considered equal to zero. System prefault voltage shall be equal to the voltage rating of the maximum tap or 1.05 times the principal tap, whichever is greater.

5.12.4 Mechanical Construction

5.12.4.1 Tank

Tank shall be of welded steel plate construction. The complete tank shall be designed to withstand vacuum and pressure in accordance with IEC 60076 or full vacuum and at least 125 percent of the maximum operating pressure of the oil preservation system furnished. The tank cover shall be sloped to assist with the flow of gas bubbles to the gas detector piping and/or relay. Field installation shall not require any welding. The base shall allow skidding or moving on rollers in any direction. Lifting lugs and jacking pads shall be provided for lifting and jacking the completely assembled transformer. The jacking pads must be located near each of the four corners. The tank shall be designed so that all current transformers can be removed easily without removing the main transformer tank cover. Holes with automatic drain valves shall be provided at the low point of the bus duct flange enclosures so that condensate and water will not accumulate. The transformer tank base shall be engraved or a placard shall be installed to clearly identify the dimensional centerline near the base of the tank on all four sides. If abbreviated, “C.L.” shall be used to signify dimensional centerline. The tank shall be marked on a minimum of two adjacent sides to show center of gravity. If abbreviated, “C.G.” shall be used to signify center of gravity.

5.12.4.2 Drawings, Nameplates and Test Reports

Drawings, nameplates, test reports, and correspondence must use the English language and English units of measure with the metric equivalent in parentheses. The following minimum information must be shown on the transformer outline drawing:

- All multiple quantities.
- Weights.
- Paint color.
- Footprint of base.
- Dimensional centerline. Location of Owner connections (bus duct, etc.) shall be referenced to centerline on all outline drawings.
- Center of gravity (shown on two views).
    - Valve sizes and types.
    - 77° F (25º C) oil level and low oil level.
    - Location and detail sketch of ground pads.
    - Location, cutout size, and open door dimensions of all cabinets.
    - Bushing and arrester ratings, stud diameters with thread information, and space arrangements with hole patterns.
    - Location, hole sizes, and detail sketch of jacking, lifting, and pulling facilities. A statement should be made describing which lugs are for lifting the transformer when completely assembled and full of oil.
    - Distance clearances around the envelope of the transformer that the Owner must meet so as not to interfere with operation or maintenance of the transformer and its accessories. Some examples are cooling control cabinet swing door distance, pullout of radiator banks maintenance distances, etc.

5.12.4.3 Core and Coils

Nuts, bolts, and clamps of the core assembly shall be provided with positive locking devices to prevent loosening. For core form transformers, the complete core and coil assembly shall be removable from the tank for repairs. The core shall be securely grounded to the tank. For core form transformers, the core ground connection shall be detachable and made in an externally located terminal box, accessible without requiring entry into the main tank.

The outermost core steel packets and tie bars/plates (if located internal to the windings) shall be divided as needed so that the maximum operating temperature does not exceed the manufacturer's standard practice. In no case shall tie bar sections be wider than 3 inches (75 mm) or core packet sections wider than 4-1/2 inches (115 mm). If slit core packets and/or tie bars/plates are used as described above, and tie bars/plates located adjacent to the core packet, insulation material provided between the bars/plates and the core packets shall be a high temperature, non-cellulosic material such as Nomex.

Windings shall be fixed under pressure with single piece clamping plate, located at the top of the winding and either a single piece or multi-piece clamp located at the bottom of each set of windings.

These clamping plates shall be properly sized and braced for short circuit forces, made from suitable materials, and locked into place with suitable means. Core form windings shall be circular. All windings shall be copper. When a continuously transposed conductor is used, it shall be epoxy bonded.

All windings shall be self-supporting for inward (buckling) and outward (hoop) forces. Windings shall not rely on the core assembly for support to resist inward radial short-circuit forces. Winding capability to resist inward radial forces shall be based on the ability of the conductor to resist forces in a "free-buckling" mode. When the coils use paper insulation, it shall be thermally upgraded paper insulation. Proof of paper quality, testing and specifications shall be furnished upon request and shall be subject to acceptance/approval by the Owner.

Geomagnetic Disturbance Withstand

Transformers supplied under this specification shall be designed and evaluated to withstand a geomagnetic disturbance in accordance with the latest revision of C57.163, “IEEE Guide for Establishing Power Transformer Capability while under Geomagnetic Disturbances”. Unless specific user data is supplied herein, the Geomagnetically Induced Current (GIC) signature included within C57.163, shall be used. The manufacturer shall demonstrate by calculation that recommended temperature limits for winding hot spots and tie-plate hotspots shown in the guide are not exceeded under the GIC signature specified (plot temperature rise response verses time during the GIC event). Such calculations shall be produced and submitted in a format acceptable for submittal to NERC.

5.12.4.4 De-energized Tap Changer (If Applicable)

The operating handle shall have provisions for padlocking and shall be located no more than 60 inches (1,500 mm) above ground level. The tap position indicator shall be clearly visible from ground level.

5.12.4.5 On Load Tap Changer (OLTC) (If Applicable)

The on load tap changer shall be furnished in accordance with Owner’s Specification 0138 included with this Exhibit and the additional specifications below. If conflicts exist, the Owner’s specifications shall govern. Acceptable Contractor alternatives to Specification 0138 and the additional specifications below shall be submitted to the Owner for approval.

When an on load tap changer is specified, it shall be furnished with the arcing contacts housed in separate compartments, designed to prevent any interchange of oil between the compartment and the main tank. Removable bolted covers shall be provided for access to the switch compartment without opening the main tank or lowering the oil in the main tank. A drain valve with sampling device shall be located in the bottom of each oil-filled compartment to provide complete oil drainage.

A magnetic liquid level gauge with a vertical face shall be mounted on the side of the oil-filled compartment. A mechanical pressure relief device shall be mounted on the top of the oil-filled compartment. The tap changer shall provide full rated kVA on taps above and below rated voltage. The tap changer shall be designed to provide at least 500,000 operations at the maximum nameplate current rating before contact replacement.

When a current limiting series transformer is provided, it must have circular windings and meet all the same criteria as the main core and coil. Series transformers and any internal surge suppression devices must be identified to the Owner. Equipment for the automatic and manual control of the LTC shall be furnished in a weatherproof compartment mounted adjacent to the tap changer compartment. Access and operation at ground level shall be provided. The following equipment shall be furnished, as necessary, to provide the specified LTC controls:

Manual Control

- Operating mechanism with motor drive.
- Weatherproof compartment with convenience outlet, anti-condensation heater, and light with switches.
- Mechanically operated limit switches and stops to prevent overtravel of the drive mechanism beyond the maximum raise and lower positions.
- Local position indicator.
- Operations counter.
- RAISE-LOWER selector switch for manual control.

Automatic Control

- AUTOMATIC-OFF-MANUAL selector switch.
- Voltage testing terminals.
- Line drop compensator with adjustable resistance and reactive elements.
- Current transformers for line drop compensation.
- Voltage regulating relay.
- Time-delay relays for first step of a tap position change.
- A hand crank for manual operation, with electrical interlock to prevent operation of the motor while the hand crank is being used.

Remote Control

- REMOTE-LOCAL selector switch.
- Remote tap position indicator, selsyn type, for mounting on Owner's remote control panel.
- Any additional equipment needed for remote/local or automatic/manual control

5.12.4.6 Insulating Oil

Unless otherwise specified, insulating oil for complete filling shall be furnished with each transformer in accordance with Owner's Specification 0100 included with this Exhibit and the additional specifications below. The oil shall be polychlorinated biphenyls (PCBs) free, cannot be FR3 fluid, and shall be Type II, inhibited with 0.15 percent to 0.30 percent by weight of DBPC (2-6 ditertiary butyl paracresol). The transformer main nameplate shall state that the oil is inhibited and PCB-free at the time of manufacture.

The electrical insulating mineral oil to be permanently installed in all transformers furnished under these specifications shall be new, unused oil. The oil shall be tested in accordance with ASTM D-1275, Method B and to Doble CCD or IEC/CIGRE CCD, and shall be deemed "non-corrosive" according to criteria stated in these documents. Also, a Dibenzyl Disulfide (DBDS) test shall be performed and shall yield results less than 20 mg/kg by weight. Results of these oil tests shall be submitted to the Owner at least 15 days before the oil is dispatched to the Project Collector Substation site (whether in the transformer body or by separate transport means). In addition to meeting the requirements of the applicable national and international industry standards, the oil shall contain less than 25 ppm water and shall test at least 30 kV breakdown strength upon receipt at the delivery point.

Oil shall be shipped by bulk container, such as a tanker or large flexible tank, designed specifically for such use. Shipment in drums is not allowed unless approved by the Owner. Each shipping container shall have its oil tested for dielectric integrity prior to being installed in the transformer.

When shipping weight permits, the transformer shall be shipped oil-filled. If the transformer is shipped without oil, then it shall be shipped pressurized with nitrogen. A pressure vacuum gauge and suitable shutoff valve shall be provided to monitor or add nitrogen during shipment.

Each transformer and its associated equipment shall be designed and delivered capable of full vacuum filling in the field. The manufacturer's recommended assembly and filling procedures shall be submitted for Owner’s review prior to shipment.

5.12.4.7 Oil Preservation System

The system shall be designed with an oil temperature alarm range of -13° F to 248° F (-25° C to 120° C). Unless specified, the Contractor will have the option of furnishing a sealed tank system, an automatically maintained inert gas pressure system, or a sealed bladder conservator system. Based on this choice, the appropriate following paragraph shall be applied:

Sealed Tank System

The system shall include a pressure vacuum gauge and a pressure relief device designed to seal the interior of the transformer from the atmosphere and hold the gas plus oil volume constant within the range of 10 psi (0.70 kg/cm2) positive to 8 psi (56 kg/cm2) negative.

Inert Gas Pressure System

An alarm device with alarm contacts for remote indication of low gas supply shall be furnished. Valves shall be provided to permit purging the gas space and testing the seal on the tank by admitting dry nitrogen under pressure. The gas control equipment, including adequate space for nitrogen bottles, shall be protected by an easily accessible weatherproof enclosure mounted on the transformer. Sufficient nitrogen gas shall be furnished for the initial flushing, filling, and operation. If necessary, used gas cylinders may be returned to the manufacturer at their expense.

Sealed Bladder Conservator System

The system shall prevent air and moisture from coming in contact with the oil through the use of a flexible rubber air cell in the conservator tank. A positive oil pressure must be maintained on all gaskets above the tank cover. A gas detector relay system shall be provided that collects

accumulated gases at the high point of the cover. The system shall include a gauge alarm contact and a gas sampling valve at ground level. When possible, the conservator tank shall be located so as to not be in proximity to isolated phase bus duct, such as in segments where LV bushings are not located. If such a location is not practical, then the conservator tank and its various piping and conduit connections shall be electrically insulated from the main tank, except the main oil pipe from the conservator to the main tank shall be securely grounded and bonded to the main tank to provide a single point of ground for the conservator tank. The intent of this single point ground system is to prevent circulating currents in the conservator tank and mount brackets induced by stray flux from the isolated phase bus system.

5.12.4.8 Oil Containment

The Project Collector Substation will need to be designed and constructed to ensure compliance with the regulations in 40 CFR Part 112- Oil Pollution Prevention. With respect to minimum design requirements for meeting 40 CFR 112, Owner specifies a concrete containment structure/pit for meeting Spill Prevention, Control and Countermeasure (SPCC) secondary containment requirements for the main power transformer(s) specified in section 12.1.1 of this document. The concrete secondary containment structures need to be designed to meet SPCC requirements, including allowing necessary freeboard for precipitation. The minimum containment volume shall be equivalent to 110% of the total transformer oil volume plus the total volume of water entering the containment basin from a 6-inch storm event. If any of the above requirements or regulations differ, the more stringent shall apply. The concrete containment structure's dimensions and orientation must be such to ensure a breach in oil from the transformer will be completely held inside the containment.

5.12.4.9 Bushings

Transformer bushings above 15 kV class shall be oil-filled, using either the transformer's oil as the cooling and insulating fluid or the bushing's own self-contained supply of oil. Bushings mounted in a vertical position shall have a self-contained oil supply. Oil-filled bushings shall have a sight gauge or other means to indicate oil level.

Bushings above 150 kV BIL shall be PCORE or ABB condenser type, with capacitance graded layers of insulating material for the purpose of controlling the distribution of the electric field, and shall be equipped with a capacitance or power factor test tap. If the bushing is mounted in a metal enclosed bus duct, the external terminal shall be designed for connection to a bus operating at 221° F (105° C).

Gaskets, oil expansion areas, and paper insulation used in the assembly of the bushings shall be suitable for the required operating temperatures. All bushings shall be constructed by using wet process porcelain materials with a homogeneous surface. Porcelain parts of each bushing rated below 450 kV BIL shall be one piece. For "draw lead" type bushings, the transformer outline drawing shall indicate the size, number of strands, and material of the bushing draw lead. Minimum creep distances shall be as specified using millimeters per rated system voltage, mm/kVL-L.

Outline drawings of each bushing shall be included with the approved transformer vendor drawings. Instruction manuals for each style of bushing shall be included with the transformer instruction manuals.

5.12.4.10 Terminals

Each bushing with a stud type connection shall be furnished with a removable stud-to-pad four-hole terminal of sufficient size to continuously carry the maximum current. Aluminum-to-copper bimetallic transition plates shall be furnished. At 230 kV and above, the terminals shall be corona free. System line connections will first connect to the associated surge arrester, if specified.

5.12.4.11 Terminations to the Transformer

If a termination compartment is specified, then an air termination compartment should be provided on the tank wall to allow for cable entry from below. If a termination flange is specified, then a bolted flange connection to cable, non-segregated, segregated, or isolated phase bus duct shall be provided as specified. A short flange should be located close to the tank, and a long flange should be located, via a throat, at the end of the bushing top terminal.

Termination flanges shall be installed to within +/- 1/8" (3 mm) tolerance of the location indicated on the transformer outline drawing. Horizontal flange surfaces shall be level to within 1/8" (3 mm) tolerance side-to-side across the face of the flange. Vertical flange surfaces shall be installed "plumb" and oriented perpendicular to the centerline of the mating bus within 1/8" (3 mm) tolerance side-to-side across the face of the flange.

5.12.5 Additional Equipment

5.12.5.1 Surge Arresters

High capacity, station class metal oxide type surge arresters, along with all the mounting equipment and grounding connectors shall be furnished and mounted next to the high and low-side bushings. Provisions shall be made to locate surge arresters as close to transformer as possible. Each arrester shall have a copper connection to a transformer ground pad. Arresters shall have full-capacity copper connections to the bushing terminals to allow for transmission line connection to the arresters.

5.12.5.2 Current Transformers

CTs shall be of the bushing type and shall be mounted internal to the transformer tank. Multi-ratio CTs must have five leads. All current transformer secondary leads shall be wired to the transformer control cabinet. The continuous current thermal rating factor (TRF) shall be 2.0 minimum. The continuous current thermal rating factor shall be 1.0 minimum. The CT secondary leads shall be fed through the tank to a CT junction block and then brought down to the transformer control cabinet. CT excitation and overcurrent curves shall be submitted for approval.

5.12.5.3 Neutral Grounding Resistor/Reactor (If Applicable)

Contractor shall appropriately size the neutral grounding reactor/resistor (NGR) to limit fault current. Contractor shall place NGR with sufficient clearance from other neighboring metallic parts per manufacturer's recommendations.

The heavy-duty, outdoor, stainless steel strip type NGR with aluminum enclosure shall be mounted on the transformer. The resistor/reactor assembly shall rest on cap and pin or post type porcelain insulators. Electrical terminals on the resistor/reactor shall be insulated bushings. One resistor/reactor terminal shall be connected by copper bar bus to the transformer neutral and the

other resistor/reactor terminal shall be connected by copper bar bus to the transformer ground pad. Arresters shall have full-capacity copper connections to associated bushing terminals, with all associated hardware, to allow for transmission line connection to the arresters. The grounding resistor/reactor enclosure shall be painted the same color as the transformer tank.

5.12.5.4 Cooling Equipment

The transformer's cooling class shall be ONAN/ONAF/ONAF. Cooling equipment including radiators, fans and mounting hardware shall be furnished in accordance with specified transformer rating. Manual control switches shall be provided in the control cabinet to allow testing and maintenance of the cooling fans, and for selecting automatic or manual control. Controls shall provide for changing the sequence of cooler groups. If any of the manufacturer's control switches include an off position that prevents operation of any of the cooling equipment, a Form C alarm contact shall be provided for the Owner's use. The cooling equipment control system shall have terminal points for incorporating a normally closed contact from the Owner's protective relaying equipment. The open status of this contact shall stop the operation of all cooling equipment. Multiple contact points shall be provided for cooling systems that have redundant, separate power supplies. Cooling fans shall be located a minimum of 24 inches (610 mm) above the base of the transformer. Personnel protection guards shall be placed over fan blades.

Cooling equipment shall be capable to withstand, without any damage or deformation, the pressure conditions specified for the tank assembly. If a future forced cooled rating is specified, provisions shall be made on both the transformer and in the control cabinet. The outline, wiring, and nameplate drawings must give sufficient details so that the future equipment can be added in the field. These details include information for the fans, breakers, relays, and wiring.

5.12.5.5 Cooling Equipment Maintenance

To support the removal and maintenance of the equipment without draining oil or removing the transformer from service, the following shall be provided:

- Flange mounted, manually operated shutoff valves with bolts and provisions for padlocking in the open or closed position.
- Oil tight covers for each connection to be used when cooling equipment is detached.
- Lifting eyes, oil drain, and vents for each cooling unit piping.

In addition, supports for arresters, conservator tanks, etc., mounted above the cooling equipment must be designed in such a way that no disassembly is required to access the cooling equipment for removal.

5.12.5.6 Alarms and Indicators

Alarm indication contacts shall be of the dry type, electrically separate and insulated from the ground, for operation on the specified DC control power system. All alarm and spare contacts and indication leads shall be wired to terminal blocks in the control cabinet for use by the Owner. These contacts shall be Form C, one normally open and one normally closed contact, which change status on an alarm condition. The functional description and actuation state of all alarm (and trip) contacts shall be clearly indicated with recommended set points, as applicable, on the manufacturer's electrical schematics and interconnection wiring diagrams.

A dial type liquid temperature indicator relay shall be furnished to indicate top oil temperature. In addition to providing visible indication, it shall be equipped with separate high alarm and high-high alarm contacts, and with a manually resettable maximum temperature indicating hand. A dial type, hot spot winding temperature indicator relay shall be furnished for the hottest winding. In addition to providing visible indication of the temperature of the winding, each indicator relay shall be equipped with separate alarm and control contacts for the cooling equipment. Each winding temperature indicator relay shall incorporate a current transformer responsive to its associated phase winding current, calibrating resistor, temperature detector element, and heater, all mounted and connected to simulate the hot spot temperature of the winding.

A fault pressure relay and gas detector relay or Buchholz type system (combination gas detector and oil surge) shall be provided that will operate upon gas accumulation and for abnormal rates of pressure rise in the main tank and LTC compartment, if provided. The system shall not be affected by mechanical shock, inrush currents, or impulse voltages. The system shall be ground or ladder accessible. The fault pressure relay system shall provide an auxiliary seal-in relay and reset switch arranged and connected to provide manually resettable lockout function on operation of the primary element. The auxiliary seal-in relay shall be designed for operation on a DC protection scheme, shall include four electrically separate, field convertible contacts for use with remote equipment, and shall be mounted inside the main control cabinet. A local DC indicating light shall be furnished to indicate relay reset required. Units not having oil conservator tanks do not require gas detection relays.

A Qualitrol (SEVERON), an Online Dissolved Gas Analyzer (DGA), TM-8 type, shall be installed by manufacturer. The DGA shall provide, at a minimum, typical 8 major fault gases, moisture in oil, oil temperature and ambient temperature. Gas data shall be provided through station RTU to SCADA EMS for remote indication and analysis. The fault gas sensor shall be positioned in the tank as recommended by the manufacturer

Transformer gauges shall be tilted as needed for ease of reading from ground level.

5.12.5.7 Additional Accessories

The following accessories shall be provided and clearly identified by the Contractor:

- Resetting mechanical pressure relief device with alarm contact and visual indicator. Associated piping, fittings, and attachments shall be provided to route the discharge from the pressure relief device to grade.
- A Y-D buried tertiary winding designed by the manufacturer at a capacity of 35% of MVA rating of the transformer.
- Valve for drainage of the oil to within 1 inch (25 mm) of the bottom of the tank, including built-in, capped sampling connection on the discharge side.
- Upper filter valve located below the 77° F (25° C) liquid level and on the diagonally opposite wall as the drain valve for the return of filtered oil to the transformer.
- One set of single-pole, double-throw (spdt) alarm contacts for liquid level indicator and mechanical pressure relief device.
- Two grounding pads on each transformer tank, on diagonally opposite corners.

- One bolted clamp type connector for 1/0 AWG (50 mm2) to 300 kcmil (150 mm2) copper conductor for each tank grounding pad.
- 0.25 inch (6 mm) by 4 inch (100 mm) copper bar ground bus connecting each surge arrester and neutral bushing to the ground pads at base level. Exposed copper shall be painted the same color as the transformer.
- Nameplates for each major item of equipment and each terminal block in the control cabinet.
- One set of special tools for installation, maintenance, and dismantling of the equipment. Tools shall be new and unused and become the property of the Owner.
- One additional gasket for each gasket located on the transformer, sealed for long-term storage.

5.12.5.8 Control Cabinet

The control cabinet for each transformer shall be intended for outdoor use and shall be dust-tight, raintight, sleet resistant, undamaged by external ice formation, and shall have suitable corrosion protection. All ventilating openings shall be louvered to prevent entrance of rain and shall be equipped with fine mesh dust filters and stainless steel insect screens. The cabinet shall be provided with a gasketed, removable, blank bottom plate that can be drilled or punched in the field. There must be no obstructions beneath the cabinet so that the Owner has clear access to connect the incoming cables or conduits. Control cabinet doors shall have a three-point cabinet type latch with a single handle and shall include provisions for padlocking. Mechanical stops shall be provided for doors and hinged panels. The control cabinet shall be mounted a minimum of 30 inches (760 mm) and a maximum of 78 inches (1,980 mm) above ground. The cabinet and all devices shall be easily accessible from the ground. The cabinet shall not be mounted on the radiators.

Copper grounding bar with terminal screws shall be located in a convenient position in the cabinet near the terminal blocks for grounding of incoming control and power cables. Indicators, control devices, and terminal blocks mounted in the control cabinet shall have device nameplates. The control cabinet shall be provided with space heaters capable of preventing condensation of moisture within the cabinet. Space heaters shall receive power from the transformer's internal control power source and shall have a voltage rating twice the energization voltage. Space heaters shall be controlled by an adjustable thermostat, factory set to close on falling temperature at 80.6° F (27° C) (ON) and open on rising temperature at 95° F (35° C) (OFF).

If required, a single-phase 15 ampere, grounded convenience outlet shall be mounted inside the control cabinet, including ground fault protection with a test button and separate circuit breaker or fused protection.

5.12.5.9 DC Control Power

Electrical devices served from this supply shall not impose any ground connections on the battery. For each DC supply specified, pull-out fuses shall be provided at the incoming terminals to protect downstream devices. A voltage failure relay and a red indicating light shall be provided to monitor each DC supply (downstream of the fuses).

The voltage failure relay shall be provided with one set of Form C alarm contacts wired to field terminals for remote indication of loss of DC power. The red indicating light shall be provided with a nameplate engraved to read: "DC POWER AVAILABLE".

5.12.5.10 Auxiliary Power

Auxiliary power will be furnished from external sources as per this specification. Main compression type terminals shall be provided for terminating the auxiliary power circuits. Main circuit protective devices shall be supplied between the main terminals and the auxiliary equipment. Additional branch circuit protective devices shall be supplied on branch circuits.

If two sources of auxiliary power are to be provided, automatic transfer equipment, including an automatic throwover contactor, or automatic transfer switch shall be furnished to transfer load from the normal source to the emergency source upon failure of the normal source. AC control power shall be derived from the auxiliary power source(s). The availability of each auxiliary power source shall be monitored by a red indicating light. Each indicating light shall be provided with a descriptive nameplate. The indicating light associated with the normal power source shall be engraved to read: "NORMAL SOURCE AVAILABLE". The indicating light associated with the emergency power source shall be engraved to read: "EMERGENCY SOURCE AVAILABLE".

Transformation equipment shall be provided as necessary within the control cabinet to supply the specified control power, which includes the space heater and convenience outlet circuits. All ungrounded legs of control power transformers shall be fused. A voltage failure relay shall be supplied to monitor and alarm on the loss of each auxiliary power source voltage and each control circuit power source voltage including the space heater control voltage. The manufacturer shall provide Form C alarm contacts for the Owner's use to indicate when any cooling equipment branch circuit protective device is open, unless a voltage failure relay downstream of the branch circuit protective device is provided with Form C alarm contacts.

If a voltage failure relay downstream of the branch circuit protective device is not provided, and an automatic transfer scheme is used with two sources of auxiliary power, the auxiliary power/control power immediately downstream of the transfer scheme shall be monitored with a voltage failure relay. That relay shall be designed with enough time delay to prevent a nuisance alarm whenever the transfer scheme switches either from normal source to emergency source or from emergency source to normal source. If the Contractor chooses to furnish motors or other auxiliary equipment designed to operate at a different voltage from the auxiliary power supply, the equipment required to transform the voltage of auxiliary power as supplied to the design voltage of the equipment shall be furnished.

5.12.5.11 Wiring

Current transformer leads shall be extended into the control cabinet and shall be terminated on shorting type terminal blocks with pre-insulated ring type connectors. The secondary leads of the current transformers shall be 100 percent copper wire and 10 AWG as a minimum. Control cabinet wiring shall be Class B, stranded copper, 14 AWG or larger, with flame retardant, cross-linked polyethylene insulation rated at 600 volts.

Splices will not be permitted in control wiring, current transformer leads, or instrument leads, unless screw terminals are provided within a splice box or where current transformer leads must

pass through the tank wall. Terminal blocks, except those used for current transformer circuits, shall be rated at 600 volts as a minimum and shall have screw terminals. Step type terminal blocks are not acceptable. Terminal blocks shall be furnished with white marking strips and without covers. Terminal blocks for circuits above 240 volts AC shall have guards to prevent accidental contact. For every ten terminals used, two or more spare unused terminals shall be furnished on each terminal block for circuit modifications.

Terminal blocks for external connections shall be grouped in the control cabinet for easy accessibility and shall be unrestricted by interference from structural members and instruments. Sufficient space shall be provided on each side of each terminal block to allow an orderly arrangement of all leads to be terminated on the block. On terminal blocks with electrical connections by both the manufacturer and the Owner, the manufacturer‘s connections shall be made on one side of the block and the Owner's connections shall be made on the opposite side. Cables between the current transformers and accessories and the control cabinet shall be completely enclosed in rigid metallic conduit or tank braces or utilize steel wire armor construction with suitable supports. Exposed non-armored cables are not acceptable.

5.12.5.12 Paint

Metallic surfaces subject to corrosion shall be cleaned and painted with the manufacturer's premium standard cleaning system, paint system, and colors.

The entire interior of the main tank and the control cabinet shall be painted white for improved inspection visibility. Exposed unpainted parts shall be fabricated of corrosion-resistant materials. Touchup paint shall be compatible with, and the same color as, the factory applied paint. This additional paint shall be supplied in two separate 1 US gallon (4 liter) containers, properly identified, carefully packed with the accessories, and protected to avoid damage during shipment.

A material safety data sheet shall be furnished with the shipping documents.

5.12.6 Factory Tests

Each transformer shall be completely assembled and tested at the factory in accordance with applicable standards using materials and equipment that will be a part of the final assembled unit, specifically, bushings, cooling, and control equipment. At some time during the manufacturing process, all equipment must be mounted to ensure proper fit. This includes, but is not limited to, bushings, the oil preservation system, arresters, neutral grounding equipment, control cabinets, and all cooling equipment. The Owner reserves the right to witness factory testing and shall be informed in writing at least 30 days prior to the scheduled start date of factory tests so that arrangements can be made for a representative to be present. The Owner shall also be notified of the sequence of tests, not less than 10 days prior to testing. Testing procedures and techniques are to be in accordance with normal accepted industry practice and the appropriate standards.

The transformer shall not be released from the test area until the dielectric, temperature rise, loss measurements, and gas-in-oil test data have been approved by the Owner. The Owner shall be notified of any unusual event or damage occurring during the fabrication of each transformer and of all tests that do not meet the applicable standard values, manufacturer's standard values, and guaranteed values. The Owner reserves the right to inspect such damages or test failures. Corrective measures to overcome such damage or failure shall be subject to acceptance by the

Owner. Tested and calculated data shall be included in the certified test report. In particular, the calculated hottest spot temperature rises of the windings shall be shown.

To minimize potential damage to the transformer during testing, the resistance, polarity, phase relation, turn ratio, no-load loss, percent impedance, temperature rise (when applicable), and load loss tests should precede dielectric tests. In this sequence, the beginning tests involve voltages and currents, which are usually reduced as compared to rated values, thus tending to minimize damaging effects to the transformer. The dielectric test sequence shall be arranged so that lightning and switching impulse tests precede the power frequency tests, and the final dielectric test performed shall be the induced overvoltage test. In addition to all tests dictated by and described in the appropriate standards, the following tests and calculations are also required:

5.12.6.1 Design and Routine Testing

Regulation: The regulation of transformer shall be calculated for unity (1.0), nine-tenths (0.9), and eight-tenths (0.8) power factor lagging.

Megger Tests: Insulation resistance and core megger tests shall be performed, with resistance measurements corrected to 68° F (20° C).

Insulation Power Factor Tests: The maximum acceptable value for insulation power factor is 0.5 percent when corrected to 68° F (20° C). Capacitance measurements shall also be made between windings and from windings to ground.

Gas-in-Oil: Dissolved gas-in-oil analysis shall be made before testing begins, before and after temperature rise tests, and after over excitation tests (totaling four times).

Impedance: The positive and zero sequence impedances shall be measured on all tap positions for units fitted with de-energized tap changers and at both tap extremes, nominal tap, and two other positions (selected by the Owner at a later date) for units fitted with LTCs.

Temperature Rise Test: A full temperature rise test shall be performed. Transformers having only a single force cooled nameplate capacity rating (ONAF) shall include a temperature rise test at 60 percent of nameplate MVA rating (in addition to the test at 100 percent rating) with all the fans operating, so that temperature rises and gradients needed for the hot spot calculations can be determined. The hottest spot temperature rise calculation shall be performed using the "maximum eddy-current watt loss method." Use of empirical hot spot gradient factors to estimate hot spot temperature rises is not acceptable. Infrared thermographic photos shall be taken of the unit from all sides and top during the hottest part of this test to record hot spot temperature data. Color copies of these photos shall be included in the test report.

Impulse Tests: Lightning impulse and chopped wave tests are required as routine tests on line and neutral terminals of all transformers, except that the chopped wave test is not required on the neutral terminals. Switching impulse tests are required as a routine test on transformer windings rated 300 kV and above, using a test voltage that is approximately 83 percent of the full wave lightning impulse level. Transformers with protective devices that are an integral part of the design shall be tested in the following sequence.

- One reduced full wave between 50% and 70% of the required full-wave impulse level

- One or more intermediate reduced full waves between 75% and 100% of the required full-wave impulse level
- One full wave at 100% of the required full-wave impulse level
- Two chopped waves at 100% of the required chopped-wave impulse level
- Two full waves at 100% of the required full-wave impulse level
- One or more intermediate reduced full waves at the same voltage levels as used before the first full-wave test
- One reduced full wave between 50% and 70% of the required full-wave impulse level

Transformer with reactive type LTC shall be tested as per below tap settings.

- Impulse on HV winding phase A: HV: max. tap; LV min. tap (maximum ratio);
- Impulse on HV winding phase B: HV: nom. tap; LV nom. tap (nominal ratio);
- Impulse on HV winding phase C: HV: min. tap; LV max. tap (minimum ratio);
- Impulse on LV winding phase A: LV: max. tap; HV min. tap (minimum ratio);
- Impulse on LV winding phase B: LV: nom. tap; HV nom. tap (nominal ratio);
- Impulse on LV winding phase C: LV: min. tap; HV max. tap (maximum ratio).

Induced Overvoltage Tests: A Class II, 1 hour, induced overvoltage withstand test with partial discharge measurements shall be performed as a routine test on all transformers regardless of voltage class. The apparent charge shall not exceed 300 picoCoulombs (pC) at 1.5 times maximum line-ground voltage and the Radio Induced Voltage (RIV) measurement shall not exceed 100 microvolts during this test. Factory tested bushings shall be part of the final assembled unit and results will be compared to the results made during preoperational site testing.

Applied Voltage Tests: A short duration (1 minute) power frequency voltage test shall be performed as a routine test on all line and neutral terminals.

Leak Test: An oil leak test shall be performed on each completely assembled transformer, using a test pressure that is 25 percent greater than the normal operating pressure.

Sound Test: The average audible sound level test is required as a design (type) test.

Control Wiring: All auxiliary equipment, CT circuits, and control wiring must be tested to verify proper connections. CT ratio and polarity must be checked. The insulation of the control circuits must be verified by applying a power frequency test voltage of 1500 volts for 1 minute or 1800 volts for 1 second with all of the circuits tied together.

Auxiliary Cooling Losses: Fan auxiliary power requirements shall be measured and recorded.

Dimensional Check: A complete dimensional check shall be performed on each transformer specified herein to confirm that the actual dimensions match the dimensions shown on the drawings. The purpose of this check is to confirm that dimensions shown for isophase bus, non-segregated phase bus/cable bus, or other Owner's interfaces shall be identical to the information shown on the manufacturer's drawings. The bus connection dimensional check shall confirm that

all bus connections have been installed in a manner that makes the connections level when the transformer is level.

Sweep Frequency Response Analysis (SFRA) Tests: Each transformer supplied under these specifications shall undergo an SFRA test using a Doble SFRA test set and leads and be performed in accordance with Doble's instructions and recommendations. A test shall be performed after all electrical tests specified herein are complete, but prior to draining the oil. Also, the manufacturer shall furnish a small temporary test bushing mounted in each bushing cover plate to be used for performing an SFRA after the insulating fluid has been drained and the unit prepared for shipping. One dry SFRA test shall be performed at the factory and the manufacturer shall make arrangements to perform a dry SFRA test as part of the receipt inspection procedures. If the transformer is delivered by railcar, the SFRA test shall be performed before the unit is untied/removed from the railcar. Software data from all tests shall be provided to the Owner.

On-Load Tap Changer Special Tests (If Applicable): All transformers equipped with on-load tap changers shall undergo the following special tests in addition to routine tests specified by the latest revision of IEEE C57.12.90.

- Load loss measurements shall also be taken with the DETC (if so equipped) in positions 1, 3, and 5 and the OLTC in extreme raise and lower positions and neutral position. Also with DETC in the lowest position and OLTC in the lowest non-bridging position and the lowest bridging position (if equipped with preventative auto transformer). Losses for the worst case of all tested positions shall be used to adjust the temperature rise test.
- With transformer de-energized, 4 complete cycles of operation.
- With transformer energized at rated voltage and at no load, 1 complete cycle of operation.
- With one winding short circuited and as high as possible rated current flowing in the tapped winding, 4 tap OLTC operations from 2R to 2L or otherwise across the coarse or changeover selector switch operates.

For all of the above tests, there shall be no abnormal deflections of current or abnormal noises coming from the transformer.

5.12.6.2 Accessory Testing

All the accessories shall be tested for continuity, ground and correct connections.

Tests shall be conducted for proper operation of all relays, indicators, switches, lights and interlocks.

5.12.7 Photographs

Three sets of color photographs of each core and coil assembly shall be furnished with the instruction books. The photographs shall be taken just prior to placing the completed core and coil assembly into the tank. All photographs shall be 8 inch by 10 inch (200 mm by 250 mm) glossy prints labeled with the transformer manufacturer's name and serial number. Five different views shall be provided as follows: top view, front view, left side view, right side view, and rear view. Digital photographs in JPEG format may be supplied in lieu of glossy prints.

5.12.8 Shipping - Impact Recorders, Dew Point Temperature, and Receipt Inspection

The manufacturer shall supply and mount impact recorders (in suitable weatherproof enclosures) directly on each transformer prior to shipment. The impact recorder shall provide a permanent record of the magnitude of axial, transverse, and vertical forces to which the transformer is subjected while in transit.

For units shipped under dry gas, the moisture content of the insulation shall be estimated by the following method immediately prior to shipment. Dry gas shall be installed in the main tank and held at a pressure of 0-5 psig (0-0.35 kg/cm2) for at least 18 hours. The dew point temperature and ambient temperature of the gas shall be measured with a suitable device, and the results used in conjunction with the vapor pressure and percent moisture by weight graphs found in IEEE C57.93 or other graphs agreed upon between manufacturer and the Owner. If the percent moisture by weight of the paper exceeds 0.5 percent, the unit shall undergo further processing until this level is achieved. If the pressure in the main tank is between 0-5 psig (0-0.35 kg/cm2) at the time the dew point is measured, it is not necessary to make any adjustments to the readings taken from the aforementioned graphs.

5.12.9 Assembly and Field Testing

Contractor shall install, assemble, vacuum fill, and test transformer. Owner is responsible for delivery of transformer to pad. Contractor is responsible for install of all auxiliary equipment, which includes radiators, pumps, conservator tank (if necessary), NGR, etc. Contractor is responsible for vacuum filling transformer and doing field test in accordance with operating manual of unit.

5.13 SHUNT CAPACITOR BANK (IF APPLICABLE)

5.13.1 General

See Owner's Specification WED 0021 included with this Exhibit for capacitor bank specifications.

5.13.2 Equipment Required

If required, capacitor banks shall be furnished in accordance with the specification data sheet(s) completed by Contractor during detailed design.

If Contractor recommends altitude correction, a clear indication should be made to the Owner.

5.14 CONTROL EQUIPMENT ENCLOSURE

5.14.1 General

See Owner's specification WED 0148P included with this Exhibit for control equipment enclosure specification. If there is any contradiction between this Exhibit and the included Owner's specifications, the more stringent shall apply.

5.14.2 Equipment Required

The Contractor shall furnish control equipment enclosure in accordance with the specification data sheet(s) completed by Contractor during detailed design.

5.15 CONTROL, PROTECTION AND MEASUREMENT PANELS

5.15.1 General

5.15.1.1 Scope of Supply

Scope of supply shall include furnishing the protective relaying panels as specified herein and on the specification data sheet(s) to be completed by the Contractor during detailed design.

5.15.1.2 Performance and Design Requirements

Performance and design requirements for the protective relaying panels shall be indicated by the Contractor on the specification data sheet(s).

5.15.2 Codes and Standards

Work performed under these specifications shall be done in accordance with the following codes and standards. Unless otherwise specified, the applicable governing edition and addenda to be used for all references to codes or standards specified herein shall be interpreted to be the jurisdictionally approved edition and addenda. If a code or standard is not jurisdictionally mandated, then the current edition and addenda in effect at the date of this document shall apply. These references shall govern the work except where they conflict with the Owner's specifications. In case of conflict, the latter shall govern to the extent of such difference:

Work	In Accordance With
Protective relaying panels	The applicable ANSI, NEMA, UL and/or IEC standards.

5.15.3 Products

5.15.3.1 General

This section covers the furnishing of protective relaying panels as specified herein and on the drawings provided by the Contractor.

5.15.3.2 Arrangement

Protective relaying panels shall be arranged in accordance with the arrangement drawing(s) provided by the contractor and as specified herein.

5.15.3.3 Vertical Panel Structures

The vertical panel structure shall be an assembly of standard fixed vertical panels. Panels shall be fabricated from not less than 11 USS gauge (minimum 3.06 mm) leveled steel sheets and reinforced as required to form a rigid structure.

An open vertical panel will be supported by wall braces. An enclosed vertical switchboard shall have an overall sheet metal enclosure (not grille) covering the back, top, and ends of the entire assembly. Access to the interior of the enclosure shall be provided by doors or by removable covers.

Each panel shall be formed with edges bent back and joints welded and ground smooth and shall be designed to be readily removable from the structure without disturbing the remaining panel assembly or existing control or cross panel wiring. Finished panel surfaces shall be free of waves,

bellies, and other imperfections. Exterior panel surfaces shall be sandblasted, ground smooth, filled, primed, and enamel finished.

Instruments, meters, lockout relays, and protective relays shall be mounted on the front of the panels. Panel cutouts, mounting studs, and support brackets shall be accurately located and indicated on the drawings.

Mounting brackets, as required, shall be arranged for mounting and wiring auxiliary equipment and devices and terminal blocks. Where required, brackets shall be hinged and located to allow access to the back of the equipment mounted on the front of the panels.

Panel space not used by equipment shall remain clear for the addition of possible future equipment.

Blank panels shall be provided with standard wiring gutters for future wiring.

The interior of each panel shall be illuminated with a light, mounted inside the top of the panels and controlled from a switch mounted inside the door.

Wiring for lights and receptacles shall be run to one common 15 ampere fuse or circuit breaker for the voltage specified on the specification data sheet(s) as an external connection.

5.15.3.4 Dual Panel Structures

The dual panel structure shall be completely enclosed at the front, rear, top, and both sides. Standard dual switchboard construction shall be used, having the front or rear panels hinged with concealed hinges that are not visible from the outside of the panel. Leveled 11 USS gauge (minimum 3.06 mm) steel sheets and formed steel members shall be welded together to form a rigid structure. Equipment cutouts, mounting studs, and brackets shall be accurately located and indicated on the drawings. Welds on exposed surfaces of the structure shall be ground smooth. Finished panel surfaces shall be free of waves, bellies, and other imperfections. Exterior panel surfaces shall be sandblasted, ground smooth, filled, primed, and enamel finished. Interior surfaces shall be sandblasted, primed, and finished with gloss white enamel.

Mounting brackets, as required, shall be arranged inside the switchboard for mounting and wiring auxiliary devices and terminal blocks. They shall be located to allow access to the back of the equipment mounted on the front of the fixed panel.

Panel space not used by equipment shall remain clear for the addition of possible future equipment.

Blank panels shall be provided with standard wiring gutters for future wiring.

The interior of each panel shall be illuminated with a light, mounted inside the top of the panel and controlled from a switch mounted inside the door.

Wiring for lights and receptacles shall be run to one common 15 ampere fuse or circuit breaker for the voltage shall be specified on the specification data sheet(s) as an external connection.

5.15.3.5 Duplex Panel Structures

The duplex panel structure shall be an assembly of standard fixed vertical front and rear panels. Standard dual switchboard construction shall be fabricated from not less than 11 USS gauge

(minimum 3.06 mm) leveled steel sheets. Leveled steel sheets and formed steel members shall be welded together to form a rigid structure.

Each panel shall be formed with edges bent back and shall be designed to be readily removable from the structure without disturbing the remaining switchboard assembly or existing control or cross panel wiring. All joints shall be welded and ground smooth.

Mounting brackets, as required, shall be arranged inside the switchboard for mounting and wiring auxiliary devices and terminal blocks. Final arrangement of devices on the panels and inside the panel shall be submitted to the Owner for acceptance.

Instruments, meters, lockout relays, and protective relays shall be mounted on the fixed front and rear panels. Panel cutouts, mounting studs, and support brackets shall be accurately located.

Auxiliary equipment may be mounted on interior panels, hinged and located to allow access to the back of equipment mounted on the front panels. Intermediate barriers between adjacent panels shall not be provided. Equipment shall not be mounted on end closure sheets.

Panel space not used by equipment shall remain clear for the addition of possible future equipment.

Blank panels shall be provided with standard wiring gutters for future wiring.

Finished panel surfaces shall be free of waves, bellies, and other imperfections. Exterior panel surfaces shall be sandblasted, ground smooth, filled, primed, and enamel finished. Interior surfaces shall be sandblasted, primed, and finished with gloss white enamel.

The distance between the front and rear panels shall be 72 inches (1,829 mm). The height above the floor or base surface shall be 90 inches (2,286 mm) plus 2 inches (50.8 mm) allowed for base channel. The panel sections shall be mounted on a 2 inch (50.8 mm) by 6 inch (152.4 mm), 8.2 pounds per foot (12.20 kg per meter) steel channel. The panel shall be designed to have the bottom open and without permanent bottom braces.

The panel shall be furnished without top panel sheets to allow control room illumination and ventilation to serve the interior.

The panel shall be provided with removable end closures designed to permit future extension from either or both ends. End closures shall be equipped with hinged formed doors. The doors shall be rigid, nonsag, and reinforced and shall be equipped with three-point latches.

Internally mounted equipment and auxiliary devices shall be arranged to provide not less than 24 inches (61 cm) of unobstructed walkway between completed front and rear panels.

The interior of the switchboard shall be illuminated with two-lamp fluorescent fixtures, arranged in a continuous strip along the top, and controlled by three-way switches provided on the end closures, inside and near the doors.

5.15.3.6 Nameplates

Engraved nameplates shall be furnished on laminated plastic tags at least 1.5 inches (40 mm) by 4 inches (100 mm). Nameplates shall have black letters with a white background. Inscriptions on

these tags shall coincide with those used on the drawings. Nameplate inscriptions will be furnished by the Contractor and approved by the Owner at a later date.

5.15.3.7 Wiring and Wiring Diagrams

The Contractor shall provide internal panel wiring, connections, and diagrams to the manufacturer in accordance with the following requirements.

Panel Wiring

All wiring used within the panel shall be installed and tested at the factory.

All wiring shall be neatly and carefully installed in wiring gutters or raceway. Wiring to and from devices mounted inside or on the panels shall be in accordance with wiring diagrams.

Except as otherwise specified, the size of wire used in the panel shall conform to the following requirements:

Service	Minimum Wire Size
Power supplies and packaged control systems	As required
Ammeter and current transformer circuits	12 AWG (4 mm2)
Control wiring	14 AWG (2.5 mm2)
Indicating lights and annunciators	16 AWG (1.5 mm2)

Diagrams

The Contractor's wiring diagrams shall be in accordance with the requirements specified herein. Sufficient space shall be left on the Owner's side of outgoing terminal blocks for adding cable color codes and circuit numbers.

The complete connection diagram of each panel shall be on an individual sheet. Information on each connection diagram sheet shall include point-to-point wiring of the entire unit as it would appear to a person wiring the panel. Elementary diagrams of control and instrument circuits, contact arrangement of switches, and internal wiring of relays and instruments for each panel shall be on additional sheets as required. Interconnection diagrams shall be on separate sheets. All sheets shall be the same size.

Terminal Blocks

Furnish and install spare control terminal blocks in each panel per Owner's requirements. In addition, one lot of terminal blocks (with 20 percent spares) shall be provided for the current transformers, potential transformers, and analog wiring interface circuits as shown on the schematic diagrams.

5.15.3.8 Buses

Control, potential, and alarm buses of 12 AWG (4 mm2) or larger panel wire shall be furnished and installed as required.

A continuous 1/4 inch (6.35 mm) by 1 inch (25.4 mm) cross-section bare copper ground bus, with copper/bronze compression or clamp type connectors at each end, shall be provided in the panel. All panel equipment requiring grounding shall be connected to this ground bus with copper/bronze compression or clamp type connectors.

5.15.3.9 Power Supply Disconnects

Each panel mounted device requiring AC or DC supply, as indicated on the Contractor's schematic diagrams, shall have in its supply circuit a panel mounted fuse or disconnecting link to allow isolation of the device from the power supply. Disconnecting links shall be sliding link type.

When required by the schematic diagrams, power supplies for special devices shall be wired to a separate supply circuit for connection to the Owner's preferred AC power supply. Isolation fuses shall be furnished for each power supply branch circuit.

5.15.3.10 Relays, Meters, Controls, and Instruments

Meters, relays, instruments, and controls shall be installed and wired on the front panels with the exception of auxiliary relays, transducers, and instrument transformers that may be mounted inside of the panel or on sub-panels. Unless otherwise noted, instruments and meters including transducers shall be suitable for operation from instrument transformers with nominal 5 ampere and 120 volt secondary. Scale ranges and dial constants shall be provided to match the primary current and voltage ratings.

Indicating Lights

Unless otherwise noted, indicating lights shall be light-emitting diode (LED) type sized for the supply voltage. The manufacturer shall supply General Electric Type ET-16 LED indicating lights or Owner-approved equal. Lamps and lenses shall be replaceable from the front of the panel. Shields shall be provided to prevent short circuits. Indicating lights in outdoor panels shall be weatherproof.

Potential Transformer Circuit Fuses

Unless otherwise noted, each potential transformer (PT) circuit entering the panel shall be provided with incoming fuses provided by the manufacturer in accordance with the Owner-approved diagrams.

5.15.3.11 Raceway

An adequate raceway system shall be provided for all wiring on each side of each panel and between panels. The horizontal raceway for interpanel wiring shall be furnished complete per Owner's specification WED 0148P and as specified herein.

A complete system of separate vertical wiring raceways shall be provided for all factory and field wiring. This shall include vertical raceways along both sides of each panel.

The raceways for factory wiring shall be sized so that fill does not exceed 30 percent. Vertical raceways for field wiring shall be twice as large as those provided for factory wiring or shall have a minimum cross-sectional area of 20 in2 (508 mm2), whichever is larger.

Vertical raceways for field wiring shall be constructed as to be accessible to conductors entering from the bottom or the top of the panel.

The manufacturer's standard raceway may be considered, provided the Contractor provides sufficient information to evaluate the raceway system offered.

5.15.3.12 Space Heater

If a space heater is specified on the specification data sheet(s), a thermostatically controlled space heater shall be furnished and installed in the panel. The space heater shall be capable of maintaining the enclosure interior at a temperature above the dew point, based on ambient conditions specified in the specification data sheet(s). Space heaters shall be controlled by an adjustable thermostat or fixed humidistat.

5.15.3.13 Receptacles

If a receptacle is specified on the specification data sheet(s), the receptacles shall be furnished, mounted, and wired in a convenient location at each end of the panel. The receptacles for portable tools and droplights will be supplied from a single-phase AC source furnished by the Contractor.

5.15.4 Factory Tests

After the panel has been fabricated and all parts assembled, the complete gear, including instruments and devices, shall be factory tested. Factory tests shall include the following:

- Tests that verify correct assembly and operation.
- High potential tests.
- Applicable standard tests.

5.15.4.1 Test Requirements

The following testing shall be conducted in accordance with the specified source. This testing is to be considered part of the Contractor's scope, and all associated costs are the responsibility of the Contractor. However, the manufacturer is responsible for all costs associated with correcting deficiencies and retesting in the event of a test failure:

Tests	In Accordance With	Conducted By
Production test	NEMA, IEEE, UL, IEC	Manufacturer
Type test/Functional test	Manufacturer standard	Manufacturer
Point-to-point wiring checking	Manufacturer standard	Manufacturer

5.15.4.2 Type Tests and Certification

The manufacturer shall perform the type tests for major components if specified by the Owner and will be in accordance with all the applicable standards.

Type test certificates from identified components are acceptable in lieu of the individual type test. Type test certificates shall be made available to the Owner at no extra charge upon request.

5.15.5 Special Shipping Requirements

The equipment shall be shipped with the control equipment enclosure in accordance with Owner's Specification WED 0148P.

5.16 RELAY PROTECTION & CONTROL

5.16.1 General

The Project Collector Substation will employ multiple protective relaying schemes within the power transformers, transmission, and auxiliary power systems on site, and the protection will also interface with protective relaying applied within the Project Interconnect Substation. The Owner requests Contractor acceptance of existing Owner protective relaying standards in the Project Collector Substation design and construction as indicated herein. These standards apply to the transformer, WTG collector and bus protection; the Owner recognizes that Subcontractor standards may differ and will require review by Contractor and Owner as part of incorporation into the Project. Select protective relaying is shown in the electrical single line diagrams included in Exhibit CC-9 which shall be integrated in Contractor's design.

A key activity and formal Contractor Submittal is the relay protection settings that will include transformer protection relays, collector bus protection relays, and 345 kV bus protection relays.

5.16.2 General Protective Relaying Requirements

The Contractor shall also incorporate the following general requirements. Project Collector Substation protective relaying shall be designed such that, in the event of a fault occurrence, the faulty system/equipment is safely disconnected, while continuity of supply consistent with system stability is maintained. The selection and setting of protection devices for the Project Collector Substation electric power and auxiliary power systems shall be based upon the following major requirements:

- Faults on systems/equipment items shall be interrupted as quickly as possible to minimize damage.
- Faults external to major power sources (e.g. Unit Auxiliary Transformers) shall only open the circuit breaker controlling these power sources after any other protection nearest the fault has failed.
- Faults internal to major power sources shall cause their circuit breakers to open as fast as possible to ensure that the transmission system can restore itself within the limits of stability.
- The protection shall be designed to be stable in transient conditions such as closing one collector breaker.
- Protection of systems and equipment shall be designed to match the specific systems/equipment operating characteristics as procured and to provide discrimination with other systems and equipment.
- Contractor design and implementation of system protection will be in accordance with applicable NERC requirements. For example, but not limited to NERC PRC standards.
- Contractor will procure equipment from the Owner's preferred manufacturer of relay and GPS clock, which is Schweitzer Engineering Laboratories (SEL), unless otherwise indicated

in the Contract. Reference Appendix A for Owner's preferred SEL product codes. The Contractor shall procure the Owner-preferred equipment, except where one has been made obsolete, in which case the Contractor will work with the Owner to determine the proper replacement.

- Collector circuits shall include directional elements that are intended to reduce the arc fault energy in the direction towards the WTGs and the ability to be enabled/disabled locally ('Maintenance Mode' or 'Arc Flash-Protection').

Protective relays shall be microprocessor-based digital type. Protective relays shall be time synchronized to the sequence of event recorders and digital fault recorders by the use of an IRIGB signal and dedicated GPS time clock.

Protective relay voltage elements shall be coordinated with WTG LVRT and HVRT requirements and capabilities. The Contractor design shall not reduce the LVRT and HVRT capabilities of the WTG system.

All Voltage and Current measurements by relays are data points to be available in the RTUs.

Protective relaying devices shall be coordinated so that electrical disturbances (fault, overload, etc.) are interrupted at the point nearest the fault, with the next upstream protective device providing backup protection. Phase and ground fault protective devices shall trip the respective breaker. Protective devices on medium voltage circuits shall operate through a lockout relay (86) or equivalent device or circuit to prevent automatic equipment restart or reclose.

Protective devices shall be rated for the maximum available fault current. Each current operated protective relay requires dedicated current transformers not shared with other protection or metering devices.

An IRIG-B signal shall be distributed to protective relaying devices for the GSU and auxiliary transformer protection, Unit protection, Generator protection, and medium voltage breaker protection – to provide event time stamping.

For requirements regarding Project Collector Substation SCADA System reference Section 6.0.

5.16.3 Component Protective Relaying Requirements

Collector Circuit Protection: The Contractor will design at a minimum, the following protection for each WTG collector circuit, using a 351S relay, overcurrent protection (50/51/BF), directional overcurrent (67) for arc flash mitigation, to be coordinated with the arc flash study (performed by Contractor) and with the Owner's Engineer.

34.5kV Bus Protection: The Contractor will design, at a minimum, the following protection for each 34.5 kV Bus, using a 587Z relay, differential current (87), to include all collector circuits and the bus tie breaker. Tripping due to differential current will trigger a primary electromechanical lockout (86) on the 34.5 kV bus. A secondary electromechanical lockout (86) will be tripped by a SEL-351S (overcurrent) relay.

Bus Tie Circuit Breaker Protection (if applicable): The Contractor will design, at a minimum, the following protection for each bus tie circuit breaker, using a 351S relay and overcurrent protection (50/51/BF).

Main Power Transformer: The Contractor shall design, at a minimum, the following protection for each the main power transformer, using a SEL-487E relay and differential current protection (87). Additional protections shall include sudden pressure (63) and under voltage (27). Contractor shall specify and provide a SEL-2414 relay for use with the transformer(s). The design shall have overcurrent protection (50/51/BF) on both the high voltage side (345kV) and low voltage side (34.5kV) of the main power transformer(s) (using two SEL-351S relays). The design shall have a primary and secondary (high and low voltage side) electromechanical lockouts (86). The design shall have dedicated CTs on the neutral connection of the main power transformer(s)'s high and low side windings. Adequate alarms shall allow operator to quickly identify any abnormal conditions. Alarms such as high/low level, high/low pressure, and winding or top oil temperature shall only provide alarms and not trip the main power transformer(s). The design shall have adequate number of visual disconnect switches on both high and low voltage side.

345kV Bus Protection: The Contractor shall design, at a minimum, the 345kV bus protection in accordance with Transmission Owner's specifications.

Capacitor Bank Protection (if applicable): Capacitor banks shall be protected by SEL-487V (one relay per bay). This relay shall trip and lock out the capacitor bank breaker in the event of a fault. This relay shall block closing for an appropriate amount of time after opening to prevent closing into a partially discharged capacitor bank. The relay should also detect and alarm if an unbalance is detected due to failed capacitor can fuses.

345 kV Line Protection: 345 kV line between Project Collector Substation and Project Interconnect Substation should be assumed to be protected by two SEL-411L (or SEL-311L) relays (primary and secondary). Transmission Owner shall determine final relay requirements. **Voltage measurement requirements:** Voltage measurements shall coordinate the protective relay settings with turbine breaker settings.

Metering: The placement of CTs and PTs for the meter shall be per the GIA. Any line loss compensation shall be programmed as needed. Communications to 3rd parties programmed as needed.

5.16.4 Protective Relay Settings and Implementation

As part of the relay protection settings, Contractor shall calculate and submit relay settings for all Project Collector Substation relays protecting equipment through the high voltage distance relays associated with 345kV circuits routed between the Project Collector Substation into the Project Interconnect Substation. Transmission system electrical information required for the completion of relay settings shall be provided by Transmission Owner, via the Owner.

Also as part of the relay protection settings, AC and DC protection circuit diagrams and calculations showing how the proposed protection settings were derived shall be submitted to the Owner (with a copy of the ETAP or CAPE software files used to develop and install the relay settings provided).

In addition, overall protection coordination diagram(s) shall be submitted to demonstrate that the relay settings proposed offer satisfactory discrimination between the various protective devices.

During construction and Start-up and Commissioning phases, the Contractor shall provide site testing and functional checks. Test plans shall be created and performed using the Doble Protection Suite Software for all relays and associated instrument transformers to verify proper operation of protection circuits. These tests and data reporting shall confirm to NERC requirements.

5.17 BATTERY BANK AND CHARGER

5.17.1 Equipment Required

The Contractor shall furnish battery charger, battery and rack in accordance with the specification data sheet(s) completed by Contractor during detailed design.

5.18 STATION SERVICE TRANSFORMER

5.18.1 Equipment Required

The station service transformer shall be furnished in accordance with the specification data sheet(s) completed by Contractor during detailed design.

5.19 GROUNDING TRANSFORMERS

5.19.1 General

Each feeder shall have at least one grounding transformer to ensure that the feeders are effectively grounded. The grounding transformers must provide effective grounding as defined by IEEE C62.92.1 at all points on the Collection System. The use of a particular grounding transformer shall be validated in accordance with the Electrical Studies and Analyses.

5.19.2 Equipment Required

Grounding transformers shall be furnished in accordance with the specification data sheet(s) completed by Contractor during detailed design.

5.20 GROUNDING SYSTEM

5.20.1 General

The grounding system shall protect all equipment and personnel inside and including the substation fence against power grid surges and lightning strikes. This includes excavation, placement of ground conductors and associated equipment, and backfill and compaction of the in-situ soil. Contractor shall conduct any and all studies and calculations necessary to determine a safe grounding design.

5.20.2 Codes And Standards

Grounding systems and components furnished with these specifications shall be manufactured in accordance with applicable standards of the Institute of Electrical and Electronics Engineers, Inc. (IEEE), the National Electrical Manufacturers Association (NEMA), the American Society for Testing and Materials (ASTM), and Underwriters' Laboratories, Inc. (UL). Grounding systems and

components shall be installed in accordance with the applicable requirements of the National Electrical Code (NEC) and the Occupational Safety and Health Administration (OSHA) standards.

5.20.3 Materials Required

Grounding component materials shall be furnished new and undamaged.

5.20.4 Execution

5.20.4.1 Grounding Components

An electrical grounding system shall be furnished and installed in accordance with the following specifications. Grounding components shall include ground rods, ground conductor, ground bus, above and below grade grounding connections, grounding lugs, and hardware required for a complete system.

5.20.4.2 Ground Rods

Ground rods shall be copper clad, cold drawn carbon steel manufactured in accordance with UL 467. The copper cladding shall be electrolytically bonded to the steel rod or bonded by a molten welding process. Cold rolled copper cladding will not be acceptable. Ground rods shall have a conical taper on one end to facilitate soil penetration. Individual ground rods shall be 3/4 inch (19 mm) diameter and 10 feet (3 m) long. Ground rods shall be similar to Type ERITECH as manufactured by Erico, or an Owner acceptable equal.

5.20.4.3 Conductors

Bare ground conductor shall be soft drawn, stranded copper conforming to the requirements of ASTM B-8. Insulated ground conductor shall be soft drawn, stranded copper conforming to the requirements of UL 83. Insulated ground conductor shall be Type TW or THW having green colored PVC insulation. Ground conductors shall be as manufactured by Rome Cable Corporation, or an Owner acceptable equal.

5.20.4.4 Bus Bar

Ground bus bar shall be soft drawn, uncoated copper conforming to the requirements of ASTM B-187. Bus bar shall be a minimum 1/8 inch (3 mm) thick and 1 inch (25 mm) wide. Where required, bus bar shall be provided with predrilled holes measuring 9/16 inch (14 mm) in diameter with NEMA center line hole spacings. Bus bar shall be as manufactured by Erico, or an Owner acceptable equal.

5.20.4.5 Exothermal Connections

Exothermal connections shall be made for below grade electrical connections with a standard duty copper molten weld conforming to the requirements of IEEE 837, IEEE 80 Section 11, and UL 467. Molds and powder cartridges used for making exothermal connections shall be furnished by the same manufacturer. Exothermal connections shall be similar to Type CADWELD as manufactured by Erico, or an Owner acceptable equal.

5.20.4.6 Compression Connections

Compression connections shall be made for above grade electrical connections and be irreversible, heavy-duty, copper crimps conforming to the requirements of IEEE 837 and UL 467. Compression

fittings and compression tools and dies shall be furnished by the same manufacturer. Compression connections shall be similar to Type HYGROUND as manufactured by Burndy Electrical, or an Owner acceptable equal.

5.20.4.7 Ground Lugs

Ground lugs shall be single hole or two hole, copper bars conforming to the requirements of UL 467. Two hole ground lugs shall have NEMA center line hole spacings. Ground lugs used with the exothermal weld process shall be similar to Type LA as manufactured by Erico, or an Owner acceptable equal. Ground lugs used with the compression process shall be similar to Type YGA as manufactured by Burndy Electrical, or an Owner acceptable equal.

5.20.4.8 Ground Plates

Ground plates shall be high strength, four hole copper bodies conforming to the requirements of IEEE 837 and UL 467. Ground plates shall have NEMA center line hole spacings and shall be provided with hole plugs on the mating side of the plate. Ground plates used with the exothermal weld process shall be similar to Type B164 as manufactured by Erico, or an Owner acceptable equal. Ground plates used with the compression process shall be similar to Type YGF as manufactured by Burndy Electrical, or an Owner acceptable equal.

5.20.4.9 Hardware

Clamps, connectors, bolts, washers, nuts, and other hardware used with the grounding system shall be of copper, copper alloy, or stainless steel.

5.20.5 Grounding Installation

Grounding system components shall be installed as described in these specifications.

5.20.5.1 Conductors

Exposed conductors shall be installed inconspicuously in vertical or horizontal positions on supporting structures. When located on irregular supporting surfaces or equipment, the conductors shall run parallel to or normal to dominant surfaces.

All below grade ground conductors shall be buried a minimum of 18 inches (450 mm) and a maximum of 30 inches (750 mm) below finished grade unless installed under a concrete foundation. Ground grid conductors under foundations shall have 6 inches of earth cover between conductor and bottom of foundation.

Conductors routed over concrete, steel, or equipment surfaces shall be kept in close contact with those surfaces by using fasteners located at intervals not to exceed 3 feet. Conductors routed around 90 degree corners shall be kept in close contact with the perpendicular surfaces and shall not be physically damaged due to an insufficient bending radius.

Damaged ground system conductors shall be repaired or replaced.

5.20.5.2 Ground Rods

Where the required ground rod length exceeds 10 feet (3 m), ground rod standard sections shall be welded together to provide an extended rod with one true centerline a minimum of joint resistance.

During welding, the ground rod sections being welded shall be supported by a guide to ensure proper alignment.

5.20.5.3 Ground Plates

Ground plates embedded in concrete shall be carefully located as indicated on the drawings and firmly secured to the concrete forms. The threaded holes in the mating surface of round plates shall be plugged prior to pouring concrete. The grounding conductor attached to the ground plates shall be inspected prior to the pouring of concrete to ensure a good solid connection in accordance with industry standards.

5.20.5.4 Column Grounding

Structural steel columns shall be grounded by use of a servit post installed in a pre-drilled hole in the web of the column near the base as indicate on the drawings. The Contractor shall provide a hole in the web of structural steel columns not so equipped for grounding provisions. The hole shall be 9/16 inch (14 mm) in diameter and located approximately 8 inches (200 mm) up from the base. Prior to the installation of the servit post, paint, scale, and other non-conductive substances shall be removed from surfaces of ungalvanized structural steel members by grinding. Galvanized steel surfaces shall be leaned with emery paper.

5.20.5.5 Conduit Grounding

All conduit grounding bushings within all enclosures, including equipment enclosures, shall be wired together and connected internally to the enclosure grounding lug grounding bus with a bare copper conductor. Grounding bushings shall be grounded with conductor sized in accordance with the NEC, but not smaller than 8 AWG.

All grounding bushings on conduit runs which are terminated at tray shall be connected to the tray grounding cable or tray side rail with bare copper conductor as indicated on the drawings.

Where a conduit run is terminated at tray and the conduit carries a separate insulated grounding conductor, this grounding conductor shall be terminated on the tray grounding cable. If the conduit run is terminated with a grounding bushing and the separate ground conductor it carries is sized in accordance with the requirements of the preceding paragraphs for conduit bushing grounding, the ground conductor in the conduit run may be continued through the conduit bushing ground connection and terminated on the tray grounding cable making unnecessary the installation of a separate conduit bushing grounding cable.

Conduit bushing ground conductors shall be connected to the tray ground cable using split bolt connectors or an Owner acceptable equal mechanical connector.

Conduit terminated at equipment and device in threaded hubs shall not require additional grounding provisions.

5.20.5.6 Tray Grounding

A bare copper grounding conductor shall be installed on all power level cable trays containing single conductor power cables. The tray grounding conductor shall be installed on the outside of the tray side rails, along the entire length of the trays, attaching to each tray fitting and to each straight section of tray at 6 foot (1.8 m) maximum intervals. The tray grounding conductor shall be

attached to the trays using bolted ground clamps, and shall be connected to the ground grid at locations indicated on the drawings. Splices for the tray grounding conductor shall be made using compression connectors.

Cable trays containing multi-conductor power cables, control, or instrument circuits shall not require a continuous ground conductor installed along the tray. Instead, these tray levels shall be grounded by means of a ground jumper extended from the tray side rail to the continuous ground conductor installed along a power level cable tray, to building steel, or to the ground grid. Grounding intervals shall not exceed 100 feet (30 m).

Grounding jumpers shall be required across all expansion splice plates, dropouts and adjustable splice plates where a continuous ground conductor is not installed along the tray level.

5.20.5.7 Equipment Grounding

Electrical equipment that requires a ground grid extension stinger shall be connected to the ground grid with copper grounding conductor. The term "electrical equipment," as used in this section, shall include all enclosures containing electrical connections or bare conductors except that individual devices such as solenoids, pressure switches, and limit switches shall be exempt from this requirement unless the device requires grounding for proper operation. Equipment will be furnished with grounding pads and/or ground lugs which the Contractor shall connect to the ground grid. All ground connection surfaces shall be cleaned immediately prior to connection.

Where ground grid extension stingers are used for connection to electrical equipment, the Contractor shall connect the grounding conductor to the equipment ground bus, pad, or lug.

Where a ground conductor is included with the phase conductors of power circuits, the ground conductor shall be connected to the equipment grounding facilities and to the source ground bus. Where a ground conductor is not included with the phase conductors, the equipment shall be grounded by connecting a separate ground cable to the equipment grounding facilities and to the tray ground cable or source ground bus. All equipment ground conductors which are not an integral part of a cable assembly shall be sized in accordance with the requirements of NEC. All ground conductors installed in conduit shall be insulated.

Circuits include an insulated ground conductor to all 6,900 volt, 4,160 volt, 480 volt, and 208 volt loads to satisfy the requirements of the preceding paragraph. This ground conductor is either a separate cable, Type GI, or is contained within the multi-conductor power cable. Power circuits from 120/208 volt power panels contain one additional conductor which is used for grounding smaller devices which require 120-volt power.

The Contractor shall design, furnish, and install all equipment grounding cables required in addition to the ground cables to devices which have electrical connections but do not require a power circuit such as junction boxes and control equipment enclosure.

Suitable grounding facilities shall be furnished on electrical equipment not so equipped. The grounding facilities shall consist of compression type terminal connectors bolted to the equipment frame or enclosure and providing a minimum of joint resistance.

Suitable grounding facilities for electrical equipment not so equipped, but requiring multiple grounding connections, shall include the installation of a bare copper ground bus for the connection of several grounding conductors. This ground bus shall be connected to the equipment frame or enclosure, providing a minimum of joint resistance.

The conduit system is not considered to be a grounding conductor except for itself and for lighting fixtures. No equipment grounding conductor shall be smaller in size than 12 AWG unless it is a part of an acceptable cable assembly.

5.20.6 Grounding Measurements

All ground resistance measurements shall be made with the Four-Point Fall of Potential method as defined in IEEE 81. Some of the acceptable instruments are as follows:

- Advanced Geosciences, Inc., Sting R1, Mini Sting, Super Sting R1, or Super Sting R8
- Iris Instruments, SYSCAL R1 Plus, SYSCAL R2, or SYSCAL Pro

The grounding point shall be connected to any bare copper grounding conductor (e.g. fence ground) as the system reference point (E). The minimum distance from E to the current electrode (CE) should be 5-6.5 times the diagonal distance of the grounding system being measured. Resistance measurements shall be taken with the potential electrode (PE) at 1%, 10%, 20%, 30%, 40%, 50%, 60%, 61.8%, 70%, 80%, 90%, and 99% of the diagonal distance. The Contractor shall compare the reading at point (E) to the theoretical value from the step and touch analysis. The test shall be performed with all phase and ground connections lifted so that the equipment being tested is isolated from the rest of the grounding system. Testing direction shall be perpendicular to any parallel conductive path (trench, conduit, fence, overhead or below-grade lines, etc.) A sketch of the testing route shall be provided for each test. Contractor shall ensure that this testing is done in accordance with Engineer of Record's requirements from the step and touch analysis.

5.21 ELECTRICAL STARTUP, TESTING, AND CHECKOUT

5.21.1 General

This section describes and defines general criteria which pertain to the startup, testing, and checkout work covered by these specifications. This work is in addition to testing activities required in other sections of this specification. The Contractor shall be responsible, as part of the base scope, for all labor and materials required to demonstrate that the electrical equipment has been installed correctly and functions properly. Functional testing shall include a demonstration that all major equipment installed can be operated in accordance with the design from local and remote stations, control loops and protective devices perform as designed and other equipment operates in accordance with their specification. After such demonstration, the systems and components shall be turned over to the Owner. Upon acceptance of completion, the Contractor shall provide standby craft labor to correct discrepancies found during initial operation on a time and material basis when requested by the Owner. Such standby craft labor shall not be utilized for completion of Contractor Punch List items for work later identified as resulting from Contractor's lack of construction completion or Contractor's warranty work. Construction checkout of all electrical systems shall be provided by the Contractor subject to approval by the Owner. The scope of work extends to all equipment connected and/or installed under these specifications.

The Contractor shall supply to the Owner their proposed electrical and instrumentation testing procedures for review and document all testing and inspections.

5.21.2 Codes and Standards

The Contractor test procedures and plans must meet NETA and IEEE standards for testing substation equipment including, but not limited to transformers, relay protection, surge arresters, disconnect switches, cables, station batteries, circuit breakers and capacitor banks (if applicable), as well as circuit loop checks and control loop checks.

Documentation of all necessary equipment capabilities, settings, testing and commissioning shall be provided in sufficiency to meet NERC (PRC & FAC) standards requirements.

5.21.3 Execution

5.21.3.1 Inspection

The Contractor shall inspect the installed instrument systems and the installed equipment specified herein prior to starting calibration and checkout and shall report in writing to the Owner all deficiencies that could prevent proper checkout of such equipment and systems. Such deficiencies, if caused by or during installation by the Contractor, shall immediately be corrected. All equipment inspections shall be prepared for operation as recommended by the equipment manufacturer, as outlined in the Exhibit Y, and as directed by the Owner.

The Contractor shall perform an infrared inspection after energization to all substation critical equipment and parts in order to determine connection issues and eliminate heat related damage and failure. Critical equipment and parts include, but are not limited to transformers, circuit breakers, disconnect switches, bushings, surge arresters, cooling systems, and tap changer tanks.

5.21.3.2 Discrepancy Procedure

The Contractor shall endeavor to promptly discover major discrepancies in equipment, materials, and installation so that corrective procedures can be initiated without delay. When the Contractor discovers equipment with an incorrect rating, damage, not being as specified, or is otherwise unsatisfactory, arrangements will be made for replacement of the equipment. The Contractor shall promptly report to the Owner any improper field installations or material usage which the Contractor believes should be corrected. The Owner will arrange for corrective action.

5.21.3.3 Calibration in-Place

All equipment furnished and installed by the Contractor shall be calibrated at the site after installation. The Contractor's technicians performing the calibration shall be experienced in the calibration and adjustment of mechanical equipment and final drive devices. Technicians shall be experienced in working with the necessary diagrams and documents in accordance with the calibration and checkout work assigned to each technician.

Devices and equipment shall be adjusted and calibrated with the equipment normally installed in place. Exceptions to this procedure will be permitted with the concurrence of the Owner for the specific device categories for which in-place calibration is not practical.

5.21.3.4 Calibration Range

Analog devices shall be calibrated to be accurate within the manufacturers' specified tolerances over a range of 0 to 100 percent full range, with check readings for accuracy and hysteresis at 0, 25, 50, 75, and 100 percent. Digital or switch contact devices shall be set to actuate or change state at the required process condition, and shall be checked for accuracy and hysteresis (deadband) at this condition. Both accuracy and hysteresis for both analog and digital devices shall be certified to be within the manufacturers' stated tolerances.

5.21.3.5 Minor Corrections

Equipment and devices furnished by others may require minor correction to ensure correct operation following calibration and checkout. These minor corrections may include the following:

- Minor assembly operations within instruments.
- Removal of factory shunts or jumpers.
- Minor wiring corrections.

The Contractor shall perform minor corrections as part of the work defined by these specifications. In exceptional cases, the Contractor may judge that timely completion of the work requires discrepancies to be repaired by the Contractor. In such cases, the Contractor shall include repair of these discrepancies as part of this work.

5.21.3.6 Contractor-Caused Defects

The Contractor shall promptly repair at no additional cost to the Owner any equipment or devices which are damaged by the Contractor's personnel in the course of performing the work. Such defects shall be promptly reported to the Owner.

5.21.3.7 Manufacturers' Procedures

Drawings and installation and operating instructions from manufacturers of the equipment appropriate to the work described in these specifications will be made available to the Contractor as required. The Contractor shall follow the manufacturers' instructions in the performance of this work and perform all required and recommended tests, calibrations, and settings identified in these instructions.

5.21.4 Equipment Testing

The Contractor shall provide all required tools and test equipment to perform the work in accordance with these specifications and the Project Schedule. The test equipment shall be periodically certified. Any test equipment found out of tolerance during certification shall be replaced or repaired.

The Contractor shall include a list of test equipment provided, including manufacturer and model. The Contractor shall provide as many items of each category as are required to perform the work in accordance with the project schedule. The Contractor shall provide the Owner with a copy of all certifications for test equipment used on the project including any recertifications or replacement certifications.

5.21.4.1 Test Instrument Certification

Test instruments subject to drift or nonobvious miscalibration shall be certified at least weekly. The Contractor's QA/QC Program shall be capable of providing verification that the certification is being performed.

Certification methods shall follow recommendations of the test instrument manufacturers.

The Contractor's personnel performing certification shall be specially trained in the methods and procedures for carrying out these calibration certifications.

5.21.4.2 Calibration or Testing Certification Sticker

The Contractor shall furnish and affix a self-adhesive label to each device calibrated or adjusted. The label shall indicate the date and the name of the person performing the calibration or adjustment.

5.21.4.3 Startup

Startup will be under the jurisdiction of the Owner throughout the startup period.

Except as stated elsewhere, the Contractor shall render all services and do all work required to place each item of equipment installed, including all auxiliaries, in operating condition to the satisfaction of the Owner. All equipment shall be prepared for operation as recommended by the equipment manufacturer.

Individual systems and items of equipment shall be completed in a sequence that will permit systematic checkout and trial operation of each such component before it is incorporated in the initial operation.

Operating interconnection procedure between Owner and Transmission Owner shall be in accordance with document EEI-073.

5.21.4.4 Equipment Checks and Calibration

Preoperational checks and inspections shall be performed on all equipment as specified herein, and in accordance with the equipment manufacturer's recommendations. A representative of the Contractor shall be present during the equipment checks.

The Contractor shall verify in writing that all work and preoperational checkouts have been completed and, when the services of equipment manufacturers' field service representatives are specified, the Contractor shall include verification by such representatives that the equipment is ready for trial operation.

5.21.4.5 Electrical and Instrumentation Checkout

This section defines the scope of electrical and all instrumentation devices and equipment which shall be calibrated in-place, adjusted, or checked out by the Contractor as part of the work covered by these specifications.

The Contractor shall provide all temporary instrumentation and gauging devices required during checkout and trial operation of the equipment and systems.

5.21.4.6 Preoperational Equipment Checks and Testing

Preoperational checks and testing shall be performed on all equipment as specified herein and in accordance with the equipment manufacturer's recommendations. A representative of the Contractor shall be present during the equipment checks. All field tests shall be witnessed by the Owner at the Owner's discretion.

The Contractor shall verify in writing that all work and checkouts have been completed, and when the services of equipment manufacturer's field service representatives are specified, the Contractor shall include verification by such representatives that the equipment is ready for trial operation.

Preoperational checks and testing shall include, but not necessarily be limited to, the following:

Safety Equipment

All coupling guards, belt guards, and other personnel safety items shall be installed. All bolting shall be securely tightened to the correct torque as recommended by the equipment manufacturer.

Fire Protection

All fire protection systems and equipment shall be installed and operative.

Shipping

All temporary shipping braces, blocks, or tie rods shall be removed.

Lighting and Receptacle Checkout

The Contractor shall test, check out, and energize the lights and receptacles furnished and installed under this Contract. Lights shall be energized as soon as circuits are complete to increase the lighting level for construction and checkout. Immediately before energizing a lighting or receptacle circuit, the Contractor shall make the following checks:

- The transformer neutral supplying the source panelboard is solidly connected to ground.
- The phase and neutral conductors to be energized are free from grounds.
- All covers are on lighting fixtures, pull boxes, and junction boxes so exposed conductors will not be energized.
- The ground conductor (if required) is solidly grounded.

After completing the pre-energization checks, the Contractor may energize the circuit under the direction of the Owner.

Metering

All metering, including panel meters and transducers, shall be calibrated to within the manufacturer's accuracy.

Unless specified otherwise, all meters shall be tested and calibrated with equipment of no more than 50 percent of the manufacturer's stated accuracy instrument being tested.

All meters shall be visually inspected for damage, and wiring connections shall be verified in accordance with the three-line diagrams.

Panels

Panel instrumentation indicating lights, switches, and relays shall be adjusted and checked out as part of the checkout of the Contractor-installed electrical equipment. Electric metering for volts, watts, amperes, and other electrical quantity functions shall be checked out as described in this section and the following section.

Panel indicators shall initially be calibrated by simulating the electronic signal normally received by the indicator. The final calibration shall be performed using the actual transmitter, signal converter, or system output to be connected to the indicator. The transmitter-receiver combination shall be calibrated to read out accuracy tolerance no greater than twice the average tolerance of the individual devices throughout the range from 0 percent to 100 percent of total scale. In certain instances for specific equipment, the Owner will specify a range of interest. In these cases, the Contractor shall calibrate the transmitter-receiver combination to read exactly correct with the calibration standard being utilized, within the range of interest.

Electrical panel instrumentation shall be calibrated.

Every instrument utilizing a plastic lens or window shall be given a static effect check. The static check shall consist of wiping the lens or window vigorously with a dry cloth of a type recommended by the manufacturer which will not harm the surface. If the needle or pointer holds up-scale or below zero set for more than 15 seconds, the surface of the lens or window shall be treated with a clear antistatic compound recommended by the manufacturer.

Cables

All 5 kV and above power cable shall be very low frequency (VLF) hi-pot tested in accordance with IEEE and ICEA standards.

Shielded cable ground checks should be made after termination is complete using a volt-ohm meter to determine that each is grounded only at the points according to the drawings.

Additional cable testing shall include, but is not limited to conductor phasing, resistance of neutral wires, and DC insulation (“megger”) tests. Optional cable testing may include, but is not limited to a partial discharge (PD) test.

Main Power Transformer(s)

For each main power transformer, measurement of resistance to ground and polarization index of each winding with all other windings grounded shall be made. Measurements shall be with a winding tester. Measurements for each transformer shall be made immediately prior to placing in service. If a transformer winding has a resistance to ground or polarization index less than recommended by the manufacturer, the transformer will not be placed in service.

Complete check of all field wiring shall be made after installation and connection to verify that field wiring is as indicated on the drawings and schematic wiring diagrams. Equipment jumpers as indicated on the schematics shall be checked.

Additional main power transformer testing shall include, but is not limited to testing of insulation, oil, CTs, ratio test for all tap positions, bushings, sudden pressure relays, pressure relief devices,

controls (cooling fans, LTC, etc.), alarms and power factor. Site tested bushing results will be compared to the results made during transformer factory testing.

Instrument Transformers

All instrument transformers, including bushing current transformers, shall be tested.

Ratio and polarity tests shall be performed on all instrument transformers. Current transformer ratio and polarity tests shall be voltage ratio tests using a digital voltmeter or current ratio tests using high current injection test equipment, as directed by the Owner.

Additional instrument transformer testing shall include, but is not limited to testing of insulation resistance, ground, and continuity and phasing checks.

Surge Arresters

Surge arrester testing shall include, but is not limited to insulation resistance, low impedance path to ground, power factor, and lead length and nameplate checks.

Circuit Breakers

Circuit breaker testing shall include, but is not limited to power factor, contact resistance, dielectric withstand, timing, and SF6 (moisture, purity, and reactive gasses).

Disconnect Switches

Disconnect switch testing may include, but is not limited to contact alignment, closed contact resistance, and orientation, clearances, and label checks.

Station Batteries

Station battery testing shall include, but is not limited to cell voltage, internal ohmic and load tests.

5.21.5 As-Built Drawings

The Contractor will furnish three sets of the following drawing categories to the Contractor for markup purposes:

- Electrical one-line and three-line diagrams
- Electrical schematic and wiring diagrams
- Interior and exterior cable schedules

The Contractor shall neatly and legibly mark each set, in triplicate, including all field corrections performed during calibration and checkout. One copy of each drawing shall be submitted to the Owner's Engineer as a part of the completed forms returned with each subsystem startup or turnover package. A second set will be turned over to the Owner for use during Start-up and Commissioning. Submittal of these two sets to the Owner's Engineer and Owner shall be concurrent with completion of the startup or turnover package. The third copy shall be retained by the Contractor until the conclusion of the project. The Contractor's copies shall be turned over to the Owner at the conclusion of the project.

6.0 SCADA and Communication Systems

The Contractor shall furnish and install the network, communication, and Project Collector Substation SCADA System in accordance with this specification. This specification will convey the scope of the Contractor.

Contractor shall provide the following deliverables including but not limited to: communication block diagrams, communication cable list, schematic wiring diagrams, Project Collector Substation SCADA System data point list, Transmission Provider and ,all configuration files in electronic format, graphic screen development, system programming, Project Collector Substation SCADA System hardware and software licenses, Project Collector Substation SCADA System desktop computer and printer, onsite commissioning and acceptance testing for the Owner, preparation and completion of any documents required by the Owner to establish that the Project Collector Substation has been properly commissioned before interconnection is allowed.

6.1 NETWORK AND COMMUNICATIONS INFRASTRUCTURE REQUIREMENTS

6.1.1 General Requirements & Scopes of Work

All work regarding Project Collector Substation SCADA System, network, and communications shall be in the Contractor's scope except where explicitly stated otherwise in this document.

6.1.1.1 General

- Contractor shall provide all trenching of the fiber infrastructure . This will include the fiber cabling within the Project. It may also include fiber installation outside the Project boundary. The layout of the fiber cables in the collection system shall follow the collection power cable layout as closely as possible.
- Contractor shall assign rack positions for all equipment, and provide drawings to convey the design. Contractor shall also furnish and install all equipment racks.
- Contractor shall provide all Ethernet cabling and connections including but not limited to the Project SCADA system, WAN, Owner IT network, etc. The Ethernet cabling will be Cat-6 or better and should support power over Ethernet.

6.1.1.2 Construction

- During construction, the Contractor will supply Internet and phones at construction laydown yard work site for Owner, Contractor, and any Subcontractors. Aggregate Internet connection for Owner shall be at least 20 Mbit/s download and 15 Mbit/sec upload and satellite communication shall not be used.
- 2-way radio. During construction, the Contractor will set up a radio system for use during construction.
    - The Contractor will design/supply equipment for a portable, multi-channel two-way radio system for use by Contractor and Owner during the construction phase.
    - The radio system shall be configured to allow other Subcontractors of the Contractor and subcontractors of the Owner (for example, the Turbine Supplier) to share two-way communications and channels for tight coordination of work.

6.1.1.3 Project Collector Substation

- Contractor shall furnish and install Ethernet and serial cabling from relays, RTU's (Remote Terminal Units), etc. to Owner's IT devices.
- Contractor shall furnish and install collector fiber optics, test, and terminate to cross connection panel and then to Project SCADA System cabinet Ethernet switches.
- Project Collector Substation may utilize microwave data connection. This option is not primary WAN interconnection but may be required.
- In order to avoid high voltage isolation equipment, the Project Collector Substation shall not utilize copper data lines of any sort (examples: POTs (Plain Old Telephone Service), T1 over copper).
- Contractor shall furnish, configure, and install RTU.
- Contractor shall design Project Collector Substation SCADA System interface with Owner PI historian. This involves programming RTUs to communicate with an Owner PI historian, via OPC (Object Linking and Embedding for process control) and/or DNP3 (Distributed Network Protocol).
- Contractor shall provide quantity of two (2) 2-post communication racks and two (2) Project Collector Substation SCADA System cabinets in building design. The power to these cabinets should be backed up by the Project Collector Substation battery system, providing at least ½ hour of backup power. The racks will grounded per applicable standards.
    - The 2-post communication rack should be equivalent to Chatsworth Products p/n 55053-703, which is a standard 2-post to accommodate 19" EIA width equipment, 3" deep rack with at least 7' height. The standard 2 post rack will have vertical cable management on both sides of each 2-post rack. The standard 2 post rack will have vertical cable management on both sides of each 2-post rack, Chatsworth Products p/n 30162-703 or equivalent.
        - Each 2-post communications rack will have -48 VDC power in each rack. There will be two -48 VDC power circuits that terminate to a Telect fuse panel with at least 10 fuse positions (A and B feeds). If the station battery power needs to have DC to DC conversion (from higher stack voltage down to -48VDC), each rack will contain a DC to DC converter.
        - Each 2-post communications rack will have (2) 30A AC circuits terminated to Power Distribution Units (PDUs) (with 5 outlets minimum)
    - The two Project SCADA System cabinets (supplied by Turbine Supplier) will need one square meter floor space each and are 1,850 mm tall x 625 mm wide x 1,200 mm deep and weighs about 500 kg. Cable entry can be through either the top or bottom of the rack. 48 inches / 1.2 meters must be allowed in the front and the back of the rack for the doors to open. Power requirements are two circuits of 120 VAC / 60 Hz / 30 A / NEMA L5-30R Outlet. To be supported by Project Collector Substation batteries, an inverter shall be provided by the Contractor.
- The Owner will be in charge of cyber security at the wind farm. The Owner will install a firewall to isolate the Project's control network.
- Contractor shall provide DC power in each rack position. Contractor shall design the battery system required to provide -48 VDC power, with one Telect DC fuse panel in each 2-

post rack. Contractor shall provide one AC inverter in each 2-post rack, providing at least 50Amps total output at 120 VAC, 60 Hz, and at least 4 power outlets. The power to these racks should be backed up by the Project Collector Substation battery system, providing at least ½ hour of backup power. The Transmission Owner shall be given at least 2 rack positions, with enough space for working, DC power, backup power requirements, etc.

6.1.1.4 Facility Security

Contractor shall furnish and install the following security-related devices and equipment for the entire site, including the Project Collector Substation. Please refer to Section 2.4 for applicable standards.

- Data and power wiring for security cameras, badge readers, control panels, etc. These will be on the Project Collector Substation building. Contractor will install conduit for cameras or badge readers per A-3.1 near the gates and corners of the Project Collector Substation yard. Design space for access control panels.
- Contractor to coordinate purchase of doors to meet Owner standards.

6.1.2 Required Equipment

6.1.2.1 Project Collector Substation

- Firewall
- Other WAN equipment
- Ethernet switch (used to communicate with RTUs, WAN interconnection router, and MUX
- Phone
- Cameras
- Badge Readers for door
- Fiber patch panels, for inside Project Collector Substation building and outside
- DC batteries, Telect fuse panel (containing at least 10 fuse circuits), for at least 40ADC at -48 VDC.
- DC-DC converters, inverters, as needed
- Project RTUs. Quantity of RTUs will be determined by the design, but anticipate 2 or 3 RTUs will be required
- HMI Computer, the interface to Project RTUs
- Serial to Ethernet converters
- 2-post racks and 4-post cabinets per Contractor design, interconnecting cabling, power cabling, etc. for Project Collector Substation SCADA System, to Owner IT equipment and to Contractor-provided RTUs, relays, power meters, Intelligent Electronic Devices (IEDs), etc.
- Satellite-synchronized network clock, providing IRIG-B (inter-range instrumentation group) protocol clock signal, SEL-2488
- WindSCADA cabinet
- WindCONTROL cabinet

- All equipment within Project SCADA System cabinets

6.1.3 Required Drawings in Final Design Package

Contractor shall provide the following for Project Collector Substation unless stated otherwise:

- Network block diagram – Owner will provide WAN connection details for this drawing. Contractor will design relay protection network
- Wiring diagrams for all equipment
- Panel layout diagram
- Fiber one-line diagram
- Equipment elevation drawings

6.1.4 Standards

Contractor shall provide a network and communication system that complies with all NERC (North American Electric Reliability Corporation) CIP (Critical Infrastructure Protection) and COM (Communications) requirements, as well as any applicable internal Owner standards.

6.1.5 Communication Protocols

Contractor shall configure RTU and other devices to interface with Project SCADA System.

Only the following communications protocols shall be allowed:

- MODBUS, for connection of RTU to Project SCADA System
- DNP3, Owner's preferred protocol for all Project Collector Substation SCADA System interfaces. Used in the control center communications to Project Collector Substation SCADA System RTUs for monitoring and control. Used in PI Historian interfaces to RTU.
- OPC, PI Historian to Project SCADA System for data collection
- SEL communications protocol, SEL-ASCII, used in RTU to IED communications, remote engineering access, MV90 access (metering)
- For IT security reasons, only serial communications to/from the RTU will be allowed unless approved by Owner.

6.2 PROJECT COLLECTOR SUBSTATION SCADA SYSTEM REQUIREMENTS

6.2.1 Project Collector Substation SCADA System Communication Design

The Project Collector Substation SCADA System will interface and exchange information with the Project SCADA System provided by the Turbine Supplier, Owner SCADA System and the Interconnection SCADA System. The Project Collector Substation SCADA System will, at a minimum, accept trip commands from the Owner's remote control center to isolate the Project from the local electrical grid. The Project Collector Substation SCADA System will be comprised of RTUs, and ancillary equipment to connect with IEDs and other systems.

The Contractor will coordinate with the Owner's telecommunication engineering, system protection, Generation Dispatch control center (GDC), and Distribution Dispatch Center (DDC)

subcontractor teams to design and specify the Project Collector Substation SCADA System and equipment.

The Project Collector Substation SCADA System will provide the following for all the equipment contained in the Project:

- Modulating (continuous) control
- Discrete (sequential) control
- Alarm monitoring and report generation
- Information display
- System data reporting and trending
- Short and long-term data storage
- An IRIG-B signal shall be distributed to protective relaying devices by the RTUs for transformer protection.

Contractor shall prepare communication block diagrams of the Project Collector Substation illustrating the interconnection of the Project Collector Substation SCADA System devices located at the Project Collector Substation, the Project SCADA System, and the Interconnection SCADA System. The block diagram shall identify devices, port number, communication cable type, protocols and device addresses at a minimum. The block diagram shall also indicate communication devices outside of the project (e.g. Owner IT network), as well as network connections from the telecom provider.

Contractor shall design, procure and install the equipment and programming necessary to interface with the Project Collector Substation SCADA System via a permanent desktop computer located in the Project Collector Substation.

All equipment operations or changes performed by an operator through the Project Collector Substation SCADA System shall require the operator to be logged in. The operator's actions shall be recorded as part of the Project Collector Substation SCADA System's data logger.

An historian shall also be integrated into the Project Collector Substation SCADA System such that it retains all data points captured by the Project Collector Substation SCADA System for a rolling two year period. All currently stored data shall be downloadable from the historian when accessed by the Owner. The Owner shall be allowed access to historian upon request.

6.2.2 Control Display Screens

The Project Collector Substation SCADA System shall include an HMI computer designed to provide means for the operator to monitor and control the Project and Project Collector Substation equipment. Each control display shall contain textual, geometric graphic, dynamic analog trending, dynamic bar chart, and alarm information representing plant systems, equipment, and other process information. Owner will own all software licenses after turnover to Owner.

The control displays shall be implemented on a high-resolution display system that, at a minimum, includes the following capabilities:

- One computer suitable for installation in the Project Collector Substation, with monitor, keyboard, and mouse. The computer will have either MS Windows or Linux operating system. The entire system should be housed for operation in one of the 2-post racks.
- One computer suitable for installation in the O&M Facility office, with monitor, keyboard, and mouse. The computer will have either MS Windows or Linux operating system.
- Dynamic numeric data linked to analog variables shall display the current numeric value of the variable, scaled as specified in the database, with engineering units.
- The latest in pictorial abilities such as automation of symbols with three-dimensional effects applied to lines and symbols shall be available.
- Standard geometric shapes shall include, as a minimum, lines, polygons, rectangles, arcs, and ellipses.
- Standard geometric symbols (circuit breakers, transformers, protective relays, etc.) and the ability to create new symbols using standard symbols and standard geometric shapes shall be included.
- The Project Collector Substation one-line power schematic should be one of the available display screens, displaying the status of all circuit breakers. Green status is used to show a breaker is open and red is used to show a breaker is closed. This screen should also display the present 345kV voltage and current readings.
- The capability to fill any closed geometric shape with any available color shall be included. This capability shall allow fill in proportion to the value of an analog variable, and to select the fill color in response to the analog variable or according to the status of a discrete variable.
- The display system shall also include the following user selectable capabilities:
    - Creation, modification, and selection of colors in the color library.
    - Definition of attributes of all textual and geometric graphic elements, such as color, line weight, line type, blinking, and dynamic conditional linkage to system variables and attributes.

The system shall provide, at a minimum, the capability for any control display to show 200 dynamic variables (analog and digital) and/or geometric symbols, control 10 data entry points, and control 100 target points. Based on an operator clicking on or selecting a dynamic variable, the system shall provide the functionality to jump directly to its point detail display. Through operator entry of a value into a data entry point, the system shall provide the functionality to store and use that value for system and equipment control. By an operator clicking on or selecting a target point, the system shall activate a "pop-up" control to allow system and equipment control.

6.2.3 Trend Displays

Trend displays shall simulate a multiple pen strip chart recorder and shall consist of a time plot of a minimum of five points concurrently. Each trace shall be in a unique color. Alphanumeric information shall be overlaid on the same screen to identify points, scales, current value, and related information. Chart roll-down shall be included. Chart roll shall be in the horizontal direction with the latest value appearing at the right-hand side of the screen. Time shall be plotted on the horizontal axis. The operator shall be able to set the zero and full-scale values for each trended variable in any screen location. The system shall permit the operator to set the grid roll speed and

the interval between time lines. The system shall provide standard trend displays with variable full-scale time ordinates. All trends shall be backward and forward scrollable from the trend start time. Selection of points to be trended shall be menu driven.

The system shall allow any system variable to be trended, and shall allow points from short-term and long-term storage to be trended. The trend display period between points on trends using data from short-term and long-term data storage shall be the same as the storage frequency selected for those points. Trending resolution shall not be coarser than ±0.5% full scale using pixel displays.

The system shall also provide the capability to incorporate trend displays into any user-created control or information display.

6.2.4 System Acceptability

The equipment used in the design must be in commercial operation in a minimum of five power generating plants of scope and magnitude similar to that for which the equipment is proposed or provided as a part of this Contract. The system shall be compatible with the electromagnetic environment in which it will operate, and shall not misoperate or sustain damage from the influence of radiated or cable conducted fields typically found in power generating plants. The system shall be designed and equipped to withstand, to the maximum extent possible, lightning surge by atmospheric electrical disturbance without damage or disruption. The system architecture shall accept new technology as it becomes available, and future system enhancements shall be compatible with the equipment supplied under this Contract so that extensive hardware and software retrofitting is not necessary. The Contractor shall not propose nor provide equipment from any manufacturer that is expected to be superseded or outdated by a later generation of equipment prior to the commercial operation date. All equipment shall be new, unused, and of the highest quality available from the manufacturer.

6.2.4.1 Failure Modes

The Project Collector Substation SCADA System's design shall carefully consider the effects of potential hardware and software failures on the functions being performed by the system. Contractor shall design the system to do the following:

- Detect failures by the use of continuously running diagnostic routines and bring them to the operator's attention.
- Provide hardware and software designs that react to failures in a predictable and repeatable manner.
- Mitigate the effects of failures by the use of equipment redundancy, software error correction, or other available means.
- The system shall meet NERC failure reporting requirements

6.2.4.2 Fault Reporting

Contractor shall ensure that the Project Collector Substation SCADA System meets NERC fault (power system short circuit events) reporting requirements.

6.2.5 System Interface Requirements

The update rate, processing rate, and response time of all control processors, the data highway communications network, and of the overall system shall be sufficient to maintain control over the equipment under all system operating conditions, including extreme upset conditions with all points in alarm.

The following Project Collector Substation SCADA System interfaces will be implemented (associated group named). The Contractor will coordinate with the Owner the development and programing of Project Collector Substation SCADA System database for each interface with the named group (quantity is preliminary and relationships to be finalized by Contractor during detailed design):

- GDC master-to-RTU slave
- GE SCADA (WIND SCADA) master-to-RTU slave
- RTU master to GE SCADA WindControl slave
- PI Historian master-to-RTU slave (Owner's PI historian)
- RTU master-to-revenue meter(s) slave (system protection)

At a minimum, the system shall scan all inputs and outputs, process all control logic, and perform all other functions required to record the changes and the time of the changes as follows:

The scan rate for all I/O (Input/Output) shall be user selectable (must allow I/O scan every 0.5 second as a minimum).

- RTU: Analog inputs and analog outputs shall be scanned at least every 0.5 seconds with at least 10 percent of the inputs and outputs able to be scanned at a 0.1 second interval.
- RTU: Digital inputs and digital outputs shall be scanned at least every 0.5 second.
- Relays: Digital sequence of events (SOE) inputs shall be scanned at least every 0.001 second. The time resolution of SOE points in different control processors shall be the same as SOE points residing in the same control processor.
- All non-SOE alarms shall be time tagged to a resolution of 0.5 second (or as specified in the I/O database).
- Relays: The processing rate for all control logic routines and calculations shall be individually selectable.
- Modulating control logic and calculations shall be processed at least every 0.5 second with the capability to process at least 10 percent of the logic at a 0.1 second interval.
- Discrete control logic shall be processed at least every 0.5 second.

At a minimum, the system shall respond to operator commands and control system changes as follows:

- Time to completely generate a display shall not exceed 2 seconds.
- The indication of any variable, on all displays including alarm displays, shall be updated within 1 second of its value or status change.

- The time to respond to any operator command shall not exceed 1 second.
- The time to respond for FDI (foreign device interface) functions shall not exceed 1 second (response time will not include the time required for the foreign device to respond to the Project Collector Substation SCADA System; only the actual bi-directional communication time shall be considered).

The response time is the total elapsed time for transmission of data through the system communications path. This time shall include all communication time from control processor to control processor, I/O scans, nodes, FDIs, monitors, keyboards, and associated equipment internal to the system.

6.2.6 Remote Web Server Interface

Contractor shall provide the hardware and software necessary to allow remote access of real-time process information by any Intranet web browser on any connected personal computer (PC). Contractor shall also provide remote access client licenses, if required.

The interface shall allow client PCs with web browsers to dynamically display process values and data, displays, trends, and reports. The remote web server interface shall also, at a minimum, provide the following functionality:

- Connectivity through company Intranet connections, dial-up connections, and standard Internet connections.
- Read-only access to all process information of the Project Collector Substation SCADA System, including access to the point database information and live and historical trend data.
- Ability to convert Project Collector Substation SCADA System graphics to web based objects to allow graphics access from standard web browsers.

6.2.7 Minimum Required Points List

Contractor shall program Project Collector Substation SCADA System RTUs to provide, read and report data tags/points for communication to and from the Owner's Pi Historian, Owner SCADA System and control centers and Project Collector Substation IEDs. Contractor will be responsible for generating the actual points list through discussion and coordination with Owner.

6.2.8 Project Collector Substation SCADA System Functional Control Requirements

The RTU will receive MW (megawatt) set point from Owner's GDC, and forward this to the Project SCADA System. The RTU will send response messages back to GDC, based on messages from the Project SCADA System.

The RTU will send regular status messages to Owner GDC and DDC (Distribution Dispatch Center) control centers of breaker status, voltage, current, and power (VAR (Volt-Ampere Reactive and MW) measurements. The status message rate will be communicated to the Contractor. Any fault or alarm messages will be sent to Owner GDC and DDC as they are generated.

6.2.9 Project Collector Substation SCADA System Commissioning Requirements

Contractor shall develop test plans (which the Owner will approve) then perform the test and verifications of the Project Collector Substation SCADA System including but not limited to the following:

- Verify RTU communication with Project SCADA System
- Verify RTU communication with Owner IT network and Owner control centers (Owner SCADA System)
- Verify RTU and power meter communication with Transmission Owner/operator as needed (Interconnection SCADA System)
- Verify remote RTU Project Collector Substation SCADA System control/login ability, connections and data transfer of all points and data tags to the Owner Pi Historian and Owner SCADA System.
- Verify functionality of the individual RTUs, relays, and other IEDs.
- Verify functionality of MW output set-point (curtailment)
- Verify functionality of any line drop compensation algorithms (if applicable)
- Verify functionality of voltage control at the POI (point of interconnect)
- Verify functionality of the reactive power control (ability to maintain required power factor at the POI)

7.0 MET Tower

7.1 PERMANENT MET TOWER

This specification is for the complete engineering, procurement, installation, testing, and commissioning of meteorological (MET) towers for power curve testing and site monitoring purposes. Contractor shall furnish and install two permanent MET towers in accordance with this exhibit and the applicable sections of the most current accepted standards for power curve testing, as specified by the IEC 61400-12-1, MEASNET, and applicable technical documentation from the Turbine Supplier.

The Contractor shall procure and install two permanent met towers, the power required to operate the equipment and the instrumentation of the permanent met towers in accordance with these specifications. The Contractor shall furnish and install low voltage cable, fiber optic cable and grounding conductor from anemometer masts to the nearest wind turbine. Grounding rings and associated rods shall be provided and installed at each permanent mast to meet applicable codes. Locations listed above are considered indicative at this time. Permanent met towers shall be placed into service prior to the scheduled date of power performance testing. It shall be designed with intent for all components, with the exception of wind monitoring and logging equipment, to remain in service for the life of the wind farm.

The tower shall be a self-supported galvanized steel lattice structure designed for maximum wind and ice loading and shall be certified for the particular site conditions. The tower shall be designed and fabricated to the latest EIA/TIA-222-H structural Standards for Steel Antenna Towers and Antenna Supporting Structures. The Contractor shall furnish and install FAA obstruction lighting onto the tower as required by the FAA lighting design. The MET tower design shall incorporate a safety climb cable. The MET tower foundation shall be designed according to the specifications of Section 3. The Contractor shall also install sufficient grounding as specified in the latest IEC 61400-12-1 and EIA/TIA-222H standards. The area around the tower shall have a chain link fence in, enclosing a perimeter of approximately of 150 feet, to protect the facility from the public. The fence shall contain a walk-in gate door with a 2 foot clearance to the ground. The gate shall accept a padlock to keep closed and locked to protect the facility. All enclosure electrical boxes at the ground level shall be lockable with a padlock.

7.2 TEMPORARY MET TOWER

All equipment and instrumentation on the permanent MET towers shall be connected to the Project SCADA System and supply data to the Turbine Supplier's SCADA client. Permanent MET tower data shall be available to the Owner through open platform communications (OPC) (or similar interface) for consumption in a PI database (or similar system).

Contractor Scope of Work is as follows:

- Tower design (with additional antenna loads), grounding design of compound, fence perimeter length determination.
- Civil work, rock base, ground grid procurement and installation.
- Procure and erect tower, fence, gates, Met equipment, ice bridge structure.

- Procure a DC-DC converter to supply DC power to MET equipment.
- Pour concrete pad for 12'x16' building, a concrete pad for a generator, and concrete for ice bridge footings.
- Procure and install underground conduits for power cable from generator pad to building pad and a conduit from an H-frame outside fence to the building pad. Each conduit rises up to a disconnect switch, mounted on the outside of the building.
- Provide and install cable of 240VAC power from nearest turbine, 100 amp rating.
- Provide and install 400/240 VAC transformer at nearest turbine, KVA rating to match power requirements.
- Setup, configuration, troubleshooting of MET equipment.
- Provide and install fiber optic connection according to contract. 12 fiber bundle is delivered to the tower as follows:
    - One pair will connect to MET equipment: this is part of the wind turbine network.
    - One pair will connect to radio equipment and will be fused back to the substation as a continuous fiber.
- Deliver drawings in DWG format.
- Offload building from truck to concrete pad at MET location. If pad not available to store building or in laydown yard, move to pad when available.
- Connect 240 power from turbine to the building's disconnect switch.
- The Contractor shall procure and install four temporary MET towers as well as the power required to operate the equipment and the instrumentation of the temporary MET towers. Temporary towers shall be guyed, triangular lattice MET towers. The Contractor will remove temporary towers from service after completion of power curve testing. No fence will be required for the temporary towers. Upon removal of the temporary towers, land shall be restored to the pre-existing condition. The Contractor will not be required to furnish and install low voltage cable, fiber optic cable and grounding conductor from anemometer masts to the nearest WTG. Contractor shall provide standalone power supply, communications, and lighting for the tower sufficient to meet all tower needs. Solar/battery power and cellular or satellite communications are acceptable.
- In order to minimize cost, the tower structures and associated components may be 'rented' from a tower supplier.
- All power curve standards and safety guidelines must be met. Instrumentation placement and configuration shall be completed in order to satisfy requirements for power performance testing and be subject to approval by the Owner prior to implementation. 90 meter temporary tower sensor and logging equipment shall conform to those listed in Exhibit A-4.2. The 80 meter temporary tower sensor and logging equipment shall conform to those listed in Section 7.3.

7.3 TOWER AND INSTRUMENT SPEC – 80 METER

This specification is for the configuration of the towers and instruments for 80 meter MET towers for power curve testing. It provides the potential tower installation team the information they need regarding sensor types and measurement heights, boom lengths and orientations, and other

configuration details. The specifications adhere to the various requirements of IEC 61400-12-1 (2nd Edition) and MEASNET.

The Richland Wind Park will require two temporary towers of height 80 meters. Temporary towers are to be guyed triangular lattice and IEC 61400-12-1 solidity of 0.3 or less. The tower shall be engineered to withstand 59.5 m/s winds. Additional requirements and details with respect to Project temporary towers are provided in Exhibit A-4.3.

Government approved warning lights are to be applied in accordance with FAA requirements and guidelines.

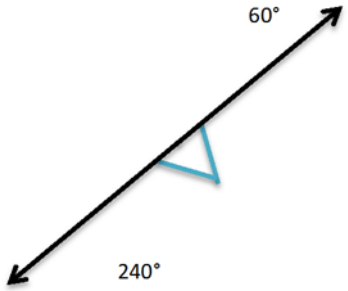
Hub height and rotor diameter are based on the GE 2.3-116 turbine at 80.0 meter hub-height. Any sensor heights listed will need to be adjusted based on the exact turbine model and hub height that is eventually used on the project.

The primary boom orientation is 60° true azimuth, with secondary orientation of 240°, as illustrated below. These orientations may change during further review of the project.

The top view of the tower is provided on the following figure:

When side-mounted, boom lengths will be at least 113 inches in total length, or 95 inches from the tower edge. The top anemometer is on a vertical post.

One of the vertices of the triangular met tower should face into the wind, and a flat face of the tower should face the potential test turbine.



During construction of the towers it is critical that the installer strictly follow the sensor heights provided in this document. The boom height will need to be adjusted downward to account for the sensor height and the riser length from the boom to deploy the sensors at the specific height.

Table 1: Configuration should be self-explanatory. The sensor listing comes from the project requirements and as specified by the IEC 61400-12-1 (2nd Edition), MEASNET and GE. Please refer to the notes regarding the individual requirements of the various documents to the right of the main table. Contractor will furnish all equipment listed in Table 1.

Alternative configurations and sensors are possible. If changes are desirable, please contact Owner for additional guidance.

Figure G.1: Top-mounted anemometer shows the most relevant IEC 61400-12-1 meteorological tower configuration for towers with top-mounted anemometers. Additional equipment is mounted at 4 meters below the primary anemometer.

80 Meter MET Instrumentation – Richland
TABLE 1: Instrument Configuration for Power Performance Testing

Idaho Power Company
Revised 8/1/2018

Some IEC Class 1 rated anemometers
Vector A100K: Class 1.8A/4.5B WindSensor P2546A: Class 1.32A/3.71B NRG Class 1: Class 1.01A/8.44B Thies First Class Advanced (4.3351): Class 0.9A/3.0B

80 Meter Power Performance Test Reference Meteorological Tower Configuration
Reference tower located 2-4 RD from test turbine/site calibration locations, per IEC 61400-12-1 (2nd Ed.) and GE siting requirements

Tower face width: 18"
Tower type: lattice, triangular, guyed, with lightning protection, mounted at 240° and offset approximately 1 m from the tower center, with a 60° protection umbrella to the top anemometer
Tower detail: round members, C_T less than or equal to 0.3 (solidity, the ratio of the projected area of all structural members on the side of the tower to the total exposed area, of 0.3 or less)
Guy wires must not cross upwind, perpendicular and within a 1 m upwind radius from the anemometers or vanes

												Supply Only		Install/Commission	
Sensor*	Manufacturer	Model	Minimum Required Accuracy	Sensor** Height (m)	Boom Orientation (°)	Boom Type	Boom*** Length (cm)	Boom Diameter (cm)	Riser ^ Height (cm)	Riser ^^ Diameter (cm)	Notes	Owner	Contractor	Owner	Contractor
Primary Anemometer	Thies	1st Class Advanced	IEC 61400-12-1 (2nd Ed.)	80.0	Vertical	Vertical	250	2.5	-----	-----	IEC Class 1, as close to hub height as possible with min. 1.5 m from tower top		x		x
Secondary Anemometer	Thies	1st Class Advanced	IEC 61400-12-1 (2nd Ed.)	76.0	60	Side Mount	250	2.5	-----	-----	IEC Class 1, at least 4 m below primary		x		x
Primary Wind Vane	Thies		±3°, 1° resolution, <6° dead band	76.0	240	Side Mount	150	2.5	20	2.5	Within 4 m to 10 m of primary anemometer		x		x
Thermo-Hygrometer	Met One	#083E-1-35	±1°C, -15-50°C / ±2-4%, 5-95%	74.0	180	Side Mount	10	2.5	-----	-----	Radiation shield, calibration tested, within 10 m of hub height, T/RH		x		x
Secondary Wind Vane	NRG	200P	±3°, 1° resolution, <6° dead band	73.0	60	Side Mount	250	2.5	-----	-----	Within 4 m to 10 m of primary anemometer		x		x

												Supply Only		Install/Commission	
Sensor*	Manufacturer	Model	Minimum Required Accuracy	Sensor** Height (m)	Boom Orientation (°)	Boom Type	Boom*** Length (cm)	Boom Diameter (cm)	Riser ^ Height (cm)	Riser ^^ Diameter (cm)	Notes	Owner	Contractor	Owner	Contractor
Barometric Pressure	Met One	#092	±5 hPa, 800-1060 hPa	74.0	180	On Tower	0	-----	-----	-----	Calibration tested, within 10 m of hub height		x		x
Vertical Flow Anemometer	RM Young	27106-T	-----	73.0	240	Side Mount	250	2.5	-----	-----	To measure upflow for data screening		x		x
Lower Anemometer	Thies	1st Class Advanced	IEC 61400-12-1 (2nd Ed.)	22.0	60	Side Mount	250	2.5	-----	-----	Lower blade tip anemometer		x		x
Lower Wind Vane	Thies		±3°, 1° resolution, <6° dead band	22.0	240	Side Mount	150	2.5	20	2.5	Near lower blade tip anemometer		x		x
Lower Thermometer	Met One	#083E-1-35	±1°C, -15-50°C	10.0	180	Side Mount	10	2.5	-----	-----	Calibration tested, 10 cm off tower for ventilation		x		x
Ground-Level Baro. Pressure	Met One	#092	±5 hPa, 800-1060 hPa	2 - 10	180	H-Frame	0	-----	-----	-----	Calibration tested, 2-10 m above ground		x		x
Rain Gauge	Campbell Scientific	237-L	binary	2.0	Vertical	H-Frame	100	2.5	-----	-----	Mount on post, in ground, away from tower		x		x
GPS	Garmin	GPS16X-HVS	-----	1.5	-----	On Logger	-----	-----	-----	-----	Mount on logger box, for synchronization		x		x
Data Logger	Campbell Scientific	CR3000	1 Hz, 10 min statistics	1.5	360	Inside Cabinet	-----	-----	-----	-----	Requires power source, near ground, for access, can be uptower		x		x

Note: Sensor heights are subject to change to be IEC Ed. 2 compliant

** Other sensors, or riser diameters may be used, see Class 1 anemometer list starting in Cell G3, for example; contact Owner if you would like to make changes*

*** Boom mounting height must be adjusted downward for the length of the riser and the sensor body itself to ensure the sensor is at the designated sensor height*

**** Assumes 18" tower width; Boom lengths for lower tower sections of larger widths to be sized according to requirements specified by IEC 61400-12-1. Boom length measured from tower leg nearest sensor to end of boom; total boom length to include one additional tower face width (18") for mounting across full face width.*

^ Riser height must be adjusted downward for the length of the riser and the sensor body itself, and must be at least 20 times boom diameter in total height to ensure the anemometer is at the designated height

^^ Riser diameter must be less than the anemometer body, and the same as that used during anemometer calibration

NOTES:
Order-mounting hardware: as needed, sensor cables: to fit distance between data logger and each sensor mounted on tower.
Annual tower checks are required.
Anemometers are to be of the same type and MEASNET calibrated before deployment and at least every 24 months by an accredited MEASNET laboratory in accordance with ISO/IEC 17025. Recalibrations must comply with IEC 61400-12-1, Annex F.
The station needs spare sensors in order to continue operations while the sensors (and logger as noted below) have calibrations checked and in case of sensor failure.
Data logger must be calibrated before deployment and after each year of field service. Calibration must follow IEC 61400-12-1 (2nd Edition) requirements.
Data logger must have a GPS system to ensure synchronicity of measurements to time reference of UTC-6 hours, assuming a project location in the Central Time Zone

Figure G.1: Drawing from IEC 61400-12-1:2016 (2nd Ed.), Mounting of Instruments on the Meteorological Mast

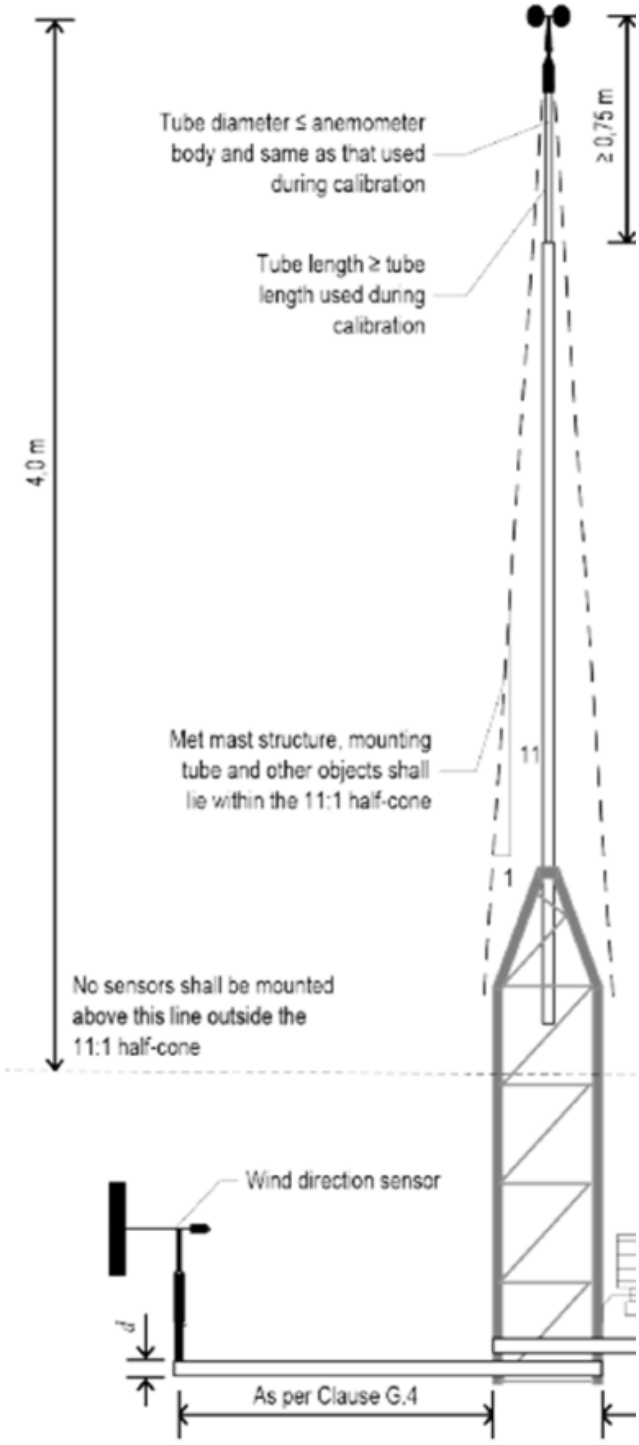


Figure G.1 – Example of a top-mounted anemor

8.0 WTG Technical Specifications

8.1 STANDARDS AND CODES

Work performed under these specifications shall be done in accordance with the following codes and standards. All work shall be governed by applicable international and national codes.

Supplier shall provide list of standards and codes used when codes differ from those detailed in this specification.

Work	In Accordance With
	NOTE: The active, most current released version of these standards at the time of contract signature shall apply.
Design and fabrication of the Wind Turbine	IEC 61400-1 ed. 3: 2005, wind design class S, for wind conditions as stated in the WTG general specification.
Type Certification of Wind Turbine Design1	DNV-GL, TÜV Nord, or equivalent world-recognized certifying agency
Design and fabrication of wind turbine towers	Applicable portions of IEC 61400, EN 1090, ANSI B16.25, ANSI B16.5
Design and construction of electrical components	Applicable IEC standards, as well as relevant portions of UL Standards.
Switchgear	IEC
Step-up transformers	IEC 60076
Lightning protection system	IEC61400-24, and/or IEC 62305
SCADA system	IEC 61400-25 and/or DNP3 and OPC protocol support for remote access and operation
All other work	All applicable national codes
Noise	Relevant portions of IEC 61400, State of Idaho requirements, Any additional local requirements
[1]Type certificate is required before COD.	

These references shall govern the Work except where they conflict with Supplier's and Purchaser's specifications and requirements. In case of conflict, the more stringent requirement shall govern to the extent of such difference.

The Wind Turbine Generators shall be type certified by a recognized international standards body before the Commercial Operation Date. Type certification shall attest compliance with IEC 61400-1 design requirements for 60 Hz operation in the appropriate wind design class for the Project Site. A copy of the type certificate shall be provided.

Wind Turbine Generators shall be manufactured at facilities with current ISO 9001 Quality Management System certification. Copies of applicable ISO 9001 certificates shall be provided.

8.2 PRODUCTS

8.2.1 Design Conditions

Wind Turbine Generators shall be horizontal axis three-bladed upwind machines with active pitch and yaw control. Wind Turbine Generators including all filters, seals, heaters, and coolers, shall be designed and constructed such that they are appropriate for installation at the Project Site. The Wind Turbine Generator shall operate under the full range of temperatures encountered at the Project site. Turbine design shall incorporate lock-out-tag-out (LOTO) provisions for all systems and components which store energy or otherwise cause potential for personal injury.

8.2.2 Mechanical Equipment

The mechanical components of the Wind Turbine Generators shall be designed and tested to the relevant parts of IEC 61400.

Wind Turbine Generator shall provide the means for safe evacuation of personnel from any and all areas within or on Wind Turbine Generator in case of emergency or injury.

Wind Turbine Generator tower, nacelle, and blades, and hub shall be factory painted or otherwise coated using Supplier's standard color, provided standard color meets the requirements of FAA advisory circular AC 70/7460-1L Marking and Lighting Wind Turbines for daytime marking of Wind Turbine Generators.

Flange joints shall meet AISC or equivalent specifications. The flange joint shall be checked during construction to ensure flanges are mated properly. Surfaces shall be flat and parallel as defined in manufacturing drawings.

8.2.2.1 Tower

Wind Turbine Generator towers shall be self-supporting and fully enclosed. The towers shall be designed to withstand the extreme load and maximum wind speeds of the relevant operating conditions per the IEC 61400 standard.

Towers shall be accessible through a lockable access door at the base of the tower. If the access door is above grade level, permanent metal stairs shall be provided. Metal stairs shall be non-slip and include a metal hand rail, and be adequately coated for the Site conditions. Wind Turbine Generator doors shall provide an adequate seal to minimize the entrance of dust, dirt and water into the Wind Turbine Generator tower. Wind Turbine Generator tower door shall have a positive means to remain latched open in strong winds.

Door vents shall have filters installed by Supplier. Filters shall be either cleanable for reuse or shall use a standard available HVAC filter.

Towers shall include a permanently installed metal ladder allowing access to nacelle and all Wind Turbine Generator equipment. Ladder shall be permanently affixed to tower using bolts, welds

and/or magnets. Access ladder shall have an integral climbing safety system. Ladder shall include rest areas at reasonable intervals between tower sections.

Wind Turbine Generator towers shall include platforms between tower sections. Platforms and floor surfaces shall have a fall prevention system such as a metal trap door or railing and include anchors at each platform. Platforms and floor surfaces shall have non-slip surfaces.

Tower shall include electrical connections for service tools and auxiliary lighting at tower base and at platforms between tower sections.

Supplier shall provide structural drawings and calculations verifying that the Tower designs comply with the load requirements of the International Building Code (edition adopted by local building department or other jurisdiction having permit authority), issued by a professional engineer licensed in the State.

Tower design and components meet all OSHA, State, and local safety requirements and regulations.

8.2.2.2 Personnel Lifts

Not Used

8.2.2.3 Nacelle

Wind Turbine Generator nacelles shall house and protect the internal components of the Wind Turbine Generator against various environmental factors, including rain, snow, dust, and sunlight. Nacelle shall be weather tight. The nacelle shall be designed such that it will perform its function in the climate conditions encountered at the Project site.

Nacelle shall provide adequate access and working space for all service and maintenance work that may be required. Safety rails, tie offs, ladders, guards, steps, doors, and anti-slip surfaces shall be installed as needed to ensure safe access to all maintenance locations. Nacelle shall provide for adequate means to safely lower personnel from the nacelle in case of an emergency using the provided tower top rescue device.

Access to the Wind Turbine Generator rotor hub, the exterior of the nacelle, and all Wind Turbine Generator instrumentation shall be safely achievable from the interior and/or exterior of the nacelle.

Nacelle shall provide the means for safe evacuation of personnel in case of emergency or injury.

Nacelle shall contain sufficient equipment to allow personnel to move safely between the inside and outside (roof) of the nacelle. Nacelles shall contain adequate safety equipment to allow personnel to safely perform any and all work that the Supplier intended to be performed on the outside (roof) of the nacelle, including but not limited to tie-off points.

8.2.2.4 Hoists and Cranes

Turbines shall be equipped with a hoist or crane in the nacelle for transporting tools and minor components from the tower base to the Wind Turbine Generator nacelle. Standard hoist or crane shall have a minimum rated capacity to lift all equipment or parts required for maintenance and or

replacement in the nacelle not including major components such as, but not limited to the gearbox (if applicable), generator and transformer (if located in nacelle).

Hoist or crane must be securely fixed to beam or girder designed to support the hoist and rated capacity. If high capacity service crane is an option, beam or girder must be designed to support rated capacity of the high capacity crane.

8.2.2.5 Rotor and Blades

The rotor shall consist of a set of blades and a hub, and shall be designed to operate reliably in the conditions at the Project Site.

Rotor blades shall be manufactured with UV protection sufficient to ensure blade integrity as an integral part of construction.

Subject to the performance of ordinary maintenance, including cleaning the blades of accumulated dirt and insects, rotor blade design and pitch system operation shall be such that the Wind Turbine Generator is resistant to power curve (performance) degradation due to fouling of the blade surface.

Rotor shall be manually lockable to prevent movement of rotor and drive train during service. If a low-speed lock is not part of the design a low-speed rotor lock shall be supplied.

Rotor blades shall maintain adequate separation from the Wind Turbine Generator tower under all operating conditions.

Lightning protection system shall be IEC compliant.

Rotor blades shall be supplied as a balanced set for each Wind Turbine Generator. Balance may be by matching blades before delivery or through manufacturing controls. Any replacement blades that may be provided for a Wind Turbine Generator shall not cause rotor imbalance. All blades shall be labeled from the Supplier with appropriate reference measures such as blade weight and moment of inertia.

All bolted connections between hub and blade shall provide suitable access to retighten said bolts. Fasteners shall have a protective coating pursuant to Section Q301. Such coating shall allow service without removal or reapplication of coating.

Blade bearings shall be designed to prevent grease contamination on blades and nacelle.

An automatic lubrication system shall be included for the blade bearings.

8.2.2.6 Brakes

The rotor shall be the primary braking system for the Wind Turbine Generator. Aerodynamic rotor braking system shall be designed to pitch the blades in order to stop the rotor at the cut-out speed of the wind turbine without damage to the Wind Turbine Generator. The rotor braking system shall be capable of preventing rotor overspeed at wind speeds to the rated survival wind speed of the Wind Turbine Generator.

Wind Turbine Generator shall have a mechanical disk brake which shall be used as a parking brake during maintenance. Mechanical brake shall provide braking assistance during emergency stops. Mechanical brakes shall not be used to stop the Wind Turbine Generator during normal shutdown or similar situations.

Rotor brake shall operate in a failsafe mode in the event of power loss.

8.2.2.7 Pitch System

Wind Turbine Generators shall be equipped with an active blade pitch system to optimize performance and power production.

Pitch system shall have a redundant safety system such as backup batteries or hydraulic accumulators. Pitch system shall operate in a failsafe manner such that loss of electric power or hydraulic pressure shall result in safe shutdown of the Wind Turbine Generator. Redundant system shall be capable of being monitored or regularly inspected such that pitch system failsafe operates in accordance with Wind Turbine Generator design requirements.

Pitch system shall be manually lockable for Wind Turbine Generator service.

8.2.2.8 Yaw System

Wind Turbine Generators shall be equipped with an active yaw system to keep the Wind Turbine Generator facing upwind during operation. Yaw system shall be designed and operated such that Wind Turbine Generator maintains upwind direction and maximizes Wind Turbine Generator performance while limiting yaw motor duty cycles to maximize operating life.

Yaw system shall include sensors to report yaw direction in degrees from true north, and provisions (via Wind Turbine Generator controller) for measuring power cable twist and untwisting power cables if necessary.

Yaw system shall be manually operable via Wind Turbine Generator controller or project SCADA system such that Wind Turbine Generator direction can be set while the machine is offline, which means that the turbine is not producing electricity but still has power and communications with the SCADA System.

Yaw system shall provide a means to prevent grease from contaminating inside and outside of tower.

Yaw system shall include an automatic lubrication system for the yaw bearing.

8.2.2.9 Cooling and Heating

Major components of the Wind Turbine Generator shall have cooling and/or heating systems as necessary. Cooling and/or heating systems shall be designed and implemented with the intent to aid in maintaining bearing, oil and oil reservoir, and related temperatures within manufacturer's recommended ranges.

Other heat generating systems shall be equipped with fans or other adequate coolers to aid in temperature maintenance as necessary.

Nacelle temperatures shall be maintained by heating and cooling such that a safe working environment is maintained for operating personnel.

Cooling and heating systems are not required to operate in the event that reliable power from the electric grid is unavailable.

8.2.2.10 Condition Monitoring System

Not Used

8.2.2.11 Gearbox

Enclosed gearbox units furnished with equipment shall be designed for continuous service and in accordance with the most current IEC 61400 standards for the type of gearbox being furnished.

Gearbox shall be a wind turbine specific design. Gearbox shall have inspection ports to allow viewing of gear teeth and faces during maintenance activities.

8.2.3 Electrical Equipment

All electrical equipment shall comply with relevant IEC and UL standards.

8.2.3.1 Raceways and Conduit

To the extent possible, all raceways and conduit required between devices mounted within or on the Wind Turbine Generator shall be factory installed.

Signal and communication wiring shall be shielded from interference from power cables.

8.2.3.2 Wires and Cables

Provide tower wiring and connection; and internal cabinet wiring and connections with the requirements of the following articles:

- General/Tower/Cabinet Wiring: Shall meet or exceed IEC 61400 and UL standard specifications.
- Wiring Diagrams: Furnish one-line diagrams. Furnish complete wiring diagrams. Preferably, drawings shall include dimensions of cabinets and enclosures.

8.2.3.3 Cabinets and Enclosures

Furnish all required cabinets and enclosures inside the Wind Turbine Generators. Enclosures shall meet applicable IEC requirements. Enclosures shall include arc flash labeling in compliance with all relevant standards.

Enclosures shall be wired for bottom-entry of cables as needed.

8.2.3.4 Generator

The electrical generator within the nacelle of the Wind Turbine Generator shall be a Wind Turbine Generator specific design. The generator shall be designed according to relevant IEC standards for generators.

Insulation system shall provide sufficient dv/dt withstand.

Generator voltage shall be to Wind Turbine Generator manufacturer's standard.

The generator shall produce three-phase alternating current power. Generator output shall be controlled as necessary to provide 60 Hz three-phase power at constant voltage to the step-up transformer.

The generator shall have a cooling system adequate to maintain operating temperatures within Supplier specified limits at all times. Generator may be air or liquid cooled.

Randomly wound type generators are not acceptable.

Generator shall include at least one set (one per phase) of extra RTDs for temperature monitoring.

8.2.3.5 Transformer (if applicable)

Wind Turbine Generator transformers shall comply with the applicable requirements of IEC 60076. Transformer shall be a three-phase transformer. Transformer shall include a lock-out-tag-out provision including a visual open indicator.

The high side voltage of the transformer shall be the same as the medium voltage collection system: 34.5 kV.

Transformer shall be suitable for continuous operation at 100 percent of the Wind Turbine Generator nameplate VA rating at rated power factor or higher.

8.2.3.6 Power Factor Control

Wind Turbine Generator shall be capable of producing output at least 0.95 leading and lagging power factor across the range of generator output.

Power factor correction and control shall be achieved through the use of power electronics, by the use of capacitors switched by power electronics or zero crossing switching, or by any other means sufficient to meet the criteria in this specification. Control signals will be transferred via site RTU using DNP3 or

MODBUS protocol via TCP/IP communications.

All capacitors shall be standard units with indicating fuse protection for each unit. Capacitors shall meet NEMA and ANSI or IEC standards. Capacitors shall be adequately cooled to keep capacitor or IGBT temperature from exceeding manufacturer specification.

Switching devices shall meet NEMA or IEC standards. Switching devices shall be specifically rated for capacitor switching and inverter output. Switching strategy shall be optimized as to not reduce the life of switching components beyond manufacturers' suggested life expectancy. Expected replacement schedule for switching devices shall be provided.

Capacitors and switches shall be located in one dedicated cabinet or cubicle of the main control cabinet. Switches and capacitors shall be readily accessible for inspection and maintenance.

8.2.3.7 Disconnect Switches

Wind Turbine Generator design shall include lockable switches for disconnection from power sources for inspection and maintenance. Switches shall be clearly marked and located in Wind Turbine Generator nacelle and at tower base.

All machines, equipment, and electrical circuits shall be capable of being stopped and isolated from all sources of energy to allow activities such as, but not limited to service, maintenance, or inspection to be safely performed. All machines, equipment and electrical circuits shall include provisions for control of unexpected energization or startup of or the release of stored energy such that work may be safely performed on said machines, equipment and electrical circuits in compliance with OSHA standard 29 CFR 1910.147 – Control of hazardous energy (Lockout/Tagout). Energy in this context includes, but is not limited to, electrical, thermal, hydraulic, pneumatic, chemical, and potential energy, such as that from elevated weights and compressed springs.

8.2.3.8 Motors

Electric motors shall be designed, manufactured, and tested in accordance with the relevant parts of IEC 60034 and IEC 61400.

To the extent possible, motors shall be of standard size and rating, and motors of equivalent size and rating shall be interchangeable between components and applications.

8.2.3.9 Switchgear (if applicable)

Switchgear shall meet Supplier's specification requirements for the Wind Turbine Generator. Medium voltage switchgear, if any, shall be designed for 34.5 kV 60 Hz operation. Low voltage switchgear, if any, shall be designed for 1,000 V 60 Hz operation. Switchgear shall be rated for the full temperature range of the Wind Turbine Generator.

Switchgear shall be: (i) installed in the base of the Wind Turbine Generator tower, (ii) sized such that it can fit through the Wind Turbine Generator tower door, and (iii) equipped with a mooring system such that it can be secured to the Wind Turbine Generator tower. Switching instructions and procedures to be provided to purchaser.

8.2.3.10 Receptacles

Electrical receptacles shall be provided in the turbines at the base of the tower, in the tower sections and in the nacelle. Electrical receptacles shall allow for personnel inside the turbines to access electrical energy for the connections of service tools and auxiliary lighting. A minimum of 1, 120 VAC, 20 A, ground fault protected electrical receptacle shall be placed in the nacelle, as well as any other receptacles and voltages that may be required for operations not limited to manufacturers standard tools.

8.2.3.11 Interior Lighting

LED Interior lighting shall be provided. Lighting shall provide adequate visibility for day or night work inside the tower and nacelle, and shall be operational from the bottom of the tower. The light switch for the bottom tower section shall be installed in a convenient location within arm's reach of the latch side of the door.

Emergency lighting shall be provided for safe egress from Wind Turbine Generators. Minimum lighting times shall be in accordance with UPS requirements. Uninterruptible Power Supply. Emergency lighting shall cover the nacelle, ladder, and ground level interior locations.

8.2.4 Special Systems

8.2.4.1 Uninterruptible Power Supply

Wind Turbine Generators shall be equipped with an uninterruptible power supply (UPS) for storage of data in the turbine controller's non-volatile memory and lighting for safe egress in the event power from the grid is lost.

The UPS shall provide power for sufficient time such that safe shutdown of the Wind Turbine Generator is possible without data loss. The UPS shall provide a minimum of 35 minutes of uninterrupted power for safety related functions including lighting for safe egress from the Wind Turbine Generator, aviation lighting and safe shut down of the Wind Turbine Generator and control systems.

Batteries shall be selected and sized in accordance with IEC 61400 and codes and standards referenced therein.

UPS system shall be capable of communicating its status information (i.e., whether UPS is working or not) through the Project SCADA system.

In the event of a long-term power loss, the Wind Turbine Generator controller must not lose any previously collected data.

8.2.4.2 Lightning Protection

The Wind Turbine Generators shall be furnished with an integral lightning protection system covering all aspects of the Wind Turbine Generator, including but not limited to blades, generator, gearbox, and control system.

The lightning protection system shall comply with applicable portions of the current edition of the following codes and standards:

- IEC 61400-24
- IEC 62305

Lightning protection system shall be grounded through Wind Turbine Generator foundation ground system provided by others. Minimum requirements for grounding system shall be provided by Supplier.

The lightning path shall not pass through bearing rolling elements.

8.2.4.3 Overspeed Protection

Wind Turbine Generators shall be equipped with a redundant overspeed protection system. Protection system shall operate continuously and automatically, and be capable of activating Wind Turbine Generator braking system to prevent Wind Turbine Generator overspeed independently of the primary Wind Turbine Generator controller.

8.2.4.4 Emergency Shutdown

Wind Turbine Generators shall include manually activated emergency stop switches in the nacelle, Wind Turbine Generator hub, and tower base. Emergency stop switches shall be large, clearly marked, and of a push button type.

8.2.4.5 Automatic Fire Detection System

Not Used

8.2.4.6 Aviation Lighting System

Aviation obstruction lighting shall be based on the requirements of FAA Advisory Circular AC 70/7460-1L Marking and Lighting Wind Turbines, Chapter 13. The actual project lighting plan is to be developed at a later date per Project based on the final project layout.

Lighting brackets shall be mountable to the Wind Turbine Generator nacelle without requiring in-field modification to brackets or nacelles.

Flashing of aviation lights shall be synchronized at the Project by means of Global Positioning System (GPS) based devices or similar. Synchronization shall be automatic, and shall self-correct in the event that synchronization is lost, such as after an extended power outage.

Aviation obstruction lighting status (operational/non-operational) shall be reported via the project SCADA system.

Aviation obstruction lighting shall be LED and shall include independent power backup to maintain functionality as required by the FAA in the event of an extended power outage.

8.2.5 8.2.5 Controls

8.2.5.1 Wind Turbine Generator Controller

Each Wind Turbine Generator shall be supplied with an on-board control system capable of controlling, monitoring, transmitting, and recording the performance of the Wind Turbine Generator and the status of critical sensors.

- Requirements. The control system shall be capable of automatically controlling and monitoring all operations of the Wind Turbine Generator. The control system shall optimize output of the generator, process all alarms, log events and performance data, and interface with the project SCADA system.
- The control system shall transmit real-time performance data and alarms to the project SCADA system. The control system shall be capable of receiving commands from the project SCADA system and adjusting Wind Turbine Generator operation and performance accordingly. A complete list of parameters which may be sent to or read from the Wind Turbine Generator control system shall be provided.
- The control system shall operate automatically under all operating conditions and conditions of power availability. The control system shall also automatically shut down the Wind Turbine Generator prior to damage occurring whenever any measured operational parameters exceed the set criteria.

- After loss of utility power interconnection or failure of utility power, restart of the instrumentation and control system to a full functioning condition shall require no local manual operations.
- Wind Turbine Generator control system shall be switchable to local manual operation. Controller shall clearly indicate when Wind Turbine Generator is in this mode. Status and monitoring information shall be available to local operators at the Wind Turbine Generator controller. If controller requires the use of a handheld terminal, an appropriate number of terminals, per Supplier's recommendations, shall be provided for the Project Site.
- Performance Data Monitoring. Controller shall be capable of monitoring, recording, and transmitting all operational, performance, and alarm data to the Project SCADA system. Monitoring capability shall include, but not be limited to:
  - Wind speed and direction from Wind Turbine Generator atmospheric sensors
  - Yaw direction
  - Power output
  - Reactive power
  - Power factor
  - Rotor speed
  - Generator speed
  - Flow or pressure sensor in the forced lubrication system
  - Oil filter status(es)
  - Temperatures
    - Generator including but not limited to windings
    - Gearbox, including but not limited to the oil sump and gearbox cooler
    - Transformer, for Wind Turbine Generators with transformers in the nacelle
    - Bearings, inclusive of but not limited to the gearbox high-speed bearing(s) and generator bearings
    - Nacelle interior
    - Ambient air
    - Fluids, including coolant, oil, lubrication and hydraulic systems
    - Thyristors
    - Converter
    - Main Bearing(s)
    - Any component capable of triggering an alarm or fault
  - Pressures
    - Gearbox oil
    - Hydraulic systems

- Grid connection status by phase
- Voltage by phase for both the rotor and the stator
- Amperage by phase for both the rotor and the stator
- Generator frequency
- Blade pitch for all blades
- Parking brake status
- Obstruction lighting status
- Cumulative real and reactive energy production
- Cumulative Wind Turbine Generator operating time
- Turbine operating state
- Turbine direction from North

System shall record Wind Turbine Generator status, and generate alarm codes whenever Wind Turbine Generator shuts down, such as when operational limits are exceeded, the grid connection is lost, a fault is recorded, or the Wind Turbine Generator is manually deactivated for maintenance. Codes shall include routine shutdown events such as power cable untwisting.

8.2.5.2 Project SCADA System

Wind Turbine Generator package shall include a Supervisory Control and Data Acquisition (SCADA) system capable of monitoring and recording diagnostic and performance data for all Wind Turbine Generators in a wind project. System shall include all hardware, software, and perpetual software licenses to perform the required functions. Hardware shall include SCADA server for installation in project substation. Further details on SCADA system are provided in the Agreement.

System shall be capable of direct interaction with individual Wind Turbine Generators for operation and troubleshooting. System shall be capable of clearing or resetting alarms remotely from Purchaser and/or Supplier's monitoring facility, except where alarms require local (at the Wind Turbine Generator) service and inspection to rectify.

System shall be capable of interfacing with and monitoring and recording atmospheric measurements from multiple met towers.

System shall be capable of controlling turbines in a group or in a number of groups. Control will include starting or stopping groups of turbines together or with a user-defined time delay. Control will have ability to start and stop groups of turbines based on environmental inputs (temperature, wind speed, time, etc.),and to curtail or stop turbines for avian and bat mitigation. Inputs should be user-defined via SCADA client.

System shall be capable of interfacing with, monitoring, and recording data from project interconnection substation equipment using DNP3 or MODBUS protocol.

System shall provide a comprehensive view of an entire wind project, including Project level interfaces.

System shall be capable of managing active power curtailment requirements on a Project level via

setpoints and ramp rates entered into the client application or by reading a setpoint from substation equipment via DNP3 or TCP/IP protocols. The system shall have hierarchy logic to determine which setpoint will take precedence.

System shall be capable of calculating and reporting overall plant performance, including real and reactive power, energy production, and availability, from recorded operational data. System shall be capable of displaying and analyzing trends for recorded data.

System shall be able to produce wind GADs reports as required by NERC as defined at the time of Agreement. The reports should be generated in complete GADs format and should not require additional medication by personnel to complete. Prior to running the report, some SCADA data may require manual input by personnel.

System shall provide SMTP notification service to alert on-call staff of alarms. To the extent possible, notification service shall be able to integrate with existing Purchaser and/or Supplier notification systems.

System shall include a database to store Project Site and Wind Turbine Generator operational data. Long-term data retention must be possible by export to Purchaser long-term data storage systems via DA2.0 OPC, or other archival storage system. Data system shall include backup facilities.

SCADA system interfaces shall be provided such that the Project SCADA system can interface with external Purchaser SCADA system for control and monitoring and with Purchaser system for data storage and retention via DNP 3.0 or OPC protocols as required.

Hardware provided by Supplier for SCADA connection shall be industry standard physical interface: Ethernet, RS-232, USB, etc.

System shall be capable of secure interconnection with remote monitoring and control system over network. Remote system connection shall support diagnostics and alarm management and shall be fully accessible and available to Purchaser's Generation Systems Operations. The purchaser will have administrative control of the SCADA system and all data equipment and all turbine controller and turbine computers, including administrative passwords. The SCADA system shall comply with NERC CIP requirements active at the time of Agreement.

Project SCADA system shall include an uninterruptible power supply (UPS) with a backup time of up to 30 minutes.

Project SCADA system shall provide time synchronization such that time stamps for recorded data for all Wind Turbine Generators are synchronized.

The time step used for monitoring and recording data when computing averages shall be 10 minutes.

Status indications relayed by the plant SCADA system shall be set from controlled device rather than controlling system.

SCADA system shall be capable of maintaining an accurate and up-to-date operating log accessible in real-time by Purchaser's GSO, with records of production for each clock hour; changes in operating status; Scheduled Outages/Deratings and Forced Outages, including such records as may be required by state or federal regulatory authorities and Utility in the prescribed format.

Supplier access to real-time or historical SCADA data is described in the Agreement.

Project SCADA system shall provide owner with administrative level access, including access to real-time and historical data for all aspects of the wind turbines.

Supplier shall install on each PC, virus protection software. Upon initial energizing of each Wind Turbine Generator and PC, and prior to connection to the on-Site intranet, Supplier shall warrant that, at the moment of commissioning completion for any single Wind Turbine Generator or PC, said system will have been determined, to the extent that the anti-virus software and operating system upgrades can detect, to be free of viruses. Any laptop or PC connected to the Project network by Supplier personnel or subcontractors shall also contain the latest Virus Protection software and updates, and shall be free of any viruses, spyware, malware, etc.

All software licenses will be delivered to purchaser including but not limited to: virus protection software, operating system software, WTG software, device drivers installed, protocol licenses and any 3rd party installed software.

8.3 ELECTRICAL STARTUP AND COMMISSIONING

8.3.1 General

8.3.1.1 Scope of Work

This section describes and defines general criteria which pertain to the startup, testing, and commissioning work covered by these specifications. This specification is applicable only to the Work or equipment provided by the Supplier. This work is in addition to testing activities required in other sections of this specification. Portions of the work may be performed prior to in field activities. The Supplier shall be responsible, as part of the base scope, for all labor and materials required to demonstrate that the electrical equipment has been installed correctly and functions properly. Functional testing shall include a demonstration that all major equipment installed can be operated in accordance with the design from local and remote stations, control loops and protective devices perform as designed, and other equipment operates in accordance with their specification. Purchaser may participate, oversee or witness commissioning and completion activities performed by either the Supplier or the Supplier's sub-contractors.

The Supplier test procedures and plans must meet IEC 61400 standards for testing on Switchgear, Load Centers, Dry Transformers, Relay Protection, and Circuit Breaker Testing, as well as Circuit Loop Checks and Control Loop Checks. The Supplier shall document all testing and inspections. The Supplier shall make available to the Purchaser their proposed Electrical and Instrumentation Testing procedures for review.

The following activities shall be performed as part of the equipment installation. The Supplier shall perform all mechanical and electrical work required to calibrate, check out, and make the equipment ready for service as required by these specifications.

The following activities shall be completed under these specifications:

- Visual and mechanical inspection of equipment.
- Mechanical adjustment and testing of all electrical equipment, as required, to assure proper mechanical functioning and operation.
- All testing and reconnection necessary to obtain correct operation of the electrical equipment.
- For field installed items, loop verification of all control and instrumentation circuits, in accordance with the Circuit List, to confirm continuity of conductors and that conductors originate and terminate at the locations designated in the circuit list or on the drawings.
- All mechanical adjustment necessary or recommended by the manufacturer of all Supplier - supplied electrical equipment being connected or installed.
- Complete testing of the lighting and receptacle system, (including any welding receptacles added to the system) as applicable.
- All instruments wired and calibrated as applicable.

Assistance shall be provided as required during trial operation and functional testing to correct installation deficiencies.

8.3.1.2 Items Furnished by Others and Interfaces

Items furnished by others and not in this Scope of Work are as described in other sections of this specification and Agreement.

8.3.1.3 Electrical Startup, Testing, and Checkout Requirements

Electrical startup, testing, and checkout shall be in accordance with the equipment manufacturer's instructions and recommendations, the applicable requirements of the Supplemental Specifications in Section 01400, and the requirements of this section.

8.3.1.4 Codes and Standards

Work performed under these specifications shall be done in accordance with the most current applicable codes and standards. Unless otherwise specified, the applicable governing edition and addenda to be used for all references to codes or standards shall be interpreted to be the jurisdictionally approved edition and addenda. If a code or standard is not jurisdictionally mandated, then the current edition and addenda in effect at the date of this document shall apply. These references shall govern the work except where they conflict with the Purchaser's specifications. In case of conflict, the latter shall govern to the extent of such difference.

8.3.1.5 Not Used

8.3.1.6 Not Used

8.3.1.7 Test Requirements

The following testing shall be conducted in accordance with the specified source. This testing is to be considered part of the defined Scope of Work, and all associated costs are the responsibility of the Supplier unless specifically identified as a Bid Option or Purchaser-conducted. Tests identified as an option are to be priced separately. If identified as Purchaser-conducted, costs for the initial

test will be the responsibility of the Purchaser. Testing costs for tests performed by Others, but confirmed by Supplier shall not be the responsibility of the Supplier; however, any cost to confirm or oversee said test shall be paid by Supplier.

Tests	In Accordance With	Conducted By
Acceptance Testing	IEC	Supplier
Transformer phase rotation is correct		Supplier
MV and HV cable connections are properly torque and marked		Supplier
MV and HV cables are properly routed, secured and not severely kinked		Supplier
All other tests required by equipment manufacturers for Work provided by Supplier		Supplier

8.3.1.8 Not Used

8.3.1.9 Supplemental Specifications

Technical supplemental specifications that are applicable to the work covered under this technical specification section are identified and included in Section 01400.

8.3.2 Not Used

8.3.3 Execution

8.3.3.1 Calibration, Testing, and Checkout Procedures

The following procedures shall be performed and followed by the Supplier. Documentation of the Inspections and Testing shall be made. These forms will be supplied by the Supplier.

Inspection

The Supplier shall inspect the installed instrument systems and the installed equipment specified and shall document such inspection in writing.

Discrepancy Procedure

The Supplier shall endeavor to promptly discover major discrepancies in equipment, materials, and installation so that corrective procedures can be initiated without delay. When the Supplier discovers equipment with an incorrect rating, damage, not being as specified, or is otherwise unsatisfactory, arrangements will be made for replacement of the equipment. The Supplier shall promptly report to the Purchaser any improper field installations or material usage which the Supplier believes should be corrected.

Supplier - Caused Defects.

Refer to the Agreement

Manufacturers' Procedures

The Supplier shall follow the manufacturers' instructions in the performance of this work and perform all required and recommended tests, calibrations, and settings identified in these instructions.

8.3.4 Personnel

The Supplier shall provide all personnel required to complete the work in accordance with the project schedule. The Supplier shall provide sufficient staff so that the project schedule is met.

The cost of all labor, supervision, materials, equipment, vehicles, supplies, and services necessary to provide field tests and adjustments required to demonstrate that electrical systems are correctly installed, tested, and calibrated shall be included in the base lump sum price.

8.3.5 Tools and Test Equipment

The Supplier shall provide all required tools and test equipment to perform the work in accordance with these specifications and the project schedule. The test equipment shall be periodically certified. Any test equipment found out of tolerance during certification shall be replaced or repaired.

8.3.6 Test Instrument Certification

Certification methods shall follow recommendations of the test instrument manufacturers.

The Supplier's personnel performing certification shall be specially trained in the methods and procedures for carrying out these calibration certifications.

8.3.7 Calibration or Testing Certification Sticker

As required, the Supplier shall furnish and affix a self-adhesive label to each device calibrated or adjusted. The label shall indicate the date and the name of the person performing the calibration or adjustment.

8.3.8 Checkout and Test Report Forms

The Supplier shall document all instruments, mechanical devices, and electrical devices that are tested or calibrated.

8.3.9 Startup

Startup will be under the jurisdiction of the Supplier throughout the startup period.

Except as stated elsewhere, the Supplier shall render all services and do all work required by the Agreement to place each item of equipment installed by it, including all auxiliaries, in operating condition to the satisfaction of the Agreement documents. All equipment shall be prepared for operation as recommended by the equipment manufacturer.

The Supplier shall provide all temporary instrumentation and gauging devices required during checkout and trial operation of the equipment and systems.

8.3.9.1 Equipment Checks and Calibration

Preoperational checks and inspections shall be performed on all equipment as specified herein, and in accordance with the equipment manufacturer's recommendations.

The Supplier shall verify in writing that all work and preoperational checkouts have been completed.

8.3.10 Electrical and Instrumentation Checkout

This article defines the scope of electrical and all instrumentation devices and equipment which shall be calibrated in-place, adjusted, or checked out by the Supplier as part of the work covered by these specifications.

The Supplier shall provide all temporary instrumentation and gauging devices required during checkout and trial operation of the equipment and systems.

8.3.10.1 Equipment Checks

Preoperational checks and inspections shall be performed on all equipment as specified herein and in accordance with the equipment manufacturer's recommendations. Field tests shall be witnessed by the Purchaser at the Purchaser's discretion with the exception of commissioning activities.

Preoperational checks shall include, but not necessarily be limited to, the following:

- Safety Equipment. All coupling guards, belt guards, and other personnel safety items shall be installed. All bolting shall be securely tightened to the correct torque as recommended by the equipment manufacturer.
- All temporary shipping braces, blocks, or tie rods shall be removed.
- Instrumentation and Controls.
  - If applicable, interlock jumpers shall be removed.
  - Panel instrumentation shall be turned on.
- Lighting and Receptacle Checkout. The Supplier shall test, check out, and energize the lights and receptacles furnished and installed under this Agreement. Immediately before energizing a lighting or receptacle circuit, the Supplier shall make the following checks:
  - The transformer neutral supplying the source panelboard is solidly connected to ground.
  - The phase and neutral conductors to be energized are free from grounds.
  - All covers are on lighting fixtures, pull boxes, and junction boxes so exposed conductors will not be energized.
  - The ground conductor (if required) is solidly grounded.
- After completing the pre-energization checks, the Supplier may request energization of the circuit.

All metering, including panel meters and transducers, shall be calibrated to within the manufacturer's accuracy.

Panel instrumentation indicating lights, switches, and relays shall be adjusted and checked out as part of the checkout of the Supplier installed electrical equipment.

Electrical panel instrumentation shall be calibrated.

Unless specified otherwise, all meters shall be tested and calibrated with equipment of no more than 50 percent of the manufacturer's stated accuracy instrument being tested.

All meters shall be visually inspected for damage, and wiring connections shall be verified in accordance with the one-line diagrams.

Every instrument utilizing a plastic lens or window shall be given a static effect check. The static check shall consist of wiping the lens or window vigorously with a dry cloth of a type recommended by the manufacturer which will not harm the surface. If the needle or pointer holds up-scale or below zero set for more than 15 seconds, the surface of the lens or window shall be treated with a clear antistatic compound recommended by the manufacturer.

Measurement of resistance to ground shall be made of all motors, switchgear, isolated phase bus, cable bus, panelboard bus, nonsegregated phase bus, and motor control center bus prior to placing in service. Measurement of resistance will be with a line operated tester. Voltage of testing device shall be in accordance with the following table or the equipment manufacturer's recommendation:

Equipment Voltage	Voltage, dc	Test Current, max, mA
480 volts	1000 volts	3
4.16 kV	2 kV	1
Above 4.16 kV	5 kV	1

For each transformer rated 500 kVA or larger, measurement of resistance to ground and polarization index of each winding with all other windings grounded shall be made and recorded. Measurements shall be with a winding tester. Measurements for each transformer shall be made immediately prior to placing in service. If a transformer winding has a resistance to ground or polarization index less than recommended by the manufacturer, the transformer will not be placed in service. The voltage of the testing device shall be in accordance with the preceding table.

Complete check of all field wiring shall be made after installation and connection to verify that field wiring is as indicated on the drawings and schematic wiring diagrams. Equipment jumpers as indicated on the schematics shall be checked.

All instrument transformers, including bushing current transformers, shall be tested.

Ratio and polarity tests shall be performed on all instrument transformers. Current transformer ratio and polarity tests shall be voltage ratio tests using a digital voltmeter or current ratio tests using high current injection test equipment.

The external circuit for each current transformer shall be completely tested before the shorting devices are removed from the current transformer secondary terminals. The tests shall include the following:

- Continuity check of the circuit external to the current transformer by application of current.
- Phase check to verify correct phase relationship at each device connected in the current transformer circuit.

The Supplier shall verify in writing that all work and checkouts have been completed.

8.4 MECHANICAL STARTUP AND COMMISSIONING

8.4.1 General

Mechanical erection and installation shall be completed by Purchaser or its contractors.

8.4.1.1 Scope of Work

Scope of Work shall include performing all work required to place all component systems and equipment provided by the Supplier into operation. Portions of the work may be completed prior to in field work.

In addition, Scope of Work for mechanical startup includes the following preoperational checks:

- Before starting equipment, all bearings, shafts, and other moving parts shall be checked for proper alignment, as necessary.
- All coupling guards, belt guards, and other personnel safety items shall be installed.
- All fire protection systems and equipment shall be installed and operative.
- All temporary shipping braces and blocks shall be removed from expansion joints.
- Each lubricating oil system shall be sampled, and if necessary filters inspected and system flushed. All oil tanks, reservoirs, gear cases, and constant level type oilers shall be checked for proper oil levels. All points requiring manual lubrication shall be greased or oiled as required.
- If applicable, all belts, pulleys, and sheaves shall be checked for correct alignment and belt tension.
- Purchaser shall approve the Mechanical Completion Checklist before startup and commissioning work begins

8.4.1.2 Items Furnished by Others and Interfaces

Items furnished by others and not in this Scope of Work are as described in other sections of this specification and Agreement.

8.4.1.3 Startup Requirements

Mechanical startup shall be in accordance with the equipment manufacturer's instructions and recommendations, and the requirements of this section.

8.4.1.4 Codes and Standards

Work performed under these specifications shall be done in accordance with the most current applicable codes and standards. Unless otherwise specified, the applicable governing edition and addenda to be used for all references to codes or standards shall be interpreted to be the jurisdictionally approved edition and addenda. If a code or standard is not jurisdictionally mandated, then the current edition and addenda in effect at the date of this document shall apply. These references shall govern the work except where they conflict with the Purchaser's specifications. In case of conflict, the latter shall govern to the extent of such difference.

8.4.1.5 Test Requirements

The following testing shall be conducted in accordance with the specified source. This testing is to be considered part of the defined Scope of Work, and all associated costs are the responsibility of the Supplier unless specifically identified as a Bid Option or Purchaser-conducted. Tests identified as an option are to be priced separately. If identified as Purchaser-conducted, costs for the initial test will be the responsibility of the Purchaser. Testing costs for tests performed by Others, but confirmed by Supplier shall not be the responsibility of the Supplier ; however, any cost to confirm or oversee said test shall be paid by Supplier :

Tests	In Accordance With	Conducted By
Perform or confirm that foundation stud nuts are properly tensioned, marked. Supplier shall confirm that protection devices are installed at the 90 day check.		Purchaser
Test, or confirm that Ping Test on every tower bolt has been performed		Purchaser
Perform or confirm that torque check has been performed on tower bolts, as specified		Purchaser
Tower bolts are installed, torque and properly marked		Purchaser
Hub bolts are installed, torque and properly marked		Purchaser
Perform or confirm that Ping Test has been performed on rotor bolt		Purchaser
All hydraulic connections are tight and no leaks are present		Purchaser
All warning and safety stickers are present and legible		Purchaser
All other tests required by equipment manufacturers for Balance of Plant Work provided by Supplier		Purchaser

8.4.2 Execution

The Supplier shall render all services and do all work required by the Agreement to place each item of equipment installed by him, including all auxiliaries, in operating condition. All equipment shall be prepared for operation as recommended by the equipment manufacturer, and shall be operated in accordance with the recommendations of the equipment manufacturer.

Individual systems and items of equipment shall be completed in a sequence that will permit systematic checkout and trial operation of each such component before it is incorporated into the initial operation.

The Supplier shall furnish operating personnel during the startup, as specified in the Agreement.

The Supplier shall apply, all oils, greases, and other lubricants required to place permanent plant equipment in a condition ready for operation. The Supplier shall provide all temporary instrumentation and gauging devices required during checkout and trial operation of the equipment and systems.

8.4.2.1 Equipment Checks

Preoperational checks and inspections shall be performed on all equipment as specified herein and in accordance with the equipment manufacturer's recommendations. A representative of the Purchaser may be present during the equipment checks with the exception of during commissioning activities.

The Supplier shall verify in writing that all work and checkouts have been completed; and, when the services of equipment manufacturer's field service representatives are specified, the Supplier shall include verification by such representatives that the equipment is ready for trial operation.

8.4.2.2 Trial Operation of Equipment

If specified by Supplier, after all preoperational checks and inspections have been completed, each piece of equipment will be given a trial operation. Trial operation of equipment will be conducted by the Supplier.

Trial operation of all equipment shall extend for a 72 hour period as required to reveal any equipment weaknesses in bearings, cooling systems, heat exchangers, and other such components, or any performance deficiencies that may later handicap the operation of main systems and the complete plant.

All rotating equipment will be checked by the Supplier for overheating, noise, vibration, and any other conditions that would tend to shorten the life of the machinery.

Cooling water systems shall be adjusted by the Supplier to provide the proper flow of coolant to each item of equipment.

Each trial operation shall be summarized by the Supplier in a written report describing the observations and results of the operation and the specific deficiencies discovered that require additional work.

8.4.2.3 Not Used

8.4.2.4 On-Line Operational Checks

If specified by the Supplier, during on-line operation of the integrated systems, all equipment will be checked by the Supplier for overheating, noise, vibration, and any other checks recommended or required by the manufacturer of the specific piece of equipment.

8.4.2.5 Operational Control

The Supplier shall establish a system of control to protect personnel and equipment as the permanent plant equipment and systems are completed and capable of energization.

The system will consist of placing appropriate tags on all equipment and system components to indicate their status and requiring mandatory clearances from designated personnel to operate, energize, or remove from service the equipment or systems. The controls established will encompass the following phases:

- Equipment or systems completed to the point where they may be energized, pressurized, or operated, but that have not yet been checked out, will be tagged; and the sources of power or pressure will be turned off and tagged. The affected components shall not be operated without clearance.
- Following initial operation of the equipment or system, tagging will be performed as stated above and the affected components shall be operated only by the personnel designated by the Purchaser.
- Equipment and systems released for service will be so tagged. When a request to remove a system from service is made, all controls and sources of power or pressure will be tagged out and shall not be operated under any circumstances. Only the personnel originally tagging the system shall clear the system for service.

To protect the equipment or systems from damage, and to ensure the safety of all personnel, the procedures established shall be followed strictly.

APPENDIX A

1. General

Suppliers/Vendors approved for use by Contractor are identified in this Appendix A. Contractor may propose additional suppliers/vendors for Owner review and approval. Owner has the right to approve or deny any proposed vendors or suppliers.

2. Battery Equipment

2.1 BATTERIES

- Alcad
- C&D Technologies –preferred
- Enersys
- Exide
- Saft

2.2 BATTERY CHARGERS

- Alcad/Hindle
- C&D Technologies –preferred
- Enersys
- LaMarche

2.3 UNINTERRUPTED POWER SUPPLY (UPS)

- Ametek/Solid State Controls
- Emerson: Liebert
- EP2
- Power Control Systems
- Wilmore Electronics

3. Cable

3.1 CONTROL CABLE

- Anixter
- AWG
- Belden
- Continental Wire and Cable
- Dekoron
- Draka Cableteq USA
- General Cable
- Lake Cable
- Okonite
- Prysmian
- Southwire
- Synergy

3.2 LOW VOLTAGE POWER CABLE

- Anixter
- AWG
- Cablec
- Draka Cableteq USA
- General Cable

- Houston Wire & Cable
- Lake Cable
- Okonite
- Prysmian
- Southwire
- Synergy
- WTEC

3.3 MEDIUM VOLTAGE POWER CABLE

- Anixter Wire and Cable
- AWG
- Cablec
- General Cable
- Kerite
- Okonite
- Prysmian
- Southwire

3.4 FIBER-OPTIC CABLE

- AFL
- AWG
- Brugg
- Corning
- Fujikura
- Prysmian

4. Cable Equipment

4.1 MV POWER CABLE SPLICES

- 3M
- Prysmian
- TE Connectivity (Raychem/Tyco)
- Thomas and Betts (T&B)

4.2 MV POWER CABLE TERMINATIONS

- 3M
- Cooper-Eaton
- TE Connectivity
- Thomas and Betts (T&B)

4.3 FIBER OPTIC ACCESSORIES

- Refer to Exhibit A-3.2, Section 8.0.

4.4 SECTIONALIZING CABINETS (JUNCTION BOXES)

- Cooper-Eaton
- Hubbell (Trinetics)
- Nordic Fiberglass

4.5 CABLE TRENCH (SUBSTATION)

- Concast
- Old Castle
- Trenwa - preferred

5. Capacitor Banks

- ABB
- Cooper-Eaton
- General Electric
- Siemens/Trench

6. Circuit Interruption

6.1 CIRCUIT BREAKERS

6.1.1 Medium Voltage

- Mitsubishi

6.1.2 High Voltage

- Mitsubishi

6.2 DISCONNECT SWITCHES

6.2.1 Medium Voltage

- ABB
- Cleveland/Price
- General Electric
- Hubbell (Ohio Brass, Trinetics)
- Morpac
- Pascor Atlantic
- Royal
- Siemens
- Southern States
- USCO

6.2.2 High Voltage

- ABB
- Cleveland/Price
- GE
- Morpac
- Pascor Atlantic
- Royal
- Siemens
- Southern States - preferred
- USCO

7. Insulators

- Lapp Insulators
- Newell–PSN, LLC.
- Hubbell (Ohio Brass)

- PPC
- Victor Insulators

8. Mechanical

8.1 HEATING/AC

- Bard - preferred
- Carrier
- Daikin Applied
- Lennox
- Trane
- York International

8.2 HEATERS

- Hastings
- Modine
- Reznor
- Sterling
- Trane

9. Monitoring/Communication

9.1 RELAYS

9.1.1 Auxiliary Control

- Allen Bradley
- GE
- Potter Brumfield

9.1.2 Fault Indicators (Collection)

- Cooper-Eaton
- Power Delivery Products
- Schweitzer Engineering (SEL)

9.1.3 Primary Protection (Substation)

- Schweitzer Engineering (SEL)

9.1.4 Panels (Substation)

- EP2
- SEL
- Systems Control

9.2 SCADA - RTU

- Novatek

9.3 METEROLOGICAL

9.3.1 Anemometers

- NRG Systems

- RM Young
- Thies (First Class Advanced)
- Vaisala
- WindSensor (RISØ)

9.3.2 Data Loggers

- Campbell Scientific
- NRG Systems

9.3.3 Tower Manufacturers

- Double K
- Nello Corporation
- Renewable NRG Systems
- Tower Systems

9.3.4 Tower Installers

- Anemometry Specialists
- Capital City Renewables
- Sioux Falls Tower
- Tower Systems

9.3.5 Wind Direction Sensors

- NRG Systems
- Thies (First Class Advanced)
- Vaisala

10. Steel Fabrication

- Cives Steel Company
- Distran
- Hirschfield Steel
- Klute
- LAX
- Merrill Iron & Steel
- Mid-City Steel
- Minnesota
- Owen Industries
- PSP
- Qualico Steel Company
- Schuff
- Severfield Structural Fabricators of Monroe, Inc.
- Structural Steel Services, Inc.
- United Steel Structures
- Valmont

11. Structures

11.1 BUILDINGS/ENCLOSURES

- American
- Butler
- Mekco

- Morton
- Parkline
- Trachte

11.2 CONTROL BUILDING (PROJECT COLLECTOR SUBSTATION)

- EP2
- Systems Control
- Trachte

12. Surge Arresters

- ABB
- Cooper-Eaton
- General Electric/Alstom
- Hubbell (Ohio Brass)
- Siemens

13. Transformers

13.1 MAIN POWER

- ABB
- GE-Prolec
- Cooper-Eaton
- EFACEC
- Hyundai
- MEPPI
- Siemens
- Waukesha
- WEG

13.2 PAD-MOUNT

- GE-Prolec
- CG Power
- Virginia Transformer
- WEG

13.3 STATION SERVICE TRANSFORMERS

- ABB
- Cooper-Eaton
- ITEC
- Siemens

13.4 GROUNDING TRANSFORMERS

- ABB
- General Electric
- Hammond Power Solution
- Niagara Transformers
- Pacific Crest

13.5 PADMOUNT TRANSFORMER BOX PADS

- Concast

13.6 INSTRUMENT TRANSFORMERS

13.6.1 Current (for relaying/system protection)

- ABB
- Alstom/General Electric
- ITEC
- Koncar
- Meramec
- Ritz
- Siemens

13.6.2 Voltage (for relaying/system protection)

- ABB
- Alstom/General Electric
- ITEC
- Koncar
- Ritz
- Siemens

13.6.3 Local Balancing Authority Metering Package

- ABB
- General Electric
- Trench

14. Package Substation Testing and Commissioning

- Energis
- CE Power
- Shermco
- Steinmetz Corporation

Single Shaft Combined Cycle Unit Convertible to Hydrogen Fuel

EPC General Requirements

DRAFT

Table of Contents

01100 - General Requirements and Scope of the Work

01100.1 General Description

This section covers the Project description, scope of the Work, and supplementary requirements for the engineering, procurement, construction, and commissioning of the Project.

01100.1.1 Project Description

The Project will be located at [ ] site near [ ] in [ ] County. The Project will be constructed at the Facility as shown on the Site Arrangement Drawing included in Attachment [ ].

The Plant will consist of two (2) combined-cycle power trains in single shaft configuration each with a gas-combustion turbine, heat recovery steam generator (HRSG), and steam turbine and associated balance-of-plant equipment and materials. The fuel will be natural gas with the capability to burn up to 30% hydrogen, by volume, blended gas. The net electrical output of each unit shall be a nominal [ ] MW.

The Plant shall be designed for unlimited operation on natural gas with up to 30% hydrogen, by volume, with the operational requirements stated in Article [ ] and permitted for operation on natural gas, hydrogen, or a combination of both fuels. Each unit shall be designed for cycling load operation.

The Plant shall be designed such that a single failure does not remove a unit from service. This requires that the two generating units be completely isolated from each other during normal operation. The use of maintenance ties is acceptable when one unit is off-line. The balance of plant equipment should be designed with enough redundancy so faults in any of those systems do not result in a unit trip. Redundancy not only includes enough capacity to operate the generating station at full rated capacity, but also includes the ability to transition to a lower load point when equipment trips; e.g. if you have two 50% rated components and one trips, the remaining equipment should be able to safely transition down to a stable operating point.

Each single shaft combined cycle unit (SSCC) will be located indoors including the HRSG, with exception of the HRSG stack. The SSCC's and ancillary equipment shall be arranged generally as shown on the arrangement drawings included with Attachment [ ].

Unodorized natural gas will be delivered to the Facility by a new pipeline and will be regulated and metered onsite. The pipeline and the fuel gas metering and will be furnished by the Contractor. A flanged connection will be provided at the downstream side of the fuel gas metering station for connection of the Contractor's gas conditioning, metering and pressure regulating fuel gas yard. Natural gas pressure and temperature at the outlet of the Contractor fuel gas metering station are defined in Article [ ].

Hydrogen gas will be delivered to an interface point at the Facility by others.

Each SSCC unit shall be located indoors with two overhead bridge cranes required for maintenance. The exhaust of the steam turbine shall be directed to a water-cooled surface condenser.

The boiler feed pumps and Turbine Cooling Air (TCA) cooler feed pumps (if required) shall be located indoors in a pump enclosure located adjacent to the utility rack. A selective catalytic reduction (SCR) system shall be included with the HRSG to reduce NO_x emissions. Space shall be provided in the HRSG for installation of a future oxidation catalyst for reduction of CO and VOC emissions.

The heat rejection system of each unit shall utilize an induced mechanical draft counterflow type cooling tower. Makeup water for the cooling towers will be provided from a new raw water supply system which is supplied from on-site wells and the [ ].

Raw water for the Facility will be provided from two sources. The service/fire water system, potable water system, and demineralized make-up water will be sourced from the on-site well system. The circulating water make-up system will be sourced from the on-site storage reservoir, on-site wells, or a combination

of the two sources, with the ability to be fed directly from the on-site wells for extended periods of time during maintenance of the reservoir. Details of the water treatment systems are provided in the [ ] Section.

Sanitary drains from the Facility shall be discharged to the [ ].

Wastewater, including evaporative cooler blowdown, boiler blowdown, and RO wastewater, shall be recovered to the cooling towers. Cooling tower blowdown, demineralizer and condensate polisher regeneration wastes, shall be discharged to new on-site evaporation ponds.

Groundwater monitoring well water shall be discharged to the new evaporation ponds.

Stormwater from the Facility shall be collected in stormwater basins or the new evaporation ponds.

Oily wastes shall be directed to an oil/water separator. Effluent from the oil/water separator shall be directed to the new evaporation ponds.

The plant shall be designed as a zero-liquid discharge (ZLD) facility including tie in points for portable equipment in the event the site equipment malfunctions, as well as design for redundancy of ponds to allow maintenance of liners in the event of a leak.

Locations of tie-ins to existing systems are listed in Attachment [ ] and detailed in the system definitions included in Section [ ]. A Control/Administration Building will be provided including areas for the Plant control room and Lock Out Tag Out/Work Authorization Room. A Warehouse will be provided for material and equipment storage. The Contractor shall be responsible for providing any other required warehouse facilities for temporary indoor storage of equipment prior to installation within the permanent plant Facility. The Contractor shall remove all temporary warehouse facilities, including foundations, at the completion of construction

One gas fired auxiliary boiler shall be provided by the Contractor to provide steam for pre-heating piping and equipment as required for plant startup and for supplying initial steam to the turbine gland seal steam system. The auxiliary boiler shall be designed for indoor installation. Each SSCC unit auxiliary steam supply system shall be cross-tied to each unit to provide backup auxiliary steam.

One two-winding, three phase generator step-up transformer (GSU) shall be provided for each unit. Facility synchronization to the [ ] kV switchyard shall be accomplished through a low-side generator breaker for each unit generator. A three-winding unit auxiliary transformer (UAT) shall be provided by the Contractor and connected to the isolated phase bus system for each SSCC. The unit auxiliary transformer shall supply power to the medium voltage 6.9 kV switchgear, which distributes power to the secondary unit substation (SUS) transformers, medium voltage motors and combustion turbine static frequency converter (SFC) system. Switchgear and motor control centers shall be provided to distribute power to the 480 volt loads. A two-winding, three phase reserve auxiliary transformer (RAT) shall be provided as a backup source for both SSCC. The RAT will be connected to the 46kV switchyard and shall provide backup power to each unit.

One identical spare transformer shall be provided with containment pad, power and control provisions for transformer space heaters and accessories, for the spare GSU, RAT and UAT.

A Plant-wide distributed control system (DCS) shall be provided to monitor and control the balance-of-plant equipment and materials. The DCS shall communicate with the SSCC control systems via redundant data highway links. An Contractor-provided virtual model and simulator shall be integrated into contractors overall control scheme. The overall network architecture of the DCS shall have the units isolated from each other physically, electrically, and logically. Controls for common area equipment shall be accessible and controlled from either DCS utilizing hardwired interfaces and logics controlling which unit has control of a given common are control system.

CTG NO_x emissions shall be controlled by dry low-NO_x (DLN) combustors. The HRSG shall be furnished with an SCR system to reduce NO_x emissions.

Base load for each SSCC shall be as defined in Section [ ] of these specifications. Maximum Load shall be as defined in the Contract Definitions.

The Plant operating modes and basic control philosophy are described below:

Each SSCC shall be designed to operate in daily cycling mode with normal operation consisting of Maximum Load and automatic generation control operation for 12 hours per day during weekdays, but also to operate 24 hours per day as necessary.

Each SSCC shall be capable of operating continuously at any load over the entire range of design ambient conditions. Load control between the units shall be coordinated to ensure the total combined net load does not go below the minimum requirement for support of operations and transmission at the point of interconnection.

Each SSCC shall be capable of operating in a stable, continuous, and controllable manner over the entire design operating range of the SSCC from a Plant load with the SSCC operating at its lowest load level, up to Maximum Load with the SSCC operating at its maximum capability throughout the design ambient conditions, while maintaining emissions compliance.

Each SSCC shall also be capable of running continuously at base load in pseudo simple-cycle mode while bypassing HRSG steam to the condenser in a cascading manner with the steam turbine offline. The STG bypass system shall be designed for continuous operation in bypass mode.

Reference Section [ ] for Plant operating performance guarantees.

The Plant does not need to be designed to generate electricity while isolated from the utility grid.

The control system design shall be based on a DCS type system. Control of the Plant shall be through the DCS as defined herein. In general, separate PLC systems shall not be utilized, except as specified herein or approved otherwise by the Owner.

The SSCC, and BOP equipment and materials shall be operated primarily from workstations located in the central control room.

01100.1.1.1 Hydrogen Capabilities. Owner expects to transition from natural gas to hydrogen fuel in incremental steps between 2025 and 2045 (“Transition Period”) as the hydrogen supply system and combustion turbine technology develops to support more hydrogen usage. The plant shall be designed to operate starting COD with a blend of 30% hydrogen by volume, and 70% natural gas by volume. Modifications to the systems and components (such as increasing fuel piping diameters, changing seal materials, increases in NOx Catalysts, and other related balance of plant systems) to support greater than 30 percent hydrogen content is expected for future upgrades.

The combustion turbine shall be capable of operating with a natural gas fuel blend containing up to 30 percent hydrogen content on a volumetric basis. Contractor’s Work shall include a fuel mixing system (per Attachment [ ]) to deliver a 30%/70% Hydrogen/Natural Gas mixture that meets Supplier’s requirements.

Contractor shall include a detailed design case to allow the Units to operate with a fuel mix of 30% hydrogen and 70% natural gas by volume at COD and shall also include detailed design for balance of plant equipment to support 100% hydrogen fueled operation. The detailed design for the 100% case shall include allowances for physical space, and sufficient room around equipment layouts for future auxiliary system expansion to allow for greater than 30% Hydrogen by Volume up to 100% hydrogen by volume injection. Contractor shall evaluate and present recommendation to the Owner for equipment that should

be installed now to support 100% hydrogen fuel combustion that would lower life cycle costs for the Owner. The systems that should at a minimum be considered in detailed design of the overall plant are as follows:

Assigned Equipment that should be considered
- Turbine Cooling Air (TCA)
- Additional NOx Catalysts
- Fuel Gas Heater

Balance of Plant Equipment that should be considered are
- Cooling Water Systems
- Emission Control Systems
- Changes in supporting infrastructure.

OEM Supplier
OEM Supplier has implemented modifications to their scope of supply to allow for 30% of hydrogen fuel by volume upon COD, as well as to facilitate transition to 100% of hydrogen fuel by volume during the transition period with overall lower life cycle capital cost. The modifications were identified by Supplier and are listed in this section. In addition, Supplier has identified the roadmap of major components that will require capital improvements during the life of the units. See OEM Contract (Attachment [ ]) for further details. The modifications to major equipment are listed here, as well as future equipment modifications that are planned during the life of the units.

Year	Description
2025	• GT Enclosure • Control Valves • Instrumentation • Foundation hardware & Design • Redundant Calorimeter • Control System Hardware
2032	• Multi Cluster Combustors • Turbine Section Casing • Fuel Gas Heater • GT Control System Mods • SCR Catalyst • Calorimeter • Foundation Hardware
2040	Multi Cluster Combustors

Hydrogen Supply
Refer to the Terminal Point/Interface List in Attachment [ ].

Fuel Mixing Skid
Refer to the fuel mixing skid specification (Attachment [ ]).

01100.1.1.2 Virtual Model. The DCS shall interface through data diodes with the Assigned Equipment supplied interactive Virtual Model. The Virtual Model includes a digital representation of all OEM supplied equipment and any equipment critical to the generation process. These interfaces provide a means for any required data in DCS controlled systems to get into the Virtual Model. Contractor shall coordinate the signal requirements with the Assigned Equipment. Contractor shall supply any Virtual Model specific instrumentation as part of their Balance of Plant scope of systems. Refer to Attachment [ ].

01100.1.2 Scope of Work

The Work described in these specifications shall be incorporated into a combined cycle Plant. The Work shall include design, engineering, procurement, construction, construction management, startup, commissioning, operator training, and demonstration and performance testing of the Plant and warranty administration. The Contractor shall provide or cause to be provided equipment and materials, machinery, tools, labor, transportation, construction fuels, chemicals, lubricants, oils, fencing, relocation of any existing utilities and security facilities, temporary power, construction utilities, administration, and other services and items required to complete the Plant. The equipment and materials, and systems to be designed, furnished, and installed by the Contractor shall include, but not be limited to, the items described in the following paragraphs.

01100.1.2.1 Owner-Furnished Work and Contractor Interface. Two one-on-one, single shaft units including CTG, ST, and HRSG, each with ancillary equipment, and other Assigned Equipment, have been purchased by the Owner and will be assigned to the Contractor. See OEM Contract (Attachment [ ]) for further details. The Contractor shall administer the OEM Contract including managing vendor drawings, quality control/inspections, delivery of equipment (including receiving, unloading, installing and maintenance during storage), erection through final acceptance by the Owner, equipment performance guarantees, field technical advisory services, etc. The Owner and Owner's engineer shall receive submittal documents from the OEM Suppliers as discussed in Section [ ].

Foundations and utilities for long term storage of the spare transformers identified above will be required. Scope of supply information for the Assigned Equipment is contained in Attachment [ ].

The CTs will be [ ] units and the STs will be [ ] two-cylinder tandem-compound, double-exhaust, condensing reheat steam turbines (TC2F) with [ ] inch last stage blades. The HRSGs will be horizontal gas-flow, triple pressure with superheat, reheat, and economizer sections supplied by [ ].

Contractor shall provide all equipment and system first fills of oils, greases and lubricants, required for startup tests and turn over to the Owner.

The Contractor shall manage the technical advisor time associated with the Assigned Equipment, included in the Owners Agreement. The technical advisor time provided is considered adequate for all Owner purchased equipment including erection, start up, testing and turnover to the Owner. The Contractor assumes the risk for the use of this time and other costs. Any technical advisor time required in excess of the Owners contract shall be to the Contractor's account. The technical advisor scope of work is detailed in Attachment [ ].

The Contractor will be providing a new [ ] kV switchyard. The Contractor shall install foundations and take-off structures on the high side of the GSU transformers and intermediate transmission towers for connection to the switchyard at an interface point as shown on the drawings in Section [ ]. Additional details on the interface with the [ ] kV switchyard are included in Section [ ].

The fuel gas metering station will be furnished and installed by others in a separately fenced portion of the Facility. The Contractor shall connect to above grade pipe flanges at the boundary of the fuel gas metering station and shall be responsible for the supply and installation of all fuel gas system scope downstream of that point. Attachment [ ] and Article [ ] of these specifications provide additional details on the Contractor's terminal points.

The Contractor shall provide a geotechnical and soil investigation laboratory testing, and a report for the basis of their own foundation and grounding design. Contractor shall not remove any soils including top soil from the Facility without the approval of the Owner. A location for excess material to be stored onsite will be furnished by the Contractor.

Staging, craft parking, temporary roads and laydown areas shall be as shown on the Site Construction Facilities drawing included in Attachment [ ]. Contractor shall remove and remediate the parking lots and lay down areas that are created by the Contractor. Space for construction facilities including trailers,

parking, security entrances, etc., shall be as indicated on the Site Construction Facilities drawing. All changes to the plan must be approved in advance by The Owner. Parking for Contractor personnel is shown Construction Facilities Drawing [ ]. Badging of Contractor personnel is the responsibility of the Contractor. Operation and supplies of the Contractor's badging program shall be by the Contractor. The Contractor must comply with the Site Security Plan program requirements when issuing badges to all personnel. Contractor badging control shall include a means of mustering and accounting for all persons onsite in the event of a generation construction area or site wide emergency. Parking and badging facilities shall be independent of other contractors, Owner and outage contractor and their personnel. All contractors shall jointly share in keeping these areas clean and maintaining a safe orderly operation during all periods of use. Badging for access to any existing Owner facilities will be managed by the Owner. Any Contractor personnel requiring access to any existing Owner facilities will need to obtain clearance from the Owner.

01100.1.2.1.1 Existing Facilities [if applicable]. Contractor interfaces with and the location of existing facilities are listed and detailed, in Attachment [ ] and the system definitions referenced in Section [ ].

While working in the existing facilities, Contractor shall strictly adhere to the Owner's site procedures Jobsite Policies included in Exhibit [ ], as well as any updates to the Owner's site procedures Jobsite Policies. Contractor's work in the existing facilities shall be performed with as little impact to the existing facility operations as possible. All work in the existing facilities shall be communicated and coordinated with the Owner and shall have Owner's pre-approval of the work plan. The Contractor shall coordinate this work such that tripping of the existing facilities is avoided.

The Contractor shall be responsible for confirming the adequacy of and making repairs to any rail spurs it uses for material delivery. Any repairs made to rail spurs shall be reviewed and approved by the Owner. The Contractor shall also be responsible for the installation and costs of required onsite rail unloading facilities. It is the Contractor's responsibility to locate, acquire access, and improve all such facilities.

01100.1.2.2 Scope for Contractor Furnished Work. The Contractor shall be responsible for all equipment and materials and services not provided by the Owner as described herein that are required for a complete, operating combined cycle plant within the terminal points of the Contractor's Work.

The following lists the major components of the Work. This is not intended to be a complete, exhaustive or comprehensive listing, but is provided for convenience of the Contractor in quickly developing an understanding of the overall scope of Work of the Project. More detailed information and requirements are provided in the later sections of this scope of Work and specification.

The Contractor's scope of Work for the Assigned Equipment under this Contract includes contract administration (including review and processing of vendor drawings and data), receiving, unloading, transportation (including heavy haul) from the Owners delivery points, storing including in-storage maintenance, installing, checkout, testing, insulating, commissioning, startup, finish painting of all equipment and materials and systems including surface preparation and priming as necessary, touch-up, tie-coats, finish coats in accordance with Section [ ] ,and testing of all equipment and materials furnished by the Owner, which includes, but is not limited to, the following equipment:

The OEM manufacturer's scope of supply is included in Attachment [ ].

Major Plant equipment to be furnished and installed by the Contractor includes:

Deaerating steam surface condensers.

Induced mechanical draft counterflow type cooling towers.

Auxiliary boiler.

Water Treatment system

Service Water and Demineralized water storage tanks.

Generator Step-up Transformers.

Unit Auxiliary Transformers.

Reserve Auxiliary Transformer

Combustion/Steam turbine generator breakers.

Fuel Gas Startup/Dewpoint Heater

Fuel Gas Compressors.

All necessary mechanical equipment, electrical equipment, and control systems as defined in Article [ ] of these specifications for a complete, redundant, reliable, operable, maintainable, and functional SSCC plant to meet Owner's intended operations shall be designed, furnished and erected

Civil/Structural:

All necessary civil/structural systems as defined in these specifications for a complete and functional combined cycle power generating plant to meet the Owners intended operations shall be designed, furnished and erected. The civil/structural activities shall be complete including, but not limited to, the following:

Surveying and control, including LIDAR.

Verification of any existing on-site utilities.

Site geotechnical investigation – The Contractor shall be solely responsible for all investigations of the Jobsite that may be necessary to collect design basis information for the plant and assure Contractor of completeness of information required to perform the Work. Any Owner furnished geotechnical reports are provided for reference information only and are not intended to be used for design basis.

Final site drainage system including but not limited to, inlets, culverts, ditches, piping, and manholes.

Modifications and repairs to any existing perimeter security fencing, gates, and security system compatible with any Owners existing security systems and requirements.

Supply and installation of perimeter security fencing, gates and security systems for expanded project areas.

Oily water separator system including new oil/water separator.

Underground utilities and piping.

Final storm water control system complete including berms, drainage structures, piping, drainage ditches and stormwater collection basins/new evaporation ponds.

Excavation of native soil with salvage and stockpile of top soil, filling, backfilling, and compaction of structural fill with reinstallation of all onsite top soil.

Finish grading including disposal of all spoil (waste) excess material.

Soil erosion, sediment control, and final stabilization. Contractor shall be responsible for maintaining all sediment controls until Final Completion.

Installation and repair of roads, parking, sidewalks, and new paving including striping and subsurface preparation.

Seeding, sodding, landscaping and final combined cycle site restoration. No existing soils shall be removed from the Jobsite without the consent of the Owner.

Development, maintenance, and security of material laydown areas as needed to complete the scope of Work.

All areas of the Plant and any existing Owner facilities disturbed by the Contractor, including laydown areas, shall be restored to acceptable condition before demobilizing from the Jobsite.

Fuel and chemical storage secondary containments.

All foundations and necessary concrete blast walls (including foundations with oil spill containment basins for on-site storage of the spare GSU, UAT and RAT transformers). The spare transformer shall be installed on concrete pad with easy access to either of the operational transformers. The path way from the spare transformer to either of the operational transformers shall be rated to support 110% of the weight of the fully dressed transformer and the heavy haul transportation equipment without any structural modifications (should not require removal of bushings, or high side leads of adjacent units).

Elevated foundations for steam and combustion turbine generators as required to comply with the foundation criteria and arrangement of the equipment as specified by the Assigned Equipment supplier.

Stairs and platforms for elevated equipment and materials.

All interconnecting walkways, stairs, ladders, handrails/guardrails not provided with the Assigned Equipment but required to provide appropriate access to all equipment. Platform sizes shall be provided for Owner review and approval.

All buildings identified in the system definitions, arrangement drawings and as determined by the Contractor to be required for a complete operating plant. The buildings and sun/rain protection systems shall include but not be limited to foundations, grouting, structural steel superstructure, elevated floors of grating and/or reinforced concrete, miscellaneous access platforms and support structures including structural steel, stairs, ladders, stair treads, grating and handrail/guardrail, metal wall and roof panels, insulation, doors, windows, louvers, prime and finish painting, and all other miscellaneous architectural items such as block walls, gypsum board/metal stud walls, insulation, hardware, trip work fireproofing, caulking, sealing, firestopping, flooring, plumbing and plumbing fixtures and breakroom and toilet room accessories as required to provide compete building systems.

Combustion turbine air inlet support steel structure. The location of the air inlet support structure steel is critical to the combustion turbine layout. The Contractor shall coordinate the design of the support steel to meet the specific location criteria identified by the Assigned Equipment supplier.

Access provisions to the HRSG inlet test emission ports on the HRSG inlet duct. Access provisions shall include support steel, platforming, walkways and stairs as required to provide necessary access to the test emission ports.

Overhead cranes, monorails, hoists/trolleys, and enclosures as specified.

Demolition and disposal of all construction debris.

Painting, including finish painting of all equipment and materials and systems including building interior and exterior surfaces, piping systems, structural steel, surface preparation and priming as necessary, touch-up, tie-coats, and finish coats in accordance with Section [ ]. All interior and exterior ladders, cages, handrail and guardrails including those furnished with the Assigned Equipment shall be galvanized.

Sanitary waste collection and disposal to a sanitary treatment facility.

Upgrades and repairs to roads, bridges, etc., located outside the Facility required for transportation of Equipment and Materials, including Owner Furnished Equipment, to the Jobsite

Mechanical:

All necessary mechanical systems as defined in these specifications and as required for a complete and functional combined cycle power generating plant to meet the Owner's intended operations shall be designed, furnished and erected. The mechanical systems shall be complete including, but not limited to, the following:

For each SSCC:

High pressure, intermediate pressure, low pressure and auxiliary steam systems.

Condensate system.

Condenser air extraction system.

Boiler feed system.

Heat rejection system including circulating water system and cooling towers.

Closed cycle cooling water systems.

Boiler vents and drains system.

Steam turbine vents and drains system.

Steam turbine seals and drains system.

Generator Rotor Removal System

CT, Gen and ST lubricating oil systems (interconnecting piping not furnished by the OEM Supplier).

Combustion turbine off-base auxiliaries' system (interconnecting piping not furnished with the CT).

Selective catalytic reduction (SCR) system (furnished by OEM Supplier).

Fuel gas system including regulating, odorizing, fuel gas compressors, separators, and heaters.

Hydrogen blending system, Attachment [ ]. Hydrogen fuel gas system including regulating, odorizing, fuel gas compressors, separators, and heaters and blending system.

Two Gas Calorimeters.

Common for the Plant:

Ammonia storage and supply system.

Cycle makeup storage and distribution system.

Auxiliary Boiler system with stack, platforms, walkways, ladders, stairs and railings.

Compressed air system (including service air and instrument air).

Compressed gas storage and supply systems for N_2 and CO_2.

H_2 generation, storage, venting and supply system for generator cooling.

Service water system.

Potable water system.

Fire protection systems (including interconnection to any existing Owner equipment fire protection and site fire protection).

Continuous fuel gas sampling capability to meet permit requirements.

Fuel gas chromatograph with all necessary instrumentation housed in a free-standing weather proof enclosure with heating, ventilation and air conditioning as required by the equipment Supplier’s design.

Raw water supply system.

Wastewater collection system.

Sanitary drainage system.

Insulation as required of piping, equipment, and vessels.

Electrical and Control:

All necessary electrical and control systems as defined in these specifications for a complete, redundant, reliable, operable, maintainable, and functional SSCC plant to meet Owner's intended operations shall be designed, furnished and erected. The electrical and control systems shall be complete including, but not limited to, the following:

For each SSCC:

Bus ducts and supports between the generator and the generator breaker, including bus ducts and supports to the PT and surge arrestor cubicle and generator excitation transformer.

Bus ducts and supports between the generator breaker and the generator step-up transformer, including bus ducts to the unit auxiliary transformer and support system as required.

Redundant auxiliary power system.

Batteries and UPS system.

Distributed control system (DCS), including system interface work stations, large screen display, printers, I/O modules, control and communication processors, video drivers, electronics and termination cabinets, data highway, and DCS intrusion detection system.

Control consoles, emergency trip panel, and dedicated process indicators.

DCS interface with the OEM turbine control system, and miscellaneous packaged equipment controls.

OEM turbine control system interconnection to the OEM operator interface stations located in the unit control room, including fiber optic cables and patch panels.

All cable and non-segregated bus between OEM supplied equipment and devices

Control and electrical interface between the plant and [ ] kV switchyard and any existing electrical grid facilities and any new gas yard.

Instrumentation, mounting structures, accessories and impulse piping.

Balance of Plant SUSs and MCCs.

Reserve Auxiliary Transformer and interconnecting electrical systems.

Cable and raceway systems.

Common for the Plant:

Standby Diesel Generator system.

BOP DCS simulator components for OEM supplied Simulator

BOP components for OEM Virtual Model

Underground duct bank systems.

Site and Plant lighting within the Facility boundaries including the new cooling tower area.

Lightning protection system.

Facility grounding system.

Cathodic protection system.

Heat tracing and freeze protection system.

Communication systems.

Construction power system.

Telephone, security and page/party system.

Building Management System for HVAC.

Plant Physical Access Control System.

Chemical:

All necessary chemical systems as defined in these specifications for a complete and functional combined cycle power generating plant to meet the Owner's intended operations shall be designed, furnished and erected. The chemical systems shall be complete including, but not limited to, the following:

Common for the Plant:

Raw water pretreatment system.

Cycle makeup treatment system.

Potable water treatment system.

Service water treatment system.

For each SSCC:

Condensate polisher system.

Cycle chemical feed system.

Sampling and analysis system.

Circulating water chemical feed system.

01100.2 Scope of Work Additional Requirements

01100.2.1 General

Equipment and materials shall be designed in accordance with Prudent Utility Practices, relevant codes and standards, and local regulations. All Contractor supplied equipment and materials shall be new and unused. Equipment and materials manufactured previously for another application shall not be utilized. Equipment and materials ratings and spare capacity shall be provided in accordance with this Scope of Work. Systems shall be designed in strict accordance with original equipment manufacturer’s requirements. All equipment and materials shall be of proven design; experimental or prototype designs will not be accepted.

The Contractor's design engineer(s) shall attend a kickoff design conference at a time and place to be selected by the Owner to discuss matters relative to the execution of this Scope of Work. The Contractor's design engineer(s) shall attend additional design conferences as required by the Owner to review and expedite the Work.

The Plant shall be designed and constructed to meet all requirements set forth in the permits included in this Scope of Work.

Conditional Use Permit (CUP) – The Contractor has applied for the CUP with [ ] County.

Construction Air Permit - The Contractor has applied for a Construction Air Permit and has received the Draft Air Permit included in Attachment [ ].

Stormwater Construction General Permit – The Contractor will be responsible for developing a draft Storm Water Pollution Prevention Plan (SWPPP) for the work associated with the Jobsite including parking, laydown and storage areas. Contractor will update the SWPPP for their portion of the site work and obtain the required Stormwater Construction General Permit. The Contractor will be responsible to implement, maintain, and monitor the SWPPP and affected areas impacted by the generation project.

FAA Notice of Construction or Alteration (FAA NCA) – The Contractor will obtain the necessary FAA NCA for the HRSG exhaust stacks and [ ]. The Contractor shall obtain the necessary FAA NCA for any erection equipment such as cranes.

Wastewater Facility Construction Permits – The Contractor will obtain the necessary permits for the construction of any evaporation ponds.

The Contractor shall be responsible for obtaining any other permits or developing any necessary plans to support construction of the Facility such as Spill Prevention Control and Countermeasures Plan, Mobile Concrete Batch Plant permit, Temporary Above Ground Storage tank registration, and others as required by the state and local jurisdictions.

The Contractor shall be responsible for delivery, receipt, inspection, unloading, hauling, handling, storage, security, assembly, and preventive maintenance of all equipment and materials until Final Completion including the Assigned Equipment delivered to the Jobsite. The Assigned Equipment will be delivered by rail, truck, or heavy haul to the Jobsite.

Contractor shall be responsible for any necessary improvements to the area adjacent to the rail sidings for crane set-up and operation, unloading, loading, and transportation from the rail sidings. Contractor shall be responsible for all heavy haul requirements between on-site railroad sidings and the equipment final set location or storage location.

Contractor shall be responsible for disposal of all waste generated during construction and start up including but not limited to cleaning effluent of piping systems and HRSG chemical cleaning.

Contractor shall be responsible for removal and disposal of construction waste generated or presently in the area of construction.

Construction water and construction power will be provided by the Contractor at defined terminal points. Other construction utilities such as construction fuels, telephone, and data connections shall be secured and provided by the Contractor at Contractor’s expense. The Contractor shall be responsible for designing and installing modifications to any existing Owner facilities as described in Article [ ] and Article [ ] to provide construction power for its use during construction. Contractor shall provide first fill of fuel for the emergency diesel generators and all fuel consumed during startup and commissioning. Contractor shall also furnish the first fill of all lubricants, materials or fluids used for flushing and startup of all equipment and materials including steam turbine, combustion turbine, boiler feed pumps, TCA cooler feed pumps and all other lubricating and hydraulic systems. The Contractor shall also provide all chemicals used during storage, startup, and commissioning and shall dispose of these materials as necessary using methods acceptable by federal, state, and local requirements. Contractor shall maintain an adequate supply of these lubricants, materials, fluids, and chemicals to provide replenishment up to the time of Substantial Completion.

It is the Contractor’s responsibility to provide clean equipment and materials, piping, and systems ready for operation and use by the Owner. All costs associated with providing a clean and ready to operate condition shall be the responsibility of the Contractor; including but not limited to demineralized water obtained from off-site sources, rental equipment and inert gas for fuel gas line blows.

Disposal of shipping fluids, materials, or flushing liquids/materials such as water, demineralized water, wastewater, lube oil, diesel fuel and fuel gas, from the Jobsite shall be performed by the Contractor to acceptable disposal sites, so that disposal is performed according to local, State, and Federal requirements.

The Contractor will be responsible for completion of system tie-ins to allow plant startup utilities such as backfeed power, water services, and fuel to be operational for combustion turbine operation.

Land and rights-of-way will be provided by the Contractor.

The Contractor shall coordinate with the Owner for any access to any existing facilities of the Owner.

Each SSCC shall be designed such that it can be safely and reliably operated under all conditions, including startup, shutdown, load ramping, and continuous operation at any load in the load range. The load range shall include any operating condition from shutdown through Maximum Load.

All piping, conduit, and cable tray shall be routed so as not to interfere with routine equipment maintenance activities. All major equipment shall have an open access path for disassembly and removal or replacement purposes. Access and egress paths shall comply with OSHA requirements but shall also meet Owner's specifications herein requiring additional space, access, and other accommodations. Owner's specifications will often exceed OSHA requirements.

Pipe racks, bus bar and cable trays shall be designed to allow for passage of truck deliveries, equipment removal/replacement, crane access, maintenance access and operations.

01100.2.2 Performance

The Performance Guarantees for the Units included in Section [ ], Plant Performance Guarantees and Tests shall be based on Project-specific data from the OEM supplier and all associated equipment and systems as described in Attachment [ ].

Fuel for performance testing shall be natural gas. The fuel analyses are included in Section [ ].

Others will provide natural gas to a natural gas metering and pressure control station to be furnished and installed by the Contractor. The Contractor shall be responsible for all scope downstream of the fuel gas metering and pressure control station.

For purposes of Unit auxiliary power loads, all Unit equipment and materials required for normal Maximum Load operation of the Unit shall be in service during testing as defined in Article [ ]. A list of the auxiliary electric equipment which will be operating during testing shall be provided in the Contractor's detailed Performance Test procedures.

Thermal Performance Test procedure guidelines are included in Section [ ], Performance Test Guidelines. The Performance Test procedures shall be developed by the Contractor with input and agreement from the OEM Supplier and the Owner.

The Contractor shall provide test thermowells, pressure test ports, and sampling ports as necessary to perform the thermal Performance Test procedures. These locations shall be provided with the detailed test procedures developed by the Contractor. Temporary strap on instrumentation for temperature or flow measurement will not be allowed.

01100.2.2.1 Noise. The guaranteed noise emissions for the Facility are included in Section [ ] Performance Guarantees and Tests.

01100.2.2.2 Emissions. The guaranteed air emissions for the Plant as presented in Section [ ] and shall be in compliance with the air permit located in Attachment [ ], Plant Performance Guarantees and Tests,

are based on the combustion turbine emissions guarantees included in the OEM contract; and emergency diesel generators emissions, auxiliary boiler emissions and fuel gas dew point heater emissions listed in the draft air permit included in Attachment [ ] .

A continuous emissions monitoring system (CEMs) shall be complete and operational and ready to be certified a minimum of 24 hours before at the time of first fire.

01100.2.3 Mechanical

Startup steam used during commissioning of the combustion turbine, steam turbine and auxiliary boiler shall be vented to atmosphere. Silencers shall be provided by the Contractor. The Contractor shall be responsible for obtaining any governmental approval, if required, to exhaust steam to the atmosphere during construction, startup, and commissioning of the Plant. The Owner reserves the right to review and request changes to the steam venting plans.

A basis of design description of the proposed fire protection systems suitable for submission to the Owners insurance provider shall be submitted to the Owner for review and approval.

Piping shall be painted as specified in Article [ ].

The Contractor shall be responsible for touch up painting of piping and equipment and materials including Assigned Equipment, meaning cleaning, surface preparation, priming, and finish coating with a matching color prior to Final Completion. The Contractor shall submit its piping color code system to the Owner for approval. All equipment and materials and piping shall be painted and/or coated per the Owner approved Contractor’s piping color code system. Equipment supplier’s standard painting, if different than Attachment [ ], is not acceptable unless approved in writing by the Owner. Contractor shall touch up prime coat before applying finish coat. Piping color shall be in accordance with the approved Contractor’s color code system to identify the process contents of the piping.

All piping shall be labeled. Labeling shall conform to ASME A13.1-1996 "Scheme for the Identification of Piping Systems" unless otherwise specified in this Scope of Work. Labels should match the piping color code system. This ASME standard defines pipe marker sizes and letter heights based on the outside diameter of the pipe to ensure good legibility of the markers.

Contractor shall follow the equipment identification and labeling system included in Attachment [ ]. All Equipment and Materials shall have a unique identification number. Equipment and Materials shall be labeled prior to shipment. Equipment and Materials identified as not having a label shall not be operated by Owner personnel until the label is in place.

Color coding of pipe systems shall be based on the pipe contents unless otherwise indicated by the Owner (inherently Hazardous Materials are identified with yellow markers and black print; nonhazardous liquids with green markers and white print; nonhazardous gases with blue markers and white print; and fire protection systems with red markers and white print). This color scheme allows for quick differentiation based on pipe content's relative level of hazard.

Piping shall have heavy duty, UV/chemical resistant labels with the system name, fluid, and flow arrow. Pipe labels shall have a spacing of not more than 20 feet, at changes in elevation, valve stations and equipment, changes in direction, intersections, and above and below floor and wall penetrations. Pipe labels shall be compatible with the surface to which it is applied. Labels shall be at least as high as the pipe diameter for pipes under 10 inches. Pipes over 10 inches shall have labels at least 10 inches high. For piping 2 inches and smaller, labels shall be able to be clearly read, but shall not be less than 1 inch. Labels shall withstand the minimum to maximum temperature range of the process piping, indoor and outdoor ambient air temperatures and be suitable for the environment.

Equipment and Materials shall not be located in trenches, pits or sumps except for sump pumps, circulating water pumps, and the condensate pump cans as required.

01100.2.4 Chemical

All water analysis and monitoring facilities (hardness, silica, iron, etc.) required for the Plant startup and commissioning will be provided by the Contractor. All other analyses shall be procured from a third party by the Contractor. Chemicals as defined in the Division of Responsibilities Matrix included at the end of this section shall be provided by the Contractor.

Commodity chemicals (e.g., amine), shall be used for the cycle chemical feed systems.

01100.2.5 Electrical/Control

The plant auxiliary electric system shall in concept be based on the one-line diagrams included in Attachment [ ]. The [ ] kV switchyard expansion will be designed so that the switchyard will have sufficient capacity to allow starting of the plant's largest motor or combustion turbine starting system while also supplying auxiliary load equal to the sum of the unit auxiliary transformer's highest MVA nameplate rating. When the actual [ ] kV system impedances are provided, a system analysis shall be completed by the Contractor to determine if changes to the auxiliary electric system are required (reduced voltage motor starters, etc.).

The power factor shall be guaranteed at the terminals of the generator, and not at the high side of the generator step-up transformers. When the existing [ ] kV system impedances are provided, the Contractor shall work to attain the system power factor desired.

Electrical system studies included in the Contractor's scope shall include those required to design and specify the Plant auxiliary electric system within the Facility boundaries. Studies include, but are not limited to, load calculations, load flow, short circuit, GSU voltage/VAR flow, and motor starting.

Plant synchronization to the [ ] kV grid shall be accomplished through the low-side generator breaker for each unit.

The Contractor shall provide the necessary information related to Contractor supplied Equipment and Materials to allow the Owner to perform system stability studies.

A minimum of three diesel generators shall be provided and shall have sufficient capacity to safely shutdown the plant following a unit trip and coincident loss of external auxiliary power.

The integrated control system for Plant operation and monitoring shall provide for complete remote operation of all systems. Manufacturers' control systems shall be supplied with remote indications and alarms. The auxiliary electric system shall not be provided with a control room main electrical panel; however, similar functionality shall be provided within the DCS using a work station flat panel screen as the operator interface in lieu of a hard device control panel.

Factory acceptance testing (FAT) of the DCS shall be conducted. The Owner and the Owner’s representatives shall be permitted to participate in the FAT. All actual components, HMI displays, input/output signals and system interfaces shall be thoroughly tested and simulated. All modifications requested by the Owner during FAT shall be maintained in a formal log, incorporated and signed off prior to shipment of the DCS to the Jobsite. The proper operation of the DCS and its actual interfaces shall be verified, and control loop tuning shall be finalized, prior to each Units acceptance testing. All logic simulations and emulators shall be provided for testing and then removed after testing prior to shipping.

The Contractor shall ensure that the DCS computing and networking infrastructure is designed and provided, fully compliant with the NERC CIP Standards as outlined in Article [ ]. The Contractor shall be responsible for implementing, if necessary, other Supplier’s control systems (i.e. turbine controls, PLC controls) with the applicable NERC CIP Standards based on those systems being directly interfaced with the Plant networking infrastructure.

Contractor shall provide plant communications systems. The Contractor shall furnish and install the PBX telephone equipment and other plant communications equipment including voicemail system routers,

switches, UPS, fiber management, fiber electronics, main distribution frame, channel bank, commercial telephone system, and servers.

A page/party system (Gaitronics) shall be furnished and installed by the Contractor.

The Contractor shall use a radio communication system during construction of the Plant and shall provide the Owners designated onsite personnel with radios for communication with the Contractor. All Contractor furnished radios shall be equipped identically and with the same set of multiple frequencies that are installed in all radios for cross communication between Contractor, Owner, and security service on the Jobsite.

The Contractor shall provide a local area network for wireless access for the Facility. Wireless access shall be available in all operating areas of the plant.

The Contractor shall provide a building management system for HVAC controls.

The Contractor shall provide and coordinate installation of the Plant Physical Access Control System for the Facility.

The fuel gas input custody transfer meter will be supplied and calibrated by the Contractor as part of the fuel gas metering and pressure control station. The Contractor shall provide a revenue quality fuel gas meter near the custody transfer point. The CTG fuel gas meter will be utilized for each Units Performance Tests. A separate fuel gas meter for the auxiliary boiler shall also be provided. All fuel gas flow signals shall be taken from the onsite meters to the DCS for display and totalized in the DCS. All Contractor provided gas meters shall be designed and calibrated in accordance with AGA Report #3.

The Contractor shall install cables between the switchyard and each Unit DCS for protective relaying.

Interface provisions for load dispatching commands and Facility status signals shall be included to support automatic generation control (AGC), automatic voltage control (AVC) and frequency response commands from the Owner’s Energy Control Center (ECC). The interface provisions for load dispatching commands, status points, and communication interfaces shall be through an RTU for each Unit. Actual Facility operation and, configuration, and output (generation decisions) remain in the control of the local Plant operators. RTUs for each Unit will be provided by the Owner.

Provide cabinet, relays and other devices for a complete system for controls and signals to support the Remedial Action Scheme (RAS)

Contractor shall install all required systems to any existing stations. Refer to [ ] and [ ] in Attachment [ ].

Instrumentation shall be provided for control, protection, operation and automation of equipment and systems in accordance with this specification.

Transmitters and valves that will provide signals to the Distributed Control System shall be furnished with Foundation Fieldbus signal communications

All instruments shall be calibrated and configured before installation and verified prior to startup and commissioning. Instruments shall be recalibrated prior to Performance Testing.

01100.2.6 Civil Structural

It is the Contractor’s responsibility to perform an independent geotechnical study, including testing and analysis as necessary to confirm the Contractor’s design. Soil testing, soil remediation, soil improvements, soil stabilization, piling, removal of underground obstructions, and or remediation related to removal of underground obstructions is part of the Contractor’s scope.

Handling and disposal of any and all existing contaminated soils or other materials will be performed by the Contractor.

The Facility site boundary and topographic survey is included in Attachment [ ]. Normal construction surveys for laying out and controlling the Work shall be included in the Contractor's Scope of Work. The Contractor shall perform a supplementary Jobsite survey to identify existing contours and features as they exist prior to startup of the Contractor's work, and to establish baselines for locating and controlling the Work. Contractor shall also establish Jobsite control geometry, subject to approval of the Owner.

Dewatering, disposal of the water and shoring of excavation works shall be the responsibility of the Contractor.

Drives to vehicle entrances to buildings shall be asphalt paved. Buildings shall be interconnected with concrete sidewalks or asphalt pavement. All other areas inside the power block loop road shall be surfaced with compacted crushed rock. The remaining open areas not paved or aggregate surfaced shall be surfaced with retained topsoil suitable for seeding with native grasses (seeding by others). The Contractor shall be responsible for repairing aggregate-surfaced onsite roads installed both by the Contractor and by others and providing final asphaltic concrete paving and striping as indicated on Drawing [ ] in Section [ ]. In addition, existing paved roads so designated on [ ] shall be crack and chip sealed with all markings repainted prior to the Contractor leaving the Jobsite.

A monorail shall be provided over each piece of equipment or removable component weighing 1000 pounds or more not accessible by mobile cranes, forklifts, or generation building cranes as required for maintenance. A permanent hoist and trolley, suitably sized, shall be installed on the monorail above the equipment listed below. Additional requirements are specified in Section [ ].

Permanent Hoist Required Equipment:

Generation building cranes.

Condenser water boxes.

Boiler feed pumps and motors.

TCA cooler feed pumps minimum recirculation valves and motors.

Condensate pumps and motors.

Closed cycle cooling water pumps and motors.

CTG/ST lube oil skid.

CTG motors on top of roofs.

CTG inlet air filter panels, from grade to inlet filter elevation.

CTG lube oil reservoir

CTG generator bearing covers, minimum two locations.

HRSG LP recirculation pumps (if applicable).

HP, IP, and LP ST main stop and control valves.

Feedwater HP and IP discharge valves.

Feedwater pump minimum recirculation valves.

LP admission valve.

Bypass valves.

SCR Catalyst removal

Stack platform at locations where CEMS connections are located, with weather proof cover.

In the alleyways of power control cubicles.

In all battery rooms.

Fire water pump and motor.

Circulating water and auxiliary cooling water pumps and motors.

Fuel gas compressors and motors.

Diesel generators.

Auxiliary boiler equipment.

Interior furnishings for the buildings such as desks/furniture, bulletin boards, etc., shall be included in Contractor's Scope of Work. All control room consoles and work stations are described within the specification and shall be included in the Contractor's Scope of Work. Breakroom, bath room, etc., shall be complete with all permanent and non-permanent fixtures as specified herein.

Interior structural steel located inside buildings and exposed in the finished construction shall be shop prime painted, cleaned and surface prepared for field touch up of primer paint, and finish painted in the field. All exterior structural steel structures shall be galvanized or painted with a durable industrial shop or field applied coating system. All structural steel coatings shall be applied in accordance with Section [ ] and shall be painted and/or coated per the Contractor's approved color code system.

Column identification by row letter and number shall be stenciled on four faces or all exposed faces of all steel columns. Identification shall be placed at a height of 66 inches above finished grade on each building operating level. If required to avoid obstructions, the height may be adjusted between 57 inches and 72 inches to ensure it is visible. Letters and numbers shall be a minimum of 4 inches tall in accordance with Attachment [ ].

01100.3 Engineering

An up-to-date printable index listing all issued Contractor drawings, by number and title, and which shows the revision status of each drawing, shall be maintained and shall be made available to the Owner at all times. An updated copy of the index shall be issued to The Owner in the monthly report. Electronic copies shall be provided in a searchable format. A copy of drawings issued for construction with revisions shall be maintained in the Owner field office by the Contractor for Owner use. This will ensure that the Owner will be working from the same up to date information as the Contractor.

Contractor shall provide a complete list of standards anticipated to be used during design. Contractor shall update the list of standards prior to Final Completion.

A complete set of "as-built" drawings (drawings that have been conformed to construction records) shall be provided to the Owner prior to Final Completion. As-built drawings shall be provided as searchable

.PDF files and in the drawings native CADD file format (2D AutoCAD 2012 or more current or similar as approved by Owner).

Contractor will provide to Owner the right to use and share drawings with third parties for maintenance support and plant design efforts in future. Contractor will add IPC numbers to drawings in addition to Contractor numbers.

01100.3.1 Engineering and Design

Contractor shall perform all engineering and design work, within the scope of Work, required for the Plant.

Within two (2) months following award of the Contract, Contractor shall develop and submit to Owner a facility design manual defining the design criteria for the Plant. Design manual shall be subject to review and approval by Owner with respect to level of detail and conformance with the requirements of the Contract. However, Owner's review of the design criteria does not relieve the Contractor of fully complying with these specifications. Contents of the facility design manual shall include the following items as a minimum:

- Design criteria for each engineering discipline
- Results of Contractor's site subsurface investigation per Schedule of Submittals
- Contractor's equipment and system designation methods
- List of systems and system designations
- Water/Mass Balances
- Cycle heat balances at the following load points: Steam Turbine Valves Wide Open, Net Power Output Guarantee point, 50% and 75% of the Net Power Output Guarantee point, and Steam Turbine Generator minimum stable load
- Full load steam generator loss tabulation and temperature profile drawing
- Auxiliary load lists
- 3D model showing preliminary maintenance access and hoist location.
- Preliminary Maintenance access study to accompany the 3D model for Owner review. The final maintenance access study shall be provided which incorporates the Owner's comments.

An up-to-date printable index listing all Contractor drawings by number, title, and revision shall be maintained and available to Owner at all times. An updated copy of the index shall be issued to the Owner at a minimum in the monthly report. Electronic copies shall be provided in a searchable format.

All vendor drawings, including drawings for Owner-supplied Materials and Equipment, shall be assigned a Contractor drawing number. An up-to-date printable index listing all vendors' drawings, including drawings for Owner-supplied Materials and Equipment, received shall be maintained and be available to Owner at all times. The listing shall show the Contractor-assigned number, vendor's drawing number, title, and revision number. An updated copy of the index shall be issued to the Owner at a minimum in the monthly report. Electronic copies shall be provided in a searchable format.

All engineering and design calculations prepared by Contractor during the design of the Facility shall be made available for Owner to review. Such calculations shall include architectural, civil, electrical, mechanical and instrumentation/control details.

The plant shall be designed and fabricated in accordance with all codes and standards and federal, state, and local regulations pertaining to the electric power industry or the equipment and services furnished pursuant to the Contract.

Contractor shall designate an Engineering Manager who will be responsible for the overall management and administration of engineering and design work.

01100.4 Procurement

Except for the Owner Furnished Equipment, the Contractor shall be responsible for the procurement, handling, and delivery to the Jobsite of all equipment and services, including, without limitation, locating, negotiating, inspecting, expediting, shipping, unloading, receiving, verifying, customs clearance and claims. Contractor shall also be responsible for inspecting, expediting, unloading receiving, verifying and onsite storage of Owner-supplied Materials and Equipment. Storage of Owner-supplied Materials and Equipment shall be in accordance with the manufacturer's requirements.

Contractor shall store all equipment at the project site in accordance with Prudent Utility Practice and equipment manufacturer's recommendations. Contractor shall take all actions necessary to preserve equipment manufacturer warranties. Contractor shall use reasonable measures to keep the equipment free from dirt, moisture and debris. Contractor shall perform all maintenance activities, including without limitation, lubrication checks, rotations, temporary heater operation, and megger checks, to ensure compliance with equipment manufacturer recommendations. Contractor shall maintain an up to date log of such maintenance activities, such log to include the dates of such activities and the signatures of the personnel performing such activities. Such log shall be available to Owner for review in Contractor's field office at all times.

Contractor shall be responsible for the procurement of all bulk materials, permanent or temporary, needed for the proper erection of systems and components of the Work. This includes, but is not limited to, all grading and fill material, foundation materials (including piling, concrete, rebar, and forms), steel, pipe, hangers, conduit, cable, cable tray, and insulation and lagging.

All technical portions of purchase orders and subcontracts for permanent engineered equipment shall be prepared in accordance with Contractor's standard practices and numbering system.

Contractor shall provide to Owner, for review and comment, all technical sections of the bid specifications for permanent equipment incorporated into the plant. Contractor shall provide record copies of conformed technical specifications for such equipment.

All vendor drawings, including drawings for Owner Furnished Equipment, shall be assigned a Contractor drawing number. An up-to-date printable index listing all vendors' prints, including drawings for Owner Furnished Equipment, that have been received shall be maintained and be available to the Owner. The listing shall show the Contractor-assigned number, vendor's drawing number, and title. An updated copy of the index shall be issued to the Owner on a monthly basis. Electronic copies shall be provided in a searchable format.

Promptly after receipt by Contractor, Owner shall be provided shop inspection reports, shop and field performance test reports, equipment data sheets, and performance curves and data for all permanent equipment as described in Article 21000.

01100.5 Construction

Contractor shall be responsible for all erection and installation work. Contractor shall manage the performance of all subcontractors and shall be responsible for the quality and time of performance for all subcontract work.

Contractor shall be responsible for all indirect construction costs including, without limitation, costs for personnel and supervision, employee travel and per diem, construction equipment (including mobilization and demobilization), material, consumables, utilities, facilities, tools, apparatus, temporary buildings, temporary utilities, scaffolding, project job office expenses, quality control testing (such as for concrete and welding), and demobilization costs.

Contractor shall be responsible for grading, excavation, dewatering, backfill, foundations, and piling. All excess excavated materials shall be stockpiled on the site as shown on the Construction Facilities Dwg [ ].

Contractor shall be responsible for flushing, boil-out/degreasing, and chemical cleaning of the feedwater system, condensate system, and all wetted HRSG sections. Chemical cleaning shall incorporate all requirements of the OEM Contractor and shall include acid or chelant cleaning and shall be followed by passivation and at least two (2) rinses with demineralized water (and additional rinses as required if the conductivity of the circulated rinse water is not acceptable, per the agreed upon chemical cleaning procedure. Contractor shall be responsible for furnishing all temporary equipment and for the proper disposal of flushing water and boil-out/degreasing and chemical cleaning wastes. Non-contaminated flushing water and any chemical cleaning rinses after the second rinse may be directed to the Facility evaporation ponds for disposal. Contractor shall furnish to Owner, for review and approval, the cleaning procedures and acceptance criteria proposed by Contractor no less than thirty (30) Days prior to Contractor commencing such cleaning.

Contractor shall be responsible for all steam blows on steam piping and air blows on air and gas piping, including all temporary equipment, piping, silencers, targets, and water treatment chemicals. Steam blows on each section of HRSGs and steam piping shall be done at a minimum cleaning force ratio or momentum ratio of 1.2 at the critical point of such sections. Contractor shall furnish to Owner, for review and approval, the steam and air blowing procedures and acceptance criteria proposed by Contractor no less than sixty (60) Days prior to Contractor commencing such steam and air blows.

Contractor shall be responsible for managing all subcontractors on the Jobsite, controlling the flow of traffic and personnel entering and leaving the Jobsite, and coordinating the use of heavy equipment and rigging equipment.

Any Work found to be in non-compliance with any drawing, specification, standard, or code, which requires any type of engineering evaluation to determine acceptability for use or corrective action to bring into compliance, shall be documented and dispositioned by appropriately trained and authorized personnel. Written documentation of the non-compliance shall be provided to Owner at the time of discovery. Written documentation of the evaluation and disposition by Contractor shall be promptly provided to Owner. Such documentation shall be in accordance with Contractor’s standard format for such documentation as outlined in these specifications and Article [ ].

During construction and updated on weekly basis, the Contractor shall keep on file one set of current "conformed-to-construction records" (“as-built”) drawings, including vendor drawings as defined in Exhibit [ ]. Such drawings shall be available to Owner for review in Contractor’s field office at all times. The information contained in these drawings shall be incorporated into subsequent formally issued revisions of these drawings. The information contained in these drawings shall be incorporated into the final "conformed-to-construction records" drawings issued to Owner as a requirement for Final Completion.

Contractor shall designate a resident Construction Manager who will be responsible for the overall management and administration of the plant construction effort. This shall include supervision and execution of subcontracts, maintenance of safe working conditions, and ensuring that contract terms and conditions are fulfilled, and that the installation is in accordance with plans and specifications.

Contractor will provide graded areas for Contractor’s use for Contractor personnel parking, construction offices, and laydown as indicated on the Construction Facilities Dwg [ ]. Security fencing will also be provided separating the Contractor’s designated area from any existing facilities and from the laydown areas assigned to other contractors. Improvements to the assigned areas, such as trailer slabs, aggregate surfacing, guard stations/badging facilities, and additional fencing within the assigned areas shall be the responsibility of Contractor.

All temporary construction office facilities, furnishings, janitorial services and supplies for the Contractor’s and subcontractor’s personnel shall be furnished by the Contractor. Power for the Contractor’s temporary construction offices shall be extended from the construction power terminal point by the Contractor. Construction (non-potable) water supply for the Contractor’s use will be provided by the Contractor and extended as needed by the Contractor. Locations of the construction power and construction water terminal points are depicted on the Construction Facilities Dwg [ ]. Potable water supply and sanitary

facilities for the Contractor's construction offices and work areas shall be furnished and maintained by Contractor. Tie-in to any existing onsite potable water and sanitary system will not be allowed. Contractor shall provide temporary office facilities for the Owner's use.

A temporary heated and air-conditioned furnished office trailer shall be provided by the Contractor for use by the technical field assistance personnel for Owner-supplied Materials and Equipment. In addition, a temporary heated and air-conditioned furnished trailer shall be provided by the Contractor for use as a dedicated training room. Contractor shall also provide furnishings and services for these trailers including appropriate office furniture, copier/fax/scanning/printing machines, Internet connections, phones lines (2 voice and data lines per office), power, janitorial services, potable water and sanitary service, and drinking water. Trailer and furnishings shall be new and unused unless otherwise approved by Owner. All facilities must be installed, functionally tested, and permitted prior to occupying.

It is required that a schedule of specific services and their frequency for all Contractor-furnished office trailers be included, covering, at minimum, the following.

> Janitorial: Sweep floors each day of work using floor sweeping compound to control dust. All bathrooms and plumbing fixtures to be cleaned and disinfected daily. All trash receptacles emptied daily.
>
> Security: Inspection, walk through, and daily door lock check at hours identified by Owner.

01100.6 Plant Startup and Commissioning

Plant commissioning is defined as all those activities, procedures, and tests required to start-up and bring installed systems and equipment to a state of readiness for contract testing and subsequent Owner acceptance and commercial operation. Plant commissioning shall include all prerequisite component and system testing, cleaning, flushing, initial operation, mechanical testing, and electrical testing, including, but not limited to:

- Hydrostatic testing of piping and pressure vessels and leak testing of tanks
- Equipment alignment checks
- Balancing of rotating equipment, as required by equipment supplier technical service representatives
- Chemical cleaning, flushes, steam blows and air blows for components and systems, as required
- Lubrication checks
- Inspection, stroking and adjustment of all manual valves, motor operated valves and control valves, and setting of torque, limit, and position indicating switches
- Setting of all relief and safety valves that are not factory certified
- Testing of electrical equipment (e.g., transformers, circuit breakers, switchgear, motor control centers, motors, batteries, chargers, inverters, etc.)
- Testing and calibration of all instrumentation (e.g., meters, relays, gauges, transmitters, switches, etc.) that are not factory calibrated
- Testing and tuning of all analog and digital controls and control loops; verification of indications, alarms, and annunciators in DCS or PLCs, as applicable; and establishment of proper values for setpoints and alarm points
- The simulator shall be used to train and verify DCS configurations prior to plant startup.
- Verification of analog and digital interlocks and protective devices and schemes
- Electrical wire and cable termination checks
- Megger, continuity, and high potential tests (as applicable)

Plant commissioning shall be completed on a system-by-system basis in accordance with these specifications and Exhibit [ ]. Appropriate documentation, referred to as System Turnover Packages, verifying successful commissioning of systems and equipment shall be submitted to the Owner on a system-by-system basis for review and approval prior to Performance Tests and Facility Capability

Demonstration Tests. Turnover packages shall be available 60 days before the first scheduled turnover for Owner review and comment. Turnover packages shall also be prepared for the buildings and improvements such as fencing, landscaping, paving, etc.

The System Turnover Package shall contain all information and data relevant to the design, construction, and commissioning of a system. The information shall be as a PDF and 3 hard copies contained in a heavy duty three ring binder and organized in a consistent fashion for each system. System boundaries shall be defined using project P&IDs and one-line drawings.

Each System Turnover Package shall contain a turnover control sheet. The turnover control sheet shall have signature blocks which, when signed and dated, shall signify the formal transfer of lockout/tagout control for a system from the construction manager to the commissioning manager and from the commissioning manager to Owner.

Each System Turnover Package shall contain, as a minimum, the following items, if applicable for the given system:

- Table of Contents
- List of all system components
- Hydrostatic, pneumatic, and leak tests (procedures, acceptance criteria, and attested results)
- Piping system velocity flushes (procedures, flow paths, acceptance criteria, and attested results)
- Initial equipment alignment, lubrication, and adjustment
- High potential and megger tests
- Wiring integrity and continuity tests
- Wire termination checks
- Equipment and system commissioning data (pressures, temperatures, flow rates, currents, voltages, vibration levels, etc.) including pump curves or other performance graphs that indicate performance relative to the referenced design target or standard.
- System P&IDs with system boundaries marked
- System control wiring diagrams
- Circuit verification records (loop checks), including verification from field device to control system operator interface
- System logic diagrams or applicable DCS system configuration printouts + logic narratives
- System defect/deficiency list/punch lists

Functional testing shall be in accordance with requirements indicated in Section [ ].

Plant commissioning and functional testing shall be conducted in accordance with a written plan to be submitted to Owner for review not less than sixty (60) days prior to initial commissioning activities.

Contractor shall provide to Owner week-ahead and day-ahead schedules for any commissioning activities that involve the delivery of electric power to the grid to allow Owner to coordinate such delivery with third parties. Such schedules shall include reasonably accurate estimates of the quantity of electric energy to be delivered on an hour-by-hour basis. Contractor shall promptly provide any revisions to such schedules. Contractor shall cooperate with Owner in meeting any scheduling requirements of third parties.

Contractor shall designate a resident commissioning manager who shall be responsible for implementing the plant commissioning and functional testing program.

01100.6.1 Pre-Commissioning Walk Down

Contractor shall walk down turnover packages prior to commissioning. Contractor shall keep and maintain a master Punch List, listing and prioritizing deficient items found during and after system walk downs. The Owner shall be invited to participate in system walk downs and shall have the opportunity to add Punch List items that must be completed prior to turnover to commissioning. Contractor shall manage the completion of all Punch List items. Additional Punch List items identified during commissioning and startup shall be added to the Punch List. The Owner may choose to add additional items to the Contractor's master Punch List by issuing such lists to the Contractor

01100.6.2 Post-Commissioning Walk Down

Contractor shall perform a final walk down after commissioning activities are completed. This walk down shall include the Owner. Any additional Punch List items identified at this time will be added to the Punch List.

01100.7 Equipment Expediting and Inspection Services

Contractor shall comply with expediting, inspection, testing, and quality control/assurance requirements including submittals to the Owner as defined in this specification and within the Contractors quality manual.

Contractor shall submit to the Owner a quality manual within 45 days after the Effective Date. The quality manual shall outline the Contractor's quality assurance and quality control program. The quality manual shall include a supplier quality surveillance matrix which shall include: description of Equipment and Materials, frequency/number of visit(s), and description of activities scheduled for each visit. Contractor shall follow procedures as outlined in the quality manual unless otherwise approved by the Owner in writing.

The Owner shall have the right to perform shop inspections and witness testing as noted in the Contract. The quality surveillance plan shall include advance notification to the Owner prior to trips to allow the Owner to schedule an inspector if desired. The Owner reserves the right to inspect and witness the following as a minimum:

Single-shaft turbine generators with accessories included in Attachment [ ] to this Scope of Work.

Steam turbine rotor and shells fabrication and testing.

HRSG pressure parts fabrication included in Attachment [ ] to this Scope of Work.

Condenser tubes and parts fabrication.

Boiler feed pumps, TCA cooler feed pumps, and condensate pumps performance tests.

Circulating water, closed cycle cooling water and auxiliary cooling water pumps performance tests.

Lube oil pump performance tests.

Motor driven fire pump performance tests.

Fuel gas compressors performance tests.

Raw water pretreatment system skid assembly completion prior to shipment.

Cycle makeup treatment system skid assembly completion prior to shipment.

Sampling system and chemical feed systems skid assembly completion prior to shipment.

Condensate polisher system skid assembly completion prior to shipment.

DCS, Simulator, and Virtual Model factory acceptance test (FAT).

CEMS factory acceptance test included in Attachment [ ] and Attachment [ ] to this Scope of Work.

Transformer factory tests

Prefabricated piping systems

Skid mounted systems

Electrical component tests

01100.8 Scheduling and Progress Reporting

Contractor shall plan, schedule, and report the progress of the Work using the critical path network scheduling method. Contractor shall prepare and maintain a detailed project schedule using Primavera Project Planner software, or equivalent software approved by Owner. The project schedule shall be developed in consideration of the durations and interdependence of all activities of the Work, including engineering, procurement, manufacturing, delivery, construction, startup, commissioning, and testing activities. The project schedule shall be resource loaded with engineering and field man-hours and construction commodity quantities. The project schedule shall identify the critical path (least float) chain of activities.

Within 90 (ninety) days following award of the Contract, Contractor shall submit for Owner's review and comments the project Level 3 schedule. The Contractor shall incorporate all reasonable comments provided by the Owner. Thereafter, the project schedule shall be updated and submitted to Owner on a monthly basis (or more frequently if necessary) reflecting actual progress for prior activities and its effects on future activities. Each submittal of the project schedule shall be made in hard copy form and electronic form (in the native format of the scheduling software), provided however, it may exclude resource loading information.

The Level 3 schedule shall include the following minimum of detail. The detailed engineering and procurement schedule shall support the construction and startup plan. It shall contain sufficient detail to identify critical path engineering deliverables, equipment and material deliveries, material installation items, and key construction sequences to support startup. This project schedule shall be based on the standard logic showing the start and finish dates of all deliverables to be produced during the life of the Project, including activities for constructability studies or reviews. Schedule activity details shall not exceed 1 month in duration, except in those instances where the smallest logical division of the Work is greater than 1 month (e.g., fabrication of long-lead equipment). The engineering and procurement activities shall be connected to the construction and startup activities with suitable logic driven relationships. Plan dates (also called target dates) shall be established for every activity in the form of a base line schedule (plan/target date schedule). It shall contain construction and startup activities showing the installation and commissioning of all discrete components of the Project.

Contractor shall prepare a weekly progress report to accurately describe the construction activities which occurred during the most recently completed week. The report shall include, as a minimum, sections on the following subjects:

- Summary of major construction activities completed or commenced since the last weekly progress report.
- Summary of significant activities planned for the upcoming period
- Total labor hours worked.
- Total average daily number of personnel on site for the regular work week.

- Installed quantities of materials such as concrete, pipe, wire, conduit, etc.
- Equipment deliveries received since the last weekly progress report.
- Equipment deliveries expected during the upcoming period.
- Equipment in on site storage.

The weekly progress report shall be submitted to Owner by Tuesday of the week following the reporting week.

Contractor shall prepare a monthly progress report to accurately describe the current status of the Project in the main categories of engineering, procurement, construction, and commissioning. The report shall begin with an executive summary and shall include, as a minimum, sections on the following subjects:

- Summary of major engineering, procurement and construction/commissioning activities completed since the last progress report
- Summary of significant engineering, procurement and construction/commissioning activities planned for the upcoming period
- Procurement status including an aggregate list of purchase orders and contracts executed, including date of execution
- Expediting status including an aggregate list of equipment delivered to the site, including date of delivery and acceptance by Contractor
- Schedule analysis and overview, including the most current project schedule, milestones met, milestones not met and reasons why, targeted milestones for the next month and next ninety (90) Days, slipped dates, plan to recover slippages, etc.
- Identification of any construction quality problems
- Identification of any safety accidents and events
- List of any problem areas and a plan for correction
- Updated list of significant action items for Contractor and Owner
- List of approved and pending Change Orders
- Drawing list with current revisions and approval dates, as appropriate
- Construction photos with captions
- On site labor statistics including Contractor and Subcontractor craft man-hours, broken down by craft
- Status of Contractor permits.
- Progress on Owner’s punch list items.
- Equipment in on site storage.

The monthly progress report shall be submitted to the Owner by the fifth day of each month following the reporting month.

Weekly and Monthly reports shall be submitted in a searchable electronic format acceptable to Owner. The Construction schedule for these reports shall include searchable Gantt chart. The weekly report shall be a level 4 report.

01100.9 Operator Training

The Contractor shall provide training for Owner’s engineering, maintenance, and operator personnel. Such training will be conducted to familiarize operating and maintenance personnel with each of the various operating systems, the major mechanical and electrical equipment, and the control systems. Detailed requirements for training are found in Exhibit [ ] Applicable vendors shall provide training on major systems and equipment. The OEM Contract includes training that shall be incorporated into the Contractors training program.

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As part of the training program, each member of the operating and maintenance staff will be provided with copies of the P&ID’s, the electrical single-line diagram, the major equipment list, and the system definitions, as outlined in Exhibit [ ]. The trainees will be expected to “walk down” each of the systems

using these reference documents to establish the location and function of all equipment and major control components in the Plant.

The classroom training will be conducted by knowledgeable instructors, subject to the Owner's approval and replacement at the Owner's request, in in a formal classroom setting. The classroom training sessions are intended to provide concentrated instruction in the design, capability, operation, inspection, and control of the equipment and systems within the Plant
.
As a supplement to the classroom training, additional training will be accomplished in the form of "hands-on" indoctrination during the commissioning of the Plant. As part of this phase of the training, the operating and maintenance personnel will be expected to work with and provide assistance to the Contractor during commissioning of the Plant. In this way, commissioning will become an extension of their actual work.

The Contractor's training program will assume that the trainees have some knowledge and experience with the types of systems and equipment to be found in power plants. The program is not intended to qualify operators having no prior knowledge and experience or training.

01100.10 Codes and Standards

The design and specification of Work shall be in accordance with applicable state and federal laws and regulations, and local codes and ordinances. The codes and industry standards used for design, fabrication, and construction are listed below and will be the editions in effect, including all addenda, at the date of Contract, and as stated in equipment and construction purchase or contract documents. Other recognized standards may also be used as design, fabrication, and construction guidelines when not in conflict with the listed standards.

- American Concrete Institute (ACI)
- American Institute of Steel Construction (AISC)
- American Iron and Steel Institute (AISI)
- American National Standards Institute (ANSI)
- American Petroleum Institute (API)
- American Society of Civil Engineers (ASCE)
- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
- American Society of Mechanical Engineers (ASME)
- American Society for Nondestructive Testing (ASNT)
- American Society for Testing and Materials (ASTM)
- American Water Works Association (AWWA)
- American Welding Society (AWS)
- National Board Inspection Code
- Cooling Tower Institute (CTI)
- Compressed Gas Association (CGA)
- Concrete Reinforcing Steel Institute (CRSI)
- FM Global Property Loss Prevention Data Sheets
- Hydraulic Institute (HI)
- Illuminating Engineering Society (IES)
- Institute of Electrical and Electronics Engineers (IEEE)
- International Society of Automation (ISA)
- Insulated Cable Engineers Association (ICEA)
- International Building Code (when no local codes prevail)
- International Plumbing Code (when no local codes prevail)
- National Association of Corrosion Engineers (NACE)
- National Electrical Safety Code (NESC)
- National Electric Code (NEC)
- National Fire Protection Association (NFPA)

- National Sanitation Foundation (NSF)
- National Electrical Manufacturers Association (NEMA)
- National Electrical Testing Association (NETA)
- Occupational Safety and Health Administration (OSHA)
- Steel Structures Painting Council (SSPC)
- Local Administrative Code Rules [LATER]
- Local Department of Transportation Standard Specifications [LATER]

01100.11 Division of Responsibility

The Division of Responsibility Matrix defining the Contractor's scope of supply and the Owner's scope of supply is included below and supplements the responsibility definition provided throughout the Contract Documents. If responsibility is not explicitly identified as Owner's, it shall be assumed to be the Contractor's.

Division of Responsibility Matrix			
Engineering, Procurement, and Construction Items	**Contractor**	**Owner**	**Remarks**
Engineering design	X		
Architectural	X		
Conformed to Construction Record drawings	X		Refer to Article [ ] and [ ]
Design documentation, calculations, analysis	X		
Engineered equipment specifications	X	X(1)	(1)For equipment supplied by Owner.
Engineered equipment purchase and expediting services	X		All equipment including Owner furnished Equipment.
Manufacturers' service representatives and technical field assistance (TFA)	X		For equipment supplied by Owner. Technical field assistance/service personnel shall be managed by Contractor.
Construction specifications	X		
Equipment, pipeline, valve, and instrument lists	X		Contractor shall include equipment supplied by Owner in the project equipment list.
Obtain spare parts recommendations and pricing from equipment vendors	X	X(1)	(1)For equipment supplied by Owner.
Purchase operating and maintenance spare parts		X	
Startup and commissioning spare parts	X(1)	X(2)	(1)Contractor is responsible for spare parts during commissioning. Contractor may borrow and replace from Owner's operating and maintenance spares inventory, if available. (2)Owner to purchase and supply for Owner-supplied equipment.

Division of Responsibility Matrix			
Engineering, Procurement, and Construction Items	**Contractor**	**Owner**	**Remarks**
Engineering and construction QA and QC programs	X		
Site acquisition, land purchase, easements, and rights-of-way	X		(1)Contractor is responsible for any easements, rights of way and other requirements associated with the transportation of Contractor and Owner-furnished equipment. Contractor is also responsible for any lay-down space or equipment storage needed beyond that available on the Jobsite.
Construction Permits	X		Contractor shall be responsible for obtaining and paying for any necessary construction permits.
Site survey	X		
Geotechnical			
Soil borings	X		
Soils reports	X		
Soils resistivity	X		
Interior furnishings	X		
Steam cleaning of all systems	X		
Inert gas blow cleaning of all systems	X		
Chemical cleaning of HRSG and other systems	X		
Disposal of chemical cleaning waste during construction	X		Neutralized wastes shall be hauled offsite and disposed of by a licensed chemical cleaning subcontractor.
Fuses, lamps, filters, gaskets, and other similar consumables required for startup	X(1)	X(2)	(1) Contractor shall provide all startup consumables for Contractor furnished Equipment and Materials (2) Owner shall provide all startup consumables for Owner Furnished Equipment

Division of Responsibility Matrix			
Engineering, Procurement, and Construction Items	**Contractor**	**Owner**	**Remarks**
Fuel gas supply	X		Refer to Section [ ] for fuel gas properties. Contractor to supply fuel gas regulating station and supply piping downstream of defined terminal point. Contractor shall be responsible for fuel gas line inert gas blowing and all associated costs. Contractor is responsible for providing fuel gas which meets the requirements of the CTG Supplier's fuel specifications and quality.
Fuel gas metering	X		Contractor shall install Owner-furnished gas turbine meter tubes and individual gas meters to the auxiliary boiler. Contractor shall provide and install revenue quality fuel gas meters. Contractor will supply revenue metering furnished by fuel gas supplier that will be located in the fuel gas metering and pressure control station.
Fuel gas regulation and filtration downstream of the fuel gas metering and pressure control station.	X		Contractor shall provide all filtration, odorization and regulation downstream of the fuel gas metering and pressure control station as required by equipment Suppliers.
Fuel gas compression and fuel gas heating system with piping and equipment	X		Required
Site preparation and earthwork design and construction	X		Contractor shall be responsible for all final earthwork design and construction. All excess materials must be moved and stored in an orderly matter to an area designated by the Owner
Site clearing and grubbing	X		
Site Earthwork and final stabilization	X		
Supply of Equipment and Materials for a complete operating Facility within the limits of the defined terminal points of the work scope	X		Except for Owner-furnished equipment.
All Construction Works	X		
All construction craft and supervision	X		

Division of Responsibility Matrix			
Engineering, Procurement, and Construction Items	**Contractor**	**Owner**	**Remarks**
Purchase of CTG, ST, HRSG, and accessories		X	Owner has purchased CTG, ST, and HRSG for assignment to Contractor.
Permitting			
Conditional Use Permit	X		Contractor shall apply for the conditional use permit to begin construction with [ ] County Attachment [ ]. LATER
Air Permit	X		Contractor shall apply for the air permit. A copy is included in Attachment [ ]. LATER
Storm Water Construction General Permit (SWPPP)	X		Contractor implementation, maintaining, and monitoring, Attachment [ ]. LATER
FAA Notice of Construction or Alteration	X		Contractor construction cranes or lifts, Attachment [ ]. LATER
Potable Water System (treatment and distribution)	X		Contractor shall obtain plan approvals from the State of [ ] for potable water treatment and distribution systems
Dredging Permit	X		Contractor shall obtain all necessary permits from the US Army Corps of Engineers and the State of [ ]
Wastewater Facility Construction Permit	X		Contractor will obtain permit for construction of new evaporation ponds, Attachment [ ]. LATER
Local Road Closure and Access Management Permits	X		
Fire Safety Approval	X		
Local Construction Dewater or Hydrostatic Testing	X		
Local Notification of Demolition	X		If necessary.
Local Building Permits	X		Contractor to apply for permit and notify the Owner for waiver application, if required.
County Demolition Permit	X		If contractor is removing materials from site
Concrete batch plant construction and operating permits	X		If required and needed by the Contractor
Any additional permits to complete the Work	X		

Division of Responsibility Matrix			
Engineering, Procurement, and Construction Items	**Contractor**	**Owner**	**Remarks**
Department of Homeland Security (DHS) Chemical Facility Anti -Terrorism Standards (CFATS)	X	X	TBD
Checkout, Startup, Testing, and Training			
Checkout/commissioning procedures	X		
Checkout and turnover	X(1)	X(2)	(1) Performed by Contractor. (2) Witnessed by Owner.
Mechanical/electrical/control checkout of systems	X(1)	X(2)	(1) Performed by Contractor. (2) Witnessed by Owner.
Set, check out, and test all electric protective and metering devices including protective relays, breaker trip devices, motor control center trip and overload devices and metering	X		Witnessed by Owner.
Startup procedures	X		
Startup of systems and plant	X(1)	X(2)	(1)Supervision and craft labor. (2)Witnessed by Owner.
Training of plant operators during startup and commissioning	X		Refer to Exhibit [ ] for training requirements
Steam blow, Inert gas blow, and Chemical cleaning	X		
Performance testing procedures	X		
Test equipment	X		
Plant operations during testing	X(1)	X(2)	Startup through Final Completion. (1)Supervision and craft labor (2)Witnessed by Owner
Performance Test	X(1)	X(2)	(1) Supervision and craft labor through Final Completion (2) Witnessed by Owner.
Emission compliance testing	X	X(1)	(1) Witnessed by Owner.
Calibration of emissions monitoring equipment	X		Witnessed by Owner
Performance test report	X		Reviewed by Owner
Water analysis and monitoring	X(1)	X(2)	Startup through Substantial Completion acceptance (1) Supervision and craft labor. (2) Witnessed by Owner.

Division of Responsibility Matrix			
Engineering, Procurement, and Construction Items	**Contractor**	**Owner**	**Remarks**
Operator training and training manuals (including Owner-furnished equipment)	X		
Operating manuals (including Owner-furnished equipment)	X		
Engineered equipment instruction manuals (including Owner-furnished equipment)	X		
Detailed operating procedures	X		
Operation and maintenance personnel	X(1)	X(2)	(1)Contractor to be responsible for operation and maintenance until Commercial Operation Date (COD). (2)After COD, Contractor may utilize Owner operations and maintenance personnel.
Witness of performance tests		X	
Witness certification of emissions monitoring equipment		X	
Permanent power, fuel, and water for startup and testing	X(1)		(1)Contractor is responsible for supply of demineralized water during steam blows.
Chemicals and lubrications until Final Completion	X		First fill lubricants
Construction Facilities, Utilities, And Services			
EPC Contractor Field Offices			Includes facilities for Technical Field Assistance personnel for Owner supplied equipment
Field office structure	X		
Field office furniture	X		
Field office equipment	X		
Field office supplies	X		
Craft change facilities	X		
Fabrication shops	X		
Training Facilities	X		
Owner Field Offices		X	Includes Owner’s Engineer offices
Tools			
Erection tools	X		

Division of Responsibility Matrix			
Engineering, Procurement, and Construction Items	**Contractor**	**Owner**	**Remarks**
Special erection tools	X		
Test equipment for erection, testing, startup and operation	X		
Equipment			
Construction equipment	X		
Subcontractor construction elevator	X		
Project construction elevator	X		
Heavy lift equipment/cranes	X		
Communication			
Construction Site Internet Connection	X		Contractor to arrange means for communication.
Construction Site Internet distribution for Contractor and Subcontractors	X		
Communication equipment and system wiring for Contractor and Subcontractors	X		
Telephone			
Construction telephone service trunk line	X		
Construction telephone trunk line connection to Contractor and Subcontractor field offices	X		
Contractor and Subcontractor's telephone equipment and system wiring	X		
Compressed Air			
Construction compressed air source	X		
Construction compressed air distribution	X		
Electrical Power			
Construction power source	X		Contractor to supply temporary power source.
Construction power source maintenance	X		
Construction power primary distribution system	X		
Construction power primary distribution system maintenance	X		

Division of Responsibility Matrix			
Engineering, Procurement, and Construction Items	**Contractor**	**Owner**	**Remarks**
Construction power Subcontractor's distribution system	X		
Construction power Subcontractor's distribution system maintenance	X		
Construction power Subcontractor's energy usage payment	X	X	
Lighting			
General areas temporary lighting and maintenance	X		Contractor to supply general area lighting at laydown, construction parking, equipment storage and badging/turnstile areas along with maintenance of same.
Subcontractor specific work area temporary lighting and maintenance	X		
General areas site lighting and maintenance	X		Contractor to supply general area lighting of any existing Owner facilities per drawings listed in Attachment [ ]
Subcontractor areas site temporary lighting and maintenance	X		
Water - potable and non-potable			
Construction water source	X		Contractor to supply service water source for construction usage, Contractor to connect and distribute.
Construction water primary distribution system	X		Contractor to provide connection source. Contractor to distribute.
Construction water Subcontractor's distribution and maintenance system	X		
Construction water Subcontractor's usage payment	X		
Drinking water supply	X		Contractor to supply potable water source for construction usage and distribute.
Drinking water distribution	X		
Heat			
Temporary heating facilities/system	X		
Heating energy usage payment	X		
Sanitary Facilities			
Construction primary sanitary facilities and maintenance	X		

Division of Responsibility Matrix			
Engineering, Procurement, and Construction Items	**Contractor**	**Owner**	**Remarks**
Subcontractor's construction sanitary facilities and maintenance	X		
Access Roads			
Primary access roads	X		
Contractor specific access roads and maintenance	X		
Primary access road maintenance	X		Contractor to maintain existing Owner or any new roadways.
Primary access road dust control	X		Contractor is responsible for dust control on the Project.
General Work related dust control	X		
Material Delivery Access Improvement			
Refurbishment of any existing roadways used for construction	X		Contractor to grade, and stone as part of Site Preparation construction
Contractor construction parking area	X		Contractor will provide sufficient area for Contractor to develop construction parking. Contractor to develop entry roadway and parking lot
Construction parking area maintenance	X		
Access road and parking area snow removal	X		Contractor will provide for any existing Owner or new roadways.
Storage Facilities			
Onsite laydown space	X		Contractor shall obtain, maintain and provide housekeeping.
Subcontractor storage area maintenance	X		
Construction material receiving and warehousing facilities	X		
Tool storage facilities	X		
Climate controlled storage facilities	X		
Construction equipment fueling facilities	X		
Permanent Site Fencing	X		Contractor is responsible for installation of all new permanent plant fencing.

Division of Responsibility Matrix			
Engineering, Procurement, and Construction Items	**Contractor**	**Owner**	**Remarks**
Temporary Site Fencing	X		Contractor is responsible for installation and removal of all other temporary site fencing necessary for construction and any fencing and gates to isolate construction from any existing facilities.
Security			
Overall site security	X		Contractor will provide manpower and facilities to provide site perimeter and ingress/egress security to general plant boundary and any Owner facilities.
EPC Contractor specific on-site and off-site laydown areas security	X		Contractor to provide coordinated effort with subcontractors for construction security of laydown areas.
Overall site security badging system and materials	X(1)	X(2)	(1)Contractor is responsible for operation and maintenance of coordinated single source security badging system for all construction employees. (2)Owner is responsible for operation and maintenance of security badging system for any existing Owner facilities.
EPC Contractor and Subcontractor badging and materials	X		
Medical Facilities			
Onsite first aid/medical services	X	X	Contractor to provide first aide and medical services/facilities for its craft and staff personnel. Owner will provide first aide and medical services/facilities for its OE and permanent plant personnel.
Project emergency ambulance	X		Contractor will provide and coordinate use of emergency personnel, ambulance or medivac services.
Drug sampling/testing facilities	X(1)	X(2)	(1)Contractor to provide drug sampling/testing services and facilities for construction related activities. (2)Owner will provide drug sampling/testing services and facilities for permanent plant and OE personnel.

Division of Responsibility Matrix			
Engineering, Procurement, and Construction Items	**Contractor**	**Owner**	**Remarks**
Emergency Medi-Vac Area	X		Contractor to final lighting and provision per FAA circulars and any heli-pad for landing emergency medical helicopter.
Fire Protection			
Construction fire protection - fire extinguishers	X		
Construction fire protection - stand pipe	X		
Overall site fire brigade participation	X		
Construction fire water wagon	X		Contractor is responsible for fire watches and firefighting equipment in their work areas, obtaining service contractor to provide fire-fighting equipment necessary to extinguish and coordinate with local emergency fire response agencies.
Cleanup			
General trash collection and disposal	X		
Subcontractor specific trash collection and disposal	X		
Field office janitorial service	X		
Concrete			
Concrete source	X		
Onsite concrete batch plant	X		Contractor is responsible for establishing and maintaining any necessary source of redi-mix concrete for the Project.
Concrete usage payment	X		
Concrete test facilities and testing	X		
Scaffolding			
Scaffolding supply/erection	X		
Welding			
Welder testing	X		
Welder test facilities	X		Contractor will develop, staff, oversee, and manage weld test and training facility for the Project.
Welding/cutting consumables	X		
Railroad			

Division of Responsibility Matrix			
Engineering, Procurement, and Construction Items	**Contractor**	**Owner**	**Remarks**
Existing railroad onsite	X[(1)]	X[(2)]	[(1)]Contractor is responsible for any rail improvements required prior to use. [(2)]Owner will provide access to any Owner rail spur on site for Contractor use.
Railroad siding install and maintenance	X		
Food Services			
Allowed in parking lot	X		
Lunch facility	X		
Survey Datum Points			
Basic horizontal and vertical control points	X		Contractor will provide state plane coordinate and plant grid monuments at the Facility for baseline reference.
Detail layout control points	X		
General Work-related survey layout	X		
Personnel Camp			
Personnel camp facilities	X		Craft housing is the responsibility of the Contractor
Facility utilities	X		
Personnel camp usage fee payment	X		
Misc. Services & Materials			
Bolting materials between any equipment or materials installed	X		
Solvents and cleaning materials	X		
Supply and placement of grout and grouting materials	X		
Touchup paint	X		
Coating of HRSG Exterior and associated structure	X		
Supply lubricants for installed equipment	X		Contractor to supply lubricants and fluids for first fill and startup activities.
Application of lubricants for installed equipment	X		

Division of Responsibility Matrix			
Engineering, Procurement, and Construction Items	**Contractor**	**Owner**	**Remarks**
Initial charge of resins, gases, chemicals, desiccants, lubricants, and hydraulic fluids	X		Contractor to provide initial charge and additional supplies for all equipment, including that required for Owner-furnished equipment through Commercial Operation Date (COD). Fluid levels shall be full at time of turnover of care, custody and control to Owner.
Maintenance of traffic	X		
Dewatering System			
Main site dewatering system	X		
EPC Contractor and Subcontractor direct Work-related dewatering	X		

MUTUAL NONDISCLOSURE & CONFIDENTIALITY AGREEMENT

This MUTUAL NONDISCLOSURE & CONFIDENTIALITY AGREEMENT (the "Agreement") is entered into to be effective as of the day of , 20 ("Effective Date") between Idaho Power Company ("IPC") and (" "). IPC and may also be referred to individually as a "Party" and collectively as the "Parties."

BACKGROUND

The Parties desire to share certain confidential and proprietary information in order to discuss (the "Discussion").

Each Party may receive or review certain confidential and proprietary information of the other Party as part of that Discussion.

Some or all of the confidential and proprietary information shared between the Parties may contain non-public information about IPC's transmission or generation system that may be considered CEII (as defined below). IPC generally does not make such information available, consistent with certain regulatory and security requirements.

IPC and have agreed to disclose such confidential and proprietary information to each other on the condition that the information be retained in confidence according to the terms and subject to the conditions included in this Agreement.

AGREEMENT

In consideration of the mutual obligations and undertakings in this Agreement, the sufficiency of which is acknowledged, the Parties agree as follows:

1. **Definitions.** In this Agreement these words and phrases shall have the following meanings:

   1.1. Confidential Information.

   (a) All non-public, confidential, or proprietary information disclosed by the Provider to Recipient or its Representatives, whether disclosed orally or disclosed or accessed in written, electronic or other form or media, and whether or not marked, designated or otherwise identified as "confidential" (in such cases where not so marked or designated, where it would reasonably be expected in the industry that such information would be deemed confidential), which may include (i) All information concerning Provider's and its affiliates', and their customers', suppliers', and other third parties' past, present, and future business affairs, including, without limitation, finances, customer information, supplier information, products, services, organizational structure and internal practices, forecasts, sales and other financial results, records and budgets, and business, marketing, development, sales and other commercial strategies; (ii) Provider's unpatented inventions, ideas, methods and discoveries, trade secrets, know-how, unpublished patent applications and other confidential intellectual property; (iii) All designs, specifications, documentation, components, source code, object code, images, icons, audiovisual components and objects, schematics, drawings, protocols, processes, and other visual depictions, in whole or in part, of any of the foregoing; (iv) Any third-party confidential information included with, or incorporated in, any information provided by Provider to Recipient or its Representatives; and (v) All notes, analyses, compilations, reports, forecasts, studies, samples, data, statistics, summaries, interpretations and other materials prepared by or for Recipient or its Representatives that contain, are based on, or otherwise reflect or are derived from, in whole or in part, any of the foregoing; and

   (b) All Critical Energy/Electric Infrastructure Information ("CEII"), as defined by the Code of Federal Regulations, Title 18, Section 388. CEII includes both Critical Energy Infrastructure Information and Critical Electric Infrastructure Information. As used in this Agreement, Critical Energy Infrastructure Information means specific engineering, vulnerability, or detailed design information about proposed or existing critical infrastructure that: (i) Contains detail about the production, generation, transportation, transmission, or distribution of energy; (ii) Could be useful to a person planning an attack on critical infrastructure; (iii) Is exempt from mandatory disclosure under the Freedom of Information Act, 5 U.S.C. 552; (iv) Does not simply give the general location of the critical infrastructure.

   As used in this Agreement, Critical Electric Infrastructure Information means information related to critical electric infrastructure, or proposed critical electrical infrastructure, generated by or provided to the Federal Energy Regulatory Commission ("FERC") or other Federal agency other than classified national security information, that is designated as critical electric infrastructure information by FERC or the Secretary of the Department of Energy pursuant to section 215A(d) of the Federal Power Act.

CEII includes but is not limited to: transmission conductor details, transmission structure design details, planned or expected transmission outages critical to the power system, substation design details, control center locations or design details, power plant facility design details, geographic coordinates more specific than line routes and natural gas line locations or design details.

(c) Confidential Information shall not include Non-proprietary Information.

1.2. Non-proprietary Information. The information with respect to which the Recipient is able to establish:

(a) At the time of disclosure was or thereafter became generally available to the public, other than as a result of any act or omission by the Recipient or its Representatives or anyone to whom the Recipient or Recipient's Representatives disclosed such information in violation of this Agreement;

(b) Was or became lawfully known to the Recipient or Recipient's Representatives on a non-confidential basis and not in contravention of any applicable law from a source (other than the Provider or Provider's Representative) that is entitled to disclose the information;

(c) Was already lawfully in the possession of the Recipient or Recipient's Representatives at the time of the information's disclosure under this Agreement and that was not acquired, directly or indirectly, from the Provider or Provider's Representative, provided that, the information is not subject to another confidentiality agreement or other obligation of secrecy;

(d) Information that the Recipient can demonstrate is independently developed by the Recipient or the Recipient's Representatives without the use or knowledge of any Confidential Information; and

(e) Information approved for disclosure or release by the Recipient by written authorization from the Provider; and provided that, any combination of the information which comprises part of the Confidential Information shall not be deemed to be Non-proprietary Information merely because individual parts of that information were within the scope of the above clauses unless the combination itself was within the scope of any of the above clauses.

1.3. Provider. The Party or its Representative who is providing information to the other Party or its Representatives on behalf of the first-mentioned Party, being IPC or , as the context requires;

1.4. Recipient. The Party or its Representative that is receiving information from the other Party or its Representatives on behalf of the first-mentioned Party, being IPC or , as the context requires;

1.5. Representatives. With respect to any Party or its affiliates, such Party's or its affiliates' directors, officers, employees, shareholders, agents, subcontractors, attorneys, engineers, accountants, consultants, and financial advisers of such Party; and

1.6. Review. The Recipient's review of any Confidential Information the Provider supplies, directly or indirectly, to the Recipient or to Recipient's Representatives under this Agreement for the purposes of the Discussion.

2. **Use and Non-Disclosure**.

2.1. The Recipient shall:

(a) Keep the Confidential Information in strict confidence and not use the Confidential Information for any purpose whatsoever, directly or indirectly, other than for the purpose of conducting the Review;

(b) Disclose only such portions of the Confidential Information to its Representatives as is required for the purpose of conducting the Review and only to those Representatives who have a need to know;

(c) Be liable for any breach of this Agreement by it or any of its Representatives; and

(d) Shall in the case of disclosure of Confidential Information to any of its Representatives, inform the Representatives at the time of disclosure of the confidential and proprietary nature of the Confidential Information; and shall direct its Representatives not to disclose without the prior written consent of the Provider (i) Any opinion or comment in respect of the Confidential Information; (ii) Any terms, conditions or any facts with respect to the Discussion or the contents of this Agreement; or (iii) Any Confidential Information to any person other than in accordance with the terms of this Agreement.

3. **Required Government Disclosures**. If Recipient or its Representatives becomes legally obligated to disclose Confidential Information to any government entity with jurisdiction over it, such Recipient shall give the Provider

prompt written notice sufficient to allow the Provider to seek a protective order or other appropriate remedy. The Recipient shall disclose only such information as is required by the governmental entity and shall use its commercially reasonable efforts to obtain confidential treatment for any Confidential Information that is disclosed.

4. **Limited Relationship**. Nothing in this Agreement constitutes or implies any partnership, joint venture or any other formal or informal business relationship between the Parties or is to be construed as making one Party the agent or fiduciary of the other with respect to the Discussion.

5. **Acknowledgments by Recipient.**

   5.1. The Recipient acknowledges that:

   (a) The Confidential Information is proprietary to the Provider, and provided to the Recipient solely for the purpose of the Review, the unauthorized disclosure of which could result in financial loss to the Provider and would reasonably be expected to harm the competitive position or negotiating position of the Provider;

   (b) The provision by the Provider of any Confidential Information to any other third party does not render such Confidential Information as Non-proprietary Information;

   (c) Without prejudice to the terms and conditions of any eventual agreement or agreements relating to the Discussion (if any), neither the Provider nor the Provider's Representatives make any representation or warranty, express or implied, as to the accuracy or completeness of the Confidential Information; each Provider represents and warrants to the respective Recipient that the Provider has the right and authority to disclose the Confidential Information being disclosed by it hereunder;

   (d) It will rely upon its own investigations, due diligence and analysis in evaluating and in satisfying itself as to all matters relating to the Discussion;

   (e) The Provider shall have no liability to the Recipient or any of Recipient's Representatives resulting from any use of the Confidential Information by the Recipient or any of its Representatives, except as expressly provided in this Agreement; and

   (f) No commitment or contract relating to the Discussion shall exist unless and until definitive agreements have been executed and delivered by or on behalf of the Parties.

6. **Return of Confidential Information**. At any time upon the written request of the Provider, and within five (5) business days of the request, the Recipient shall either return all copies, whether in written, electronic or other form or media, of the Confidential Information to the Provider or shall destroy and verify in writing its destruction of, any and all copies or other reproductions or extracts thereof, together with such documents, memoranda, notes and other writings whatsoever prepared by Recipient and its Representatives based on the Confidential Information provided that failure to destroy or return electronic copies of materials or summaries containing or reflecting Confidential Information that are automatically generated through data backup, archiving, and/or other similar systems shall not be deemed to violate this Agreement, so long as the Confidential Information is not disclosed or used in violation of the other terms of this Agreement.

   For clarity, the Parties covenant and agree that neither Party acquires any intellectual property rights under this Agreement.

7. **Failure or Delay Not Waiver**. It is understood and agreed by the Recipient that any failure or delay by the Provider in exercising any right, power or privilege under this Agreement shall not operate as a waiver thereof, nor shall any single or partial exercise thereof preclude any other or future exercise of any right (equitable or otherwise), power or privilege hereunder. All waivers must be in writing and signed by the waiving Party.

8. **Duration of Disclosure Period; Survival of Obligations**. This Agreement governs disclosures of Confidential Information by the Parties for a period of three years from the Effective Date ("Disclosure Period"). Notwithstanding, and regardless that the Confidential Information may have been returned or copies destroyed prior to the expiration of the Disclosure Period, the obligations of confidentiality and nondisclosure imposed by this Agreement shall survive any termination or expiration of the Disclosure Period and shall be in effect in perpetuity.

9. **Remedies; Indemnity**. The Recipient acknowledges that monetary damages may not be a sufficient remedy for a breach of this Agreement by the Recipient or any of its Representatives and agrees that in addition to any other remedy to which Provider or its affiliates may be entitled under this Agreement, at law or in equity, Provider shall be

entitled to seek injunctive relief to prevent breaches of this Agreement and to specifically enforce the terms and provisions hereof.

The Recipient agrees, to the extent allowed by law, to indemnify, defend, and hold harmless the Provider and its and their successors and their respective officers, directors, agents, and employees, from, for, and against any and all allegations, liabilities, suits, losses, damages, claims, actions, costs, and expenses of any nature, including court costs and attorneys' fees, related to the receiving Party breaching any term or condition of this Agreement.

10. **Notices**. Notices, where required herein, shall be deemed to have been duly served when (i) delivered in person, or (ii) sent by mail or courier, return receipt requested, at the address for each Party as follows:

    Idaho Power Company
    1221 W. Idaho St.
    Boise, ID USA 83702
    Attention:

    (Insert Other Party's Name and Contact Info. Here)
    (Address)
    (Address)
    Attention:

11. **Severance.** If any provision of this Agreement is determined by a court of competent jurisdiction to be wholly or partially unenforceable for any reason, such unenforceability will not affect the enforceability of the balance of this Agreement and all provisions of this Agreement shall, if alternative interpretations are applicable, be construed so as to preserve the enforceability hereof.

12. **Entire Agreement and Amendment.** This Agreement expresses the entire agreement between the Parties with respect to the disclosure, delivery and use of the Confidential Information and supersedes and cancels all prior communications, understandings and agreements between the Parties, whether written or oral, express or implied, with respect to such subject matter. This Agreement may not be modified except by a writing duly signed by both Parties.

13. **Governing Law, Etc.** This Agreement shall be governed by and construed in accordance with the laws of the State of Idaho without giving effect to the choice of law rules thereof, and may be executed in several counterparts. The exclusive venue of any action shall be Ada County, Idaho.

14. **No Waiver of Privilege**. Unless agreed upon in writing by the Provider, neither Party intends to waive, nor cause any of its Representatives to waive, the attorney-client, attorney work product, or other applicable privilege of the Provider or any of its subsidiaries, affiliates, or joint ventures ("Privilege") by providing any information subject to a Privilege. Accordingly, each Party agrees that a production to any Recipient or any of its Representatives by the Provider or any of its Representatives of Confidential Information protected by a Privilege shall not constitute a waiver of any such Privilege by any person, and each Party hereto agrees that, upon request by the Provider or any of its Representatives, Recipient will, and will cause its Representatives to, immediately return and/or destroy such inadvertently produced information.

15. **Assignment.** Neither Party may assign all or any part of this Agreement, by operation of law or otherwise, without the other Party's prior written consent, which consent shall not be unreasonably withheld or denied. This Agreement shall be binding on and inure to the benefit of each Party's successors and assigns.

16. **Attorneys' Fees.** In the event that Provider institutes any legal suit, action or proceeding, against Recipient to enforce the covenants contained in this Agreement, Provider shall be entitled to receive in addition to all other damages to which it may be entitled, the costs incurred by Provider in conducting the suit, action or proceeding, including reasonable and actual attorneys' fees and expenses and court costs.

(Signature page follows)

AGREED AND ACCEPTED to be effective as of the Effective Date.

(COUNTERPARTY NAME)

By: _____

Name: _____

Title: _____

IDAHO POWER COMPANY

By: _____

Name: _____

Title: _____

Idaho Power 2026 All Source RFP
Exhibit N – Counterparty Financial Questionnaire

Please provide the following information with <u>your proposal</u> to enable Idaho Power (IPC) to evaluate the financial viability of the Respondent and any entity(ies) providing credit assurances on behalf of the Respondent, if applicable.

Respondent's Credit Information

1. Credit information for Respondent
    a. Exact legal name and address of Respondent.
    b. Attach copies of three years audited financial statements (including balance sheet, income statement, notes and cash flow statement) for the three most recent fiscal years.
    c. If Respondent is unable to provide audited financial statements or is relying upon another entity(ies) to provide credit assurances on its behalf, Respondent must indicate so here and complete the following section.
        i. Is Respondent unable to provide audited financial statements?
        ii. Is Respondent relying upon another entity(ies) to provide credit assurances on Respondent's behalf?
    d. If available, provide Debt Ratings from S&P and/or Moody's (please provide senior unsecured long-term debt rating (or corporate rating if a debt rating is unavailable). Please indicate type of rating, rating, and source.
    e. Identify pending legal disputes (describe). Please provide contact name, phone number and e-mail address that can assist with answering questions.
    f. State whether Respondent is or has within the past five (5) years been the debtor in any bankruptcy proceeding.
    g. Respondent should demonstrate its ability and/or the ability of its credit support provider to provide the required security equal to the value of the contract price set forth in the proposal, including its plan for doing so including type of security, sources of security, and a description of its credit support provider.
    h. Respondent should provide a reasonable demonstration of its ability to finance the proposed project based on past experience and a sound financial plan identifying the proposed sources for debt and equity and evidence that the project is financeable.

2. Credit information for entity(ies) providing credit assurances on behalf of Respondent, if applicable (e.g. parent company, or financial institution)
    a. Exact legal name and address of entity(ies) providing credit assurances on behalf of Respondent.
    b. Describe relationship to Respondent and describe type of credit assurances to be provided (e.g., parental guaranty, cash deposit, or a letter of credit from a qualified financial institution). Qualified Institution shall mean the United States office of a commercial bank or trust company organized under the laws of the United States of America or a political subdivision thereof or a foreign bank with a branch office located in the United States and, in either case, whose rating with respect to its long term unsecured, unsubordinated indebtedness, is rated at least A by S&P and A2 by Moody's. Respondent must provide to IPC from the entity(ies) providing the credit assurances on behalf of the Respondent executed by an authorized signatory and indicating their form of credit assurances it will provide. It should be noted that more than one commitment letter, or more than one form of commitment letter, may be necessary.
    c. Debt Ratings from S&P and/or Moody's (please provide senior unsecured long-term debt rating (or corporate rating if a senior unsecured long-term debt rating is unavailable). Please indicate type of rating, rating, and source:
    d. Attach copies of audited financial statements (including balance sheet, income statement, and cash flow statement) for the three most recent fiscal years for parent companies, as applicable.
    e. Describe any pending or threatened legal disputes or claims for parent companies, as applicable.
    f. State whether entity(ies) providing credit assurances on behalf of the Respondent is or has within the past five (5) years been the debtor in any bankruptcy proceeding.

Idaho Power 2026 All Source RFP
Exhibit N – Counterparty Financial Questionnaire

Credit Requirements

The Respondent may be required to post credit assurances equal to the value of the contract price set forth in the proposal which is expected to have a commercial operation date of no later than June 1, 2026. IPC will require a letter from the entity providing financial assurances at the proposal submittal stating that it will provide financial assurances on behalf of the Respondent.

If necessary, the Respondent will be required to demonstrate the ability to post any required credit assurances in the form of a commitment letter from a proposed guarantor or from a financial institution that would be issuing a Letter of Credit. IPC will require each Respondent to provide an acceptable commitment letter(s), if applicable, twenty (20) business days after the Respondent is notified that the Respondent has been selected for the Initial Shortlist. Respondent will be required to provide any necessary guaranty commitment letter from the entity(ies) providing guaranty credit assurances on behalf of the Respondent and/or any necessary letter of credit commitment letter from the financial institution providing credit assurances in the form of a Letter of Credit. Forms of commitment letters are part of this **Exhibit N**. The timing of when credit security must be posted is detailed in the Credit Security Requirements Methodology section, which is also part of this **Exhibit N**.

IPC must approve the amount, substance and issuer of all provided credit assurance.

Amount of Credit Assurances to be Posted

The RFP selected resources have the potential to expose IPC and its ratepayers to credit risk in the event a selected Respondent is unable to fulfill its obligations pursuant to the terms of an executed agreement. The credit risk profile is a function of several factors:

1. Type of resource agreement.
2. Size of resource.
3. Expected energy delivery start date.
4. Term of underlying contract.
5. Creditworthiness of Respondent and Respondent's credit support provider, if applicable.

Should the financial institution providing credit assurances on behalf of the Respondent fail to meet these minimum requirements of a qualified institution IPC will require credit assurances from a replacement financial institution that does meet the requirements.

Build Transfer Agreement

For all resources that involve a physical asset with appropriate step-in rights, IPC views potential credit exposure as the cost it would incur in the event the resource failed to reach commercial operation by June 1, 2026 or the Bidder failed to fulfill its obligations at any time during the life of the contract. If the failure occurred near the expected commercial operation date, IPC would also potentially have to procure energy, capacity and other environmental attributes associated with the energy in the open market at then-prevailing market prices. IPC has determined the amount of credit assurances required for these types of transactions to be up to 100% of the purchase price, based upon nameplate project size. The credit assurance requirement will be terminated upon the project achieving commercial operation date with proven tax credit eligibility of the appropriate resource technology.

The above descriptions of IPC's potential credit exposures are not in any way intended to limit Respondent's liability with respect to obligations under any contract entered into with IPC, including without limitation, attorney's fees or other damages incurred by IPC in the event of a breach of contract by Respondent.

IPC will also explore with a Respondent, if selected, other commercial avenues to reduce security requirements, such as, but not limited to, reduction in security amounts as project development milestones are met, a stipulated acceleration of commercial operation date(s) (i.e., prior to June 1, 2026) or IPC's review of Respondent's underlying

Idaho Power 2026 All Source RFP
Exhibit N – Counterparty Financial Questionnaire

third-party contractual terms, provisions and/or incentives that further support Respondent achieving commercial operations prior to June 1, 2026.

Posting of Credit Security

Terms and conditions for the posting of security are set forth in the applicable Exhibit H - Draft Agreements for Resource Based Bids which as noted above can be negotiated relative to milestones and amounts. If applicable, the Respondent will be required to demonstrate the ability to post any required credit assurances in the form of a commitment letter from a proposed guarantor or from a financial institution that would be issuing a Letter of Credit. Forms of commitment letters are a part of this **Exhibit N**.

Idaho Power Company's Security

Please note that IPC will not post security to support its obligations under any definitive agreement. Respondents who will require such security from IPC should not submit a proposal in response to this RFP.

Idaho Power 2026 All Source RFP
Exhibit N – Counterparty Financial Questionnaire

FORM OF GUARANTY COMMITMENT LETTER

(Must be on letterhead of Respondent's guarantor)

Idaho Power (IPC)
1221 W. Idaho Street
Boise, ID 8370s
Attn: Credit Department
Email: Credit@idahopower.com

To Whom It May Concern:

[NAME OF GUARANTOR] ("Guarantor") is [INSERT RELATIONSHIP TO RESPONDENT] ("Respondent").

In connection with Respondent's submittal in Idaho Power (IPC)'s 2026 All Source Request for Proposals (RFP) for Peak Capacity and Energy Resources, this commitment letter contains Guarantor's assurance to Idaho Power (IPC) that, should Idaho Power (IPC) enter into a transaction with Respondent arising out of any proposal submitted by Respondent in the RFP, with terms and conditions mutually acceptable to Idaho Power (IPC) and Respondent, Guarantor will at that time issue an unconditional guaranty in form and substance reasonably satisfactory to Idaho Power (IPC), and that Guarantor will guarantee all obligations of payment and performance of Respondent to Idaho Power (IPC) as Guarantor's independent obligation (up to a maximum amount of $_____, plus expenses of enforcing the guaranty).

Guarantor understands that Idaho Power (IPC) will not enter into a transaction with Respondent without said guaranty. Guarantor further understands that Idaho Power (IPC) is under no obligation to enter into any transaction with Respondent, under the RFP or otherwise.

Yours truly,

(name of committing guarantor)
(name and title of authorized officer)

Idaho Power 2026 All Source RFP
Exhibit N – Counterparty Financial Questionnaire

FORM OF LETTER OF CREDIT COMMITMENT LETTER

(Must be on letterhead of entity(ies) providing the letter of credit on behalf of the Respondent)

Idaho Power (IPC)
1221 W. Idaho Street
Boise, ID 83702
Attn: Credit Department
Email: Credit@idahopower.com

To Whom It May Concern:

In connection with Respondent's submittal in Idaho Power (IPC)'s 2026 All Source Request for Proposals (RFP) for Peak Capacity and Energy Resources, this commitment letter contains [ISSUING BANK]'s assurance to Idaho Power (IPC) that, should Idaho Power (IPC) enter into a transaction with Respondent arising out of any proposal submitted by Respondent in the RFP, with terms and conditions mutually acceptable to Idaho Power (IPC) and Respondent, [ISSUING BANK] will at that time issue an irrevocable standby letter of credit in form and substance reasonably satisfactory to Idaho Power (IPC), up to a maximum amount of $_____.

[ISSUING BANK] understands that Idaho Power (IPC) will not enter into a transaction with Respondent without said letter of credit. [ISSUING BANK] further understands that Idaho Power (IPC) is under no obligation to enter into any transaction with Respondent, under the RFP or otherwise.

Yours truly,

(name of entity(ies) providing the letter of credit)
(name of authorized officer)

IRREVOCABLE STANDBY LETTER OF CREDIT No._____

Date:

BENEFICIARY:

Idaho Power Company
1221 W. Idaho Street
Boise, Idaho 83702
Attention: Corporate Treasurer

APPLICANT:

PROJECT NAME
_____
_____
Attention: _____

Ladies and Gentlemen:

[BANK], [ADDRESS] (the "Bank") hereby establishes this Irrevocable Standby Letter of Credit (this "Letter of Credit") in favor of Idaho Power Company, an Idaho corporation (the "Beneficiary"), for the account of [APPLICANT], a [STATE OF ORGANIZATION AND FORM OF ENTITY] (the "Applicant"), in the amount of US$_____.00 (_____ United States Dollars and 00/100 only) (the "Available Amount"), effective immediately and expiring at 5:00 p.m. New York time on _____, 20__, or, if such day is not a Business Day (as hereinafter defined), on the next preceding Business Day (the "Expiration Date").

For the purposes hereof, the term "Business Day" shall mean any day, other than a Saturday or Sunday, on which commercial banks are not authorized or required to be closed in the City of New York, New York.

Subject to the terms and conditions herein, funds under this Letter of Credit are available to the Beneficiary by presentation of the following documents at [BANK], [ADDRESS], ATTENTION: _____, on or prior to 5:00 p.m. New York time on any Business Day, on or prior to the Expiration Date:

1. The original of this Letter of Credit and all amendments thereto for endorsement thereto (or photocopies of the originals for partial drawings or for facsimile transmittals); and

2. The Drawing Certificate duly dated and issued in substantially the form of Attachment A attached hereto, duly completed and purportedly bearing the signature of an officer of the Beneficiary.

Notwithstanding the foregoing, any drawing hereunder may be requested by transmitting the requisite documents as described above to the Bank by facsimile at (___) ___-____ to the attention of the [BANK DEPARTMENT]. Any claims made by facsimile must be confirmed by such person as shall be specified

Example

from time-to-time by the Bank. The facsimile transmittal shall be deemed received when confirmed to Bank by telephone at (___) ___-____. Drawings made by facsimile transmittal are deemed to be the actual presentation without the need of original signed documents.

In the event of any non-conforming presentation, we shall immediately notify Beneficiary in writing by facsimile to (___) ___-____ that the presentation has been rejected, which notice shall indicate the reason for dishonoring such presentation and shall place at the disposal of beneficiary the documents presented by Beneficiary in support of its demand for payment. Beneficiary may thereafter present documents and receive payment hereunder in the event a conforming presentation is made in accordance with the terms herein.

Partial drawing of funds shall be permitted under this Letter of Credit, and this Letter of Credit shall remain in full force and effect with respect to any continuing balance; *provided*, that the Available Amount shall be reduced by the amount of each such drawing.

This Letter of Credit is not transferable or assignable. Any purported transfer or assignment shall be null and void and of no force or effect.

Banking charges and all other costs and fees associated with this Letter of Credit shall be the sole responsibility of the Applicant.

This Letter of Credit sets forth in full our obligations and such obligations shall not in any way be modified, amended, amplified, or limited by reference to any documents, instruments, or agreements referred to herein, except only the attachment referred to herein; and any such reference shall not be deemed to incorporate by reference any document, instrument, or agreement except for such attachment.

The Bank engages with the Beneficiary that Beneficiary's drafts drawn under and in compliance with the terms of this Letter of Credit will be duly honored if presented to the Bank on or before the Expiration Date.

Except so far as otherwise stated herein, this Letter of Credit is subject to the International Standby Practices ISP 98 (also known as ICC Publication No. 590), or revision currently in effect (the "ISP"), and as to matters not covered by the ISP, the laws of the State of Idaho (without regard to the principles of conflicts of laws thereunder).

[BANK]

By:_____
Name:
Title:

Example

ATTACHMENT A

FORM OF DRAWING CERTIFICATE

To:

[BANK]
_____
_____
_____
Attn: _____

Subject: Irrevocable Standby Letter of Credit No. _____

The undersigned _____, an authorized representative of Idaho Power Company, an Idaho corporation (the "Beneficiary"), hereby certifies to [BANK] (the "Bank"), with reference to Irrevocable Standby Letter of Credit No. _____, dated _____, 20__ (the "Letter of Credit"), issued by the Bank in favor of the Beneficiary, as follows as of the date hereof:

1. The Beneficiary is entitled to draw under the Letter of Credit an amount equal to $_____, pursuant to the terms of that certain [NAME OF AGREEMENT] between _____ and Beneficiary, dated as of _____, 20__.

2. Based upon the foregoing, the Beneficiary hereby makes demand under the Letter of Credit for payment of XXX AND XX/100 Dollars ($_____), which amount does not exceed (i) the amount set forth in paragraph 1 above, and (ii) the Available Amount under the Letter of Credit as of the date hereof.

3. Funds paid pursuant to the provisions of the Letter of Credit shall be wire transferred to the Beneficiary in accordance with the following instructions:
_____
_____
_____

Unless otherwise provided herein, capitalized terms which are used and not defined herein shall have the meaning given each such term in the Letter of Credit.

IN WITNESS WHEREOF, this Certificate has been duly executed and delivered on behalf of the Beneficiary by its authorized representative as of this ___ day of _____, 20__.

IDAHO POWER COMPANY

By:_____

Example

Idaho Power 2026 All Source RFP
Exhibit O – Draft Form Letter of Credit

Name:
Title:

Example

PARENT GUARANTY OF PAYMENT

THIS GUARANTY (the "Guaranty") is made as of the day of , 20 (the "Effective Date") by , , a formed under the laws of the State of ("Guarantor") to and in favor of Idaho Power Company, a corporation formed under the laws of the State of Idaho (the "Beneficiary").

RECITALS:

A. , , a formed under the laws of the State of ("Obligor"), a wholly-owned subsidiary of Guarantor, and the Beneficiary entered into that certain [insert contract name, i.e. PPA] made the day of , 20 (which agreement, as amended from time to time after the Effective Date, is herein referred to as the "[insert contract name, i.e. PPA]") pursuant to which, *inter alia*, Obligor agreed to provide to the Beneficiary for a [insert project generation] project to be constructed in (the "Project").

B. Guarantor has agreed to guarantee to the Beneficiary the proper performance, payment and discharge of Obligor's Obligations (as defined in Section 1 hereof) by Guarantor.

C. Unless otherwise defined herein, all words and phrases used herein which are defined in the [insert contract name, i.e. PPA] shall, for the purposes hereof, have the same meanings as are respectively given thereto in the [insert contract name, i.e. PPA].

IN CONSIDERATION OF the Beneficiary entering into the [insert contract name, i.e. PPA] and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged by Guarantor, and intending to be legally bound hereby, Guarantor covenants to, and agrees with, the Beneficiary as follows:

1. Guaranty. Guarantor hereby absolutely, unconditionally and irrevocably guarantees to the Beneficiary and its successors and permitted assigns, the due, punctual and complete performance, payment and discharge by Obligor of each and all of the performance, payment, indemnification and other obligations and liabilities of any and every nature and kind whatsoever, whether now in existence or hereafter arising, on the part of Obligor arising under the [insert contract name, i.e. PPA] or otherwise in relation to the transactions therein provided for (collectively, the "Obligor's Obligations").

2. Absolute Liability of Guarantor. The obligations of Guarantor hereunder are absolute, primary, direct and independent obligations and are not subject to any right of set-off, recoupment or counterclaim as against the Beneficiary. The Beneficiary is not required to exhaust its recourse against Obligor, or any other Person, or any security it may hold, or to take any other action before being entitled to demand, by written notice, payment or performance of Obligor's Obligations from Guarantor.

3. Payment; Currency. All sums payable by Guarantor hereunder shall be made in freely transferable and immediately available funds and shall be made in the currency in which Obligor's Obligations were due. If Obligor fails or refuses to pay any Obligor's Obligations when due and owing, Beneficiary may make a demand upon Guarantor (hereinafter referred to as a "Payment Demand"). A Payment Demand shall be in writing and shall specify in what manner and what amount Obligor has failed to pay and an explanation of why such payment is due and owing, with a specific statement that Beneficiary is calling upon Guarantor to pay under this Guarantee. A Payment Demand satisfying the foregoing requirements shall be deemed sufficient notice to Guarantor that it must pay such amount and such payment shall be made to Beneficiary by Guarantor within three business (3) days after receipt of such Payment Demand. A single written Payment Demand shall be effective as to any specific default under the [insert contract name,

Example

i.e. PPA] that is capable of being cured by the payment of money during the continuance of such default and additional written demands concerning such default shall not be required until such default is cured. Beneficiary shall promptly return to Guarantor any amount paid by Guarantor if and to the extent a court of competent jurisdiction (upon final appear thereof, if any) shall have determined that such Obligor's Obligation was not payable by Guarantor.

4. No Release of Guarantor. Guarantor has no right either to terminate this Guaranty or to be released or discharged from its obligations hereunder, which obligations shall not be affected, released nor diminished for any reason whatsoever including:

(a) any release or discharge, in whole or in part, of Obligor's Obligations or any amendment or supplement to or any modification of, assignment or termination, in whole or in part, the [insert contract name, i.e. PPA];

(b) any extension or renewals of Obligor's Obligations or any change in the time, manner or place of payment or performance of Obligor's Obligations or any course of dealing by the Beneficiary with Obligor (including accepting any compromises from Obligor);

(c) the occurrence of any event of default by Obligor under the [insert contract name, i.e. PPA] or otherwise in relation to Obligor's Obligations;

(d) any taking (or any abstaining from taking) of any security or guarantee for the performance of Obligor's Obligations, in whole or in part, or the perfecting (or the failing to perfect) any such security;

(e) any exchange, surrender, substitution, loss or release of, or other dealing with, any security or guarantee from time to time held by the Beneficiary for the performance of all or any part of Obligor's Obligations;

(f) any waiver, consent or other action or inaction or any exercise or non-exercise of any right, remedy or power with respect to Obligor's Obligations;

(g) any merger, amalgamation or consolidation of Obligor into or with any other Person or any change in the corporate existence, financial condition, constitution, name, structure, business, control or ownership of Obligor;

(h) any bankruptcy, winding-up, liquidation, dissolution, insolvency, reorganization or other similar proceeding affecting Obligor or its assets or any release, stay or discharge of any Obligor's Obligations resulting therefrom;

(i) any invalidity, illegality, irregularity or unenforceability for any reason of the [insert contract name, i.e. PPA], Obligor's Obligations or any part thereof as regards Obligor;

(j) any provision of applicable Laws purporting to prohibit the payment by Obligor or Guarantor of any amount payable by Obligor in connection with Obligor's Obligations;

(k) any force majeure (other than a force majeure which, pursuant to the [insert contract name, i.e. PPA], relieves Obligor of liability for the performance of any Obligor's Obligations);

Example

(l) any lack or limitation of power, incapacity or disability on the part of Obligor to enter into the [insert contract name, i.e. PPA] or of its directors, partners or agents or any other irregularity, defect or informality on the part of Obligor in relation to Obligor's Obligations; and

(m) any other Laws or other circumstances or matters that might otherwise constitute a legal or equitable discharge or release of a surety or guarantor.

5. Waiver of Notice & Defences. Guarantor hereby waives: (a) diligence, presentment, protest, demand for payment, notice of dishonour or non-payment, notice of acceptance of this Guaranty and any other notice not expressly granted to Guarantor by this Guaranty; and (b) all defences (legal or equitable) which, if asserted, would diminish the liability of Guarantor under this Guaranty.

6. No Subrogation against Obligor. Until all obligations of Guarantor under this Guaranty are discharged: (a) Guarantor shall not assert against Obligor any claim that Guarantor now has or may hereafter have against Obligor in connection with this Guaranty or the performance by Guarantor of its obligations hereunder (provided that, Guarantor may assert any such claim if required due to the imminent expiry of an applicable limitation period or otherwise to preserve such claim but only to the extent required to preserve such claim); (b) the Beneficiary shall not be subrogated to any of Guarantor's rights in Obligor's Obligations; and (c) Guarantor agrees that it shall not exercise any rights of subrogation, reimbursement, contribution or indemnity from Obligor with respect to this Guaranty to the extent the exercise of such rights would be reasonably likely to impair the ability of Obligor to perform Obligor's Obligations.

7. Continuing Guaranty. This Guaranty is a continuing guarantee and, in the case of each of Obligor's Obligations requiring the payment of monies, this Guaranty applies to and secures any ultimate balance due or remaining due to the Beneficiary; and if, at any time, all or any part of any monies paid previously applied by the Beneficiary to any Obligor Obligation is or must be rescinded or returned by the Beneficiary for any reason whatsoever, such Obligor Obligation will, for the purposes hereof, to the extent such payment is or must be rescinded or returned, be deemed to have continued in existence and this Guaranty shall continue to be effective or be reinstated, as applicable, to such Obligor Obligation as if such application had not been made.

8. Recovery Limitation under [insert contract name, i.e. PPA]. Notwithstanding any other provision of this Guaranty all limitations of liability (including requirements to file notice of claims prior to certain specified dates in order to permit the same to be proceeded with) in favour of Obligor contained in the [insert contract name, i.e. PPA] shall apply equally to the liability of Guarantor under this Guaranty such that the Beneficiary shall not be entitled to claim any liability against (or to receive any recovery from) Guarantor in excess of that which the Beneficiary would have been entitled to recover from Obligor, in the aggregate, under the [insert contract name, i.e. PPA]. For purposes of clarity, the guaranteed obligations include to Obligor's Obligations as set forth in Section 1, together with all reasonable costs and expenses (including attorney's fees), if any, incurred by Beneficiary in enforcing its rights under this Guaranty and under the [insert contract name, i.e. PPA].

9. Entire Guaranty and No Representations. This Guaranty constitutes the entire agreement between the Beneficiary and Guarantor with respect to the guarantee by Guarantor of Obligor's Obligations herein provided for and cancels and supersedes any prior understandings and agreements with respect thereto. There are no representations, warranties, terms, conditions, undertakings or collateral agreements, expressed, implied or statutory, regarding the guarantee by Guarantor of Obligor's Obligations herein provided for other than as expressly stated and set forth in this Guaranty.

Example

10. No Assignment. Neither Guarantor nor the Beneficiary may assign its interest in this Guaranty or any of its rights and obligations hereunder without the prior written consent of the other, and, subject to the foregoing, this Guaranty enures to the benefit of, and is binding upon, Guarantor and the Beneficiary and their respective successors and permitted assigns; provided, however, that Beneficiary may assign its interest in this Guaranty, or any of its rights and obligations hereunder, to any Person that Beneficiary has the right to make an assignment to pursuant to the terms of the [insert contract name, i.e. PPA].

11. Governing Law. This Guaranty shall be governed by and construed in accordance with the laws of the State of New York (without reference to conflict of laws rules). THE GUARANTOR AND BENEFICIARY IRREVOCABLY WAIVE ANY AND ALL RIGHT TO TRIAL BY JURY IN ANY LEGAL PROCEEDING ARISING OUT OF OR RELATING TO THIS GUARANTY OR THE TRANSACTIONS CONTEMPLATED BY THIS GUARANTY.

12. Notices. All notices sought or required to be given hereunder shall be in writing and shall be effectively given or made if delivered personally, sent by prepaid courier service, sent by registered/certified mail (postage fully prepaid) or sent by facsimile (with transmission confirmed), in each case to the applicable address and/or facsimile number set out below:

If to the Beneficiary:

Idaho Power Company
Attn: Legal Department
1221 W. Idaho Street
Boise, ID 83702

If to Guarantor:

or at such other address and/or facsimile number as may be given by Guarantor or the Beneficiary to the other by notice in writing from time to time and such notices shall be deemed to have been received, if delivered personally or by prepaid courier service, upon delivery, if transmitted by facsimile on or prior to 5:00 p.m. (New York, New York local time) on a Business Day, upon the completion of its transmission (and if not transmitted on a Business Day or transmitted after 5:00 p.m. (New York, New York local time) on a Business Day, then on the first Business Day following the completion of the transmission) or, if sent by registered/certified mail, four Business Days following the day of the mailing thereof; provided that if any such notice shall have been mailed and if regular mail service shall be interrupted by strikes or other irregularities, such notice shall be deemed to have been received four Business Days following the resumption of normal mail service.

13. Payment of Legal Expenses. Guarantor shall reimburse the Beneficiary for all attorney's fees, disbursements and other expenses reasonably incurred by the Beneficiary in enforcing the payment, performance or discharge of Obligor's Obligations and the obligations of Guarantor hereunder.

14. Severability. If any provision of this Guaranty is determined to be invalid or unenforceable in whole or in part, such invalidity or unenforceability will apply only to that provision and all other provisions of this Guaranty shall continue in full force.

Example

15. No Waiver, Remedies. No failure on the part of the Beneficiary to exercise, and no delay in exercising, any right under this Guaranty shall operate as a waiver of it, nor does any single or partial exercise of any right under this Guaranty preclude the other or further exercise of it or any other right.

16. Termination. The liability of Guarantor under this Guaranty shall terminate and this Guaranty shall, automatically and without the need for any further act or formality whatsoever, be of no further force or effect immediately upon all of Obligor's Obligations arising at any time under the [insert contract name, i.e. PPA] having been performed, paid and discharged in full or otherwise ceasing to exist in accordance with the applicable provisions of the [insert contract name, i.e. PPA].

17. Counterparts. The Guaranty may be executed in counterparts, each of which when executed and delivered shall constitute one and the same instrument. This Agreement may be duly executed and delivered by execution and facsimile or electronic format (including portable document format (.pdf)) delivery of the signature page of a counterpart to the other Party, and, if delivery is made by facsimile or other electronic format, the executing Person shall promptly deliver, via overnight delivery, a complete original counterpart that it has executed to the other executing Persons, but this Agreement shall be binding on and enforceable against the executing Person whether or not it delivers such original counterpart.

18. Further Assurances. Guarantor shall cause to be promptly and duly taken, executed and acknowledged and delivered, such further documents and instruments as Beneficiary may from time to time reasonably request in order to carry out the intent and purposes of this Guaranty.

19. Authority of Guarantor. Guarantor represents and warrants to Beneficiary that (a) it has the corporate power and authority to execute, deliver and carry out the terms and provisions of this Guaranty; (b) Guarantor has obtained any authorization, approval, consent or order of, or registration or filing with, any court or other governmental body having jurisdiction over Guarantor that is required on the part of Guarantor for the execution and delivery of this Guaranty; and (c) this Guaranty constitutes a valid and legally binding agreement of Guarantor enforceable against Guarantor in accordance with its terms, except as the enforceability of this Guaranty may be limited by the effect of any applicable bankruptcy, insolvency, reorganization, moratorium or similar laws affecting creditors' rights generally and by general principles of equity.

Example

AGREED AND ACCEPTED as of the Effective Date.

(COMPANY NAME)

By: _____

Name: _____

Title: _____

IDAHO POWER COMPANY

By_____

Idaho Power 2026 All Source RFP
Exhibit O – Draft Form Letter of Credit

Name: _____

Title: _____

Example

Idaho Power 2026 All Source RFP
Exhibit P - Bid Format and Requirements

This Exhibit P – Bid Format and Requirements, further outlines the content and format requirements for all proposals submitted into IPC's 2026 AS RFP. Bids that do not include the information requested as described in this exhibit may be deemed ineligible for further evaluation. Further, if the Bidder does not provide information within two (2) business days of a request by IPC, Bidder may be deemed ineligible at IPC's sole discretion.

All sections must be complete and in compliance with the RFP for the bid to be considered further.

GENERAL ORGANIZATION OF THE BID SUBMITTAL

All proposals must contain the following information and be organized as indicated below to facilitate timely evaluations. Each bid proposal must be as follows:

A. Section 1: Executive Summary of Proposal
Bidder shall submit a full narrative of the proposal, including but not limited to:
- Cover Letter and General introduction and information about your company, company organization chart, and business classification;
- Summary of project(s) contained in the proposal identifying key dates and construction milestones;
- Project team identification describing how your project team is organized along with a description of the key personnel and how each will contribute to the project;
- Supplemental Information including any information assumptions to successfully complete the project(s)

B. Section 2: Resource Based Product Non-Price Factor Narrative
- Contract Progress and Viability including descriptive narrative as it relates to Bidder submittal relative to Exhibit B – Bid Entry Form.
- Project Readiness and Deliverability including descriptive narrative as it relates to Bidder submittal relative to the Exhibit B – Bid Entry Form.
    - Interconnection and Transmission Service – Further identify specific steps taken and what state the project development is currently in as it relates to Interconnection and Transmission Service requirements
    - Environmental and Siting – Further describe what stage of development the project is in, including site control parameters, permits, jurisdictional requirements, and environment mitigation.

C. Section 3: Resource Based Product Pricing Narrative
- In narrative form, detail the selectable portfolio(s) as entered in the Exhibit B – Bid Entry Form. Specifically, describe what resources are available for IPC to model in our long-term capacity expansion tool. Bidder shall describe specific pricing inputs related to the proposal(s) including:
    - Asset Purchase Options with price
    - Operations and Maintenance Package Pricing and Terms
    - Power Purchase Agreement Pricing with specific terms identified
    - Battery Storage Agreement Pricing with specific terms identified

D. Section 4: Market Purchase Product Narrative
- In narrative form, describe the products being offered as entered into the Exhibit B – Bid Entry Form
    - Term
    - Product being offered (WSPP Schedule C or equivalent preferred; heavy load hour or light load hour; slice; other attributes)

Idaho Power 2026 All Source RFP
Exhibit P - Bid Format and Requirements

- Point of Delivery, including whether bid is contingent on transmission capacity listed in Exhibit E, Table 4
- Volume
- Pricing
- Western Resource Adequacy Program eligibility
- Shaping optionality
- Description of form of agreement

E. Section 5: Project Financing strategy, including tax credit strategy
- Plan for financing the project
  - Describe how you have or how you will obtain sufficient funding to complete the project
    1. Level of debt and equity to be raised
       a. Describe existing relationships with large banks to help you acquire the necessary funding
    2. Is a parent guarantee necessary to receive the funding?
    3. Describe plan for monetizing the tax credits
- For the asset purchase option, describe your plan to comply with the Inflation Reduction Act (IRA) requirements to ensure the 30% Investment Tax Credit. Specifically, describe your plan to comply with prevailing wage and apprenticeship requirements and how you will document proof of your compliance.

F. Section 6: Contract Terms
- In addition to redlined contract terms submitted with the proposal, bidder shall provide a detailed issues list in narrative form.