Florida Municipal Power Agency

REQUEST FOR PROPOSALS

FOR

BATTERY ENERGY STORAGE SYSTEM

Florida Municipal Power Agency
8553 Commodity Circle
Orlando, Florida 32819-9002
(407) 355-7767
www.fmpa.com

Request for Proposals RFP 2025-212

December 2025

REQUEST FOR PROPOSALS

(This is not an order)

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TO: Florida Municipal Power Agency
8553 Commodity Circle
Orlando, Florida 32819
Attn: Sharon Samuels

RFP# 2025-212

Date Issued: December 10, 2025

Telephone: (407) 355-7767

SEALED PROPOSALS MUST BE SUBMITTED, AS OUTLINED BELOW, PRIOR TO PROPOSAL OPENING AT **10:00 A.M. ON FEBRUARY 5, 2026**. PUBLIC OPENING WILL BE IN THE FMPA FIRST FLOOR CONFERENCE ROOM LOCATED IN THE FMPA BUILDING AT 8553 COMMODITY CIRCLE, ORLANDO, FLORIDA 32819.

- Proposals shall be submitted electronically via Vendor Link or submitted physically at the FMPA office in Orlando. Forms provided in the RFP must be signed; Docusign/ReadySign secure signatures are acceptable forms of signature.
- Proposals received after the opening date and time may be rejected and returned unopened.
- The attached Request for Proposals shall become part of any agreement resulting from this Request for Proposals.

DESCRIPTION

DECEMBER 2025

FLORIDA MUNICIPAL POWER AGENCY
REQUEST FOR PROPOSALS
FOR
BATTERY ENERGY STORAGE SYSTEM

See attached Request for Proposals and Response Forms for detailed description.

ADVERTISEMENT

Proposals for Battery Energy Storage System

DECEMBER 2025

FLORIDA MUNICIPAL POWER AGENCY

REQUEST FOR PROPOSALS
RFP 2025-212

Sealed and electronically submitted proposal responses will be received by the Florida Municipal Power Agency (FMPA), 8553 Commodity Circle, Orlando, Florida 32819 until 10:00 a.m., February 5, 2026, when at that time Responses will be opened and logged publicly in the 1st floor Conference Room by an FMPA representative.

FMPA is publicly announcing its intent to receive proposals for the deployment of (1) a battery energy storage system (BESS) for its All Requirements Project (ARP) located in the Florida Keys, and, separate and distinct from the ARP BESS, (2) indicative pricing for a localized BESS solution in support of an FMPA Member, as detailed further in this RFP.

As further detailed in this RFP, bidders may bid on either the ARP BESS or provide indicative pricing for the localized member BESS, or both. FMPA's selection of a successful bidder for the ARP BESS does not obligate FMPA or a member from selecting the same, or any, proposal for a localized member BESS. FMPA members may, at their sole discretion, use the results from the localized indicative pricing to select a proposal for individual member BESS project(s). A list of FMPA members can be found at www.fmpa.com.

RFP packages for this project may be obtained from FMPA at the above address, by telephone at (407) 355-7767, via email request to *sharon.samuels@fmpa.com*, via Internet download at *www.fmpa.com*, or via https://myvendorlink.com.

No response package may be altered, withdrawn, or resubmitted after the scheduled closing time for receipt of the responses. Response packages received after the day and time stated above will not be considered and will be returned to the responding Firm unopened.

The Florida Municipal Power Agency reserves the right to reject any and all response packages in total or in part and/or to waive defects in responses.

Jacob Williams
General Manager and CEO
Florida Municipal Power Agency

1. FMPA Description

The Florida Municipal Power Agency (FMPA or the Agency) is a project-oriented, joint-action agency. There are currently 33 Members of FMPA – each a municipal electric utility – located throughout the State of Florida (see the list of FMPA Members at www.fmpa.com). As a joint-action agency, FMPA facilitates opportunities for FMPA Members to achieve economies of scale in power generation and related services. For the 13 All Requirements Power Supply Project (ARP) Participants who receive capacity and energy from the ARP, FMPA supplies all of the electric power and energy, transmission and associated services. The FMPA ARP owns and operates approximately 1,400 MW of generation facilities throughout Florida. In addition to bulk power supply and associated services, many FMPA members participate in various joint purchasing activities.

2. RFP Scope

A. Part 1 – FMPA ARP BESS

As part of continual planning for and optimization of the ARP power supply portfolio, FMPA is evaluating the value proposition of a BESS within the service area of one of our ARP Members, Keys Energy Services (KEYS). KEYS co-owns the primary transmission line (132 MW firm entitlement share of a 329 MW line) utilized to deliver power from a more northern mainland grid location (the FPL transmission system) down to KEYS. Florida Keys Electric Cooperative (FKEC or co-owner) retains the majority share of the line. KEYS has historically utilized available secondary transmission capacity (unutilized capacity made available by the co-owner) on this line over and above its firm entitlement during peak hours where KEYS firm transmission capacity is exceeded by KEYS load. This arrangement has effectively worked to avoid costly dispatch of reliability-oriented oil-fired reserve capacity at the Stock Island Generating Station in limited instances where such a condition is present.

Over the next 3-5 years, load growth within the KEYS system as well as the co-owner system is anticipated to strain the ability of KEYS to leverage excess transmission capacity to avoid dispatch at Stock Island Generating Station. While the exact timing and rate of growth for load across both systems is subject to material uncertainty, recent experience suggests the frequency of days where the co-owner provides indications to KEYS of constraints has increased. Commensurate with an evaluation of a BESS solution, FMPA has also concurrently evaluated other plausible options, such as reconductoring/reinvestment in additional transmission throughput capacity, enhancing or adjusting the thermal generation makeup at Stock Island, and other alternatives. Given the potential for additional tax credits at the federal and/or state level in support of energy storage investments, we are seeking the expertise of RFP respondents to propose a range of alternative business models or their preferred business arrangement to ensure the most successful cost outcome for FMPA. FMPA will consider and evaluate a range of responses from purchase power arrangements, build and construct or EPC responses to this RFP.

The results of this RFP will inform the FMPA integrated resource planning ("IRP") process by providing transaction quality information from which FMPA can determine the optimal mix of investments relative to the KEYS/Stock Island long term portfolio. ***Of foundational importance to these***

evaluations is a reliable, transactionable, estimate of capital cost and long-term maintenance cost for a BESS of contemplated capacity and discharge duration. Having access to actionable data across a range of business model possibilities will empower FMPA to iteratively compare the avoided costs of Stock Island dispatch against the carrying and maintenance costs of a potentially viable BESS alternative.

The sections that follow detail expected use cases for the BESS and estimated utilization across an approximate useful life. Additionally, FMPA's current expectations for potential business models, preferred and alternative sites, interconnection requirements for the preferred site, and mission-critical operational control requirements for the BESS are provided. All such information represents the best available estimates and does not preclude innovative approaches as deemed feasible by RFP respondents. FMPA seeks the least cost solution possible for the ARP to ensure that the portfolio continues to remain competitive from a cost and reliability perspective.

B. Part 2 – Indicative Pricing for Lake Worth Beach BESS

Additionally, pursuant to the likely benefits of this procurement to other FMPA Members, FMPA seeks a detailed, replicable process for identification of transaction quality data that could be utilized by other FMPA Members that may be examining or have an intent to deploy similar BESS solutions for localized use cases. To that end, on behalf of the City of Lake Worth Beach ("Lake Worth Beach"), FMPA seeks indicative pricing for a specific localized battery solution as detailed in the "Desired RFP Response Sections and Guidance" subsection below. For the avoidance of doubt, the remainder of this Request for Proposals and associated design criteria, technical studies, and performance constraints apply to the "Part 1" FMPA ARP BESS specified solution for the KEYS system. Respondents can assume a more indicative set of design parameters for purposes of responding to the "Part 2" Indicative Pricing for Lake Worth Beach BESS, with the specific, currently known project parameters for Lake Worth Beach as detailed in the aforementioned "Desired RFP Response Sections and Guidance" subsection below.

Bidders are encouraged, but are not required, to provide a response to this Part 2 to be eligible for selection by FMPA for Part 1 – FMPA ARP BESS. FMPA's selection of a proposal for Part 1 does not in any way affect or obligate FMPA, Lake Worth Beach, or any other FMPA member, in regard to their selection, or non-selection, of a proposal for Part 2.

OWNER'S ENGINEERING FOR Part 1 - FMPA ARP BESS DEPLOYMENT

In support of the evaluation of the BESS within the KEYS system, FMPA has undertaken significant owner's engineering work, the results of which are included in supportive diagrams and Appendices A and B as follows:

1. **Appendix A** reflects the Sargent & Lundy 30% design package for the aforementioned Big Pine site, which includes the design criteria, statement of work, one-line diagram, and other technical materials to empower a clear understanding by respondents of the ultimate desired configuration for the BESS. ***Respondents should align with the expectation that the Big Pine site and associated substation will be the point of interconnection for the BESS system and the sole focus of Part 1 of this RFP***.
2. **Appendix B** represents the BESS injection study prepared by Quanta Technology, LLC, which examines transmission and local feeder impacts associated with the injection (and absorption

as a load) of the size and duration of BESS that is expected to meet FMPA's planning needs relative to avoidance of dispatch of Stock Island generation.

3. **Supportive one-line diagrams of the KEYS transmission system and the Big Pine Substation.**

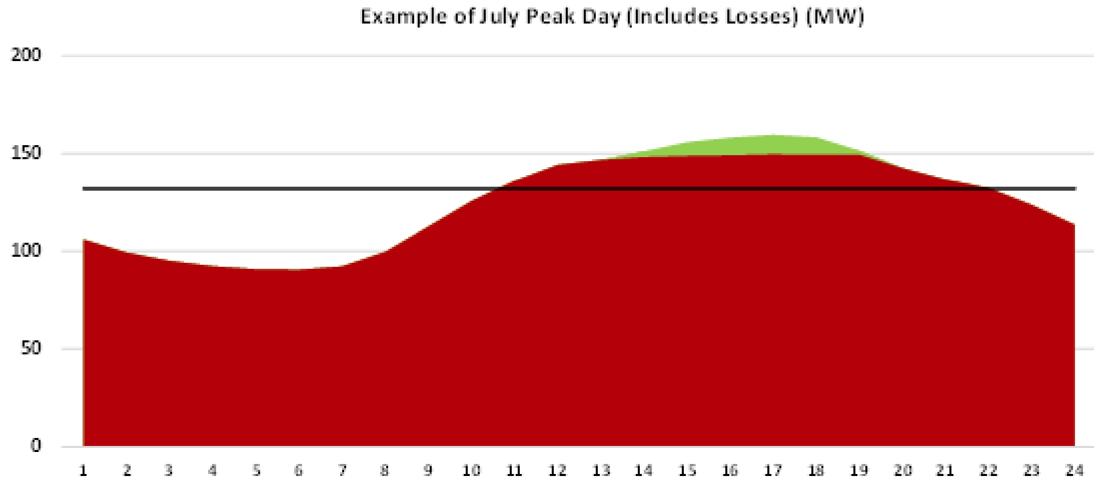
RFP respondents should review all Appendices carefully and ensure adequate coverage of key BESS proposed features that align with the climatological/corrosive environment, fire suppression/redundancy, and site elevation to manage storm surge considerations that will influence the ultimate BESS deployment. ***Solutions that do not carefully consider and adhere to the appropriate design criteria may be rejected by FMPA for non-compliance with this RFP***.

FMPA ARP BESS USE CASES AND EXPECTED SIZE/DURATION

The primary use case for the BESS is the avoidance of costly oil-fired generation at Stock Island in peak load conditions driven from expected growth in load for both KEYS and the co-owner. Based on our internal analysis of available sites and prior discussions with vendors on density for existing best-in-class BESS architectures, as well as the detailed engineering assessments found in Appendices A and B, FMPA is targeting a 15 MW project for maximum capacity, with a discharge duration of 4 hours (with the specification for 15 MW based on the assessment of buildable acreage at the Big Pine site performed by S&L as can be made available to Respondents upon request) and the ability to execute up to 2 full charge and discharge cycles per day (i.e. 730 overall cycles per year). FMPA seeks solutions with a minimum expected lifespan of 20 years.

Specifically, the following are the use cases anticipated for the BESS in priority order. Preliminary, FMPA anticipates that at inception, use cases #1 and #2 will be fully functional, with time given beyond inception to gain operational comfort with the BESS such that additional use cases can be layered into the process.

1. ***High Value Energy Arbitrage for Transmission Mitigation.*** The BESS will charge with relatively inexpensive generation from the ARP's portfolio interconnected to the Florida Power and Light (FPL) transmission system during off-peak hours, in due recognition of roundtrip efficiency requirements, and discharge during on-peak hours during days where it is expected that the co-owner will experience transmission capacity constraints, such that current co-owned incoming transmission line is loaded at 90% of its maximum rating. In this use case, there is a significant avoided cost associated with not running Stock Island (avoiding a start, reducing required output levels from the generation, or avoiding the generation altogether) that will increase in frequency as load grows across both systems over time. While utilization may initially be low, FMPA will evaluate, via this RFP, the capital cost required to break even on a net present value basis in terms of avoided Stock Island dispatch over a 20-year project duration. The figure below provides an illustrative example of peak-shaving capability, wherein the green area under the load curve represents mitigation of transmission constraints through reduction of required grid generation in key constrained hours (note: the BESS at contemplated size is unlikely to avoid all generation due to days where the needed avoidance is higher than the max rating of the BESS).



2. ***Low Value Energy Arbitrage to Maintain FMPA ARP BESS to Design Parameters.*** Daily arbitrage during periods where Stock Island is not expected to run (lower load periods) is still viable to the extent it allows for daily cycling of the BESS and can mitigate the performance, HVAC consumptive use, and degradation risks associated with keeping the BESS at a max charge state for extended periods of time. Respondents can offer alternatives to daily cycling if such alternatives exist. Assuming a 15 MW 4-hour solution, the table below provides the current FMPA projection of the split between high value and low value arbitrage opportunities, assuming a maximum annual energy discharge, excluding degradation, and assuming an approximate commissioning date of 2029. The forecast reflects internally (KEYS) and externally (FKEC) derived base case load growth, the latter of which is subject to significant uncertainty. ***Respondents should make sure to factor in augmentation considerations in their responses to the extent such augmentation is required to ensure 15 MW of injection capacity for the BESS over its useful life.***

Year	Total Energy (MWh)	Charge/Discharge Cycles/Yr (Max)	High Value (MWh)	Low-Value (MWh)*
2029	21,900	730	2,371	19,529
2030	21,900	730	2,669	19,231
2031	21,900	730	2,972	18,928
2032	21,900	730	3,307	18,653
2033	21,900	730	3,632	18,268
2034	21,900	730	3,976	17,924
2035	21,900	730	4,372	17,528
2036	21,900	730	4,761	17,199
2037	21,900	730	5,159	16,741
2038	21,900	730	5,601	16,299

*It should be noted that FMPA does not view low-value arbitrage as sufficiently valuable as a standalone use case and that in practice, the BESS may not be eligible for perfect arbitrage as shown above due to the need to sequester the capacity in high load periods to ensure dispatch during the proper times, maintenance periods, misalignment between load requirements and available capacity that may require a generator start (operation at generator minimum load may displace the smallest divisible BESS cell) and other shorter duration opportunities. We expect low value periods to decline over time as load growth requires additional high value arbitrage in more days and more months per year.

3. ***Ancillary Service Provision.*** Depending upon the capability of the BESS to partially discharge and provide more instantaneous support for grid ancillary services, FMPA would like to explore this possibility. We recognize that shorter duration BESS solutions designed to manage intra-hour or moment to moment supply and demand balance issues are not necessarily translatable to a BESS with a design premise for discharge of 4 hours, but would like to understand any ancillary service capabilities that could be co-optimized in the long term with daily arbitrage, such that the BESS can be deployed on an as-needed basis and not limited to low value arbitrage if opportunities present themselves to obtain broader settlement value for other purposes. FMPA operates in the Florida Municipal Power Pool (FMPP) Balancing Area, which currently does not provide specific storage value streams for ancillary services, but may do so in the future.

4. ***Instantaneous Reliability Support.*** The ARP obtains Network Transmission Service from FPL which requires an exact alignment, subject to certain technical bandwidth considerations, between FMPA generation and FMPA native load on the Transmission Provider System. Significant n-1 forced outage events on the FPL system present real-time challenges for the FMPP in terms of securing firm replacement and/or emergency generation to ensure no violations of the Network Service agreement (which carries increasing risk of significant financial penalties if multiple events occur in a limited period of time). As with use case #3, FMPA would like to explore the potential for this type of support, which we assume can be had via the BESS' inherent instantaneous ramp rate. However, the value add to the business case is very low on a risk-adjusted basis given the small size of the BESS contemplated as compared to the size of key resources designated as Network Resources to serve the ARP's Native Load on the FPL system.

5. ***Supplemental Local Capacity***. KEYS is radially connected to the bulk transmission system, and in rare occasions, KEYS may be decoupled from the FPL Transmission system due to a forced outage on the transmission line or as a result of a natural disaster. A BESS would supplement existing on-island capacity that would be required to run to serve load under such forced outage conditions with BESS charging derived directly from local Stock Island generation during off-peak load hours. ***Refer to the Appendices within this RFP for further details regarding the optional request to provide a grid-forming capability for the BESS as an optional characteristic.***

As noted above, the primary financial implications and benefit of the potential BESS investment lie with use case #1, with other use cases serving to bolster, but not define, the value proposition. RFP respondents are encouraged to identify other use cases worthy of consideration that they believe may provide ***additional tangible financial value to offset the carrying and maintenance cost of the proposed BESS***.

BUSINESS MODEL CONSIDERATIONS

Given the potential for additional tax credits at the federal and/or state level in support of energy storage investments, we are seeking the expertise of RFP respondents to propose a range of alternative business models or their preferred business arrangement to ensure the most successful cost outcome for FMPA. Below is a table of potential transaction alternatives as contemplated by FMPA. We encourage respondents to provide affirmation of certain expectations or to propose alternatives that drive cost down.

Transaction Structure	Description
Turnkey Installation/EPC with FMPA Ownership Transfer at Commercial Operation Date (COD) with either an FMPA/KEYS long-term O&M model or a respondent-provided Long-Term Service Agreement (LTSA)	Turnkey engineering, procurement, and construction and interconnection by qualified firm, with ownership transfer to FMPA at COD. Financing of BESS as an FMPA resource within the All Requirements Project. FMPA owns, operates, maintains, and assumes all liability and insurance requirements for the asset from COD to decommissioning (note – FMPA is still evaluating options for O&M and desires respondents to fully detail their proposed LTSA model and associated pricing).
Power Purchase Agreement (PPA) with stated capacity price/guarantee, long-term service agreement, and other costs (if applicable) as all-in bundle.	Firm provides full EPC, commissioning, testing, and integration of the BESS and serves as the PPA offeror, subject to fixed ($/kW-mo.) fees for BESS capacity, BESS maintenance, guarantees related to capacity (e.g. degradation) and other costs as required to include insurance and operational liability. FMPA pays an all-in bundled cost to offeror and maintains operational control of the BESS from a dispatch perspective, subject to details provided in the "Operational Control Preferences" subsection below.
Hybrid PPA with Buy-Out Option	Project begins as PPA but contains FMPA buy-out option after a date certain. Allows for FMPA to gain operational experience with BESS and gradually transfer responsibility from PPA offeror to FMPA generation team. FMPA maintains operational control of the BESS from a dispatch perspective, subject to details provided in the "Operational Control Preferences" subsection below.

PREFERRED SITE, MARINE CLIMATE, SEA LEVEL, AND POTENTIAL ALTERNATIVE SITES

FMPA's preferred site for the initial FMPA ARP BESS deployment is detailed in Appendices A and B and has been subjected to a 30% design as a precursor to this RFP.

FMPA and KEYS cannot guarantee site control relative to other potential sites, and would prefer the focus be on feasible deployment at the above site and that respondents assume the Big Pine site as the sole focus of Part 1 of this RFP. Additionally, it should be noted that as part of design pre-work for this RFP, it has been determined that a dedicated feeder will need to be constructed between the point of interconnection and the Big Pine substation, but that such efforts are outside the scope of this RFP. FMPA and KEYS will collaborate with Respondents as necessary to construct the dedicated feeder required with sufficient ampacity to ensure reliable charge and discharge of the BESS.

It is expected that RFP respondents provide a discussion regarding the following critical issues specific to a warm, marine climate as part of their response (refer to "Desired RFP Response Sections and Guidance" subsection below for further details):

- Elevation level to protect against storm surge
- Protection of battery enclosure in terms of withstanding hurricane force winds
- HVAC usage estimate per year and appropriate thermal management system to ensure proper control in marine climate with regular temperatures of 90 degrees F or more
- Impact on roundtrip efficiency of the BESS in the specific climate
- Safety mitigations to prevent extreme temperatures from causing fires, explosions, or other events that would adversely impact the ARP's ability to reliably serve KEYS load or meet our obligations to all ARP Members
- Corrosion mitigation due to specific marine environment through selection of appropriate battery enclosure materials and supplemental equipment
- Insurance requirements and benchmarks given RFP respondents' prior deployment experience
- Other technical design and injection considerations as detailed in Appendices A and B.

OPERATIONAL CONTROL PREFERENCES

FMPA's ARP operates within the FMPP balancing area (BA). The FMPP is a partnership between the ARP, OUC, and Lakeland Electric that leverages joint dispatch and associated services to lower cost and enhance reliability for the partners. All of FMPA's resources that are connected to the FPL transmission system are pseudo-tied into the FMPP BA. It is expected that the BESS will begin its life with a more simplified operational cadence to allow FMPP to gain experience with planning for and around BESS dispatch. Over time, more advanced dispatch optimization practices may be deployed, so it is paramount to a successful project to have the BESS be supportive of that flexibility. FMPA and FMPP must maintain the ability to control the timing, output level, and duration of the BESS within a reasonable boundary in partnership with the BESS provider that allows us to maximize value on a daily, hourly, and potentially sub-hourly basis.

The list below provides key desired features of the BESS from an operations perspective:

- Autonomous operation such that the FMPP Energy Control Center (ECC), located in Orlando, FL can determine when to charge, discharge, and manage signals for dispatch purposes

- Local control capability to support emergency situations, such as loss of communications after a severe weather event
- Integration with the existing EMS (AspenTech OSI) and full functionality for remote charging and discharging and real-time monitoring around the clock
  - FMPA anticipates delivering charge to the BESS from mainland grid resources during normal operations, but may also require connectivity to charge the BESS using Stock Island generation during emergency periods (e.g. storm recovery)
- Transparent auxiliary load requirements for powering the system during normal and emergency conditions
- Selectable (within reason given cost considerations) level of charge (or election capability with respect to indivisible "cells" comprising a certain amount of energy)
- Flexibility with respect to selected ramp rate and selected level of output given known charge states
  - Example: 2 MW of capacity per second
  - Example: ramp to full output in 20 seconds
- Optional as deemed available by RFP respondents: software, either as a bolt-on or as integrated into the FMPP's existing load forecasting and day-ahead scheduling protocols to optimize BESS dispatch that fuses together load and transmission capacity information (note: the FMPP ECC currently does not have information regarding the co-owner's system which may be needed to fully manage BESS utilization), near term weather/load forecasts and other business intelligence to support better scheduling by FMPP for hours of dispatch to avoid the maximum amount of Stock Island generation possible, and increase the value of the arbitrage use case.
  - Note: assuming daily arbitrage of either high or low value occurs year-round, the incremental benefit of dispatch optimization is geared towards (i) the right start hour and the right end our, (ii) the potential to avoid a Stock Island start by operating the BESS at reduced output levels for a longer period of time, and (iii) maintaining charge states based on certain other high risk periods or conditions. RFP respondents are not expected to fully design such a platform, but to provide actionable information on the current best practices in the industry for managing BESS dispatch, and what may be viable for this particular deployment.

DATA AVAILABLE ON REQUEST

FMPA can provide the following additional data upon request to the extent it is deemed valuable to the responses received:

- Hourly KEYS load forecast for study period
- Historical co-owner load shape for study period
- Dispatch costs/start costs for avoided Stock Island generators
- Preliminary site feasibility assessment of the Big Pine site as conducted by S&L (a precursor to selection of the Big Pine site for 30% design efforts)

RFP respondents are not expected to perform a detailed economic evaluation of the overarching investment or a comparison to other alternatives. Given the use cases delineated above, respondents should focus on providing viable capital cost estimates, maintenance cost estimates, and balance of plant estimates with accompanying business model(s) proposed to allow FMPA to iteratively evaluate the true range of capital costs and long-term value proposition for the potential BESS as compared to other alternatives.

INCURRED COSTS
All costs incurred to prepare responses to this RFP shall be borne by RFP respondents. FMPA is under no obligation to reimburse respondents for such costs, nor is FMPA under any obligation to transact in any way with any RFP respondent.

SUPPLEMENTAL INFORMATION
FMPA may elect to request supplemental information from responders to this RFP to further advance our understanding of proposed project parameters.

BIG PINE SITE FIELD VISIT
A Mandatory site visit with walk-down has been scheduled for January 8, 2026 at 10:00am at 279 Industrial Road, Big Pine Key, FL 33043. As the current site is vacant, PPE in the form of hard hats, safety glasses, pants, shirts with sleeves and shoes are required, with other PPE at Respondents' discretion. This Site visit is based on availability of key FMPA and KEYS subject matter experts and reflects an opportunity for respondents to review the preferred site, point of interconnection, and other key project parameters. Respondents who intend to attend the site visit are requested to utilize either the RSVP functionality within Vendor Link or RSVP via email to Sharon.samuels@fmpa.com to allow FMPA and KEYS sufficient notice to accommodate participants.

SCHEDULE AND KEY CONTACTS
Responses to this RFP are requested by no later than midnight on February 5, 2026. Responses can be submitted via Vendor Link or submitted physically at the FMPA office in Orlando. Questions associated with this RFP can be sent to sharon.samuels@fmpa.com. All questions must be received no later than January 12, 2026 to allow sufficient time for FMPA staff to prepare responses and relay them to all RFP recipients.

3. Desired RFP Response Sections And Guidance

The following is an outline of desired RFP response sections. Respondents are encouraged to follow the outline unless the cover letter specifies reasons for deviations from the outline. ***Responses, excluding detailed design documentation in support of the proposed battery solution, which can be included in appendix form should be limited to no more than 30 pages.*** Respondents should provide a balance between technical detail and brevity that allows FMPA to iteratively evaluate the solution(s). Excessive or extraneous information that will detract from the value of the responses and prevent FMPA from getting a concise synopsis of the potential solution should be avoided.

I. Cover Letter

II. Executive Summary
   a. Concise description of solution
   b. Concise description of business model, siting and technical details that encapsulates clear responses to all key sections of this RFP
   c. Summary of pricing
   d. Key Contact Information

III. Overview of the Firm
   a. Team Members
   b. 2-3 References for similar sized deployments and related information to support Qualifications of the Firm as detailed further below
   c. Any work intended to be subcontracted and details on subcontracted firm qualifications

IV. Detailed Project Description for Part 1 – FMPA ARP BESS
   a. General Project description
   b. Preferred business model
   c. Capital and O&M cost basis and description of BESS configuration
      a. Ongoing maintenance solutions, and/or options with summary of pricing
   d. Safety and Thermal Control
   e. Siting and Interconnection Schema
      i. Required geotechnical evaluations
      ii. Required or anticipated interconnection studies
   f. Operational Control Schema
      i. Discussion of best in class operational software or bolt-on platforms for dispatch optimization
   g. Detailed Development Schedule
   h. Detailed Pricing
      i. Include multiple options if available or note differences in proposed approach versus RFP table provided by FMPA above
      ii. Vendors must provide a detailed cost breakdown including: capital costs (equipment, installation, commissioning), operating and maintenance costs, software licensing fees (if applicable), taxes and duties
      All costs must be quoted in local currency and include applicable taxes. Vendors must specify payment terms and any financing options available.
   i. Warranty Clauses and Insurance Requirements
      i. The vendor shall provide warranty coverage for the following components:
      Battery modules: minimum 10-year performance warranty
      Inverters and power electronics: minimum 5-year warranty
      Control systems and software: minimum 3-year warranty

      Warranty must cover:
      Manufacturing defects
      Performance degradation beyond specified thresholds (recognizing that the respondents shall ensure the ability to rely upon the 15 MW max capacity across the duration of the asset life cycle using either augmentation or other proposed approach).
      Replacement or repair of faulty components.
      ii. Vendors must include details on warranty claim procedures, response times, and availability of spare parts. Extended warranty options should also be listed.
      iii. The vendor must describe the insurance requirements it intends to operate under such that they can be compared against FMPA's typical requirements for contractual arrangements.

V. Part 2 - Lake Worth Beach Indicative Pricing

i. Assume Battery Capacity of 8 MW and a duration of 2 hours

ii. Assume the BESS is interconnected to the Lake Worth Beach sub-transmission system at 26kV

iii. Provide indicative pricing for the battery containerized solution only; Lake Worth Beach will perform additional engineering studies to determine other interconnection/balance of asset components to support a full deployment

iv. Assume sufficient acreage for a parcel as yet to be determined to support the desired maximum output and desired duration

Part 1 Minimum Qualifications

Respondents proposing for Part 1 must provide the following minimum qualifications as part of Section III of their proposal consistent with the outline above:

1) List of at least five references for which similar projects were conducted with emphasis on work for electric utilities in the state of Florida and the Southeast region. Include name, company, title, phone number and email address, and a brief description of the project including the start and end dates;
2) Resumes of Key Personnel who will be performing key roles.
3) A list of references (Can be the same as utilities provided for history documentation.)
4) Confirmation of prior deployment of a minimum of 10 projects greater than 10 MW
5) Confirmation of a balance sheet of market capitalization greater than $250M
6) Confirmation of the Respondent as a going concern for minimum of 5 years of company history
7) Min investment grade credit rating

4. RFP Schedule

FMPA's timetable for this Request for Proposals (RFP) process is shown below. Note that the dates shown are only estimates and may be modified at any time by FMPA.

Notice/Distribution of RFP	December 10, 2025
KEYS Site Visit (Tentative date)	January 8, 2026
Deadline for submittal of Intent-to-Respond Form and questions concerning the RFP	January 12, 2026
FMPA Response to general Questions	January 26, 2026
Sealed Response Packet Due Date	February 5, 2026
Notification of Selected List of Respondents for Presentations (If needed) (Part 1)	March 19, 2026
Notification of Intent to Negotiate (Part 1)	April 10, 2026
Start of Negotiations contingent on Board approval with Selected Respondent(s) (Part 1)	April 17, 2026

5. Notice to Respondents

Sealed response packages, either via Vendor Link (https://myvendorlink.com) or hardcopies in sealed envelopes, will be received until 10:00 a.m. EST on February 5, 2026 ("RFP Due Date") at the offices of the Florida Municipal Power Agency, 8553 Commodity Circle, Orlando, FL, 32819 at which time the bids will be opened and logged publicly in the 1st floor Conference Room.

Each Respondent is required to submit a Respondent Information Form (included in this RFP package), other forms included in this package as appropriate, and any other information necessary to allow a complete evaluation of the proposal. Respondents who have filed an Intent-to-Bid Form will be notified by e-mail of any issuance of any RFP addenda with any necessary revisions to information contained in this RFP, including a change in the Response Packet Due Date. All addenda will be posted at www.fmpa.com. FMPA reserves the right to reject all responses received after the Response Packet Due Date.

Directions for Vendor Link submissions:
Register on Vendor Link at https://myvendorlink.com prior to submittal date. Download the RFP, and complete the required forms. Upload your submittal, required forms and attachments to Vendor Link. Emailed submissions will not be accepted.

Directions for Hardcopy submissions:
Hardcopy submissions shall be clearly marked on the outside of the sealed envelope "RFP# 2025-212". Emailed submissions will not be accepted. ***Other than forms required and resumes, the response length shall be no greater than 30 pages.***

6. Right of Rejection

This RFP is not an offer establishing any contractual rights. This solicitation is solely an invitation to submit proposals.

FMPA reserves the right to:

1. Reject any and all responses received in response to this RFP.
2. Waive any requirement in this RFP.
3. Not disclose the reason for rejecting a response.
4. Seek and reflect clarifications to responses.
5. Award to more than one firm.
6. Select the proposal that is in the best interest of FMPA.

7. Interpretations and Addenda

All questions regarding interpretation of this RFP, technical or otherwise, must be submitted by January 12, 2026 in writing. Only those firms that have filed an Intent-to-Bid Form may submit questions to the RFP. We reserve the right not to answer other questions. Questions should be submitted to the following:

By Mail or Courier: Sharon Samuels
Florida Municipal Power Agency
8553 Commodity Circle
Orlando, Florida 32819

By Email: sharon.samuels@fmpa.com

Only written responses provided by FMPA to Respondents' questions will be considered official. A verbal response by FMPA will not be considered an official response. FMPA will issue a Questions & Answers document with answers to all official questions to all parties that have filed an Intent to Bid.

8. Errors and Modifications of Responses

Each Respondent should carefully review the information provided in the RFP prior to submitting a response. The RFP contains instructions which should be followed by all Respondents. Modifications to responses already received by FMPA will only be accepted prior to the Response Packet Due Date.

9. Proprietary Confidential Business Information

All responses shall be the property of FMPA. Pursuant to Section 119.071(1) (b), Florida Statutes (2025), all sealed packages submitted to FMPA in response to this RFP are exempt from the public records disclosure requirements of Article 1, section 24(a) of the Florida Constitution and section 119.07(1), Florida Statutes, until such time as FMPA provides notice of a decision or 30 days after opening of packets, whichever is earlier. FMPA will not disclose to third parties any information labeled "Confidential" in a response, unless such disclosure is, in the sole opinion of Counsel for FMPA, required by law or by order of any court or government agency having appropriate jurisdiction. However, FMPA reserves the right to disclose any information contained in any response to third parties for the sole purpose of assisting in the response evaluation process.

10. Public Records

Firm acknowledges that FMPA is subject to Florida's Government in the Sunshine Law, including, without limitation, Chapter 119, Florida Statutes. As such, any documents submitted in response to this RFP may be public records subject to public disclosure. Please refer to Section 9, above, for confidential proprietary business information or trade secrets contained in such records. If a Respondent does not designate its confidential proprietary business information in its response in accordance with Section 9, above, FMPA may disclose all undesignated information that FMPA is legally bound to disclose in response to a public records request.

11. Evaluation Process – Part 1 – FMPA ARP BESS

The proposals will be evaluated based on information provided by each proposer by the Proposal Due Date. No additional data will be considered after the Proposal Due Date, except for clarifications requested by FMPA and KEYS. FMPA and KEYS will evaluate the proposals in terms of cost and other quantitative and non-quantitative factors.

Selection and rejection of proposals and notification of proposers at all stages will remain entirely with FMPA's discretion. FMPA intends to notify proposers not selected under this solicitation within a reasonable amount of time.

The evaluation criteria will include a variety of considerations, which may include:

a. Experience with similar projects and references
b. Proposed solution structure (i.e. PPA, EPC etc.) (level of subcontracted work)
c. Ongoing maintenance solutions
d. Past Performance
e. Schedule, availability and lead time
d. Warranty and support offerings
e. Safety and quality plans
f. Pricing / Pricing Structure

Proposals must include sufficient information supporting pricing to permit FMPA and KEYS to evaluate all proposals, which may include different pricing elements, different products, and different methods and assumptions, on an equal basis. If sufficient information supporting pricing is not provided, FMPA may have to make pricing assumptions in evaluating proposals to achieve, in FMPA's judgment, an equal evaluation of all proposals. Those pricing assumptions made by FMPA are at FMPA's discretion and based upon FMPA's subjective evaluations of the proposals received, and may or may not be shared with proposers.

Any proposer that proposes an alternative to any FMPA specified technical or business terms, or specified-products, must clearly identify such alternatives and provide supporting information for why the proposer believes its alternative(s) are superior to FMPA's specifications. FMPA is not obliged to accept any proposer's alternatives.

FMPA and KEYS will evaluate responses for conformity with RFP requirements. For all conforming responses, the team will further evaluate responses based on technical soundness of the proposed solution, cost competitiveness, project timeline, vendor experience, warranty and service offerings, and the proposed business structure. As desired and at FMPA and KEYS' option, interviews with respondents to review and address questions or clarifications in a given proposal may be scheduled. ***FMPA/KEYS is under no obligation to accept any proposal and reserves the right to reject all proposals.***

12. Public Entity Crimes Statement

Pursuant to Section 287.133(2) (a), Florida Statutes (2014), all responding firms should be aware of the following:

> "A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid, proposal, or reply on a contract to provide any goods or services to a public entity; may not submit a bid, proposal, or reply on a contract with a public entity for the construction or repair of a public building or public work; may not submit bids, proposals, or replies on leases of real property to a public entity; may not be awarded or perform work as a contractor, supplier, subcontractor or consultant under a contract with a public entity; and may not transact business with any public entity in excess of the threshold amount provided in Section 287.017 for CATEGORY TWO for a period of 36 months following the date of being placed on the convicted vendor list."

13. Drug Free Workplace

Whenever two or more responses to this RFP are similar with respect to quality, delivery, and service, preference shall be given to a Respondent that certifies that it has implemented a drug-free work-place program by completing and executing the attached Drug Free Workplace Statement.

14. Use of Ideas

All materials submitted in response to the RFP become the property of FMPA and will be returned only at the option of FMPA. Except as otherwise prohibited by law, FMPA has the right to use any and all ideas presented in response to this RFP. Selection or rejection of a firm does not affect this right.

Appendix A

DESIGN CRITERIA

Battery Energy Storage Site at Big Pine Key

Revision 0
December
2, 2025
Project No. 15411-003

55 East Monroe Street
Chicago, IL 60603

Issue Summary Page

Rev	Purpose of Issue	Date of Issue	Pages Affected
0	Issued for Bids	12/02/2025	All

Approval Page

Date	Issuance/Revision	Prepared By	Reviewed By	Approved By
12/02/2025	Bid Issue – Rev 0	S. Van Dyke	G. Magsaysay	S.Van Dyke

Contents

Contents

1.0 SCOPE

This document describes the electrical and civil/structural design basis used for the design of the new 15 MW, 60 MWh Battery Energy Storage System (BESS) at 279 Industrial Road,Big Pine Key, FL 33043 near the existing Keys Energy Big Pine Key Substation in Big Pine Key, FL for the Florida Municipal Power Agency (FMPA) All Requirements Project.

2.0 PERMITTING

2.1 Introduction

As part of the approval process the conditions and constraints imposed by regulatory bodies that affect the design of the BESS Station shall be processed and documented. This section lists the regulatory bodies (Authorities Having Jurisdiction, or "AHJ") which may have approval authority processes that will affect the design.

2.2 Federal

- Federal Energy Regulatory Commission (FERC)
- North American Electric Reliability Corporation (NERC)
- U.S. Army Corps of Engineers
- Federal Bureau of Public Roads
- Federal Fish and Wildlife Service
- U.S. Coast Guard
- U.S. Navy

2.3 State

- Florida Department of Environmental Protection
- Florida Department of Transportation
- Florida Fish and Wildlife Conservation Commission
- Florida Public Service Commission

2.4 County and Local

- County Highway Department
- County Zoning
- Conditional Use Permits
- Erosion Control/Storm Water Permits
- City, Village and Township Highway Permits
- Fence Permit

- Sign Permit
- Building Permit

2.5 Other

- Private Landowners
- Environmental Impact Statement

3.0 ELECTRICAL DESIGN

3.1 Codes and Standards

The electrical design shall be in accordance with applicable industry codes/standards, in effect as of the approval date of this design criteria document. Applicable federal, state, and local codes and standards shall also be observed. A summary of the industry codes and standards to be used are as follows:

- IEEE C2-2023, National Electrical Safety Code (NESC)
- NEMA C29.9 Standard for Wet-Process Porcelain Insulators—Apparatus, Post-Type
- NEMA/IEEE/ASA C37 Standards Series for substations and circuit breakers
- IEEE C37.04 Rating Structure of AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis
- IEEE C37.06 Preferred Ratings and Related Required Capabilities for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis
- IEEE C37.09 Test Procedure for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis
- IEEE C37.30 IEEE Standard Definitions and Requirements for High Voltage Air Switches, Insulators, and Bus Supports
- IEEE C37.32 Standard for Switchgear – High Voltage Air Switches, Bus Supports and Switch Accessories – Schedule of Preferred Ratings, Manufacturing Specifications and Application Guide
- IEEE C37.33 Standard for Switchgear – High Voltage Air Switches – Rated Control Voltages and their Ranges
- IEEE C37.34 Standard Test Code for High Voltage Air Switches
- IEEE C37.35 Guide for the Application, Installation, Operation, and Maintenance of High Voltage Air Disconnecting and Load Interrupter Switches
- IEEE C37.37 IEEE Standard Loading Guide for AC High Voltage Switches (in excess of 1000 Volts)
- NEMA/IEEE C57 Standards Series for power and Instrument Transformers
- IEEE C57.12.00 IEEE Standard General Requirements for Liquid-Immersed Distribution, Power and Regulating Transformers
- IEEE C57.13 Standard Requirements for Instrument Transformers

- IEEE C57.13.2 Standard Conformance Test Procedures for Instrument Transformers
- IEEE C57.91 Guide for Loading Oil-Immersed Distribution and Power Transformers
- IEEE C57.12.90 IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers; and Guide for Short-Circuit Testing of Distribution and Power Transformers
- IEEE C57.16 Requirements, Terminology and Test Code for Dry-Type Air-Core Series Connected Reactors
- IEEE C57.129-2000 Trial Use Standard General Requirements and Test Code for Oil Immersed HVDC Converter Transformers
- IEEE C62 Standards Collection: Guides for Surge Protection
- IEEE C62.11 IEEE Standard for Metal-Oxide Surge Arresters for AC Power Circuits
- IEEE C62.22 Guide for the Application of Metal Oxide Surge Arresters for Alternating- Current Systems
- IEEE C37.46 Specifications for Power Fuses and Fuse Disconnection Switches
- IEEE C37.47 Specifications for Distribution Fuse Disconnecting Switches, Fuse Support and Current Limiting Fuses
- IEEE C37.91 Guide for Protective Relay Applications to Power Transformers
- IEEE C37.99 Guide for Protection of Shunt Power Capacitors
- IEEE C37.90 Standard for Relays and Relay Systems Associated with Electric Power Apparatus
- IEEE C37.90 Standard Surge Withstand Capability (SWC) Tests
- IEEE 80, Guide for Safety in AC Substation Grounding
- IEEE 141 Recommended Practice for Electric Power Distribution for Industrial Plants
- IEEE 142 Recommended Practice for Grounding of Industrial and Commercial Power Systems
- IEEE 242 Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
- IEEE 446 Emergency and Standby Power Systems for Industrial and Commercial Power Systems
- IEEE 484, Recommended Practice for Installation Design and Installation of Vented Lead-Acid Batteries for Stationary Applications
- IEEE 485, Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications
- IEEE 519 Guide for Harmonic Control and Reactive Compensation of Static Power Converters
- IEEE 525, Guide for Design and Installation of Cable Systems in Substations
- IEEE 693, Recommended Practices for Seismic Design of Substations

- IEEE 979, Guide for Substation Fire Protection
- IEEE 980, Guide for Containment and Control of Oil Spills in Substations
- IEEE 998, Guide for Direct Lightning Stroke Shielding of Substations
- IEEE 1491, Guide for Selection and Use of Battery Monitoring Equipment in Stationary Applications
- IEEE 1547-2018 IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electrical Power Systems Interfaces
- IEEE-2030.2.1 Guide for Design, Operation, and Maintenance of Battery Energy Storage Systems, both Stationary and Mobile, and Applications Integrated with Electrical Power Systems
- IEC 255-5 Electric Relays. Part 5: Insulation Tests for Electric Relays
- IEC 255-22 Electric Relays. Part 22: Electrical Disturbance Tests for Measuring Relays and Protection Equipment
- NEMA CC1, Electric Power Connectors for Substations
- NEMA TR-1 Transformers, Regulators, and Reactors
- NEMA LA 1 Surge Arresters
- NEMA SG 6 Schedules of Preferred Ratings, Manufacturing Specifications and Application Guide for High Voltage Air Switches, Bus Supports, and Switch Accessories
- NEMA FU 1 Low Voltage Cartridge Fuses
- NFPA 70, National Electrical Code (NEC)
- NFPA 90, Standard for the Installation of Air Conditioning
- NFPA 850, Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations
- NFPA 855 Standard for the Installation of Stationary Energy Storage Systems
- UL 1642 Standard for Lithium Batteries
- UL 1741 Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
- UL 9540 Energy Storage Systems and Equipment
- UL 9540A ANSI/CAN/UL Standard for Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems
- Aluminum Electrical Conductor Handbook-Aluminum Association
- ASHRAE 183 Peak Cooling and Heating Load Calculations in Buildings Except Low-rise Residential Buildings
- ASHRAE 90.1 Energy Standard for Buildings Except Low-Rise Residential Buildings

3.2 BESS Equipment

3.2.1 BESS System Rating

The BESS shall be a 15MW, 60MWh Battery Energy Storage System. BESS ratings shall be as shown in Table 3.2.1.

Table 3.2.1 – System Ratings	
Nominal Voltage and Frequency	13.8kV, 60Hz
Maximum Power BESS can Produce	15MWac
Maximum Energy BESS can Provide per Cycle	60MWhac
BESS Power Factor Rating @ POI	+/- 0.95

3.2.2 BESS General Requirements

All BESS equipment shall be self-contained to minimize the risk of property and personnel damage caused by fire, explosion, or other failures of the BESS.

Due to variety of BESS technologies, suppliers shall list the capacity of their proposed BESS only in terms of what the BESS will be capable of sustaining over its 20-year life, defined as a minimum of 15,000 full cycles.

The BESS shall be capable of being charged from the existing grid via the dedicated 13.8kV feeder circuit from the existing Big Pine Key Substation.

3.2.3 BESS Application

PHASE 1 - Grid Services

Fixed Discharge Peak Shaving Mode

Output a real, fixed power level at a fixed power factor for a fixed duration. This mode will be set through autonomous control or remotely.

Table 3.2.3 – BESS Use Case	
Cycle Profile	Two Nameplate-Equivalent Cycles per Day. Beginning and end of Life Charge/Discharge Power and Energy of 15 MWac and 60 MWhac per Cycle at POI
Primary Use Case	Transmission Congestion Mitigation
Secondary Use Case	Peak Shaving
Depth of Discharge	100%
Augmentation	System must be designed to maintain 15 MW, 60 MWhac over 20 years.
Charge Profile	Constant Power – Constant Voltage (CP-CV)

3.2.4 BESS Monitoring and Control

Table 3.2.4 – Monitoring & Control	
Data	Time Sync through an IRIG-B source
Monitoring 1 Functions Response Time – 0.5 seconds when charging or discharging Local Reporting and Archiving Remote Reporting (Real Time) Remote Archiving	The BESS should monitor and archive the following real time data and report consistent with Keys/FMPP/FMPA's existing historian system: Output Current, Voltage, Frequency, Power Factor, Power Flow (Real and Reactive with Direction), Harmonics (THD and TDD), Breaker Status (Open/Closed), BESS Status (Online/Offline), State of Charge, State of Health, Alarms (see Table 3.2.5 and Exhibit A Statement of Work)
Monitoring 2 Functions Response Time – 15 seconds when charging or discharging Local Reporting and Archiving Remote Archiving	The BESS will have defined characteristics based on the technology used and the interconnection type. The following items should be monitored, reported locally in the HMI, stored locally, and reported remotely for data archiving: Energy Storage Capacity of the BESS, Total Capacity in MWh, Capacity Available to be Delivered to Grid, Power Available in MW
Monitoring 3 Functions Response Time – Once every month Local Reporting and Archiving Remote Archiving	Operation Life – in years based on technology and application Cycle Life – based on the number of charge/discharge cycles and DOD during those cycles Response Time – Length of time to start releasing energy. Based on technology, startup delays, ramp rates, and programmed dispatch requirements. Round Trip Efficiency - Measurement starts and ends at a common SOC and includes any losses inherent to the system.
Control Functions Response Time – Less than 1 second System Control Center	Master shutdown switch, local and remote control by communications shall be provided which commands all inverters to trip off-line and all battery contactors to open.
Grid Protection Response Time: 5 Cycles, 80 ms	Inverter Stops Operations, Fault Interruption

3.2.5 BESS Alarms

Table 3.2.5 – Alarms	
Alarms and Indication	BESS should have system health monitoring and report alarms, non-critical and critical. An alarm point's address list shall be provided for the Energy Management System (EMS). Keys/FMPP/FMPA will designate alarms to be reported remotely.
Remote Non-Critical	Operating Mode of BESS, Discharging, Charging, State of Health
Remote Critical Alarms	Thermal Management Failure, Flood Monitor, Fire Alarm, Battery Management System, Door Open, State of Critical Charge
Reported to Customers	Status to customer will be provided to indicate when they are islanded on the battery-inverter system. This provides an opportunity for the customer to shed non-essential loads extending the duration of the battery supply for grid forming option. Local indication by outside light at BESS Remote indication by customer preference

3.3 BESS System DC/AC Inverters

Inverters input voltage shall be as required based on the BESS system battery output voltage.

The inverter output voltage shall be BESS supplier's standard and shall be coordinated with the BESS system step-up transformer.

The inverter MVA rating shall be as required to carry the rated output of the BESS system batteries connected to the inverter, account for the losses in the system (cable, transformer, etc.) and achieve the power factor shown in Table 3.2.1 at the Point of Interconnection (POI) as a minimum.

The DC side of the inverter (connected to the battery) shall be provided with a disconnect switch rated to carry the battery system output current.

The AC side of the inverter shall be provided with a circuit breaker rated at the output ampacity of the inverter with a 20% capacity margin.

3.4 BESS System Step-Up Transformers

The BESS system step-up transformers shall be pad mounted, feed-through configuration, wye-delta connected windings. The low voltage winding voltage rating shall match the inverter output voltage. The high voltage winding voltage shall be 13.8 kV. The transformers shall be dry type or utilize non-flammable natural ester oil. Transformers shall be equipped with surge protection, load switch and fuse.

The MVA ratings of BESS step-up transformers shall be matched with the MVA rating of the inverter. The BESS step-up transformers shall be provided with 2 +/-2.5% off-line taps.

3.5 Station Service Center

3.5.1 BESS AC Service

BESS AC service shall consist of a dry type 3-phase, wye-wye, 13.8kV-480V, stepdown transformer, 480V main distribution panel, a dry type three phase transformer and a 120/208 volts, three phase, 4- wire panelboard.

The station auxiliary transformer along with its associated protection and disconnect equipment shall be designed to carry all the critical loads and located to allow safe and easy access and operation.

The BESS AC service for the site shall be sized to accommodate the requirements of the anticipated load.

An automatic transfer switch and emergency generator shall be provided for all 120/208V emergency loads in the event that the station is offline.

3.6 BESS System Communications

A fiber connection shall be made to the RTU to communicate SCADA communications for the BESS equipment to Keys/FMPP/FMPA.

3.7 SCADA

Remote Terminal Unit(s) (RTUs) are required at the BESS containers and will provide remote operation and SCADA data for Keys/FMPP/FMPA.

A SCADA system shall be installed to allow full monitoring of equipment status and alarms that shall be transmitted to Keys/FMPP/FMPA operations. Additional control points shall be provided to allow Keys/FMPP/FMPA operations full control of all functions of the control system. Control would be provided for the breaker. Specifically, functionality will be determined during the detail design stage of the project.

Standardized functional communication protocols for use in the SCADA network for data gathering and transfers are DNP3.0.

3.8 Interconnection Equipment

This section summarizes the major equipment to be installed in the for the BESS Station Interconnection. All Interconnection equipment shall be designed to support the Maximum Operating Voltage as indicated in Table 3.9.2 under Section 3.9.2.

3.8.1 Recloser

The Recloser shall be an automatic three phase, solid dielectric vacuum recloser. Auxiliary contacts for recloser internal control functions shall be provided. The Recloser shall conform to

IEEE C37.60 and IEEE 386. Recloser ratings shall be as shown in Table 3.8.1. The recloser shall include its own pole mounted aux power transformer.

Table 3.8.1 - Power Recloser Ratings	
Operating Voltage	13.8 kV
Basic Impulse Level (BIL)	110 kV
Maximum Continuous Current (amperes)	800 A
Short Circuit Interrupting Current (kA)	12.5 kA

3.8.1.1 Bushing Current Transformers

Two (2) multi-ratio, 600 to 5 ampere relaying accuracy Class C400 current transformers shall be mounted on each bushing. The exact Current Transformer (CT) ratios will be determined later. The current transformers shall be in accordance with ANSI-C57.13.

3.8.2 3-Way Bypass Disconnect Switches

The disconnect switches shall be non-load break, single-pole, hookstick operated, single-throw complete with station post insulators, switch blades, contacts, and include all necessary hardware for the assembly and mounting to distribution pole structures. All disconnect switches shall conform to IEEE Standard C37.32 for High Voltage Switches. Ratings for disconnect switches shall be as shown in Table 3.8.2.

The hookstick bypass switch shall be placed in such a way that the blades open towards the recloser so that the blade shall be dead when the switch is in the open position.

Table 3.8.2 - Disconnect Switch Ratings	
Operating Voltage (phase-to-phase)	13.8 kV
Basic Impulse Level (BIL)	110 kV
Maximum Continuous Current (amperes)	800 A
Short Time Withstand (symmetrical) Current	25 kA

3.8.3 Surge Arresters

The surge arresters shall be station class, metal-oxide (MOV) type. Arresters shall be installed at transformer terminals. Arresters shall be installed as close as possible to the equipment being protected. Surge arresters shall be in accordance with IEEE-C62.11. Ratings for surge arresters shall be as shown in Table 3.8.3.

Table 3.8.3 – Surge Arrester Ratings	
Nominal Operating Voltage (phase-to-phase)	13.8 kV
Rated Surge Arrester Voltage MCOV	10.4 kV
Construction Material	Polymer

3.8.4 Wire-Wound Voltage Transformers (VTs)

Wire-Wound Voltage Transformers (VTs) shall be used for protective relaying and metering applications. The VTs shall be single-phase, having a minimum of two secondary windings with standard ratings as shown in Table 3.8.4 The VTs shall be in accordance with ANSI C57.13.

Table 3.8.4 - Wire-Wound Voltage Transformer Ratings	
Nominal Operating Voltage (phase-to-phase)	13.8 kV
Primary Voltage (line-ground)	7.97 kV
Maximum Voltage (phase-to-phase)	15.5 kV
Basic Impulse Level (BIL)	110 kV
Winding Ratios (Phase/ground)	66.4:1
IEEE Accuracy Class @ Burden MWXYZ&ZZ	0.3
Total Thermal Burden	1000 VA

3.9 Emergency Ratings

The ratings of the required equipment are usually based upon normal loadings, load cycles, ambient service conditions and the life of the insulation. This information is based on ANSI/IEEE/NEMA Standards and Manufacturer's Data. In general, equipment shall be sized for continuous operation at the maximum continuous value specified by the manufacturer.

3.9.1 Meteorological Conditions

Table 3.9.1 - Meteorological and Environmental Conditions	
Ambient Temperature Range	+12.7˚C to +32.7˚C
Average Ambient Temperature	22˚C
Altitude	2 m
Keraunic Level (IEEE-998-2012: Figure 6)	70-80 thunderstorm days annually
Maximum Relative Humidity	100%
Minimum Relative Humidity	0%
Isokeraunic Zone	40
Maximum Wind Speed	200 mph minimum

3.9.2 Voltage & Frequency Rating

The interconnection equipment and bus systems shall be designed for the voltage ratings in accordance with Table 3.9.2. The 13.8kV system shall be served via a new feeder circuit from the Big Pine Key Substation.

Table 3.9.2 - Equipment Voltage Ratings	
Nominal Operating Voltage (phase to phase)	13.8 kV
Nominal Phase-to-Ground Voltage	7.97 kV
Maximum of the Nominal Phase-to-Phase Voltage	15.5 kV
Maximum of the Nominal Phase-to-Ground Voltage	8.95 kV

Basic Insulation Level (BIL)	110 kV

3.9.3 Current Rating

The new equipment shall be designed for the following current ratings.

- Equipment: minimum continuous current rating of 800 amperes at 13.8 kV.
- Short Circuit Current Rating: 12.5 kA at 13.8kV

3.9.4 Clearances and Spacing

3.9.4.1 Yard Clearances

All BESS Station and Interconnection equipment shall be designed to maintain the yard clearances and spacing in Table 3.9.4.1.

Table 3.9.4.1 – Minimum Yard Clearances	
	13.8 kV System
Nominal Operating Voltage (phase to phase)	13.8 kV
Maximum of the Nominal Phase-to-Phase Voltage	15.5 kV
Basic Insulation Level (BIL)	110 kV
Phase-to-Phase, minimum metal-to-metal	12 inches for rigid bus
Phase-to-ground, minimum metal-to-metal	8 inches for rigid bus
Bottom of insulator or bushing porcelain to foundation top	8ft – 6in
Vertical clearance of unguarded live parts to foundation top	8ft – 6in
Vertical clearance of conductor over internal roadways	15 feet
Horizontal clearance of unguarded live parts	48 inches

3.10 Overhead Conductor System Design

The overhead conductor system consists of jumper conductors to the new recloser from the incoming 13.8kV line. The overhead conductor system shall be designed to meet the voltage and continuous current rating requirements, as well as the mechanical requirements for bus design. The overhead conductor system shall be designed as specified in the following sections.

3.10.1 Overhead Conductor Size

The overhead conductor shall be sized to meet voltage, current, and structural rating requirements.

The overhead conductor for the 13.8kV system will be provided by FMPA and routed along the

Industrial and Sands Roads between the existing Big Pine Key Substation and the new 13.8kV Big Pine Key BESS station. The point of interconnection shall be at the BESS Station recloser.

3.10.2 Overhead Fitting Selection

Fittings for stranded conductor shall be of the bolted type.

Fittings for conductor jumpers shall be of the bolted type. Jumpers shall be designed so that they can be unbolted and removed from equipment for maintenance, repair, or replacement.

3.11 Station Service Center

3.11.1 DC Service

The new loads (protection and control) will be supported from a dedicated DC power source.

3.11.2 Protective Relaying & Control System.

The design of the protective relaying and control systems shall be in accordance with industry standards (IEEE, ANSI standards) as well as in accordance with Keys/FMPP/FMPA system protection standards.

Schweitzer relays will be used for the protection schemes on the breaker.

3.11.3 Boundary Inter-tie Metering

Revenue metering shall be at the point of interconnection and will be provided by Owner. Any additional metering identified by contractor as required for the BESS system shall include the following:

- Instrument Transformers
- Intelligent Electronic Devices (IEDs)

3.11.4 Voltage Input to Protective Systems

A voltage source will be provided to the protection relays.

3.11.5 Interconnection Recloser

The recloser protection scheme will consist of an overcurrent protection scheme, SEL-651R Relay, part 0651R22D1AAXAE112216XX.

3.12 Communication Equipment

BESS Station communication equipment required shall have a level of performance consistent with that required of the protective system, such as:

- Equipment shall be monitored in order to assess equipment and channel readiness.
- Equipment shall be designed to assure adequate signal transmission during bulk power system disturbances and shall be provided with means to verify proper signal performance.

- Equipment shall be designed to prevent unwanted operations such as those caused by equipment or personnel.
- Equipment shall be powered by the DC batteries or other sources independent from the power system.

Keys/FMPP/FMPA will arrange for any telephone lines that will be required, and will provide a communications rack with FDP for fiber interface to the BESS communications equipment..

3.13 Grounding System (BESS)

3.13.1 Description of Grounding System

The grounding system shall be modeled using the SES CDEGS grounding analysis software package. The grid shall be designed to meet the requirements of ANSI/IEEE Standard 80.

Soil resistivity measurements are required and shall be obtained during detailed design.

3.13.2 Grounding System Components

3.13.2.1 Soil Structure

The CDEGS program will determine the number of soil layers present based on field test results input via the RESAP module.

The soil model results are considered usable if the resultant soil model accurately reflects the measured data.

The original RESAP soil model can be adjusted to minimize the RMS error. The field data cannot be modified.

3.13.2.2 Ground Grid

Fault currents less than 10kA with a clearing time per protection and control requirements shall use bare copper ground grid conductor. The standard ground grid burial depth is a minimum of 18 inches below the final grade.

3.13.2.3 Grounding Electrodes

The standard ground electrode shall be 10 feet long and made of 5/8 inch diameter copper-clad steel rod. Longer lengths can be made by joining multiple rods together with ground rod couplers.

Ground rods shall be installed near major equipment and at applicable ground grid locations. Applicable locations include BESS Station perimeter, Recloser Interconnection Structure, etc.

3.13.2.4 Connections

All above grade connections shall be compression and below grade grid conductors and ground rod connections shall be exothermic connections.

3.13.2.5 Above Grade Structures

Equipment and structure grounds, or "stingers," consisting of bare conductors shall connect each piece of equipment and steel structure to the ground grid. The minimum conductor size shall be calculated but never be smaller than the ground grid conductor size. There will be two (2) ground connections to each structure and piece of equipment.

Disconnect switch structures and circuit breakers shall have grounding mats provided in locations where an operator will be standing. These grounding mats shall be adequately grounded by two independent paths.

3.14 Lightning Shielding Design

The BESS direct (lightning) stroke shielding design shall be performed in accordance with IEEE Standard 998-1996 "IEEE Guide for Direct Lightning Stroke Shielding of Substations" using the "electro-geometrical model" or the "rolling sphere technique."

The shielding design shall utilize a combination of shielding masts and/or mast poles. It is not anticipated that shield wires will be required at these locations.

3.15 Raceway

Conduits shall be provided between the BESS, interconnect equipment and the control house.

All below-grade conduits shall be buried to a minimum depth of thirty (30) inches below the finished grade and shall have red marking tape buried six inches above the conduits. All below grade conduit runs below shall be reinforced with concrete.

Conduits shall be sized in accordance with the National Electric Code (NFPA-70).

Conduit fill ratio shall not exceed the requirements of the National Electric Code (NFPA-70).

3.15.1 BESS

All above-grade cable tray shall be rigid aluminum. Exposed conduit and fittings shall be schedule 40 PVC. Below grade conduits shall be schedule 40 PVC encased in concrete.

3.16 BESS Cabling

The following is a partial list of the requirements for power, instrumentation and control cabling within the BESS, control house, and interconnection equipment. All cables to follow Keys standards and the requirements below:

- The voltage drop for all control cables shall be verified not to exceed 5%. The voltage drop for all power cables shall not exceed 3%.
- All power cables shall be sized based on the anticipated maximum continuous load currents and maximum short circuit current. Factors that shall be considered to determine the adequate cable size are conductor material, ambient conditions, cable insulation, cable stranding, proximity of parallel current carrying cables and whether the cables are in buried conduit, conduit in air, or in a cable tray.
- All low voltage power, instrumentation and control cables shall be insulated for a 600 volt rating, 90ºC, Cross-linked Polyethylene (XLPE) fire retardant insulation,

thermosetting compound.

- Medium voltage power cables shall be 105 º C (MV-105), 133% insulation, ethylene- propylene rubber (EPR) based fire retardant insulation, thermosetting compound.
- Coaxial and instrumentation cable shall be fully shielded both inside and outside the control house.
- Cable shields and unused conductors are not required to be terminated or grounded inside the control house. Outside the control house cable shields and unused conductors are terminated and grounded.
- Separate cable systems shall be used to supply redundant communications and control systems in order to prevent a single event from interrupting the flow of critical system information and operations.
- AC and DC circuits shall not be in the same cable.
- 13.8kV circuits between recloser and BESS equipment shall be in dedicated ductbanks.
- Communications cables shall be in dedicated conduits, separate from low voltage AC and DC cables.

3.17 BESS Yard Lighting

The outdoor lighting system will be designed to provide adequate illumination for security, emergency egress within the BESS and the interconnection recloser, and an indication of the position of recloser disconnect switch blades. The illumination levels shall meet levels identified in the National Electric Safety Code (NESC) and any local rules and regulations. LED lighting system shall be used.

3.18 Audible Noise

The level of audible noise inside enclosures shall not exceed 80 dB(A) in areas where personnel are permitted during ESS operation. Audible noise outside of the system fence shall not exceed 52 dB(A).

The successful Bidder shall make audible noise measurements after commissioning to verify the compliance with requirements above. At these measurements the background audible noise shall be deducted when calculating the audible noise level for the ESS as specified in the first paragraph.
Measurements shall be made at several locations in order to eliminate local interference effects.

4.0 CIVIL/STRUCTURAL/FOUNDATION DESIGN

4.1 Codes and Standards

The civil/structural design of the BESS shall be in accordance with the latest revision of industry codes, standards, and design guides unless stated otherwise. Applicable federal, state and local codes and standards shall also be observed. In addition to the Codes and Standards listed in Section 3.1 Codes and Standards, the following additional industry codes and standards shall be observed for civil/structural design. The latest accepted edition(s) are applicable.

- American Concrete Institute (ACI) 318.
- American Institute of Steel Construction (AISC) 360
- American National Standards Institute (ANSI) standards
- ASTM International
- American Society of Civil Engineers (ASCE) standards
- American Welding Society (AWS) D1.1
- International Building Code
- Concrete Reinforcing Steel Institute (CRSI) standards
- Florida Department of Transportation Standard Specifications
- Florida Department of Environmental Protection
- Monroe County Manual of Storm Water Management Practices
- South Florida Water Management District Environmental Resource Permit Applicant's Handbook

Other recognized standards and ordinances will be used where required, to serve as guidelines for the design, when not in conflict with the above listed standards.

4.2 Civil Design Criteria

4.2.1 Site Grade and Flood Protection

The existing grades for the proposed BESS site vary from an elevation of 3 feet above sea level at the northwest corner of the proposed site to 2 feet above sea level along the southeast boundary. To adhere to FMPA's flood protection criteria, the BESS equipment will be elevated to match or exceed an elevation of 8' above sea level.

The BESS site is at an area below the FEMA 100-year base flood elevation, which is listed at 8 feet above sea level based on FEMA Flood Insurance Rate Maps for the site. The effective FEMA Flood Insurance Rate Map for the proposed BESS site location (12087C1536K, dated February 2005) shows the 100-year Base Flood Elevation to be between elevations at 8 feet with respect to the NGVD 1929 datum. FEMA has published a more recent, but still preliminary map update (12087C1536L, dated December 2019) that shows the Base Flood Elevation to be elevation 8 feet (Zone AE) with respect to the NAVD 1988 datum. Additionally, the preliminary update shows a Limit of Moderate Wave Action line that bisects the proposed BESS site, which indicates that the western portion of the site may observe breaking waves up to 1.5 feet in height during a 100-year event.

Note that the USACE Corpscon software may be used for converting between these two vertical datums (i.e., NGVD 1929 and NAVD 1988), and the resultant conversion from an elevation referenced to the NGVD 1929 datum to an elevation referenced to the NAVD 1988 datum is to subtract 1.35 feet from that elevation: as an example, elevation 10 feet (NGVD 1929) = elevation 8.65 feet (NAVD 1988). Considering this datum conversion, there is not a significant difference in the FEMA base flood elevations reported on the 2005 and 2019 maps. The USACE guidance also includes low and high value projections in sea level rise from 1992 to 2100. In 2050 (for a 35-year BESS service life), USACE anticipates a low value for sea level rise to be 5 inch water level increase, and a high value of 1.7 feet in sea level rise. The anticipated sea level rise should be accounted for in all site grading and flood protection measures.

The BESS equipment and systems shall be elevated to 10’ above sea level utilizing concrete piers or other support piles to support the equipment with decking around the equipment.

4.2.2 Site Grading and Drainage

Drainage systems and storm water management will comply with Monroe County and South Florida Water Management District (SFWMD) requirements. The proposed intent is to follow current practices for onsite stormwater management that include collecting non-contact stormwater and infiltrating the runoff into the soil.

For the BESS Area, stormwater management is anticipated to include volumetric containment of a 1-inch runoff (as required by county and state regulations as noted below) by temporarily storing the runoff beneath the equipment or within the fill supporting the equipment and infiltrate the rainfall volume into the soil.

The Monroe County’s Manual of Storm Water Management Practices, dated June 2020, describe the requirements for preparing a Storm Water Management Plan and identify dry detention practices for infiltrating a 1 inch of runoff. The County’s stormwater quality requirements can be addressed using SFWMD BMP Trains software, which provides credits for Low Impact Design features, or by performing an empirical evaluation of a rainfall runoff depth corresponding to the percent of impervious pavement within the project site.

The SFWMD’s Environmental Resource Permit Applicant’s Handbook describes practices and requirements similar to Monroe County. SFWMD also requires consideration for managing and controlling runoff from a 25-year event.

During construction, coverage from the Florida Department of Environmental Protection (FDEP) for a Generic Permit for Construction Activities is required to document appropriate management of stormwater runoff and fugitive dust from earth disturbance areas, and to provide guidance for construction housekeeping practices that are routinely expected for construction sites.

During foundation and utility excavation, some groundwater dewatering is anticipated, which will require a groundwater dewatering permit from the FDEP. Some level of treatment is expected to meet water quality requirements through the use of sediment filter bags or portable tanks equipped with filter systems and or flocculent injection may be necessary.

4.2.3 Site Surfacing

Areas within the BESS station shall be surfaced with a minimum of six inches of crushed stone aggregate. Roadways shall be designed for an HS-20 loading. It is anticipated that maintenance crane usage will be infrequent, and when used, crane matting will be placed beneath outriggers to limit soil loading conditions.

The roadways shall be designed for the width and turning radius of the largest vehicle using roadway with required clearance to overhead power lines. Largest vehicle will be determined during detailed design after the BESS vendor has been selected and site layout is finalized.

4.2.4 Fencing

New fencing shall be designed to enclose the new Big Pine Key BESS Station as required, with a minimum 7’ plus 1’ razor wire.

4.3 Structural Design Criteria

4.3.1 Material

All structures shall be designed and constructed using either standard steel shapes or tapered tubular polygonal shapes.

- All detailing, show and field workmanship to be done in accordance with AISC “Manual of Steel Construction” Latest Edition.
- All steel structure members shall be cleaned prior to finishing.
- Coating process shall be an electrostatically applied polyester powder with a final baked on average thickness between 2.0 and 4.0 mils.
- Finish shall have a minimum pencil hardness of 2H as tested per ASTM D3363.
- Finish shall pass the ASTM B117 salt spray test for a minimum of 1000 hours.

4.3.2 Design

Steel structures shall be designed in accordance with the ASCE 7-16 “Minimum Design Loads and Associated Criteria for Buildings and Other Structures,” including the specified LRFD load combinations.

4.3.3 Structure Design Loads

The following loading conditions shall be used to analyze and design the structure. Dead load is defined as the weight of the structure, conductors and equipment. Short circuit loading shall be applied in conjunction with each load condition for structures supporting rigid bus.

4.3.3.1 Extreme Wind

A wind pressure due to a wind velocity of 200-mph shall be applied to the structures, conductors, and equipment. The wind pressure shall be calculated in accordance with ASCE 7-16. The ambient air temperature shall be taken as 75°F.

4.3.3.2 Seismic

Seismic design parameters (accelerations, site class, etc.) will be provided in the geotechnical report for each site. The seismic loads shall be calculated in accordance with ASCE 7-16. Unless larger values are provided in the geotechnical report, the following minimum values shall be used for the mapped ground motion spectral response accelerations: $S_s = 0.025$ and $S_1 = 0.016$. The ambient air temperature shall be taken as 75°F.

4.3.4 Structure Deflections

Structure deflections shall be checked for the specified loading conditions with all load factors equal to 1.0, except that short circuit loading shall not be included. The calculated deflections shall not exceed the following limits:

Line Support Structures and Shield Poles:

- Horizontal deflection of vertical members: 1/100 of height
- Horizontal deflection of horizontal members:1/200 of span
- Vertical deflection of horizontal members:1/200

of span All Other Structures:

- Horizontal deflection of vertical members: 1/200 of height
- Horizontal deflection of horizontal members:1/300 of span
- Vertical deflection of horizontal members:1/300 of span

Note: The load conversion factor of 0.78 can be used for extreme wind load when calculating deflections.

4.4 Foundation Design Criteria

Foundation design shall conform to ACI 318, County and State Codes, and be in accordance with the following general minimum criteria.

Concrete Strength	fc = 4,500 psi at 28 days
Reinforcing Steel (ASTM A615 Gr 60)	fy = 60,000 psi
Foundation Loads	
Structures	From structure design calculations
Equipment	From equipment manufacturer shop drawings or product literature
Safety factors (foundation reactions shall be service loads)	
Shallow Foundations – Bearing Capacity	3.0
Shallow Foundations – Stability (Overturning, Sliding, and Uplift)	1.5
Drilled Piers	2.0

4.4.1 Drilled Pier Deflection Criteria

Deflection and rotation of drilled pier foundations shall be limited to 0.5 inch of deflection (vertical and horizontal) and 0.5 degrees of rotation due to unfactored (service) loads.

4.4.2 Equipment and Structure Foundations

Foundations for the ground supported pieces of equipment and support structures shall be cast-in-place reinforced concrete drilled piers unless otherwise indicated by the geotechnical report. Anchor bolts for all structures shall be of sufficient length to allow for the use of leveling nuts. The use of grout between the structure base plate and the top of the structure foundation is not required.

4.4.3 Foundation Depth

In general, foundations shall extend below the final grade as required by local or state code and the recommendations in the geotechnical report.

4.4.4 Foundation Projection

All foundation top of concretes shall have 6” to 12” reveal as required. Foundations set below this elevation require approval from FMPA.

5.0 FIRE PROTECTION DESIGN

5.1 Codes and Standards

The fire protection design of both the battery energy storage system and interconnection equipment shall be in accordance with the latest revision of industry codes, standards, recommendations, and design guides unless stated otherwise. Applicable federal, state, and local codes and standards shall also be observed. In addition to the Codes and Standards listed in Section 3.1 Codes and Standards, the following additional industry codes and standards, and Owners insurance company (FM Global) shall be observed for fire protection design. The latest accepted edition(s) are applicable.

5.1.1 Model Building Codes and Standards

- International Fire Code (IFC), 2021 Edition
- Monroe County, Florida Codes, Standards, Amendments and Ordnances

5.1.2 Insurance Recommendations

- FM Global Property Loss Prevention Data Sheets (www.fmglobaldatasheets.com)
- Data Sheet 1-0, Safeguards During Construction, Alteration, and Demolition
- Data Sheet 1-2, Earthquakes
- Data Sheet 1-10, Smoke and Heat Venting in One-story Sprinklered Buildings
- Data Sheet 1-20, Protection Against Exterior Fire Exposure
- Data Sheet 1-21, Fire Resistance of Building Assemblies
- Data Sheet 1-28, Wind Design
- Data Sheet 1-29, Roof Deck Securement and Above-Deck Roof Components
- Data Sheet 1-31, Panel Roof Systems
- Data Sheet 1-42, Damage-Limiting Construction
- Data Sheet 1-52, Field Verification of Roof Wind uplift Resistance
- Data Sheet 2-0, Installation Guidelines for Automatic Sprinklers
- Data Sheet 2-8, Earthquake Protection for Water-Based Fire Protection Systems
- Data Sheet 2-10, Dry Pipe, Deluge, Pre-action Valve and Accessories
- Data Sheet 2-81, Fire Protection System Inspection, Testing, and Maintenance
- Data Sheet 3-0, Hydraulics of Fire protection Systems
- Data Sheet 3-7, Fire Protection Pumps
- Data Sheet 3-10, Installation/Maintenance of Fire Service Mains

and Their Appurtenances

- Data Sheet 3-26, Fire Protection Water Demand for Non-storage Sprinklered Properties
- Data Sheet 4-4, Standpipe and Hose Systems
- Data Sheet 4-5, Portable Extinguishers
- Data Sheet 5-4, Transformers
- Data Sheet 5-19, Switchgear and Circuit Breakers
- Data Sheet 5-20, Electrical Testing
- Data Sheet 5-23, Emergency and Standby Power Systems
- Data Sheet 5-33, Electrical Energy Storage Systems
- Data Sheet 5-40, Fire Alarm Systems
- Data Sheet 5-48, Automatic Fire Detection
- Data Sheet 5-49, Gas and Vapor Detectors and Analysis Systems
- Data Sheet 7-17, Explosion Protection Systems
- Data Sheet 9-0, Maintenance and Inspection
- Data Sheet 10-1, Pre-Incident Planning
- Data Sheet 10-2, Emergency Response
- Data Sheet 10-3, Hot Work Management
- Data Sheet 10-6, Fire Protection Impairment Management
- Data Sheet 10-8, Operators

5.1.3 National Fire Protection Association (NFPA)

- NFPA 1, Fire Code
- NFPA 10, Standard for Portable Fire Extinguishers
- NFPA 13, Standard for the Installation of Sprinkler Systems
- NFPA 14, Standard for the Installation of Standpipe and Hose Systems
- NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection
- NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection
- NFPA 22, Standard for Water Tanks for Private Fire Protection
- NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances
- NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
- NFPA 30, Flammable and Combustible Liquids Code
- NFPA 68, Standard on Explosion Protection by Deflagration Venting

- NFPA 69, Standard on Explosion Prevention Systems
- NFPA 70, National Electrical Code®
- NFPA 70E, Standard for Electrical Safety in the Workplace®
- NFPA 72, National Fire Alarm and Signaling Code®
- NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operation
- NFPA 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants
- NFPA 850, Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations
- NFPA 855, Standard for the Installation of Stationary Energy Storage Systems

5.2 Design

Existing fire hydrants and water lines presently exist near the BESS site and will be expanded with new piping and hydrants to the gate. The fire protection design will be dependent on the BESS vendor requirements.

Firewall requirements and designs will be dependent on the BESS vendor layout, but are not anticipated to be required. After BESS vendor layout has been determined, firewall requirements will need to be reviewed against applicable codes and standards as well as requirements specified by FM Global.

The following project Fire Protection Master Plan detailed documents as a minimum shall be prepared and submitted to the Owner as part of the initial design process. They include:

- Combination Building and Fire Codes, and Life Safety Compliance Review documents
- UL 9540A, 5th edition, Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems result reports
- Combination hazard mitigation analysis (HMA) and fault condition documents
- Deflagration analysis, calculation, and mitigation documents
- Emergency Fire Pre-plans and Response for during construction documents
- Emergency Fire Pre-plans and Response for after all construction is completed documents
- All analysis and calculations required by the Authority Having Jurisdiction (AHJ) and the applicable codes and standards, etc.

Fire protection systems shall be designed, installed, tested, and documented in accordance with:

- Fire Protection Master Plan and associated project documents
- All the fire protection components, devices, equipment, and materials used during the UL 9540A large-scale certification test
- Combination hazard mitigation analysis (HMA) and fault condition documents
- Deflagration analysis, calculation, and mitigation documents

- AHJ
- FM Global

(END)

BATTERY ENERGY
EXHIBIT A - STORAGE (BESS) SPECIFICATION FOR BIG PINE KEY BESS

December 2, 2025
REV. 0

Revision Index

Revision	Date	Purpose
0	12/02/2025	ISSUED FOR BIDS

Table of Contents

SECTION 1 – DEFINITIONS

When construing this Exhibit A, the following words and expressions shall have the following meanings hereby assigned to them:

1.1 "AHJ" means Authorities Having Jurisdiction.

1.2 "BESS" means the Battery Energy Storage System comprised of several Batteries and associated Equipment and Materials.

1.3 "BMS" means the Battery Management System.

1.4 "BOL" shall mean Beginning of Life of the facility

1.5 "BOP" means Balance of Plant, a term used to describe all installed infrastructure (auxiliary and support systems) within the BESS facility, including the interconnection equipment to bring the system on-line.

1.6 "BTM/FTM" means Behind The Meter/Front of The Meter, which indicates the location of the BESS with respect to its position within the grid.

1.7 "COD" means the Commercially Operable Date for the facility, when the equipment is ready to charge and discharge from the grid.

1.8 "EMS" means Energy Management System, which is a system that controls the power of the BESS (and its flow).

1.9 "EOL" shall mean End of Life of the facility for a 20 year term.

1.10 "FMPA" shall mean the Florida Municipal Power Agency.

1.11 "FMPP" shall mean the Florida Municipal Power Pool.

1.12 "HMI" means Human/Machine Interface, an interface through which a human can interface with a machine performing a specific operation.

1.13 "IFC" means Issued For Construction.

1.14 "KEYS" means Keys Energy Services, the public power utility in the lower Florida Keys.

1.15 "LVRT" means Low Voltage Ride Through for the ability to remain connected to the grid during temporary, short-term drop in grid voltage.

1.16 "MW/MWH" means Megawatt and Megawatt Hour, respectively. These are two units of energy measurements applicable to the commissioned BESS.

1.17 "O&M" means Operation and Maintenance, the general terms of operation and maintenance required for the BESS to operate correctly and in a safe manner.

1.18 “PCS” means Power Conditioning System, a type of device that converts electrical power from one form to another.

1.19 “POI” means Point of Interconnection, the physical location on the power system at which the BESS is connected to the utility grid.

1.20 “RTE” means Round Trip Efficiency for the entire BESS system measured at the Medium Voltage POI Meters and is defined as the ratio of the full energy discharged versus the full energy charged for the system.

1.21 “SCADA” means Supervisory Control And Data Acquisition, a computer system used for gathering and analyzing data, which subsequently controls connected equipment (if necessary).

1.22 “SOH” means a measurement of a battery's current capacity relative to its original capacity, expressed as a percentage.

1.23 “SPCC” stands for Spill Prevention, Control, and Countermeasure.

1.24 “SWPPP” stands for Stormwater Pollution Prevention Plan.

1.25 “System” includes Batteries, a PCS and an EMS.

1.26 “Total system losses” indicates all electrical losses between the BESS AC inverter terminals and the POI, 13.8kV Line Breaker. These include transformer and cable impedance losses and line losses (gen-tie line back to interconnecting utility).

– END OF SECTION 1–

SECTION 2 – GENERAL SYSTEM DESCRIPTION AND REQUIREMENTS

The intent of Section 2 of this Exhibit A is to outline the general requirements for the supply and installation of the Project for the Owner at the Site. The Project, including the necessary interconnection facilities required, is to be designed, delivered, installed, commissioned and tested per the provisions and requirements of the agreement, including this Exhibit A. Contractor shall be responsible for providing a full turnkey facility including but not limited to the engineering, procurement, construction, delivery and testing of the Project. The Owner will assume operational control and ownership of the BESS facility at Substantial Completion, upon successful completion of all Acceptance Tests.

This exhibit is not intended to technically describe all details on the engineering and/or construction of the equipment to be supplied, but to provide design details and performance standards in the areas that the Owner deems to be important. The design, engineering, construction, supply and testing of all components not specifically called out in this exhibit, must conform to all applicable industry standards and meet all applicable federal, state, and local laws.

This specification consists of 12 Sections defined as follows:

- Section 1 is a description of the definitions used throughout Exhibit A.
- Section 2 is a description of general information and requirements.
- Section 3 is a description of the battery technical specification.
- Section 4 is a detailed specification of the power conversion system and medium voltage transformer.
- Section 5 is a description of the energy management system requirements.
- Section 6 is a description of the balance of plant specification.
- Section 7 is a description of the fire technical specifications.
- Section 8 is a description of the cyber security technical specification.
- Section 9 is a description of the Contractor’s guarantees.
- Section 10 is a description of the O&M service requirements for the BESS.
- Section 11 is a description of the commissioning and testing of the BESS.
- Section 12 is a list of codes, standards, conceptual plans and reference documents applicable to this specification.

2.0 GENERAL SCOPE OF WORK

2.1 Contractor shall be responsible for the design, engineering, fabrication, delivery, civil works, erection, installation, testing, commissioning and field verification of the Project and associated components, including all activities delineated in Section 2.0 below, specifically:

2.1.1 Delivery of all equipment under the Scope of Work to the Site as well as the civil works, erection, installation, assembly, connection, commissioning and field verification of all equipment supplied as required to form a complete BESS system as well as the facilities required to connect the BESS to the grid, otherwise referred to as Balance of Plant (BOP) facilities that consist of the interconnection grid facilities.

2.1.2 Design studies as outlined in Section 6 (Balance of Plant) of this specification.

2.1.3 Design and installation of a proper ground mat at the Site.

2.1.4 Design details including inverter models and detailed equipment ratings required to perform control system simulation to evaluate the interaction of the BESS with Owner's local area generation, if applicable.

2.1.5 Provide input to Owner operations during the development of the operating procedures for the BESS.

2.1.6 All required ministerial plans and permits to support construction activities, other than the Owner Acquired Permits, including but not limited to SWPPP, SPCC, building, electrical, fire safety, and other AHJ approvals.

2.1.7 Operation of a fully functioning Project that meets the ratings and performance requirements defined within this exhibit, as measured at the POI, 13.8kV Line Breaker.

2.2 Contractor shall provide a list of subcontractors/vendors/system integrators supporting the various aspects of the work for inclusion in Exhibit B.

2.3 The BESS facility shall be configured as a collection of non-walk-in battery containers organized into one or more feeder circuits. All equipment shall be designed as needed to meet the requirements in this specification. Contractor shall propose a total turn-key solution for batteries, racks, PCS' consisting of inverters, transformers and primary protection, battery monitoring systems, system integrator controller, battery enclosures/containers, fire detection, protective fusing and coordination devices and any other miscellaneous hardware for a complete BESS at the project site. Contractor is responsible for the procurement of the necessary battery equipment and PCS as well as a software solution to integrate the performance and operability of the battery and PCS equipment with integration into the BESS EMS system, and shall turn over licensure of the EMS for control of the BESS system to Owner in accordance with the agreement. The BESS shall be constructed and capable of being operated in accordance with this specification, and Contractor shall facilitate integration across FMPP, KEYS, and FMPA performance specifications, AHJ and insurance requirements, all applicable codes, laws, and permits, the agreement, and in accordance with the project milestone schedule.

2.4 The BESS facility shall be designed such that the batteries are rated to support the normal (primary) auxiliary feed for the inverters, BMS loads and thermal management loads of the entire system. The emergency (back-up) auxiliary feed shall be designed to support critical loads only. The Contractor shall determine the site's critical loads, but at a minimum shall include fire protection panel loads, lighting loads, and reduced thermal management loads; in the event of a grid failure the system shall be designed to adequately support the operability of the system once the grid is restored. The back-up 480VAC auxiliary feed shall be provided via an emergency generator.

2.5 Contractor shall provide auxiliary power load requirements for the Project for Normal and Emergency Aux load provisions.

2.6 Contractor shall provide a detailed project schedule which includes the following: production periods for the PCS and BESS that support a COD, estimated permitting submission and approval dates, owner's review periods (not less than 15 days), engineering, construction, commissioning and any required outages anticipated. Contractor must provide packages for Owner's review at 30%, 90% and IFC. All proposed arrangements are required to fit in the available area. Please see "Big Pine Key BESS Layout.pdf" for more information. The BESS shall meet all the requirements discussed in this specification.

2.7 Project Performance Requirements/Guarantees

2.7.1 The Project will be held to the performance guarantees set forth in Exhibit B2.

2.8 Submission Guidelines

2.8.1 A descriptive document shall be included, which presents the proposed BESS configuration, and its compliance with the rating and functional requirements. Contractor shall include all assumptions and identify the methodology used for calculation of fundamental frequency and harmonic stresses and system performance. Contractor shall include applicable EMTP-RV (provided in filetype ".ecf"), PSCAD (provided in filetype ".pscx"), PSLF (provided in filetypes ".dyd and .epc") and PSS/E (provided in filetypes ".dyr and .raw") models.

2.8.2 A single-line diagram of the Project shall be included. Please see the overall "FMPA BIG PINE KEY BESS ONE LINE.pdf" included for information. The single line diagram shall include required BOP components necessary to connect the BESS to the grid, in addition to estimated conductor sizes and quantities for AC and DC cables including approximate length, fuse sizes, AC and DC and location, switch ratings, breaker ratings, transformer ratings and impedance, protective relaying devices, metering devices and CT/PT ratios. Single-line diagram shall include identification of aux power design, location of aux meters, and connections to BESS and EMS. Communication medium to interconnecting utility shall be identified on the drawing. Single-line diagram shall also include identification of the additional components needed to support augmentation, if required to maintain system requirements through end of life.

2.8.3 A protection block diagram of the Project shall be included. The purpose of the protection block diagram is to identify the layers of protection inherent in the BOP and BESS facilities. This shall include identification of the mechanical, thermal and electrical protection elements in the system along with a representation of how these elements interact with the EMS, BMS, PCS fire protection panel and associated system, and SCADA.

2.8.4 The audible noise levels, with consideration of the AHJ noise ordinance, and the proposed BESS layout, shall be presented. This description shall also give the principles of the methodology used for calculation of noise levels.

2.8.1 The reliability and availability of the proposed BESS shall be addressed. Results of availability calculations shall be presented, along with the assumptions taken and methodology used.

2.8.2 The layout drawing shall include the proposed Project, the location of the main components, as well as any future augmentations to the system. Please see the overall "FMPA BIG PINE KEY BESS ONE LINE.pdf" included for information. A plan of the BESS enclosure shall also be provided. The site layout drawing shall include the battery containers arranged with their associated PCS in power blocks to demonstrate the capacity to add augmentation equipment as required.

2.9 Owner Provided Documents

2.9.1 The Owner provided documents for the project are summarized below:

2.9.1.1 Big Pine Key BESS Drawings (P1 through P6)

2.9.1.2 Existing Big Pine Substation Geotechnical Report

2.9.1.3 BESS Input Sheet (xls)

2.9.1.4 13.8kV Line Recloser

2.9.1.5 Owner Cybersecurity and Controls Requirements (TBD)

2.9.1.6 Lighting Specifications

2.9.1.7 Documentation of Buried Utilities

– END OF SECTION 2–

SECTION 3 – BATTERY TECHNICAL SPECIFICATION

3.0 BATTERY TECHNICAL SPECIFICATION

3.1 BATTERY SYSTEM PARAMETERS

3.1.1 The Contractor shall provide power system computer aided design (PSS/E™) models of their proposed modules for use in verifying that the Interconnection Point rating is met.

3.1.2 The Contractor shall ensure that minimum RTE at BOL for the facility is 90% and the EOL for the facility is 87.5% at the POI, 13.8kV Line Breaker.

3.1.3 Allowable System Losses for Lithium Ion Batteries (One-way PSCAD):

System Efficiencies	Efficiency at BOL	Efficiency at EOL
Medium Voltage Transformer Efficiency (2 stages)	99.50%	99.50%
MV Collection and Line Losses to POI	99.25%	99.25%
High Voltage Main Generator Transformer (per attached GSU specification)	99.50%	99.50%

3.1.1 The System shall be designed to maintain ninety-eight percent (98%) technical availability for equipment under Contractor's scope, excluding scheduled maintenance. See Section 9 for additional required Performance Guarantees.

3.2 BATTERY REQUIREMENTS

3.2.1 The Contractor shall supply batteries and connections. Specifications are to be provided by the Contractor. Terminations and interconnects shall have adequate current carrying capacity and shall be designed as specified.

3.2.2 The System shall be designed to achieve the required storage capacity (MWh) at the end of life. The Contractor shall determine if this will be achieved through margin, augmentation or replacement. If required, the Contractor shall be responsible for the augmentation or replacement of the System to maintain the AC output throughout the Term of the agreement. All augmentation or overbuild margin shall be located in the same initially specified footprint/parcel area as defined in Section 3 subsection 2.5 of this Exhibit A. All augmentation design shall comply with the Battery Vendor requirements.

3.2.3 If capacity is to be maintained by augmentation, the Contractor shall provide an augmentation program six months prior to Substantial Completion and provide an update plan three months prior to the Substantial Completion Date, every year and up to the Term of the agreement. The plan shall include the number of additional battery units that need to be added to the system over the remaining Term of the agreement and how each existing battery units will be revised (if applicable) to account for the displaced modules, the space required, and potential layout required.

3.2.4 The battery system components (e.g., enclosures) are required to fit within the Site. The Contractor can modify the conceptual Equipment layout to accommodate their Design, however, the Site area is fixed, and no additional area shall be available without the Owners explicit written approval, which may be given or withheld at Owner's sole discretion. Proposed Equipment layouts shall consider at a minimum: System Equipment footprints, auxiliary buildings/enclosure footprints, minimum Equipment clearances, minimum space required for hot air venting, construction access, temporary equipment laydown areas, and maintenance access.

3.2.5 Aisle spacing between enclosures shall conform to the applicable codes and allow clearance for maintenance and module removal (if applicable).

3.3 RAMP RATES

3.3.1 A minimum Ramp Rate of at least 10% of the System's dispatchable name plate capacity (MW rating) per second over the duration of the contract is required.

3.3.2 The maximum allowable ramp rates (MW/sec) are specified in Attachment 1 of this Exhibit A.

3.4 SYSTEM RESPONSE TIME

3.4.1 The system shall be able to respond to any dispatch instruction within 1 second. System response time defined as time from receipt of dispatch instruction by Contractor EMS to full response to the direct power command in system output under ready mode of the BESS, measured at the MV BESS meter.

3.5 SYSTEM RAMP RESPONSE

3.5.1 The system during charging and discharging modes shall maintain the control signal until it receives a responding measurement value at the POI, 13.8kV Line Breaker reaching within 2% of the Maximum Discharge (MW) or Maximum Charge (MW)

3.6 STARTS AND OTHER RUN TIME LIMITATION REQUIREMENTS

3.6.1 Start limitations: None

3.6.2 Run time limitations: In addition to any limits imposed by the operational characteristics, the System will be limited to two full discharge cycles per day at the Interconnection Point, and two full charge cycles per day.

3.6.2.1 The minimum run time after a discharge start-up is: 1 second

3.6.2.2 The minimum run time after a charge start-up is: 1 second

3.6.2.3 The minimum down time after a shutdown is: 1 second

3.7 SYSTEM APPLICATIONS

3.7.1 At normal efficiency mode, the full Contract Capacity shall be available to provide any of the below ancillary or energy arbitrage services:

3.7.1.1 Energy arbitrage

3.7.1.2 Peak Shaving

3.7.1.3 Transmission congestion mitigation

3.8 BATTERY ENCLOSURE REQUIREMENTS

3.8.1 Labeling of the battery rack or module shall include manufacturer's name, cell type, nameplate rating and date of manufacture, in fully legible characters or quick response (QR) code. Labeling shall adhere to ANSI standards and be suitable for outdoor, coastal applications.

3.8.2 The battery wiring shall be sized with adequate capacity and protection for individual cells as well as distinct areas of the DC system in accordance to NFPA 70, and the NEC. The wiring shall have stranded copper or aluminum conductors with flame retardant thermo-plastic insulation rated at 90°C in accordance to NFPA 70, and the NEC.

3.8.3 Battery cells, racks, and wiring shall be insulated for the maximum expected voltages plus a suitable factor of safety as specified by the Contractor, as well as NFPA 855 and NFPA 70.

3.8.4 Batteries, racks and connections shall meet all standards, codes, and requirements set forth under Section 12.

3.8.4.1 All enclosures and conductive members of the modules shall be solidly grounded.

3.9 BATTERY TESTING

3.9.1 As part of the performance guarantee, annual pre-scheduled capacity tests are required. Each Battery will be fully charged prior to the annual capacity test.

3.9.2 See Section 11 of this Exhibit A for additional testing requirements.

3.10 BATTERY ENERGY MANAGEMENT SYSTEM

3.10.1 Battery Management System

3.10.1.1 The BMS design shall protect the battery and interconnected power system from malfunction and component failure during both charging and discharging.

3.10.1.2 The BMS design shall include monitoring circuits and data systems for the following parameters:

3.10.1.2.1 Battery string currents and voltages;

3.10.1.2.2 Battery module temperatures

3.10.1.3 As an option, include BMS monitoring circuits for battery module current, voltage, conductance, and impedance. Specify the impact these capabilities will have on system reliability and BMS response time.

3.10.2 The BMS shall provide the following control functions:

3.10.2.1 Battery string balancing to equalize the state of charge among the different strings.

3.10.2.2 State of Health (SOH) algorithm which estimates degradation based upon the key operational parameters.

3.10.2.3 Identifies anomalous data points or trends and alarms impending failure (thermal runaway, accelerated capacity fade, etc.)

3.10.2.4 Isolates a string or module if required.

3.10.2.5 Provides degradation value (% fade).

3.10.2.6 Ensures the battery is following charge and discharge algorithms.

3.10.2.7 State of Charge (SOC) algorithm which infers SOC based upon key operational parameters.

3.10.2.8 The BMS shall be capable of communicating with the energy management system (EMS). The BMS shall monitor battery module voltages. Voltage imbalances between modules can indicate a problematic cell or cells within a module. If the voltage imbalance is found to be in excess of the battery manufacturer's recommendations, the BMS shall take protective action by isolating the module and battery rack from the total system to avoid an unsafe operating condition.

3.11 THERMAL MANAGEMENT SYSTEM

3.11.1 System Sizing

3.11.1.1 The heating and cooling required for each BESS Enclosure shall be designed to be compliant with the governing codes and standards applicable to liquid filled close loop systems, and adequately sized for the environment in which the equipment will be operating.

3.11.2 Energy Efficiency

3.11.2.1 The overall design of the thermal management system and the system equipment and components shall meet the applicable requirements of ASHRAE 90.1 and local energy codes.

3.11.3 Fire Protection

3.11.3.1 The design of the thermal management systems shall meet the applicable requirements of the AHJ and Section 7 subsection 8 of this Exhibit A.

3.11.4 System Controls

3.11.4.1 The thermal management system shall be controlled by an automation system and any system alarms and status shall be wired to the system EMS and SCADA networks.

3.11.4.2 The thermal management system controls shall meet the applicable requirements of ASHRAE 90.1 and ASHRAE 135 (BACnet).

3.11.5 Environmental Design

3.11.5.1 See Attachment 1 for Environmental Design requirements

– END OF SECTION 3–

SECTION 4 – POWER CONVERSION SYSTEM AND MEDIUM VOLTAGE TRANSFORMER SPECIFICATIONS

4.0 TECHNICAL REQUIREMENTS

4.1 System Criteria

4.1.1 The power conversion system (PCS) is a component of the System that includes the inverters and direct coupled medium voltage transformers. This will be connected to the Interconnection Point via a main pole mounted recloser to connect to the dedicated 13.8kV feeder to the Big Pine Substation. The System rating and system parameter assumptions shall meet utility RFP requirements, as well as be compliant with all applicable grid codes.

4.2 Design Requirements

4.2.1 Each PCS shall be of a rating to support / complement the battery strings and consist of quick response, bi-directional utility grade inverters, and transformers and transformer primary protection. The inverters shall provide reactive power during undervoltage and overvoltage power scenarios. All PCS components shall be housed in the same enclosure.

4.2.2 If Contractor proposes a BESS container that has integral string inverters then the inverter requirements herein apply but the MV transformer shall be a separate, free standing component.

4.2.3 Contractor shall provide PCS' that meet all requirements set forth herein.

4.2.4 Contractor shall provide a quantity of PCS to meet the capacity required herein.

4.2.5 Contractor shall provide an PCS design to perform the intended functions specified herein, which will assure compliance with the utility's operating requirements in Section 6 of this Exhibit A.

4.2.6 Contractor shall optimize the selected PCS for the ambient conditions to account for derating. See Attachment 1.

4.2.7 Performance testing for PCS system shall be measured by the Owner at the POI.

4.2.8 Contractor shall certify that the proposed PCS' connected to their respective battery containers will fit into Owner's allocated available area and shall perform as contractually expected for the duration of the contract.

4.2.9 All equipment to be maintained at 10' above sea level to accommodate a 2' reveal over the FEMA 8' 100 year flood plain.

4.2.10 The integrated BESS shall be able to regulate power at the POE.

4.3 Grounding

4.3.1 The PCS grounding design shall be coordinated with the System grounding grid design.

4.3.2 PCS shall be designed so that it will provide personnel protection for step and touch potential in accordance with IEEE standards. The PCS protection shall be adequate for the detection and clearing of ground faults.

4.3.3 All exposed non-current carrying metal parts in the PCS shall be solidly grounded at multiple connection points. Contractor shall make best efforts to prevent corrosion at the connection of dissimilar metals such as aluminum and steel.

4.3.4 Contractor shall ensure that the PCS is adequately protected from lightning by including appropriately sized surge suppression devices.

4.4 Utility Grade, Bi-Directional Inverters

4.4.1 Inverters shall regulate the power level at the inverter output (e.g. via a power measurement or current transformer (CT)/potential transformer (PT) closed loop feedback control, or equivalent method).

4.4.2 Contractor shall provide a PCS system that is able to achieve full power rating across the entire AC voltage range (+/- 10% of rated).

4.4.3 Contractor to provide optional pricing for inverters to support a grid-forming type system, capable of operating in an islanded condition. The inverter shall include devices capable of interrupting line-to-line fault currents and line-to-ground fault currents.

4.4.4 The inverters shall include all necessary self-protective features and self-diagnostic features to protect the inverter from damage in the event of component failure or from parameters beyond normal operating range due to internal or external causes. The self-protective features shall not allow the inverters to be operated in a manner which may be unsafe or damaging. Faults due to malfunctions within the inverter or system equipment shall be cleared by the inverter over-current protection device.

4.4.5 The inverter AC output shall be protected by a suitably rated 3-phase AC Circuit breaker.

4.4.6 The inverters shall be directly coupled to appropriately sized step-up transformers that are compatible with the inverters being provided, prevent adjacent inverter crosstalk or voltage spikes during operation and damaging transients, be capable for a 20-year design life with minimal maintenance and have sufficient electrostatic protection and proper grounding methods.

4.4.7 The inverter grounding system shall be designed so that it will provide personnel protection for step and touch potential in accordance with IEEE standards. The system shall also be adequate for the detection and clearing of ground faults. The inverter grounding system shall also be adequate to dissipate any power system electrical transients produced by the BESS. All the exposed non-current carrying metal parts in the inverter package shall be solidly grounded. The inverters shall be adequately protected from lightning such that neither inverters nor components fail.

4.4.8 Except for the requirements set forth elsewhere in this scope of work, in the event of a grid-failure or large disturbance, the inverters shall automatically disconnect from the system network. The system shall be designed with an LVRT window, as required by IEEE 1547, and any applicable grid codes. The inverter shall be capable of islanding detection by both passive (over- and under-voltage or frequency) measures and at least one active measure, as required. For these faults the inverter shall have the capacity to shut down and automatically disconnect from the grid. The inverters shall have the capacity to remain synchronized during allowable voltage variations resulting from faults on the transmission network.

4.5 Medium Voltage Transformer

4.5.1 Medium voltage step-up transformers shall be paired to the inverter(s) to provide AC power at voltage and power factor as specified in the data sheets provided in Attachment 2.

4.5.2 If the battery containers proposed include integral string inverters and provide an ac output, the transformers shall be free standing separate components.

4.5.3 Medium voltage step-up transformers shall be painted, all stainless steel construction per KEYS specifications.

– END OF SECTION 4–

SECTION 5 – SCADA SYSTEM REQUIREMENTS

5.0 GENERAL REQUIREMENTS

5.1 Scope

5.1.1 The Contractor is responsible for the design and integration of supervisory control and data acquisition (SCADA) systems associated with the Project, including but not limited to the balance of plant (BOP) SCADA System, interconnecting equipment (recloser, etc.), Battery Energy Management System (EMS) and interfacing back to the Owner's RTU.

5.1.2 The Contractor is responsible for the design and integration of the EMS for control of the BESS, along with monitoring all systems and battery performance indicators. The EMS system shall be designed to be observed and controlled remotely at the Owner's main control room via Owner's RTU. After commercial operation date (COD) and when the site is commercially operational, Contractor shall maintain outside access to the EMS system and SCADA networks for remote monitoring, remote troubleshooting, and warranty monitoring under Long Term Services agreement.

5.1.3 The Contractor shall be responsible for the overall management of the system integration and the EMS design for equipment under Contractor's scope, and shall lead all meetings when they occur and shall manage action items assigned for all parties.

5.1.4 The Contractor shall provide an Ethernet link (Modbus TCP/IP) from the RTU to the new System. The System will require an interface to the PI server via network cabinets with access to the control network. The Contractor shall include network connections and software to get the necessary data onto the control network.

5.2 Deliverables

5.2.1 For the BOP, the Contractor will create, maintain, and submit for reviews a SCADA points list and associated SCADA system map.

5.2.2 The SCADA points list(s) will include status of all equipment, communications both internal and external, metering points, control points, alarms, operational performances, operational calculations, and operational functions as required.

5.2.3 The SCADA points list(s) shall capture all required monitoring information identified in the BOP and the interconnect equipment sections.

5.3 SCADA SYSTEM COMPONENTS

5.3.1 RTU

The SCADA development for the System includes the programming for the Owner's RTU. The Owner's Master remote terminal unit RTU will interface with the following:

5.3.1.1 Battery Facility Energy Management System (EMS)

5.3.1.2 Outside data recipients (System Operator and Interconnect Utility)

5.3.1.3 Mapping of information to the appropriate ports for transfer and mapping of the information to the network will preside over a switch in the BESS Station Control House and at switch at the System operation center on site.

5.3.1.4 The RTU shall allow real-time connectivity with all systems that it is receiving information from and transmitting information to.

5.3.1.5 The SCADA system shall support inputs and outputs to exchange information concurrently with all sub-systems that it is connected to.

5.3.1.6 The Contractor will supply a final list of IO points and calculated values to Owner in electronic form three (3) months before SCADA commissioning. The list must contain, but not limited to the following:

5.3.1.7 Suppling Device Name / Address

5.3.1.8 Point Name

5.3.1.9 Point Description

5.3.1.10 Port Assignment

5.3.1.11 Variable Type

5.3.1.12 Minimum Value

5.3.1.13 Maximum Value

5.3.1.14 Engineering Units

5.3.1.15 Sampling Interval

5.3.1 Autonomous Functions

5.3.1.1 A simplified description of the required autonomous functions is presented below. Contractors shall verify that autonomous functionality required to meet the desired usage cases is included. Contractor shall provide a detailed description of how their proposed system will function to implement these features.

5.3.2 External Override Functions

5.3.2.1 The main use case of the system is manual dispatch by Owner operators. When operated in such a manner, this may temporarily reduce some of the autonomous function scale. A simplified description of the necessary controls is presented below. The communication mechanism for this control shall come across the EMS for dispatch of the SCADA system. Contractor shall provide a detailed description of how their proposed system will function to implement these features. All set points shall be configurable and viewable by remote SCADA control and locally via the local HMI system.

5.3.3 Remote Monitoring and Control

5.3.3.1 The RTU shall operate as the master controller over the PCS Equipment & Batteries. The System software must operate in a manner designed to monitor, optimize and protect the battery asset. Optimization shall include but not be limited to controlling state of charge for efficiency and battery life. Software will perform a closed loop control to maximize PCS accuracy within two (2) seconds.

5.3.3.2 The SCADA system shall control the PCS to perform the specified and intended functions of the System. The SCADA system controller shall also interface with the BMS and the EMS. Owner shall coordinate SCADA communication requirements with the Contractor to insure compatibility between communication systems. The Contractor shall perform a mock simulation of the SCADA system to confirm functionality of the system. This mock simulation will include a demonstration of the SCADA system and its ability to follow control or demand signals.

5.3.3.3 Contractor shall provide periodic technology upgrades and provide a plan to expand the capabilities of the System software controls.

5.3.3.4 Owner shall have direct access to all relevant I/O, data points, data maps, and tuning constants contained within the site master controller.

5.3.4 Remote Telemetry Requirements

5.3.4.1 The SCADA system shall provide real-time status, condition and variable performance data to Owner's RTU

5.3.4.2 Owner will approve the network interface hardware and protocols for the System.

5.3.4.3 SCADA system shall allow remote operation and resets by Owner.

5.3.4.4 All communication and SCADA shall be compliant with all NERC standards at time of initial operation (i.e. Critical Infrastructure Protection or CIP). Owner shall coordinate SCADA communication requirements with the Contractor to ensure compatibility between communication systems.

5.3.4.5 Contractor shall provide a list of input and output data that will interface with Owner's SCADA System. The list shall include the following information as a minimum:

a. Point Number & Tag Name

b. PLC Modbus Address

c. PI Modbus Address

d. Data Point

e. Data Point Description

f. Type of Signal (Analog/Digital)

g. Owner Access (Read/Write)

h. Units (e.g. Amps, Volts, kW, kVAR, etc.)

i. Data Type (e.g. uint16, int16, bool, etc.)

j. Comments Section

k. Minimum range (e.g., -32,767)

l. Maximum range (e.g., 32,767)

m. Scaled minimum (e.g., -20)

n. Scaled maximum (e.g., 20)

o. Scaling (e.g. x10)

5.3.4.6 The SCADA system, while operating relatively autonomously shall be required to communicate with the Owner's control system in several ways. The System shall be required to implement robust SCADA functionalities both for communication with Owner operators and data collection. Contractor shall include in their response a description of how their proposed system will implement these features. In addition, all setpoints shall be configurable and viewable by the remote SCADA control and locally via the local HMI system.

5.3.4.7 Contractor shall install Fiber Distribution Panels (FDP) and fiber optic cables as needed for communications requirements. Contractor will provide and terminate fiber to the System on a fiber to serial converter. Contractor will be responsible for termination of serial to their RTU. The protocol of this connection will be DNP3.0.

5.3.4.8 Owner will provide a maximum of 1 network switch, 1 fiber-Ethernet converter and 1 fiber-serial converter.

5.4 HMI

5.4.1 The Contractor is responsible for the complete programming including graphical representations of the system to be displayed on the HMI screens.

5.5 SCREEN CONTENT

5.5.1 The home screen shall represent accurately the site single line electrical schematic. It shall contain graphics and data representing:

5.5.1.1 Name of the facility

5.5.1.2 Current local time

5.5.1.3 Interconnection Point

5.5.1.4 Interconnection Point VAC

5.5.1.5 Revenue meters

5.5.1.6 Identification of any equipment out of service

5.5.1.7 Status of each breaker

5.5.1.8 Actual measured values shall be displayed for total site real MW out and separately MW in (each is positive)

5.5.1.9 System MW

5.5.1.10 System MVAR

5.5.1.11 System mode (charging/discharging)

5.5.1.12 Site power factor as read from the MV BESS Meter for each feeder real kW, VAC, amps

5.5.1.13 Feeder status (open/closed)

5.5.1.14 Identification if primary breaker has tripped

5.5.1.15 Available energy kWh

5.5.1.16 Module fan alert

5.5.1.17 All screens shall contain the name of site and the name of the displayed screen

5.5.2 System Alarms

Energy being exported and related parameters like amperage parameters shall be shown as a positive value when registers exist for both exported and imported energy. When the register is only for a net value, a negative value will indicate the direction of 'into' the Facility.

The main screen shall represent accurately the site single line electrical drawing and will display:

5.5.2.1 Real kW

5.5.2.2 VAC out

5.5.2.3 Amps AC out

5.5.2.4 Amps AC in Battery available energy

5.5.2.5 MP Internal Battery Temperatures (17 per MP) Operating mode (charging/discharging)

5.5.2.6 Fault description

5.5.2.7 Alarms shall be displayed at the operator interface and communicated via the Owner's RTU to the Owner's facility and site operators

5.5.2.8 The values for all measured and calculated points shall be available on a screen except for intermediate calculation values

5.5.1 Any screen shall be accessible from the homepage with five (5) select operations (mouse click or keystroke) or less.

5.5.2 Any displayed value will have a label preceding it and describing its source using equipment ID information and the value will be followed by the appropriate unit abbreviation.

5.5.3 Screens shall open and present current data within five (5) to thirty (30) seconds.

5.5.4 All screens shall include labels and icons that are definitive in all states. For example, for a label "Breaker Closed" or "Breaker Open", an icon for the breaker shall be included that is identifiable in both the open and closed positions. The icon shall show the "open position" or "closed position" and the label shall be definitive and change with the actual state of the breaker. The appropriate color codes shall be incorporated in the icons and labels.

5.5.5 Color codes:

5.5.5.1 Red = IEC State IAOGFP, Full Performance, Breaker Closed.

5.5.5.2 Orange = IEC States IAONG (TS, EN, RS, EL), Breaker Tripped, Waiting on Resource

5.5.5.3 Green = IANO (SM, PCA, FO, S), Off, Breaker Open,

5.5.5.4 Yellow = Parameter(s) in Alarm,

5.5.5.5 Yellow Flashing = IEC State IU, Bad Quality, Bad Com, Value out of limits, AC disconnect status

5.6 HMI ALARMS/EVENTS/LOGGING NOTIFICATIONS

5.6.1 There shall be an alarm category that represents any station fault events. It shall contain:

5.6.1.1 Date

5.6.1.2 Time

5.6.1.3 Substation fault description

5.6.2 There shall be an event category that represents any station equipment state changes. It shall contain:

5.6.2.1 Date

5.6.2.2 Time

5.6.2.3 Device name

5.6.2.4 State description

5.6.3 There shall be an alarm category that represents any System events. It shall contain:

5.6.3.1 Date

5.6.3.2 Time

5.6.3.3 Event description

5.6.4 There shall be a Log entry notification for each event.

5.6.5 A log shall contain these alarms/events and filters shall exist in the log that allows these categories to be viewed separately on an operator terminal.

5.6.6 An alarm acknowledgment method must be implemented and documented as a log entry.

5.7 EMS

5.7.1 The Contractor shall provide an EMS for the site capable of controlling the inverters and monitoring the overall system health and operations of the battery racks. The EMS shall comply with FMPP, Keys, and FMPA System

Operator requirements.

5.7.2 All instrumentation and control equipment shall be a modern proven design and shall achieve a high level of availability and ease of equipment maintenance. The hardware shall be selected from manufacturers who commonly supply electrical generation utilities. Standardization of instrumentation and controls hardware shall be observed, to the extent practical, throughout the System.

5.7.3 Local single loop control shall only be used with the specific approval of the Owner.

5.7.4 Owner may request optional pricing for additional capabilities to take advantage of additional System use cases.

5.7.5 The EMS must include at least one (1) HMI within the operation control center located in the central control room at the Owners facility

5.8 System EMS Control Functions

5.8.1 The controller shall be capable of controlling the following parameters, as measured at the POI at a minimum to the following:

5.8.1.1 System to be capable of operating at Power factor, between -0.85 lagging and +0.90 leading; for site performance requirements Power factor between +/- 0.95 at the POI.

5.8.1.2 Voltage at the Interconnection Point from 0.90 pu to 1.10 pu

5.8.1.3 Respond to AGC control signals from the Owner.

5.8.1.4 Respond to PF, Voltage, Energy and Power change commands as required and measured at the POI.

5.8.1.5 Power curtailments (kWs) with one percent (1%) resolution from zero percent (0%) to one hundred (100%) of maximum inverter output

5.8.1.6 Reactive power VAR control, produce inductive or capacitive VARs within the full limitations of the inverters

5.8.1.7 The controller shall have an adjustable ramp rate controller capable of adjusting the charge and discharge rate.

5.8.1.8 The controller shall be capable of controlling the plant in less than one (1) second from command received by the controller to the new output first reaching within 2% of the power command value

5.8.1.9 Controller shall be capable of controlling the local recloser, via a communication link to the SCADA network.

5.8.2 The design of the EMS shall:

5.8.2.1 Provide control, monitoring, alarming, data acquisition, logging, reporting, historical storage for up to one (1) year, function, and trending for the System.

5.8.2.2 Following any storage rating test, Contractor shall submit a testing report detailing results and findings of the test in accordance with Exhibit B. The report shall include meter readings and digital plant log sheets verifying the operating conditions and output of the System.

5.8.2.3 Provide coordination of operation of the BMS and associated auxiliary equipment.

5.8.2.4 Be designed for automatic control of the System from start up to charging, discharging, as well as permitting the operator to initiate manual commands.

5.8.2.5 Allow for the System to be initiated, controlled, and monitored from the power station's existing control room by Owner's RTU.

5.8.2.6 Shall allow the startup, shutdown and all control functionality of the System by a single operator.

5.8.2.7 Allow for remote operations (monitor, control, etc.) from the Facility's main control room and a battery control center by Owner's RTU via Modbus TCP/IP or DNP3 communication protocols.

5.8.2.8 Include the ability to be integrated with Owner's existing communication and/or control systems via Modbus TCP/IP or DNP3 communication protocols.

5.8.3 The EMS shall include supervisory controls of the BMS operation and monitoring, battery operating condition indication and displays to advise operating personnel of the current operating status of the System and to enable the operator to take over the manual control of the System from the local control room, main control room, or remotely in the event of an emergency or System upset conditions.

5.8.4 The EMS shall be utilized, to the maximum extent practical, for control of the BESS equipment. The control consoles furnished as part of the EMS shall provide the control room interface with the process. Local manual backup of EMS controls is not required. Where process equipment is furnished with its own packaged controls, including but not limited to, the BMS, thermal management system, fire protection, and instruments, these devices shall be interfaced with the EMS as required to provide data for monitoring, logging, control, to annunciate alarm conditions, and to communicate EMS commands and responses to and from the packaged controls as required. The following features shall be included at a minimum:

5.8.4.1 Performance monitoring shall be limited to primary process data presentation to the operator/System engineer. Round Trip efficiency calculations and temperature monitoring are required.

5.8.4.2 Permissive displays shall be provided for all equipment which requires permissives or interlocks. Displays shall provide a dynamic listing of the conditions which must be met for a designated piece of equipment to start or operate.

5.8.4.3 The control system shall have provisions to receive megawatt demands for operator entered settings, remote dispatch settings or internally generated contingencies.

5.9 EMS HMI

5.9.1 The EMS HMI will include the following at a minimum:

5.9.1.1 System available energy in operation mode (charging / discharging)

5.9.1.2 Inverter power (kW, kVAR, pf), state, alarms and inverter control.

5.9.1.3 Medium voltage transformer top oil temp, pressure, and temperature alarms

5.9.1.4 Check meters

5.9.2 A single line diagram shall be included showing current, voltage, power, alarms, and breaker status

5.9.3 EMS shall have a historian capable of storing one (1) second data for up to one month on site and three (3) years remotely and shall have real time trending and graphics for analysis of the monitored points.

5.10 IT

5.10.1 Owner’s information and technology (IT) department will provide their requirements in the form of a parts list and required IP address after contract award.

5.11 ACCEPTANCE TESTING

5.11.1 Factory Acceptance testing may be required prior to shipment of equipment. Owner’s engineers may visit factory and test equipment operability.

5.11.2 Site Acceptance Testing in accordance with Exhibit B will be required and performed on Site in the final configuration of installation. Full operation is required at this time as well as all documentation and training.

5.12 SCADA/EMS OPERATIONS MANUAL

5.12.1 The SCADA and EMS Operations Manuals are to provide a detailed overview of the appropriate system including information on hardware devices, communication protocols, addressing, and physical and logical connections.

5.12.2 The manuals shall include data maps depicting each point of data, the assigned addresses of each data point as it relates to each device in the system, and how the data is communicated to and from those devices. Each data point is described with its origin, use, destination and description. A data table derived from the final test documents shall suffice if approved by Owner.

5.12.3 As part of the operation manuals, communication diagrams shall be included that indicate all devices pertaining to the system and distinguishing between the different protocols and signal types being utilized. All addressing and port assignments are to be provided on the drawing as well as in a table format within the operation manual. Contractor shall supply all relevant communication settings, including but not limited to baud rates, parity, and polling settings.

5.12.4 All Ethernet devices must have their hostnames, IP addresses, routing setups, subnets, DNS servers, and physical port assignments depicted in table format with the manual.

5.12.5 All devices within the SCADA and EMS systems which require security logins will have their usernames and passwords recorded in an attachment to the master copy of the operations manual only, as well as any pertinent information such as security levels and restrictions. One administrator password for every device is required.

5.12.6 The Operation Manuals shall contain descriptions of the expected behavior and screen shots of all HMI screens, a table showing the HMI database (including tag names, addresses, and data sources) and an explanation of any internal scripts or logic being conducted within the HMI System. All usernames and passwords pertaining to the HMI system are provided as stated in the previous paragraph and include operating system credentials as well as runtime and development HMI levels.

5.12.7 Operation of the HMI system shall be explained, including the explanation of any symbols and color-codes being used, screen navigation, alarm system notifications and acknowledgements, time-zone management and trip and close procedures.

5.12.8 Instructions shall also be provided for the procedures to add or change screen(s). These include steps required to add points to the HMI for reading to/from connected remote devices.

5.12.9 The system shall include the software tools necessary to modify all or any parts of the SCADA system. The system shall include any and all software licenses for the life of the System and upgrades available during the warranty period (not less than one (1) year).

5.12.10 The SCADA and EMS operations manuals shall be of the entire system including all equipment that Contractor supplied.

– END OF SECTION 5–

SECTION 6 – BALANCE OF PLANT (BOP) SPECIFICATION

6.0 GENERAL

Section 6 details the design, procurement, installation and electrical equipment requirements of the Balance of Plant (BOP) for the System Facility. The design criteria and performance specifications are based on industry standards.

This Section is intended to serve as a baseline while providing flexibility for the Engineer of Record (EOR) to exercise engineering judgment about the appropriate mechanical, fire protection, thermal, electrical, structural and civil designs for the System. The requirements set out in Section 6 shall be met while designing Owner's BOP System Facility. Exceptions based on engineering judgment may be submitted to the Owner and Owner's engineer for design consideration and approval.

Minimum technical requirements to design and construct the BOP System Facility shall include but not be limited to, the following items:

a. Contractor shall provide all engineering, technical expertise, management, and supervision, to design, specify, and complete all aspects of the BOP System Facility, including but not limited to: access, interconnection up to the MV Interconnection Point, equipment, devices, materials, construction, testing, and commissioning.

b. Contractor shall have the overall responsibility for the design provided by their EOR. Both the Contractor and the EOR shall be licensed in the State of construction to perform Work for the System. Both the Contractor and the EOR are responsible to meet all requirements of the latest adopted codes and standards for the State and City of construction.

c. Contractor shall provide documentation of the testing and commissioning of each device, as well as: the receiving, handling, disassembly, and reassembly of all equipment in the BOP System Facility.

d. Contractor shall be responsible for programing and integrating all components of a standalone supervisory control and data acquisition (SCADA) system into the Owner's plant information (PI) data collection system and the station remote terminal unit (RTU) SCADA system.

e. Contractor shall be responsible for energizing the BOP System Facility, and for all components to be successfully integrated into the bulk electric grid.

f. Contractor shall be responsible for meeting all requirements of the System scope of work (SOW).

6.1 General Requirements

6.1.1 Contractor shall be familiar with the Owner's and System Operator general requirements and System specific requirements for the BOP System Facility such that it will be designed and constructed to adhere to these requirements.

6.1.2 Contractor shall be aware of all local requirements of the Authority Having Jurisdiction (AHJ). All requirements of the AHJ shall be satisfied by the

Contractor and shall be incorporated into the design and construction of the BOP System Facility.

6.1.3 Contractor shall obtain a new geotechnical report for the site as necessary to facilitate the new design.

6.1.4 The existing geotechnical report for the adjacent Big Pine Key Substation has been provided for reference. It is the Contractor's responsibility to be familiar with the geological and soil geotechnical conditions at the adjacent Big Pine Key Substation and take into account the design recommendations included in the geotechnical report provided by Owner during the bid process. Estimating errors based on wrong geotechnical assumptions shall be the burden of the Contractor, not the Owner.

6.1.5 Contractor shall be responsible for complying with all technical requirements contained in FMPA's RFP and System Operator requirements and corresponding literature that pertain to the BOP System Facility design.

6.2 DESIGN REQUIREMENTS

6.2.1 Design shall comply with the site-specific design requirements contained herein and the plans and reports provided in the scope of work (SOW).

6.2.2 Contractor is responsible for developing and submitting specifications for all equipment and materials (unless othercommiwise provided in this Exhibit A), which may be needed to design and construct the BOP System Facility.

6.2.3 The Contractor shall be responsible for adhering to the applicable AHJ's noise ordinances for all BESS components, including MV pad mount transformers.

6.2.3.1 The Contractor shall be responsible for the design and installation of a fire detection/thermal network and alarm system.

6.2.3.2 The Contractor shall be responsible for verifying that conductor types and sizes are in accordance with National Electric Code (NEC) requirements and the AHJ. In the event of differences between the national electric code and other relevant codes to the System, or any other requirements of the System, the more stringent requirements shall apply.

6.2.4 The Contractor shall be responsible for coordinating the Battery Management System with the Fire Detection system to comply with the expectations of the AHJ and the NFPA codes.

6.2.5 Contractor is responsible for all site preparation, civil, and structural work as defined in Section 6 subsection 3 of this Document.

6.2.6 Contractor is responsible for receiving at jobsite, executing a materials receipt form, and unloading all equipment. Once equipment has been placed on foundations, Contractor shall install all equipment with required accessories as shown on the contract drawings and installation manuals (unless otherwise noted). The Contractor shall also apply touch-up paint as necessary to repair any existing rust, scratches, or blemishes to delivered equipment.

6.2.7 Contractor is responsible for creating an energization and de-energization plan for safe operation of the facility. The Contractor shall coordinate with all applicable parties to coordinate the energization plan.

6.3 CIVIL AND STRUCTURAL REQUIREMENTS

6.3.1 General

6.4 This Section covers the civil and structural requirements and provides the minimum technical requirements to design and construct the facilities supporting the BOP aspects to the System, shall include but not be limited to, the following items:

6.4.1.1 Civil

6.4.1.2 Roads

6.4.1.3 Permitting

6.4.1.4 Earthwork

6.4.1.5 Earthwork Testing

6.4.1.6 Fencing

6.4.1.7 Structural

6.4.2 Civil

6.4.2.1 The Contractor is responsible for the following:

6.4.2.2 Establishing and maintaining survey control points for the duration of the Work.

6.4.2.3 All surveying, layout and control work to complete the System.

6.4.2.4 Removal and disposal of all vegetation, organic matter, top-soil, earth, sand, gravel, rock, boulders and debris required to complete the construction of the Work per the specifications.

6.4.2.5 Restoration of the land after removal of non-permanent improvements (road shoulders, lay-down areas, turnarounds, etc.) to as close to their original state as possible, including contour grading compatible with the terrain such to achieve proper water drainage across roads, etc.

Disturbed areas shall be de-compacted to a workable condition to return the areas to their pre-construction state.

6.4.2.6 Providing graded areas which are to be smooth, compacted, and free from irregular surface changes and sloped to drain.

6.4.2.7 Providing final grade adjacent to equipment and/or structures below finished slab/pad elevations and sloped away from slab/pad to maintain positive drainage (minimum one percent (1%) slope, no greater than a three percent (3%) slope).

6.4.2.8 Design, implementation and maintenance of the SWPPP requirements during construction and maintaining a log of storm events as required in the SWPPP and corrections to best management practices (BMPs) as needed. For greater clarity, Contractor's responsibility includes the submission/uploading of the SWPPP to the appropriate agencies.

6.4.2.9 Contractor is responsible for providing an SPCC Plan.

6.4.3 Roads

6.4.3.1 Contractor is responsible for the following:

6.4.3.2 Coordination with Owner and the AHJ to determine allowable haul routes over public roads that shall be used for the System. Special permits are required for US1 south of Homestead. FDOT permits are void beyond Homestead.

6.4.3.3 Conduct a visual survey to document the existing conditions of the roads to be used by the System prior to commencement of construction. Such survey should include videotaping of pre-construction conditions.

6.4.3.4 Site access shall be via existing access roads for the site that are capable of accommodating delivery. The construction traffic will be expected to observe the site speed limit during construction.

6.4.3.5 Designing of all accessways to BESS Facility, as well as the acquisition of required permitting necessary off of the Owner's property required for use by the Contractor to facilitate their construction is the responsibility of the Contractor.

6.4.3.6 Maintaining all roads for the duration of the Work. Maintenance shall include grading work and soft spot repair of access roads. Road maintenance shall comply with the requirements of the local AHJ's. If the roads are damaged during construction by the Contractor, the Contractor shall be responsible for restoring the roads back to their original condition, meeting all requirements.

6.4.3.7 Conducting a post-hauling road condition study to assess the structural condition of the haul roads identified in the transportation study after the completion of heavy and large truck traffic operations associated with the construction of the Facility (the post-construction hauling condition assessment report).

6.4.3.8 Repairing any damage to public roads as a result of its construction activities associated with Contractor's Scope of Work. Contractor shall leave the roads at construction completion in as good, or better, condition as at the start of construction.

6.4.3.9 Providing sufficient parking area for O&M trucks reasonably proportional to the BOP System Facility size.

6.4.4 Permitting

6.4.4.1 The Contractor is responsible for obtaining all ministerial permits and approvals required for construction. The Contractor should consider the following list of potential plans and permits but should not consider the list to be fully exhaustive:

6.4.4.2 NPDES Construction General Permit Coverage

6.4.4.3 Stormwater Pollution Prevention Plan (SWPPP)

6.4.4.4 Spill Prevention Control & Countermeasures Plan (SPCC) Plan

6.4.4.5 Fugitive Dust Control Plan

6.4.4.6 Construction Traffic Control Plan

6.4.4.7 Hazardous Materials Management Plan

6.4.4.8 Water Quality Management Plan

6.4.5 Earthwork

6.4.5.1 The Contractor shall perform all excavation, dewatering, subgrade preparation, earthwork, and disposal of spoils as necessary, which are necessary for constructing the site to design grade elevations and installation of all utilities.

6.4.5.2 Contractor shall ensure that all subgrade preparation, fill material placement, and utility bedding and backfill placement meets the requirements of the geotechnical report for the project.

6.4.6 Earthwork Testing

6.4.6.1 A preliminary geotechnical report will be provided by the Owner at least 2 weeks before the execution date. The Contractor will assume Owner's conducted geotechnical results and analysis.

6.4.6.2 The Contractor shall hire and coordinate with a Testing Service to assure compliance with soil material requirements for type, compaction, and moisture levels indicated within the geotechnical report and design drawings. The geotechnical report shall include, at minimum, geological properties, soil, bearing, electrical and thermal resistivity, and liquefaction.

6.4.6.3 The Testing Service hired by the Contractor shall provide a certification report at the end of construction to the Owner. The certification report shall be signed and sealed by a licensed engineer in the State where the Work is being performed. The Testing Service is responsible for establishing and implementing a suitable testing program to ensure compliance with the design drawings, specifications, and geotechnical recommendations.

6.4.7 Site Security Fencing

6.4.7.1 Temporary security fencing shall be provided by the Contractor for the BESS Facility. Contractor shall provide a temporary chain-link fence around the BESS equipment and laydown as necessary.

6.4.7.2 The Contractor shall be responsible for design and installation of permanent security fencing around the BESS facility prior to energization of the facility per NESC Substation requirements.

6.4.8 Structural

6.4.8.1 All structures, foundations, and trench for bus, equipment, and/or shielding, as required. Structural design shall be in accordance with the locally adopted building code, ASCE MOP #113, and associated standards and guides. The site shall be classified as Risk Category II, unless required otherwise by the AHJ.

6.4.8.2 Complete BESS System configured in either containers or building. The BESS Facility shall include foundations for the MV transformers, Battery Enclosures, fire detection network, Fiber and Controls Network, lighting and electrical outlets. The design of the structural, MEP, fire protection, and other building systems shall be in accordance with the locally adopted building code and other applicable codes/standards, and the requirements of the specification.

6.5 AUXILIARY POWER REQUIREMENTS FOR BOP FACILITIES

6.6 This Section outlines the necessary auxiliary power equipment and requirements.

6.6.1 Station Service

6.6.1.1 Contractor shall provide and meter separately the Aux Power Transformer for the electrical service required to serve the ancillary electric needs of the Project, including electricity for lighting, security, climate control, ventilation mechanisms, control systems, operation and other auxiliary systems necessary for operation, and maintenance of the System ("Station Use"). The Contractor shall install dedicated auxiliary power panels for AC and DC loads needed by the Project. The Contractor is to determine the size required for supporting the emergency (back-up) auxiliary system loads for the Project and provide an emergency generator to support these loads as required.

6.6.1.2 The Station Service shall be designed such that protective devices are properly coordinated and ensure that the arc-flash incident energy is less than eight (8) cal/cm2 at all locations in system for both AC and DC sources.

6.7 BOP SYSTEM EQUIPEMENT

6.7.1 General

6.7.1.1 The Contractor's SOW shall include all equipment and Work required for the System installation up to and including the MV Interconnection Point at the new 13.8kV Pole Mounted Recloser. The following shall be required in the Contractor's SOW, including but not limited to:

6.7.1.2 All engineering, fabrication and supply of the components of the System and pertinent assemblies and accessories to meet the functional requirements listed herein. Drawings required by any applicable law(s), rule(s) or regulation(s) of AHJ's shall be signed and sealed by the EOR. Necessary modifications to the existing engineering drawings and documents shall be done according to the State of construction laws and rules for such work in addition to generally accepted industry practices and engineering disclosures and procedures.

6.7.1.3 Harmonic filters as required by the specified harmonic performance levels, as required and defined by FMPP, KEYS, and FMPA. Inverter performance and associated harmonics shall be in compliance with IEEE 1547. Contractor to develop and comply with safety and site security procedures.

6.7.1.4 All power transformers required by the BESS system.

6.7.1.5 A back up emergency generator with auto throw over switch as required for emergency loads.

6.7.1.6 All instrument transformers as required.

6.7.1.7 Standalone Medium Voltage (MV) transformers as required for the step up of the inverter AC output to the 13.8kV if battery containers are proposed with internal string inverters, otherwise MV transformers shall be integral to the PCS'.

6.7.1.8 Grounding Transformers as required.

6.7.1.9 All necessary equipment for the control, protection, signaling and measurement system of the BESS and their interface to the Owner's network control, as required.

6.7.1.10 System for alarm and fault recording as required.

6.7.1.11 Operator's interface (HMI) as required.

6.7.1.12 Surge protection of the BESS yard as required.

6.7.1.13 BESS yard lighting as required.

6.7.1.14 Revenue grade metering at the MV BESS is provided by the Contractor and shall meet the requirements of FMPP, Keys, and FMPA.

6.7.1.15 PTs and CTs for protection and metering on the MV BESS interconnection bus or feeders, as required.

6.7.1.16 A ground mat and rods installed at the BESS station.

6.7.1.17 All cables for the equipment in the BESS yard, including and limited to connections between all equipment provided by the Contractor up to connections to the MV switchgear.

6.7.1.18 The design of the BESS shall communicate with, be controlled by and interface utilizing the existing communication protocols and SCADA schemes of FMPP, Keys, FMPA. The design packages shall include any required documentation revisions and updates.

6.7.1.19 All BESS equipment shall be self-contained to minimize the risk of property and personnel damage caused by fire, explosion, or other failures of the BESS, as applicable to NFPA 855.

6.8 Owner Provided Equipment

6.8.1 The following equipment and services will be furnished by the Owner and is subsequently not part of the Contractor's Scope of Work.

6.8.2 A dedicated piece of land where the BESS and systems will be installed. This piece of property is herein referred to as the "Site". The Contractor will not be required to remove existing abandoned structures, reroute duct banks, and relocate or reconfigure the existing Site as needed to accommodate the BESS.

6.8.3 Access/right of entry to the Site at any day of the week during civil works, erection, installation and commissioning. This shall include an access road for transport of heavy equipment.

6.8.4 Available as-built reference data and drawings for the Contractor's use in the design and interconnection of the BESS system.

6.8.5 Temporary storage area for equipment on site. Any storage beyond the limits of the station will be contractor's responsibility.

6.8.6 Owner to provide storage area for spare parts as required.

6.8.7 Communications Rack with FDP for interface to Owner's network.

6.9 Contractor Provided Equipment

6.9.1 PCS Equipment, including inverters and Medium Voltage (MV) transformers

6.9.2 Batteries & Battery enclosures.

6.9.3 MV and LV Cable, including control, fiber optic and communications

6.9.4 Fire Detection and Alarm System

6.9.5 Fiber Optic / Field Network / Control

6.9.6 Equipment and BESS facility lighting

6.9.7 MV pole mounted equipment:

6.9.7.1 Recloser/Circuit Breaker

6.9.7.2 Instrument Transformers and Relays

6.9.8 Unless otherwise noted, the Contractor is responsible for all materials and equipment pertaining to the BOP to design and turn over a fully functional System to the Owner. Additional requirements for the thermal management system, fire detection, and structural components are captured in Section 3 subsection 10, Section 7, and Section 6 subsection 3, respectively.

6.9.9 DC Fused Disconnect Switches

6.9.10 The EOR design drawings shall indicate the type and quantity of switches required.

6.9.11 DC fused disconnect switches shall include a properly grounded mat for operator to stand on while operating the switch.

6.9.12 If DC fused disconnect switches need adjustments to function correctly, Contractor shall provide any miscellaneous brackets, bearings, couplings, nuts, bolts, lock washers, or other necessary hardware as required.

6.9.13 Medium voltage transformers (PCS and auxiliary transformers) per Section 4 of this Exhibit A.

6.9.14 Structural Supports as required for the elevated equipment.

6.9.15 MV MCOV station class surge arresters

6.9.15.1 MV MCOV arresters shall be installed on each feeder circuit bay, where each feeder connects to the BOP System Facility equipment. Arresters are to be coordinated with the collector circuit arresters.

6.9.15.2 When reactive power equipment is included in the design, MV MCOV arresters shall be installed at each riser location within the BOP System Facility.

6.9.15.3 The loop-fed medium voltage transformers shall include MV MCOV arresters installed on the last transformer in a string. The size and type of these arresters is to be reviewed by the EOR and coordinated with the owner provided equipment.

6.9.15.4 All arresters shall be sized per the insulation coordination study.

6.10 BALANCE OF PLANT

6.10.1 BOP System Design Considerations

6.10.1.1 The System shall operate automatically without local operator supervision. The Facility shall be capable of being started, stopped and controlled via remote telemetry, recognizing and responding to dynamic control signal or equivalent when on-line. This will be accomplished directly from Owner's centralized control room. The System shall have the appropriate level of automation to allow 24/7 real-time remote monitoring and operation from Owner's control center.

6.10.1.2 The design of the System shall communicate with, be controlled by, and interface utilizing Owner approved communication protocols and SCADA schemes. The design packages shall include any required documentation revisions and updates.

6.10.2 System

6.10.2.1 For technical requirements of the System, reference Section 3 of this Exhibit A.

6.10.3 SCADA and Energy Management System

6.10.3.1 For technical requirements of the SCADA and EMS Systems, reference Section 5 of this Exhibit A.

6.10.4 PCS Equipment

6.10.4.1 For technical requirements of the System PCS, reference Section 4 of this Exhibit A.

6.11 Required Electrical Studies

6.11.1 Contractor will be required to perform the following studies to demonstrate the adequacy and design and performance of the BESS system:

6.11.1.1 Main Circuit Design – a report and one-line diagrams will need to be presented to describe the main circuit design of the BESS. In this report the analysis for the rating of the main high voltage components shall be presented (for the thyristor valves see further below). Power system characteristics shall be clearly stated and a summary of the rating of the BESS components shall be given.

6.11.1.2 Insulation Coordination – an insulation coordination study shall be performed by the Contractor to ensure proper selection and coordination of the arrestors selected for the BESS bus and branches. The results of this analysis shall be presented to Owner in a report.

6.11.1.3 Control Strategy Documentation – In this report the control strategies implemented in the control system shall be described in detail. The verification of the main strategies shall be done by running the real control system together with a simulator implementing a network equivalent together with the BESS medium voltage components. The verification can be done during the factory validation test of the control system.

6.11.1.4 Protective Relay Coordination - In this report the calculation of relay protection setting levels shall be presented together with the principles for protection coordination. A summarized list of the protection settings shall be given.

6.11.1.5 Arc Flash Analysis – In this report the System arc flash incidence levels, appropriate approach distances, and required PPE levels shall be identified.

6.11.1.6 Reactive Power Study – Power factor range analysis at a rated output, to be performed to confirm compliance with grid code requirements

6.11.1.7 Harmonic Analysis

6.11.1.8 Provide documentation for NERC Facility Ratings Summary for the installed equipment.

6.11.1.9 Short Circuit and Load Flow Analysis Reports

6.11.1.10 Grounding Analysis

6.11.1.11 DC and AC Load Calculations

6.11.1.12 Shielding

6.11.1.13 PSS/E and PSCAD Dynamic System Models for submittal to FMPP, KEYS, and FMPA.

6.11.1.14 Loss Evaluation - In this report the total BESS losses shall be calculated and compared with guaranteed values. Explanations to discrepancies, if any, shall be given. The final Loss Evaluation report shall be based on component loss data obtained from factory tests. Loss Evaluation shall include all system aux loads, transformer loads, impedance loads, line loss loads, from the system to the POI, 13.8kV Line Breaker.

6.11.1.15 The titles and scope of the design studies shall be clearly stated in the bid.

6.12 Construction Inspections

6.12.1 The Owner shall be provided an opportunity to review, comment, and approve or reject all on-site construction services provided by the Contractor and the Subcontractors in accordance with the agreement. Changes requested by Owner that differ from approved plans will result in associated change order fees.

6.13 SYSTEM PLANT FUNCTIONALITY REQUIREMENTS

6.13.1 Voltage and Frequency

6.13.1.1 Nominal System frequency is 60 Hz. Minimum and maximum scheduled frequencies shall be determined by the Contractor based on applicable grid codes and standards.

6.13.1.2 Minimum temporary frequencies based on the NERC Planning Standards, Table W-1, the minimum transient frequency standard shall not go below 59.6 Hz for 6 Cycles (System Alternating Current) or longer for Category B (single element) outages, and not below 59.0 Hz for six (6) Cycles (System Alternating Current) or longer for Category C (multiple element) contingencies. Owner begins shedding load at 58.5 Hz.

6.13.2 Power and Energy Capabilities

6.13.2.1 The total harmonic distortion at POI shall be compliant with the latest revision of IEEE 1547, as well as any applicable code requirements.

6.13.2.2 AC characteristics of the System: All characteristics relating to capabilities are to be expressed in power and energy as metered at the POI meter. The MV BESS meter can be used as a check point by the Contractor’s controller.

6.13.2.3 Owner recognizes that a variety of System technologies exist. The useful working life of some technologies is strongly dependent upon the usage profiles such as depth of discharge. For this reason, Contractor shall list the capacity of its proposed System only in terms of what that System will be capable of sustaining over its useful life, considering the planned use case in Section 3

6.13.3 System Safety Requirements

6.13.3.1 Owner requires that the Contractor demonstrates that appropriate safety systems are in place to minimize the risk of property damage from fires, explosions or other failures of the System. This shall include at a minimum automated controls to limit the risk of fires. Proposed systems must comply with relevant IEEE standards. Specific standards to be followed are UL1973, 9540, 1741 and ASME.

6.13.3.2 Initial training for the local municipal response services not to exceed 24 hours will be required by the Contractor. The training shall include review of the required PPE and Arc Flash incidence zones.

6.13.3.3 Additional design requirements for the fire detection system are contained in Section 7 of this Exhibit A. All equipment must be self-contained.

6.13.4 Electrical Losses and Parasitic Loads

6.13.4.1 Owner recognizes that inherent inefficiencies will result in the BESS consuming more energy than delivered. Additionally, is it anticipated that operational requirements such as cooling, and powering ancillary equipment will result in further losses.

6.13.5 Calculation of Electrical Losses

6.13.5.1 Contractor shall provide a summarized loss evaluation of the total proposed BESS system. The summarized losses shall include guaranteed not to exceed losses for the BESS when operated according to Contractor's defined schedule. The total system losses shall be calculated, assuming an outside temperature of 85 deg. F and an expected nominal operating voltage.

6.13.5.2 Total system losses, E1 (kWH), during 24 hours of standby operation.

6.13.5.3 Total system losses, E2 (kWH), incurred by 4 hours of full power discharge and subsequent recharge.

6.13.5.4 Total system losses, E3 (kWH), incurred by 2 hours of 50% power discharge and subsequent recharge.

6.13.5.5 As-built BESS losses shall be based on factory measurements and calculations.

6.13.5.6 The BESS system bid prices shall, as part of the bid evaluation process, be adjusted to take into account the present value of the total BESS system losses.

6.13.6 Audible Noise

6.13.7 Unless otherwise stated in Attachment 1, the level of audible noise at the property boundary shall comply with the applicable noise ordinances. The Contractor shall ensure any and all applicable noise control ordinances are accounted for when specifying audible noise levels.

6.13.8 The Contractor shall make audible noise measurements after commissioning to verify the compliance with the requirements above. At these measurements the background audible noise shall be deducted when calculating the audible noise level for the BESS as specified in the first paragraph. Measurements shall be made at several locations in order to eliminate local interference effects.

– END OF SECTION 6–

SECTION 7 – FIRE DETECTION TECHNICAL SPECIFICATIONS

7.0 SITE FIRE DETECTION DESIGN

7.1 Contractor shall be responsible for complying with all federal, state, and local building and fire codes, as well as AHJ adopted requirements of NFPA 855.

7.2 Contractor shall provide a UL 9540a tested and compliant system.

7.3 Contractor shall be responsible for all required documents and deliverables for Monroe County Fire Authority approval of the proposed fire detection system for the facility. Included by not limited to a site Fire Master Plan, Fire Detection Plan, Hazard Mitigation Analysis (or similar), Fire Alarm Plan and a site Emergency Action Plan.

7.4 Contractor shall provide a Failure Mode and Effects Analysis (FMEA) report during engineering for Owner Review.

7.5 All fire detection systems and components within shall be designed, manufactured, assembled, tested and installed in accordance with the specified standards, NFPA and IEEE codes and standards, the Owners insurance company recommendations, all applicable AHJ requirements including amendments and ordinances, and this agreement.

7.6 General:

7.7 Contractor shall provide a detailed system description and strategy methods to detect, prevent the spread and/or contain fires, explosions or property damage. The designed system shall encompass, at minimum, the following protective functions, characteristics, and accompanying information:

7.7.1 Monitoring of the battery and inverter system to rapidly identify a sign of failure within the system before gassing, overheating, thermal runaway and fire event.

7.7.2 Automatic power isolation, both physically and electronically, to ensure the least possible amount of energy is available to the failing component or sub-system. Design emphasis shall be placed on the capacity to disconnect from the batteries in case of malfunction.

7.7.3 Passive barriers to reduce the likelihood of heat from thermal runaway causing adjacent systems from failing.

7.7.4 Ventilation system(s) that include an emergency mode to exhaust gassing and maintain the potential explosive concentration below 15% of the Lower

Explosive Limit (LEL).

7.7.5 Installation of high-volume water spray for extreme thermal runaway situations. The design shall also encompass the installation of monitoring systems to confirm gassing and or a smoke condition.

7.7.6 Methods applied at PLC or SCADA level to determine safe operating limits and to detect and respond to system malfunctions.

7.7.7 Methods which do not rely on PLC or SCADA to detect and respond to thermal run-away and other malfunctions.

7.7.8 Information to be provided alongside the submission:

7.7.8.1 A list of relevant IEEE safety and/or fire standards which apply to the proposed fire protection system and BESS shall be included alongside the submitted design. List of conditions that could result in a system shutting itself down.

7.7.8.2 Training material for fire detection and material handling to be provided to local municipal response services.

7.7.9 Annual training for the local municipal response services not to exceed 16 hours per year.

7.7.10 All equipment must be self-contained.

7.7.11 Battery enclosure systems shall be UL9540 and UL9540A tested/listed. Both hard copies and electronic copies of the manufactures installation manuals that were reviewed and listed (or approved) as part of the UL9540 and UL9540A testing, certification and listing process shall be provided to Owner. No exceptions.

7.7.12 Hazard signage shall be placed on the exterior of the BESS enclosure.

7.7.13 Subject matter expert (SME) support shall be provided on-site in the event of any fire or battery failure. SME support shall be provided within a reasonable response time.

7.7.14 Construction fire pre-plans documents and fire department training shall be provided prior to the arrival and installation of the BESS.

7.7.15 Final fire pre-plans documents and additional fire department training shall be provided prior to the final completion of the installation of the BESS.

7.7.16 Contractor shall include blowout panels for the sudden explosive failure event.

7.7.17 The specified codes, standards and recommendations define minimum requirements only. They do not necessarily include all requirements necessary to satisfy the applicable local statutes, as interpreted by the Local

Statutory Authorities, or this agreement. Unless otherwise indicated, the issue of the specific code or standard in effect as of the execution date shall apply (Latest Edition). They include:

7.7.17.1 FM Global Property Loss Prevention Data Sheets DS 5-33, Electrical Energy Storage Systems.

7.7.17.2 Considerations for ESS Fire Safety, by Consolidated Edison and NYSERDA, dated February 9, 2017.

7.7.17.3 NFPA Codes, Standards and Recommendations:

i. NFPA 1: Fire Code
ii. NFPA 10: Standard for Portable Fire Extinguishers
iii. NFPA 13: Standard for the Installation of Sprinkler Systems
iv. NFPA 24: Installation of Private Fire Service Mains and Their Appurtenances
v. NFPA 25: Standard for the Inspection Testing & Maintenance of Water Base Fire Protection Systems
vi. NFPA 30: Flammable and Combustible Liquids Code
vii. NFPA 68: Standard on Explosion Protection by Deflagration Venting
viii. NFPA 69: Standard on Explosion Prevention Systems
ix. NFPA 70: National Electrical Code
x. NFPA 72: National Fire Alarm Code
xi. NFPA 90A: Standard for the Installation of Air-Conditioning and Ventilating Systems
xii. NFPA 101: Life Safety Code
xiii. NFPA 850: Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Station
xiv. NFPA 855: Standard for the Installation of Energy Storage Systems
xv. NFPA 2001: Standard on Clean Agent Fire Extinguishing Systems
xvi. NFPA 5000: Building Construction and Safety Code.

7.8 Fire Detection Features:

7.8.1 Proposed outdoor enclosures and cabinets shall be physically separated or have a fire barrier installed to create the separation, see FM-Global datasheet 5-33 for examples.

7.8.2 SCADA shall be separate from a battery enclosure or cabinet, or, shall a single enclosed unit be proposed, adequate fire rated separations, as well as compliance with Section 9.11 of the International Fire Code (IFC) shall be met.

7.8.3 Not less than 3-hour fire rated separation between battery compartment and SCADA

7.8.4 Explosion protection construction as defined in the IFC to prevent loss of communication in a catastrophic event.

7.8.5 Adequate separation from the property line shall be provided by acceptable distance or a fire barrier.

7.8.6 General fire protection, to include detection shall comply with the applicable local building codes and fire codes, and the NFPA codes, standards and recommendations. In all cases the latest editions shall be used.

7.8.7 Smoke or Flame detection shall be provided.

7.8.7.1 Each of the above detection systems shall have specific SCADA alarms.

7.8.7.2 The main fire alarm control unit (FACP) and all local fire alarm control units (LFACP) shall be of the intelligent addressable type, by the same manufacturer, and networked together using fiber optic cabling.

7.8.8 The fire protection philosophy, method for achieving the philosophy, compliance strategies shall be documented and based on industry standard practices.

7.8.8.1 Electric utilities are currently exempt from NFPA 855, but this shall be considered when responding to this bid.

– END OF SECTION 7–

SECTION 8 – CYBER AND PHYSICAL SECURITY TECHNICAL SPECIFICATION

8.0 PLACEHOLDER

– END OF SECTION 8–

SECTION 9 –CONTRACTOR'S GUARANTEED PERFORMANCE [NTD: Sample language to be developed further in forthcoming Exhibit B1]

9.0 CONTRACTOR'S GUARANTEED PERFORMANCE

9.1 TERM

9.2 Contractor shall guarantee the performance of the System for the term of the contract.

9.3 GUARANTEED CAPACITY

9.4 The Interconnecting Utility will schedule Capacity Performance Tests with the System Operator in accordance with System Operator installed capacity market testing requirements and Section 11 of this Exhibit A. Services contractor shall guarantee that the System Capacity shall be equal to or greater than the Contract Capacity during the entire term of the contract. The System Capacity shall be measured at the end of each twelve (12) month period ending on the anniversary of the Commercial Operation Date (a "Performance Period"). If the System Capacity is below the Guaranteed Capacity, services contractor shall pay to Owner Capacity Liquidated Damages per below. The point of guarantee and point of measurement shall be at the POI, 13.8kV Line Breaker.

9.5 Guaranteed Capacity: Contract Capacity

9.6 GUARANTEED ROUND-TRIP EFFICIENCY (RTE)

9.6.1 Round-Trip Efficiency is the measured rate of efficiency comparing a unit of energy injected into the System and the amount of that unit of energy discharged by the System. RTE will be established by testing protocols defined in this Exhibit A, Section 11 of this Exhibit A and measured annually at the end of each Performance Period. The point of guarantee and point of measurement shall be at the POI, 13.8kV Line Breaker. If the measured Round-Trip Efficiency at end of each Performance Period is below the Guaranteed Round-Trip Efficiency, then the services contractor shall pay to Owner the following RTE Liquidated Damages:

9.6.1.1 Guaranteed Round-Trip Efficiency (RTE): 87.0% exclusive of auxiliary loads

9.6.1.2 RTE Liquidated Damages: (Guaranteed Round-Trip Efficiency – Round Trip Efficiency) * $'Price' per MWh x Charging Energy

9.6.1.3 "Charging Energy" is the quantity of MWh metered at the Energy Delivery Point to charge the Storage Unit for the Performance Period.

9.7 GUARANTEED RAMP RATE

9.7.1 Contractor shall guarantee a minimum ramp rate of ten percent (10.0%) of the System's Contract Capacity per second ("Guaranteed Ramp Rate").

9.7.2 The Ramp Rate will be measured per the procedure outlined in this Exhibit A, Section 11. If the System is unable to demonstrate the Guaranteed Ramp Rate, Contractor shall place the System into an Unplanned Outage immediately and resolve any issues so that the System can achieve the Guaranteed Ramp Rate.

– END OF SECTION 9–

SECTION 10 – O&M SERVICE REQUIREMENTS [NTD: Sample language to be developed further in RFP]

10.0 PLACEHOLDER

– END OF SECTION 10–

SECTION 11 - COMMISSIONING AND TESTING

11.0 COMMISSIONING AND TESTING

11.1 COMMISSIONING OF THE COMPLETE SYSTEM AND INSTALLATIONS

11.1.1 Operational testing of all BESS systems, individual components as well as the whole BESS, and their interface to the Owner's EMS via the Owner's communication system shall be the responsibility of the Contractor.

11.1.2 The Contractor shall also be responsible for adherence to OSHA and Owner's safety standards and requirements. Site specific safety standards have been attached separately.

11.2 TESTING

11.2.1 General

11.2.1.1 Testing shall be performed in accordance with the agreement, the applicable standards, and any additional requirements in this specification. If the requirements of this specification conflict with any of the above standards or practices, the Contractor shall identify the conflict to the Owner and adhere to the more stringent governing standard. Where standards are not suitable or applicable, other common industry procedures and mutually acceptable methods shall be used.

11.2.1.2 The results obtained from type tests must demonstrate that the equipment conforms to the requirements of this specification.

11.2.1.3 The results obtained from tests must be compiled and organized in writing. All test results must contain the appropriate signature of the Contractor.

11.2.1.4 The Contractor shall furnish all labor, materials, instrumentation and testing facilities for all tests in this specification.

11.2.1.5 If any piece of equipment provided as a part of the BESS does not pass a test or is damaged, the Contractor must replace or repair the failed or damaged equipment and modify the equipment design, if necessary. The Contractor shall redo the tests previously done on any equipment which is replaced, repaired or modified. All expenses for the material, re-installation and re-testing will be the responsibility of the Contractor.

11.2.1.6 The Contractor, at all times, must obtain permission from the Owner to perform field verification tests when the BESS is connected to the power system. These tests may have to be performed during night or low load periods. If transmission system conditions prevent the Contractor from performing field tests, this fact shall not delay other contractual activities and obligations, neither of the Customer, nor of the Contractor.

11.2.2 Factory Validation Tests of BESS Control System

11.2.2.1 A factory simulation test shall be conducted for the control system. Contractor shall thoroughly test as many control functions as possible on a representative simulator at factory. These tests shall provide an initial verification of performance before the control equipment is shipped to site.

11.3 Commissioning Procedures and Plan

11.3.1 Contractor shall support the performance of on-site performance testing for the project. Startup, operational and test procedures shall be developed jointly with the battery/PCS vendors, Owner and shall be provided to Owner in accordance with the agreement. Such testing shall commence as soon as the system can be operated safely and reliably. All necessary documentation shall be provided by the Contractor.

11.3.2 The BESS commissioning tests are those tests to be performed at the site on the fully assembled BESS, without having the BESS connected to the power system. The tests shall include but not be limited to the following items:

11.3.2.1 Insulation check of auxiliary cables.

11.3.2.2 DC distribution system, battery and battery charger.

11.3.2.3 Testing of relay protections and protective control functions (by secondary injection).

11.3.2.4 Testing of control and monitor system and thyristor valves (if required).

11.3.2.5 Verification and tuning of thermal management system (if required).

11.3.2.6 Check of operation and indications of circuit breakers, disconnect and earthing switches.

11.3.2.7 Capacitance check of capacitor banks (if required).

11.3.2.8 Verify proper operation of all pump fans and motors.

11.3.2.9 Verify proper operation of heating, ventilation and lighting systems.

11.3.2.10 Check of current and voltage transformers.

11.3.2.11 Overall check of trip operations from protections to breaker.

11.3.2.12 Check of circuits through the local control interface and the remote EMS interface.

11.4 Field Verification Tests

11.4.1 Upon satisfactory completion of the commissioning tests, energizing of the

BESS and Field Verification Tests shall be performed. These tests are performed at the site on the fully assembled BESS with the BESS operating and connected to the power system. The tests shall include but not be limited to the following items:

11.4.1.1 Measure and verify the Power and Energy Capabilities operation at nominal power system properties.

11.4.1.2 Measure and verify Autonomous Functions operation. Contractor shall provide the requirements and setup needed to perform the test to Owner for approval.

11.4.1.3 Measure and verify the External Override Functions operation.

11.4.1.4 Verify the Remote Monitoring and Control operations. Contractor to provide the requirements and setup needed to perform the tests to Owner for approval after award.

11.4.1.5 Verify Data Storage and Auditing operation. Contractor to provide the requirements and setup needed to perform the tests to Owner for approval.

11.4.1.6 Verify Connection and Disconnection Control operation.

11.4.1.7 Measure and verify current total harmonic distortion at POI to validate requirements herein.

11.4.1.8 Measurements of audible noise.

11.4.1.9 Check of supplementary control functions

11.4.1.10 Qualification Functional Testing.

11.4.1.11 Performance Testing

11.4.1.12 Capacity Testing

11.4.1.13 Duty Cycle Efficiency Testing

11.5 Notification of Testing

11.5.1 The Contractor shall give the Owner advance notice of type, routine and factory acceptance tests two weeks before the actual testing date.

11.5.2 Inspection and Test Plans shall be submitted for the Customer's information 30 days prior to commencement of the test.

11.5.3 The Contractor shall furnish a detailed Inspection and Test Plan for the commissioning and field verification, 2 months before the beginning of the testing.

11.6 SUPPLEMENTARY STORAGE RATING TEST PROTOCOL

11.6.1 No later than (To be determined with contractor) days following the Final Notice to Proceed, Contractor shall deliver to Owner for its review and approval (such approval not to be unreasonably delayed or withheld) a supplement to this Exhibit A with additional and supplementary details, procedures and requirements applicable to Storage Rating Tests based on the then current Design of the System ("supplementary Storage Rating Test protocol"). Thereafter, from time to time during construction, Contractor may deliver to Owner for its review and approval (such approval not to be unreasonably delayed or withheld) any Contractor's recommended updates to the then current supplementary Storage Rating Test protocol. The initial supplementary Storage Rating Test protocol (and each update thereto) will be submitted by the Owner to the Interconnecting Utility for approval. Once approved by the Interconnecting Utility, the initial supplementary Storage Rating Test protocol (and each update thereto) shall be deemed an amendment to this Exhibit A.

11.7 SYSTEM OPERATING RESTRICTIONS

11.7.1 Results of all testing performed as set forth in this Exhibit A must conform to the applicable values in Attachment 4.

11.8 BESS OPERATING LIMITATIONS

11.8.1 The Maximum Annual Throughput of the System (MWhs) is defined in Attachment 1. A Full Cycle Equivalent is defined as cumulative energy discharged to the Point of Interconnection equal to the Maximum Storage Level.

11.8.2 A maximum average state of charge (SOC) of eighty percent (80%) shall be maintained during each operating cycle per day, as measured by the control system using a sampling rate of approximately two (2) seconds. Owner can maintain this average SOC with no warranty impacts.

11.8.3 The allowable charge (MW), discharge (MW), charging rates (MW/sec) and discharging rates (MW/sec) are specified in Attachment 4.

11.9 OPTIONAL OPERATING SCENARIOS

11.9.1 Contractor may provide warranty terms that adjust the Guaranteed Capacity and Guaranteed Round Trip Efficiency for the following optional operating scenarios. Each of these scenarios can cause accelerated degradation of the System.

11.9.2 The total System throughput in any Performance Period exceeds seven hundred thirty (730) Full Cycle Equivalents.

11.9.3 The total System throughput exceeds two Full Cycle Equivalents per day.

11.9.4 The system shall be designed to allow for the Off taker the ability to operate the facility past the initial 730 Full Cycle Equivalents, to a max of additional 100 cycles limited to a 4-hrs, 60 MWh daily energy through put.

11.9.5 Contractor to provide option for grid forming/islanding mode.

– END OF SECTION 11–

SECTION 12 – CODES, STANDARDS, CONCEPTUAL PLANS AND REFERENCE DOCUMENTS

12.0 CODES AND STANDARDS

12.1 General

12.1.1 The Contractor shall design and manufacture all equipment in accordance with ANSI standards. All documents, drawings, instruction manuals and test certificates shall use English units

12.1.2 All Work connected with the supply of the BESS system shall be in accordance with the requirements of the appropriate ANSI/IEEE standards and including any Applicable Law and a proposed Change of any Applicable Law of any Governmental Authority, which proposal was in existence prior to the execution date but not yet made effective; but only if such proposal has been published to the public by the applicable Governmental Authority. Where no ANSI/IEEE standard exists the BESS system shall comply with recognized standards (including IEC) and design practices. If the requirements of this specification conflict with any of the above standards or practices, this specification shall apply. Based on the location of the project as stated in Attachment 1, the Contractor is required to determine any applicable codes pertaining to the municipal, state, or federal AHJ.

12.1.3 The latest revisions of the following standards, in particular, shall apply:

12.1.3.1 General

ANSI C2	National Electrical Safety Code
NFPA 70	National Electrical Code
FL Elec Code	Florida Electric Code 2020
IEEE 979	Guide for Substation Fire Protection
NFPA 72	National Fire Alarm and Signaling Code
IBC	International Building Code
FL Building Code	FL Building Code 2020
ASCE 7	Minimum Design Loads
ACI 318	Building Code Requirements for Structural Concrete

12.1.3.2 BESS

UL 9540	Standard for Energy Storage Systems and Equipment
UL9540A	Test Method
UL 1642	Standard for Lithium Batteries (Cells)
UL 1741	Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources

IEEE 1547	IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces
NFPA 855	Standard for the Installation of Stationary Energy Storage Systems
IEEE 2030.2.1	Guide for Design, Operation, and Maintenance of Battery Energy Storage Systems, both Stationary and Mobile, and Applications Integrated with Electric Power Systems

12.1.3.3 Fire Protection

NFPA 855	Standard for the Installation of Energy Storage Systems Note: Comply with local fire department requirements as of the date of the offer, including the local fire department's Letter of Approval.
NFPA 13	Standard for the Installation of Sprinkler Systems
NFPA 15	Standard for Water Spray Fixed Systems for Fire Protection
NFPA 72	National Fire Alarm and Signaling Code

12.1.3.4 Transformers and Reactors

IEEE C57	Standards Collection: Distribution, Power, and Regulating Transformers. Note: The items below are all included where applicable by the reference above. [NEMA TR-1 Transformers, Regulators, and Reactors]

12.1.3.5 Arresters

IEEE C62	Standards Collection: Guides for Surge Protection
IEEE C62.11	IEEE Standard for Metal-Oxide Surge Arresters for AC Power Circuits
NEMA LA 1	Surge Arresters

12.1.3.6 Circuit Breakers

IEEE C37	Standards Collection: Circuit Breakers, Switchgear, Relays, Substations, and Fuses Note: The items below are all included where applicable by the reference above.

12.1.3.7 Disconnect Switches

IEEE C37.37	IEEE Standard Loading Guide for AC High Voltage

	Switches (in excess of 1000 Volts)
NEMA SG 6	Fuses
IEEE C37.46	Specifications for Power Fuses and Fuse Disconnection Switches
IEEE C37.47	Specifications for Distribution Fuse Disconnecting Switches, Fuse Support and Current Limiting Fuses
NEMA FU 1	Low Voltage Cartridge Fuses

12.1.3.8 Protection

IEEE C37.91	IEEE Guide for Protective Relay Applications to Power Transformers
IEEE C37.99	Guide for Protection of Shunt Power Capacitors
IEEE C37.90	IEEE Standard for Relays and Relay Systems Associated with Electric Power Apparatus
IEEE C37.90.1	IEEE Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems
IEEE 242	Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
IEEE 141	Recommended Practice for Electric Power Distribution for Industrial Plants
IEC 255-5	Electric Relays. Part 5: Insulation Tests for Electric Relays
IEC 255-22	Electric Relays. Part 22: Electrical Disturbance Tests for Measuring Relays and Protection Equipment

12.1.3.9 Control Equipment

ANSI/IPC D30OG	Printed Board Dimensions and Tolerances
ANSI/IPC A610B	Acceptability of Printed Boards

12.1.3.10 Instrument Transformers

IEEE C57.13	IEEE Standard Requirements for Instrument Transformers
IEEE C57.13.2	IEEE Standard Conformance Test Procedures for Instrument Transformers

12.1.3.11 Harmonics

IEEE 1547	IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces

12.1.3.12 Grounding

IEEE 80	Guide for Safety in AC Substation Grounding

12.1.3.13 Seismic

IEEE 693	IEEE Recommended Practice for Seismic Design of Substations

– END OF SECTION 12–

Attachment 1 – Project Specific Requirements

Facility Name	Big Pine Key BESS
Location	Big Pine Key, FL
Rating (MW/MWh)	15 MW / 60 MWh
Cycles of operation per day	2 deep cycles per day
Configuration	5 enclosures (verified by Contractor for use cases specified)
Point of Interconnect (POI)	13.8kV Big Pine Substation Feeder at new 13.8kV Pole Mounted Recloser.

Note – Refer to preliminary drawings in Attachment 5

Environmental Conditions[2]	
Category	**Requirements**
Equipment Design Parameters	-30°C to 50°C
Minimum Ambient Design Conditions	45°F; 66% RH
Maximum Ambient Design Conditions	100°F; 100% RH, full rated power available at up to C with power derate above this temperature
Annual Average Design Conditions	77.9°F
Minimum daily average ambient air temperature	70°F; 66% RH
Maximum relative humidity	71%
Minimum relative humidity	66%
Average annual rain fall	39.6 inches
Extreme rain fall	1.4 in/hr
Extreme wind speed, 1% occurrence	200 mph[1]
Maximum steady wind velocity (NESC Heavy)	200 mph (mph 3 second gusts)

Keraunic level (number of thunderstorm days per year)	70-80 days/year
Contamination Level	(per IEEE C57-19-100. Section 9.1.1 Table 1)

[1] Contractor is also required to account for maximum speeds based on 3 sec gust, 50 year mean return interval (MRI), in hurricane prone region, with Exposure C level.
[2] Contractor shall ensure that selected equipment (including but not limited to the batteries, inverters, and transformers) are adequately rated and capable of correct and uninterrupted performance within the environment installed in.

Contractor shall ensure that selected transformers and inverters are adequately rated and capable of correct and uninterrupted performance within the environment installed in.

System Use Case	
Category	Requirements
Cycles per year	730
Cycles per day	2 cycles per day
State of Charge monitoring frequency	Once per hour
Allowable charge (MW)	15
Allowable Discharge (MW)	15
Allowable charging ramp rates (MW/sec)	15 MW/sec
Allowable discharging ramp rates (MW/sec)	15 MW/sec

Contractor is expected to ensure battery design shall meet nameplate capacity until end of contractual obligations.

Attachment 2 – Medium Voltage Transformer Requirements

kVA	TBD kVA 3 Phase Medium Voltage Transformer(s)
Temperature Rise	75°C average winding rise
Cooling Class	____KNAN______________
Frequency	60 Hz.
Duty Cycle	Designed for energy application
Insulating fluid	_____FR3_____________
Elevation	Designed for operation up to __50’ (ft) above sea level
Sound Level	NEMA TR1 Standard (52dB @ 50ft)
Primary High Voltage	______13.8kV____________
kV Class	______15kV____________
Primary Configuration	Dead Front, , Delta
Electrostatic Shield	
Taps	_____2.5%, 5 taps
Primary Bushings	600 amp, 13.8 kV, 110 kV BIL (Qty: 6)
Load-break Switching	2 Position
Visual air gap switch Arresters	EPC EOR to specify, __ amp,__ kV, __ kV BIL (Placed on high voltage side of the transformer) __ kV (kV MCOV)
Overcurrent Protection	Cartridge Fuses in Series with Partial-Range Current-Limiting Fuses (Qty: 3)
Secondary Low Voltage	Wye .48kV
Secondary kV Class	.48 kV
Secondary Bushings	*Bushing Description bushing(s) (Qty: 3)
Bushing Supports	Standard LV Bushing Support Assembly
Cabinet	Contractor shall provide dimensions with submittal
Cabinet hardware	Hex-head cabinet door bolts
Cabinet Accessories	Fault indicator provisions in cabinet sill
IEEE K-Dimension	Loop feed per IEEE C57.12.34-2009 Figure #
Coatings	All equipment to be painted, stainless steel construction per KEYS standards.
Notifications	Customer Specific Decals (Qty: 4)
Certifications	UL Listed
Gauges & Fittings	Liquid level gauge
Gauges & Fittings	Thermometer, dial-type
Gauges & Fittings	Pressure/vacuum gauge
Gauges & Fittings	Schrader valve
Gauges & Fittings	Pressure relief device, 50 SCFM
Gauges & Fittings	Drain valve with sampler in LV Compartment (1")
Tank accessories	Nitrogen Blanket

Tank accessories	Hold-down cleats (Qty: 2)
Performance Data:	
Design Impedance	6% at TBD kVA
Fluid Weight	Provide the data with submittal
Total Weight	Provide the data with submittal
Fluid Volume	Provide the data with submittal
Primary Conductor Material	Provide the data with submittal
Secondary Conductor Material	Provide the data with submittal

Attachment 4 – System Operating Restrictions

File Update Date:	**10/21/2025**
Storage Unit Name:	**"Big Pine Key BESS" 15 MW/60 MWh**
A. Contract Capacity	
Contract Capacity (MW):	15 MW
B. Total Unit Dispatchable Range Information	
Maximum Storage Level (MWh) [1]:	60 MWh usable (as measured by the system controls)
Minimum Storage Level (MWh) [2]:	0 MWh usable (as measured by the system controls)
Maximum Discharge (MW):	15 MW
Maximum Charge (MW):	15 MW
Guaranteed Round Trip Efficiency (%)	87.0%, exclusive of auxiliary loads at BOL; 84.5%, exclusive of auxiliary loads at EOL

Notes:

[1] The BESS facility shall be designed to provide the below ancillary services without impact to the capacity and energy requirements for the project. The BESS shall be designed to respond to AGC signals from the Owner's RTU

Attachment 5

For responses to this section of the specification at time of bid, contractor only needs to provide explanation for exceptions taken to any of the below.

POWER AND ENERGY CAPABILITIES		
ITEM	**MINIMUM REQUIREMENT**	**VENDOR RESPONSE**
Power/Energy *Discharge power available when BESS is at neutral SOC which can be sustained for:*		
Four Hours two times per day (Supplemental Power function)	15 MW at the 20-year end of life	

AUTONOMOUS FUNCTIONS *These functions shall be simultaneously armed and active. In case of conflict, they are listed in order of priority.*		
ITEM	**REQUIREMENTS**	**VENDOR RESPONSE**
Fault Response		
Monitor at POI	YES	
In the event of a grid-failure or large disturbance, the inverters should automatically disconnect from the system network. The inverter should be capable of islanding detection by both passive (over- and under-voltage or frequency) measures and at least one active measure, as required by the utility. For these faults the inverter shall have the capacity to shut-down and automatically disconnect from the grid. The inverters shall have the capacity to remain synchronized during allowable voltage variations resulting from faults on the transmission network. The allowable voltage variations during a network fault are outlined in NERC PRC-029-1.	YES	

State of Charge Management		
Monitor system state of charge and provide a mechanism to regulate SOC, principally to recover SOC after discharge events (both manual and automatic)	YES	

EXTERNAL OVERRIDE CONTROLS		
Provide functionality to trigger manual discharge, using the following parameters:	**MINIMUM REQUIREMENTS**	**VENDOR RESPONSE**
If present conditions do not permit requested discharge (ex SOC is too low), system must report the maximally conforming parameters which are available over DNP.	YES	

REMOTE MONITORING AND CONTROL		
ITEM	**MINIMUM REQUIREMENTS**	**VENDOR RESPONSE**
BESS-Owner communication mechanism for data transfer, define maximum sampling during faults/triggered actions.	DNP 3.0	
Connection to external communications systems?	ONLY with permission from Owner	
BESS internal communications	Owner EMS compliant desired	
Heartbeat timer to ensure communication path is online and processor is functioning	Timer Count down logic	
Minimum available metrics via both data transfer and operator control updated by event driven data or buffers.		
Current operational status (Summary of BESS health)	YES	
Total Real Power (MW)	YES	
Total Reactive Power (MVAR)	YES	

State of Charge (Expressed as MWH of real power AC)	YES	
Current power capabilities	YES	
Voltage and Frequency as measured at MV BESS meter	YES	
Operation mode	YES	
Fault codes / description	YES	
Contractor to supply points list and sampling frequency.	YES	
	YES	
	YES	
<u>Required adjustable set points</u> *Operation mode including arming and disarming each autonomous function, and all operational set points for each function.*		
Fault response		
Fault Response Power (kVAR)	YES	
Maximum response time for implementing changes to setpoints for system in ready state	2 seconds	

PERFORMANCE VALIDATION		
Audit data must be accessible via an onsite HMI. Contractor may select appropriate methods to supply this function.	YES	
Audit data must be accessible to the Owner EMS system. Contractor may recommend appropriate methods to supply this function.	YES	
Describe how system will be maintained to continuously perform at initial nameplate.	Via augmentation or other method.	

CONNECTION AND DISCONNECTION FROM OWNER POWER SYSTEM		
ITEM	**MINIMUM REQUIREMENT**	**VENDOR RESPONSE**

While voltage and frequency remain within the specified voltage and frequency windows, the BESS shall remain connected to the Owner grid and operational at all times unless instructed otherwise by disconnection signal.	YES	
Provide function for commanded disconnection from the Owner grid both remotely via Owner's RTU and via local Owner's HMI. This is to be used for routine disconnection when sufficient warning is available to permit a graceful disconnection by the BESS.	YES	
Startup and connection time from a full off condition	Contractor to provide	
Maximum time for BESS POI disconnection after receiving emergency stop signal	Not to Exceed 10 Seconds	
Power Quality:		
Current Total Harmonic Distortion at POI	IEEE 1547	
Low and High Frequency Ride-Through:		
Transmission	IEEE 1547	
Distribution	NERC PRC-024	
General	FERC Order 827	

Table 1 – Division of Responsibilities

Part I: Project Management & System Design			
		Contractor	**Owner**
1	Overall project management	☑	
2	Existing site documentation: Supply any and all relevant engineering and construction drawings of existing site such as a site plot plan, single line diagram and network/SCADA communications diagram etc.		☑
3	Ministerial Construction Permits as identified, but not limited to section 6.4.4 of Exhibit A.	☑	Provide Support
4	Discretionary & Environmental Permits (As required)	Provide Support	☑
5	Provide Equipment weights and dimensions necessary for foundation design	☑	
6	Site civil design (foundation details, foundation plan, inside the fenced area with Contractor's equipment)	☑	
7	Power system studies for fault studies, arc flash, steady state and dynamic performance analysis, harmonic analysis, and insulation coordination. (strictly contributions from Project up to new 13.8kV feeder connection at existing Big Pine Key Substation). Contractor to provide their standard template for technical studies. Transient analysis will be limited to Contractor's scope.	☑	
8	Engineered equipment package design including;	☑	
9	Batteries, 13.8kV Equipment, 26kV Recloser & Bypass Switch, control enclosure, Contractor's BESS controller, AC cabling	☑	
10	Detailed design for the installation of all equipment	☑	
11	Provide RTU that will allow Contractor's site controller to connect to for receipt of command signals.		☑
12	SCADA functionality via Contractor Standard SCADA Architecture Drawing	☑	
13	Define SCADA and facility operation data points required in Contractor Standard SCADA Architecture Drawing		☑
14	Design AC cabling from Inverters to medium voltage collection system and MV equipment up to the POI.	☑	
15	Comply with the Site Specific EHS Plan and develop and comply with Contractor's Safety and Site Security Procedures	☑	
16	Fire Detection System in accordance with Governmental Authorities and industry fire codes	☑	

17	Compliance engineering per applicable codes and standards	☑	
18	Provide professional engineer stamped drawings and calculations for the Issued for Construction package.	☑	
19	Builders All Risk Insurance		☑
20	Provide generator for any temporary power needs during testing. Generator to be connected to Owner provided transfer switch to power the control building.	☑	
	Part II: Site Construction		
21	Prior to commencement of soil disturbance activities by Contractor, Owner and Contractor will develop and agree to a soils management plan that establishes procedures should potentially hazardous materials be encountered. Such procedures shall include communications with Owner so that Owner can assess the environmental characteristics of suspected material and, based on such assessment, call for either the replacement of such material to its original location, temporary stockpiling or removal (assessment and removal to be at Owner's expense). The soils management plan will require that assessed material that is excavated and found to be suitable for subsequent replacement must be replaced within 90 days of excavation. Contractor to use industry standard plastic sheeting beneath soil stockpiles as required by Soils Management Plan.	☑	☑
22	Provide site security within Contractor's scope including applicable laydown and parking areas. Contractor is responsible for security of its own material and equipment and must take appropriate measures to secure site or provide security when valuable material is on site.	☑	
23	Site preparation studies: Soil borings analysis, geotechnical study for the complete site.	☑	Provide Support
24	Site grading and drainage drawings by a civil engineer holding a professional engineer license in the state of Florida.	☑	
25	Routine road and site cleanup, including trash clean up and removal by Contractor. Clearing and grubbing of vegetation by Owner	☑	☑
26	All underground conduit requires installation of pull strings and clear demarcation of conduit runs	☑	
27	Contractor to include spare conduit (as required in lines 44 and 59)	☑	
28	Sub-surface remediation. Any preconstruction compaction, and cut/fill of engineered fill		☑
29	Implementation of spill prevention measures, and control and disposal of spill prevention and construction waste created by the contractor using best management practices (BMPs)	☑	
30	Prepare and provide quality assurance plan for Owner's review and approval prior to Contractor's mobilization at the Site	☑	
31	Providing temporary chain-link fence around the equipment and laydown as necessary.	☑	
32	Temporary construction power feed upon Contractor's mobilization at the Site	☑	

33	Temporary facilities (construction trailer, toilets, trash receptacles, etc.)	☑	
34	Temporary equipment storage area on site. (No external laydown area provided by Owner)	☑	
35	Construction water supply during installation	☑	
36	Excavation and final grading by contractor for installation and finishing of project site inside the fenced area where Contractor's equipment is installed for construction ready site	☑	
37	Foundations, excavation and backfill top finish, containment as required only for installation of contractor supplied equipment – inside fenced area	☑	
38	Dedicated transport layer of the connectivity for the Contractor's plant controller with adequate bandwidth to send and receive data to Contractor's remote operation facility and Owner's or 3rd party dispatcher's remote operation facility ("Internet Connection").		☑
39	Overhead or underground cables, wires, wire ways, or other work required inside the fenced area to connect the internet connection from the Point of Interconnection to the Contractor's BESS controller.	☑	
40	Modifications to or demolition of existing site structures – as required.	☑	
41	Relay protection package	☑	
42	Owner to procure and install revenue metering including metering accuracy class CTs & PTs at pole outside BESS Station.	Provide Support	☑
43	Contractor to procure meter accuracy class CTs and install as needed in Switchgear and run PT and CT leads from Switchgear to control house relay cabinet with provisioned space for Owner provided/installed meters.	☑	
44	Installation of a spare conduit from control house to light towers (as required) to be used for owner security systems.	☑	
Part III: Equipment Supply			
45	Provide Batteries (batteries, battery racks, battery modules, BMS, and interconnecting DC cables, inverters, AC breaker, HVAC, fire detection)	☑	
46	Provide new step-up transformers from inverters to 13.8kV System	☑	
47	Provide Dedicated Control Enclosure	☑	
48	Fire detection including fire alarm panels	☑	
49	Automated dry contact alarm to connect to existing owner system to local fire department.	☑	
50	Owner remote facility alarm notification through Project dispatch/SCADA system similar to all other high priority alarms.	☑	

51	Provide Contractor's BESS controller including over-current protection of Project and Project system components	☑	
52	Contractor's BESS controller alarm/monitoring system interface with Contractor's remote operations facility	☑	
53	Provide cabling: Includes AC cabling from inverters to recloser. Includes aux power and communication cables.	☑	
54	Installation of all auxiliary power cables and auxiliary systems within BESS yard.	☑	
55	Riser structure, Recloser, and Recloser bypass switch.	☑	
56	Provide AC Aux Power Transformer, Emergency Generator, and associated equipment.	☑	
57	Provide general site lighting inside the fence where Contractor's equipment is installed. Site lighting to match design of existing lighting on site.	☑	
58	Site surveillance/video monitoring. Must be capable of being accessed from a remote Owner facility.		☑
59	Contractor to provide spare conduit between each light pole and the control enclosure (see #44).	☑	
60	Thermal cameras that meet local Governmental Authority requirements	☑	
Part IV: Project Execution and Installation			
61	Transportation of all equipment to Site	☑	
62	Adhere to reporting requirements in the to be negotiated EPC agreement or alternative	☑	
63	Providing equipment crane, unloading/installation rigging and other special equipment. Lift plans for Batteries are requested	☑	
64	Equipment receiving and staging at Site	☑	
65	Physical placement of the equipment at its installation locations, setting and anchoring in place	☑	
66	Installation of racks, battery modules, rack switchgear, and interface equipment into Battery including interconnection cables	☑	
67	Install AC cabling from Battery to 13.8kV transformers terminating at 15kV metal clad switchgear, and any related cabinets or ancillary equipment. Includes aux power and communication cables.	☑	
68	Grounding system for entire BESS site, including fence external grounds as required.	☑	
69	System integration between Contractor's BESS controller and Owner RTU	☑	
70	Owner integration with interface between Owner and Contractor's BESS controller		☑

71	Provide verification testing and start up procedures for the Project, including inverters and system-level control and isolation transformers	☑	
72	Complete verification tests and certification of AC BOP equipment	☑	
73	Commissioning of battery system and equipment	☑	
74	Perform final system verification tests	☑	
Part V: Completion/End of Life Works			
75	Site finish and waste clean-up inside the fenced area	☑	
76	Provide documentation: Operating Manuals, As-Built Drawings, recommended spare parts list, final test reports, MSDS	☑	
77	Provide virtual and onsite operation and maintenance training on equipment	☑	
78	As applicable, provide operation and maintenance special tools	☑	
79	Restoration of roads and gates to its original condition if damage is due to Contractor equipment	☑	

SECTION	DOCUMENT	DESCRIPTION	30%	90%	IFC	AS-BUI Remarks
Electrical	Cover sheet	General notes, symbols & legends, project specifications		x	x	x
Electrical	Site plan	General arrangement drawing	x	x	x	x
Electrical	Ultimate Site Plan	General Arrangement Drawing (Ultimate)		x	x	x
Electrical	Substation single line diagram	Covers High Voltage and Medium Voltage as applicable	x	x	x	x
Electrical	BESS single line diagram	Covers BESS and 26kV Recloser as applicable	x	x	x	x
Electrical	Auxiliary single line diagram	Covers Low Voltage distribution including lighting and controls	x	x	x	x
Electrical	Relay & protection single line diagram	Covers protection for both Substation and BESS		x	x	x
Electrical	Metering single line diagram	Covers metering, telemetry and communication details		x	x	x
Electrical	Equipment grounding plan	Covers all electrical systems (Substation, BESS, Auxiliaries)	x	x	x	x
Electrical	Grounding details	Covers check pits, bonding, crimps or exothermic weld details		x	x	x
Electrical	Three line diagrams	Covers Substation, BESS, and Auxiliary systems		x	x	x
Electrical	Schematic diagrams (one per MP)	Covers schematics for all electrical systems		x	x	x
Electrical	Conduit Routing Plan drawing	Covers routing and schedules for power cabling on MV and LV equipment		x	x	x
Electrical	Cable Schedules	Cable schedules for power cabling on MV and LV equipment		x	x	x
Electrical	Aux. power & coms cables plan drawing	Covers routing and schedules for aux power and communications cable		x	x	x
Electrical	Aux. power distribution plan	Covers auxiliary power distribution plan and metering details		x	x	x
Electrical	Aux. power panel schedules	Covers panelboards sizing and schedules		x	x	x
Electrical	Site lighting plan	Covers overall project lighting		x	x	x
Electrical	Underground raceway plan	Covers UG conduits, raceway, etc. including sections, details and crossings		x	x	x
Electrical	Cable and conduit termination details	Covers all conduit details, including risers, sealing, and other details		x	x	x
Electrical	Physical diagrams	Covers equipment outlines, elevations, weights, assemblies and erection details.		x	x	x
Electrical	Wiring Diagrams	Covers all electrical cable wiring terminations, including wiring codes and cable names.		x	x	x
Electrical	Equipment datasheets	Covers all equipment datasheets		x	x	x
Electrical	Electrical BOM	Covers BOM for all electrical equipment				
Civil-Structural-Geotech	Cover sheet	General notes, symbols & legends, project specifications		x	x	x
Civil-Structural-Geotech	Existing conditions and plot plan		x	x	x	x
Civil-Structural-Geotech	Clearing, demolition and grubbing plan			x	x	x
Civil-Structural-Geotech	Grading and drainage plan	Includes cut and fill quantities and site elevation sections		x	x	x
Civil-Structural-Geotech	Storm water management plan	Includes ditches, berms, collection basin or detention pond		x	x	x
Civil-Structural-Geotech	Foundation plan	Includes equipment layouts and access road details	x	x	x	x
Civil-Structural-Geotech	Typical details	Includes commonly used details and cross sections, fire hydrant, slope paving, expansion joints, light poles, panels or rack mounted equipment smaller foundations		x	x	x
Civil-Structural-Geotech	Anchoring details	Includes anchoring bolts, welding or any other attachment method as applicable		x	x	x
Civil-Structural-Geotech	Project fencing	Includes overall project fence, elevations, type and material		x	x	x
Civil-Structural-Geotech	Landscaping plan	Includes irrigation piping, equipment plan drawing, tree preservation and visual impact mitigation measures		x	x	x
Fire	Cover sheet	General notes, symbols & legends, project specifications and detection or suppression design basis		x	x	x
Fire	Fire detection plan	Covers fire system elevations and detection coverage		x	x	x

Fire	Fire detection diagrams	Covers wiring, termination, and connectivity for fire alarm panel, detection devices and other devices		x	x	x	
Fire	Fire detection details	Covers all fire system details, datasheets and listings		x	x	x	
SCADA-project	Cover sheet	General notes, symbols & legends, project specifications		x	x	x	
SCADA-project	Project SCADA diagram	Covers all SCADA subsystems such as BESS, Substation, Fire, Security, External on a single document and ensures all interfaces are in place		x	x	x	
SCADA-BESS	Cover sheet	General notes, symbols & legends, project specifications		x	x	x	
SCADA-BESS	SCADA single line and network topology			x	x	x	
SCADA-BESS	POI SCADA layout and details	Covers POI SCADA rack or cabinet, general arrangement, elevations and BOM		x	x	x	
SCADA-BESS	POI SCADA termination details	Covers connectivity and termination details		x	x	x	
SCADA-BESS	Field network enclosure layout and details	Covers Field Network Enclosures (FNE), general arrangement, elevations and BOM		x	x	x	
SCADA-BESS	Field network enclosure termination details	Covers connectivity and termination details		x	x	x	
SCADA-BESS	IP Address and points list			x	x	x	
SCADA-BESS	Network termination details	Covers network termination details for fiber optics, CAT6, serial comms as required		x	x	x	
SCADA-BESS	Equipment BOM	Covers all equipment including BESS Mfg furnished equipment and contractor provided equipment		x	x	x	
Security	Cover sheet			x	x	x	
Security	Physical security	Includes coordination with project fence sub-contractor		x	x		
O&M	Equipment O&M	Covers all project equipment operation and maintenance manuals				x	
Studies	Geotech	Includes soil contamination, electrical and thermal resistivity	x	x	x	x	Big Pine Key Substation Included for reference.
Studies	Ground grid sizing	Study performed in CDEGS per IEEE 80		x	x	x	
Studies	Cable sizing, pulling and thermal analysis	Covers thermal insulation, voltage drop, short circuit, power losses in steady state and/or transient analysis		x	x	x	
Studies	BESS protection and coordination	Covers protection and coordination studies including relay settings			x	x	
Studies	Load flow study	Includes BESS plant model on E-tap or SKM		x	x	x	
Studies	POI reactive power study			x	x	x	
Studies	Noise study	Includes simulation (at 90% & IFC) and site surveys as required (at As-Built)		x	x	x	Pre & Postconstruction
Studies	Harmonics study				x	x	
Studies	Arc-flash study	Includes labels and labels plan drawing			x	x	
Studies	Lightning protection study	Includes entire project (BESS, Substation) as applicable		x	x	x	
Studies	Lighting calculations	Calculations as needed to complement the overall site lighting plan		x	x	x	
Studies	Auxiliary loads	Includes auxiliary loads sizing and station back-up power (DC battery bank per IEEE-485)		x	x	x	
Studies	Structural and foundations	Includes seismic, wind loads, etc. for all project equipment and per applicable standards such as IEEE 693		x	x	x	

MILESTONE	DEFINITION
30%	This includes the preliminary design from the EPC
90%	This includes all drawings issued for final review prior to release for permitting
IFC	This is the 90% package with minor revisions and engineering stamps
AS-BUILTS	This is the record drawings including engineering stamps

EXHIBIT B-1

COMMISSIONING AND ACCEPTANCE TESTS

This Exhibit sets forth a template to support the requirements for the commissioning and Acceptance Tests and will be the basis for the commissioning procedures and Acceptance Test procedures to be developed by Contractor in accordance with the Agreement. The Acceptance Test procedures and this Exhibit B-1 shall be used to determine whether Contractor has satisfied Contractor's Performance Guarantees as shall be set forth as part of negotiations for the definitive Agreement. Owner is responsible for all testing of Owner-Provided Components.

1. **General**.

- Contractor shall provide Owner with at least ten (10) Business Days' advance notice prior to the commencement of any testing (fifteen (15) Business Days if an outage is required), and Owner will confirm the date of such testing in writing prior to the first date of the testing specified in such notice.

  If either Party determines that the requirements of this Exhibit conflict with any of the applicable standards or practices, such Party shall notify the other Party and Contractor shall adhere to the more stringent governing standard.

  The Owner will provide backfeed power to enable hot commissioning activities and Acceptance Testing after Mechanical Completion. Contractor is responsible for coordination of the testing to avoid peak hours.

- Project Operation Restrictions: All testing performed pursuant to this Exhibit B-1 must show that the Project is operating within the range of values to be negotiated between Owner and Contractor as part of the definitive Agreement.

- The results from all testing must demonstrate that the Equipment and Materials conform to the applicable requirements of the Agreement.

2. Commissioning Tests

- Commissioning Test Requirements:

  - Commissioning testing consists of operational testing of all Project systems, individual components as well as the whole Project, and their interface to the Owner's EMS via the Owner's communication system.

  For each commissioning test performed, Contractor shall provide written results to Owner.

  - The Contractor, at all times, must obtain permission from the Owner in accordance with the Agreement to perform commissioning tests when the Project is connected to the Grid. The Contractor is responsible for the coordination of the testing to avoid peak hours and in accordance with transmission system conditions. These tests may have to be performed during night or low load periods. Tests shall be scheduled with sufficient float to prevent any impacts to the to-be-negotiated required COD date and to accommodate any transmission system constraints.

- Commissioning Procedures and Plan:

- Contractor shall perform on-site commissioning testing following Mechanical Completion in accordance with the commissioning procedures and commissioning plan. The Commissioning Plan shall be submitted for review by the Owner six weeks prior to the scheduling of commissioning activities. Commissioning testing shall consist of 2 sets of tests: (i) tests to be performed before the Project is connected to the Grid, and (ii) field verification tests to be performed after the Project is connected to the Grid.

- The commissioning tests to be performed before connection to the Grid and prior to hand-over to BESS-OEM for Cold commissioning shall include the following items:

  - Insulation check of Control and Power cables.
  - Insulation check of auxiliary cables and panels.
  - Testing of relay protections and protective control functions (by secondary injection).
  - Testing of control and monitor system and thyristor valves (if required).
  - Verification and tuning of cooling system (if required) of the PCS-MV skids.
  - Check of operation and indications of circuit breakers, disconnect and earthing switches.
  - Capacitance check of capacitor banks (if required).
  - Verify proper operation of all pump fans and motors.
  - Verify proper operation of heating, ventilation and lighting systems (as applicable) of the BOP.
  - Check of current and voltage transformers.
  - Overall check of trip operations from protections to breaker.
  - Check of circuits through the local control interface and the remote EMS interface.
  - Fiber optic network testing
  - Fire detection system testing including functional test of UPS and battery charger. Specifically verifying that the BESS OEM Scope is fully integrated into the BOP and all detection signals are being received via the EMS and Site Fire Detection Panel.
  - Visual inspections and torque tests of all Project equipment and terminations.
  - Battery enclosure mechanical checks (as applicable).
  - Medium voltage step-up transformer testing not limited to insulation resistance tests; perform transformer turns ratio tests; insulation power factor or dissipation factor tests on all windings and/or bushings; verify correct phasing; sample oil and perform DGA, if applicable;
  - Ground grid testing
  - Insulation checks of medium voltage cables and collection substation equipment including VLF or HiPot testing.
  - Functional test of SCADA cabinet UPS

- Point to point test for all field IOs
- End to End verification tests for protection and SCADA systems.

Upon satisfactory completion of the above testing, the Project shall be connected to the Grid and

Contractor shall conduct the field verification tests. The field verification tests will occur concurrently with performance testing and shall include the following items:

- Measure and verify the Project's power and energy capabilities operation at nominal power system properties. This test shall be broken into three segments, verification of the DC block to the PCS-MV equipment, PCS-MV to the Collection MV Substation, and from the Collection MV Substation to the POI. The purpose is to verify full system capabilities
- Measure and verify autonomous functions operation as listed in Attachment 5 of Exhibit A.
- Measure and verify the external override functions operation as listed in Attachment 5 of Exhibit A.
- Verify the remote monitoring and control operations as listed in Attachment 5 of Exhibit A.
- Verify data storage and auditing operation as outlined in the Performance Validation section of Attachment 5 of Exhibit A.
- Verify connection and disconnection control operation as outlined in Attachment 5 of Exhibit A.
- Measure and verify current total harmonic distortion at POI to meet the requirements specified in IEEE 1547.
- Support Owner for functional and performance testing. Support limited to meter verification testing demonstrating the Project's capability to 1) discharge and charge at its guaranteed power capacity; 2) discharge its full guaranteed energy capacity; and 3) demonstrate its ramp rate and response time capabilities.

3. **Acceptance Tests**.

Contractor shall perform the following tests: Capacity Guarantee, Discharge/Charge Rate Guarantee, Charge Time Guarantee, Availability Test Guarantee, RT Efficiency Guarantee, Self-Discharge Rate Guarantee, Standby Self-Discharge Rate Guarantee, Ramp Rate Guarantee, Response Time Guarantee, and Power Factor Compliance Guarantee. Contractor shall coordinate and lead all tests that overlap between the BESS OEM scope of work and the EPC scope of work. EPC Contractor is responsible for the coordination of the site Acceptance Tests. The BESS contractor and/or Owner will provide support for the aforementioned tests. The Contractor will not be responsible for meeting guarantees for non-performance of equipment outside of Contractor's scope of work.

Contractor shall perform the following Acceptance Tests:

- Capacity Test. In order to determine the maximum dependable operating capability of the Project to charge and discharge energy (the "Project Capacity"), Contractor shall conduct a test in which the Project is charged over a period not to exceed the Guaranteed Charge Time and in no case greater than 4.8 hours, at the maximum charge rate (15 MW) setting for the Project and is discharged over a 4 hour period at the maximum discharge rate setting for the Project (the "Capacity Test"). The state of charge shall be 0% at the beginning of charging and 100% (representing all available energy in the system, inclusive of any overbuild) at the beginning of discharging. The Capacity Test must demonstrate that the system is capable of providing power from 0% to 100% SOC while maintaining the Charge Rate Guarantee. The state of charge as indicated by the project controller shall be recorded at the beginning and end of each Capacity Test for use in the Charge Time Test. The number of MWh of energy charged or discharged will be measured by the Project's MV meter. The Project Capacity of the Project, which is to be determined at the POI (as defined in Exhibit A), shall be calculated based on the output at the Project's MV meter. The Project Capacity is equal to the amount of energy discharged over a 4-hour period. The Project Capacity will be compared against the Capacity Guarantee to determine if the Performance Threshold has been achieved. The Capacity Guarantee will be satisfied if the energy output meets or exceeds 100% of the Capacity Guarantee and the discharge rate meets or exceeds 100% of the Discharge Rate Guarantee. The Capacity Test must demonstrate that the system is capable of providing power from 100% to 0% SOC while maintaining the Discharge Rate Guarantee over the duration of 4 hours. If the measured capacity is greater than the Capacity Guarantee, the Project Capacity will be set equal to the Capacity Guarantee for purposes of the other Acceptance Tests. The Contractor will be responsible for establishing the state of charge basis between 0% and 100% inclusive of both those values where energy and capacity is useable.

- Charge Time Test and Charge Rate. In order to confirm the amount of time it takes the Project to charge (the "Charge Time"), Contractor shall conduct a test to determine the actual amount of time in hours that the Project requires to achieve 100% state of charge starting from 0% state of charge (the "Charge Time Test"). The amount of time required during the Charge Time Test to achieve 100% state of charge shall be the Project's Charge Time. The Charge Time Guarantee will be satisfied if the Charge Time does not exceed the Charge Time Guarantee. In order to confirm the charge rate for the Project (the "Charge Rate"), Contractor shall calculate the average Charge Rate based on the amount of energy required to charge the Project, and the amount of time required to charge the Project with such energy, from 0% state of charge to 100% state of charge as measured during the Charge Time Test. The Charge Rate will be compared against the Charge Rate Guarantee to determine if the Project satisfies the Charge Rate Guarantee. If the Charge Time Guarantee is increased as described above, the Charge Rate Guarantee will be decreased proportionally.

- Availability Test. Contractor shall conduct a 24 hour test of the Project to measure the availability of the Project to operate in accordance with the technical capabilities of the Project (the "Availability Test"). During the Availability Test, Owner shall dispatch the Project generally in accordance with the Test Plan and shall select the set points for the Project's operation in a manner consistent with the technical specifications for the Project and the Charge Rate and Project Capacity determined under the Charge Rate Test and Capacity Test. Contractor shall record the performance of the Project during the Availability Test, including the MWh requested to be charged and discharged, the actual MWh charged and discharged at the Project's MV meter during the time period requested, and any outages or other failures that occur. The MW/MWh of the Project affected by an outage or other failure during a Settlement Interval (as defined below) shall be deemed unavailable during the period that the outage or other failure exists. In addition, if the Project fails to deliver the required energy or charge the required energy pursuant to any set point selected by Owner, the Project shall be deemed to be partially unavailable during the period when it fails to deliver or charge at the required output/input. In the event of any outage or other failure during the Availability Test, the test may be halted or interrupted in accordance with the provisions of this Exhibit B-1 relating to Testing Conditions and Excusable Event; Force Majeure Event. Set points shall only be adjusted at the beginning/end of a Settlement Interval. The availability of the Project ("Project Availability") shall be determined in accordance with the following formula:

Project Availability = ($\sum_{i=1}^{n} CA_i$) / n

Where:

n = the total number of Settlement Intervals during the Availability Test

i = each Settlement Interval during the Availability Test

Settlement Interval = a 5 minute settlement interval

CA_i = with respect to Settlement Interval "i", 1 – (Unavailable Capacity/ Project Capacity)

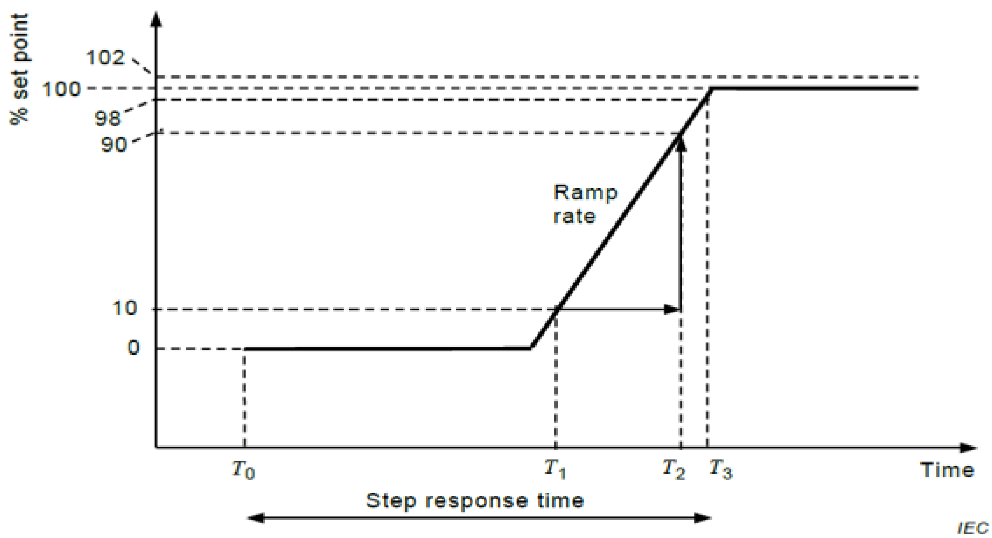
Unavailable Capacity = with respect to Settlement Interval "i", the sum of (a) the number of MW of the Project Capacity that is unavailable to charge or discharge as a result of an outage or other failure, plus (b) the number of MW determined by multiplying (x) the available Project Capacity, by (y) the percentage obtained by dividing the MW/MWh actually charged/discharged by the MW/MWh required to be charged/discharged at the set point selected by Owner during such Settlement Interval.

Project Availability will be compared against the Availability Test Guarantee to determine if the Project has successfully satisfied the Availability Test Guarantee.

- RT Efficiency Test. In order to determine the efficiency of the Project to charge energy and return such energy through a discharge, the Contractor shall conduct a test starting at 0% state of charge and begin charging the Project at the Project Capacity until it achieves 100% state of charge. Following the expiration of up to 15 minutes after the end of such charging, at the direction of the Project's scheduling coordinator, the Project shall then discharge energy from the same state of charge at the Project Capacity until it returns to 0% state of charge, whichever occurs first (the "RT Efficiency Test"). The amount of energy charged and discharged during the RT Efficiency Test shall be measured by the Project's MV meter. The Project's efficiency will be determined by dividing the amount of energy discharged during the RT Efficiency Test by the amount of energy charged during the RT Efficiency Test (the "RT Efficiency"). The RT Efficiency Test may be performed in conjunction with the Capacity Test. The RT Efficiency will be compared against the RT Efficiency Guarantee to determine if the Guaranteed Performance Threshold has been achieved.

- Auxiliary Load Test. In order to determine the load consumed by the Project, Contractor shall conduct a test to determine the amount of energy consumed by the Project's auxiliary systems during standby, idle and normal operation (the "Auxiliary Load Test"). The battery auxiliaries will be measured as part of this overall guarantee. Normal operation auxiliary load testing will be conducted when the entire phase is running at its maximum capacity during either charging or discharging. The auxiliary systems to be included in this test are all the balance of plant auxiliaries required to run the plant. The amount of energy consumed by the Project's auxiliary systems (the "Auxiliary Load") will be determined based on measuring the auxiliary meter for 24 hours (run concurrently with the Availability Test). All three states of standby, idle and normal operation will be tested during the Availability Test. The Auxiliary Load shall be measured and metered through a separate meter for the Auxiliary Loads. The Auxiliary Load will be compared against the Auxiliary Load Guarantee to determine if the Guaranteed Performance Threshold has been achieved.

- Ramp Rate Test. In order to determine the ability of the Project to ramp the Project's power output between different set points, Contractor shall conduct a test to determine the rate of change in power output levels (the "Ramp Rate Test"). Owner will select up to four starting set points and an equal number of different ending set points for the Project that will be used for purposes of the Ramp Rate Test. Test points will be selected and communicated to Contractor during development of the Test Plan. In order to provide valid measurements, the selected setpoints must result in steps greater than or equal to 5MW, to accommodate the sampling rate of the power measurement, as shown generally in the figure below (which is Figure 5 from IEC 62933-2-1). T1 is defined as the first point measured after the Project's response to the new setpoint is registered by the Project's MV meter, and T2 is defined as the first point measured greater or equal to 90% of the setpoint. Contractor shall measure the time period between T1 and T2. The Ramp Rate will be calculated by |(Power at T2-Power at T1)/(T2-T1)|, which is the slope of the line from T1 to T2. The average of the 6 tests will be the Project's ramp rate (the "Ramp Rate"). The Ramp Rate will be compared against the Ramp Rate Guarantee, within a tolerance that accounts for measurement system error to be mutually agreed by both parties, to determine if the Project has successfully satisfied the Ramp Rate Guarantee.



Step response time and ramp rate of EES system

- Response Time Test. Contractor shall conduct a test to determine the Project response time to respond to charging and discharging commands from both a ready state (as defined below) and an offline state (as defined below) (the "Response Time Test"). The amount of time it takes the Project to change from Ready state/Offline state (neither charging nor discharging) to charging at the guaranteed Charge Rate and the amount of time it takes the Project to change from Ready state/Offline state to discharging at the guaranteed Discharge Rate will each be tested independently from both a ready state and an offline state (each, a "Response Time"), and the Response Time for both tests in each state (ready or offline) must satisfy the applicable Performance Guarantee. Project response time during the Ready and Offline state is defined as time from control system receipt of dispatch instruction from the Contractor EMS (when the control system modbus values are updated) to Battery charge/discharge output first reaching the maximum system output under ready mode of the Battery, measured at the MV Project meter. The command is read from the control system modbus interface and the power output is read directly from the MV Project meter. The Response Times will be compared against the Response Time Guarantees to determine if the Project has successfully satisfied the Response Time Test Guarantees.

"Ready state" means that the plant site controller is online, the DC bus is running, and the inverter contactors are closed.

"Offline state" means that the plant site controller is not in an active mode and that the DC bus is not running and the inverter contactors are open.

- Standby Loss Test. In order to determine the rate at which the Project loses its stored energy when synchronized to the grid, Contractor shall conduct a test to determine the lost energy from the Project while the Project is synchronized to the Grid in an Offline state (as defined above), with all energy sources (including auxiliary power) being provided from the grid (the "Standby Loss Test"). In order to determine the standby losses of the Project, the Contractor shall conduct a test starting at 0% state of charge and begin charging the Project at the Charge Rate until it achieves 100% state of charge (representing all available energy in the Project, inclusive of any overbuild). Following the expiration of 24 hours (during which the Project is placed under rest) after the end of such charging, the Project shall then be discharged over a 4 hour period at the maximum discharge rate setting for the Project. The amount of energy discharged during the Standby Loss Test shall be measured by the Project's MV BESS meter. The Project's standby losses will be calculated as follows:

$$Standby\ losses = 1 - \frac{energy\ discharged\ during\ the\ Standby\ Loss\ Test}{Capacity\ Guarantee}$$

  The standby losses will be compared against the Standby Loss Guarantee to determine if the Guaranteed Performance Threshold has been achieved.

- Noise Ordinance Compliance Tests. Contractor shall retain an independent third-party to conduct test(s) to determine the Project's operating noise levels (the "Noise Ordinance Compliance Tests"). The Noise Ordinance Compliance Tests shall be conducted at the system level and at predefined operating modes mutually agreed upon between Owner and Contractor.

- Subsystem Tests. Contractor shall conduct isolated subsystem tests to determine if the Project's lighting, fire detection system, and SCADA system perform as intended consistent with the manufacturer's specifications.

- Power Factor Compliance Test. In order to ensure that the power factor capability of the Project complies with the requirements of FERC Order 827, Contractor shall conduct a test demonstrating the power factor range, at continuous rated power output, at the Project's MV meter. The Power Factor Guarantee will be satisfied if the dynamic power factor range at continuous rated power output meets or exceeds the Power Factor Compliance Guarantee at the MV BESS meter.

Owner may, in its sole discretion, elect to waive a particular portion of an Acceptance Test at any time. Such election or waiver during one Acceptance Test does not shorten any run period or waive any portion of any subsequent Acceptance Test.

4. **Testing Requirements**.

- Test Plan. In connection with the delivery of the Acceptance Test procedures to be developed by Contractor under the Agreement, Contractor shall prepare and submit to Owner a proposed plan and schedule in order to complete the Acceptance Tests ("Contractor's Proposed Test Plan"). The Acceptance Test procedures and Contractor's Proposed Test Plan must describe, with supporting detail, the actions, processes, protocols, and schedules for the performance and completion of the Acceptance Tests in accordance with this Exhibit B-1 and the requirements of the Agreement, including compliance with applicable guidelines, and required by the applicable Governmental Authority prior to issuance of the affected permits, from the National Fire Protection Association as set forth in Exhibit A, and the provisions of published test procedures developed by the Electric Power Research Institute (EPRI) or Energy Storage Integration Council (ESIC) (or equivalent test procedures accepted as an Industry Standard for lithium ion battery energy storage systems). Owner and Contractor will cooperate and work together in good faith, including reasonable cooperation with Owner's offtaker if requested by Owner, to resolve any issues and to reasonably agree on a final Acceptance Test plan and set of Acceptance Test procedures (the "Final Test Plan") no later than thirty (30) days before the expected Substantial Completion Date. If Owner and Contractor do not reach agreement on a final Test Plan by that date, Owner shall have the right to require that the Final Test Plan include such tests, procedures and requirements as it may request but, if tests, procedures and requirements are not consistent with the terms and conditions of this Agreement, they shall be treated as an Owner Directive subject to the Agreement, including if applicable an equitable adjustment of any affected Contractor Performance Guarantees. If any matters set forth in the Final Test Plan vary from those set forth in this Exhibit B-1, the matters set forth in the Final Test Plan shall govern.

- Test Date. Contractor shall provide Owner with at least five (5) Business Days' advance notice prior to the commencement of any Acceptance Test (fifteen (15) Business Days if an outage is required), and Owner will confirm the date of such Acceptance Test in writing prior to the first date of the Acceptance Test specified in such notice.

- Test Conditions. At all times during the performance of an Acceptance Test, the Project shall not be operated under abnormal operating conditions such as (i) unstable load conditions; (ii) operation outside of manufacturers' recommendations; or (iii) operation outside of regulatory restrictions. If abnormal operating conditions occur during the performance of an Acceptance Test, Owner or Contractor, as applicable may so notify the other Party and in such notice elect to postpone or reschedule all or a portion of such Acceptance Test in its reasonable discretion, in which case such test will be deemed an Incomplete Test and treated as provided below. All testing will be conducted at unity power factor. If the Grid voltage as measured at the POI during any performance test is less than 1.0 pu, the Project will experience lower power and energy output as a result of increased losses in the collection system (cables and transformers) and derating of the inverter output power. If the low voltage at the POI is due to low Grid voltage and not due to Project operation, then the impacts on the results of the performance test will be accounted for by calculating the increased losses in the Project that result from the voltage at POI not being 1.0 pu (e.g., equal to 13.8 kV).

Calculations and adjustment factors will be agreed upon ahead of the performance tests following detailed design of the Project.

- Test Records; Monitoring. Contractor shall record the results of each Acceptance Test and provide all conditions, inputs, assumptions, raw data, records and results associated with each Acceptance Test to Owner within two (2) Business Days following completion of such Acceptance Test. During the performance of each Acceptance Test, the Project shall be functioning in a manner to permit Owner to remotely monitor, observe and independently verify the performance of the Project through the Project's remote monitoring and control systems.

- Incomplete Test. If any Acceptance Test is not completed in accordance with the Final Test Plan and this Exhibit B-1 (each an "Incomplete Test"), the Contractor is required to repeat the incomplete Acceptance Test.

- Final Report. Within ten (10) Business Days after the completion of an Acceptance Test (including a retest), Contractor shall prepare and submit to Owner a written report of the Acceptance Test. At a minimum, the report shall include: (1) a description of the Final Test Plan applicable to such Acceptance Test; (2) a record of the personnel present during all or any part of the Acceptance Test, whether serving in an operating, testing, monitoring or other such participatory role; (3) documentation confirming that the Acceptance Test was Successfully Run; (4) a record of Acceptance Test conditions and assumptions, including any unusual or abnormal conditions or events that occurred during the Acceptance Test and any actions taken in response thereto; (5) the measured Acceptance Test data; (6) whether the Acceptance Test demonstrated that the Project achieved the applicable Performance Guarantee and Minimum Performance Threshold, including supporting calculations, and if the Project achieved the Minimum Performance Threshold but not the Performance Guarantee, the schedule for any rework and subsequent testing in order for Contractor to achieve the applicable Performance Guarantee; and (7) Contractor's statement of either Contractor's acceptance of the Acceptance Test or Contractor's rejection of the Acceptance Test results and reason(s) therefor. Owner will review the report and, within ten (10) Business Days after receipt of such report, Owner shall notify Contractor in writing of either Owner's acceptance of the Acceptance Test results or Owner's rejection of the Acceptance Test results and reason(s) therefor. Contractor shall re-perform at its sole cost any Acceptance Test if the Acceptance Test results were rejected by either Party.

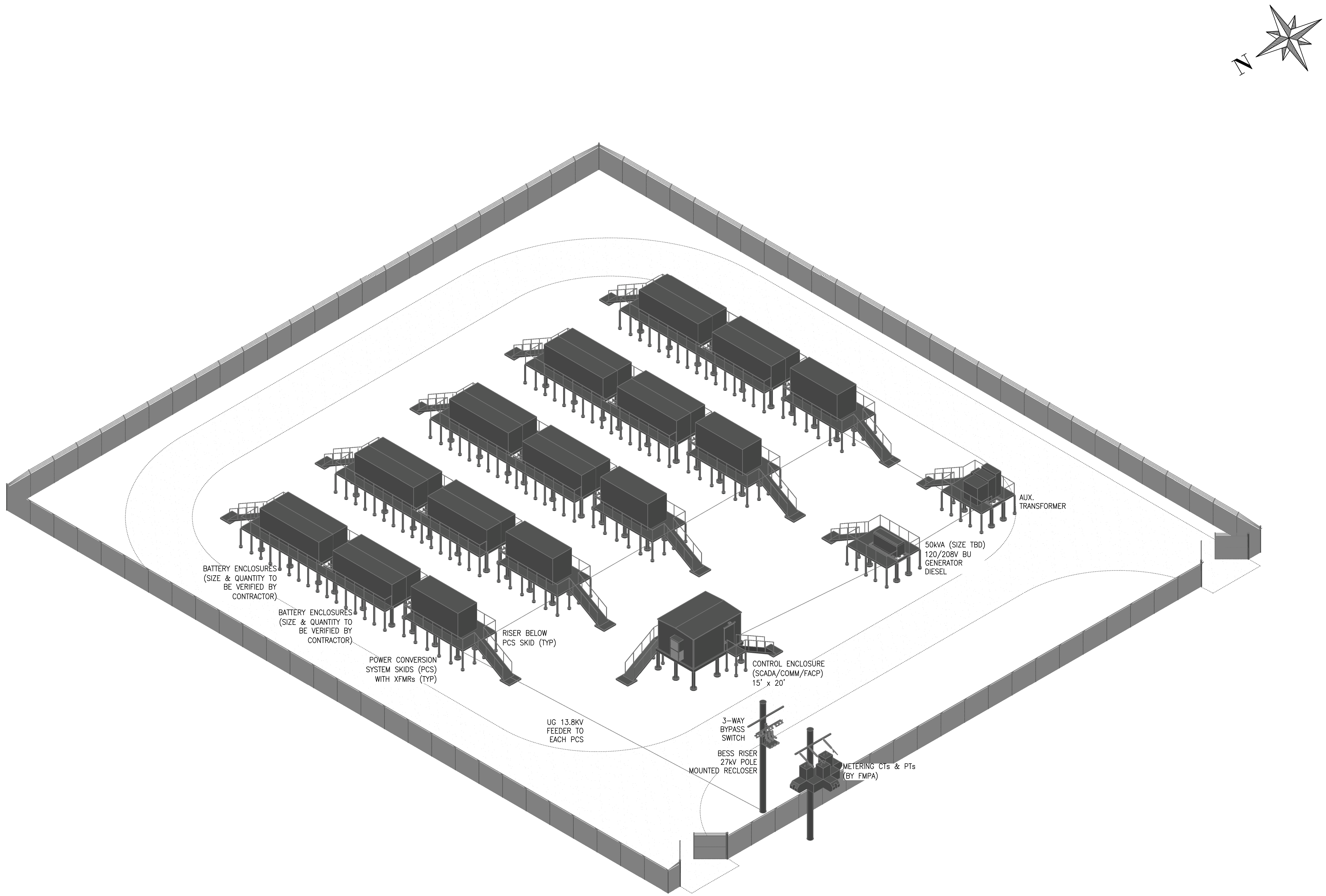
- Instrumentation and Metering. The Project's installed metering equipment shall be used to record all energy discharged and charged by the Project, unless specifically stated to the contrary in this Exhibit B-1. Contractor shall provide all instrumentation and data collection equipment required to perform the Acceptance Tests. Instrumentation shall include all instruments permanently installed at the Project and the temporary instruments suggested by Contractor or reasonably requested by Owner. Within forty-five (45) days after final approval of the Acceptance Test Procedures and Proposed Test Plan, Contractor shall provide a list of the temporary calibrated instrumentation that will be used during the Acceptance Tests for Owner's review and approval. Wherever possible, the instrumentation, metering and data collection equipment that will be used after the Project achieves Substantial Completion for monitoring and controlling the operation of the Project shall be used for the Acceptance Tests. Contractor shall calibrate or cause to be calibrated all such instrumentation, metering and data collection equipment no more than three (3) months prior to the date of the applicable Acceptance Test. Copies of all calibration sheets shall be provided to Owner at least seven (7) Business Days prior to the commencement of the first Acceptance Test.

- Costs and Energy Scheduling. Except as otherwise provided in this Exhibit and the Agreement, Contractor shall be responsible for all costs incurred by it in conducting the Acceptance Tests. Owner shall be responsible for the supply of all energy required for any Acceptance Test and shall receive the proceeds from the sale of any energy output during an Acceptance Test. Contractor shall provide all information necessary and reasonably requested by Owner to permit Owner to schedule the supply and delivery of energy from and onto the grid.

- Retests. If Contractor fails to achieve the Guaranteed Performance Threshold for any Performance Guarantee, Contractor shall make such necessary corrections and/or repairs to remedy the failure and shall re-perform the relevant Acceptance Test until the Guaranteed Performance Threshold is achieved.

- Excusable Event; Force Majeure Event. If an Excusable Event, Force Majeure Event that would adversely impact an Acceptance Test occurs during the performance of the Acceptance Test, the Acceptance Test will be suspended for the duration of the Excusable Event, Force Majeure Event, and will be rerun (or, subject to mutual agreement of the Parties, resumed), after the Excusable Event, Force Majeure Event is no longer adversely impacting the Acceptance Test.

- Supplemental Storage Rating Protocol: If, more than 75 days prior to commencement of commissioning, any changes are made in the design of the Project that impact the performance of the Project, then no later than 75 days prior to commencement of commissioning, Contractor shall deliver to Owner for its review and approval (such approval not to be unreasonably delayed or withheld) a supplement to this Exhibit B-1 with additional and supplementary details, procedures and requirements applicable to Acceptance Tests based on the then current design of the Project. From time to time during construction, Contractor may deliver to Owner for its review and approval (such approval not to be unreasonably delayed or withheld) any Contractor's recommended updates to the then current supplementary storage rating test protocol. The initial supplementary storage rating test protocol (and each update thereto) will be submitted by the Owner to the Interconnecting Utility for approval. Once approved by the Interconnecting Utility, the initial supplementary storage rating test protocol (and each update thereto) shall be deemed an amendment to this Exhibit B-1.



CONSTRUCTION NOTES:

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2. FOR GENERAL NOTES SEE DRAWING P3.

NOTES:

1. QUANTITY & SIZE OF PCS, XFMR, AUX POWER EQUIPMENT ARE SHOWN FOR REFERENCE. CONTRACTOR TO VERIFY ALL EQUIPMENT SIZING PER SPECIFICATION REQUIREMENTS.

PRELIMINARY
NOT FOR CONSTRUCTION

N.T.S.

HOLD INFORMATION

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RELEASE INFORMATION

REV.	DATE	DESCRIPTION
0	12-02-2025	ISSUED FOR BID

ISSUE PURPOSE: BIDS
SPECIFICATION:
PROJECT NO.: A15411.003

I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF STATE NAME.

ENTER NAME
ENTER DATE

MY LICENSE RENEWAL DATE IS: ENTER DATE
PAGES OR SHEETS COVERED BY THIS SEAL: THIS DOCUMENT ONLY.

CERT OF AUTHORIZATION (WHEN REQ'D)

CAD FILE NAME: P1.DWG
PREPARED BY: R. BROCKMAN
REVIEWED BY: S. VAN DYKE
APPROVED BY: S. VAN DYKE

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CHICAGO, ILLINOIS 60603-5780

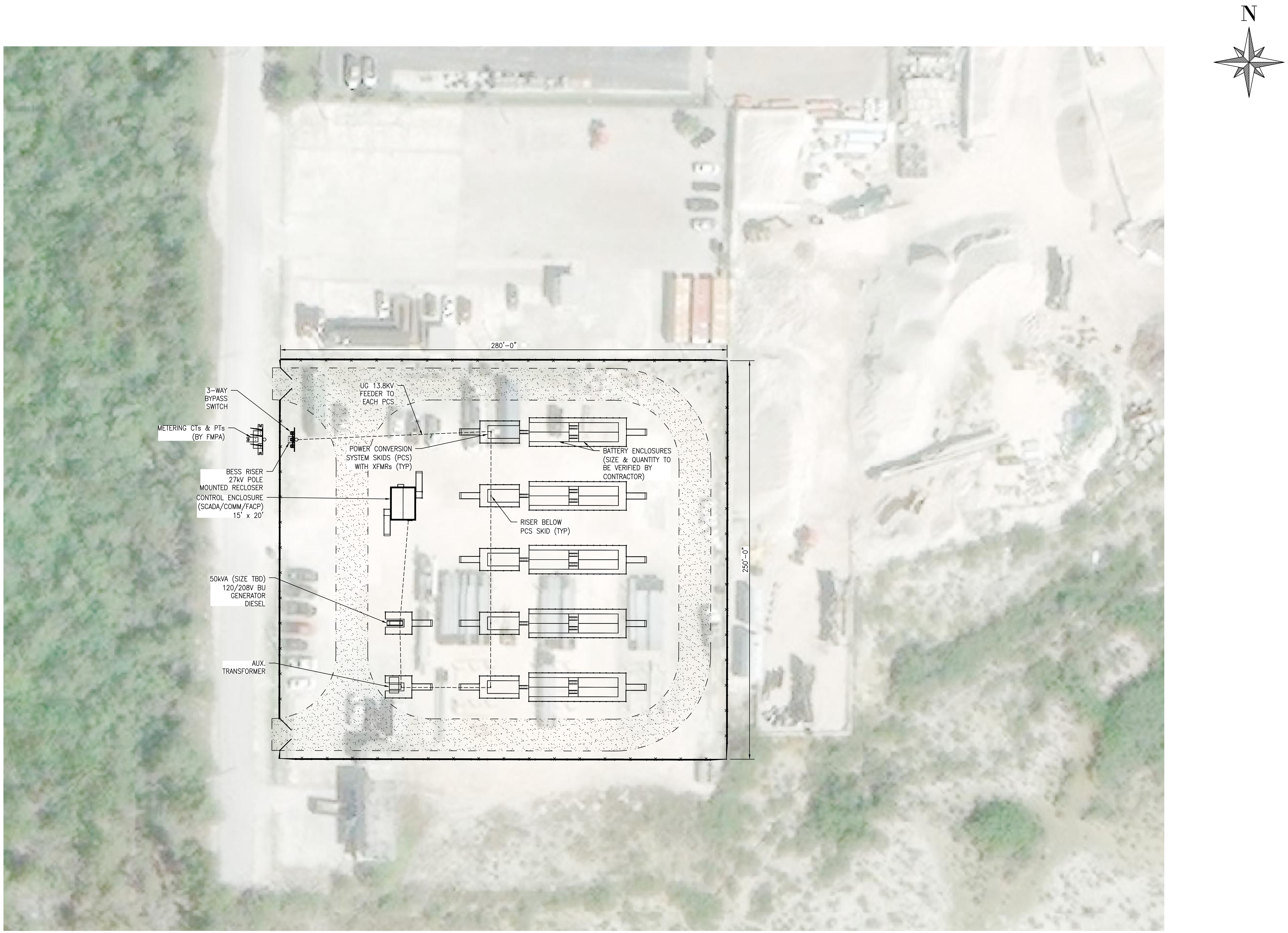
FMPA MUNICIPAL POWER

PROJECT
BIG PINE KEY BESS

DRAWING TITLE
ISOMETRIC PLAN

DRAWING NUMBER	REVISION
P1	0

SHEET 1 OF 6



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PRELIMINARY
NOT FOR CONSTRUCTION

1/32" = 1'-0"

HOLD INFORMATION

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CERT OF AUTHORIZATION (WHEN REQ'D)

CAD FILE NAME: P2.DWG
PREPARED BY: R. BROCKMAN
REVIEWED BY: S. VAN DYKE
APPROVED BY: S. VAN DYKE

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CHICAGO, ILLINOIS 60603-5780

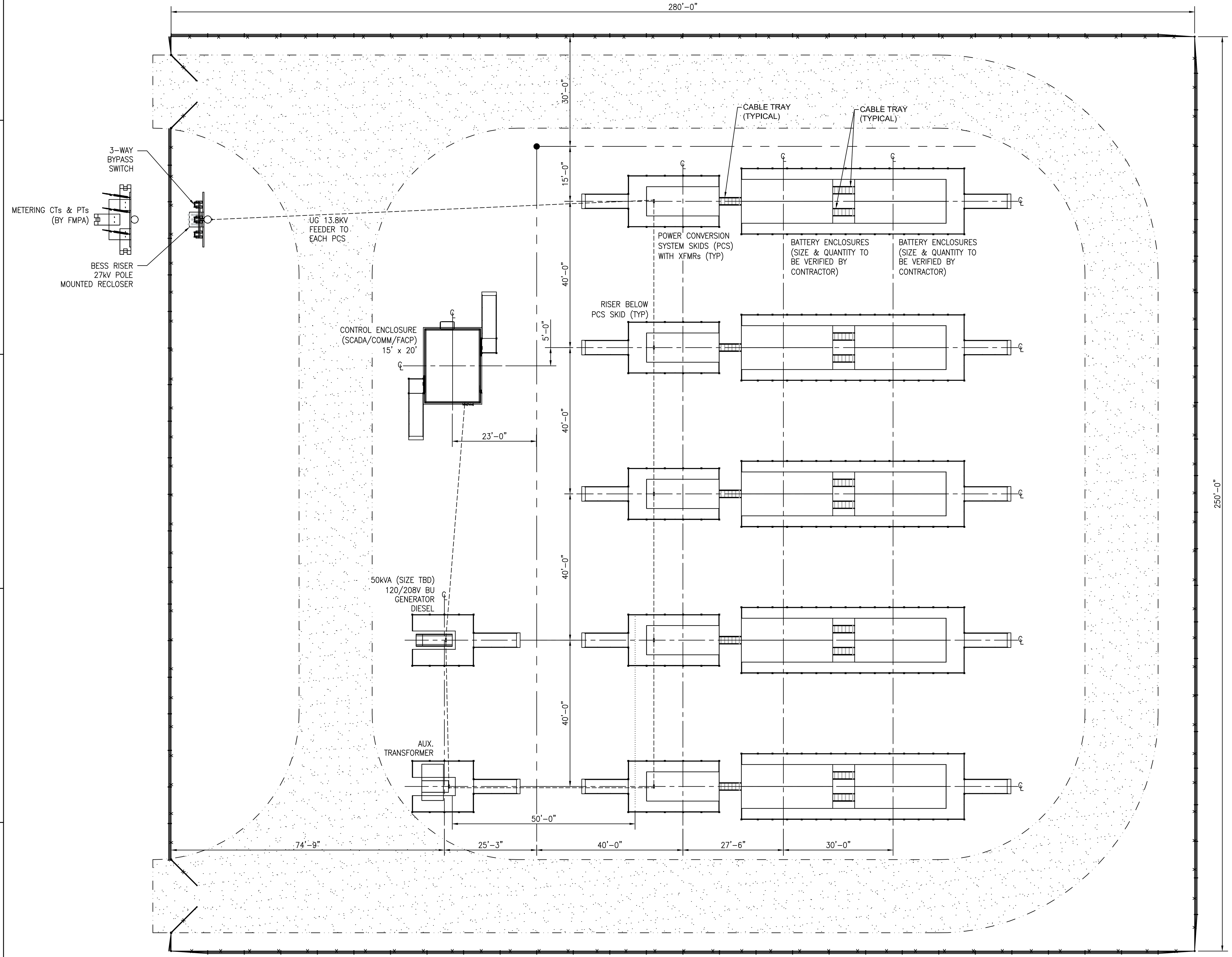
FMPA
MUNICIPAL POWER

PROJECT
BIG PINE KEY BESS

DRAWING TITLE
SITE PLAN

DRAWING NUMBER	REVISION
P2	0

SHEET 2 OF 6



N

GENERAL NOTES:

1. ALL WORK DONE BY CONTRACTOR/INSTALLER PURSUANT TO THIS DRAWING SHALL:
   (A) CONFORM TO THE GOVERNING CONTRACT DOCUMENTS
   (B) BE PERFORMED EXCLUSIVELY BY ITS TRAINED, COMPETENT PERSONNEL OR, WHERE PERMITTED, THAT OF ITS SUBCONTRACTOR(S)
   (C) COMPLY WITH ALL APPLICABLE SAFETY LAWS, REGULATIONS, PROGRAMS AND PRACTICES TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING THE CONTRACTOR'S/INSTALLER'S PERSONNEL(OR THAT OF ITS SUBCONTRACTOR(S)) PERFORMING THE WORK.

2. UNDERGROUND OR EMBEDDED UTILITIES MAY EXIST WITHIN THE AREA OF AND ADJACENT TO THE LIMITS OF THE WORK. THE LOCATION OR IDENTIFICATION OF SUCH UTILITIES HAS NOT BEEN VERIFIED BY OWNER OR BY S&L. CONTRACTOR/INSTALLER IS RESPONSIBLE FOR FIELD LOCATING AND IDENTIFYING UNDERGROUND AND EMBEDDED UTILITIES AND ANY OTHER UNDERGROUND AND EMBEDDED UTILITY DIMENSIONS.

3. REFERENCES USED HAVE BEEN IDENTIFIED ON EXCAVATION/ FOUNDATION/DEMOLITION DRAWINGS AND HAVE BEEN PROVIDED TO ASSIST THE CONTRACTOR/ INSTALLER IN THE FIELD LOCATING EXISTING UTILITIES AND OTHER POTENTIAL UNDERGROUND OR EMBEDDED INTERFERENCES. THESE REFERENCES ONLY SHOW THE APPROXIMATE LOCATION OF POTENTIAL UNDERGROUND OR EMBEDDED UTILITIES AND MAY NOT INDICATE OR REFLECT ALL EXISTING UNDERGROUND OR EMBEDDED UTILITIES OR THEIR ACTUAL LOCATIONS.

4. REFERENCES IDENTIFIED SHALL NOT SUBSTITUTE FOR THE CONTRACTOR'S/INSTALLER'S OBLIGATION TO FIELD LOCATE ANY UNDERGROUND OR EMBEDDED UTILITIES OR INTERFERENCES THAT MAY AFFECT THE WORK.

5. DUE CAUTION SHALL BE TAKEN DURING ANY EXCAVATION/ FOUNDATION/DEMOLITION WORK WITHIN THE AREA OF AND ADJACENT TO THE LIMITS OF THE WORK DUE TO POSSIBLE INTERFERENCES THAT MAY NOT BE REFLECTED ON THE REFERENCES IDENTIFIED.

6. QUANTITY & SIZE OF PCS, XFMR, AUX POWER EQUIPMENT ARE SHOWN FOR REFERENCE. CONTRACTOR TO VERIFY ALL EQUIPMENT SIZING PER SPECIFICATION REQUIREMENTS.

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PRELIMINARY
NOT FOR CONSTRUCTION

1/16" = 1'-0"

HOLD INFORMATION

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RELEASE INFORMATION

REV.	DATE	DESCRIPTION
0	12-02-2025	ISSUED FOR BID

ISSUE PURPOSE: BIDS
SPECIFICATION:
PROJECT NO.: A15411.003

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CERT OF AUTHORIZATION (WHEN REQ'D)

CAD FILE NAME: P3.DWG
PREPARED BY: R. BROCKMAN
REVIEWED BY: S. VAN DYKE
APPROVED BY: S. VAN DYKE

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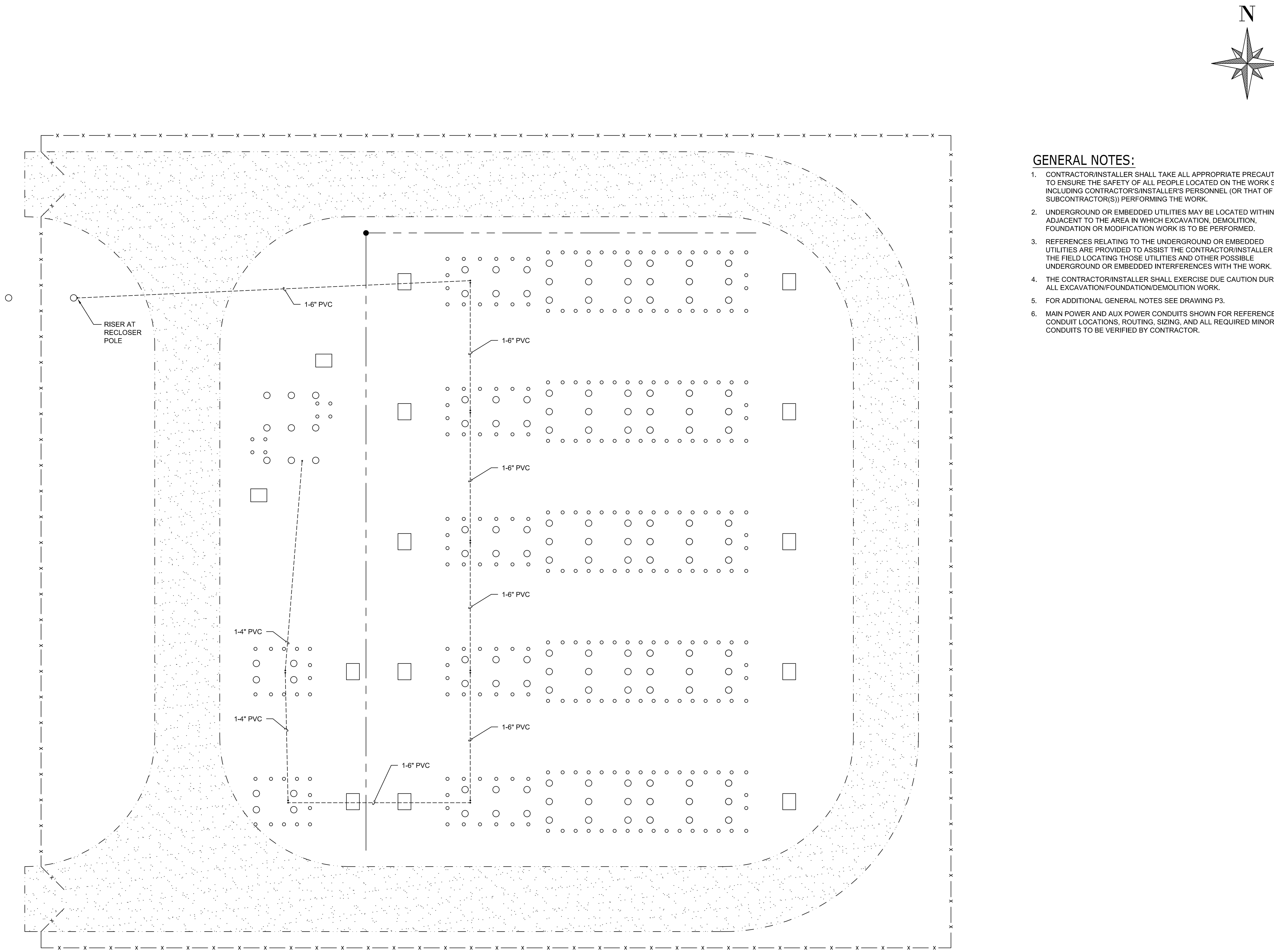
FMPA MUNICIPAL POWER

PROJECT
BIG PINE KEY BESS

DRAWING TITLE
GENERAL ARRANGEMENT

DRAWING NUMBER	REVISION
P3	0

SHEET 3 OF 6



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3. REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.
4. THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.
5. FOR ADDITIONAL GENERAL NOTES SEE DRAWING P3.
6. MAIN POWER AND AUX POWER CONDUITS SHOWN FOR REFERENCE. CONDUIT LOCATIONS, ROUTING, SIZING, AND ALL REQUIRED MINOR CONDUITS TO BE VERIFIED BY CONTRACTOR.

PRELIMINARY
NOT FOR CONSTRUCTION

1/16" = 1'-0"

HOLD INFORMATION	
NO.	DESCRIPTION

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RELEASE INFORMATION		
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ISSUE PURPOSE:	BIDS
SPECIFICATION:	
PROJECT NO.:	A15411.003

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CERT OF AUTHORIZATION (WHEN REQ'D)

CAD FILE NAME:	P4.DWG
PREPARED BY:	R. BROCKMAN
REVIEWED BY:	S. VAN DYKE
APPROVED BY:	S. VAN DYKE

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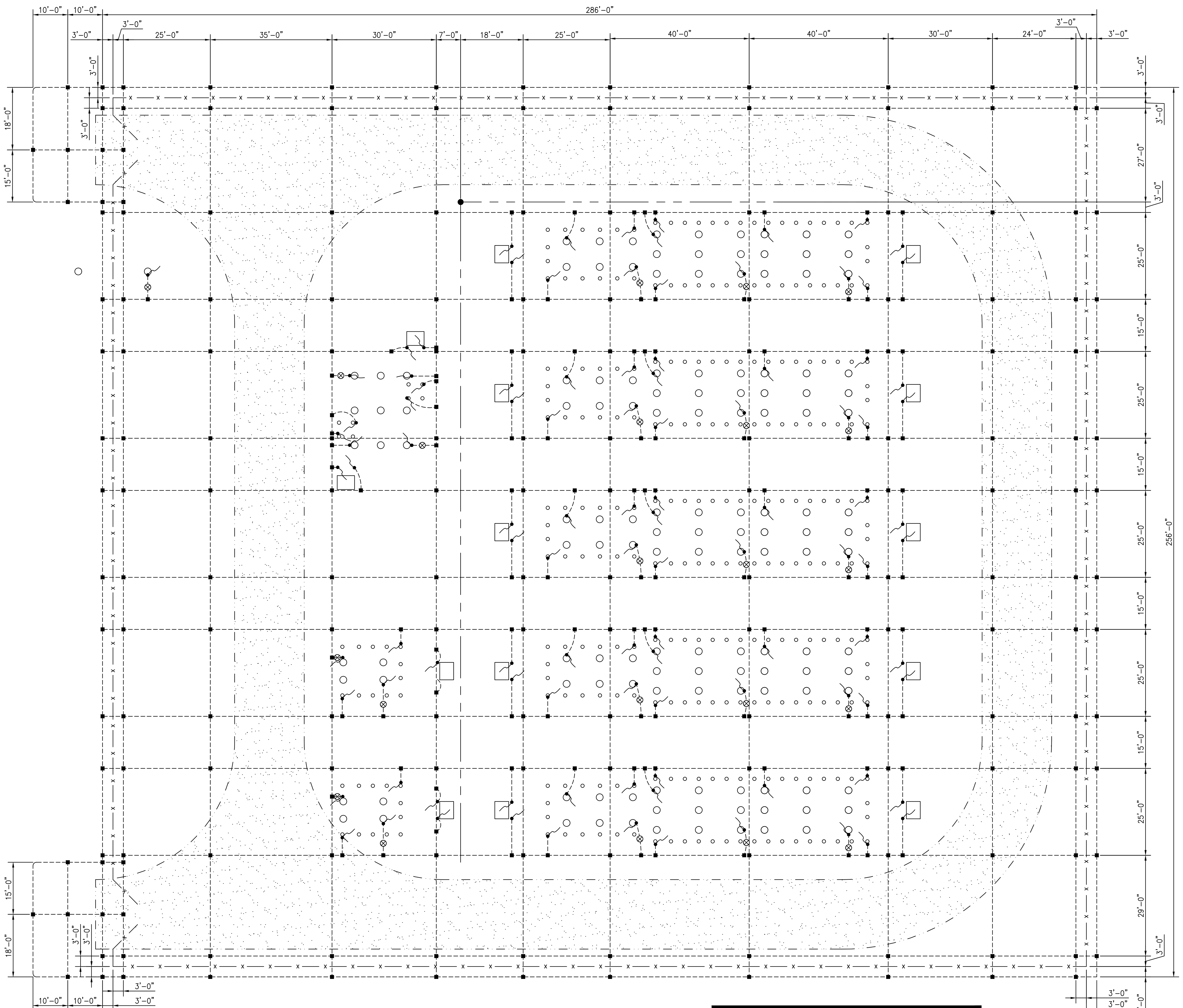
CHICAGO, ILLINOIS 60603-5780

FMPA MUNICIPAL POWER

PROJECT
BIG PINE KEY BESS

DRAWING TITLE
CONDUIT PLAN

DRAWING NUMBER	REVISION
P4	0
SHEET 4 OF 6	



N

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4. THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION /FOUNDATION/DEMOLITION WORK.
5. FOR GENERAL NOTES SEE DRAWING P3.
6. GROUNDING GRID SHOWN FOR REFERENCE. GRID SIZING AND LAYOUT TO BE CONFIRMED BY CONTRACTOR.

NOTES:

1. FOUNDATION EXCAVATIONS CAN BE USED FOR PLACEMENT OF GROUND WIRE PROVIDED THE WIRE IS SURROUNDED BY SOIL.
2. BURIED GROUND WIRE TO BE 18" BELOW GRADE.
3. ALL CONNECTIONS BELOW GRADE TO BE "NVENT ERICO" CADWELD CONNECTIONS.
4. REFER TO CIVIL CONSTRUCTION SPECIFICATIONS FOR GROUNDING INSTALLATION.

LEGEND:

#4/0 AWG SDBC GROUND GRID 18" BELOW GRADE

EXOTHERMIC CONNECTION WIRE TO WIRE

#4/0 AWG SDBC GROUND TAIL EXTEND 5FT. ABOVE GRADE UNLESS NOTED OTHERWISE SDBC = SOFT DRAWN BARE COPPER

GROUND ROD, COPPER-CLAD STEEL 3/4" X 10'-0"

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SPECIFICATION:
PROJECT NO.: A15411.003

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CERT OF AUTHORIZATION (WHEN REQ'D)

CAD FILE NAME: P5.DWG
PREPARED BY: R. BROCKMAN
REVIEWED BY: S. VAN DYKE
APPROVED BY: S. VAN DYKE

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CHICAGO, ILLINOIS 60603-5780

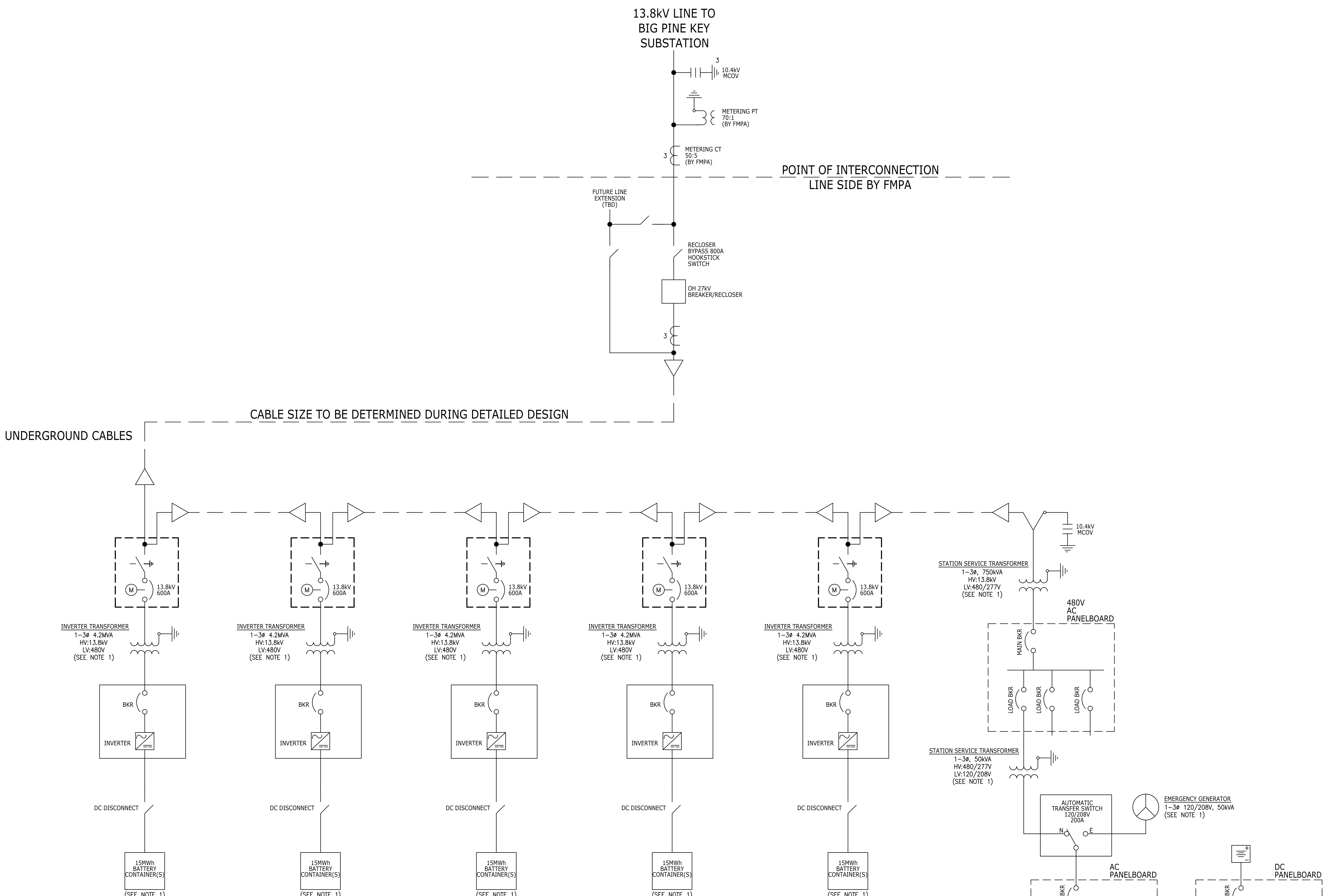
FMPA MUNICIPAL POWER

PROJECT
BIG PINE KEY BESS

DRAWING TITLE
GROUNDING PLAN

DRAWING NUMBER	REVISION
P5	0

SHEET 5 OF 6



NOTE:

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N.T.S.

HOLD INFORMATION	
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PROJECT
KEYS BIG PINE BESS

DRAWING TITLE
ONE LINE DIAGRAM

DRAWING NUMBER	REVISION
P6	A
SHEET 6 OF 6	

Appendix B

QUANTA TECHNOLOGY
A QUANTA SERVICES COMPANY

REPORT

Battery Energy Storage System - Interconnection Study

PREPARED FOR

Florida Municipal Power Agency

Keys Energy Services

DATE

November 21, 2025

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VERSION HISTORY

VERSION	DATE	DESCRIPTION
1.0	October 24, 2025	Initial submission
2.0	November 21, 2025	Final submission

Acronyms and Abbreviations

The following acronyms and abbreviations are used in this report:

APA	Siemens' Gridscale X™ Advanced Protection Assessment
BES	Bulk Electric System
BESS	Battery Energy Storage System
CMLD	Composite Load Characteristic Model
DVAR	Dynamic Volt-Amp Reactive Compensation
DVC	Dynamic VAR Compensation
FKEC	Florida Keys Electric Cooperative
FKLR	Florida Keys Load Reduction Protection Scheme
FMPA	Florida Municipal Power Agency
FPL	Florida Power & Light
FRCC	Florida Reliability Coordinating Council
KEYS	Keys Energy Services
NERC	North American Electric Reliability Cooperation
OSHA	Occupational Safety and Health Administration
PCS	Power Conversion System
PSS®E, PSS/E	Siemens' Power System Simulation for Engineering
STATCOM	Static Synchronous Compensator
UFLS	Underfrequency Load Shedding Protection Scheme
UVLS	Undervoltage Load Shedding Protection Scheme

Executive Summary

Florida Municipal Power Agency (FMPA) is considering the interconnection of a 4-hour Battery Energy Storage System (BESS; Project) with +/- 15 MW (16.67 MVA) and 0.90 power factor capability at Keys Energy Services' (KEYS) Big Pine substation through (as studied herein) the existing feeder 4. To assess the potential impacts on the transmission system for the proposed Project, Quanta Technology, LLC (Quanta), performed an Interconnection Study (Study) that consisted of transient stability and short circuit analyses. The following scenarios were evaluated:

1. **Base Model**: System at import limit; N-0 Conditions
   - Customer load in KEYS and FKEC adjusted to simulate FKEC Line 5 at 95% of its thermal loading
   - No generation dispatched
2. **Study Model 01**: System at import limit with BESS discharging at 100% (+15 MW); N-0 Conditions
   - Base Model customer load in KEYS and FKEC is increased to simulated FKEC Line 5 at 95% of its thermal loading
   - No generation dispatched
3. **Study Model 02**: System at import limit with BESS charging at 100% (-15 MW); N-0 Conditions
   - Base Model customer load in KEYS and FKEC is decreased to simulated FKEC Line 5 at 95% of its thermal loading
   - No generation dispatched
4. **Study Model 03**: System at import limit with BESS discharging at 100% (+15 MW) and Stock Island generation dispatched; N-0 Conditions
   - Base Model customer load in KEYS and FKEC is increased to simulated FKEC Line 5 at 95% of its thermal loading
5. **Study Model 04**: System in overnight conditions with BESS charging at 100% (-15 MW); N-0 Conditions
   - Base Model customer load in KEYS and FKEC is decreased to simulate typical overnight load levels
   - No generation dispatched

For purposes of this report, load is defined as customer demand only. The charging and discharging status and capacity of the BESS is summarized separately.

Summary of Results

The results of the Study concluded that the interconnection of the Project does not adversely affect the Florida Keys transmission system or the FRCC region as a whole. The transient stability analysis did not identify reliability concerns for the scenarios evaluated and disturbance events simulated. System response was stable and within allowable criteria being consistent with current operating conditions. The short circuit analysis reviewed the fault current impacts with the addition of the Project and determined a minimal increase to existing levels. There were no circuit breakers identified that would require upgrading nor concerns with increasing PPE levels.

Nonetheless, due to the size of the Project and how it is interconnecting to the transmission system, there are a couple of items to be aware of:

1. Should the conductor ampacity of BPS feeder 4 not be adequate to accommodate both peak loading conditions and the maximum capacity of the Project, the feeder will need to be upgraded, or the Project will need to connect to the substation through its own dedicated feeder.
2. The two 138/13.8kV transformers at Big Pine are each rated for 30 MVA. During BESS charging conditions, should total substation demand (i.e., customer load plus BESS charging demand) exceed 30 MW, there is potential for operating limitations with one transformer out of service.

Recommendations

The following recommendations are presented for consideration as the Project continues in maturity through its developmental process:

- Perform a Distribution System Impact Study considering:
  - Voltage Flicker
  - Harmonics
  - Grounding Voltage Drop
  - Risk of Islanding
  - Reverse Power Flow
- Coordinate with the manufacturer to obtain user-defined and FRCC-approved dynamic models that reflect the final "as built" configuration of the Project and update the Study accordingly.

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TABLES

1 Introduction and Methodology

Florida Municipal Power Agency (FMPA) is considering an interconnection of a Battery Energy Storage System (BESS; Project) at Keys Energy Services (KEYS) Big Pine substation. To assess the potential impacts on the transmission system for the proposed Project, Quanta Technology, LLC (Quanta), performed an Interconnection Study (Study) that consisted of transient stability and short circuit analyses.

The transient stability analysis reviewed the transmission system's response to various local disturbance events both with and without the Project. Various Standards and Criteria from NERC[1], FRCC[2], and IEEE[3] were used in the Study, as applicable. The short circuit analysis reviewed the Project's fault contribution to existing fault currents and compared the new current levels to existing circuit breaker interrupting capabilities. Lastly, using the Project's fault contribution, a high-level arc-flash review of Big Pine Feeder 4 was done based on results from a 2021 Arc-Flash Study previously performed by Quanta Technology.

1.1 Background

1.1.1 Florida Keys Electric System

Two 138 kV transmission lines supply the "Florida Keys" (i.e., the geographical set of islands and not a company) from the Florida mainland, beginning at the Monroe/Miami-Dade County line, and are energized by Florida Power & Light (FPL) via their Farm Life 138 kV substation. These lines are jointly owned by Florida Keys Electric Cooperative (FKEC) and Keys Energy Services (KEYS). FKEC supplies power to many Florida Keys located north of, and including, Marathon Key. KEYS supplies power to the remaining islands located south of Marathon Key, to Key West. FMPA supplies wholesale power to KEYS through a combination of FMPA resources delivered via the FPL and FKEC/KEYS transmission systems, as well as FMPA-owned generation located on Stock Island. FKEC and KEYS are interconnected through a radial 138 kV line (KEYS' Line 7) from Marathon.

The FKEC transmission system consists of two 138 kV transmission lines fed from FPL's Farm Life substation to FKEC's Tavernier substation. One of these lines connects directly to Tavernier ("Express Line"; Line 3; T3), while the other interconnects to substations at Jewfish Creek (Line 2; J2) and Key Largo (Line 4; K4N, K4S) along its way to Tavernier (Line 4; T4). From Tavernier, a radial 138 kV transmission line (Line 5) to FKEC's Marathon substation interconnects with two intermediate taps at Islamorada and Crawl Key. A 17.9-ohm (55.5 MVAr) series capacitor is installed near the Islamorada tap, and 138 kV shunt capacitor banks at Key Largo, Islamorada, and Marathon support voltage.

The KEYS transmission system consists of a single, radial 138 kV transmission line fed from FKEC's Marathon substation to KEYS' Big Pine substation. This transmission line continues south, interconnecting the Cudjoe Key and Big Coppitt substations before reaching the US1 substation and stepping down to 69 kV via two autotransformers. The KEYS system continues through Key West via a 69 kV loop. Voltage control is largely provided by two dynamic VAR compensation installations at Big Pine (34.8 MVAr) and Stock Island (40 MVAr). Lastly, FMPA-owned generation is installed at Stock Island (approximately 111 MW) to support demand as needed.

[1] NERC Reliability Standard TPL-001-5.1: Transmission System Planning Performance Requirements
[2] FRCC Stability Criteria for Transmission Planning Performance (FRCC-MS-PL-050)
[3] IEEE Std 1547-2018: IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces

A key constraint arises on FKEC's Line 5, particularly south of the Islamorada Substation, where power flow becomes a limiting factor during peak periods. KEYS relies on local generation from FMPA within its service area to avoid pre-contingency actions such as load shedding. This generation helps maintain system reliability by supplementing power during high-demand periods, as requested by FKEC as a transmission operator.

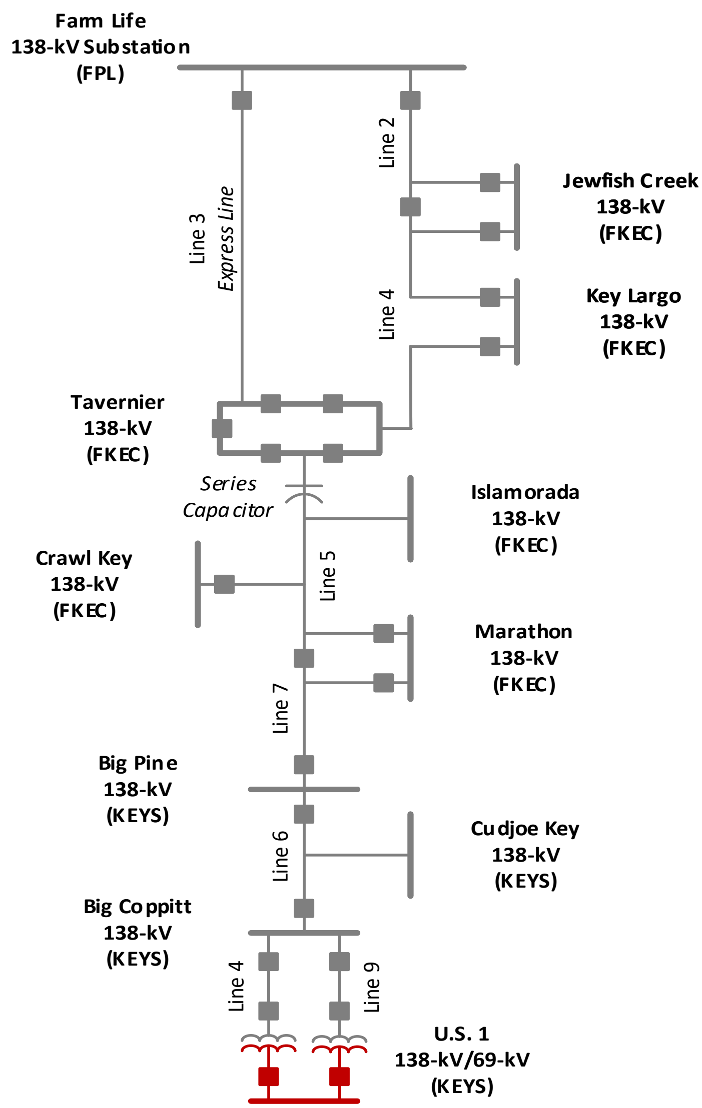

Figure 1. Florida Keys Network Topology | 138 kV Transmission System

1.1.2 Project: Battery Energy Storage System

At the time of the Study, minimal information was available for the proposed BESS Project. At present, no manufacturer has been selected, and minimal design work has been performed. Information and data that would typically be included as part of an interconnection agreement are unavailable. The current understanding of the Project is that it will be a 4-hour BESS with a 15 MW (16.67 MVA) discharging/charging capability and 0.90 power factor. Based on the proposed location, the Project will be approximately 0.7 miles away from the nearest transmission system substation, KEYS' Big Pine substation (BPS). There is an existing distribution feeder (BPS Feeder 4) that the Project (as studied herein) will use to interconnect to the transmission system. The preliminary design includes 4 PCS units rated at 4.4 MVA with 4 battery containers.

Additionally, four x 480V/13.8kV transformers (4.4 MVA; Z=6%) will be used to connect to the distribution feeder.

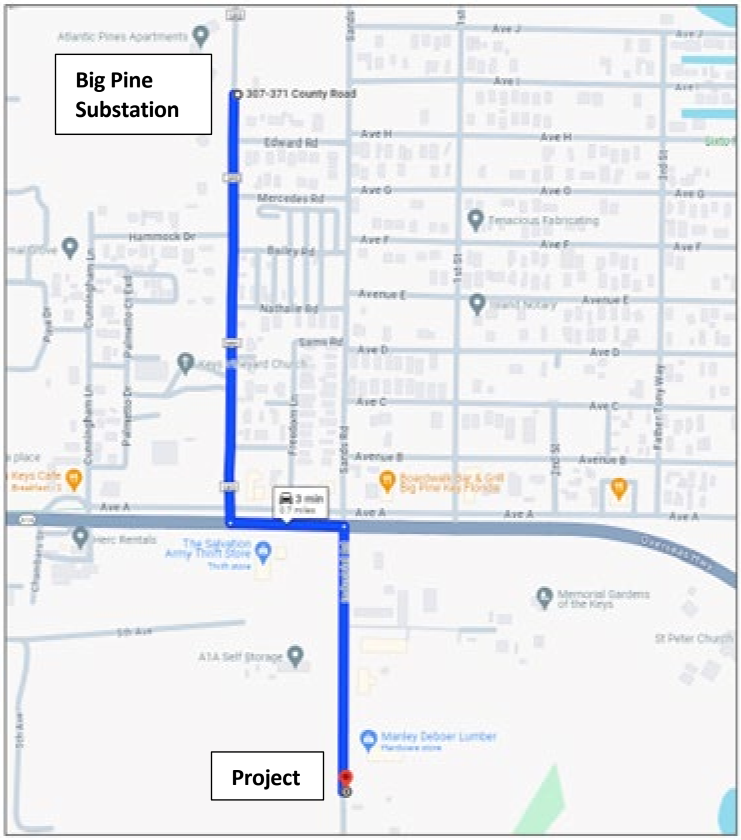

Figure 2. Proposed Geographical Location for the Project

1.2 Methodology

Due to the configuration and sensitive nature of the Florida Keys electric system (i.e., KEYS and Florida Keys Electric Cooperative (FKEC)) to thermal overloads and dynamic voltage recovery, contingency analyses are conducted through transient stability. The system evaluation through a time-domain simulation enables a more accurate representation of system performance, accounting for potential delayed voltage recovery and dynamic VAR compensation (DVC) response. Additionally, the modeling needed to properly capture the system response requires more detail than would be typically used in a regional transmission planning model. For the transient stability analysis, Quanta Technology used Siemens' Power System Simulation for Engineering (PSS®E, PSS/E) software package (version 35.6.4).

Quanta Technology already possessed a detailed short circuit and protection model of the Florida Keys system having previously performed an Arc-Flash Study for the area in 2021. Quanta used Siemens' Gridscale X™ Advanced Protection Assessment (APA) protection modeling and short circuit program, previously known as PSS®CAPE, to perform the short circuit analysis.

1.2.1 Model Development

The model development for the Study consisted of steady-state and stability categories. For the steady-state modeling of the Florida Keys transmission system, Quanta Technology used the latest available stability databank modeling (2024 series 2026 summer peak .SAV case) from FRCC. The model was updated based on the scenarios summarized in Table 1. Bus voltage levels (138 kV, 69 kV, 25 kV, and 13.8 kV), bus power factors, and load distribution (i.e., substations and feeders) across the FKEC and KEYS systems were reviewed.

Table 1. Study Scenario Description and Details

SCENARIO	CUSTOMER LOAD (MW)	GENERATION (MW)	LINE 5 LIMIT (Y/N)
Base	KEYS: 141.6 FKEC: 147.6 Total: **289.3**	BESS: 0.0 Stock Island GEN: 0.0	Y
Study Model 01 *(BESS discharging)*	KEYS: 151.2 FKEC: 157.6 Total: **308.8**	BESS: 15.0 Stock Island GEN: 0.0	Y
Study Model 02 *(BESS charging)*	KEYS: 130.6 FKEC: 136.2 Total: **266.8**	BESS: -15.0 Stock Island GEN: 0.0	Y
Study Model 03 *(Stock Island Gen)*	KEYS: 160.0 FKEC: 167.6 Total: **327.6**	BESS: 15.0 Stock Island GEN: 15.0	Y
Study Model 04 *(Overnight)*	KEYS: 73.4 FKEC: 79.1 Total: **152.5**	BESS: -15.0 Stock Island GEN: 0.0	N

A significant amount of additional modeling detail was necessary to better represent the Florida Keys system than what is typically modeled in the FRCC models, and transmission system analysis models in general. Distribution step-down transformers (with voltage levels of 25kV and 13.8kV) were added for each substation, and each distribution feeder was modeled explicitly with its own load representation. This was done to better capture the voltage response at each substation while also incorporating the necessary protection on the transmission system. The dynamic models for the generation were updated and switched shunt models were added. Additionally, the undervoltage load shedding (UVLS) and underfrequency load shedding (UFLS) settings provided by KEYS and FKEC were applied to the dynamics model. Finally, the KEYS' DVC representations were updated to better simulate their response behavior, and the load characteristic models were updated (from CIM5 and CLOD) to use the new industry standard composite load model (CMLD).

1.2.1.1 Project Modeling

The Project is currently sized to approximately 15 MW and can be considered a small generator and classified as a utility-scale distributed energy resource (U-DER). The Project was modeled based on NERC recommended DER modeling framework[4] as shown in Figure 3 and modeled at the 13.8kV level voltage at Big Pine alongside the feeder 4 load.

[4] NERC Reliability Guideline: DER Data Collection and Model Verification of Aggregate DER

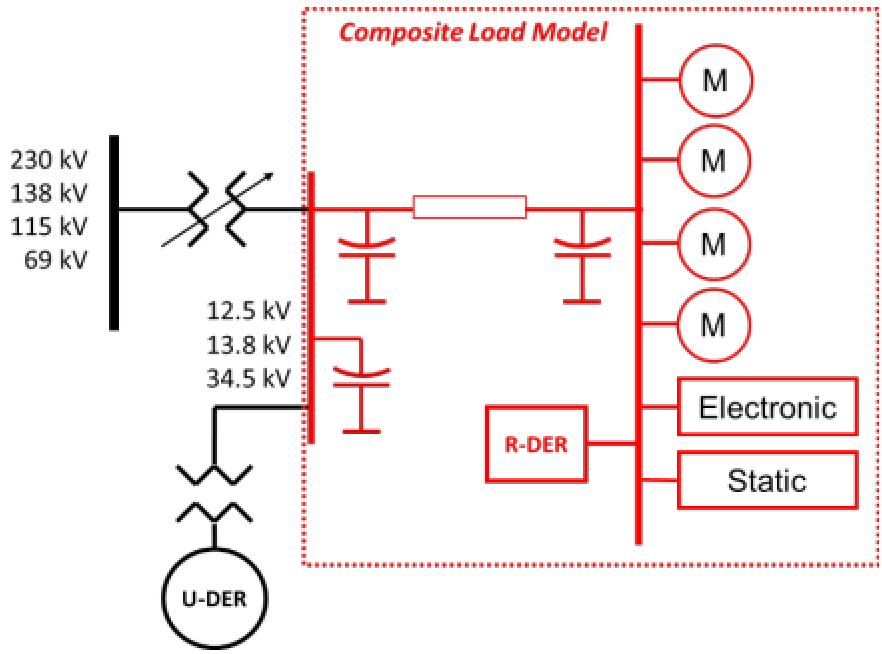

Figure 3. NERC Recommended DER Modeling Framework

However, given the sensitivity of the transmission system and the scope of the Study to evaluate impacts on the transmission system, a more detailed approach to modeling the Project's dynamic response was chosen. Given the Project's current stage of development, no dynamic stability models are currently available from a manufacturer for use. For purposes of this Study, standard PSS/E models typically used for BESS representations were selected, and default modeling parameters, assuming grid-following system design, were used to represent the potential Project behavior in simulated disturbance events. The models used were:

- REGCA1 | Renewable Energy Generator/Converter Model
- REECC1 | Electrical Control Model for Utility-Scale Battery Energy Storage
- REPCA1 | Generic Renewable Plant Control Model

Additionally, the Project was modeled using IEEE 1547-2018 Category II[5] under-voltage and under-frequency protection settings. These settings were represented using VTGTPAT (voltage) and FRQTPAT (frequency) models. A summary of the dynamic models and data parameters used to represent the Project are in Appendix A: Project Dynamic Model Parameters.

1.2.1.2 KEYS' Dynamic VAR Compensation

The KEYS' dynamic VAR compensation (DVC) was updated for the Study. The DVC at the Big Pine substation and Stock Island substation were remodeled using a user-defined model (CDVAR5) from American Superconductor (AMSC). This also required updates to the associated switched shunt representations, with each one being modeled explicitly.

[5] Abnormal operating performance Category II covers all Bulk Power System (BPS) stability and reliability needs and is coordinated with existing reliability standards to avoid tripping for a wider range of disturbances of concern to BPS stability.

1.2.1.3 Composite Load Model

Quanta Technology used PSS/E's composite load model (CMLD) as the load characteristic model to represent the load behavior of the simulated disturbance events. The CMLD model captures static load components (e.g., lighting, resistive heating) and dynamic components (e.g., induction motors, electronic loads). In particular, the dynamic component behavior of single-phase and three-phase induction motor response, which includes stall and recovery behaviors during faults and/or voltage sags, are crucial for determining voltage stability and system recovery during and post-event. This behavior is incredibly important to capture for a voltage-sensitive system such as the Florida Keys. The original data parameters recommended by NERC for the CMLD model were tuned to better represent both historical and expected system response of the Florida Keys transmission system and the system representation in the model.

1.2.1.4 Florida Keys Load Reduction Scheme

The Florida Keys load reduction scheme (FKLR) was developed to allow dynamic voltage recovery of the Florida Keys system for the loss of a 138 kV tie line, with and without a fault, and to alleviate thermal overloads on FKEC Lines 2, 3, 4, and 5 following a dynamic voltage recovery, due to the loss of a transmission line or real/reactive power resource. The FKLR was designed to operate for overloads that occur during high-load conditions for the following scenarios:

- Loss of FKEC Line 3 (Farm Life-Tavernier 138 kV; T3) overloads FKEC Line 2 (Farm Life-Jewfish Creek 138 kV; J2) and produces voltage stability problems.
- Loss of FKEC Line 2 (Farm Life-Jewfish Creek 138 kV; J2) overloads FKEC Line 3 (Farm Life-Tavernier 138 kV; T3) and produces voltage stability problems.
- Loss of FKEC Line 4N (Jewfish Creek-Key Largo 138 kV; J4) overloads FKEC Line 3 (Farm Life-Tavernier 138 kV; T3) and produces voltage stability problems.
- Loss of FKEC Line 4S (Tavernier-Key Largo 138 kV; T4) overloads FKEC Line 3 (Farm Life-Tavernier 138 kV; T3) and produces voltage stability problems.
- Overload of FKEC Line 5 for the loss of real/reactive power resources in KEYS.

The dynamic modeling of the FKLR was recently updated for use in PSS/E version 35 and was coded using the current feeder assignments.

1.2.2 Transient Stability Analysis

Quanta Technology simulated system disturbance events and analyzed the time-domain system response for the Florida Keys transmission system. The specific events studied are summarized in Table 2. These events were NERC TPL-001-5.1 P1 planning events, which simulated a three-phase fault on a transmission facility with normal clearing.

The evaluation of these disturbance events was used to determine the Project's impact on the transmission system under different scenarios. The loss of the Florida Keys' ties at Farm Life was used to determine whether the Project could adversely impact the Florida mainland, potentially impacting the current Florida Keys BES exemption status with NERC and, in turn, prohibiting the Project from consideration.

Table 2. Disturbance Event Simulation Descriptions

SIM NO	FAULT TYPE	CLEARING TIME	DISTURBANCE EVENT DESCRIPTION
-	-	-	No Disturbance (N-0)
1	3PH	4.5 cyc	Loss of Florida Keys Ties (Lines J2 and T3); Farm Life Fault

SIM NO	FAULT TYPE	CLEARING TIME	DISTURBANCE EVENT DESCRIPTION
2	3PH	4.5 cyc	Loss of Line 3 (T3); Farm Life Fault
3	3PH	4.5 cyc	Loss of Line 2 (J2); Farm Life Fault
4	3PH	4.5 cyc	Loss of Line 3 (T3); Tavernier Fault
5	3PH	4.5 cyc	Loss of Line 2 (J2); Jewfish Creek Fault
6	3PH	4.5 cyc	Loss of Line 4N (J4); Jewfish Creek Fault
7	3PH	4.5 cyc	Loss of Line 4S (T4); Key Largo Fault
8	3PH	4.5 cyc	Loss of Series Capacitor; Islamorada Fault
9	3PH	4.0 cyc	Loss of Stock Island DVC; SIPS Fault
10	3PH	4.5 cyc	Loss of Key Largo Capacitor Banks; Key Largo Fault
11	3PH	4.5 cyc	Loss of Islamorada Capacitor Banks; Islamorada Fault
12	3PH	4.5 cyc	Loss of Marathon Capacitor Banks; Marathon Fault
13	3PH	4.0 cyc	Loss of BESS Project; BPS2 Feeder 4 Fault
14	3PH	4.0 cyc	Loss of Stock Island CT#2; SIPS Fault
15	3PH	4.0 cyc	Loss of Big Pine DVC; Big Pine Fault

Various system characteristics, including bus voltages and frequencies, transmission line flow, generator rotor angles, and other indicators of system stability, were monitored during the simulations and plotted over a 50-second time frame. The performance of the electric transmission system was evaluated against both FRCC Stability Criteria for Transmission Planning Performance (FRCC-MS-PL-050) and FKEC, FMPA, and KEYS performance criteria. Such criteria include but are not limited to generation response oscillations that are lightly damped or increase in amplitude, resulting in load shedding for single contingency events and out-of-step operation of generators (loss of synchronism).

1.2.3 Short Circuit Analysis

Quanta Technology performed a short circuit analysis to determine the Project's contribution to fault current to the KEYS' transmission system. A scenario considering max generation dispatch, all facilities in service (no branch or transformer outages) and pre-fault voltages of 1.05 p.u. were used to determine maximum expected short circuit fault currents. Quanta compared the phase current calculated for three phase-to-ground, single-line-to-ground, and line-to-line short circuits and selected the maximum current to the point of the fault. The total maximum fault current was compared with the short circuit ratings of the equipment at that location. This represented the maximum expected fault current that could be required to be interrupted and is conservative.

Buses at which the maximum total fault current exceeded 80% of the rating of the circuit breaker interrupting capacity were given a detailed review to determine whether breakers at that bus were over duty. The detailed review included consideration of the bus configuration and historical pre-fault voltage (as applicable) at the station in question and was reviewed to determine the actual expected maximum interrupting or withstand current.

1.2.4 High-Level Arc-Flash Review

Quanta Technology performed an arc-flash study for KEYS in 2021. For arc-flash studies, OSHA requires utilities to identify employees exposed to hazards from electric arcs and make a reasonable estimate of the incident heat energy to which the employee would be exposed. The study results were meant to assist KEYS when selecting appropriate Personal Protective Equipment (PPE) for workers. The classification system for PPE categories used in the results of the arc-flash study is from NFPA 70E Table 130.7(C)(15)(c) (see Table

9). The study calculated the incident heat energy value for various arc-flash events to determine the worst-case scenario at each location and identify the PPE that would be required. KEYS standard of practice is to have workers wear PPE that provides protection for incident levels of 8 cal/cm^2 or less in any situation where there is a possible exposure to arc-flash hazard.

Table 3. Incident Energy Protection Range for NFPA 70E PPE Categories

NFPA 70E PPE CATEGORY NUMBER	INCIDENT ENERGY RANGE (cal/cm^2)
1	< 4
2	4 – 8
3	8 – 25
4	25 – 40

For the high-level arc-flash review, Quanta Technology compared the 2021 study's Big Pine substation results, while considering the Project's contributions to fault current, against previously calculated locations in the system, specifically Cudjoe Key substation, which had similar variables and PPE classifications to Big Pine but with higher fault current. The only variable change in the incident heat energy calculation is the fault current, due to the contribution from the Project, with all other variables remaining constant. The review compared the previously calculated fault currents at Big Pine, considered the additional current from the Project, and compared the total fault current to the fault current previously calculated at Cudjoe Key. With this comparison, a high-level determination would be made as to whether existing PPE categories at Big Pine would need to be adjusted with the interconnection of the Project.

2 Transient Stability Analysis Results

This section summarizes the results of the transient stability analysis. Each table summarizes the system response to the simulated disturbance event, the amount of load shed by protection, and comments on post-event system conditions. Analysis plots for each simulation and scenario are in Appendix B: Transient Stability Analysis Plots. Overall, the results between the base and all projects were similar in system response.

2.1 Base | Transient Stability Results

The Base model scenario represents the Florida Keys transmission system as it exists and operates today at FKEC's Line 5 thermal loading limit. The results of the Base analysis show that the Florida Keys system remains stable with an acceptable damped response for all simulated disturbance events. The FKLR operates to mitigate overloads on FKEC Lines 2, 3, and 4 while allowing the Florida Keys system to remain connected to mainland Florida. For disturbance events not associated with FKLR protection, the UVLS protection operated as expected, minimizing the voltage drop on the system and allowing the KEYS system to remain connected to FKEC and mainland Florida. Lastly, the loss of the Florida Keys from mainland Florida did not adversely impact the Florida electric system.

Table 4. Transient Stability Results | Base

SIM NO	DIST. EVENT	STABLE	CUSTOMER LOAD SHED (MW)				COMMENTS
			FKLR	UVLS[1]	UFLS	ISLND	
-	No Disturbance (N-0)	**Y**	-	-	-	-	· No voltage or thermal issues
1	Loss of Florida Keys Ties (Lines 2 and 3; Farm Life Fault)	**Y**	-	-	-	289.3	· No voltage or thermal issues
2	Loss of Line 3 (Farm Life Fault)	**Y**	53.3	9.9	-	-	· FKLR Blocks A and B Trip · No voltage or thermal issues
3	Loss of Line 2 (Farm Life Fault)	**Y**	30.4	7.2	-	-	· FKLR Block A Trip · No voltage or thermal issues
4	Loss of Line 3 (Tavernier Fault)	**Y**	30.4	64.0	-	-	· FKLR Block A Trip · No voltage or thermal issues
5	Loss of Line 2 (Jewfish Creek Fault)	**Y**	30.4	7.6	-	-	· FKLR Block A Trip · No voltage or thermal issues
6	Loss of Line 4 North (Jewfish Creek Fault)	**Y**	30.4	7.6	-	-	· FKLR Block A Trip · No voltage or thermal issues
7	Loss of Line 4 South (Key Largo Fault)	**Y**	30.4	49.5	-	-	· FKLR Block A Trip · No voltage or thermal issues
8	Loss of Series Capacitor (Islamorada Fault)	**Y**	-	2.0	-	-	· No voltage or thermal issues
9	Loss of Stock Island DVC (SIPS Fault)	**Y**	-	72.9	-	-	· No voltage or thermal issues
10	Loss of Key Largo Capacitor Banks (Key Largo Fault)	**Y**	-	20.8	-	-	· No voltage or thermal issues

SIM NO	DIST. EVENT	STABLE	CUSTOMER LOAD SHED (MW)				COMMENTS
			FKLR	UVLS[1]	UFLS	ISLND	
11	Loss of Islamorada Capacitor Banks (Islamorada Fault)	**Y**	-	26.8	-	-	· No voltage or thermal issues
12	Loss of Marathon Capacitor Banks (Marathon Fault)	**Y**	-	73.3	-	-	· No voltage or thermal issues
13	*Loss of BESS Project (BPS2 Feeder 4 Fault)*	-	-	-	-	-	*Not applicable*
14	*Loss of Stock Island CT#2 (SIPS Fault)*	-	-	-	-	-	*Not applicable*
15	Loss of Big Pine DVC (Big Pine Fault)	**Y**	-	60.8	-	-	· No voltage or thermal issues

[1] Includes full feeder load shedding, 1-Phase motor D UV trips, and 3-Phase load (motor A, B, and C) UV trips via CMLD model action.

2.2 Study Model 01 | Transient Stability Results

The Study Model 01 scenario represents the Florida Keys transmission system with the BESS Project discharging at 15 MW and the transmission system at FKEC's Line 5 thermal loading limit. The results of the Study Model 01 analysis indicate that the Florida Keys system remains stable, exhibiting an acceptable damped response to all simulated disturbance events. The FKLR operates to mitigate overloads on FKEC Lines 2, 3, and 4 while allowing the Florida Keys system to remain connected to mainland Florida. For disturbance events not associated with FKLR protection, the UVLS protection operated as expected, minimizing the voltage drop on the system and allowing the KEYS system to remain connected to FKEC and mainland Florida. The loss of the Florida Keys from mainland Florida did not adversely impact the Florida electric system. Lastly, the Project was found to trip due to under-frequency protection. While the system response was stable, in some instances, there was increased load loss post-event when compared to the Base scenario.

Table 5. Transient Stability Results | Study 01

SIM NO	DIST. EVENT	STABLE	CUSTOMER LOAD SHED (MW)				COMMENTS
			FKLR	UVLS[1]	UFLS	ISLND	
-	No Disturbance (N-0)	**Y**	-	-	-	-	· No voltage or thermal issues
1	Loss of Florida Keys Ties (Lines 2 and 3; Farm Life Fault)	**Y**	-	-	-	308.8	· Loss of Project (15MW) · No voltage or thermal issues
2	Loss of Line 3 (Farm Life Fault)	**Y**	56.9	32.7	-	-	· FKLR Block A and B Trip · Loss of Project (UF: 15MW) · No voltage or thermal issues
3	Loss of Line 2 (Farm Life Fault)	**Y**	32.4	7.9	-	-	· FKLR Block A Trip · Loss of Project (UF: 15MW) · No voltage or thermal issues
4	Loss of Line 3 (Tavernier Fault)	**Y**	32.4	71.9	-	-	· FKLR Block A Trip · Loss of Project (UF: 15MW) · No voltage or thermal issues

SIM NO	DIST. EVENT	STABLE	CUSTOMER LOAD SHED (MW)				COMMENTS
			FKLR	UVLS[1]	UFLS	ISLND	
5	Loss of Line 2 (Jewfish Creek Fault)	**Y**	32.4	15.5	-	-	· FKLR Block A Trip · No voltage or thermal issues
6	Loss of Line 4 North (Jewfish Creek Fault)	**Y**	32.4	8.8	-	-	· FKLR Block A Trip · No voltage or thermal issues
7	Loss of Line 4 South (Key Largo Fault)	**Y**	32.4	52.4	-	-	· FKLR Block A Trip · Loss of Project (UF: 15MW) · No voltage or thermal issues
8	Loss of Series Capacitor (Islamorada Fault)	**Y**	-	64.6	-	-	· Loss of Project (UF: 15MW) · No voltage or thermal issues
9	Loss of Stock Island DVC (SIPS Fault)	**Y**	-	77.5	-	-	· No voltage or thermal issues
10	Loss of Key Largo Capacitor Banks (Key Largo Fault)	**Y**	-	15.4	-	-	· No voltage or thermal issues
11	Loss of Islamorada Capacitor Banks (Islamorada Fault)	**Y**	-	33.4	-	-	· Loss of Project (UF: 15MW) · No voltage or thermal issues
12	Loss of Marathon Capacitor Banks (Marathon Fault)	**Y**	-	78.3	-	-	· Loss of Project (UF: 15MW) · No voltage or thermal issues
13	Loss of BESS Project (BPS2 Feeder 4 Fault)	**Y**	-	1.4	-	-	· Loss of Project (15MW) · No voltage or thermal issues
14	*Loss of Stock Island CT#2 (SIPS Fault)*	-	-	-	-	-	*Not applicable*
15	Loss of Big Pine DVC (Big Pine Fault)	**Y**	-	64.2	-	-	· Loss of Project (UF: 15MW) · No voltage or thermal issues

[1] *Includes full feeder load shedding, 1-Phase motor D UV trips, and 3-Phase load (motor A, B, and C) UV trips via CMLD model action.*

2.3 Study Model 02 | Transient Stability Results

The Study Model 02 scenario represents the Florida Keys transmission system with the BESS Project charging at -15 MW and the transmission system at FKEC's Line 5 thermal loading limit. The results of the Study Model 02 analysis indicate that the Florida Keys system remains stable, exhibiting an acceptable damped response to all simulated disturbance events. The FKLR operates to mitigate overloads on FKEC Lines 2, 3, and 4 while allowing the Florida Keys system to remain connected to mainland Florida. For disturbance events not associated with FKLR protection, the UVLS protection operated as expected, minimizing the voltage drop on the system and allowing the KEYS system to remain connected to FKEC and mainland Florida. The loss of the Florida Keys from mainland Florida did not adversely impact the Florida electric system. Lastly, the Project was found to trip due to under-frequency protection.

Table 6. Transient Stability Results | Study Model 02

SIM NO	DIST. EVENT	STABLE	CUSTOMER LOAD SHED (MW)				COMMENTS
			FKLR	UVLS[1]	UFLS	ISLND	
-	No Disturbance (N-0)	**Y**	-	-	-	-	· No voltage or thermal issues
1	Loss of Florida Keys Ties (Lines 2 and 3; Farm Life Fault)	**Y**	-	-	-	266.8	· Loss of Project (-15MW) · No voltage or thermal issues
2	Loss of Line 3 (Farm Life Fault)	**Y**	49.2	9.3	-	-	· FKLR Block A and B Trip · Loss of Project (UF: -15MW) · No voltage or thermal issues
3	Loss of Line 2 (Farm Life Fault)	**Y**	28.0	7.3	-	-	· FKLR Block A Trip · Loss of Project (UF: -15MW) · No voltage or thermal issues
4	Loss of Line 3 (Tavernier Fault)	**Y**	28.0	48.3	-	-	· FKLR Block A Trip · Loss of Project (UF: -15MW) · No voltage or thermal issues
5	Loss of Line 2 (Jewfish Creek Fault)	**Y**	28.0	6.7	-	-	· FKLR Block A Trip · No voltage or thermal issues
6	Loss of Line 4 North (Jewfish Creek Fault)	**Y**	28.0	9.0	-	-	· FKLR Block A Trip · No voltage or thermal issues
7	Loss of Line 4 South (Key Largo Fault)	**Y**	28.0	34.4	-	-	· FKLR Block A Trip · Loss of Project (UF: -15MW) · No voltage or thermal issues
8	Loss of Series Capacitor (Islamorada Fault)	**Y**	-	-	-	-	· Loss of Project (UF: -15MW) · No voltage or thermal issues
9	Loss of Stock Island DVC (SIPS Fault)	**Y**	-	67.5	-	-	· No voltage or thermal issues
10	Loss of Key Largo Capacitor Banks (Key Largo Fault)	**Y**	-	20.2	-	-	· No voltage or thermal issues
11	Loss of Islamorada Capacitor Banks (Islamorada Fault)	**Y**	-	4.0	-	-	· Loss of Project (UF: -15MW) · No voltage or thermal issues
12	Loss of Marathon Capacitor Banks (Marathon Fault)	**Y**	-	60.0	-	-	· Loss of Project (UF: -15MW) · No voltage or thermal issues
13	Loss of BESS Project (BPS2 Feeder 4 Fault)	**Y**	-	1.0	-	-	· Loss of Project (-15MW) · No voltage or thermal issues
14	*Loss of Stock Island CT#2 (SIPS Fault)*	-	-	-	-	-	*Not applicable*
15	Loss of Big Pine DVC (Big Pine Fault)	**Y**	-	46.0	-	-	· Loss of Project (UF: 15MW) · No voltage or thermal issues

SIM NO	DIST. EVENT	STABLE	CUSTOMER LOAD SHED (MW)				COMMENTS
			FKLR	UVLS[1]	UFLS	ISLND	

[1] *Includes full feeder load shedding, 1-Phase motor D UV trips, and 3-Phase load (motor A, B, and C) UV trips via CMLD model action.*

2.4 Study Model 03 | Transient Stability Results

The Study Model 03 scenario represents the Florida Keys transmission system with the BESS Project discharging at 15 MW, Stock Island CT#2 dispatched at 15 MW and the transmission system at FKEC's Line 5 thermal loading limit. The results of the Study Model 03 analysis show that the Florida Keys system remains stable, exhibiting an acceptable damped response to all simulated disturbance events. The FKLR operates to mitigate overloads on FKEC Lines 2, 3, and 4 while allowing the Florida Keys system to remain connected to mainland Florida. For disturbance events not associated with FKLR protection, the UVLS protection operated as expected, minimizing the voltage drop on the system and allowing the KEYS system to remain connected to FKEC and mainland Florida. The loss of the Florida Keys from mainland Florida did not adversely impact the Florida electric system. Lastly, the combination of the Project and SI CT#2 minimized the post-disturbance impacts to system stability and load shedding. In many instances the amount of load shedding was reduced, relative to the total demand, and the Project remained online post-event for more simulations.

Table 7. Transient Stability Results | Study Model 03

SIM NO	DIST. EVENT	STABLE	CUSTOMER LOAD SHED (MW)				COMMENTS
			FKLR	UVLS[1]	UFLS	ISLND	
-	No Disturbance (N-0)	**Y**	-	-	-	-	· No voltage or thermal issues
1	Loss of Florida Keys Ties (Lines 2 and 3; Farm Life Fault)	**Y**	-	-	-	329.8	· Loss of Project (15MW) · Loss of SI CT#2 (15MW) · No voltage or thermal issues
2	Loss of Line 3 (Farm Life Fault)	**Y**	60.8	10.5	-	-	· FKLR Block A and B Trip · No voltage or thermal issues
3	Loss of Line 2 (Farm Life Fault)	**Y**	34.6	6.7	-	-	· FKLR Block A Trip · No voltage or thermal issues
4	Loss of Line 3 (Tavernier Fault)	**Y**	60.8	28.3	-	-	· FKLR Blocks A and B Trip · Loss of Project (UF: 15MW) · No voltage or thermal issues
5	Loss of Line 2 (Jewfish Creek Fault)	**Y**	34.6	5.4	-	-	· FKLR Block A Trip · No voltage or thermal issues
6	Loss of Line 4 North (Jewfish Creek Fault)	**Y**	34.6	7.8	-	-	· FKLR Block A Trip · No voltage or thermal issues
7	Loss of Line 4 South (Key Largo Fault)	**Y**	34.6	5.8	-	-	· FKLR Block A Trip · No voltage or thermal issues
8	Loss of Series Capacitor (Islamorada Fault)	**Y**	-	0.3	-	-	· No voltage or thermal issues
9	Loss of Stock Island DVC (SIPS Fault)	**Y**	-	71.6	-	-	· No voltage or thermal issues

SIM NO	DIST. EVENT	STABLE	CUSTOMER LOAD SHED (MW)				COMMENTS
			FKLR	UVLS[1]	UFLS	ISLND	
10	Loss of Key Largo Capacitor Banks (Key Largo Fault)	**Y**	-	-	-	-	· No voltage or thermal issues
11	Loss of Islamorada Capacitor Banks (Islamorada Fault)	**Y**	-	-	-	-	· No voltage or thermal issues
12	Loss of Marathon Capacitor Banks (Marathon Fault)	**Y**	-	62.7	-	-	· Loss of Project (UF: 15MW) · No voltage or thermal issues
13	Loss of BESS Project (BPS2 Feeder 4 Fault)	**Y**	-	13.5	-	-	· Loss of Project (15MW) · No voltage or thermal issues
14	Loss of Stock Island CT#2 (SIPS Fault)	**Y**	-	62.5	-	-	· Loss of SI CT#2 (15MW) · No voltage or thermal issues
15	Loss of Big Pine DVC (Big Pine Fault)	**Y**	-	25.0	-	-	· Loss of Project (UF: 15MW) · No voltage or thermal issues

[1] Includes full feeder load shedding, 1-Phase motor D UV trips, and 3-Phase load (motor A, B, and C) UV trips via CMLD model action.

2.5 Study Model 04 | Transient Stability Results

The Study Model 04 scenario represents the Florida Keys transmission system during overnight conditions with the BESS Project charging at -15 MW. The results of the Study Model 04 analysis are similar to those of Study Model 02 and show that the Florida Keys system remains stable, exhibiting an acceptable damped response to all simulated disturbance events. The FKLR operates to mitigate overloads on FKEC Lines 2, 3, and 4 while allowing the Florida Keys system to remain connected to mainland Florida. For disturbance events not associated with FKLR protection, the UVLS protection operated as expected, minimizing the voltage drop on the system and allowing the KEYS system to remain connected to FKEC and mainland Florida. The loss of the Florida Keys from mainland Florida did not adversely impact the Florida electric system. Lastly, the Project was found to trip due to under-frequency protection.

Table 8. Transient Stability Results | Study Model 04

SIM NO	DIST. EVENT	STABLE	CUSTOMER LOAD SHED (MW)				COMMENTS
			FKLR	UVLS[1]	UFLS	ISLND	
-	No Disturbance (N-0)	**Y**	-	-	-	-	· No voltage or thermal issues
1	Loss of Florida Keys Ties (Lines 2 and 3; Farm Life Fault)	**Y**	-	-	-	152.5	· Loss of Project (-15MW) · No voltage or thermal issues
2	Loss of Line 3 (Farm Life Fault)	**Y**	15.8	3.8	-	-	· FKLR Block A Trip · Loss of Project (UF: -15MW) · No voltage or thermal issues
3	Loss of Line 2 (Farm Life Fault)	**Y**	15.8	3.8	-	-	· FKLR Block A Trip · Loss of Project (UF: -15MW) · No voltage or thermal issues

SIM NO	DIST. EVENT	STABLE	CUSTOMER LOAD SHED (MW)				COMMENTS
			FKLR	UVLS[1]	UFLS	ISLND	
4	Loss of Line 3 (Tavernier Fault)	**Y**	15.8	3.8	-	-	· FKLR Block A Trip · Loss of Project (UF: -15MW) · No voltage or thermal issues
5	Loss of Line 2 (Jewfish Creek Fault)	**Y**	15.8	4.5	-	-	· FKLR Block A Trip · No voltage or thermal issues
6	Loss of Line 4 North (Jewfish Creek Fault)	**Y**	15.8	3.8	-	-	· FKLR Block A Trip · No voltage or thermal issues
7	Loss of Line 4 South (Key Largo Fault)	**Y**	15.8	4.6	-	-	· FKLR Block A Trip · Loss of Project (UF: -15MW) · No voltage or thermal issues
8	Loss of Series Capacitor (Islamorada Fault)	**Y**	-	-	-	-	· No voltage or thermal issues
9	Loss of Stock Island DVC (SIPS Fault)	**Y**	-	28.7	-	-	· No voltage or thermal issues
10	Loss of Key Largo Capacitor Banks (Key Largo Fault)	**Y**	-	11.3	-	-	· No voltage or thermal issues
11	Loss of Islamorada Capacitor Banks (Islamorada Fault)	**Y**	-	15.2	-	-	· Loss of Project (-UF: 15MW) · No voltage or thermal issues
12	Loss of Marathon Capacitor Banks (Marathon Fault)	**Y**	-	8.5	-	-	· Loss of Project (-UF: 15MW) · No voltage or thermal issues
13	Loss of BESS Project (BPS2 Feeder 4 Fault)	**Y**	-	-	-	-	· Loss of Project (-15MW) · No voltage or thermal issues
14	*Loss of Stock Island CT#2 (SIPS Fault)*	-	-	-	-	-	*Not applicable*
15	Loss of Big Pine DVC (Big Pine Fault)	**Y**	-	11.5	-	-	· Loss of Project (UF: -15MW) · No voltage or thermal issues

[1] Includes full feeder load shedding, 1-Phase motor D UV trips, and 3-Phase load (motor A, B, and C) UV trips via CMLD model action.

3 Short Circuit Analysis

3.1 Fault Current

The results of the Short Circuit Analysis indicate that the incremental increase in fault current resulting from the Project has minimal impact on the Big Pine substation. Table 9 summarizes the results and no circuit breakers were found over-dutied; i.e., the current to be interrupted, after accounting for IEEE X/R correction factors, was less than the circuit breaker capacity.

Table 9. Short Circuit Results

BUS NAME	BREAKER KV	BREAKER NAME	OPENING TIME (CYC)	BREAKER INTERRUPTIBLE CURRENT (A)	**BASE** SLG FAULT CURRENT (A)	**BASE** 3PH FAULT CURRENT (A)	**PROJECT** SLG FAULT CURRENT (A)	**PROJECT** 3PH FAULT CURRENT (A)
BIG PINE (5301)	138.0	W1	3.0	**40,000**	2,923	3,534	2,944 (21)	3,595 (61)
BIG PINE (5301)	138.0	W2	3.0	**40,000**	2,923	3,534	2,944 (21)	3,595 (61)
BIG PINE (5301)	138.0	W3	3.0	**40,000**	2,923	3,534	2,944 (21)	3,595 (61)
BIG PINE (5301)	138.0	W4	3.0	**40,000**	2,923	3,534	2,944 (21)	3,595 (61)
KEY BPS2 (5340)	13.8	-	-	-	15,353	13,767	15,896 (542)	14,713 (946)

3.2 High-Level Arc-Flash Review

The results of the high-level arc-flash review determined that the addition of the Project does not raise the fault currents at Big Pine above those previously calculated at Cudjoe Key. The results of the review are:

- For Close-In Min/Max faults (3PH AC Open) for feeders at the switchgear, as well as underground feeder faults, the post-Project PPE Category is expected to remain as 1 for Big Pine 13.8kV Feeder 4. *The previously studied maximum fault current on the feeder was 12,931 A. The addition of approximately 946 A would result in a new fault current of 13,877 A which is below the 14,607 A calculated at Cudjoe Key Feeder 4, which had resulted in an incident energy range of 3.9 cal/cm^2, just below the PPE Category 1 threshold of 4 cal/cm^2.*

- For Close-In Min/Max faults (SLG AC Open) on overhead feeders, the post-Project PPE Category is expected to remain as 1 for Big Pine 13.8kV Feeder 4. *The previously studied maximum fault current on the feeder was 14,597. The addition of approximately 542 A would result in a new fault current of 15,139 A, which is below the 16,659 A calculated at Cudjoe Key Feeder 4, which had resulted in an incident energy range of 3.27 cal/cm^2, falling below the PPE Category 1 threshold of 4 cal/cm^2.*

- For faults (3PH AC Enclosed) on the 13.8kV bus, while the current increases, the outcome remains the same. The Project will not change the previously calculated PPE Category of 3.

- For faults (SLG AC Open) on the 138kV bus, the post-Project PPE Category is expected to remain as 0. *The post-Project additional fault current of approximately 21 A does not move the maximum (3,165 A) above what was previously calculated at Cudjoe Key (3,371 A).*

Overall, there is no expected impact (no change in PPE Category classification) related to arc-flash at the Big Pine substation with the interconnection of the Project.

4 Conclusion and Recommendations

The results of the Study conclude that the interconnection of the Project does not adversely affect the Florida Keys transmission system or the FRCC region as a whole. The transient stability analysis did not identify reliability concerns for the evaluated scenarios and disturbance events simulated. System response was stable and within allowable criteria, consistent with current operating conditions. The short circuit analysis reviewed the fault current impacts with the addition of the Project and determined minimal increase to existing levels. There were no circuit breakers identified that would require upgrading, nor were there concerns with increased PPE levels.

Nonetheless, due to the size of the Project and how it is interconnecting to the transmission system, there are a couple of items to be aware of:

1. Should the conductor ampacity of BPS feeder 4 not be adequate to accommodate both peak loading conditions and the maximum capacity of the Project, the feeder will need to be upgraded, or the Project will need to connect to the substation through its own dedicated feeder.
2. The two 138/13.8kV transformers at Big Pine are each rated for 30 MVA. During BESS charging conditions, should total substation demand (i.e., customer load plus BESS charging demand) exceed 30 MW, there is potential for operating limitations with one transformer out of service.

4.1 Recommendations

The following recommendations are presented for consideration as the Project continues in maturity through its developmental process:

- Perform a Distribution System Impact Study considering:
  - Voltage Flicker
  - Harmonics
  - Grounding Voltage Drop
  - Risk of Islanding
  - Reverse Power Flow
- Coordinate with the manufacturer to obtain user-defined and FRCC-approved dynamic models that reflect the final “as built” configuration of the Project and update the Study accordingly.

Appendix A: Project Dynamic Model Parameters

```
// Florida Keys Detailed Model
// Big Pine Battery Energy Storage System (BESS); Modeled on BPS Feeder 4
// Generic BESS Model Data; IEEE 1547-2018 Category II Protection Settings
/
// BESS Model
 534010 'REGCA1' 1       0
        0.20000E-01   10.000      0.90000      0.50000       1.2200
         1.2000      0.80000      0.40000      -1.3000      0.20000E-01
         0.0000       99.000      -99.000      0.70000      /
 534010 'REECC1' 1
         0          0       1       0       0
        0.90000          1.1000         0.10000E-01    -0.10000E-01     0.10000E-01
         2.0000          1.0000         -1.0000         0.0000          0.50000E-01
        0.60000        -0.60000          1.2000         0.80000          0.0000
         1.0000          0.0000          1.0000         0.46000          99.000
        -99.000          1.0000         -1.0000          1.1000         0.10000E-01
         0.0000          1.0000         0.33000          1.0000         0.66000
         1.0000          1.0000          1.0000          0.0000          1.0000
        0.33000          1.0000         0.66000          1.0000          1.0000
         1.0000          99999.         0.30000         0.80000         0.20000      /
 534010 'REPCA1' 1
       534004      534010      534004     '1 '        0       1       0
        0.20000E-01      15.000          5.0000          0.0000         0.10000
        0.80000          0.0000          0.0000         0.20000E-01      0.0000
       -0.10000          0.0000          0.0000         0.50000        -0.50000
        0.10000E-01      2.5000         0.20000E-01    -0.60000E-03     0.60000E-03
         99.000         -99.000         0.30000E-02     -1.0000         0.10000
         20.000          20.000      /
 // Protection Settings
 53401001   'VTGTPAT'    534004   534010  '1 '     0.10000       1.2000      0.11000      0.50000E-01  /
 53401002   'VTGTPAT'    534004   534010  '1 '     0.10000       1.1000      0.95000      0.50000E-01  /
 53401003   'VTGTPAT'    534004   534010  '1 '     0.45000       2.0000      0.11000      0.50000E-01  /
 53401004   'VTGTPAT'    534004   534010  '1 '     0.70000       2.0000      9.95000      0.50000E-01  /
 53401005   'FRQTPAT'    534004   534010  '1 '     40.0000       62.000      0.11000      0.50000E-01  /
 53401006   'FRQTPAT'    534004   534010  '1 '     56.5000       80.000      0.11000      0.50000E-01  /
```

Appendix B: Transient Stability Analysis Plots

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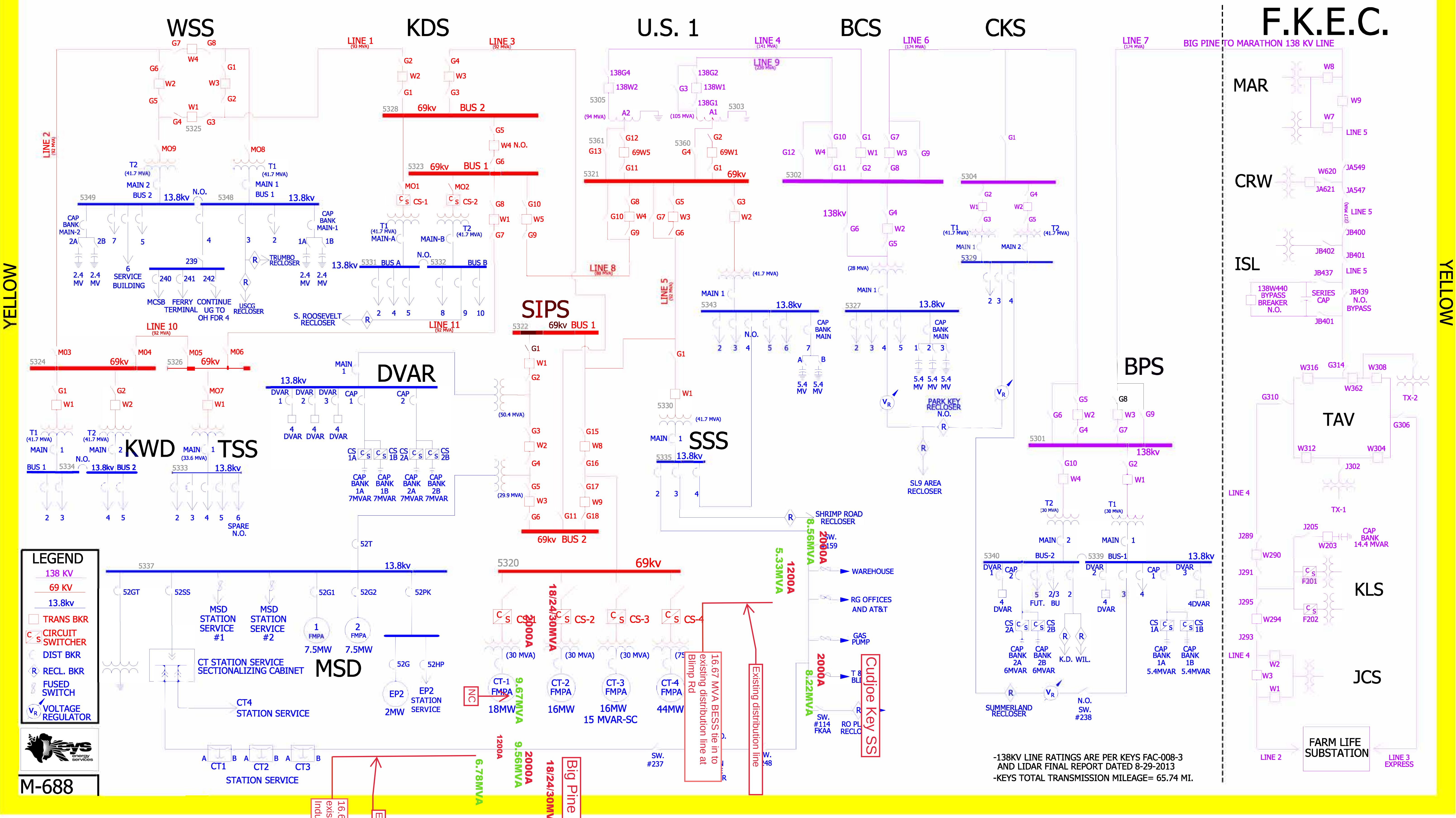
TRANSMISSION ONE-LINE DIAGRAM

KEYS ENERGY SERVICES

2024 RELEASE
REV-1
08-8-2024



-138KV LINE RATINGS ARE PER KEYS FAC-008-3 AND LIDAR FINAL REPORT DATED 8-29-2013

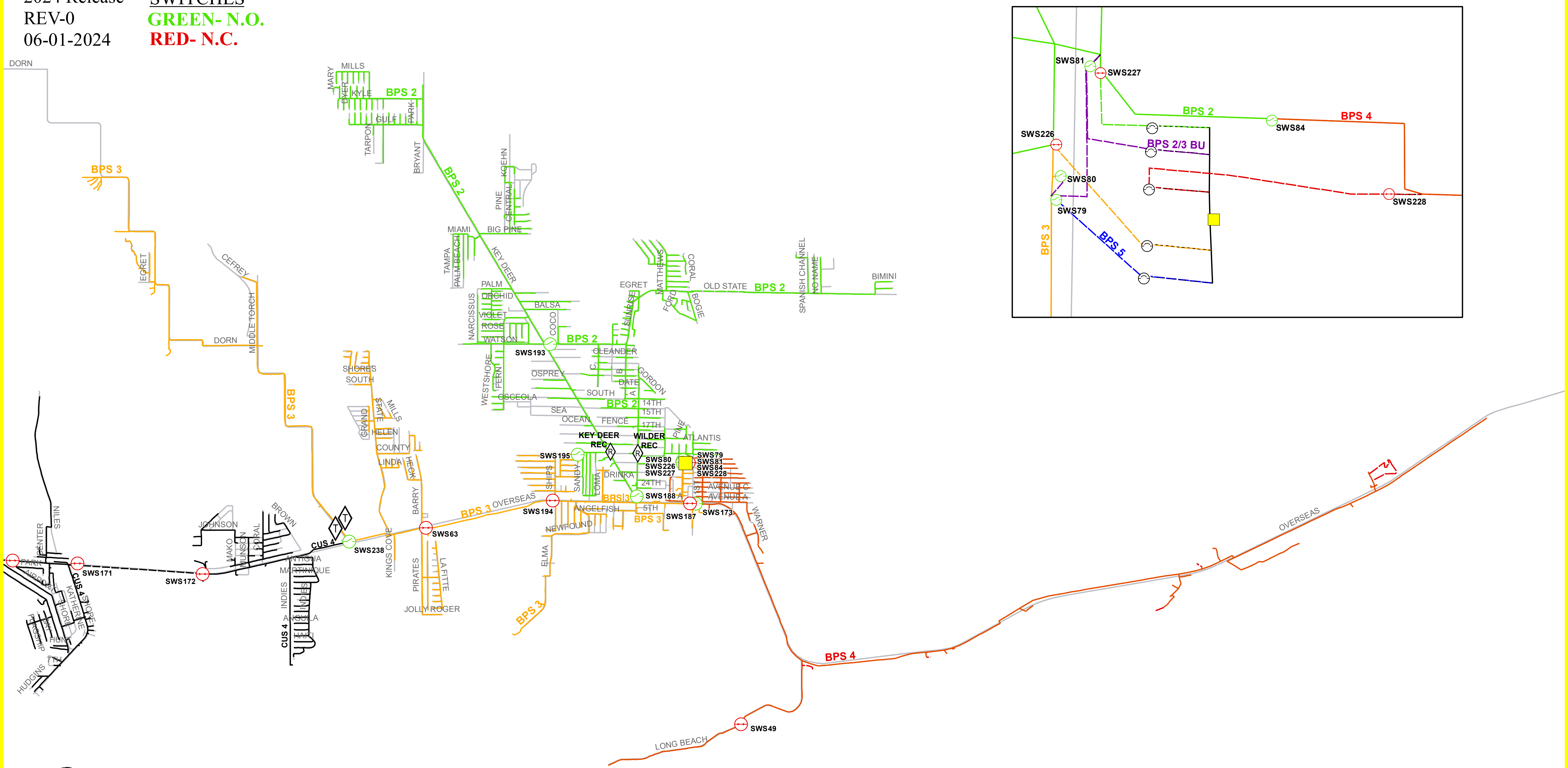
-KEYS TOTAL TRANSMISSION MILEAGE= 65.74 MI.

YELLOW

BIG PINE SUBSTATION
13.8 KV ONE LINE

2024 Release
REV-0
06-01-2024

SWITCHES
GREEN- N.O.
RED- N.C.



energy services

RFP FORMS

FMPA RFP 2025-212
Intent-to-Bid Form

Form Due Date: January 12, 2026

If you intend to submit a response to this Request for Proposals, we ask that you complete this form as soon as possible and e-mail it to *sharon.samuels@fmpa.com*. You may also mail a copy of this form to the following address:

Sharon Samuels
Florida Municipal Power Agency
8553 Commodity Circle
Orlando, Florida 32819

If you identify yourself as a potential respondent, FMPA will be able to notify you of any RFP changes or revisions and forward to you any addenda to the RFP.

Please note:

Filing an Intent-to-Bid form is voluntary: It is NOT required by FMPA in order for you to submit a response.

Filing an Intent-to-Bid form does not commit you to responding.

Filing an Intent-to-Bid form is **required** if you submit specific questions concerning this RFP.

----------- Intent-to-Bid ------------

RFP 2025-212: BESS

Name of Firm:

Address:

Name of Contact Person:

E-Mail Address:

Phone:

DRUG-FREE WORKPLACE COMPLIANCE FORM

IDENTICAL TIE RESPONSES

Preference shall be given to businesses with drug-free workplace programs. Whenever two or more responses which are equal with respect to price, quality, and service are received by the State or by any political subdivision for the procurement of commodities or contractual services, a response received from a business that certifies that it has implemented a drug-free workplace program shall be given preference in the award process. Established procedures for processing the responses will be followed if none of the ties vendors have a drug-free workplace program. In order to have a drug-free workplace program, a business shall:

The undersigned vendor in accordance with Florida Statute 287.087 hereby certifies that ___________________________ does:
(Name of business)

1. Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.

2. Inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.

3. Give each employee that may be engaged in the eventual provision of commodities or contractual services envisioned by this RFQ a copy of the statement specified in Subsection 1.

4. In the statement specified in Subsection 1, notify the employees that, as a condition of working on the commodities or contractual services that are envisioned by this RFQ, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of Chapter 1893 or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction.

5. Impose a sanction on, or require the satisfactory participation in a drug abuse assistance or rehabilitation program if such is available in the employee's community, by any employee who is so convicted.

6. Make a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

As the person authorized to sign the statement, I certify that this form complies fully with the above requirements.

____
Vendor's Signature

____
Date

FMPA RFP 2025-212

RESPONDENT INFORMATION FORM

Please check the area(s) for which your Firm is providing a proposal:

☐ I – BESS Proposal for KEYS ☐ II – LWB Indicative Pricing

Please check the box as applicable:

☐ Firm is a certified minority business enterprise as defined by the Florida Small and Minority Business Act.

Firm Name:

By: ____

(Authorized Person's Signature)

____

(Print or type name and title of signer)

Firm Address:

Telephone Number:

Toll Free Number:

Contact Person Name:

Contact Email:

Date:

DISPUTE DISCLOSURE

Answer the following questions by placing an "X" in the appropriate "YES" or "NO" box. If you answer "YES", please explain in the space provided, or via attachment.

Has your firm, or any of its officers, received a reprimand of any nature or been suspended by the Department of Professional Regulation or any other regulatory agency or professional association within the last five (5) years?

YES ☐ NO ☐

Has your firm, or any member of your firm, been declared in default, terminated or removed from a contract or job related to the services your firm provides in the regular course of business within the last five (5) years?

YES ☐ NO ☐

Has your firm had filed against it or filed any requests for equitable adjustment, contract claims or litigation in the past five (5) years that is related to the services your firm provides in the regular course of business?

YES ☐ NO ☐

If yes, state the nature of the request for equitable adjustment, contract claim or litigation, a brief description of the case, the outcome or status of suit and the monetary amounts or extended contract time involved.

I hereby certify that all statements made are true and agree and understand that any misstatement or misrepresentation or falsification of facts shall be cause for forfeiture of rights for further consideration of this project:

Project: FMPA RFP# 2025-212

______________________ **Firm**	______________________ **Date**
______________________ **Authorized Signature**	______________________ **Officer Title**
______________________ **Printed or Typed Name**	

STATEMENT OF NO RESPONSE

Sharon Samuels
Florida Municipal Power Agency
8553 Commodity Circle
Orlando, FL 32819

We, the undersigned, have declined to submit a response on your FMPA Request for Proposals RFP 2025-212 for the following reasons:

______We do not offer the requested services.
______Our schedule would not permit us to perform.
______Unable to meet specifications.
______We anticipate a potential conflict of interest
______Other – Explain Below

We understand that if the Statement of No Response letter is not executed and returned, our name may be deleted from the list of qualified proposers of the Florida Municipal Power Agency.

Company Name:

By: ____
Authorized Person's Signature)

____
(Print or type name and title of signer)

Company Address:

Email Address:

Telephone Number:

Toll Free Number:

Fax Number:

Date:

Thanks for your interest in servicing FMPA.