CITY OF TAMPA

Bob Buckhorn, Mayor **CONTRACT ADMINISTRATION DEPARTMENT**

Michael W. Chucran, Director

ADDENDUM NO. 2

DATE: March 29, 2017

Contract 17-C-00012; Howard F. Curren AWTP Standby Power Programmable Logic Controller Upgrade

Bidders on the above referenced project are hereby notified that the following addendum is made to the Contract Documents. BIDS TO BE SUBMITTED SHALL CONFORM TO THIS NOTICE.

Item 1: Insert, into Section 44-Programmable Logic Controller (PLC), after W-44.03 C., the attached W-44.03.D.

Clarification: Portions of the Specification Section 44.03.D. are crossed out because those items will not be included in the new system operation, but remain for clarification to the Contractor when viewing the existing plc program.

Item 2: Disregard references to requirements for a project sign, as a project sign will not be required for this project.

All other provisions of the Contract Documents and Specifications not in conflict with this Addendum shall remain in full force and effect. Questions are to be e-mailed to Contract Administration@tampagov.net.

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WM-44.03

D. Standby Generators System Operation

A. Operational Overview

1. The standby generation equipment shall function in association with the 13.2 kv Switchgears No. 1, 2, and 3 to serve the plant electrical loads. Overall system operations shall be in accordance with the control diagrams and details shown and as described hereinafter.

2. All text hereinafter which states “to provide interconnecting control circuits” to produce a particular operation function, are circuits or programmable logic which is to be located in 13.2 kv Switchgear No. 3 or as otherwise noted and required.

3. The term “generator” throughout applies to existing ~~turbine generators and the new~~ engine generators.

4. Circuit breakers referenced by numbers throughout the text are prefixed with numbers 1, 2, and 3, which identifies the 13.2 kv switchgear in which the breaker is located.

5. All system operation and control functions shall be coordinated and integrated such that during automatic and/or manual operation, no unsafe condition shall occur, no malfunction of intended operation shall occur, and the highest possible reliability of operation shall be maintained.

6. Coordinate and integrate all system operation and control functions with the modifications to the ~~existing turbine generator controls and~~ existing 13.2 kv Switchgears No. 1 and 2 circuit breaker controls to provide an overall fully functional system.

7. Coordinate and integrate the functions and circuitry of all selector switches to ensure that the various settings available do not cause a malfunction of the intended system operation.

8. The standby generation system and associated circuit breaker controls shall operate through an ANSI 43 Manual-Automatic control mode selector switch at 13.2 kv Switchgear No. 3. In the Manual mode, all control functions will be manually performed by the operator. In the Automatic mode, all control

functions will be automatic except for specific steps described herein which require the operator to initiate the procedure.

9. All transfers of load between TECO and the standby generation system, except on TECO power failure, shall be closed transition transfer. Load transfer in all cases shall occur in approximately 10 to 15 seconds. The engine generator control system shall regulate the output power of the engine generators to match the operating plant load of the engine generators and prevent the exporting power to the TECO system.

10. Provide control circuits, interlocks, and relays to protect against overloading.

11. The programmable logic controller shall control the 13.2 KV Switchgear No. 3 main circuit breakers (3-52-S1 & 3-52-S2) closure to the system bus, until an adequate number of generators are connected in parallel to the 13.2 KV Switchgear No. 3 bus.

12. In the event that only two engines are connected in parallel on 13.2 KV Switchgear No. 3 bus, the system shall inhibit closure of the 13.2 KV Switchgear No. 3 main circuit breakers (3-52-S1 & 3-52-S2) and sound an audible alarm. After the plant operators have removed downstream load to within the two engine capability or more generators are added, the operation of the load sequence selector switch shall automatically reinitiate the transfer procedure.

13. The load controls shall also be backed-up with a bus frequency monitor which shall trip the 13.2 KV Switchgear No. 3 main circuit breakers (3-52-S1 & 3-52-S2) loads during a bus under frequency condition.

~~14. Load Demand/Engine Start/Stop Sequence~~

~~a. In a normal power failure operation, load demand sensing will, after a 0 to 60 minute adjustable time delay, be placed into operation. The PLC shall monitor the load on the emergency bus and will initiate signals to subtract and add generators as required. An indicating lamp on the master control cubicle will be flashing during the 0 to 60 minute time delay and will be on constant, when the system is operating in load demand mode.~~

b. The generator starting and stopping sequence can be changed through the PLC Register Access Panel.

c. If the sequence is changed during an automatic operation, any engine on line will remain on line. If the generator selected as the base generator is not on line, it will be immediately started up and placed on line. The generators that are selected as sequence position #2 through 7 will be added in sequence to the bus and subtracted in reverse sequence. Should a generator be locked out of the system, it will be skipped over and the next generator in sequence will be started as required.

d. Back-lit engraved indicating windows shall be provided on the master generator cubicle to light when the loading of the generating system reaches the preset "Decreasing Load", "Increasing Load", and "Overload" setpoints. These lights are flashing when timing and are on constant when timed out.

e. The setpoints shall be field adjustable through the PLC Register Access Panel. The "Overload" setpoint is adjustable from 90 to 125% of each engines' rated loading. The "Increase Load" is adjustable from 60 to 100% (or "Overload" minus 10%, whichever is smallest) of the on line capability of the system. The "Decrease Load" is adjustable from 40 to 80% (or "Increase Load" minus 10%, whichever is smallest) of the on line capability of the system after the decrease.

f. The overload and increase load time delays shall have "inverse time characteristic"- the higher the loading- the shorter the time delay. The settings shall be programmable through the PLC Register Access Panel. The ranges are 0 to 10.0 seconds for the overload setpoint, and 0 to 99.9 for the increase load time delay. The decrease load time delay shall be adjustable from 0 to 99.9 seconds.

15. Generator Selector Switch

a. Provide a four-position generator selector switch labeled, "LOCKOUT/RESET-OFF-AUTO-RUN", on each generator control panel cubicle door.

b. When the selector switch is in the "LOCKOUT/RESET" position, the generating sets shall be locked out. Whenever the selector switch is

placed in “lockout/reset” position while the generator is operating, it will immediately shut down and its circuit breaker will trip.

c. An “OFF” position shall be provided to allow a normal shutdown, with a time delay to allow the engine to cool after operating under load. Whenever the selector switch is placed in the “off” position while the generator is operating, the generator circuit breaker will trip, but the engine will continue to operate until the expiration of time delay setting of the idle relay.

d. When the selector switch is placed in the “AUTO” position, the generator shall be on standby and shall start whenever a start signal is received from the PLC. When the utility power returns, and the PLC signals the generator to shut down, the circuit breaker will be tripped and the engine will continue to operate for the idle time delay period before shutting down in readiness for the next power failure.

e. When the selector switch is in the “RUN” position the generator will start and come up to speed. It will continue to run until the selector switch is returned to “OFF” or “LOCKOUT/RESET” position. This position is to be used for testing or manual operation.

B. Automatic Start Sequence

Provide interconnecting control circuits to produce the following normal operating function when a system start command is given to the standby generation system.

1. Upon receipt of a start command, all of the generators shall start unless otherwise locked out.

2. The associated output circuit breaker for the first generator to reach operating voltage and frequency shall close to the bus in 13.2 kv Switchgear No. 3.

3. The next generator to randomly reach operating voltage and frequency shall synchronize to the first generator and the associated output circuit breaker shall close.

4. Likewise, each of the remaining generators shall synchronize to the bus and the associated output circuit breaker shall close.

5. Provide control logic which positively prevents two engine generators from being connected to the same dead bus simultaneously.

C. Loss of Utility Sequence (TECO Power Failure)
Provide interconnecting control circuits to produce the following normal operating functions when both TECO Service Lines No. 1 and No. 2 fail.

1. Upon failure of both TECO service lines, an adjustable time delay of 0.5 to 10 seconds shall be initiated.

2. At the end of the time delay, Main Breakers 1-52-1 and 1-52-2 shall open, Tie Breaker 3-52-TIE shall close and an automatic start sequence shall initiate for all generators.

3. Simultaneous with the operation described in Step 1, Distribution Breaker 1-52-6A which serves the cogeneration system shall automatically open.

4. Upon sensing that all of the generators are connected to the bus, the system shall initiate an adjustable time delay of 0 to 30 seconds to allow for a voltage check of both TECO service lines prior to loading the generators.

5. At the end of the time delay and providing that voltage has not returned to both TECO service lines, Distribution Breakers 3-52-S1 and 3-52-S2 shall sequentially close to energize 13.2 kv Switchgear No. 1. A manually operated loading sequence selector switch shall determine the closing order of Breakers 3-52-S1 and 3-52-S2.

6. After 13.2 kv Switchgear No. 1 is energized, Distribution Breaker 1-52-6A which serves the cogeneration system may be closed.

D. Return Utility Sequence (TECO Power Available)

1. When voltage returns to both TECO service lines and after an adjustable time delay of 0 to 60 minutes, a restore enable signal shall be initiated to allow a manual restoration of both TECO service lines. A restore selector switch for each of the TECO service lines (located on 13.2 kv Switchgear No. 3) shall initiate the restoration sequence.

2. Upon operating the restore selector switch for TECO Service Line No. 1, the generator bus shall synchronize to TECO Service Line No. 1 and Main

Breaker 1-52-1 shall close. The generators shall gradually unload until all load on 13.2 kv Switchgear No. 1, Bus No. 1 has been assumed by TECO. Upon completion of the load transfer, Distribution Breaker 3-52-S1 shall open. With TECO Service Line No. 1 restored to service, operate the restore selector switch for TECO Service Line No. 1. The generator bus shall synchronize to TECO Service Line No. 2 and Main Breaker 1-52-2 shall close. The generators shall gradually unload until all load on 13.2 kv Switchgear No. 1, Bus No. 2 has been assumed TECO. Upon completion of the load transfer, Distribution Breaker 3-52-S2 and Tie Breaker 3-52-TIE shall open. As each generator is unloaded, the associated output circuit breaker shall open. The generator shall continue to run unloaded for an adjustable time period before complete shutdown.

E. Generators Exercising Sequence

Note: In the event that either TECO service line fails during a Generator Exercising Period, the affected line will sense reverse power (ANSI 32 relay) and trip the associated main breaker in Switchgear No. 3. The generators in operation at the time will unload and initiate a normal shutdown sequence. The Load Test-Manual-Standby Service selector switches shall be manually operated to the "Normal" position.

1. Provide interconnecting control circuits to produce the following normal operating function when exercising the generators to the plant load. The sequence shall initiate when either or both of the "Load Test-Normal-Standby Service" duty selector switches for TECO service lines No. 1 and No. 2 (located on 13.2 kv Switchgear No. 3) are operated to the "Load Test" position. Tie Breaker 3-52-TIE shall remain open when exercising the generators to the plant load.

2. Assuming the duty selector switch for TECO service line No. 1 is operated to the "Load Test" position, an automatic start sequence shall be initiated for all the generators connected to 13.2 kv Switchgear No. 3, Bus No. 1.

3. After all of the associated generators, have synchronized and closed to 13.2 kv Switchgear No. 3, Bus No. 1, the standby generation system shall be ready to assume the plant load connected to 13.2 kv Switchgear No. 1, Bus No. 1.

4. By operating the loading sequence selector switch to the 3-52-S1 position, the generator Bus No. 1 shall synchronize to TECO Service Line No. 1 and Distribution Breaker 3-52-S1 shall close.

5. The generators shall gradually assume the plant load.

6. The operating procedure for exercising the generators connected to 13.2 kv Switchgear No. 3, Bus No. 2 shall be similar. Operate the duty selector switch for TECO Service Line No. 2 to the "Load Test" position and the loading sequence selector switch to the 3-52-S2 position to initiate the transfer sequence. Breaker 3-52-S2 shall switch the load.

7. To terminate the exercising of the generators and restore TECO Line No. 1 to service, operate the associated duty selector switch from "Load Test" to "Normal". The generators shall be gradually unloaded until all load on 13.2 kv Switchear No. 1, Bus No. 1 has been assumed by TECO. Upon completion of the load transfer, Distribution Breaker 3-52-s1 shall open. To terminate the exercising of the generators connected to 13.2 kv Switchgear No. 3, Bus No. 2, initiate the same sequence using the selector switches associated with generator Bus No. 2. As each generator is unloaded, the associated output circuit breaker shall open. The generator shall continue to run unloaded for an adjustable time period before complete shutdown.

F. TECO Standby Power Program Sequence (TECO Going Off Line)

Provide interconnecting control circuits to provide the following normal operating function for transferring the plant loads to the generators when notified that TECO will be deenergizing Service Lines No. 1 and No. 2. The sequence will be initiated when the duty selector switches are sequentially operated to the "Standby Service" position.

1. Upon operating both selector switches to the "Standby Service" positon, Tie Breaker 3-52-TIE shall close and an automatic start sequence initiated for all of the generators.

2. After all of the generators have synchronized and closed to the bus in 13.2 kv Switchgear No. 3, the standby generation system shall be ready to assume the plant load.

3. Assuming the loading sequence selector switch is operated to the 3-52-S1 position, the generator bus shall synchronize to TECO Service Line No. 1 and Distribution Breaker 3-52-S1 shall close.

4. The generators shall gradually assume the plant load on 13.2 kv Switchgear No. 1 Bus No. 1. Upon completion of the load transfer, Main Breaker 1-52-1 shall open.

5. By operating the loading sequence selector switch to the 3-52-S2 position, the generator bus shall synchronize to TECO Service Line No. 2 and Distribution Breaker 3-52-S2 shall close.

6. The generators shall gradually assume the balance of the plant load on 13.2 kv Switchgear No. 1, Bus No. 2. Upon completion of the load transfer, Main Breaker 1-52-2 shall open.

7. When TECO is ready to restore power to the plant, the operation shall be as described in the subsection “Return of Utility Sequence.”