"RE-BUILDING THE CITY'S WATER SYSTEMS FOR THE 21ST CENTURY"

Sewerage & Water Board OF NEW ORLEANS

625 ST. JOSEPH STREET
NEW ORLEANS, LA 70165 • 504-529-2837 OR 52-WATER
www.swbno.org

Addendum No. 2

Date: 11/15/2024

Your reference is directed to **Contract Number:** 2024-SWB-97 for Grid Control System which is scheduled to open at **11:00 a.m. CST** on **December 03, 2024** for SWBNO Engineering Department.

This addendum provides for the following:

1. Extended bid period
    a. Request for Proposal Bid Advertisement:
        i. **REMOVE** Language:
        "Inquiries and/or Requests for Clarification are due to Connor Metcalf, on November 26, 2024, no later than 5:00 pm CST via in writing or email to cmetcalf@swbno.org. All responses will be posted on or before November 29, 2024.

        Proposals will be received by the Sewerage and Water Board of New Orleans Procurement Department by December 3, 2024 at 11:00 am local time. For submission instructions, see proposal documents."

        ii. **REPLACE** Language With:
        "Inquiries and/or Requests for Clarification are due to Connor Metcalf, on December 20, 2024, no later than 5:00 pm CST via in writing or email to cmetcalf@swbno.org. All responses will be posted on or before December 27, 2024.

        Proposals will be received by the Sewerage and Water Board of New Orleans Procurement Department by January 7, 2025 at 11:00 am local time. For submission instructions, see proposal documents."

b. SECTION 1.12 RFP Schedule Summary
   i. Table 1. Anticipated RFP Schedule Summary has been **ADJUSTED** to the following:

Event	Date	Local Time
RFP Release	October 14, 2024	
Non -Mandatory Pre-Proposal Meeting	October 22, 2024	10:00am
Deadline for Written Questions	December 20, 2024	5:00pm
Responses to questions/clarification	December 27, 2024	
Proposal due date and time	January 07, 2025	11:00am
Evaluation Committee meeting, open to public	TBD	TBD

2. Additional Reference Drawings have been released as part of this addendum. Please reference Addendum attachments.

3. This Addendum includes the following attachments (not included in the page count):
   a. Attachment – <GCS_Add2Attach1_BidQuestionsV1> (Pages 3-13)
   b. Attachment – <GCS_Addendum2_ReferenceMaterial> (Pages 14-720)

The above revisions shall be incorporated in and take precedence over any conflicting part of the original proposal documents. This addendum is hereby officially made a part of the referenced proposal.

Receipt of this addendum shall be acknowledged by inserting its number and date in the space provided in the Form of Proposal.

This addendum consists of Seven Hundred and Twenty (720) pages.

*** END OF ADDENDUM ***

Solicitation 2024-SWB-97 – Grid Control System (GCS)

Questions and Responses During Bidding

Version 1, Dated: November 8, 2024 [Questions 23-38]

BIDDER QUESTION #1	Do we have any leeway with regards to the SEL components that are specified in the spec?
RESPONSE #1	**Bidders may propose vendor hardware of any reputable OEM provided that it meets the RFP requirements and is capable of the required integration into the existing PDCS system. The proposed hardware capabilities will be evaluated as part of the RFP award process.**
BIDDER QUESTION #2	Should the FEED Study be used as a part of the design specification for the GCS or is the FEED study only to be used as a "reference"?
RESPONSE #2	**Reference only, the requirements are as defined in the RFP.**
BIDDER QUESTION #3	Please confirm is the ECS (Electrical Control System) is existing or to be included with the GCS system deliverable.
RESPONSE #3	**The ECS system is existing as defined in the RFP. Any augmentations to the ECS to achieve the RFP objectives are the responsibility of the Supplier.**
BIDDER QUESTION #4	Will the GCS supplier be responsible for installation, wiring and testing of any newly identified and required I/O devices, fiber/ethernet cabling, controllers, control racks, etc?
RESPONSE #4	**Yes.**

BIDDER QUESTION #5	Will the GCS supplier be responsible for updating existing AVEVA HMI screens in use by the Customer to incorporate necessary GCS screens, or will GCS supplier provide a new AVEVA license and dedicated GCS screens, or will customer modify existing AVEVA HMI screens to incorporate GCS screens?
RESPONSE #5	**The GCS Supplier will be required to updated existing AVEVA HMI screens for integration of the GCS into the overall PDCS environment. Supplier will be given access to the existing software to make the upgrades.**
BIDDER QUESTION #6	Will electrical single lines be made available to bidders, denoting existing IED, breakers, fuses, transformers, etc?
RESPONSE #6	**The one line included in Appendix A of the RFP package shall be used for bidding purposes. No additional information beyond that defined or included with the RFP will be provided. As necessary, the respondent shall detail assumptions or basis for their offering that are not sufficiently defined in the RFP. Additional detailed drawings will be provided to the successful bidder.**
BIDDER QUESTION #7	Will IED control drawings be made available to bidder, reflecting all existing IED control wiring, Axion I/O wiring, RTU wiring, network communications drawings, etc?
RESPONSE #7	**No additional information beyond that defined or included with the RFP will be provided for bidding purposes. As necessary, the respondent shall detail assumptions or basis for their offering that are not sufficiently defined in the RFP. Detailed information will be provided to the successful bidder.**
BIDDER QUESTION #8	Several sections identify that the system will be evaluated again RMF Level 1 or 2. Does this indicate that customer cybersecurity personnel will be responsible for RMF evaluation process and will the system undergo a Authority to Operate (ATO) criteria?
RESPONSE #8	**The reference to RMF is principally for common basis of understanding and a starting point for interoperability. Owner will review Suppliers design for integration into existing infrastructure as defined in the RFP.**

BIDDER QUESTION #9	Does customer have an identified list of prioritized loads, or load list that should be included in the Fast Load Shed design, and for load restoration during black-start? a. Fast Load Shed schedule/load list for 60Hz b. Fast Load Shed schedule/load list for 25Hz
RESPONSE #9	**The load shed design will be part of the Supplier required system development in collaboration with the Customer.**
BIDDER QUESTION #10	The FEED Study references IED password management, is this required for the GCU scope?
RESPONSE #10	**Not directly; the Supplier will work with the Owner during implementation within the Owner's IED password policy.**
BIDDER QUESTION #11	Given the age of some infrastructure, please identify those devices and equipment for which adequate documentation is not presently available to model the equipment; ie: generators, SFC, RCV, relay, etc.
RESPONSE #11	**Supplier shall assume documentation is available for all major GCS controlled equipment. During execution, Supplier shall coordinate with Owner's team to identify any additional parameters for infrastructure assets to implement a fully functional GCS system.**
BIDDER QUESTION #12	If additional I/O points are identified to complete the GCS installation, is the GCS supplier required to use SEL Axion platform or will a GCS supplier I/O platform be considered without negative scoring?
RESPONSE #12	**Bidders may propose vendor hardware of any reputable OEM provided that it meets the RFP requirements and is capable of the required integration into the existing PDCS system. The proposed hardware capabilities will be evaluated as part of the RFP award process.**
BIDDER QUESTION #13	SDN ethernet switches are specified in the RFP, is the Customer using SDN software applications for the SDN switches, or is "deny by default" the primary reason for the SDN switches? Will customer consider other Layer3 switches which are "deny by default"?
RESPONSE #13	**SDN network topology is for multiple reasons, the primary is pre-defined network pathways for electrical-protection-speed restoration. Additional security features are of additional inherent benefit. SDN switches are a requirement and considered the base design, utilization of a non-SDN switch would be considered an alternate would have to be evaluated as an alternate during Supplier's detailed design.**

BIDDER QUESTION #14	Please confirm desired network redundancy; PRP, RSTP, or HSTP. Or if network redundancy will be performed by others.
RESPONSE #14	**The PDCS network is a mesh that is based on software-defined network (SDN) pre-defined network paths. The network redundancy is based on hardware redundancy within the SDN pre-defined network paths. The IED network redundancy is moderately dependent on the selected IED, but a majority of existing IED's are SEL 751 that support PRP as well as other dual-ethernet port solutions.**
BIDDER QUESTION #15	Will GCU supplier or Others be responsible for any IED settings changed required for successful operations of GCU and LS system.
RESPONSE #15	**The GCS supplier will be responsible for any IED settings changes required for successful operation of GCS.**
BIDDER QUESTION #16	Will GCS commissioning testing be done during normal business hours or off hours?
RESPONSE #16	**The Supplier shall assume GCS commissioning testing will generally be performed during normal business hours, noting the RFP defined 'continuation of operations' requirements. It is emphasized in many locations in the RFP that the SWBNO is a 24/7/365 operation and that extensive coordination will be required to perform system testing.**
BIDDER QUESTION #17	Do the existing generator have auto-synchronizers installed and operational?
RESPONSE #17	**Yes.**
BIDDER QUESTION #18	Please describe the existing method of generator synchronization.
RESPONSE #18	**All generators, rotating or virtual (SFC's), have auto-synchronization to their 'generator bus'. Any interconnection beyond that 'generator bus' is, at this time, manual synchronization to that other source.**
BIDDER QUESTION #19	Are the 24Hz RFC to be replaced by 25Hz SFC's?
RESPONSE #19	**The existing 24-hz RFCs will be retired in the future**
BIDDER QUESTION #20	What is the Overtime rate for Customer staff, if afterhours support is needed during installation and SAT.
RESPONSE #20	**Customer operations staff supporting the installation and SAT would not be the liability of the Supplier.**

BIDDER QUESTION #21	The phrase of “Ethernet/IP” is referenced in the RFP document, please confirm or define if this is the Allen-Bradley protocol, or just a reference to IP based communications over ethernet connectivity.
RESPONSE #21	**This is a generic term and not Vendor specific.**
BIDDER QUESTION #22	Can we have a 3 week extension for the bid?
RESPONSE #22	**An extension to the bid period has been considered and we will extend the bidding period to December 3, 2024. Please refer to Addendum 1 for additional details.**

End Bidder Questions V0

BIDDER QUESTION #23 **RESPONSE #23**	2024-SWB-97 RFP references "Attachment C" - Economically Disadvantaged Business Participation Summary Sheet on page 30. Can you please provide this form? It is not included in the RFP. **Refer to Addendum No. 1 dated 11/1/2024**
BIDDER QUESTION #24 **RESPONSE #24**	We have not seen the attendee list nor the meeting recording from the "Pre-Proposal Meeting" held on October 22nd. Can you please provide? **Refer to Addendum No. 1 dated 11/1/2024**
BIDDER QUESTION #25A	Per these sections of the RFP, the supplier must use an integrator with extensive experience specific to the SEL RTAC / Powermax hardware. Based on other previous load shed projects with their Powermax team as well as the proprietary software and coding of their system, Enginuity Global would choose to subcontract SEL for the controller programming. This would require a quote directly from SEL for this, is that what is expected? RFP reference to the above: Multiple sections reference this L. Supplier shall obtain PDCS Systems Integrator services from demonstrated established experienced specialty PDCS Systems Integrator with electrical protection control system design experience including a minimum 100,000 points and ten 50MW each, or greater, electrical network projects experience utilizing the hardware, software, and configuration specified for the Work. Selected Systems Integrator to provide field support during Construction, Startup, and Commissioning. Selection of the PDCS Systems Integrator is subject to approval by the Engineer based on substantiating proven experience meeting the Specified requirements. Additionally, resumes of key PDCS Systems Integrator personnel performing no less than 60 percent of the Work shall also be the basis of PDCS Systems Integrator selection approval. Non-approval of underqualified PDCS Systems Integrator requiring an alternate qualified PDCS Systems Integrator is not basis for a contract change. Specific hardware reference 2.05 CONTROLLERS A. The controllers shall be from Schweitzer Engineering Laboratory (SEL) Real Time Automation Controller (RTAC) or approved equal. The system design is based on SEL RTAC. B. A single RTAC shall be provided per electrical distribution system 'logical' node; essentially per functional switchgear assembly. The RTAC shall facilitate system wide communication from the intelligent electronic devices (IEDs) in the 'logical' via the PDCS communications architecture. The RTAC shall manage multi-IED sequential logic sequences, such as primary source fail over, primary source restoration, and others as required for safe and functional operation of the logical and the wider SWBNO managed electrical network. The operation of the IEDs shall not be dependent on the health of the RTAC, such that the RTAC can fail and not impact the IED point of service protection functionality.

RESPONSE #25A	**Bidders may propose vendor hardware of any reputable OEM provided that it meets the RFP requirements and is capable of the required integration into the existing PDCS system. The integration skills shall meet the specified requirements for the hardware/software solution proposed. The basis of design was the SEL PowerMAX solution and thus the qualifications are based on the basis of design solution. An approved alternate per the specification requirements can be evaluated as part of the RFP award process. Subcontracting to a specification compliant entity is within the requirements of the specification. Use of an experienced integrator is optional and available to a supplier should they choose to subcontract all, some, or part of the contract. The submitted solutions proposal should be on supplier letterhead in accordance with the bid specifications.**
BIDDER QUESTION #25B **RESPONSE #25B**	Note for question 1: This would need to be subcontracted to SEL (we would need costs for this for equal bidding between vendors) • 40 94 23 (controller) parts 2.01-L, 2.01-N, and all of 2.09, 2.10, 2.11 • 40 94 24 (HMI) parts 1.01 through 1.05, 2.01-F, 2.05-G,H, 2.06, 2.10 through 2.11 • All Data Exchange Requirements per 40 94 25 • All GCS programming requirements per 40 94 26 • Additional time for warranty requirements • Additional time in the proposal on recommended installation practices of all control system design hardware prior to and during design, FAT, SAT, and commissioning. **Not necessarily, SEL hardware or equivalent hardware from a reputable OEM would be acceptable as long as solution meets the functional design requirements outlined in the bid specifications. Bidders may choose to subcontract all, some, or parts of the work to one or more subcontractors.**
BIDDER QUESTION #26 **RESPONSE #26**	Are there any specific billing requirements to be included in the proposal? **Bidder shall provide milestone dates in accordance with Specification 01 32 00 included in the RFP which shall be used for payment dates.**
BIDDER QUESTION #27 **RESPONSE #27**	Does the design and engineering scope include upgrading the partially controlled breakers (identified in yellow/orange on the feed package one-line) to new SEL relays with IEC 61850 monitoring and control over Ethernet? (p. 504 of the PDF). **Only if required by the bidder to achieve the requirements of the specification. Generally, the expectation is that the load serving feeder breakers will be used primarily for load shedding operations by the GCS. Control of mains/ties to be as required by the bidder to meet the requirements of the specification.**

	Refer to Appendix A Scoping One Line for contract scope. FEED study is provided for reference only.
BIDDER QUESTION #28 **RESPONSE #28**	Are the blue-colored breakers shown on the existing one-line diagram currently integrated into the SCADA network? Additionally, will upgraded network cards with multiple ports be required to establish a standalone network? (40 94 23 1.01 B.1) **Per the legend on the referenced one-line, the blue-colored breakers are 'fully controlled / monitored' which indicates they are fully integrated into the PDCS. The network design is the responsibility of the bidder, including any upgrades required by the bidder's design. The expectation is that no upgrades to the existing network will be required unless required by the bidders design.**
BIDDER QUESTION #29 **RESPONSE #29**	Is any modification required for the existing Axion controllers or Wonderware at the PDCS nodes? **Modifications to the existing PDCS are dependent on the bidder's design. It is expected that configuration updates will be required at each of the PDCS nodes, both at the Axion and the local HMI to integrate the GCS functionality into the PDCS. Node Axion controller software may need to be modified to allow for network communications with upgraded breakers. Wonderware HMI may need to be modified to accommodate operator access to the new control interfaces available in the Grid Control System. Access to the PDCS project development files will be made available to the successful bidder.**
BIDDER QUESTION #30 **RESPONSE #30**	Will the new PDCS node locations require Axion control similar to the existing or use IEC61850? **Yes, but this work will be done by prior Contract Package and will be ready for integration into the GCS by the GCS bidder.**
BIDDER QUESTION #31 **RESPONSE #31**	If the answers to questions 4 and 5 are yes, will modifications be required to the existing PDCS nodes (e.g., SDN switches, etc.)? **See responses 28B, 29, and 30; the expectation is that there will be, at a minimum, configuration changes to existing PDCS nodes, with the degree and extent of modifications dependent on the bidder's design.**
BIDDER QUESTION #32	1.01 F – retrofit / upgrades required in scope. Please confirm these are protective relays? a. Does this include any existing SCADA or DCS networking/security interfaces?

	b. Is there a spec for the SEL relays and test switches required? c. Is procurement of this in scope?
RESPONSE #32	**The referenced specification section is unclear, however, objects that are indicated with a "PDCS" designator on one-line SWBNO-E-SK-30.00.20240910 are integrated into the PDCS. Objects beyond those indicated on the above referenced one-line if required to be integrated into the PDCS for GCS functionality are the responsibility of the bidder.**
BIDDER QUESTION #33	1.01 B.2 – Will SEL SDN design for block-by default be deemed acceptable?
RESPONSE #33	**The referenced specification section is unclear, however the bidder's network design shall follow all specification requirements, up to and including the deny-by-default aspect of SEL SDN switches.**
BIDDER QUESTION #34	Will the SCADA interface connection be routed through a security gateway? Should this use the existing computer system, or will a new rack/enclosure be required to connect to the GCS controller?
RESPONSE #34	**Any GCS hardware shall be fully integrated into the existing PDCS infrastructure within the PDCS architecture. The need for security gateway, new rack/enclosure is dependent on the bidder's design and would be the responsibility of the bidder if required per the bidder's design.**
BIDDER QUESTION #35	Should the estimate include all future points shown, or should this be excluded due to the uncertainty of the future WPC setup?
RESPONSE #35	**The bid should not include the physical infrastructure nor licensing for future points but should include scalability and computational capacity for future points per the requirements of the specification.**
BIDDER QUESTION #36	Section 3.01 – The installation of equipment is to be provided by a separate contractor based on the construction scope outlined in this document, correct? This cost should not be included in our proposal, correct? Additionally, "Manufacturer Services" is mentioned—please clarify what is required.
RESPONSE #36	**Incorrect, any hardware installation required by the bidder's design is the responsibility of the bidder. As noted in the RFP, substantial on-going work is being performed by other Contractors including additions to the PDCS that will be 'GCS ready' awaiting integration by the GCS Contractor per the GCS bidder's design.**

BIDDER QUESTION #37	Have all the scenarios listed in the FEED been executed in ETAP, or do the stability (underfrequency) studies for each contingency, progressive, and underfrequency scenario fall within this scope? a. If studies are required, are governor and exciter impulse step test available for each generator and frequency converter?
RESPONSE #37	**The bidder shall assume any studies required to design and/or configure the GCS are required to be performed by the GCS supplier; with emphasis that the HIL testing is expected to utilize the GCS studies to inform required HIL test setup. The existing ETAP model can be provided to the successful bidder.**
BIDDER QUESTION #38	For the implementation plan outlined on page 41, Will the scope of this project include all parts with different project starting and installation schedules? If so, how should "Part Future" be handled?
RESPONSE #38	**Part Future is NOT in the bidder's scope and is intended to indicate that future elements will be added to the GCS as the PDCS implementation progresses. All non-future 'parts' are to be scheduled within the bidder's project execution plan.**
BIDDER QUESTION #39	Need Model # and firmware revision of each RTAC unit with its physical location in respect to the supplied electrical one line.
RESPONSE #39	**The requested information will be supplied to the successful bidder, any assumptions required by the bidder to submit their bid in this regard shall be listed.**
BIDDER QUESTION #40	PDCS hardware that needs to be integrated into GCS, we request model numbers and firmware revisions.
RESPONSE #40	**The requested information will be supplied to the successful bidder, any assumptions required by the bidder to submit their bid in this regard shall be listed.**
BIDDER QUESTION #41	How many physical operator stations that will be needed with the GCS?
RESPONSE #41	**No additional operator stations are expected to be supplied under the Work unless required by the bidder's design; all GCS operator interface shall be fully integrated into existing PDCS operator workstations per the specification. There are, or will be, nominally nine (9) PDCS operator workstations that are all the exact same form-factor into which the GCS interface shall be integrated.**
BIDDER QUESTION #42	Please provide photos of both existing PDCS servers showing all network connections.

RESPONSE #42	**Please see Addendum 2 “Reference Material”.**
BIDDER QUESTION #43	Please provide network architecture drawing/diagram for the IEDs and PDCS.
RESPONSE #43	**Please see Addendum 2 “Reference Material”.**

SEWERAGE AND WATER BOARD OF NEW ORLEANS

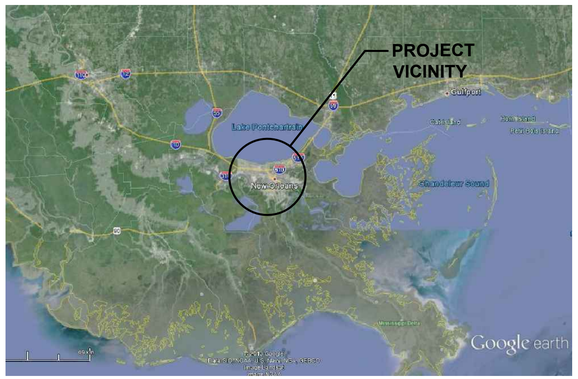
FOR THE CONSTRUCTION OF

CONTRACT NO. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

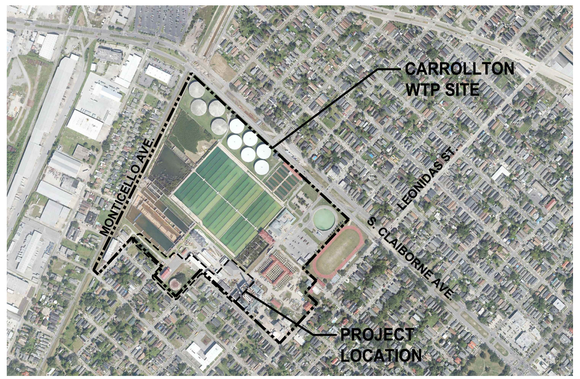
VICINITY MAP

NOT TO SCALE



LOCATION MAP

NOT TO SCALE



DRAWING INDEX

A

THESE COMPILED ENGINEERING AS–BUILT RECORD DRAWINGS ARE A COMPILATION OF A COPY OF THE ORIGINAL SEALED ENGINEERING DESIGN DRAWINGS FOR THIS PROJECT, MODIFIED BY ADDENDA, CHANGE ORDERS AND INFORMATION FURNISHED BY THE CONTRACTOR. THE INFORMATION SHOWN ON THESE COMPILED ENGINEERING AS–BUILT RECORD DRAWINGS THAT WAS PROVIDED BY THE CONTRACTOR OR OTHERS NOT ASSOCIATED WITH ME CANNOT BE VERIFIED FOR ACCURACY OR COMPLETENESS. MY COMPILATION OF THIS INFORMATION DOES NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR ERRORS RESULTANT TO INCORRECT, INCOMPLETE OR OMITTED DATA ON THE CONTRACTOR'S AS–BUILT RECORD DRAWINGS – NOR DOES IT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR NON–CONFORMANCE WITH THE ORIGINAL CONTRACT DOCUMENTS. THE ORIGINAL SEALED ENGINEERING DRAWINGS ARE ON FILE IN THE OFFICES OF THE SEWERAGE AND WATER BOARD.

REV.	DATE	DESCRIPTION	BY
A	10–25–19	AS–BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

COVER, VICINITY MAP, LOCATION MAP AND DRAWING INDEX

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY LISBETH HABANS NAGRATH, LICENCE No. 36792 ON 2-6-15. THIS DOCUMENT SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT.

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. GA-01

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

DR: SJ CLARK
CK: RA CASSANOVA
AP: LH NAGRATH
LAST EDIT:
SCALE: NOT TO SCALE
DATE: JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 1 OF 72

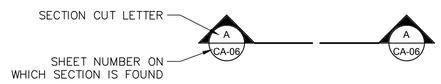
GENERAL NOTES:

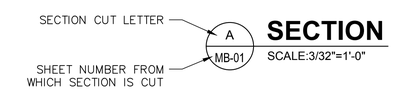
1. CONTRACTOR TO CONTACT THE SEWERAGE AND WATER BOARD (S&WB) PRIOR TO THE COMMENCEMENT OF ANY ACTIVITIES THAT MAY SUSPEND OPERATIONS.
2. COORDINATE WORK ACTIVITIES, INCLUDING ACCESS WITH THE S&WB AND OTHER CONTRACTORS WORKING IN THE AREA, AS REQUIRED BY SECTION 01 31 13 PROJECT COORDINATION.
3. THE CONTRACTOR IS RESPONSIBLE FOR REPAIRING ALL DAMAGE TO ADJACENT CONSTRUCTION AREAS AT NO ADDITIONAL COST TO THE S&WB AND SHALL BE LIABLE FOR ANY DAMAGE CAUSED BY FAILURE TO COMPLY WITH THESE INSTRUCTIONS.
4. THE CONTRACTOR IS RESPONSIBLE FOR DAMAGE TO EXISTING UTILITIES WHICH OCCUR BY THEIR FAULT DURING CONSTRUCTION AND SHALL IMMEDIATELY REPORT DAMAGE TO THE S&WB. ALL REPAIR COSTS SHALL BE BORNE BY THE CONTRACTOR.
5. THE CONTRACTOR SHALL NOTIFY THE S&WB IF THEY PLAN TO WORK ON AN S&WB HOLIDAY OR WEEKEND DAY. THE S&WB HAS THE FINAL AUTHORIZATION ON WORK PERFORMED NOT ON REGULAR WORK DAYS.
6. ALL WORK SHALL CONFORM TO THE CITY OF NEW ORLEANS DEPARTMENT OF PUBLIC WORKS, THE SEWERAGE AND WATER BOARD OF NEW ORLEANS, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS AND STATE AND FEDERAL REGULATIONS.
7. THE CONTRACTOR SHALL FURNISH ALL LABOR, SUPERVISION, MATERIALS, AND EQUIPMENT REQUIRED FOR THE WORK DETAILED IN THE CONTRACT AND AS REQUIRED BY THESE DRAWINGS AND SPECIFICATIONS.
8. ALL WORKMANSHIP AND MATERIALS SHALL CONFORM TO THE SPECIFICATIONS OF THE SEWERAGE AND WATER BOARD EXCEPT AS NOTED.
9. DIMENSIONS AND/OR ELEVATIONS MARKED "NTS" ARE NOT SHOWN TO SCALE. DRAWINGS ARE GENERALLY TO SCALE BUT SHOULD NOT BE SCALED.
10. NOISE CONTROL – THE CONTRACTOR SHALL TAKE REASONABLE MEASURES TO AVOID UNNECESSARY NOISE APPROPRIATE FOR THE AMBIENT SOUND LEVELS IN THE AREA DURING WORK HOURS. ALL CONSTRUCTION MACHINERY AND VEHICLES SHALL BE EQUIPPED WITH PRACTICAL SOUND MUFFLING DEVICES AND OPERATED IN A MANNER TO CAUSE THE LEAST NOISE CONSISTENT WITH EFFICIENT PERFORMANCE OF THE WORK.
11. ALL UTILITIES TO REMAIN UNLESS NOTED OTHERWISE. THE LOCATION OF THE EXISTING UTILITIES SHOWN ARE BASED ON EXISTING RECORDS AND WHERE POSSIBLE MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE.
12. THE CONTRACTOR SHALL NOTIFY THE S&WB REPRESENTATIVE OF ANY UTILITIES FOUND ON THE SITE WHICH WERE NOT IDENTIFIED ON THE SURVEY PRIOR TO DEMOLITION.
13. SILT FENCES SHALL BE INSTALLED AROUND THE PERIMETER OF THE CONSTRUCTION AREA PRIOR TO ANY OTHER CONSTRUCTION IN ACCORDANCE WITH SECTION 01 57 13 TEMPORARY EROSION AND SEDIMENT CONTROL.
14. AT POINTS OF TIE–IN TO THE EXISTING SYSTEM, THE NEW PIPE MATERIAL SHOULD MATCH EXISTING PIPING IN SIZE AND SCHEDULE OR BE INSTALLED AS NOTED ON THE PIPING DRAWINGS.
15. THE CONTRACTOR WILL BE REQUIRED TO REPAIR, AT HIS OWN EXPENSE AND IN AN APPROVED MANNER, ALL DEFECTS IN WORKMANSHIP OR MATERIAL DISCLOSED BY INSPECTIONS PRIOR TO OBTAINING FINAL ACCEPTANCE. THE CONTRACTOR SHALL ALSO BEAR ALL COSTS ASSOCIATED WITH THE RE–TESTING, INCLUDING ANY COSTS INCURRED BY THE S&WB.
16. ALL REQUIRED DEMOLITION WORK SHALL BE INCLUDED IN THE BASE BID PACKAGE SUBMITTED BY THE CONTRACTOR.
17. PRIOR TO ANY DEMOLITION, CLEARING, OR EXCAVATION, THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND UTILITIES BY CALLING LOUISIANA ONE CALL AT 811 OR 1–800–272–3020 AND THROUGH COORDINATION WITH THE S&WB.
18. DO NOT ALLOW MATERIAL AND DEBRIS GENERATED BY DEMOLITION ACTIVITIES TO ACCUMULATE ON THE JOB SITE. REMOVE DAILY AND DISPOSE OF IN A LEGAL MANNER. NO ONSITE SALE OF REMOVED ITEMS IS PERMITTED.
19. THE CONTRACTOR MUST TAKE ALL NECESSARY PRECAUTIONS TO ENSURE THE SAFETY OF THE PUBLIC AND/OR WORKERS ON THE SITE, AND TO PREVENT ACCIDENTS OR INJURY TO ANY PERSON ON, ABOUT OR ADJACENT TO THE WORK AREA.
20. THE SITE IS IN ZONE A1. ELEVATION 1.50 FEET, AS PER FLOOD INSURANCE RATE MAP COMMUNITY– PANEL NUMBER 255203 0160 E. EFFECTIVE DATE MARCH 1, 1984.
21. ANY WORK, CONSTRUCTION MATERIALS, FITTINGS, AND APPURTENANCES REQUIRED BY THE PLANS AND SPECIFICATIONS (INCLUDING FITTINGS AND MATERIALS AT ALL TIE–IN POINTS, TEMPORARY WORK, AND MATERIALS NEEDED TO ACCOMPLISH THE PROPOSED IMPROVEMENTS) AND NOT OTHERWISE IDENTIFIED IN THE PLANS, SHALL BE DEEMED INCIDENTAL TO CONSTRUCTION AND SHALL BE PERFORMED, SUPPLIED, AND INSTALLED AT NO ADDITIONAL COST TO THE OWNER.
22. SHOULD FIELD LOCATION OF EXISTING UTILITIES REQUIRE ADJUSTMENT TO PROPOSED UTILITY ALIGNMENT, CONTRACTOR SHALL PERFORM ADJUSTMENTS AS REQUIRED.
23. THE CONTRACTOR SHALL PROVIDE CONSTRUCTION AS BUILT DRAWINGS UPON COMPLETION.
24. SEE SECTION 05 12 00 FOR AWS SYMBOL LEGEND.

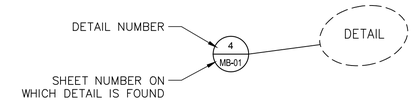
SITE ACCESS NOTES:

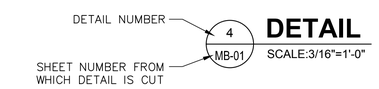
1. CONTRACTORS WILL PRESENT A GOVERNMENT ISSUED (STATE OR FEDERAL) ID. A PHOTOCOPY WILL BE MADE AND THE ID RETURNED TO THE INDIVIDUAL. THE FOLLOWING INFORMATION WILL BE PROVIDED AT THE TIME OF THE PHOTOCOPY: COMPANY NAME, SUPERVISOR'S NAME AND DAYTIME PHONE NUMBER, DATES (OR TIME FRAME) OF EXPECTED VISITS TO THE PLANT AND NAME OF S&WB EMPLOYEE SUPERVISING THE CONTRACT.
2. THE NAME WILL BE ADDED TO THE CONTRACTOR'S ENTRY LIST THAT IS AT EACH ENTRY GATE. WHEN THE CONTRACTOR ENTERS HE WILL BE REQUIRED TO SHOW HIS GOVERNMENT ISSUED I.D. WHICH WILL BE COMPARED WITH THE LIST. HIS ENTRY INTO THE PLANT WILL BE NOTED. ALL CONTRACTORS WILL DISPLAY A CONTRACTOR ISSUED ID AT ALL TIMES WHEN IN THE PLANT UNLESS IT IS UNSAFE TO DO SO.
3. IF THE CONTRACTOR NEEDS TO HAVE A VEHICLE ENTER THE PLANT ON A REGULAR BASIS THEY WILL NEED TO CONTACT TODD HATHEWAY FOR ISSUANCE OF THE VEHICLE PASS. ONLY THOSE VEHICLES THAT NEED TO BE USED TO BRING IN MATERIALS AND TOOLS ON A DAILY BASIS WILL BE ISSUED A VEHICLE PASS.
4. ALL CONTRACTOR EMPLOYEES SHALL PARK IN THE S&WB EMPLOYEE PARKING LOT (THE PARKING LOT TO THE LEFT WHEN ENTERING THE PLANT FROM CLAIBORNE AVE) AND ENTER THROUGH THE EMPLOYEE GATE.
5. IF ANY CONTRACTOR EMPLOYEE IS TERMINATED OR REASSIGNED, THE CONTRACTOR SHALL INFORM THE S&WB IMMEDIATELY TO REMOVE THE EMPLOYEE'S NAME FROM THE GATE LIST.
6. CONSTRUCTION ACCESS THROUGH THE GATE AT GENERAL OGDEN STREET AND SPRUCE STREET WILL BE PERMITTED. PROVIDE 72 HOURS NOTICE TO TODD HATHEWAY IF CONTRACTOR INTENDS FOR EMPLOYEES TO USE THESE GATES. GATE MUST BE STAFFED WITH SECURITY PERSONNEL WHEN IN USE.

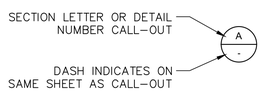
SYMBOLOGY LEGEND



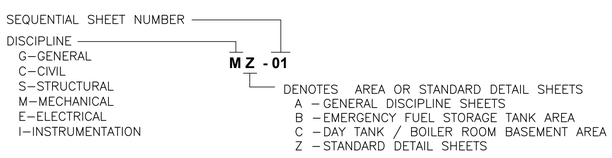








DRAWING NUMBERING SYSTEM



DEPICTED IS STANDARD MECHANICAL DETAIL SHEET NO 1

PROJECT ABBREVIATIONS:

#	NUMBER
&	AND
@	AT
%	PERCENT
℄	CENTER LINE
ℙ	PROPERTY LINE
'	FOOT; FEET
"	INCHES
A	AMPERE, AMPS
ADAAG	AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES
ACI	AMERICAN CONCRETE INSTITUTE
AG	ABOVE GROUND
AWS	AMERICAN WELDING SOCIETY
BM	BENCHMARK
BOP	BALANCE OF PLANT
BOT	BOTTOM; BOTTOM OF TANK
BV	BALL VALVE
BYND	BEYOND
CC	CENTER TO CENTER
CFO	CLEAN FUEL OIL
CFPS	CERTIFIED FIRE PROTECTION SPECIALIST
CFR	CODE OF FEDERAL REGULATIONS
CL	CENTER LINE
CLR	CLEAR
CONC	CONCRETE
CONT	CONTINUOUS
CPLR	COUPLER
CPT	CONTROL POWER TRANSFORMER
CS	CARBON STEEL
CV	CHECK VALVE
CY	CUBIC YARDS
DI	DUCTILE IRON, DRAINAGE INLET
DISC	DISCONNECT
DV	DELUGE VALVE
DWG	DRAWING
EL	ELEVATION
ELEV	ELEVATION
EXT	EXTERIOR
EXT'G	EXISTING
FACP	FIRE ALARM CONTROL PANEL
FC	FOAM CONCENTRATE, FLEXIBLE CONNECTION
FFE	FINISH FLOOR ELEVATION
FLG	FLANGE
FLH	FLEXIBLE HOSE
FO	FUEL OIL
FS	FOAM SOLUTION
GALV	GALVANIZED
GPM	GALLONS PER MINUTE
GV	GATE VALVE
H	HORIZONTAL
HMGP	HAZARD MITIGATION GRANT PROGRAM
HO	HAND/OFF
HOA	HAND/OFF/AUTOMATIC
HP	HORSE POWER
HS	HAND SWITCH
HSS	HIGH STRENGTH STEEL
HWY	HIGHWAY
INV	INVERT
JB	JUNCTION BOX
KSI	KIPS PER SQUARE INCH
LAH	LEVEL ALARM HIGH
LAHH	LEVEL ALARM HIGH HIGH
LALL	LEVEL ALARM LOW LOW
LAX	LEAK ALARM
LCP	LOCAL CONTROL PANEL
LG	LONG
LG	LEVEL GAUGE
LI	LEVEL INDICATOR
LIT	LEVEL INDICATOR TRANSMIT
LPS	LIGHTNING PROTECTION SYSTEM
LSH	LEVEL SWITCH HIGH
LSHH	LEVEL SWITCH HIGH HIGH
LSLL	LEVEL SWITCH LOW LOW
LSX	LEAK SWITCH
MAX	MAXIMUM
MCC	MOTOR CONTROL CENTER
MD	MUD DISCHARGE
MIN	MINIMUM
MJ	MECHANICAL JOINT
NC	NORMALLY CLOSED
NO	NORMALLY OPEN, NUMBER
NTS	NOT TO SCALE
NV	NEEDLE VALVE
OC	ON CENTER
OE	OVERHEAD ELECTRIC
OSHA	OCCUPATIONAL HEALTH AND SAFETY STANDARDS
OW	OILY WATER
OWS	OIL–WATER SEPARATOR
P	PUMP
PCCP	PORTLAND CEMENT CONCRETE PAVEMENT
PE	POLYETHYLENE
PFO	POLISHED FUEL OIL
PL	PROPERTY LINE
PLC	PROGRAMMABLE LOGIC CONTROLLER
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	POST TENSION
PTI	POST TENSION INSTITUTE
PVC	POLYVINYL CHLORIDE
PW	POTABLE WATER
R	RADIUS
R/W	RIGHT–OF–WAY
RA	RELEASING AGENT
RED	REDUCER
RW	RAW WATER
SCH	SCHEDULE
SCP	STEEL CASING PIPE
SD	STORM DRAIN
SF	SAFETY FACTOR, SQUARE FEET
SIM	SIMILAR
SL	SLUDGE LINE
SS	SANITARY SEWER, STAINLESS STEEL
SWBNO	SEWERAGE AND WATER BOARD OF NEW ORLEANS
S&WB	SEWERAGE AND WATER BOARD OF NEW ORLEANS
T	TREAD(S), TELEPHONE, TONS
TK	TANK
TOC	TOP OF CURB, TOP OF CONCRETE
TOG	TOP OF GRATING
TOS	TOP OF SLAB
TP	TEST POINT
TW	TREATED WATER
TYP	TYPICAL
UG	UNDERGROUND
UGE	UNDERGROUND ELECTRIC
V	VOLTS/VERTICAL
VIF	VERIFY IN FIELD
VFD	VARIABLE FREQUENCY DRIVE
W	WEST, WIDE, WATTS
W/	WITH
WF	WIDE FLANGE
WL	WATERLINE
WW	WELDED WIRE
WWF	WELDED WIRE FABRIC
YC	EVENT CONTROL
YR	EVENT RECORD

REV.	DATE	DESCRIPTION	BY
A	10–25–19	AS–BUILT MARKUPS	LHN

A AS–BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR.

Trigon
Quality ▲ Commitment ▲ Client Service
TRIGON DWG. NO. GA-02

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

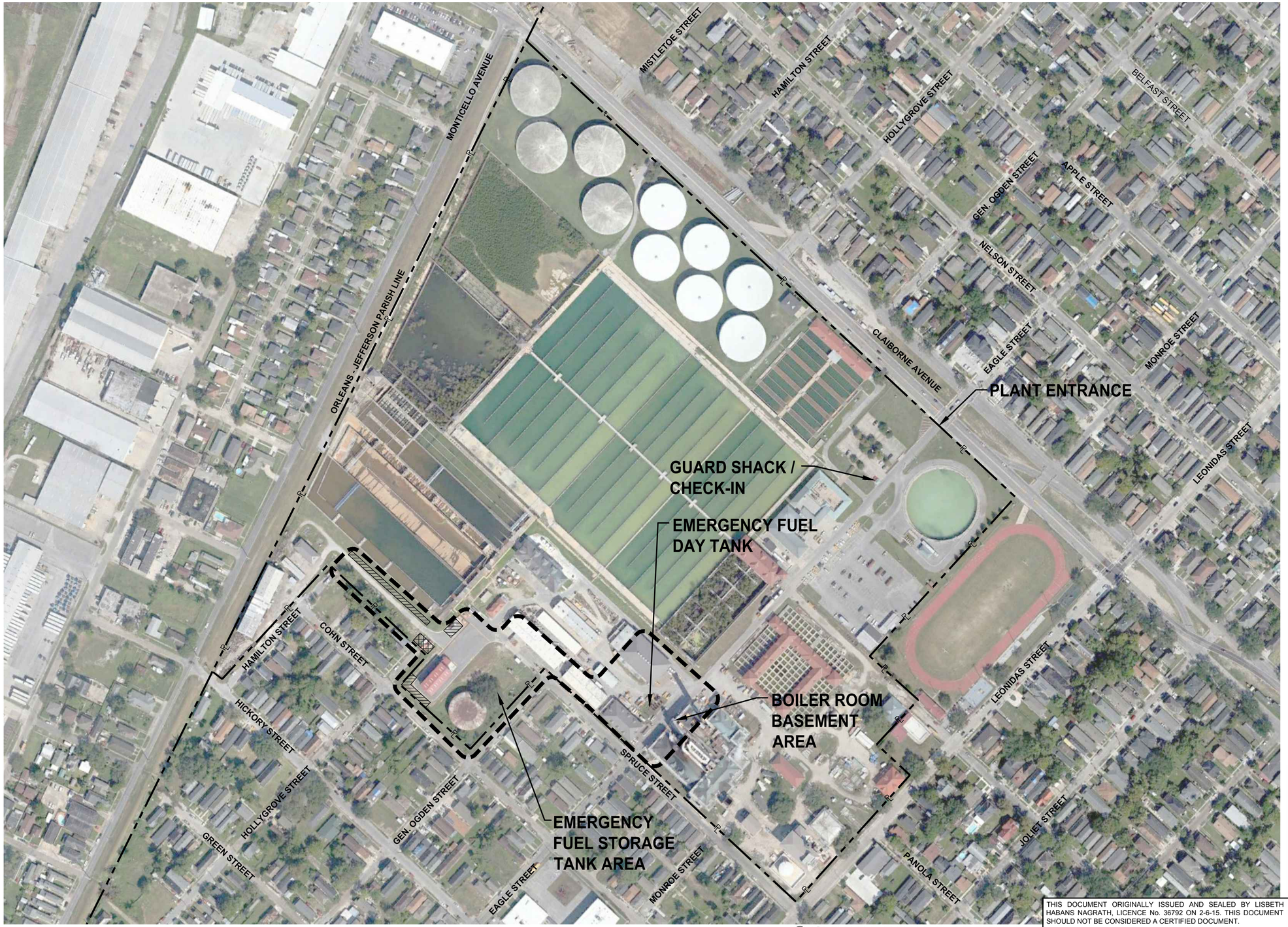
GENERAL NOTES, LEGEND AND ABBREVIATIONS

DR.	SJ CLARK
CK:	RA CASSANOVA
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	NONE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 2 OF 72



TRUE NORTH

PLANT NORTH

0 150 300

SCALE: 1" = 150'-0"

CONSTRUCTION LEGEND

- LAYDOWN AREAS
- CONSTRUCTION TRAILER AREA

A RECORD DRAWING INFORMATION NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR.

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY LISBETH HABANS NAGRATH, LICENCE No. 36792 ON 2-6-15. THIS DOCUMENT SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT.

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. GA-03

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

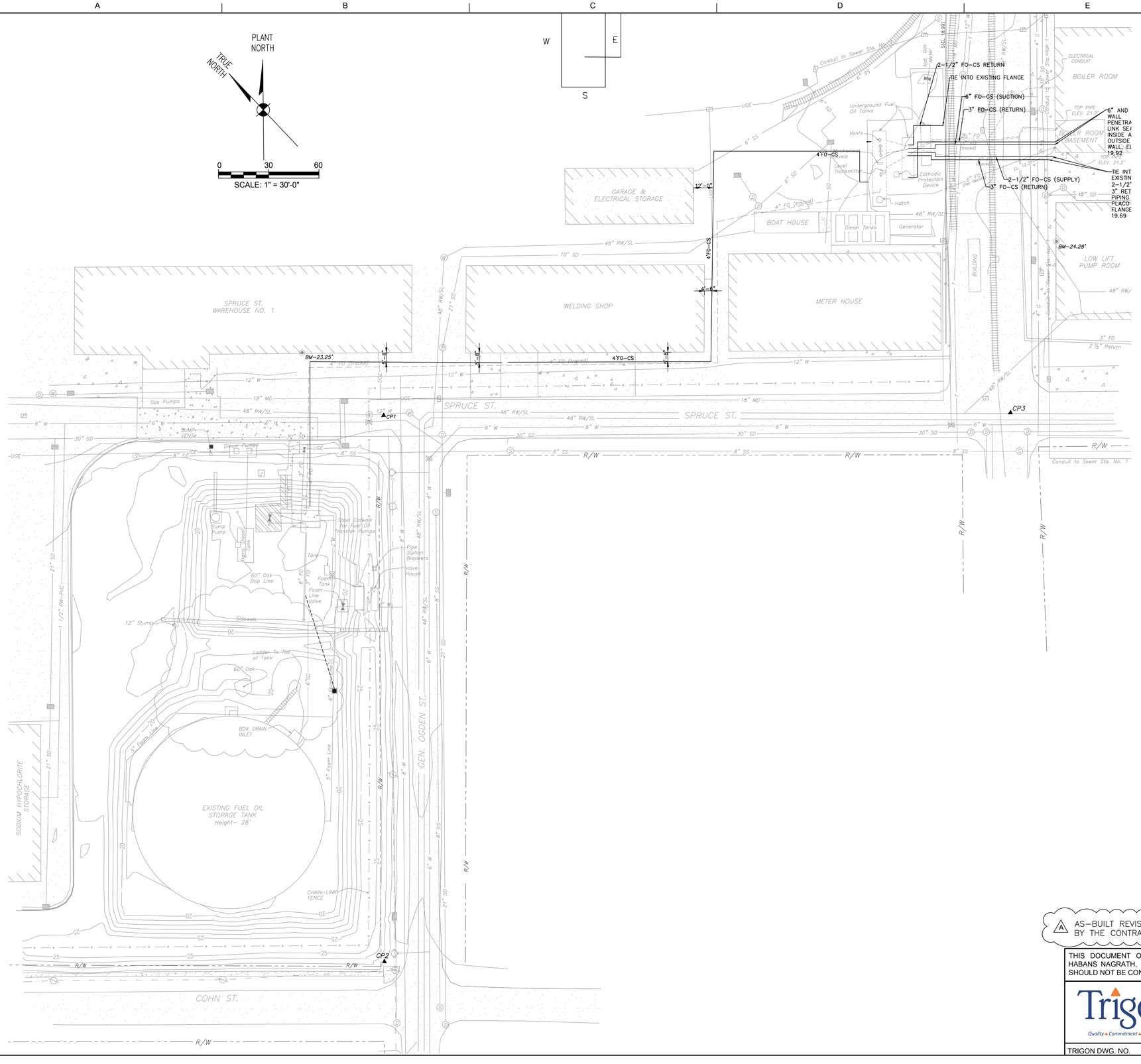
CARROLLTON WTP OVERALL SITE PLAN

DR.	SJ CLARK
CK:	RA CASSANOVA
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 3 OF 72



SITE SURVEY PROVIDED BY:

DALE STOCKSTILL & ASSOCIATES, P.A., PROFESSIONAL LAND SURVEYORS, 8054 HWY. 11, CARRIERE, MS 39426, PH:601-798-2326 AND SUBMITTED ON JANUARY 13, 2014.

SURVEYOR'S NOTES:

DATUMS:

THE COORDINATE DATUM USED IN THE DIGITAL VERSION OF THIS DRAWING IS LOUISIANA STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, NAD 83, US SURVEY FEET AS DETERMINED BY STATIC GPS OBSERVATIONS PROCESSED THROUGH NGS'S OPUS SITE [WWW.NGS.NOAA.GOV/OPUS].

THE VERTICAL DATUM FOR THIS DRAWING IS CAIRO DATUM AS DETERMINED BY PLANT BENCHMARKS.

NOTES:

THE POINTS USED IN CREATING THE DIGITAL TERRAIN MODEL (DTM) WERE OBTAINED BY A COMBINATION OF REAL TIME KINEMATIC (RTK) GPS OBSERVATIONS AND TRIGONOMETRIC LEVELING USING A TOTAL STATION AND CONVENTIONAL SURVEYING METHODS.

THIS IS A TOPOGRAPHY SURVEY AND IS NOT INTENDED TO BE USED AS A BOUNDARY SURVEY.

UTILITY QUALITY LEVEL SHOWN ON DRAWING AS PER ASCE 38-02

UNDERGROUND UTILITIES ARE SHOWN AS PER RECORD DRAWINGS. NO PHYSICAL PIPE LOCATIONS WERE DETERMINED EXCEPT AS NOTED.

RIGHT-OF-WAY SOURCE:

THE RIGHT-OF-WAYS SHOWN ON WERE OBTAINED FROM THE CITY OF NEW ORLEANS GIS PARCEL SHAPE FILE DATED JUNE 20, 2014, LOCATED ON CITY WEB SITE [WWW.DATA.NOLA.GOV].

SURVEY CONTROL POINTS

▲ CONTROL POINT #1 (CP1)
MAG NAIL SET
N= 532371.8450
E= 3661746.3440
ELEV.= 21.82' CD
ELEV.= 0.295' NGVD 88
LAT.- 29°57'30.32"
LONG.- 90°07'49.50"

▲ CONTROL POINT #2 (CP2)
5/8" REBAR SET W/CAP
N= 532129.577
E= 3661526.1487
ELEV.= 21.76' CD
ELEV.= 0.312' NGVD 88
LAT.- 29°57'27.95"
LONG.- 90°07'52.03"

▲ CONTROL POINT #3 (CP3)
MAG NAIL SET
N= 532119.4129
E= 3662022.6461
ELEV.= 21.58 CD
LAT.- 29°57'27.95"
LONG.- 90°0746.39"

EXISTING SITE LEGEND

POWER POLE
OVERHEAD POWER LINE
TELEPHONE
LIGHT POLE
SINGLE LIGHT TRAFFIC SIGNAL
DRAIN INLET
6' CHAINLINK FENCE
BENCH MARK
SEWER MANHOLE
DRAINAGE MANHOLE
WATER MANHOLE
WATER METER
FIRE HYDRANT
WATER VALVE
POWER BOX
VALVE
TREE DRIP LINE
UNDERGROUND ELECTRIC
OVERHEAD ELECTRIC
ELEC. TRACED LINE
STORM DRAINAGE
SANITARY SEWER
WATERLINE
RAW WATER / SLUDGE LINE
MUD DISCHARGE
FUEL OIL
RIGHT-OF-WAY
FIN. FLR. ELEV. CONTROL POINT
ASHPALT
CONCRETE

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

AS-BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR.

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY LISBETH HABANS NAGRATH, LICENCE No. 36792 ON 2-6-15. THIS DOCUMENT SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT.

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. CA-01

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

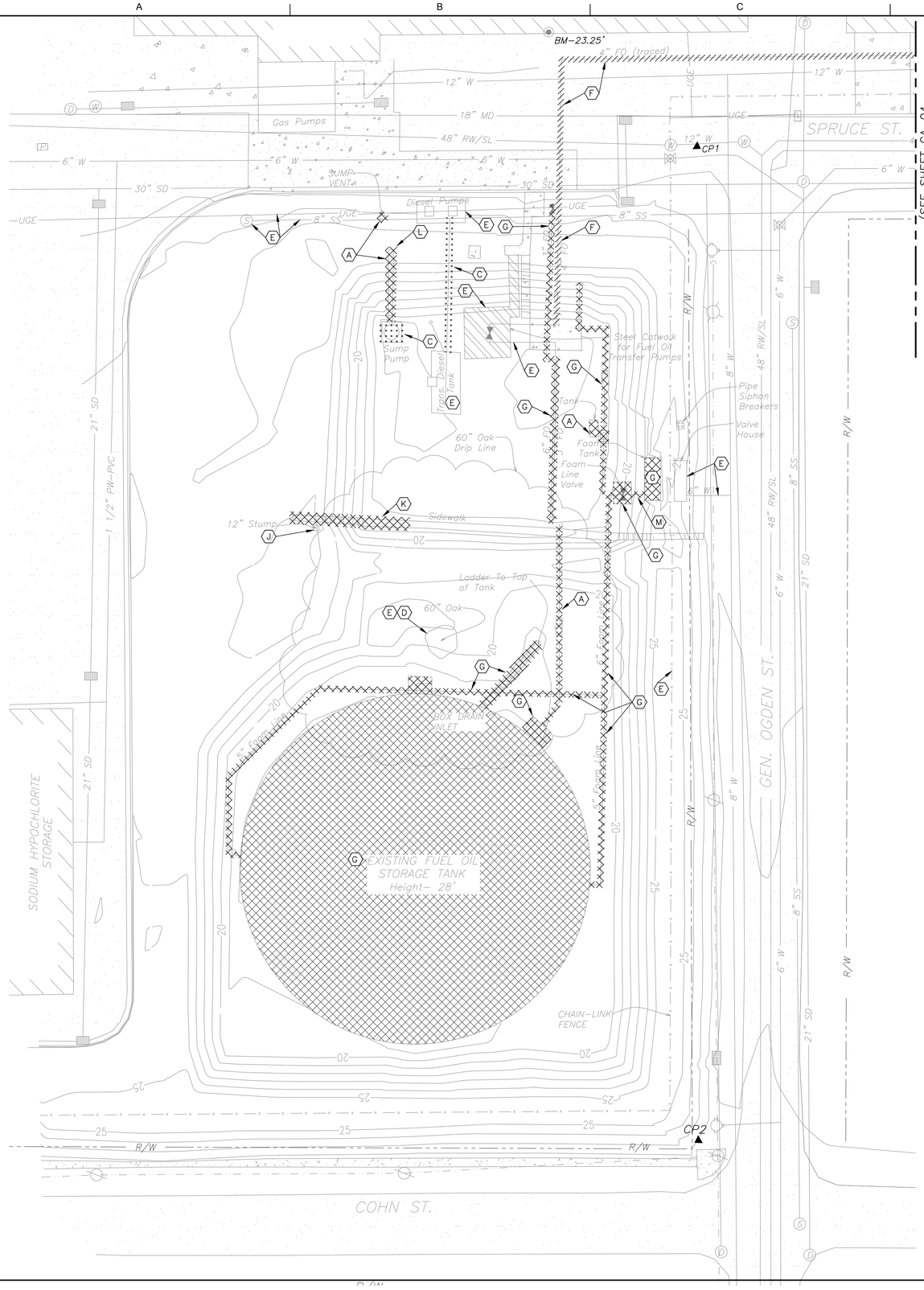
EXISTING SITE PLAN AND CIVIL NOTES

DR:	SJ CLARK
CK:	RA CASSANOVA
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	1"=30'-0"
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 4 OF 72



DEMOLITION LEGEND:

- TO BE REMOVED.
- TO BE RELOCATED.
- TO BE ABANDONED.

SEE SPECIFIC DEMOLITION NOTES FOR DESCRIPTION OF WORK TO BE PERFORMED.

(A) TO BE REMOVED FROM SITE.

(B) NOT USED.

(C) TO BE RELOCATED.

(D) PROVIDE TREE TRIMMING IN ACCORDANCE WITH SPECIFICATION SECTION 31 13 16.

(E) TO BE PROTECTED DURING CONSTRUCTION.

(F) TO BE ABANDONED. FILL WITH FLOWABLE MATERIAL (SAND/CEMENT MIXTURE) AND PLUG AT BOTH ENDS FOLLOWING INSTALLATION OF NEW LINE.

(G) TO BE REMOVED FROM SITE FOLLOWING TRANSFER OF FUEL OIL SERVICE.

(H) (NOT USED)

(I) (NOT USED)

(J) TO BE REMOVED FROM SITE, INCLUDING ROOTS AS REQUIRED FOR PILE DRIVING.

(K) TO BE REMOVED, AS REQUIRED FOR CONTAINMENT AND RE–GRADING.

(L) FIELD VERIFY LOCATION OF EXISTING SUMP DISCHARGE BELOW GRADE. REMOVE TO AVOID CONFLICT WITH NEW WORK. SHOULD EXISTING DRAIN LINE EXTEND BEYOND REQUIRED EXCAVATION, PLUG END.

(M) PROTECT EXISTING 6" WL FOR CONNECTION TO PROPOSED FIRE SUPPRESSION SYSTEM.

DEMOLITION NOTES:

1. SEE SPECIFICATION SECTION 01 31 13 PROJECT COORDINATION FOR CONSTRUCTION SEQUENCING.
2. DEMOLITION WORK SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 02 41 00 DEMOLITION. SEE SPECIFICATION SECTION 02 65 00 UNDERGROUND AND ABOVEGROUND STORAGE TANK REMOVAL.
3. CONTRACTOR SHALL DEMOLISH THE EXISTING STEEL FUEL OIL TANK IN ACCORDANCE WITH ALL APPLICABLE LAWS AND REGULATIONS.
4. FUEL OIL IN EXISTING STORAGE TANK SHALL BE CLEANED AND TRANSFERRED TO NEW TANK (TK–001). THE APPROXIMATE LIQUID LEVEL IN TANK IS 6 FEET ABOVE THE FLOOR. THE S&WB ESTIMATES 3 FEET OF SLUDGE AND 3 FEET OF FUEL.
5. FUEL OIL SLUDGE DISPOSAL SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 02 65 00.
6. SEE SHEET CA–01 FOR EXISTING SITE LEGEND.
7. ALL UTILITIES TO REMAIN UNLESS OTHERWISE NOTED.
8. FIELD VERIFY LOCATION OF EXISTING UTILITIES PRIOR TO START OF CONSTRUCTION.
9. PROVIDE TEMPORARY EROSION AND SEDIMENT CONTROL AND STORM WATER POLLUTION PREVENTION PLAN, USING BEST MANAGEMENT PRACTICES, IN ACCORDANCE WITH SPECIFICATION SECTION 01 57 13.

REV.	DATE	DESCRIPTION	BY
A	10–25–19	AS–BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

(A) AS–BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR.

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY LISBETH HABANS NAGRATH, LICENCE No. 36792 ON 2-6-15. THIS DOCUMENT SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT.

FUEL STORAGE TANK AREA DEMOLITION PLAN

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

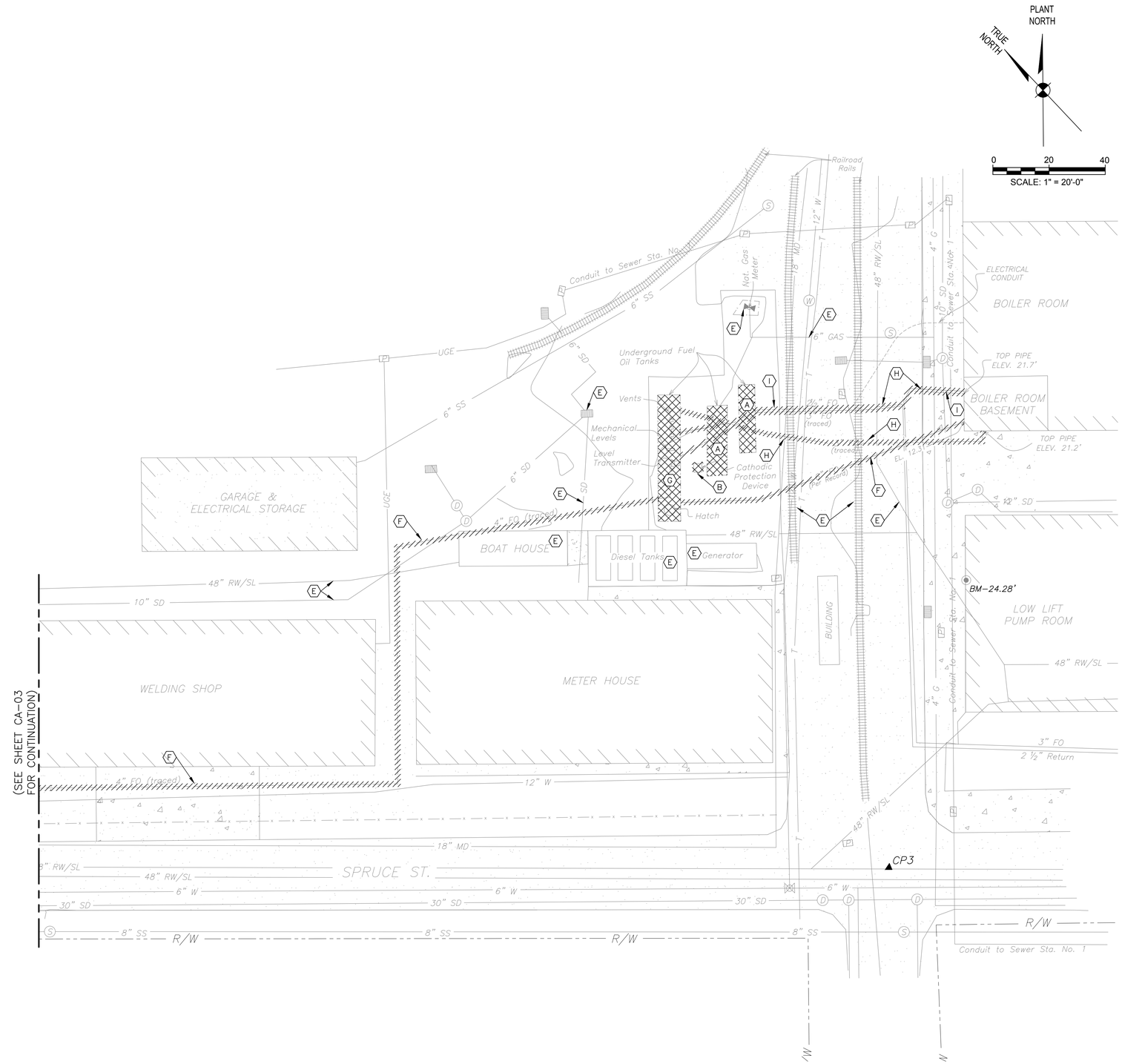
trigonassociates.com

TRIGON DWG. NO.	CA-02
DR:	SJ CLARK
CK:	RA CASSANOVA
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	1"=20'-0"
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 5 OF 72



DEMOLITION LEGEND:

- TO BE REMOVED.
- TO BE RELOCATED.
- TO BE ABANDONED.

SEE SPECIFIC DEMOLITION NOTES FOR DESCRIPTION OF WORK TO BE PERFORMED.

- (A) TO BE REMOVED FROM SITE.
- (B) COORDINATE REMOVAL/RETURN OF ITEM TO S&WB.
- (C) (NOT USED)
- (D) (NOT USED)
- (E) TO BE PROTECTED DURING CONSTRUCTION.
- (F) TO BE ABANDONED. FILL WITH FLOWABLE MATERIAL (SAND/CEMENT MIXTURE) AND PLUG AT BOTH ENDS FOLLOWING INSTALLATION OF NEW LINE.
- (G) TO BE REMOVED FROM SITE FOLLOWING TRANSFER OF FUEL OIL SERVICE.
- (H) TO BE ABANDONED FOLLOWING INSTALLATION OF NEW LINES.
- (I) COORDINATE WITH S&WB DURING REMOVAL OF FUEL OIL LINES TO VERIFY LEVEL OF SERVICE OF EXISTING ADJACENT COMPRESSED AIR LINES. EXISTING FUEL LINES TO AND FROM GAS TURBINE ARE TO REMAIN.

DEMOLITION NOTES:

1. SEE SPECIFICATION SECTION 01 31 13 PROJECT COORDINATION FOR CONSTRUCTION SEQUENCING.
2. DEMOLITION WORK SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 02 41 00 DEMOLITION. SEE SPECIFICATION SECTION 02 65 00 UNDERGROUND AND ABOVEGROUND STORAGE TANK REMOVAL.
3. THREE (3) EXISTING UNDERGROUND STORAGE TANKS SHALL BE REMOVED. THE LARGEST TANK (15,000 GALLONS) IS CURRENTLY IN-SERVICE. FUEL FROM THE IN-SERVICE TANK SHALL BE TRANSFERRED TO TEMPORARY TRAILER TANK(S) WITH TEMPORARY PIPING TO THE DIESEL PUMP ROOM DURING DEMOLITION AND CONSTRUCTION. CONTRACTOR TO PROVIDE DETACHABLE FLEXIBLE HOSES TO ALLOW REPOSITIONING OF TEMPORARY TANK. (1)
4. SEE SHEET CA-01 FOR EXISTING SITE LEGEND.
7. ALL UTILITIES TO REMAIN UNLESS OTHERWISE NOTED.
8. FIELD VERIFY LOCATION OF EXISTING UTILITIES PRIOR TO START OF CONSTRUCTION.
9. PROVIDE TEMPORARY EROSION AND SEDIMENT CONTROL AND STORM WATER POLLUTION PREVENTION PLAN, USING BEST MANAGEMENT PRACTICES, IN ACCORDANCE WITH SPECIFICATION SECTION 01 57 13.

(A) AS-BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR.

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN
1	3-19-15	REVISED NOTE 3 AND REMOVED RAIL OPTION (ADD.2)	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

DIESEL PUMP ROOM/DAY TANK AREA DEMOLITION PLAN

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

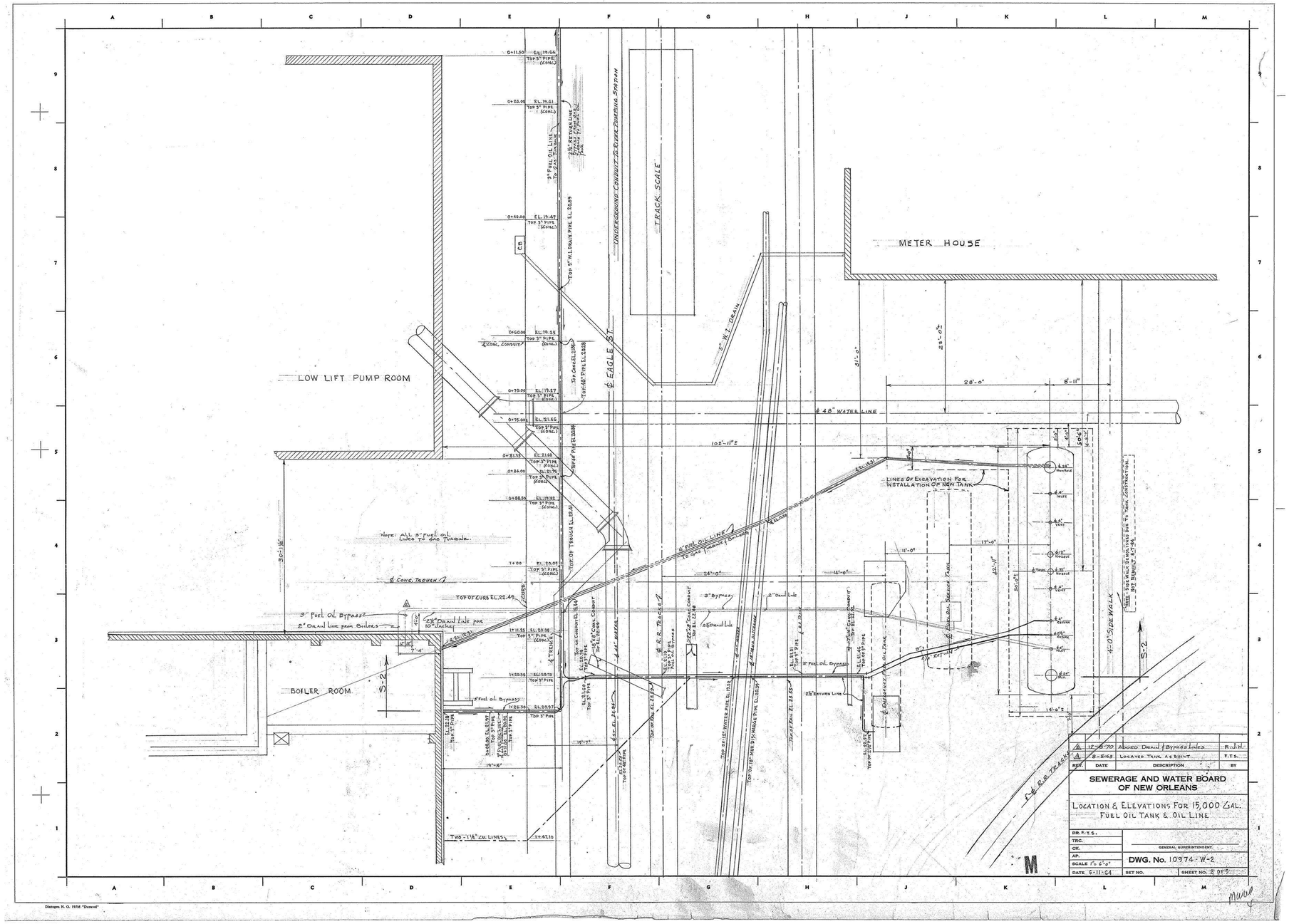
TRIGON DWG. NO. CA-03

DR:	SJ CLARK
CK:	RA CASSANOVA
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	1"=20'-0"
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 6 OF 72



REV.	DATE	DESCRIPTION	BY
A	12-6-70	Added Drain & Bypass Lines	R.J.H.
A	8-1963	Located Tank As Built	F.T.S.

SEWERAGE AND WATER BOARD OF NEW ORLEANS

LOCATION & ELEVATIONS FOR 15,000 GAL. FUEL OIL TANK & OIL LINE

DR. F.T.S.	
TRC.	
CK.	GENERAL SUPERINTENDENT
AP.	DWG. No. 10974-W-2
SCALE 1"= 6'-0"	
DATE 6-11-64	SET NO. SHEET NO. 2 OF 5

DRAWING NO. 10974-W2 SHEET 2 OF 5

FOR REFERENCE ONLY

⚠ AS-BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR.

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. CA-04

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

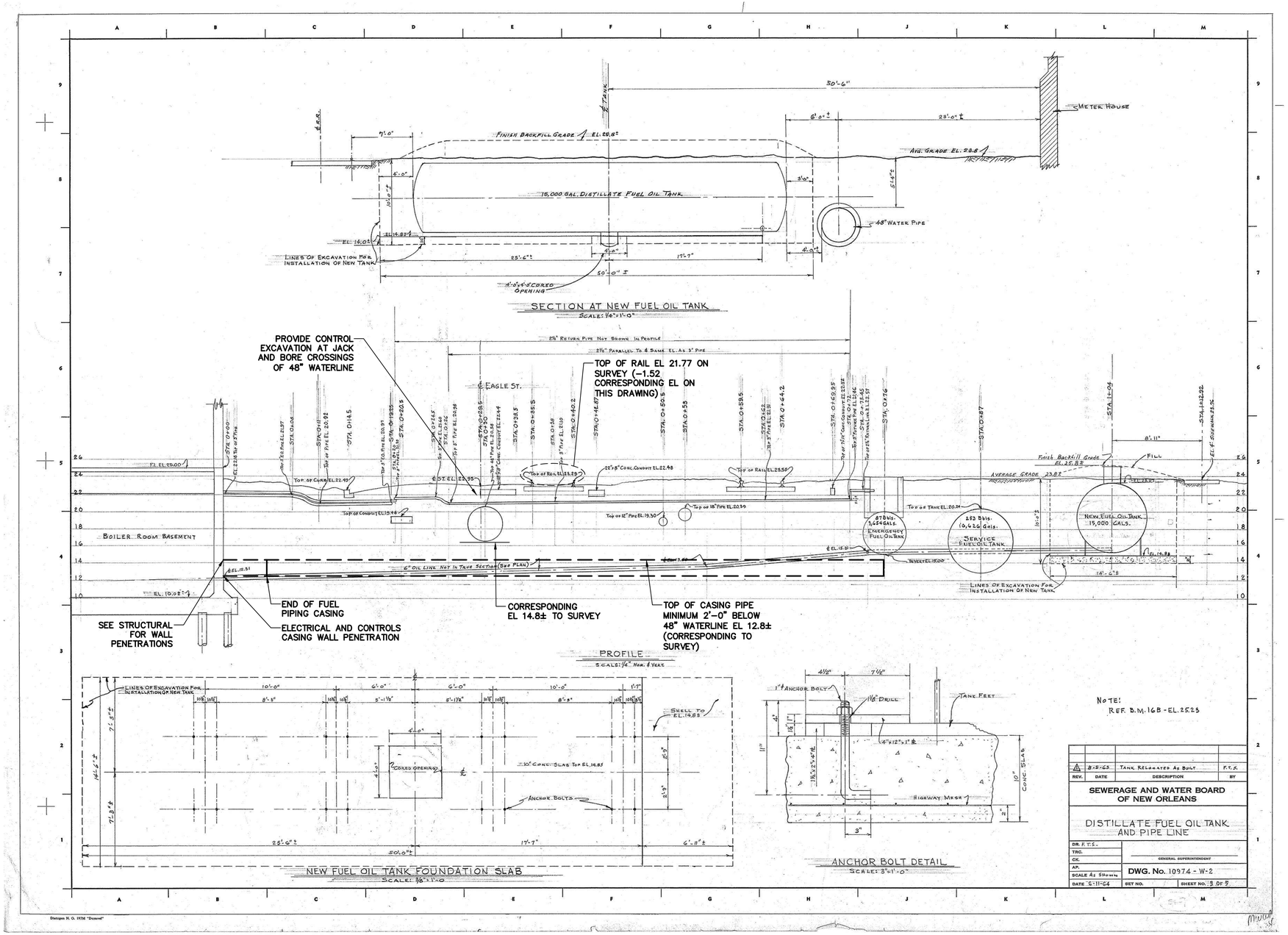
EXISTING FUEL OIL PIPING PLAN

DR:	SJ CLARK
CK:	RA CASSANOVA
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 7 OF 72



A JACK AND BORE REPLACED WITH OPEN CUT PER FCO-009/RFQ-001. SEE SUL-0243 FRO HAND SKETCHED RECORD DRAWINGS.

NOTES:

1. THE BACKGROUND SHOWN ON THIS DRAWING IS A COPY OF SWBNO DRAWING 10974-W-2, SHEET 3 OF 5, DATED 6-11-64. THIS BACKGROUND HAS BEEN INCLUDED FOR REFERENCE ONLY.
2. ELEVATIONS SHOWN ON REFERENCE DRAWING DO NOT CORRESPOND TO SURVEY DATUM. FIELD VERIFY ELEVATION OF PROPOSED CASING PIPES. TOP OF CASING PIPES SHALL BE MINIMUM 2'-0" BELOW 48" WATERLINE. PROVIDE CONTROL EXCAVATION TO VERIFY LOCATION OF 48" WATERLINE AND TO ENSURE DISTANCE OF CASING PIPE FROM BOTTOM OF 48" WATERLINE.

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN
△	8-25-65	TANK RELOCATED AS BUILT	F.T.S.

SEWERAGE AND WATER BOARD OF NEW ORLEANS

DISTILLATE FUEL OIL TANK AND PIPE LINE

DR. F.T.S.	
TRC.	
CK.	GENERAL SUPERINTENDENT
AP.	DWG. No. 10974-W-2
SCALE As Shown	
DATE 6-11-64	SET NO. SHEET NO. 3 OF 5

DRAWING NO. 10974-W2 SHEET 3 OF 5

Dietzgen N. O. 19756 "Duoprint"

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

EXISTING FUEL OIL PIPING SECTION / JACK AND BORE

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY LISBETH HABANS NAGRATH, LICENCE No. 36792 ON 2-6-15. THIS DOCUMENT SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT.

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. CA-05

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

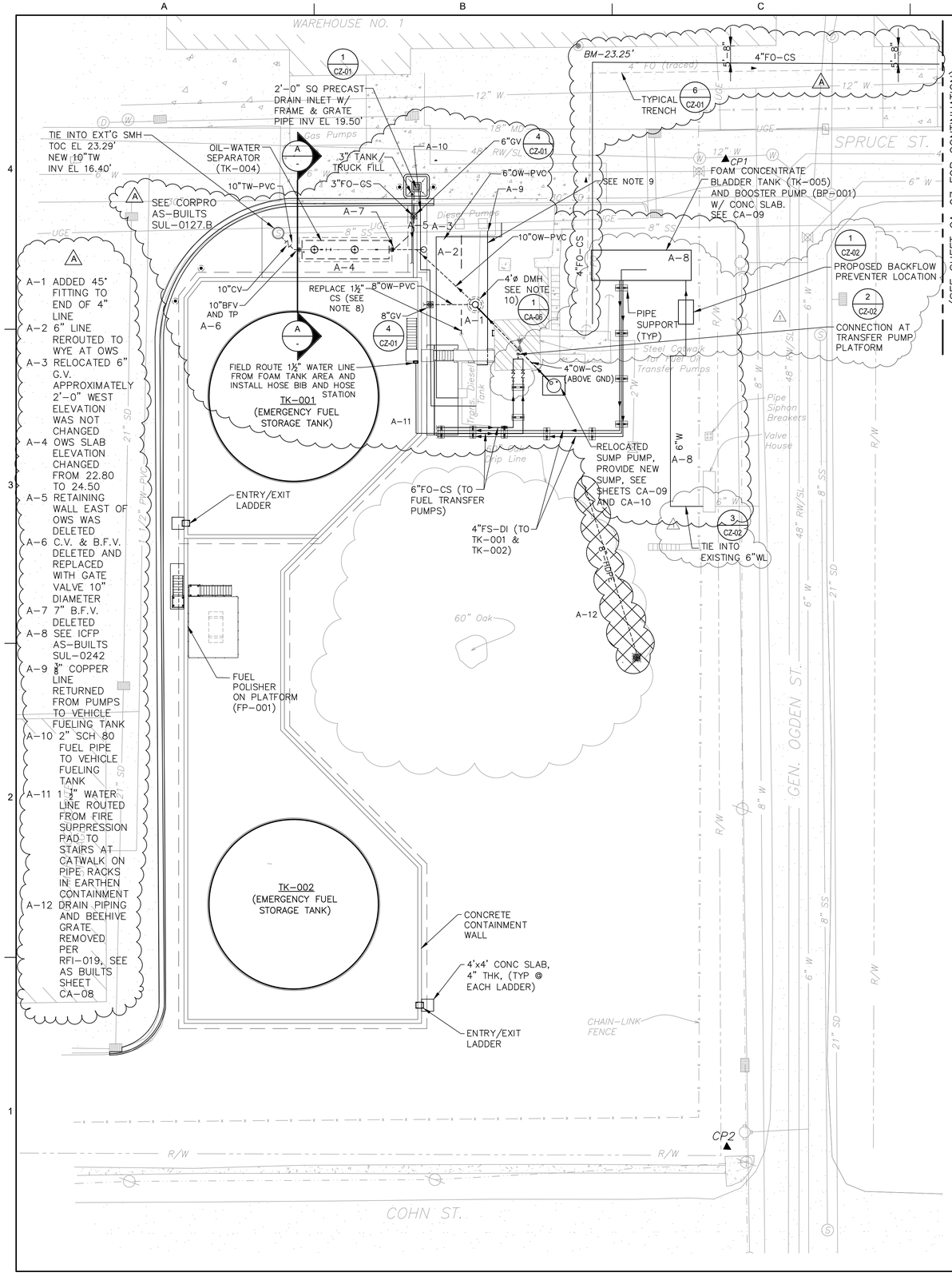
trigonassociates.com

DR.	SJ CLARK
CK:	RA CASSANOVA
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 8 OF 72



A-1 ADDED 45° FITTING TO END OF 4" LINE

A-2 6" LINE REROUTED TO WYE AT OWS

A-3 RELOCATED 6" G.V. APPROXIMATELY 2'-0" WEST ELEVATION WAS NOT CHANGED

A-4 OWS SLAB ELEVATION CHANGED FROM 22.80 TO 24.50

A-5 RETAINING WALL EAST OF OWS WAS DELETED

A-6 C.V. & B.F.V. DELETED AND REPLACED WITH GATE VALVE 10" DIAMETER

A-7 7" B.F.V. DELETED

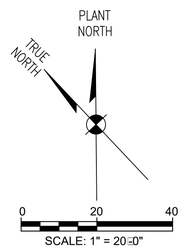
A-8 SEE ICFP AS-BUILTS SUL-0242

A-9 ¾" COPPER LINE RETURNED FROM PUMPS TO VEHICLE FUELING TANK

A-10 2" SCH 80 FUEL PIPE TO VEHICLE FUELING TANK

A-11 1½" WATER LINE ROUTED FROM FIRE SUPPRESSION PAD TO STAIRS AT CATWALK ON PIPE RACKS IN EARTHEN CONTAINMENT

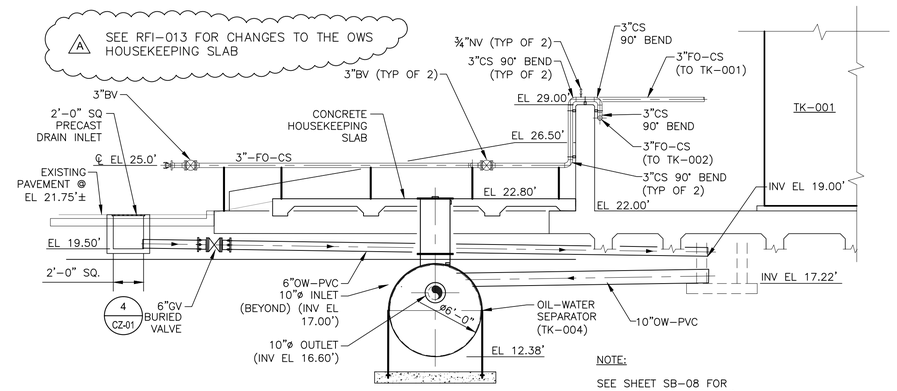
A-12 DRAIN PIPING AND BEEHIVE GRATE REMOVED PER RFI-019, SEE AS BUILTS SHEET CA-08



NOTES:

1. SEE SHEET CA-01 FOR EXISTING SITE LEGEND.
2. SEE SPECIFICATION SECTION 01 31 13 PROJECT COORDINATION FOR CONSTRUCTION SEQUENCING.
3. LOCATION OF EXISTING UTILITIES SHOWN ARE BASED ON EXISTING RECORDS. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. CONTRACTOR SHALL FIELD VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO THE START OF CONSTRUCTION. ALL NEW UNDERGROUND PIPING SHALL BE FIELD ROUTED.
4. MINIMUM 2'-0" COVER REQUIRED OVER ALL NEW UNDERGROUND PIPING.
5. SIZE OF OWS IS APPROXIMATE. INVERT EL OF INLET IS FIXED AT EL 17.00' TO SUPPORT DRAINAGE. CONTRACTOR TO CONFIRM INLET AND OUTLET ELEVATIONS.
6. SEE SHEET SB-07 AND COORDINATE WITH OWS MANUFACTURER FOR INSTALLATION REQUIREMENTS AND RECOMMENDATIONS.
7. ALL OWS NOZZLES SHALL BE COVERED AND SEATED DURING EARTH WORK OPERATIONS.
8. REPLACE 1½" CS PIPE FROM VEHICLE FUELING TANK TO DIESEL FUEL PUMP CONTRACTOR TO FIELD VERIFY EXISTING LOCATION AND REROUTE AS REQUIRED TO AVOID NEW DRAIN LINES TO OWS.
9. REROUTE EXISTING VEHICLE FUELING TANK FILL LINE UNDER CATWALK. MODIFY OR REPLACE PIPE SUPPORTS IN-KIND. CONTRACTOR TO FIELD VERIFY TIE IN LOCATIONS.
10. SEE SPECIFICATIONS FOR S&WB STANDARD DRAINAGE MANHOLE AND COVER DETAILS.
11. PROVIDE IMPRESSED CURRENT CATHODIC PROTECTION SYSTEM FOR STEEL PIPE LINE AND OIL-WATER SEPARATOR IN ACCORDANCE WITH SECTION 26 42 00.
12. MATCH EXISTING GRADE FOR UTILITY TRENCH RESTORATION.
13. SEE SHEETS CA-09 AND CA-10 FOR PROPOSED SUMP.

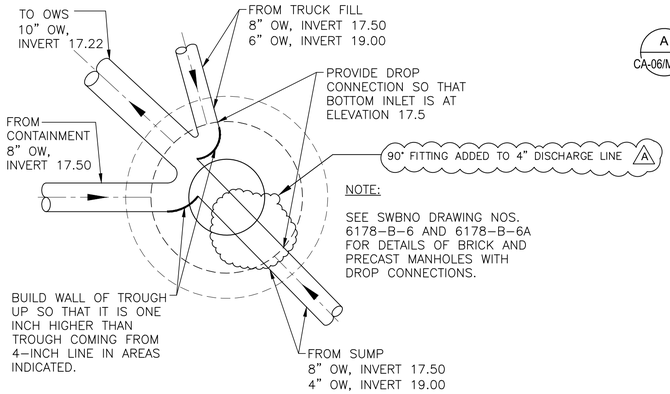
10. 6-70' PILES DELETED RFI #013



NOTE:

SEE SHEET SB-08 FOR HOLD DOWN, SLABS, AND EXCAVATION DETAILS

A CA-06/MB-02 **SECTION** SCALE:1"=5'-0"



NOTE:

SEE SWBNO DRAWING NOS. 6178-B-6 AND 6178-B-6A FOR DETAILS OF BRICK AND PRECAST MANHOLES WITH DROP CONNECTIONS.

1 CA-06 **DETAIL** SCALE: NTS

A SEE FCO-014/RFQ-002 FOR CHANGES TO PIPING TO AND FROM OWS. SEE RFI-013 FOR CHANGES TO THE OWS HOUSEKEEPING SLAB. SEE E SHEETS FOR CONTRACTOR PROVIDED ELECTRICAL AS-BUILTS. NEW BELOW GRADE FUEL LINE ENCASED IN 4000 PSI FIBER RIENFORCED CONCRETE PER FCO-006.

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN
1	3-23-15	REVISED PIPING, CALLOUTS & FIRE SUPPRESSION SLAB	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLE□

FUEL STORAGE TANK AREA ENLARGED SITE PLAN

Trigon
Quality ▲ Commitment ▲ Client Service
TRIGON DWG. NO. CA-06

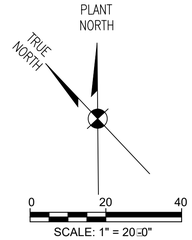
TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

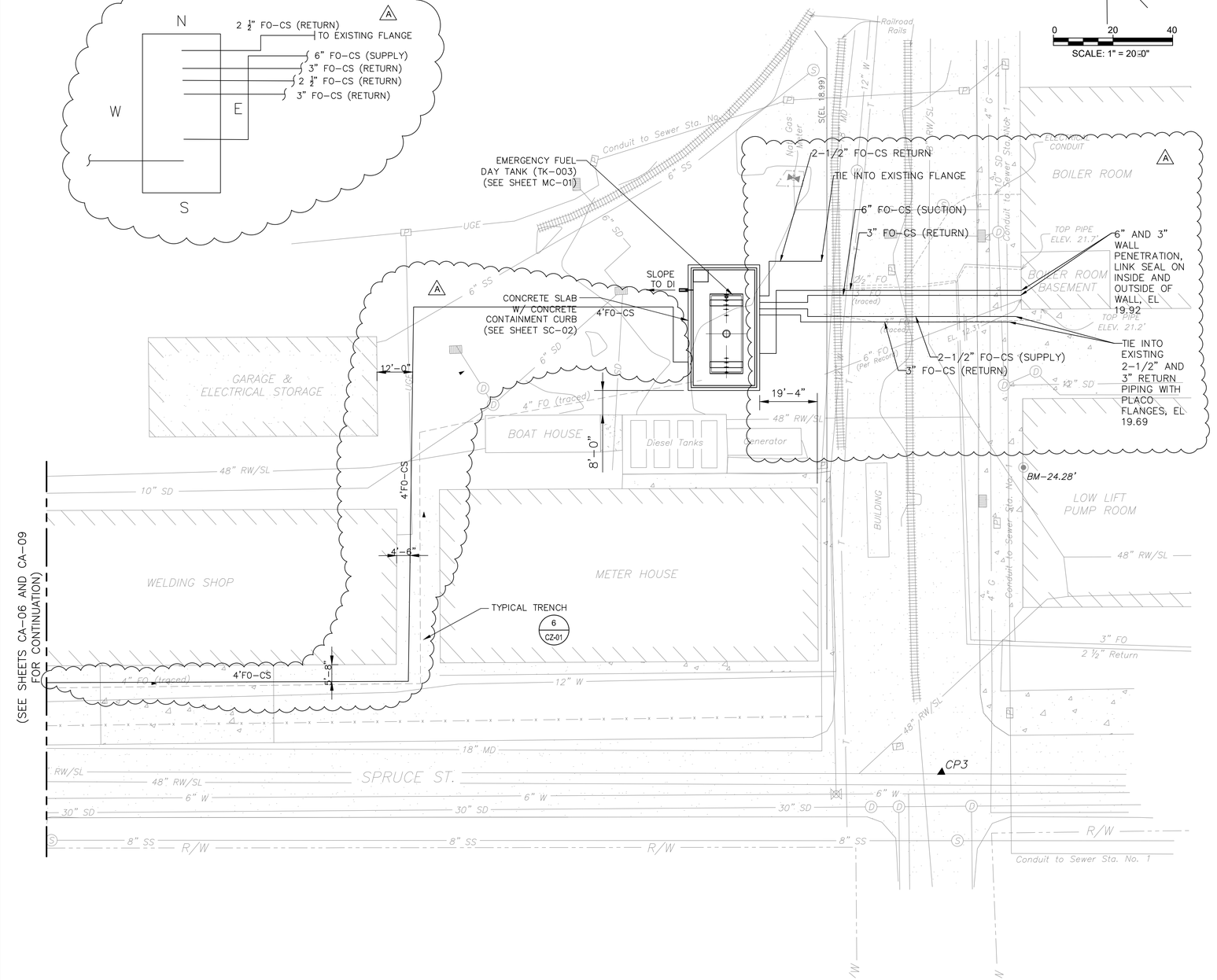
DR:	SJ CLARK
CK:	RA CASSANOVA
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 9 OF 72



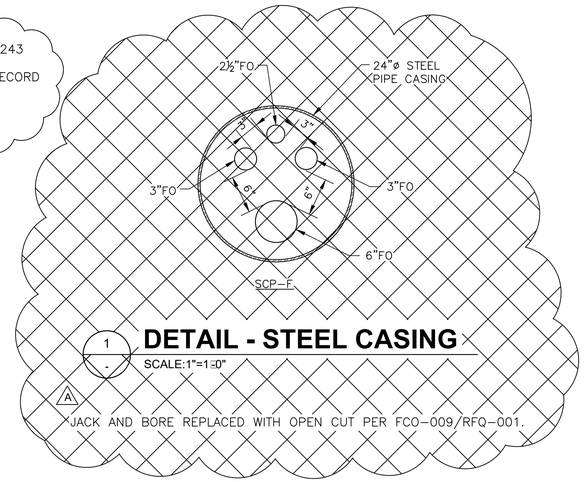


NOTES:

1. SEE SHEET CA-01 FOR EXISTING SITE LEGEND.
2. SEE SPECIFICATION SECTION 01 31 13 PROJECT COORDINATION FOR CONSTRUCTION SEQUENCING.
3. STEEL CASING PIPE TO BE INSTALLED BY JACK AND BORE FOR 6-INCH CARRIER PIPE (SUCTION FROM DAY TANK TO DIESEL PUMP ROOM) AND TWO (2) 3-INCH RETURN/BYPASS AND ONE (1) 2 ½"-INCH RETURN/BYPASS FROM DIESEL PUMP ROOM.
4. 2½" RETURN/BYPASS FROM GAS TURBINE NOT SHOWN. PIPE SHALL BE INSTALLED FROM EXISTING LOCATION IN EXCAVATED AREA TO NEW DAY TANK.
5. STEEL CASING PIPE TO BE INSTALLED BY JACK AND BORE FOR ELECTRICAL AND CONTROL CONDUITS. SEE ELECTRICAL SHEETS FOR DETAILS.
6. STEEL CASING PIPE SHALL HAVE MINIMUM WALL THICKNESS OF 0.500 INCHES. STEEL SPACERS SHALL BE USED FOR SUPPORT OF CARRIER PIPES, AT 10 FOOT INTERVALS, IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS SUCH THAT EACH SPACER SUPPORTS THE SAME UNIT WEIGHT OF THE CARRIER PIPES.
7. CASING PIPES REQUIRE CATHODIC PROTECTION. STEEL SPACERS WITH EPDM OR COMPOSITE CONTACT SURFACES SHOULD BE USED.
8. ENCLOSE ENDS OF CASING PIPE WITH 8-INCH BRICK MASONRY WITH WATER TIGHT GROUT.
9. PROVIDE IMPRESSED CURRENT & CATHODIC PROTECTION SYSTEM FOR STEEL PIPE LINES AND STEEL CASING PIPES IN ACCORDANCE WITH SECTION 26 42 00.
10. LOCATION OF EXISTING UTILITIES SHOWN ARE BASED ON EXISTING RECORDS. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. CONTRACTOR SHALL FIELD VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO THE START OF CONSTRUCTION. ALL NEW UNDERGROUND PIPING SHALL BE FIELD ROUTED.
11. MATCH EXISTING GRADE FOR UTILITY TRENCH RESTORATION.
12. SLOPE NEW PAVEMENT TO NEAREST DRAIN INLETS.
13. UNDERGROUND TANKS FOR REMOVAL SHOWN FOR COORDINATION OF EXCAVATION.
14. SPOT ELEVATIONS SHOWN ARE EXISTING.

SEE SUL-00243 FOR HAND SKETCHED RECORD DRAWINGS

A



1 - **DETAIL - STEEL CASING**

SCALE:1"=1'-0"

A JACK AND BORE REPLACED WITH OPEN CUT PER FCO-009/RFQ-001.

A NEW BELOW-GRADE FUEL LINES ENCASED IN 4000 PSI FIBER REINFORCED CONCRETE PER FCO-006 AND FCO-009/RFQ-001.STEEL PLATES INSTALLED OVER FUEL LINES AND ELECTRICAL/CONTROLS DUCTBANK FOR EAGLE STREET CROSSING PER FCO-009/RFQ-001. SEE E SHEETS FOR CONTRACTOR PROVIDED ELECTRICAL AS-BUILTS.

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT MAIN WATER PURIFICATION PLANT POWER COMPLE□

DIESEL PUMP ROOM/DAY TANK AREA ENLARGED SITE, YARD PIPING & GRADING PLAN

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

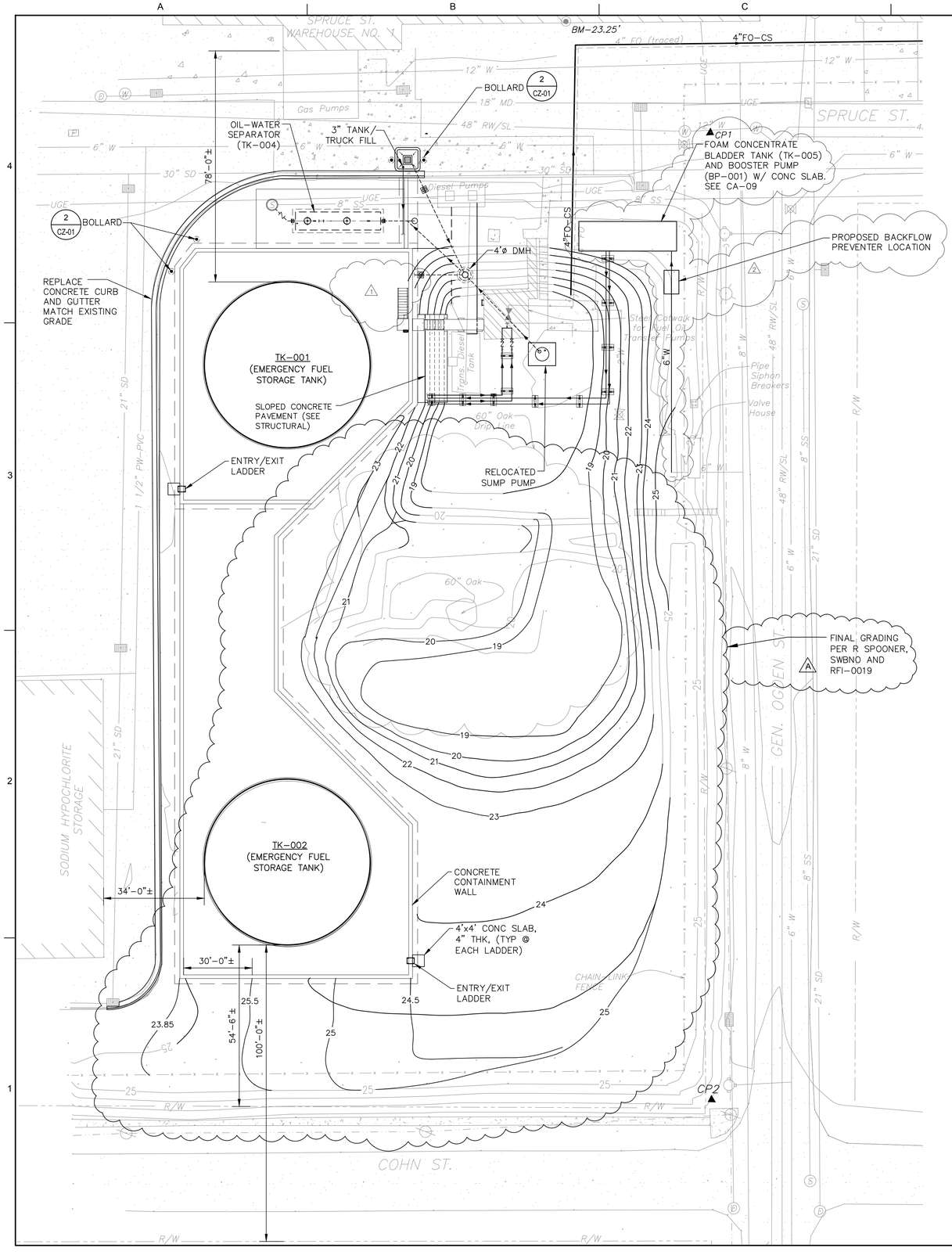
TRIGON DWG. NO. CA-07

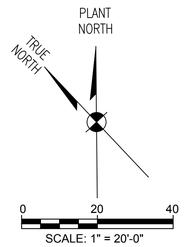
DR:	SJ CLARK
CK:	RA CASSANOVA
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 10 OF 72





GRADING NOTES:

1. ALL UTILITIES TO REMAIN UNLESS OTHERWISE NOTED.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE BASED ON EXISTING RECORDS. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. CONTRACTOR SHALL FIELD VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO THE START OF CONSTRUCTION. ALL NEW UNDERGROUND PIPING SHALL BE FIELD ROUTED.
3. SPOT ELEVATIONS SHOWN ARE EXISTING.

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN
2	3-23-15	REVISED FIRE SUPPRESSION SLAB & WL CONN. (ADD3)	LHN
1	3-16-15	DELETED GV CALLOUT (ADD1)	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

FUEL STORAGE TANK AREA SITE GRADING PLAN

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

TRIGON DWG. NO. CA-08

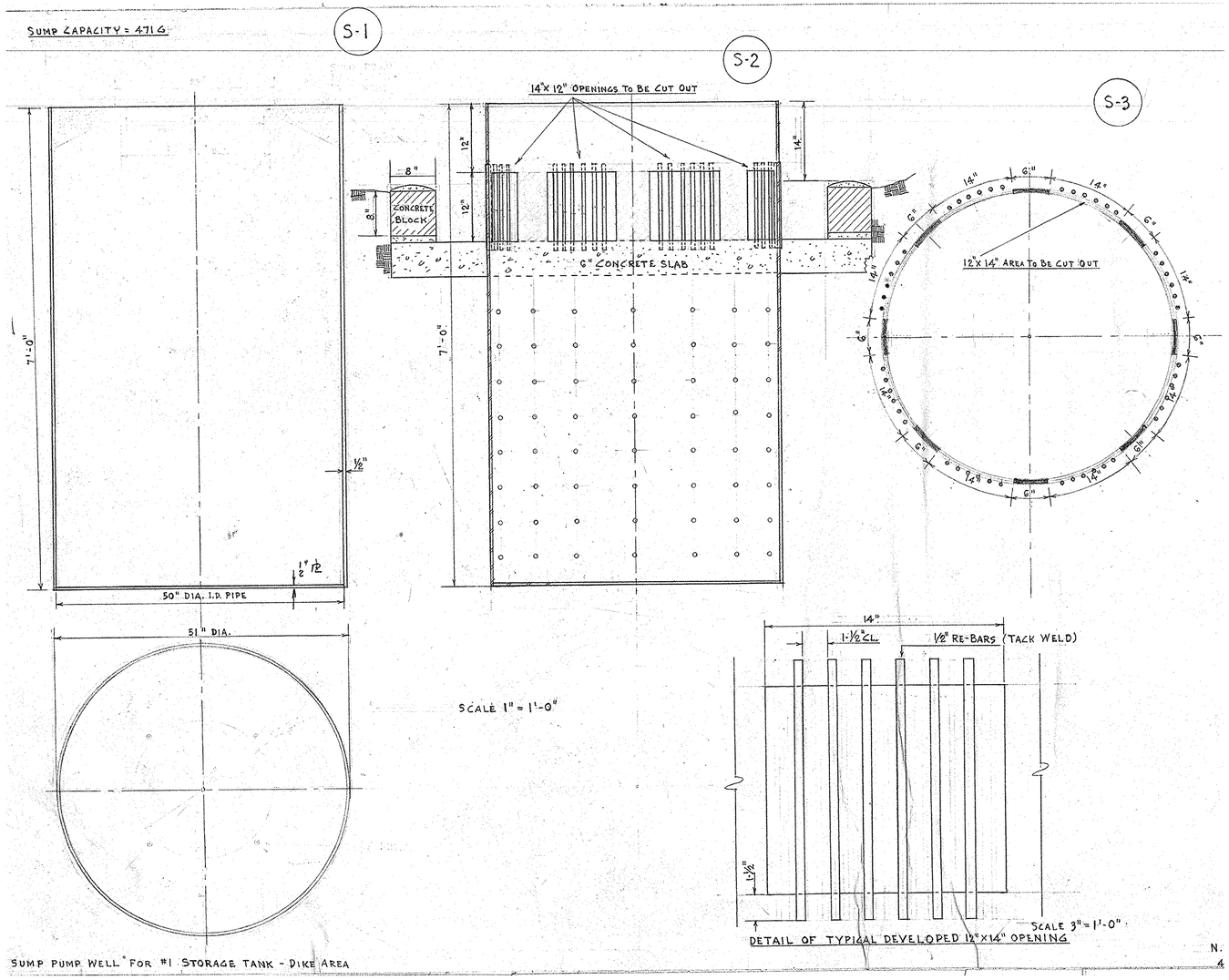
DR: SJ CLARK
CK: RA CASSANOVA
AP: LH NAGRATH
LAST EDIT:
SCALE: AS NOTED
DATE: JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO:

SHEET NO: 11 OF 72

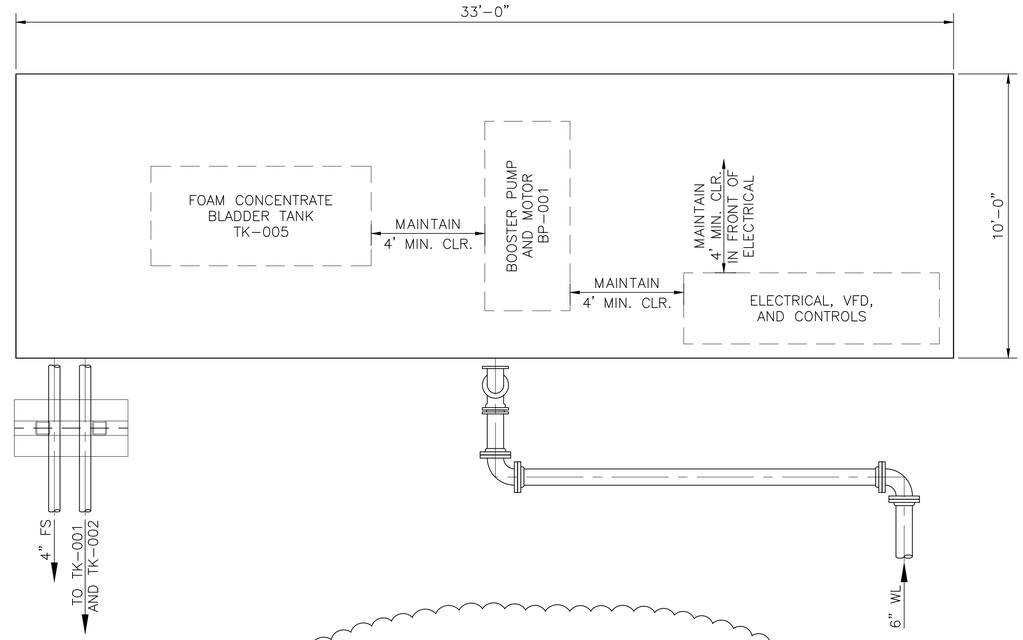


REFERENCE DRAWING - SUMP

SCALE:NTS (SEE NOTE 1)

SUMP NOTES:

1. THE BACKGROUND SHOWN IS REFERENCE DRAWING NO. 10961–W–2, SHEET 3A OF 3, DATED 11–13–64.
2. PROVIDE NEW SUMP IN KIND. FIELD VERIFY EXISTING SUMP PUMP COVER AND SUMP FOR MODIFICATIONS. PROVIDE COVER AND SUMP TO ACCOMMODATE EXISTING PUMP AND MOTOR. EXISTING PUMP, MOTOR, CHECK VALVE, AND PIPING FROM PUMP TO CHECK VALVE SHALL BE MOVED TO NEW SUMP LOCATION AS SHOWN ON CA–06 AND CA–08. DISCONNECT AND REMOVE EXISTING SUMP PUMP AND MOTOR. EXISTING LEVEL CONTROLLER TO BE USED FOR START/STOP OF EXISTING PUMP. SEE ELECTRICAL.



FIRE SUPPRESSION AREA

SCALE:3/8"=1'-0"

SEE SUL–0242 FOR ICFP AS–BUILTS

FIRE SUPPRESSION NOTES:

1. CERTIFIED FIRE PROTECTION SPECIALIST (CFPS) SHALL VERIFY SIZING OF SYSTEM TO PROVIDE ADEQUATE FIRE SUPPRESSION COVERAGE FOR TK–001 AND TK–002. SUBMIT FIRE SUPPRESSION PLAN.
2. CONTRACTOR SHALL PROVIDE A COMPLETE FUNCTIONING FIRE SUPPRESSION AND AUTOMATION/DETECTION SYSTEM. LAYOUT AND SIZE OF PROPOSED SLAB SHALL BE ADJUSTED PER CFPS RECOMMENDATIONS AND MANUFACTURER REQUIREMENTS, AT NO COST TO OWNER.
3. PIPING AND VALVE CONFIGURATION SHALL BE THE RESPONSIBILITY OF THE CFPS AND SHALL PROVIDE RELEASE OF AFFF SOLUTION TO BOTH OR EITHER TK–001 AND/OR TK–002.
4. COORDINATE WITH ELECTRICAL ENGINEER ON ELECTRICAL REQUIREMENTS, INCLUDING VFD DRIVE SIZE, SHOULD PUMP HP VARY FROM SIZE SHOWN ON DRAWING AND LISTED IN SPECIFICATIONS. FIRE SUPPRESSION SUPPLIER SHALL BE RESPONSIBLE TO SUPPLY THE EQUIPMENT REQUIRED, ALONG WITH ASSOCIATED ELECTRICAL EQUIPMENT AND INSTALLATION AT NO COST TO OWNER.

REV.	DATE	DESCRIPTION	BY
A	10–25–19	AS–BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

FIRE SUPPRESSION AND SUMP DETAILS

Trigon
Quality ▲ Commitment ▲ Client Service
TRIGON DWG. NO. CA-09

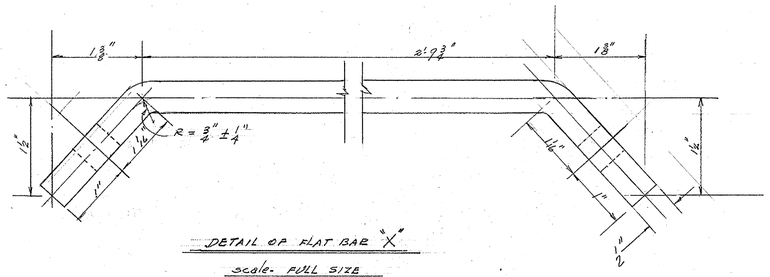
TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

DR.	SJ CLARK
CK.	GA KOLENOVSKY
AP.	LH NAGRATH
LAST EDIT:	
SCALE:	1"=20'-0"
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

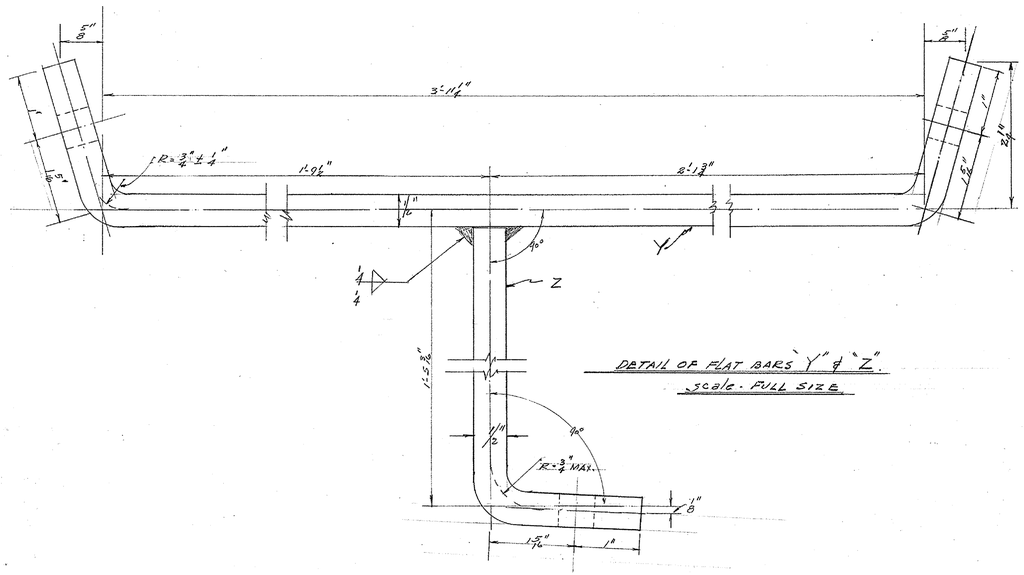
DWG. No. 12098-W8

SET NO: SHEET NO: 12 OF 72



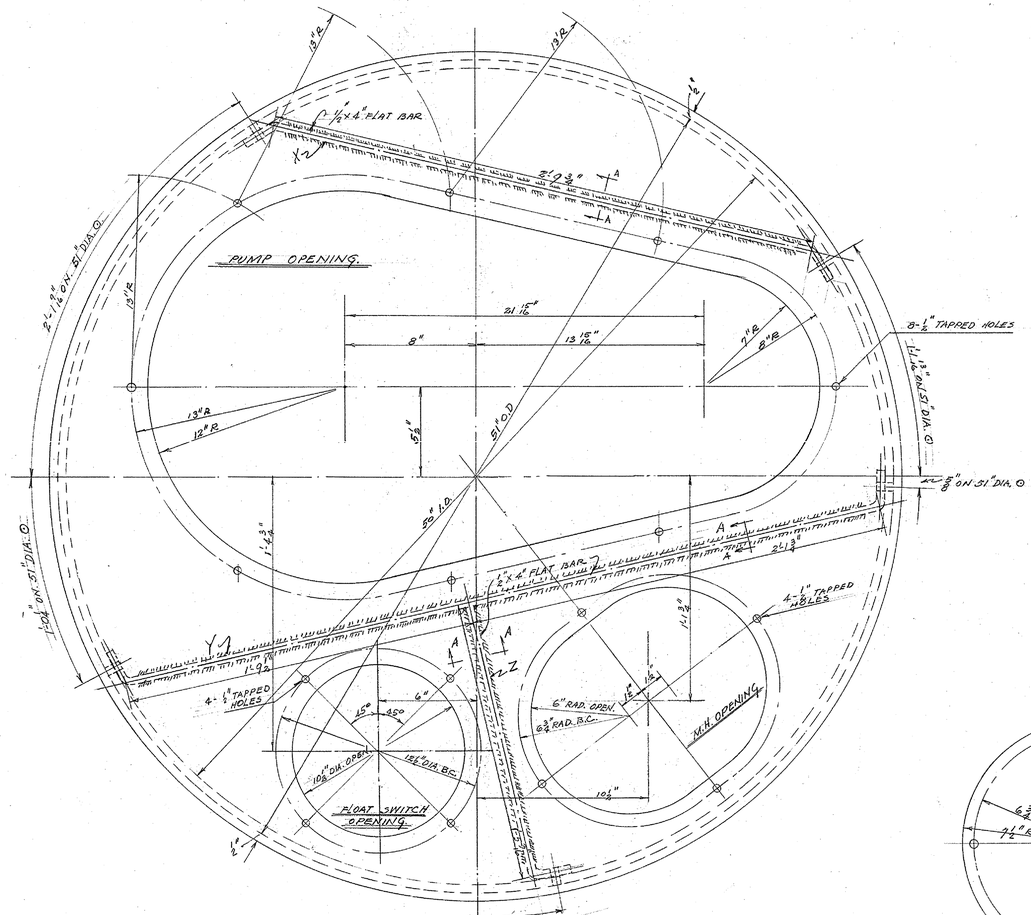
DETAIL OF FLAT BAR "X"

scale. FULL SIZE



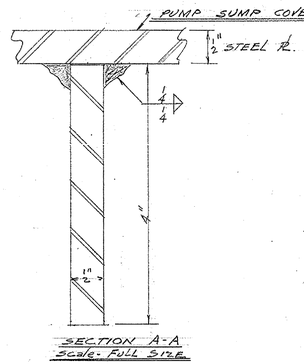
DETAIL OF FLAT BARS "Y" & "Z".

scale. FULL SIZE



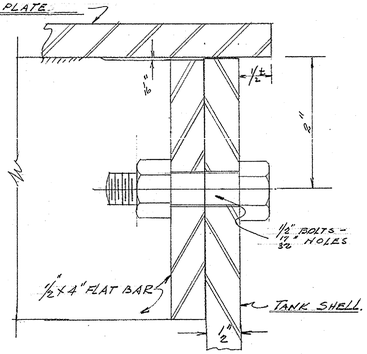
PUMP SUMP COVER PLATE

Scale. 3"=1'-0"



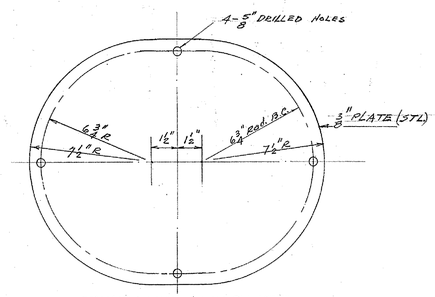
SECTION A-A

Scale. FULL SIZE



TYPICAL BOLTED CONNECTION

Scale: FULL SIZE



MANHOLE COVER PLATE

Scale: 3"=1'-0"

REFERENCE DRAWINGS - SUMP

SCALE:NTS (SEE NOTE 1)

NOTES:

1. THE BACKGROUND SHOWN IS REFERENCE DRAWING NO. 10961–W–2, SHEET 2A OF 3, DATED 6–64.
2. PROVIDE NEW SUMP PUMP COVER AND SUMP IN KIND. FIELD VERIFY EXISTING SUMP PUMP COVER AND SUMP FOR MODIFICATIONS. PROVIDE COVER AND SUMP TO ACCOMMODATE EXISTING PUMP AND MOTOR. EXISTING PUMP, MOTOR, CHECK VALVE, AND PIPING FROM PUMP TO CHECK VALVE SHALL BE MOVED TO NEW SUMP LOCATION AS SHOWN ON CA–06 AND CA–08.

REV.	DATE	DESCRIPTION	BY
A	10–25–19	AS–BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

SUMP PUMP DETAILS

A AS–BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR.

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY LISBETH HABANS NAGRATH, LICENCE No. 36792 ON 2-6-15. THIS DOCUMENT SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT.

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

TRIGON DWG. NO. CA-10

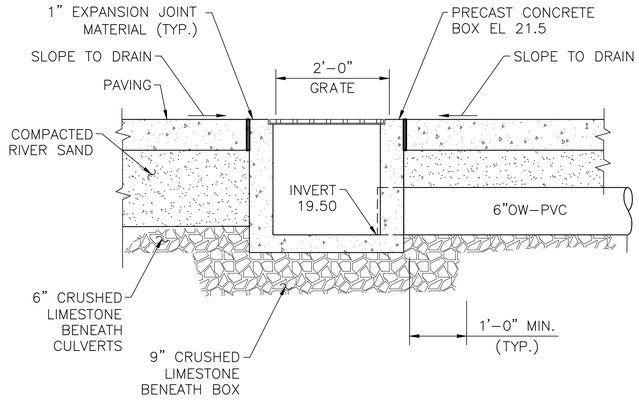
DR:	SJ CLARK
CK:	GA KOLENOVSKY
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	1"=20'-0"
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

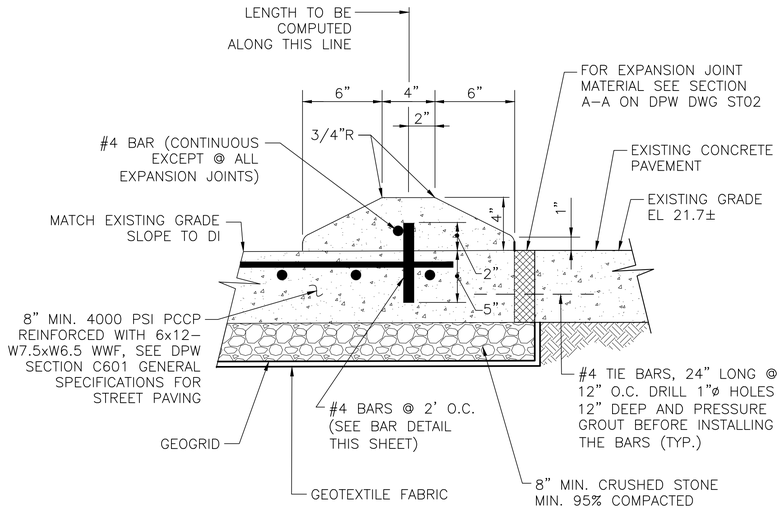
SET NO:

SHEET NO: 13 OF 72



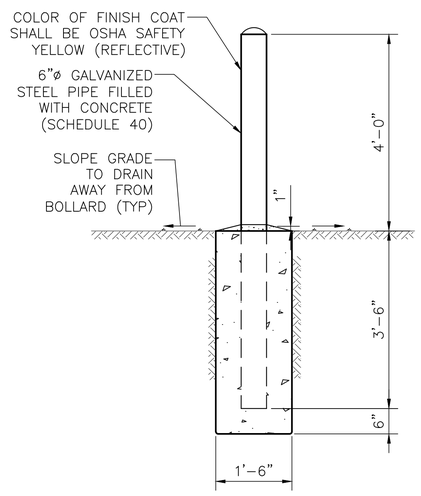
1 CA-06 DETAIL - PRECAST DRAIN INLET

SCALE: NTS



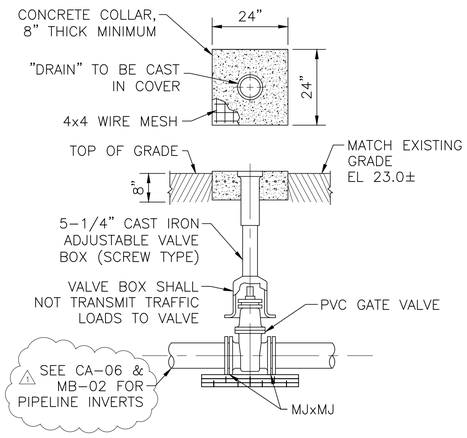
2 CA-08 DETAIL - CONCRETE MOUNTABLE CURB

SCALE: NTS



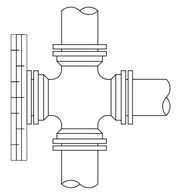
3 CA-08 DETAIL - BOLLARD

SCALE: NTS

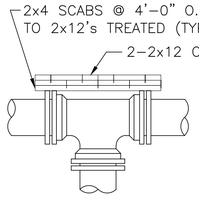


4 CA-06 DETAIL - TYPICAL BURIED VALVE INSTALLATION

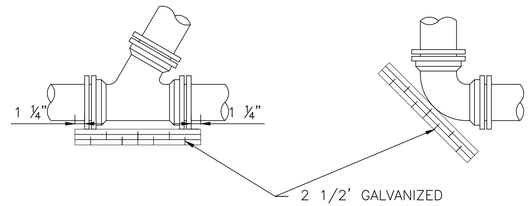
SCALE: NTS



CROSS WITH PLUG

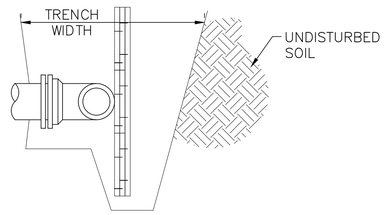


TEE

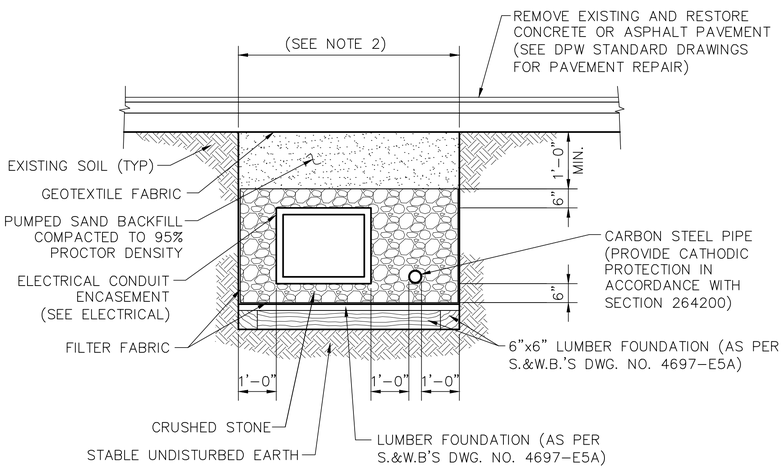


WYE

BEND



TYPICAL SECTION



NOTES:

1. SHEETING AND BRACING FOR ALL EXCAVATIONS SHALL BE DESIGNED BY A REGISTERED LOUISIANA PROFESSIONAL ENGINEER.
2. DESIGN EXCAVATIONS FOR TYPE C SOIL, PER GEOTECHNICAL RECOMMENDATIONS, MARCH 7, 2014. MAXIMUM ALLOWABLE SLOPES FOR EXCAVATIONS LESS THAN 20 FT. DEEP ARE 1 ½:1 (H:V) PER 29 CFR PART 1926 SUBPART P.

6 CA-06/CA-07 DETAIL - TYPICAL PIPE TRENCH

SCALE: NTS

NOTES:

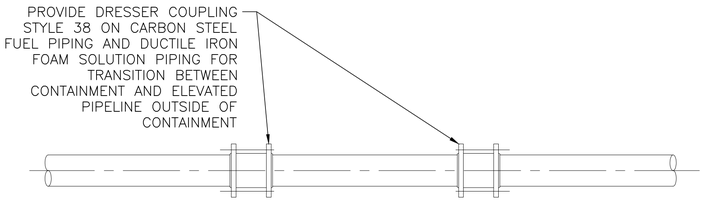
1. NUMBER OF REQ'D. BOARDS AS NEEDED DEPENDING UPON TRENCH WIDTH AND REQ'D BEARING AREA.
2. BOARDS SHALL BE PRESSURE TREATED.
3. NAILS SHALL BE GALVINIZED.

PIPE SIZE	MINIMUM REQUIRED SOIL BEARING AREA*
6"	10.6 SQ. FT.
8"	18.8 SQ. FT.

VALUES ARE FOR 90° BEND, BASED ON 500 P.S.F. SAFE BEARING LOAD AND PIPE PRESSURE OF 100 P.S.I. PLUS 33% SAFETY FACTOR FOR OTHER SOILS AND PRESSURES.

5 - DETAIL - TYPICAL THRUST RESTRAINT

SCALE: NTS



7 CA-06 DETAIL - TYPICAL PIPE DEFLECTION

SCALE: NTS

REV.	DATE	DESCRIPTION	BY
A	10–25–19	AS–BUILT MARKUPS	LHN
1	3–16–15	REVISED CALL-OUT DETAIL "4" (ADD.1)	LHN

AS–BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR.

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY LISBETH HABANS NAGRATH, LICENCE No. 36792 ON 2-6-15. THIS DOCUMENT SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT.

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. CZ-01

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

CIVIL DETAILS

DR:	SJ CLARK
CK:	GA KOLENOVSKY
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

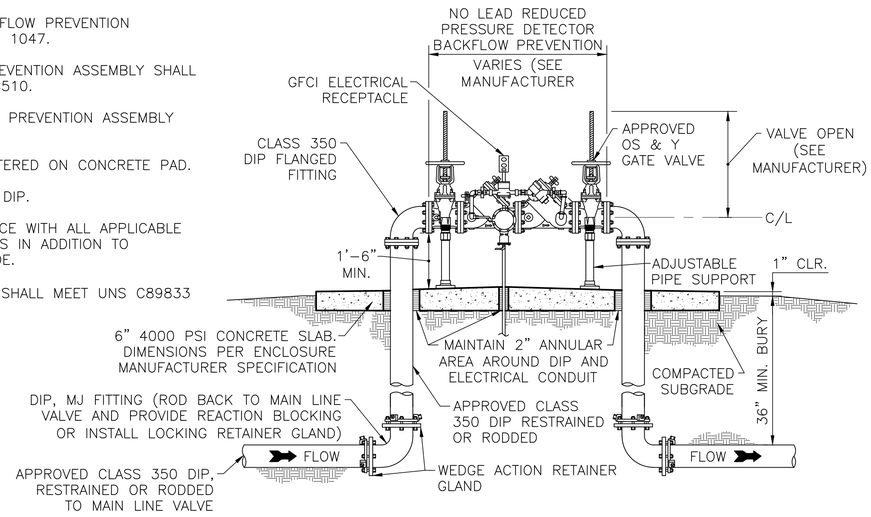
GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 14 OF 72

BACKFLOW PREVENTER NOTES:

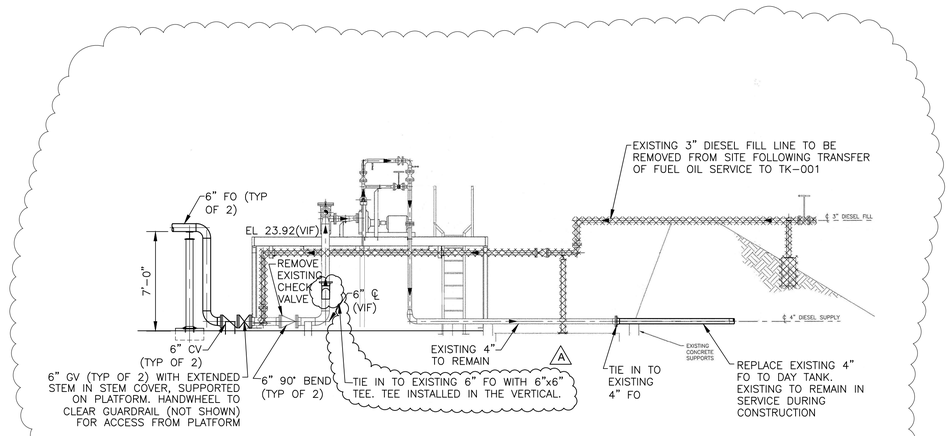
1. REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY SHALL COMPLY WITH ASSE 1013 & AWWA C511.
2. REDUCED PRESSURE DETECTOR BACKFLOW PREVENTION ASSEMBLY SHALL COMPLY WITH ASSE 1047.
3. DOUBLE CHECK VALVE BACKFLOW PREVENTION ASSEMBLY SHALL COMPLY WITH ASSE 1015 & AWWA C510.
4. DOUBLE CHECK DETECTOR BACKFLOW PREVENTION ASSEMBLY SHALL COMPLY WITH ASSE 1048.
5. BACKFLOW ASSEMBLY SHALL BE CENTERED ON CONCRETE PAD.
8. PIPE MATERIAL SHALL BE CLASS 350 DIP.
9. INSTALLATION SHALL BE IN COMPLIANCE WITH ALL APPLICABLE CITY ORDINANCES AND SPECIFICATIONS IN ADDITION TO THE ORLEANS PARISH PLUMBING CODE.
11. ALL 'NO LEAD' BRASS COMPONENTS SHALL MEET UNS C89833 AS PER ASTM B584.



1 CA-06 TYPICAL BACKFLOW PREVENTER

SCALE:NTS

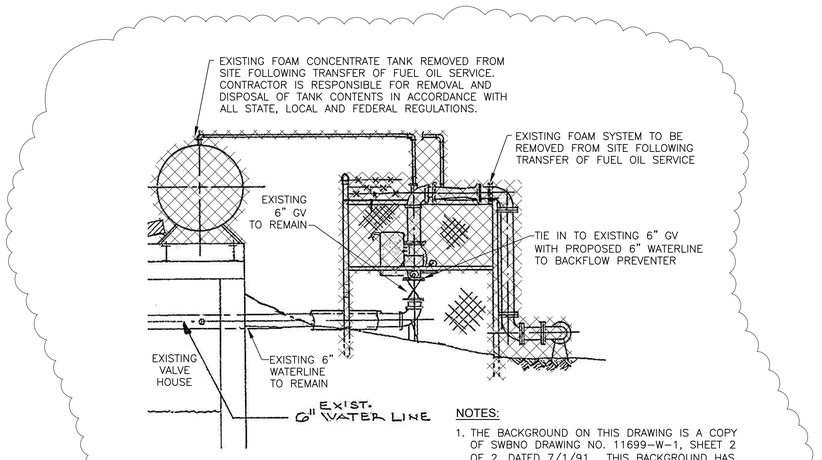
A SEE SUL-0242 FOR ICFP AS-BUILTS AND ABOVE GRADE PIPE REROUTING



1

2 CA-06 CONNECTION AT TRANSFER PUMP PLATFORM

SCALE:3/16"=1□0"



NOTES:

1. THE BACKGROUND ON THIS DRAWING IS A COPY OF SWBNO DRAWING NO. 11699-W-1, SHEET 2 OF 2, DATED 7/1/91. THIS BACKGROUND HAS BEEN INCLUDED FOR REFERENCE.

1

3 CA-06 WATERLINE CONNECTION AT VALVE HOUSE

SCALE:3/16"=1□0"

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN
1	3-23-15	ADDED DETAILS "2 & 3" (ADD.3)	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLE□

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. CZ-02

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

CIVIL DETAILS

DR: SJ CLARK
CK: GA KOLENOVSKY
AP: LH NAGRATH
LAST EDIT:
SCALE: 1"=20□0"
DATE: JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO:
SHEET NO: 15 OF 72

POST TENSIONED NOTES AND SPECIFICATIONS:

1. GENERAL REQUIREMENTS FOR POST TENSIONED SLAB ON GRADE: THESE NOTES AND SPECIFICATIONS ARE ADDITIONS TO THE SPECIFICATIONS INDICATED ON EACH DRAWING. CONTRACTORS MUST COMPLY WITH THE SPECIFICATIONS AS INDICATED.

   DESIGN DATA:

   SOIL BEARING CAPACITY: 800–1200 PSF

   LIVE LOAD ON THE FOUNDATION: 100 PSF

   DEAD LOAD: AS CALCULATED (VARIES) PSF

   STANDARDS:

   ASTM FOR STEEL

   ASTM A–615 (GRADE 60) REINFORCING STEEL

   ASTM 1557 SOIL COMPACTION

   ACI 318 FOR CONCRETE (LATEST EDITION)

   ACI A–416, TENDONS, DESIGNATED MILL NO. (SALVAGED CABLES NOT ALLOWED.)

   PTI "SPECIFICATIONS FOR UNBONDED TENDONS"

   PTI "DESIGN MANUAL" (LATEST EDITION)

   PTI "DESIGN AND CONSTRUCTION OF POST TENSIONED SLABS

2. SITE PREPARATION: GENERAL CONTRACTOR WILL BE RESPONSIBLE FOR LAYOUT AND VERIFICATION OF DIMENSIONS. TOLERANCES ARE 1/2" +/– AND SOIL PREPARATION. CONTRACTOR WILL BE RESPONSIBLE TO ESTABLISH THE SURVEY ELEVATION AS REQUIRED FOR FEMA WORK AS PER CODE, OR AS INDICATED ON DRAWINGS. CHECK FOR UNDERGROUND UTILITIES, PROTRUSIONS, OPENINGS, INSERTS, PIPES, CONDUITS, THIMBLES, COLUMNS, PINS, ANCHORS, BOLTS, DROPS, OFFSETS, LEDGES, BLOCK OUT, AND OTHER ITEMS SHOWN ON THE DRAWINGS, BEFORE CORRECTING.

3. TENDONS LAYOUT WILL BE AS SHOWN ON THE DRAWINGS. PLASTIC CHAIRS SHALL NOT DAMAGE THE MEMBRANE DURING CONCRETING.

4. SOIL BASE PREPARATION WILL BE IN INCREMENTS OF 6 INCHES COMPACTED TO 95% OF MAXIMUM DENSITY AT OPTIMUM MOISTURE CONTENT. TYPE OF FILL AS SPECIFIED. MIN 6" SAND FILL IS REQUIRED IF NOT SPECIFIED IN DWGS. THE SLAB ON GROUND INCLUDES A MINIMUM FILL, WHILE THE RAISED SLAB REQUIRES FILL THAT HAS A PRE–LOAD TIME AND SETTLEMENT WHERE SPECIFIED. CONSULT CITY REQUIREMENTS FOR FILL IN PLACE. CONTRACTOR MUST INFORM ENGINEER IF ANY CHANGE TO THE FILL IS MADE.

5. SOIL INFORMATION: CONTRACTOR WILL CONSULT THE SOIL BORING REPORT WHERE SUBMITTED, OBTAINED BY: PSI DATED: 7 MARCH 2014. THE SOIL BEARING CAPACITY INDICATED IS: 800–1200 PSF. THE SOIL PREPARATION WILL INCLUDE TOP SOIL REMOVAL AS SPECIFIED, UPON WHICH WILL BE PLACED SPECIFIED GRANULAR FILL TO BE COMPACTED TO 95% AT OPTIMUM MOISTURE (FOR SAND FILL).

6. THE OWNER'S SUPERVISOR WILL REQUIRE TESTING NECESSARY TO CONFIRM THE SPECIFIED LOADINGS. THE SOIL PREPARATION LOADS SHOULD BE MINIMUM OR BETTER THAN SPECIFIED. CONTRACTOR TO SUBMIT RECORDS TO ENGINEER.

7. CONTRACTOR WILL FOLLOW THESE SPECIFICATIONS AND OTHER WHERE SUBMITTED. CONTRACTOR MUST RECORD ALL PROCEDURES, TENSIONS, AND DEVIATIONS, WHICH WILL BE SUBMITTED TO THE ENGINEER DURING THE TENSIONING WORK. QUALITY CONTROL WILL BE THE RESPONSIBILITY OF THE CONTRACTOR REGARDLESS OF ANY OWNER REPRESENTATIVE PRESENCE.

8. MATERIALS CONCRETE MIX: CONTRACTOR TO SUBMIT DESIGN MIX AS SPECIFIED ON DRAWINGS. INDICATE MIX BELOW (SAMPLE): (CALCIUM CHLORIDE ADMIXTURES AND FLY ASH NOT ALLOWED) (CONCRETE SEALING MUST BE DONE WITH CONCRETE COMPOUND)

   SACKS PER CUBIC YARD: 5.9 SACKS/CY

   WATER PER CUBIC YARD: 30 GALLONS/CY

   CONCRETE STRENGTH AFTER 28 DAYS: 3,500 PSI

   CONCRETE STRENGTH BEFORE STRESSING: 1,500 PSI

   MINIMUM CURING TIME 5 DAYS, UNDER FAVORABLE WEATHER

   6 MILS PE MEMBRANE WILL BE USED AS SPECIFIED

9. THERMAL CRACKING REDUCTION WILL BE MITIGATED WITH THE INSTALLATION OF THE 6X6 W2.9XW2.9 MESH, INSTALLED 1" BELLOW THE FINISH TOP OF THE SLAB IN THE SLAB AREA. WELDED WIRE FABRIC WILL CONFORM WITH ASTM A185, PROVIDING FOR 9" AT THE END LAPS AND 3" FOR THE SIDE LAPS.

10. POST TENSION WORK WILL COMPLY WITH PTI SPECS (LATEST EDITION). TENDONS: 7 STRESS RELIEVED STRANDS, COATED, CASES IN PE PLASTIC (ALLOW 8" X 36" CLEARANCE FOR STRESSING EQUIPMENT). ULTIMATE STRESS: 270 KSI, FOR TYPICAL TENDON'S STRESSING:

1/2 INITIAL STRESSING	33.0K
ANCHORED STRESS	28.9K
7/16 INITIAL STRESSING	24.8K
ANCHORED STRESS	21.7K
3/8 INITIAL STRESSING	21.7K
ANCHORED STRESS	16.1K
SHORT TENDONS OVER	20%
STRESS	

    (STRESSING MODIFICATIONS PERMITTED ONLY IF APPROVED BY ENGINEER.) NO ACTIVE LOADING IS PERMITTED PRIOR TO STRESSING.

11. REQUIREMENTS PRIOR TO STRESSING: REMOVE FORMS 6 DAYS AFTER CONCRETING, CHECK MIN. CONCRETE STRENGTH, CONCRETE MAY SHOW MINOR CRACKS THOSE WILL BE CLOSED POST STRESSING.

12. POST TENSION STRESSING SAMPLE CALCULATIONS (NOTES ON ELONGATION):

    CONTRACTOR WILL INFORM THE ENGINEER OF THE TENSIONING FORCES RELATIVE TO OBTAINED ELONGATIONS. WHERE ELONGATION IS NOT ACHIEVED AS PER ADJUSTMENT, CONTRACTOR WILL CHECK THE PHYSICAL PROPERTIES OF THE CABLES AND WILL COMPARE TO THE MODULUS AND ELONGATION CALCULATED. PT CONTRACTOR MUST CALCULATE THE ELONGATION AS FOLLOWS: LENGTH OF THE CABLE IN FEET TIMES 9.37%F. FOR EXAMPLE: 100FT X 9.37%/100 = 9.37 ELONGATION.

13. SUBMITTALS: DESIGN CALCULATIONS BASED ON ARCHITECTURAL BUILDING DESIGN, PSF LL, PSF DL, WIND LOADS AS PER CODES. ALL COMPUTATIONS MUST INDICATE ELONGATION EXPECTED FROM THE POST TENSIONING.

14. SHOP DRAWINGS, DETAILS, COMPONENTS OF THE CONSTRUCTION METHODOLOGY OF STRESSING,PROFILES OF TENDONS, AND OTHER QUALITY CONTROL PROCEDURES MUST BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

    TESTS AND CERTIFICATIONS: CERTIFIED MILL REPORTS FOR PRE STRESSING CABLES MUST BE SUBMITTED TO THE ENGINEER. OTHER DATA INCLUDED MUST CERTIFY: THE CABLE'S ULTIMATE STRENGTH, MODULUS OF ELASTICITY, AND PERCENT ELONGATION AT RUPTURE IN COMPLIANCE WITH THE DESIGN CALCULATIONS. ALL TENDONS MUST BE MARKED WITH THE MILL CERTIFICATION NUMBER.

15. MATERIALS: POSTTENSIONING STEEL WILL BE SEVEN–WIRE LOW RELAXATION STRAND IN ACCORDANCE WITH ASTM A416, GRADE 270 (LATEST EDITION) ULTIMATE TENSILE STRENGTH WILL NOT BE LESS THAN 270 KSI.

    ANCHORS: THE APPROVED ANCHORS MUST MEET SPECIFICATIONS.

    ALL ANCHORS AND THEIR USE MUST MEET THE "SPECIFICATIONS FOR UNBONDED TENDONS", AS PREPARED BY THE POST TENSION INSTITUTE.

    COATING MUST BE RUST PREVENTATIVE AND LUBRICANT APPLICATION AS PER LATEST PTI REQUIREMENTS. SHEATHING MUST BE PE PLASTIC, MINIMUM 0.025 INCHES THICK AND CAPABLE OF SUSTAINING 180 DEG F TEMPERATURE. THERE SHALL BE NO VISIBLE DAMAGE DONE TO THE PLASTIC SHEATHING SUCH AS CRACKS, BLISTERS AND OTHER IMPERFECTIONS.

16. EQUIPMENT: HYDRAULIC JACKS MUST HAVE ACCURATE READING, INDEPENDENTLY TESTED AND CALIBRATED HYDRAULIC PRESSURE GAUGES. THE SHEATHING CAN BE CUT TO A MINIMUM LENGTH NECESSARY FOR THE GRIP ON THE CABLE NOT TO BE EXCEED 6 INCHES.

17. CONTRACTORS QUALIFICATIONS: CONTRACTOR MUST PROVE A MINIMUM OF 3 YEARS OF EXPERIENCE IN FIELD OF POSTTENSIONING. QUALIFIED SUPERINTENDENT MUST SUPERVISE THE WORK AND ASSURE FOR QUALITY WORKMANSHIP. SUPERINTENDENT MUST SCHEDULE THE TENSIONING PROCEDURES TO COMPLY WITH THE REQUIREMENTS FOR TENSIONING 5 DAYS AFTER THE CONCRETE WORK WAS PLACED AFTER A MINIMUM SPECIFIED STRENGTH WAS OBTAINED FROM THE SAMPLES TESTED. INTERMEDIATE JOINT POSTTENSIONING WILL BE TENSIONED UNDER THE SAME CONDITION. ANY CHANGES FOR POSTTENSIONING SCHEDULE MUST BE APPROVED BY THE ENGINEER. 1) ELONGATION MEASUREMENTS, 2) STRESSES MEASURED DURING ELONGATION AND 3) GAUGE PRESSURES.

CONCRETE AND REINFORCING STEEL NOTES:

1. STANDARDS:

   ACI: 301, 315, 318

   REBAR: ASTM A615–GRADE 60

   WELDED REINFORCEMENT STEEL: ASTM A706, GRADE 60

   WIRE FABRIC WELDED: ASTM A185

   STEEL FIBER: ASTM A820, TYPE I

CLASS	F'C (PSI)	REQUIREMENTS
CONCRETE FOOTINGS, PIERS, INTERIOR CONCRETE (NOT POST TENSION)	3,000	
EXTERIOR CONCRETE (NOT POST TENSION)	4,000	
MASONRY GROUT	3,000	
EARTH FILL	2,000	COMPACT TO 95% AT OPTIMUM MOISTURE

2. MIN. MESH REINFORCING WHERE NO OTHER IS SPECIFIED WILL BE 6X6X–W1.4X1.4 WWF INSTALLED SIMILAR TO REBAR.

3. MIN. WALL REINFORCEMENT:

WALL THICKNESS	HORIZONTAL	VERTICAL
8–INCH	#4 AT 12" ON CENTER	#4 AT 18" ON CENTER
10–INCH	#4 AT 10" ON CENTER	#4 AT 16" ON CENTER
12–INCH	#4 AT 16" ON CENTER	#4 AT 18" ON CENTER

4. 2–#5 REBAR AT ALL OPENINGS MIN. EXTENDED 2' BEYOND ENDS OF OPENING.

5. STAGGER SPLICES 40 DIAMETERS WHERE ALLOWED.

6. WHERE CONTRACTOR JOINTS SPECIFIED AT MAX. 45' KEYED EXPANSION JOINTS USE 1'' COMPRESSIBLE FILLER AND WATERSTOP.

7. CLASS B TENSION LAP SPLICES FOR HORIZONTAL AND VERTICAL REINFORCING ARE ALLOWED. NO SPLICES IN BEAMS, JOISTS OR SLAB STEEL IS PERMITTED, COMPRESSION SPLICES LAP 30 DIAMETERS, TENSION SPLICES PER ACI CODES, WIRE FABRIC LAP 1 SPACE +2" AT ALL EDGES.

8. OPENINGS: IF NOT SPECIFIED AND NEEDED CONTRACTOR MUST OBTAIN APPROVAL FROM THE ENGINEER PRIOR TO CUTTING.

9. LAYOUT AND SHOP DRAWINGS WILL BE THE TOTAL RESPONSIBILITY OF THE CONTRACTOR. DISCREPANCIES WILL BE REPORTED TO THE ENGINEER.

10. STEEL OVERLAP WHERE SPECIFIED, THE LENGTH WILL BE IN ACCORDANCE WITH ACI 318–05, OR AS SHOWN ON THE PLANS.

11. WHERE NOT SHOWN ON THE DRAWINGS THE REINFORCING DETAILS WILL CONFORM WITH TYPICAL "DETAILS AND DETAILING CONCRETE REINFORCEMENT", ACI SP–66.

12. RE–BARS POSITIONING WILL BE PROPERLY ALIGNED AS PER SPECIFIED REQUIREMENTS, WHICH WILL INCLUDE ALL PROPER SUPPORTS TYPICAL FOR CONCRETE WORK. ENGINEER WILL INSPECT PLACEMENT, ORIENTATION, AND POSITION OF REINFORCING PRIOR TO CONCRETE PLACEMENT. CONTRACTOR TO ARRANGE FOR INSPECTION.

13. THE REINFORCING WILL BE ADJUSTED FOR BY PASS OF OBJECTS SUCH AS, PIPES, OPENINGS, AND OTHER OBSTRUCTIONS. SUCH DETAILS WILL BE APPROVED BY THE ENGINEER.

14. REINFORCING WILL BE CONTINUOUS WITH FULL TENSION LAP SPLICES. AT BEAMS AND SLAB ENDS, THE REBAR HOOK AND DETAILING WILL BE IN ACCORDANCE WITH ACI PRACTICES FOR 90 DEGREE BENDING. CORNERS WILL BE INSTALLED WITH "L" BARS AS PER ACI RECOMMENDATIONS. THE ENGINEER WILL APPROVE AND INSPECT THE DETAILS OF SUCH INSTALLATION. CONTRACTOR WILL SUBMIT SHOP DRAWINGS FOR REINFORCING WORK FOR APPROVAL TO THE ENGINEER PRIOR TO FABRICATION.

15. CONSTRUCTION JOINTS WILL BE INSTALLED AS PER DRAWINGS. ANY ADDITIONAL CONSTRUCTION JOINTS WILL BE APPROVED BY THE ENGINEER IF FOUND NECESSARY.

16. PROTRUSIONS THROUGH THE CONCRETE WORK WILL BE WITH SLEEVES OR AS PER DRAWINGS. CONTRACTOR WILL COORDINATE PLACEMENT AND INSTALLATION OF THOSE WITH OTHER TRADES.

17. TYPICAL CHAMFERS, WHERE NOT OTHERWISE SPECIFIED ON THE DRAWINGS, WILL BE 3/4".

18. THE STRENGTH OF THE CONCRETE WILL BE AS SPECIFIED ON THE DRAWINGS, AND WILL GENERALLY BE IN ACCORDANCE WITH THE FOLLOWING: CONCRETE MINIMUM 28 DAY COMPRESSIVE STRENGTH. CAST IN PLACE PILE CAPS, BASE, SLABS, WALLS, PLATFORMS, COLUMNS, PILASTERS, BEAMS AND DECKS, 4,000 PSI CONCRETE STRENGTH. PRECAST CONCRETE, 4,000 PSI FOR BEAMS AND PANELS, AND 3,000 PSI CONCRETE STRENGTH FOR DUCT–BANKS, SIDEWALKS AND BOLLARDS.

19. CONCRETE DESIGN IN ACCORDANCE WITH ACI 301 AND 318, DELIVERED AT THE SITE IN ACCORDANCE WITH "SPECIFICATIONS FOR READY–MIX CONCRETE" ASTM C94.

20. CONCRETE PLACEMENT AND CONSOLIDATION IN ACCORDANCE WITH ACI 304 AND 309, CURED ACI 308, FINISHED ACI 301.

21. WELDED WIRE FABRIC, WHERE INDICATED ON THE DRAWINGS, WILL CONFORM TO ASTM A185 PROVIDING 9" FOR END LAPS AND 6" FOR SIDE LAPS.

22. EPOXY GROUT WILL BE USED AS A NON–SHRINK AND NON–METALLIC GROUT IN ACCORDANCE WITH REQUIREMENTS FOR INSTALLATION EMBEDDED ANCHOR BLOTS, NUTS AND WASHERS, ASTM F1554 OR ASTM A307 FOR HOT DIP GALVANIZED STEEL.

23. CONCRETE COVER WILL BE IN ACCORDANCE WITH ACI 318–05 UNLESS OTHERWISE SPECIFIED ON THE DRAWINGS AND SPECIFICATIONS. THESE CRITERIA WILL BE APPLICABLE TO SLABS, WALLS, BEAMS, AND COLUMNS. WHERE PERMANENT HYDROSTATIC LOADING IS IMPOSED, THE COVER WILL BE 3" IN ACCORDANCE WITH EM 1110–2–2104.

STRUCTURAL STEEL NOTES:

1. THE STABILITY OF THE STRUCTURE IS ASSURED IN ITS COMPLETED STAGE. TEMPORARY SUPPORTS, TEMPORARY GUY WIRES, BRACES, FALSEWORK, CRIBBING OR OTHER ELEMENTS ARE REQUIRED DURING ERECTION UNDER ALL LOADING CONDITIONS. THE CONTRACTOR IS OBLIGATED TO PROVIDE ALL THESE FEATURES.

2. CONTRACTOR MUST COORDINATE ARCHITECTURAL, MECHANICAL, ELECTRICAL, PLUMBING AND CIVIL DRAWINGS FOR INSERTS, SLEEVES, CURBS, PADS, AND ANY OTHER FEATURES AFFECTING STRUCTURAL WORK NOW SHOWN.

3. ALL FABRICATIONS MUST BE APPROVED AS "SHOP DRAWINGS" PRIOR TO FABRICATION AND MUST COMPLY WITH "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES," AS PUBLISHED BY AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC), LATEST EDITION.

4. SHOP DRAWINGS WILL BE PREPARED ACCORDING TO THE LATEST "STRUCTURAL STEEL DETAILING MANUAL" OF THE AISC AND SUBMITTED FOR REVIEW PRIOR TO FABRICATION.

5. STRUCTURAL STEEL GENERALLY, IF NOT NOTED OTHERWISE WILL COMPLY WITH ASTM A36 STANDARD FOR STRUCTURAL STEEL, PLATE, BARS, AND CHANNELS, ASTM A993 FOR WIDE FLANGE SHAPES, ASTM A53 GRADE B, FOR STRUCTURAL PIPES, ASTM A500 GRADE B OR A501 FOR STRUCTURAL TUBING BOLTS: ASTM A325. WELDING ELECTRODES: AWSA 5.1 OR 5.5 SERIES E70 ALL WELDING WILL BE ELECTRIC, TECHNIQUE AND WORKMANSHIP TO CONFORM TO THE AMERICAN WELDING SOCIETY AWS D1.1 USE E70XX ELECTRODES. WELDERS MUST BE CERTIFIED. THE WELDING SYMBOLS ARE TO INDICATE THE SIZE AND TYPE OF THE WELDS. THE SHOP DRAWINGS WILL SHOW A COMPLETE DETAIL FOR WELDING WHICH WILL BE SUBMITTED FOR APPROVAL PRIOR TO CONSTRUCTION BY CONTRACTOR.

6. STRUCTURAL STEEL IN CONFORMANCE WITH "SPECIFICATIONS FOR STRUCTURAL STEEL BUILDINGS– ALLOWABLE STRESS DESIGN AND PLASTIC DESIGN" OF AISC, LATEST EDITION. BEAMS WITHOUT SPECIFIED CAMBER MUST BE FABRICATED SO THAT AFTER ERECTION ANY CAMBER DUE TO ROLLING OR SHOP FABRICATION IS UPWARD AT MID SPAN.

7. PAINTING AND PROTECTION OF THE STEEL STRUCTURES WILL CONFORM TO THE SPECIFICATIONS AS NOTED IN THE STEEL SECTION. PAINT AND PROTECTION: PRIME COAT (TOUCH UP AFTER ERECTION), SPRAY ON FIREPROOFING ON STEEL. WHERE REQUIRED ITEMS FOR HOT–DIPPED GALVANIZATION WILL INCLUDE THE FOLLOWING: A. ITEMS INCLUDED ON THE DRAWING, AND MISCELLANEOUS INCIDENTAL ITEMS NECESSARY FOR UNIFORMITY OF STEEL CONNECTIONS TO PREVENT CORROSION, ALL IN CONFORMANCE WITH THE SPECIFICATIONS.

8. STEEL WELDED CONNECTIONS MUST BE WELDED, BOLTED OR BOTH. MEMBERS CONNECTED IN THE SHOP THAT ARE WELDED AND BOLTED, IF NOT NOTED OTHERWISE, WILL BE BOLTED WITH 3/4"ØA–325 HIGH STRENGTH BOLTS. ALL SUCH CONNECTIONS WILL BE AS PER DESIGN HALF OF THE ALLOWABLE UNIFORM LOAD, UNLESS OTHERWISE NOTED. MINIMUM OF TWO 3/4"Ø BOLTS WILL BE APPLIED PER CONNECTION. BOLTED CONNECTIONS WILL BE ASSEMBLED AND TESTED ACCORDING TO SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR ASTM A490 BOLTS.

9. ALL STEEL JOISTS MUST BE FABRICATED TO RESIST A NET WIND UPLIFT FORCE AS PER 170 MPH UPLIFT CALCULATION REQUIREMENTS APPLIED OVER THE ENGAGED AREA. ALL BOLTED CONNECTIONS WILL BE SHEAR BEARING TYPE. DESIGN CONNECTIONS TO A FULL MEMBER CAPACITY, AND SHOW IT ON THE SHOP DRAWINGS.

10. TESTING: INDEPENDENT TESTING LABORATORY, WHERE SPECIFIED, WILL BE DONE ON ALL CRITICAL WELDS AND 25% ON NON–CRITICAL. FULL PENETRATION WELDS ARE CONSIDERED CRITICAL WELDS AND THOSE SPECIFIED AS MOMENT CONNECTION WELDS. MILL REPORTS WILL BE PROVIDED TO IDENTIFY THE MATERIAL. A235 & A490 BOLTS – PROVIDE FOR BOLT INSPECTIONS.

11. STEEL ANCHORS AND DRILLED CONNECTIONS:

    DRILLED ANCHORS TO CONCRETE WILL BE WEDGE TYPE WITH ONE PIECE WRAP AROUND.

    ANCHORS WILL BE GALVANIZED AS FOLLOWS:

ANCHOR SIZE	MIN EMBEDMENT	PULLOUT (LBS)	SHEAR (LBS)
1/4"Ø	2"	550	590
3/8"Ø	2–1/2"	1050	1300
1/2"Ø	3–1/2"	1700	2200
5/8"Ø	4"	2400	3300
3/4"Ø	4–3/4"	3250	4650
1"Ø	6"	6400	7470

    LOADS INDICATED ARE SERVICE LOADS IN LBS FOR STAINLESS STEEL ANCHORS AT 3,000 PSI CONCRETE.

12. MISCELLANEOUS STEEL WORK ITEMS: OPENING CUT WILL EXCEED 15% OF THE SECTION WITHOUT SPECIAL REINFORCEMENT. MECHANICAL CONTRACTOR'S WORK AND TIES WITH THE STEEL MEMBERS TO BE RECONCILED. NON–SHRINKING GROUT CRD–C621 ASTM C1107, WILL BE USED UNDER BEARING PLATES, TEMP. RANGE 45° TO 90° AND 30 MINUTES WORKING TIME. BELOW GRADE STEEL PROTECTION 3" OF CONCRETE AND 4" MASONRY, PROVIDE 1/4" THICK SETTING PLATES AT BEAMS BEARING ON MASONRY OR CONCRETE. THE PLATE 2–3/8Ø X 6" HEADED STUDS SHOP WELDED TO THE PLATE AND EMBEDDED TO THE WALL. USE HEAVY WASHER AT ALL ANCHOR BOLTS. ANGLE SUPPORTS FOR ALL METAL DECK RIBS AT COLUMNS. COORDINATE THE MACHINING DIMENSIONS WITH THE SHOP DRAWINGS AND COORDINATE ANY DISCREPANCY WITH THE ENGINEER.

13. WHERE STEEL H–PILINGS IS USES WILL BE IN ACCORDANCE WITH ASTM A572, GR. 50 OR AS PER SPECIFIC INSTRUCTIONS ON THE DRAWINGS.

STRUCTURAL DESIGN CRITERIA:

A. IBC 2012, ASCE–7–10, MINIMUM DESIGN LOADS:
   BASIC WIND SPEED 170MPH
   IBC 2012, 1609B, CATEGORY IV BUILDING
   *STRUCTURAL DESIGN CALCULATED TO MEET WIND SPEED 170 MPH WITH CONSIDERATION OF ROUND TANK OBJECTS
B. ACI 318 FOR CONCRETE (LATEST EDITION)
C. ASTM FOR STEEL

REV.	DATE	DESCRIPTION	BY
A	10–25–19	AS–BUILT MARKUPS	LHN

(A) POST TENSION NOTES AND SPECIFICATIONS REPLACED ENTIRELY WITH THE VECP DESIGNED BY CARUBBA ENGINEERING. CONCRETE AND REINFORCING NOTES AND STRUCTURAL NOTES REPLACED WITH CARUBBA ENGINEERING DESIGN OF THE VECP ONLY AS THESE NOTES RELATE TO THE WORK INCLUDED IN THE VECP. SEE SUL–0159 FOR VECP DESIGN.

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY IVAN MANDICH, LICENCE No. 15570 ON 2-6-15.

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. SA-01

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

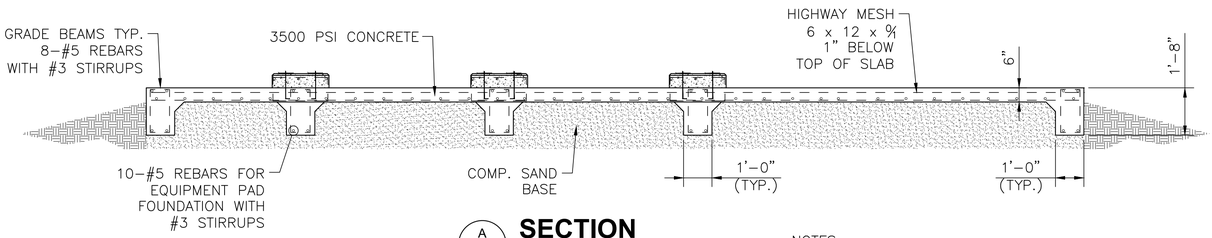
STRUCTURAL GENERAL NOTES

DR:	SJ CLARK
CK:	GA KOLENOVSKY
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	1"=20'-0"
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

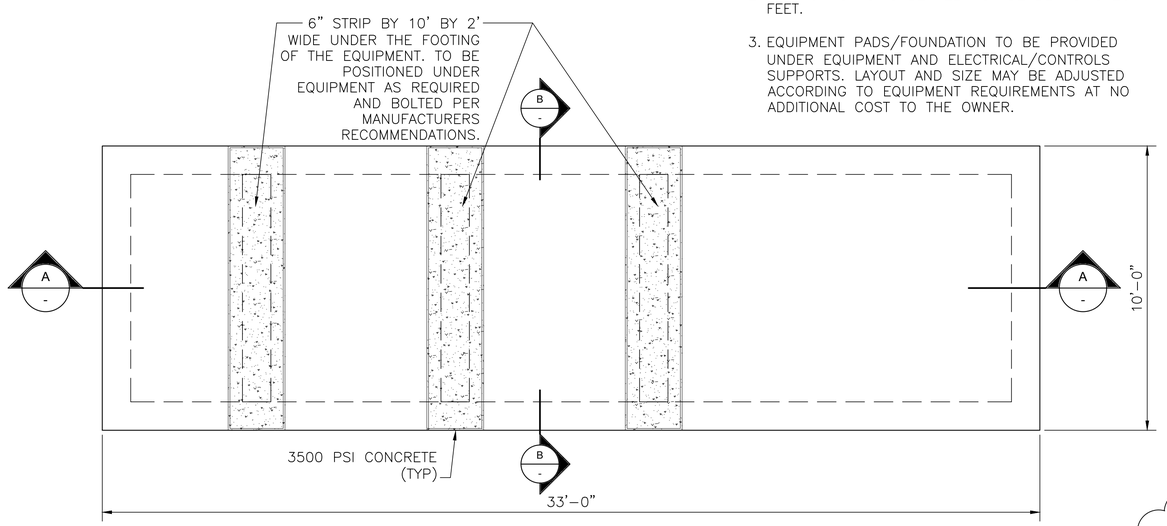
SET NO: SHEET NO: 16 OF 72



A / - **SECTION**

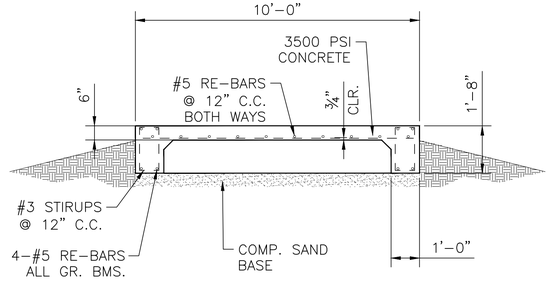
SCALE: 3/8"=1'-0"

NOTES:
1. SUBMIT FOUNDATION PLAN TO ENGINEER PER MANUFACTURERS REQUIREMENTS.
2. MAXIMUM SPACING BETWEEN GRADE BEAMS IS 20 FEET.
3. EQUIPMENT PADS/FOUNDATION TO BE PROVIDED UNDER EQUIPMENT AND ELECTRICAL/CONTROLS SUPPORTS. LAYOUT AND SIZE MAY BE ADJUSTED ACCORDING TO EQUIPMENT REQUIREMENTS AT NO ADDITIONAL COST TO THE OWNER.



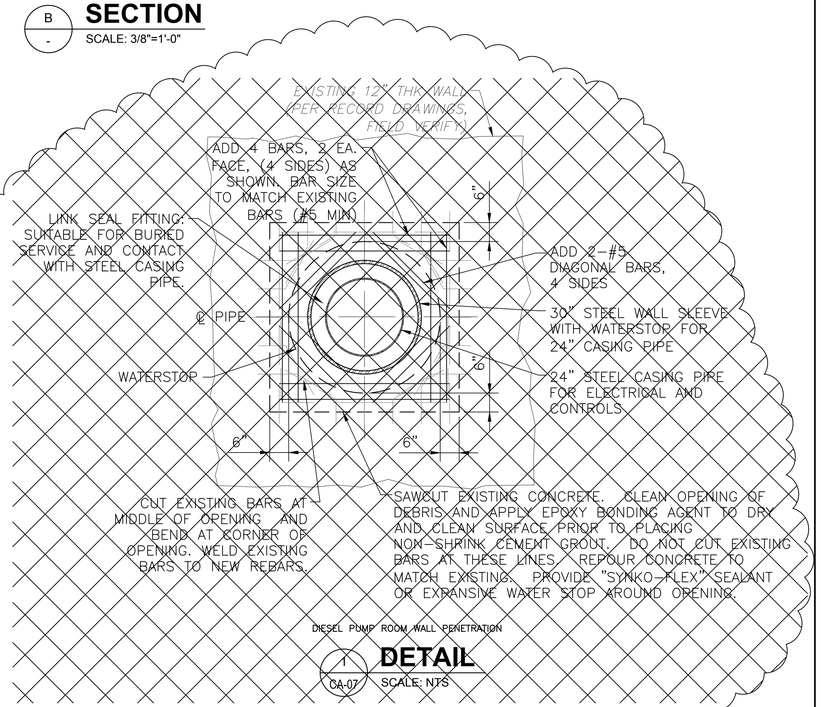
FIRE SUPPRESSION SYSTEM FOUNDATION - PLAN

SCALE: 3/8"=1'-0"



B / - **SECTION**

SCALE: 3/8"=1'-0"



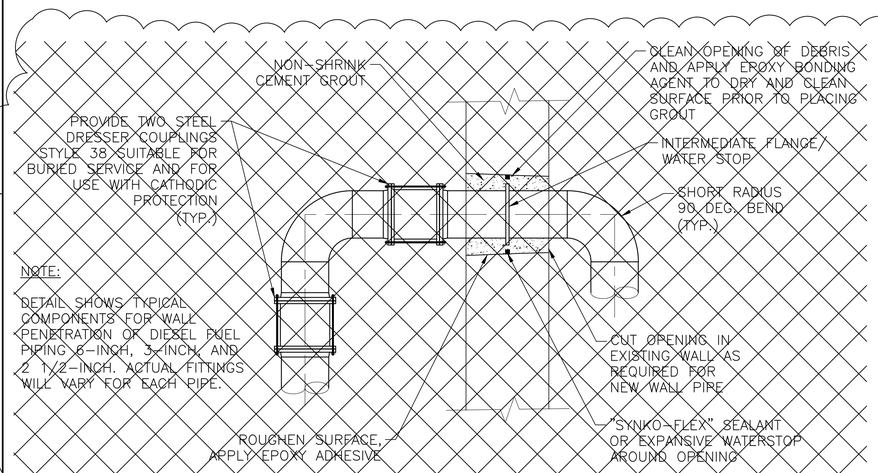
A

DIESEL PUMP ROOM WALL PENETRATION

1 / CA-07 **DETAIL**

SCALE: NTS

SEE SUL–0243 FOR HAND SKETCHED RECORD DRAWINGS. JACK AND BORE REPLACED WITH OPEN CUT PER FCO–009/RFQ–001. LINKSEAL INSTALLED ON INSIDE AND OUTSIDE OF DIESEL PUMP ROOM.



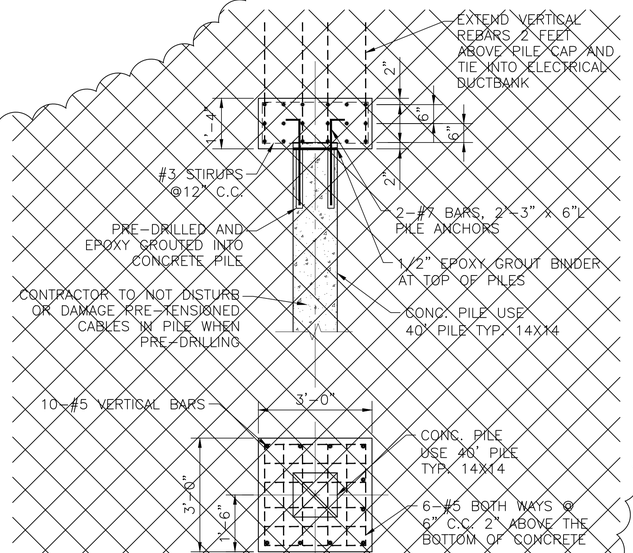
NOTE:

DETAIL SHOWS TYPICAL COMPONENTS FOR WALL PENETRATION OF DIESEL FUEL PIPING 6–INCH, 3–INCH, AND 2 1/2–INCH. ACTUAL FITTINGS WILL VARY FOR EACH PIPE.

DETAIL - DIESEL PUMP ROOM WALL PENETRATIONS

2 / X

SCALE: NTS



PLAN

3 / X **DETAIL**

SCALE: 1/2"=1'-0"

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

FIRE SUPPRESSION AND WALL PENETRATIONS

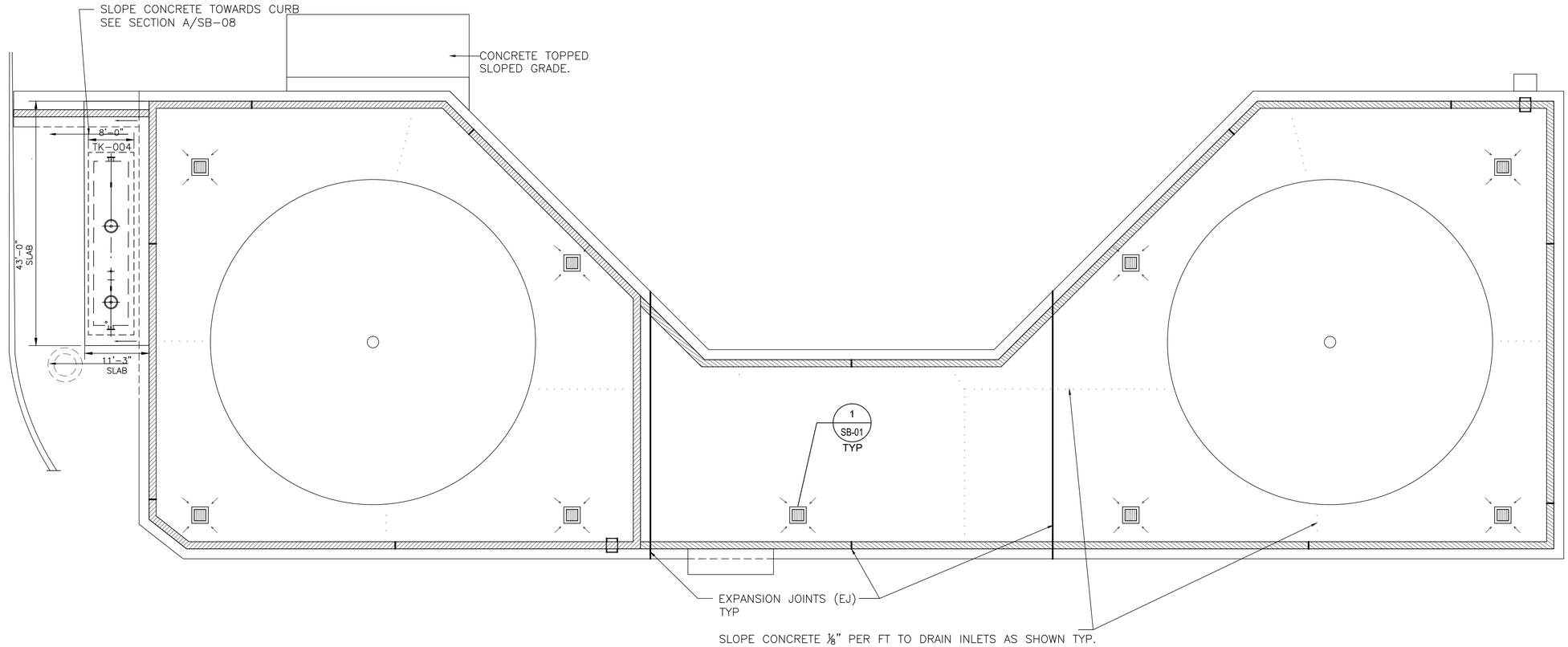
Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

TRIGON DWG. NO.	SA-02
DR:	SJ CLARK
CK:	GA KOLENOVSKY
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	1"=20'-0"
DATE:	JANUARY 28, 2015
DWG. No.	12098-W8
SET NO:	
SHEET NO:	17 OF 72

GENERAL SUPERINTENDENT



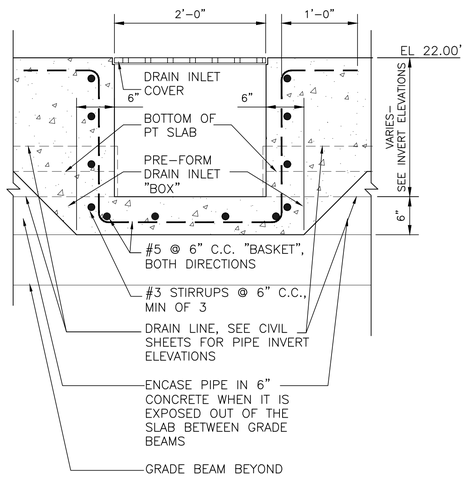
SLOPING PLAN

SCALE:3/32"=1□0"

LEGEND:

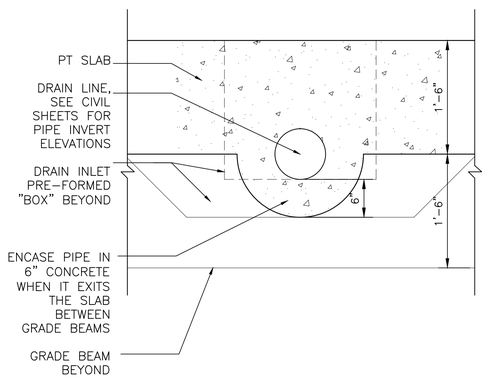
HIGHEST EL FROM DRAIN INLET

DRAIN INLET, TYP OF 9
FLOOR EL 22.00



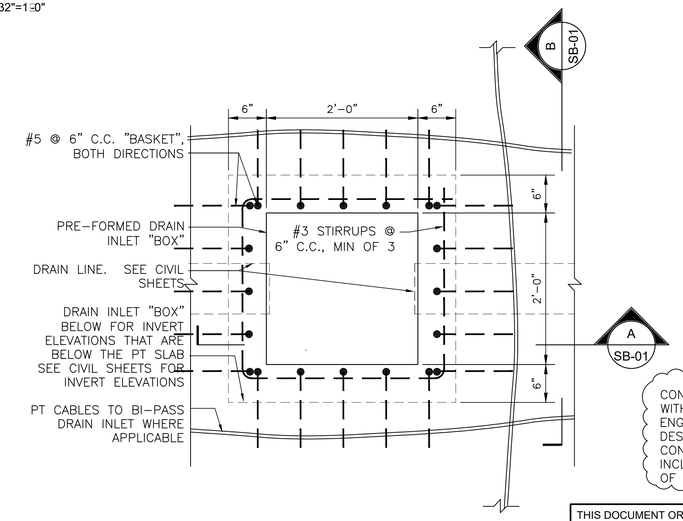
A SB-01 **SECTION- DRAIN INLET**

SCALE:1"=1□0"



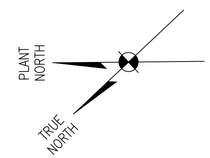
B SB-01 **SECTION- DRAIN INLET**

SCALE:1"=1□0"



1 SB-01 **PLAN- DRAIN INLET**

SCALE:1"=1□0"



NOTES:

1. SLOPING OF POST TENSION CONCRETE SLAB TO BE ACHIEVED INTEGRAL AS PART OF THE INITIAL POUR.
2. 6x6 WW MESH W2.9xW2.9; MUST BE 1 INCH BELOW THE TOP OF SLAB, AS SLOPED, TYP.

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

A — CONCRETE CONTAINMENT DESIGN REPLACED WITH VECP DESIGNED BY CARRUBA ENGINEERING, SEE SUL-0159 FOR VECP DESIGN. AS-BUILT DRAWINGS FOR CONTAINMENT PROVIDED BY RLH ARE INCLUDED AS AN APPENDIX TO THIS SET OF AS-BUILT DRAWINGS.

SEWERAGE AND WATER BOARD
OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLE□

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY IVAN MANDICH, LICENCE No. 15570 ON 2-6-15.

FUEL STORAGE TANK AREA
SLOPING PLAN

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

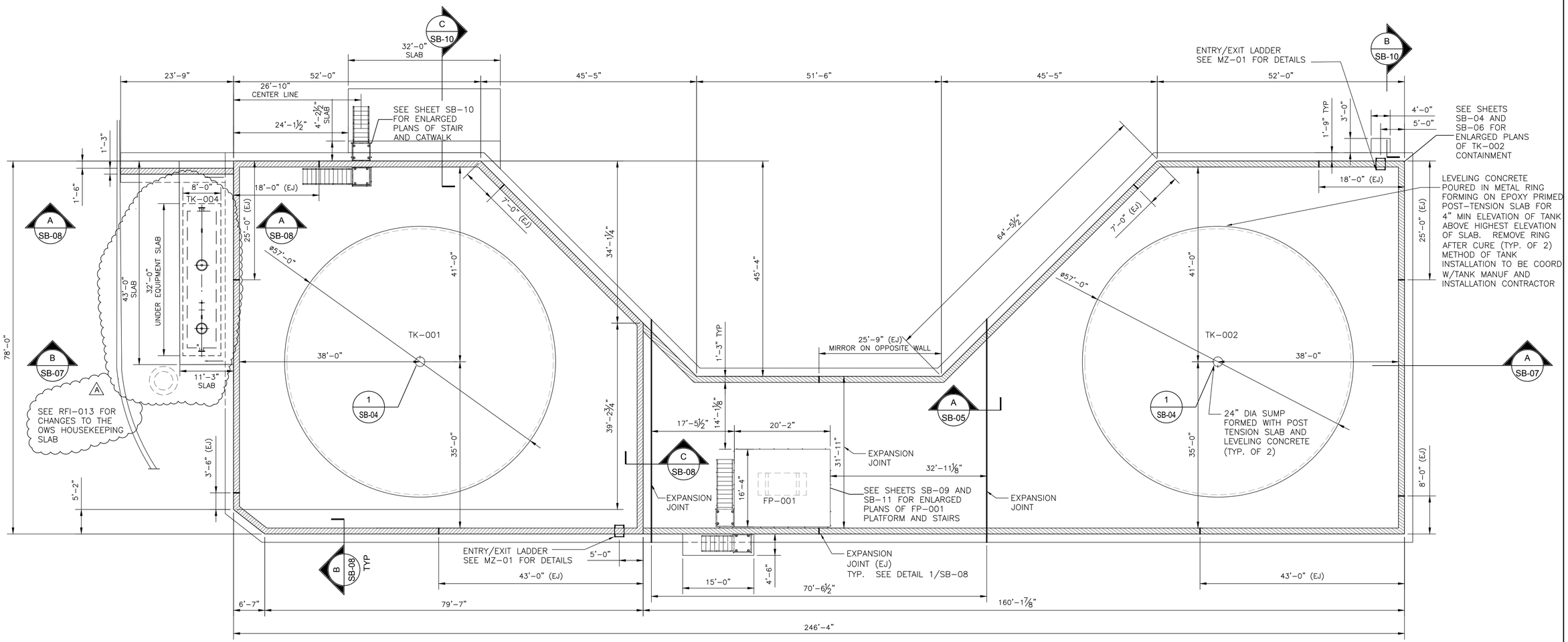
TRIGON DWG. NO. SB-01

DR.	K MCALLISTER
CK:	I MANDICH
AP:	I MANDICH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 18 OF 72

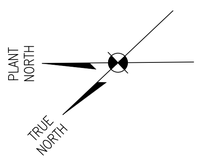


PLAN

SCALE:3/32"=1'-0"

NOTES:

1. SIZE OF OWS IS APPROXIMATE. SLAB UNDER EQUIPMENT SHALL ACCOMMODATE MANUFACTURER SIZING, RECOMMENDATIONS, AND PENETRATIONS THROUGH THE SLAB. CONTRACTOR TO VERIFY INSTALLATION MEANS AND METHODS W/TANK MANUFACTURER.



REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

A CONCRETE CONTAINMENT DESIGN REPLACED WITH VECP DESIGNED BY CARRUBA ENGINEERING, SEE SUL-0159 FOR VECP DESIGN. AS-BUILT DRAWINGS FOR CONTAINMENT PROVIDED BY RLH ARE INCLUDED AS AN APPENDIX TO THIS SET OF AS-BUILT DRAWINGS.

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

FUEL STORAGE TANK AREA PLAN

Trigon
Quality ▲ Commitment ▲ Client Service
TRIGON DWG. NO. SB-02

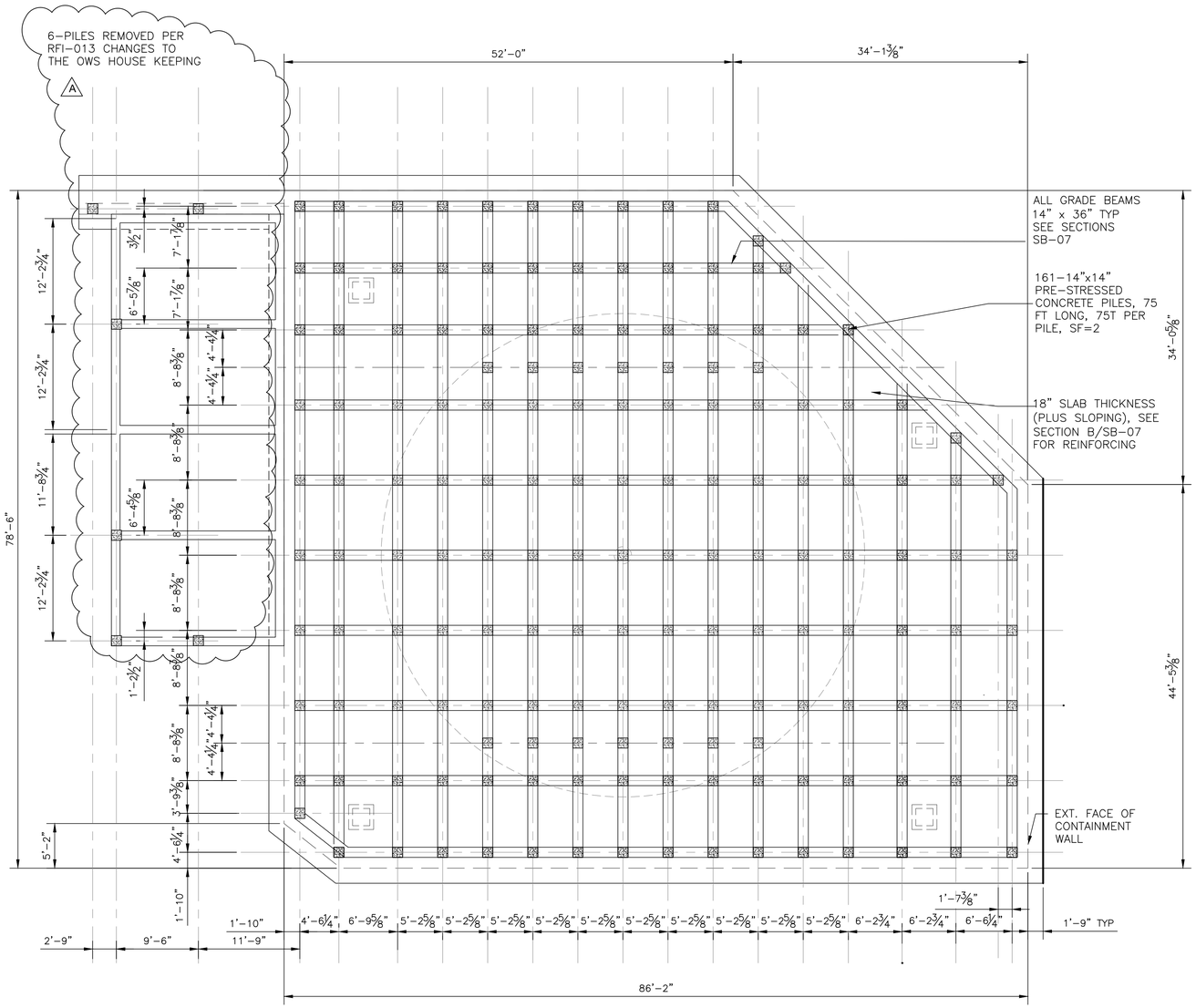
TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

DR.	K MCALLISTER
CK:	I MANDICH
AP:	I MANDICH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

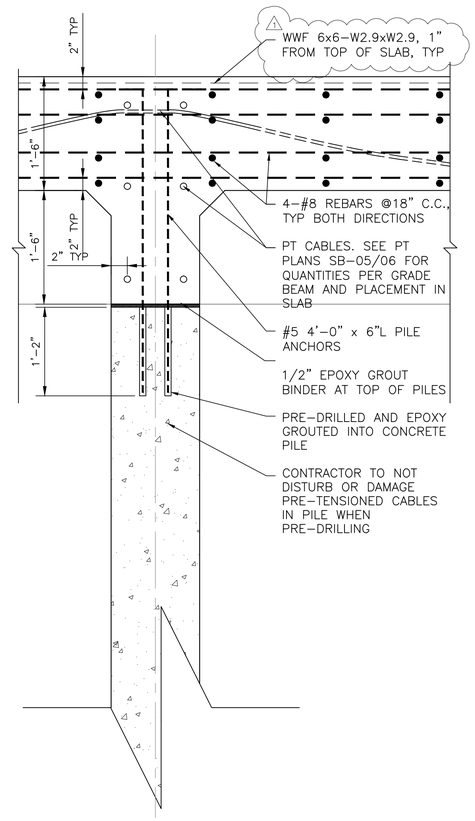
DWG. No. 12098-W8

SET NO: SHEET NO. 19 OF 72



ENLARGED PLAN- FOUNDATION / PILES

SCALE:1/8"=1□0"



1 SB-07 **DETAIL- PILE**

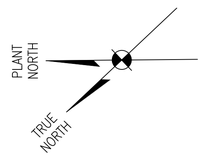
SCALE:1"=1□0"

NOTES:

1. SEE SPECIFICATION 31 62 13.19 PRECAST CONCRETE PILES FOR PILE DRIVING: LOCATION OF PILES; PLUMBNESS OF PILES; TOP OF PILE ELEVATION; RECORDATION OF PILE DRIVING.
2. TYP. 14x14 PRE-STRESSED CONCRETE PILES:

   6 TOTAL (TK-004 SLAB), 70' LONG, 50T LOAD CAPACITY, ULTIMATE LOAD CAPACITY 100T/PILE, SF.=2

   161 TOTAL (TK-001 CONTAINMENT), 75' LONG, 75T LOAD CAPACITY. ULTIMATE LOAD CAPACITY 150T/PILE, SF=2



REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN
1	3-27-15	REVISED DETAIL "1" CALL-OUT (ADD.4)	ICM

A CONCRETE CONTAINMENT DESIGN REPLACED WITH VECP DESIGNED BY CARRUBA ENGINEERING, SEE SUL-0159 FOR VECP DESIGN. AS-BUILT DRAWINGS FOR CONTAINMENT PROVIDED BY RLH ARE INCLUDED AS AN APPENDIX TO THIS SET OF AS-BUILT DRAWINGS.

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLE□

FUEL STORAGE TANK AREA (TK-001) FOUNDATION PLAN

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY IVAN MANDICH, LICENCE No. 15570 ON 2-6-15. THIS DOCUMENT SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT.

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. SB-03

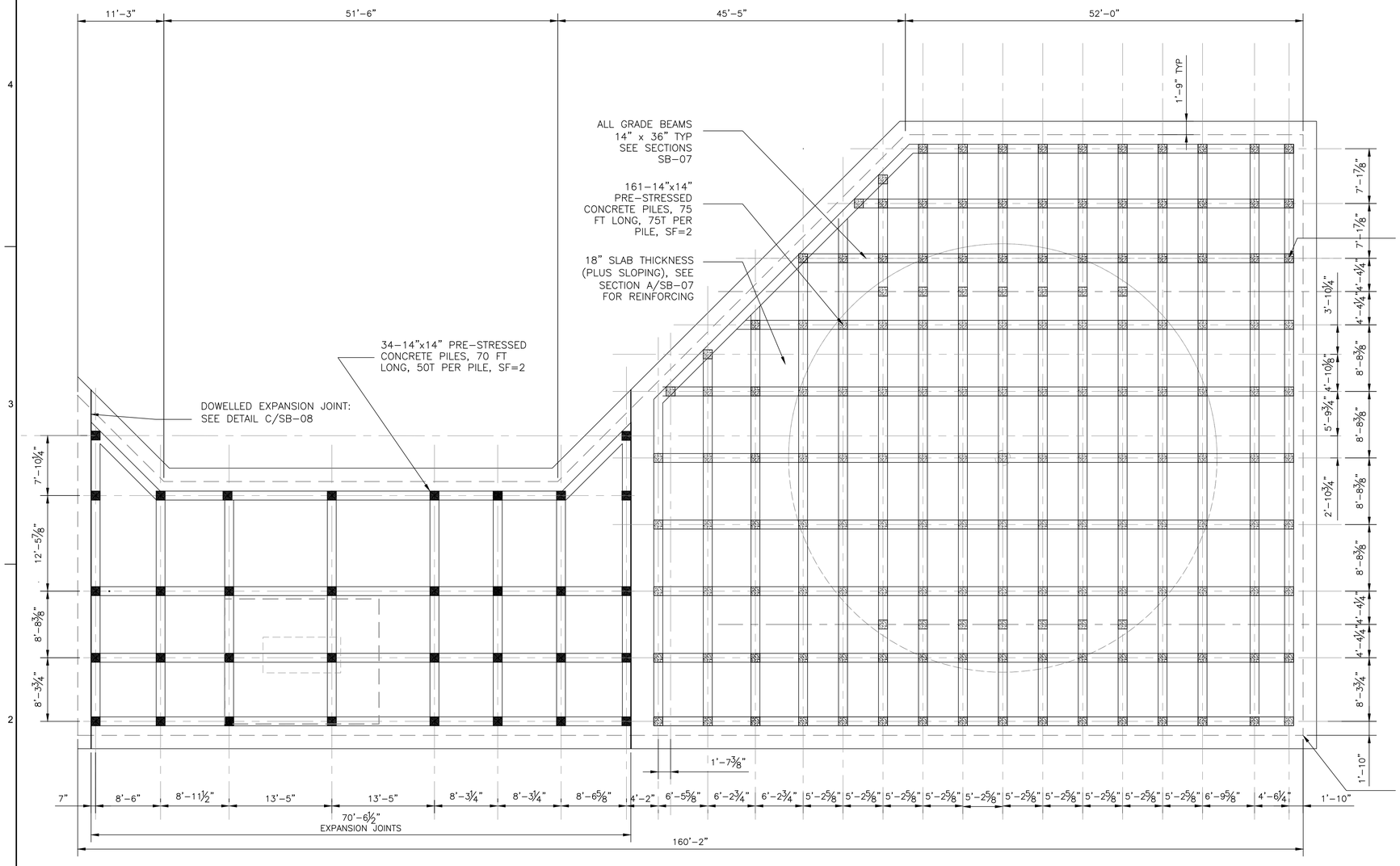
TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

DR:	K MCALLISTER
CK:	I MANDICH
AP:	I MANDICH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

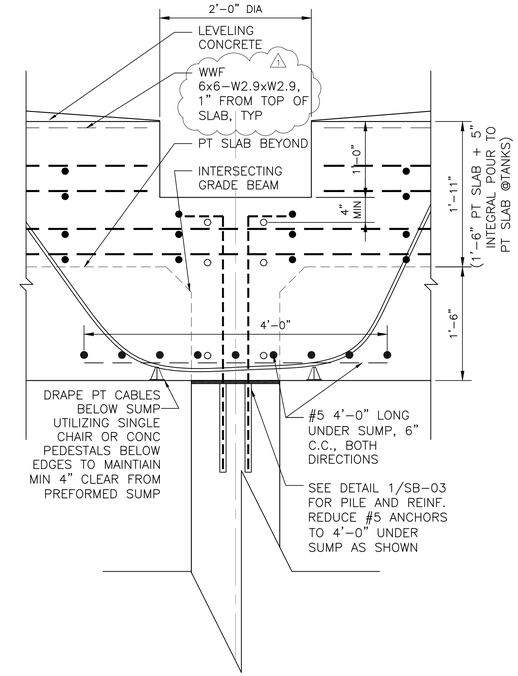
DWG. No. 12098-W8

SET NO: SHEET NO: 20 OF 72



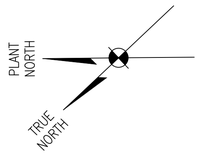
ENLARGED PLAN- FOUNDATION / PILES

SCALE:1/8"=1'-0"



2 SB-07 DETAIL- SUMP, TK-001 / TK-002

SCALE:1-1/2"=1'-0"



NOTES:

1. SEE SPECIFICATION 31 62 13.19 PRECAST CONCRETE PILES FOR PILE DRIVING.
2. TYP. 14x14 PRE-STRESSED CONCRETE PILES:

   34 TOTAL, 70' LONG, 50T LOAD CAPACITY, ULTIMATE LOAD CAPACITY 100T/PILE, SF.=2

   161 TOTAL (TK-002 CONTAINMENT), 75' LONG, 75T LOAD CAPACITY. ULTIMATE LOAD CAPACITY 150T/PILE, SF=2

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN
1	3-27-15	REVISED DETAIL "2" CALL-OUT (ADD.4)	ICM

A CONCRETE CONTAINMENT DESIGN REPLACED WITH VECP DESIGNED BY CARRUBA ENGINEERING, SEE SUL-0159 FOR VECP DESIGN. AS-BUILT DRAWINGS FOR CONTAINMENT PROVIDED BY RLH ARE INCLUDED AS AN APPENDIX TO THIS SET OF AS-BUILT DRAWINGS.

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

FUEL STORAGE TANK AREA- TANK-002 FOUNDATION PLAN

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

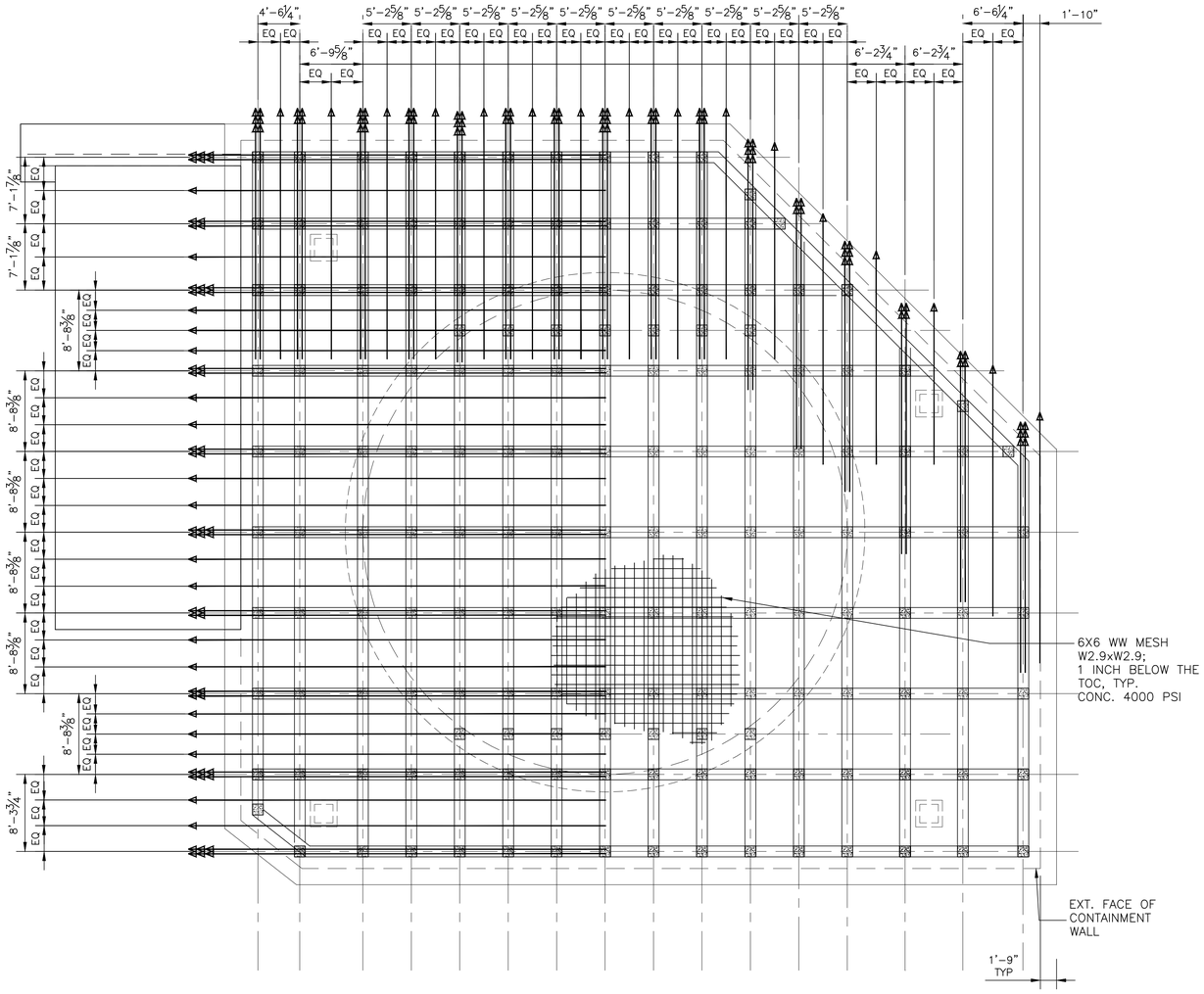
DR:	K MCALLISTER
CK:	I MANDICH
AP:	I MANDICH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

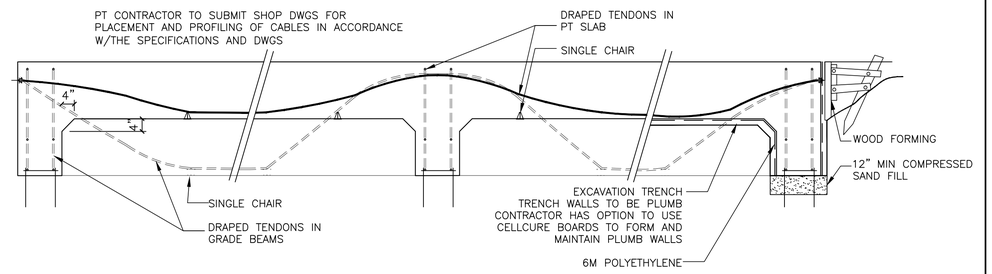
SET NO: SHEET NO: 21 OF 72

TRIGON DWG. NO. SB-04



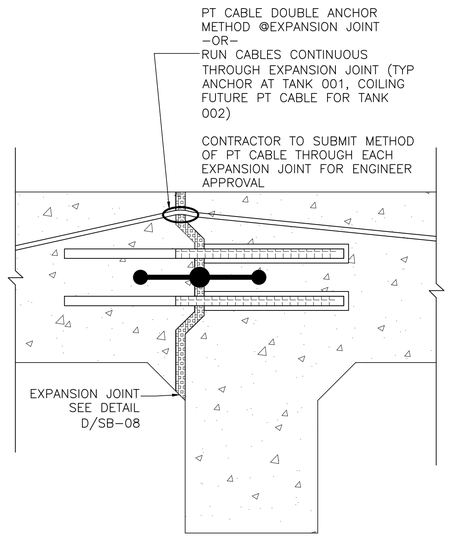
ENLARGED PLAN- POST TENSION

SCALE:1/8"=1□0"



SCHEMATIC TYP POST TENSION INSTALLATION / EXCAVATION

SCALE:1/2"=1□0"



POST TENSION AND EXPANSION JOINTS

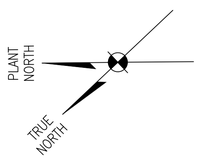
A / SB-02

SCALE:1 1/2"=1□0"

NOTES:

1. SEE SPECIFICATION 03 38 16 POST TENSIONED CONCRETE FOR POST TENSION SLAB
2. CONTRACTOR TO USE CONTINUOUS CABLES, PREPARED FOR THE ENTIRE LENGTH, AND TENSIONED BOTH DIRECTIONS.
3. CONTRACTOR TO USE ANCHORING FROM FACE TO FACE ON THE CONTINUOUS CABLES.
4. MESH 6X6 W2.9xW2.9 WILL BE INSTALLED 1 INCH BELLOW THE TOP OF THE FINISHED SLAB IN THE ENTIRE SLAB AREA.
5. NOTES ON ELONGATION:
   CONTRACTOR WILL INFORM THE ENGINEER OF THE TENSIONING FORCES USED IN OBTAINING THE GIVEN ELONGATION. IF FOUND THAT THE ELONGATION FALLS SHORTER THAN THE PULLING FORCES AS PER CALIBRATED GAUGES, CONTRACTOR WILL PROCEED TO OBTAIN THOSE FORCES. CONTRACTOR TO ACHIEVE THE SPECIFIED ELONGATION. CHECK THE PHYSICAL PROPERTIES OF THE CABLES USED TO MATCH THE MODULUS AND ELONGATION GIVEN.
6. ELONGATION CALCULATIONS SAMPLE:

   PT CONTRACTOR MUST CALCULATE THE ELONGATION AS FOLLOWS:
   LENGTH OF THE CABLE IN FEET TIMES 9.37% AND TENSIONED TO SPECIFICATIONS AND TO THE ALIGNMENT AS SHOWN SEE TYP SECTIONS.



THIS SHEET WAS REPLACED ENTIRELY WITH THE VECP DESIGNED BY CARUBBA ENGINEERING, SEE SUL–0159 FOR VECP DESIGN. AS–BUILT DRAWINGS FOR CONTAINMENT PROVIDED BY RLH ARE INCLUDED AS AN APPENDIX TO THIS SET OF AS–BUILT RECORD DRAWINGS.

REV.	DATE	DESCRIPTION	BY
A	10–25–19	AS–BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLE□

FUEL STORAGE TANK AREA-TK-001 POST TENSION PLAN

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

DR:	K MCALLISTER
CK:	I MANDICH
AP:	I MANDICH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

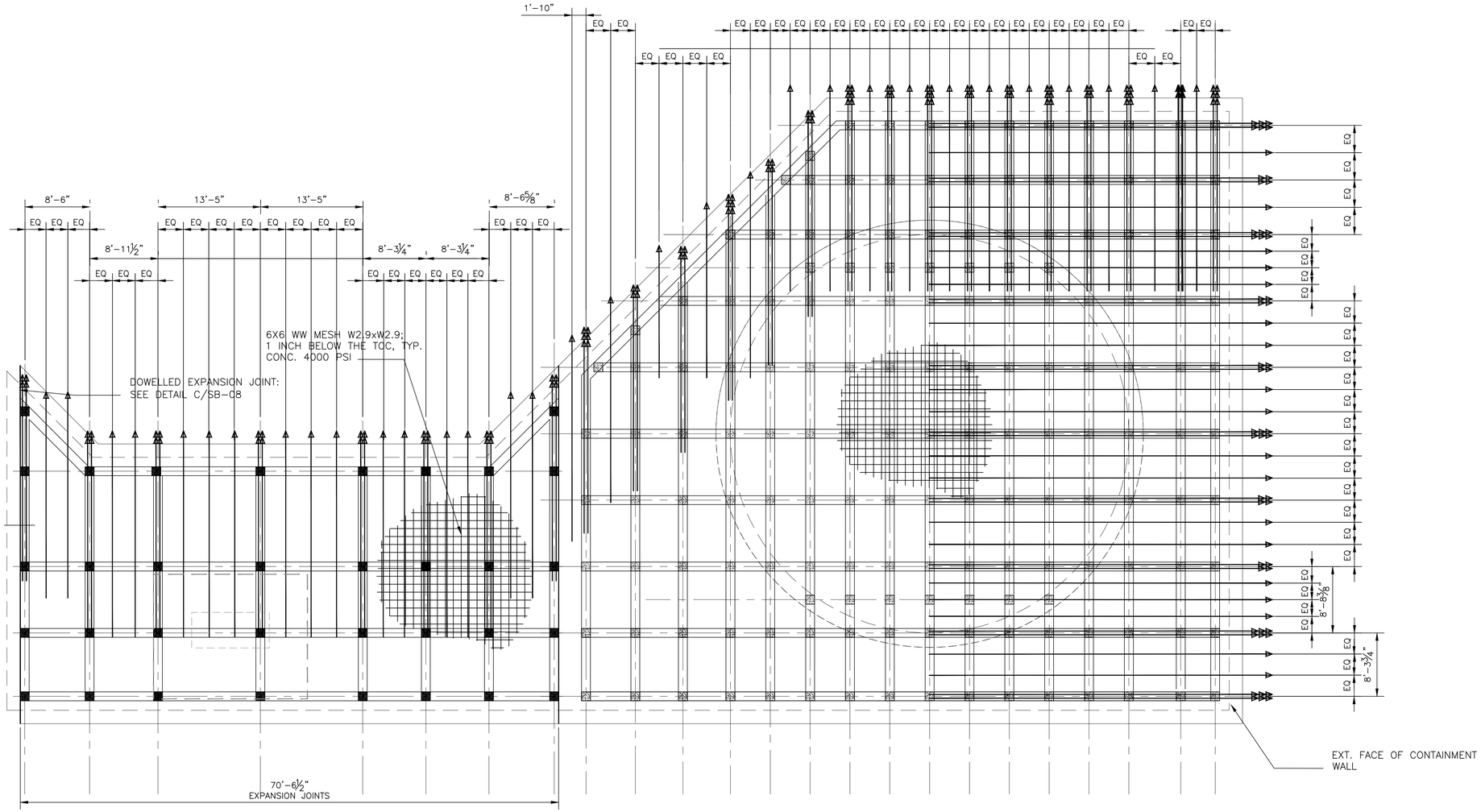
GENERAL SUPERINTENDENT

DWG. No. 12098-W8

TRIGON DWG. NO. SB-05

SET NO:

SHEET NO: 22 OF 72



ENLARGED PLAN- POST TENSION

SCALE:1/8"=1'-0"

PLANT NORTH

TRUE NORTH

NOTES:

1. SEE SPECIFICATION 03 38 16 POST TENSIONED CONCRETE FOR POST TENSION SLAB
2. CONTRACTOR TO USE CONTINUOUS CABLES, PREPARED FOR THE ENTIRE LENGTH, AND TENSIONED BOTH DIRECTIONS.
3. CONTRACTOR TO USE ANCHORING FROM FACE TO FACE ON THE CONTINUOUS CABLES.
4. MESH 6X6 W2.9xW2.9 WILL BE INSTALLED 1 INCH BELLOW THE TOP OF THE FINISHED SLAB IN THE ENTIRE SLAB AREA.
5. NOTES ON ELONGATION:
   CONTRACTOR WILL INFORM THE ENGINEER OF THE TENSIONING FORCES USED IN OBTAINING THE GIVEN ELONGATION. IF FOUND THAT THE ELONGATION FALLS SHORTER THAN THE PULLING FORCES AS PER CALIBRATED GAUGES, CONTRACTOR WILL PROCEED TO OBTAIN THOSE FORCES. CONTRACTOR TO ACHIEVE THE SPECIFIED ELONGATION. CHECK THE PHYSICAL PROPERTIES OF THE CABLES USED TO MATCH THE MODULUS AND ELONGATION GIVEN.
6. ELONGATION CALCULATIONS SAMPLE:

   PT CONTRACTOR MUST CALCULATE THE ELONGATION AS FOLLOWS:
   LENGTH OF THE CABLE IN FEET TIMES 9.37% AND TENSIONED TO SPECIFICATIONS AND TO THE ALIGNMENT AS SHOWN SEE TYP SECTIONS.

REV.	DATE	DESCRIPTION	BY
A	10–25–19	AS–BUILT MARKUPS	LHN

THIS SHEET WAS REPLACED ENTIRELY WITH THE VECP DESIGNED BY CARUBBA ENGINEERING, SEE SUL–0159 FOR VECP DESIGN. AS–BUILT DRAWINGS FOR CONTAINMENT PROVIDED BY RLH ARE INCLUDED AS AN APPENDIX TO THIS SET OF AS–BUILT RECORD DRAWINGS.

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLE□

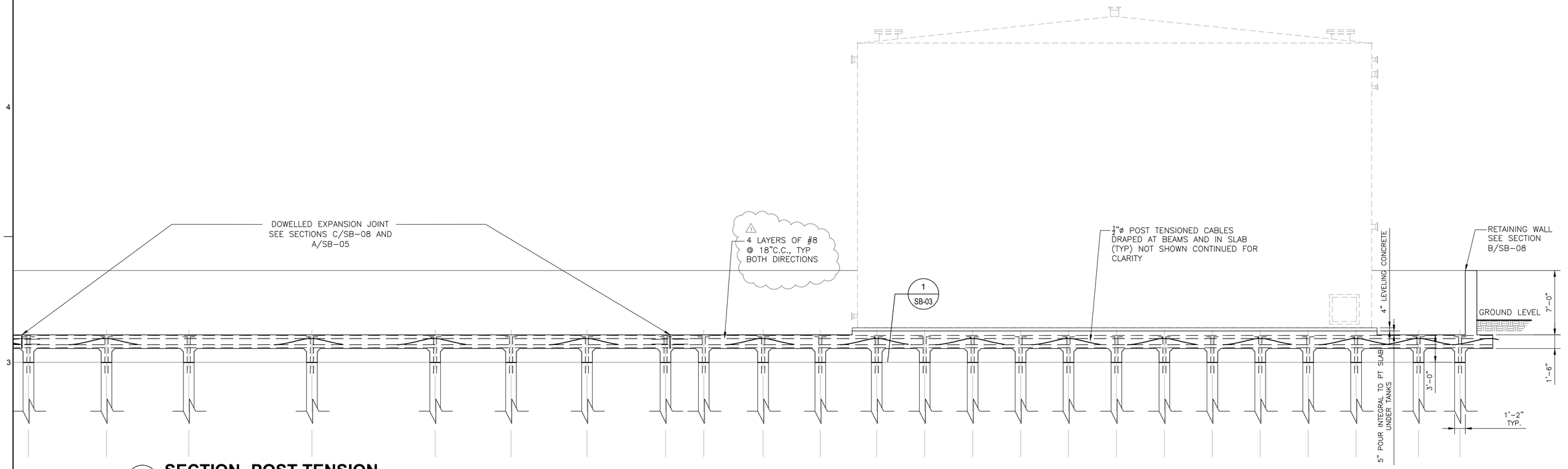
FUEL STORAGE TANK AREA (TK-002) POST TENSION PLAN

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

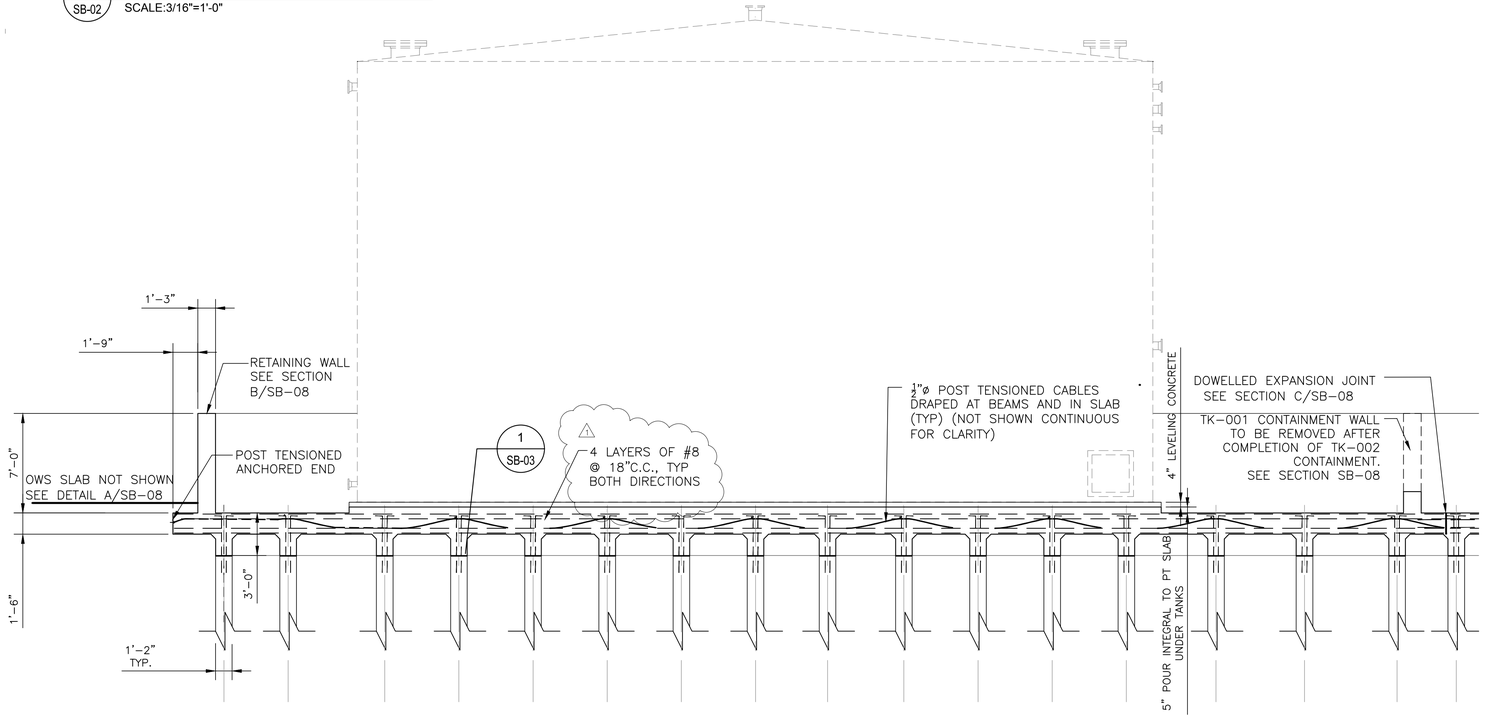
trigonassociates.com

TRIGON DWG. NO.	SB-06
DR.	K MCALLISTER
CK:	I MANDICH
AP:	I MANDICH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015
GENERAL SUPERINTENDENT	
DWG. No.	12098-W8
SET NO:	
SHEET NO:	23 OF 72



A SB-02 **SECTION- POST TENSION**

SCALE:3/16"=1'-0"



B SB-02 **SECTION- POST TENSION**

SCALE:3/16"=1'-0"

A CONCRETE CONTAINMENT DESIGN REPLACED WITH VECP DESIGNED BY CARRUBA ENGINEERING, SEE SUL-0159 FOR VECP DESIGN. AS-BUILT DRAWINGS FOR CONTAINMENT PROVIDED BY RLH ARE INCLUDED AS AN APPENDIX TO THIS SET OF AS-BUILT DRAWINGS.

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN
1	3-27-15	REVISED REBAR CALL-OUT (ADD.4)	ICM

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. SB-07

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

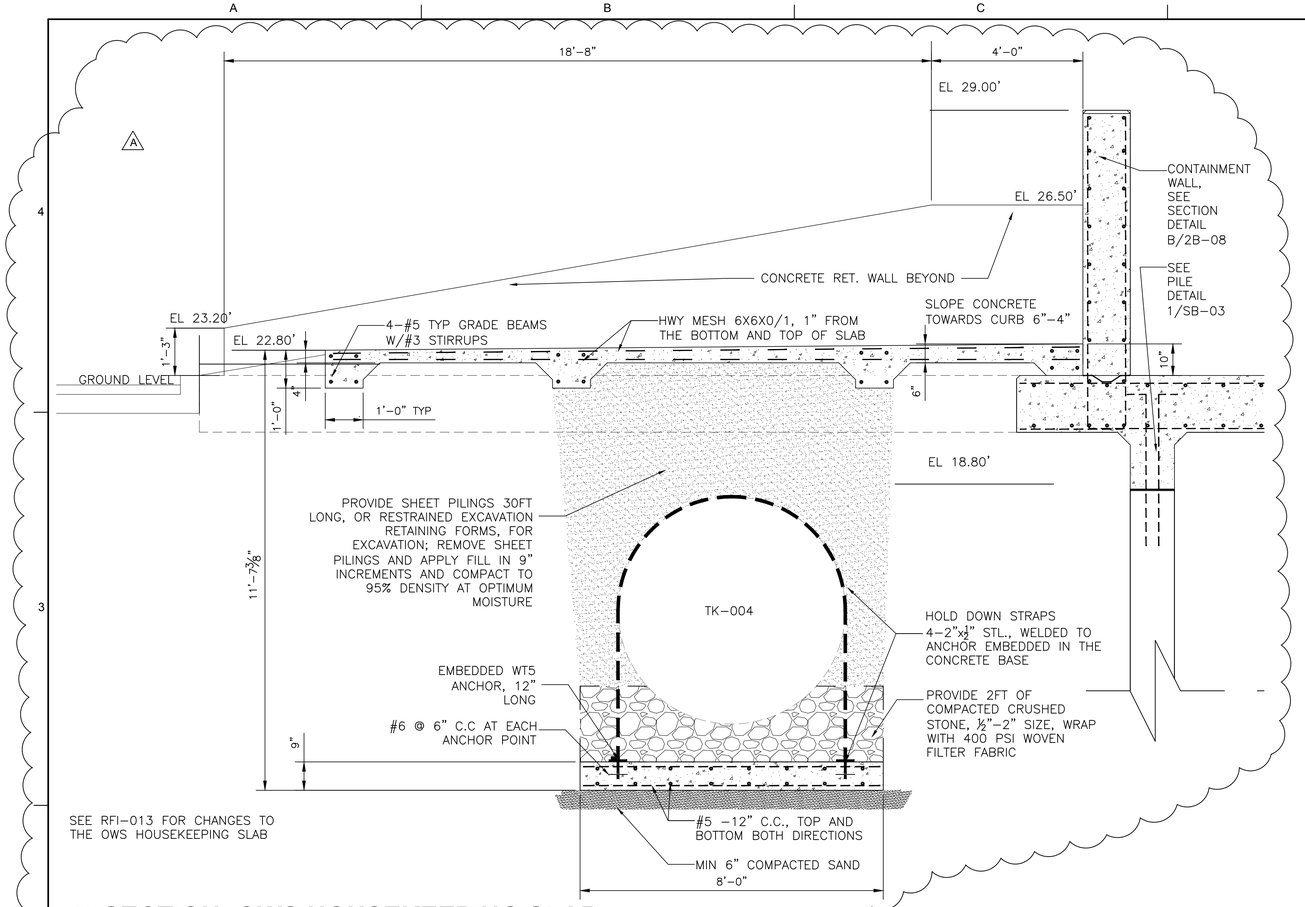
FUEL STORAGE TANK AREA
SECTIONS

DR:	K MCALLISTER
CK:	I MANDICH
AP:	I MANDICH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

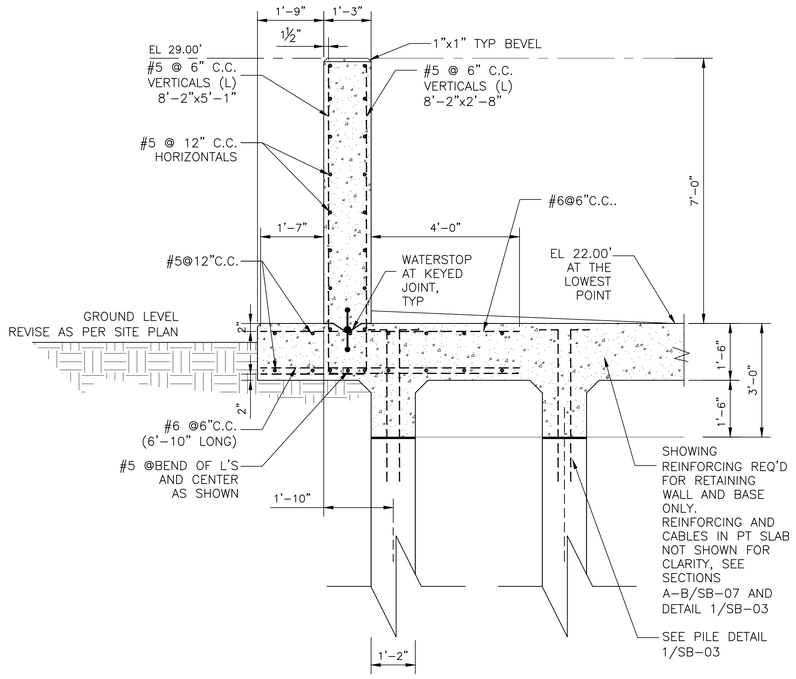
DWG. No. 12098-W8

SET NO: SHEET NO: 24 OF 72



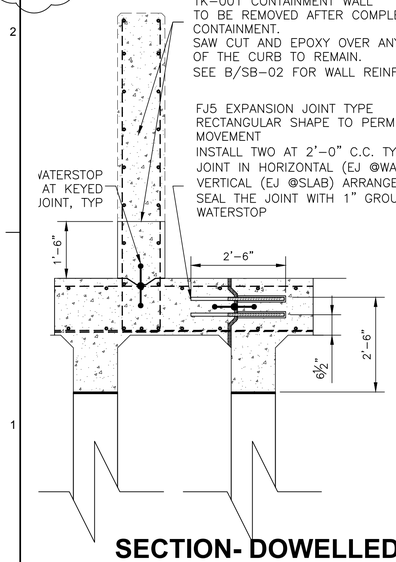
A SB-02 **SECTION- OWS HOUSEKEEPING SLAB**

SCALE:1/2"=1'-0"



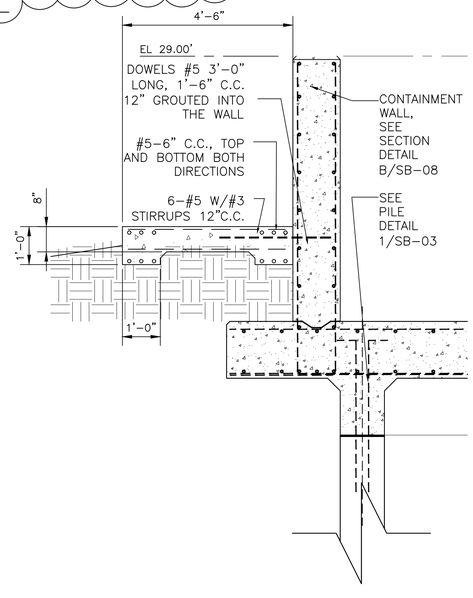
B SB-02 **SECTION- RETAINING WALL TYP**

SCALE: 1/2"=1'-0"



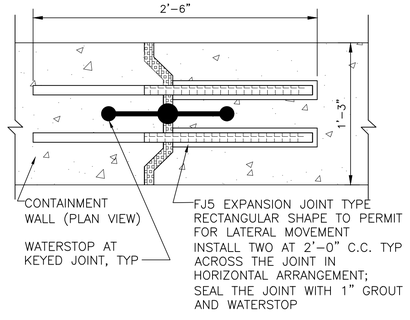
C SB-02 **SECTION- DOWELLED EXPANSION JOINT**

SCALE: 1/2"=1'-0"



D SB-09 **SECTION- STAIR SLAB**

SCALE: 1/2"=1'-0"



1 SB-02 **DETAIL- WALL EXPANSION JOINT**

SCALE: 1 1/2"=1'-0"

NOTES:

1. SIZE OF OWS IS APPROXIMATE. SLAB UNDER EQUIPMENT SHALL ACCOMMODATE MANUFACTURER SIZING, RECOMMENDATIONS, AND PENETRATIONS THROUGH THE SLAB. CONTRACTOR TO VERIFY INSTALLATION MEANS AND METHODS W/TANK MANUFACTURER.

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

A ALL WORK ASSOCIATED WITH CONTAINMENT SLAB AND WALLS REPLACED WITH VECP DESIGNED BY CARUBBA ENGINEERING, SEE SUL-0159 FOR VECP DESIGN. AS-BUILT DRAWINGS FOR CONTAINMENT PROVIDED BY RLH ARE INCLUDED AS AN APPENDIX TO THIS SET OF AS-BUILT DRAWINGS.

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY IVAN MANDICH, LICENCE No. 15570 ON 2-6-15. THIS DOCUMENT SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT.

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. SB-08

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

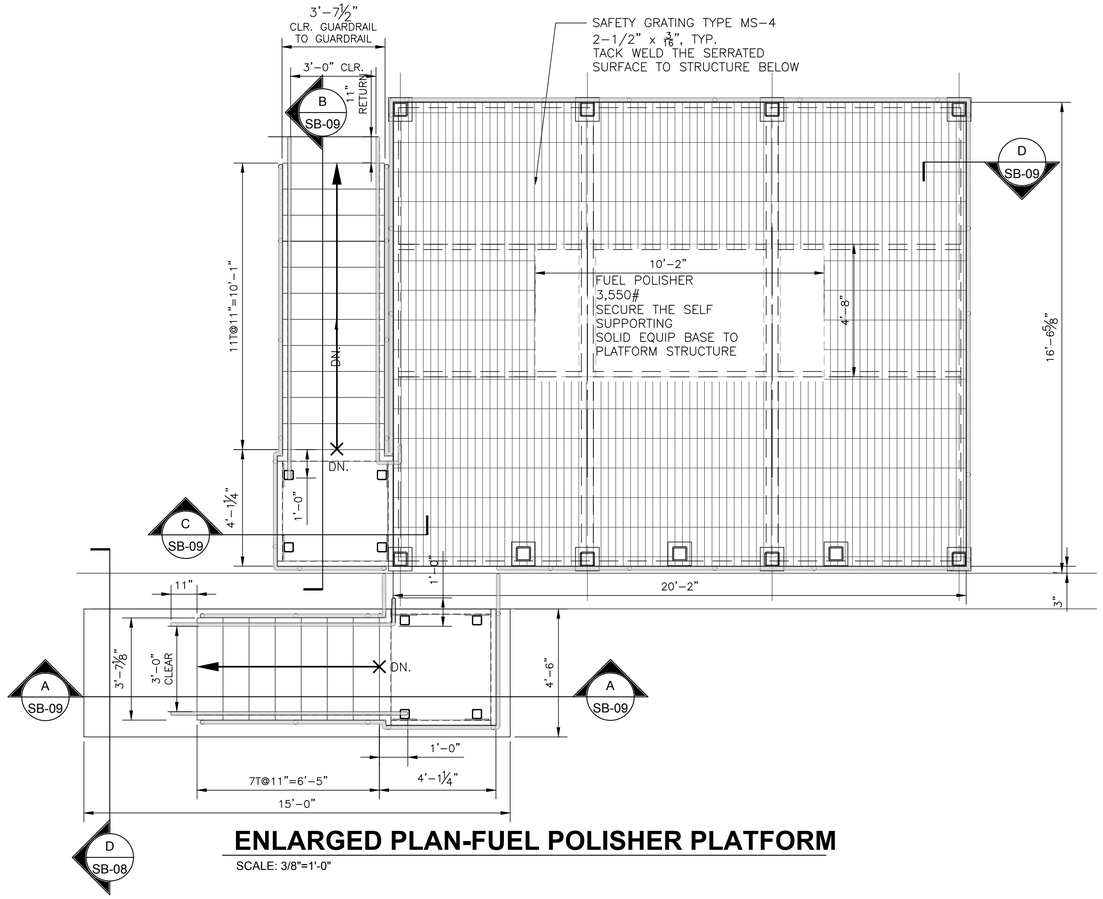
FUEL STORAGE TANK AREA SECTION DETAILS

DR.	K MCALLISTER
CK:	I MANDICH
AP:	I MANDICH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

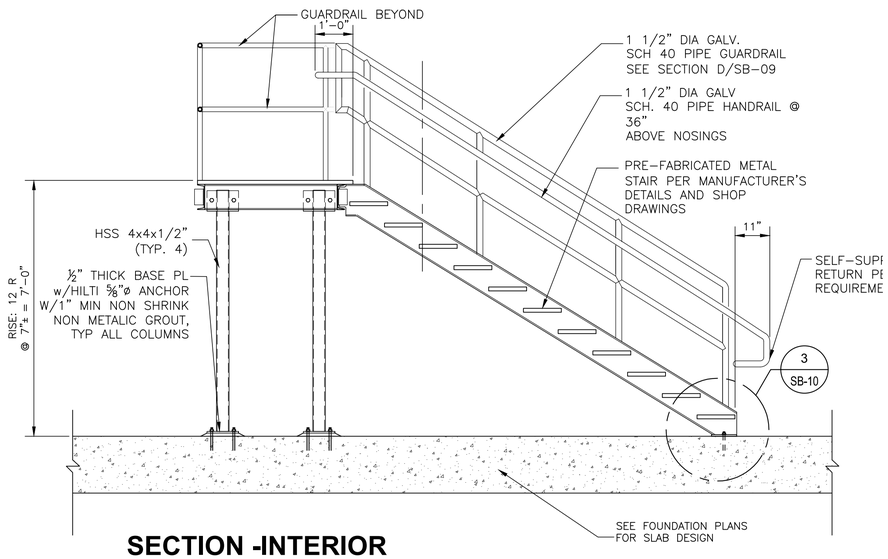
DWG. No. 12098-W8

SET NO: SHEET NO: 25 OF 72



ENLARGED PLAN-FUEL POLISHER PLATFORM

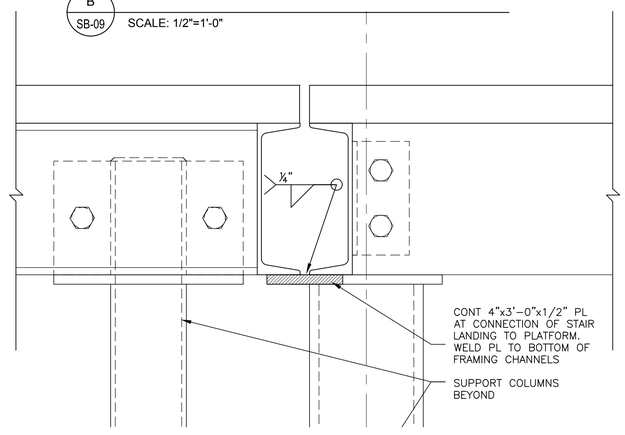
SCALE: 3/8"=1'-0"



SECTION -INTERIOR CONTAINMENT STAIRS

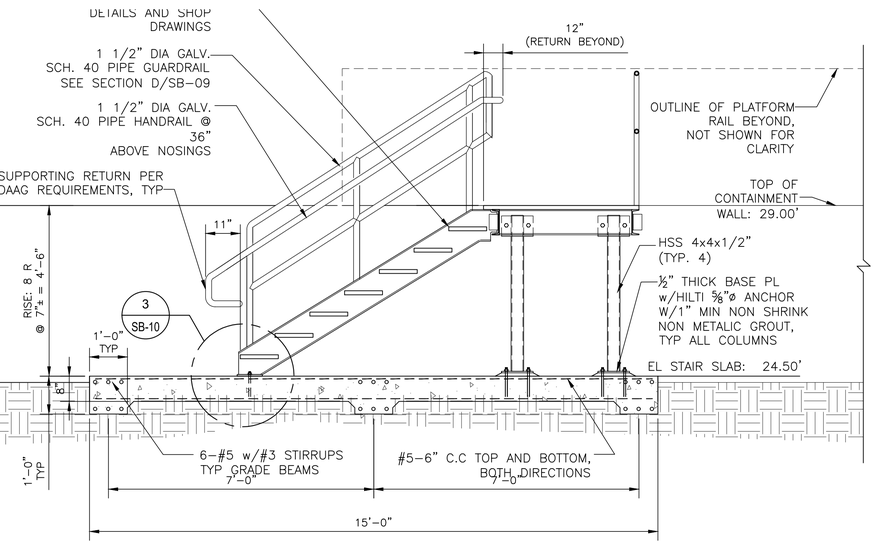
B SB-09 SCALE: 1/2"=1'-0"

6X6 WW MESH W2.9xW2.9; 1 INCH BELOW THE TOC, TYP. CONC. 4000 PSI



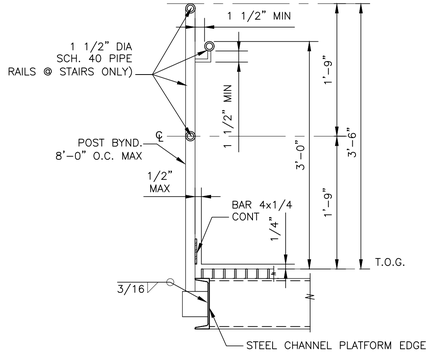
SECTION-STAIR LANDING TO PLATFORM

C SB-09 SCALE: 3"=1'-0"



SECTION THROUGH STAIR

A SB-09 SCALE: 1/2"=1'-0"



TYP GUARDRAIL / HANDRAIL SECTION

D SB-09 SCALE: 1"=1'-0"

NOTES:

1. SEE SPECIFICATION 05 51 16 INDUSTRIAL METAL STAIRS FOR STAIRS AND HANDRAILS

A SEE SUL-0241 FOR BASELINE AS-BUILTS

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY IVAN MANDICH, LICENCE No. 15570 ON 2-6-15. THIS DOCUMENT SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT.

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. SB-09

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

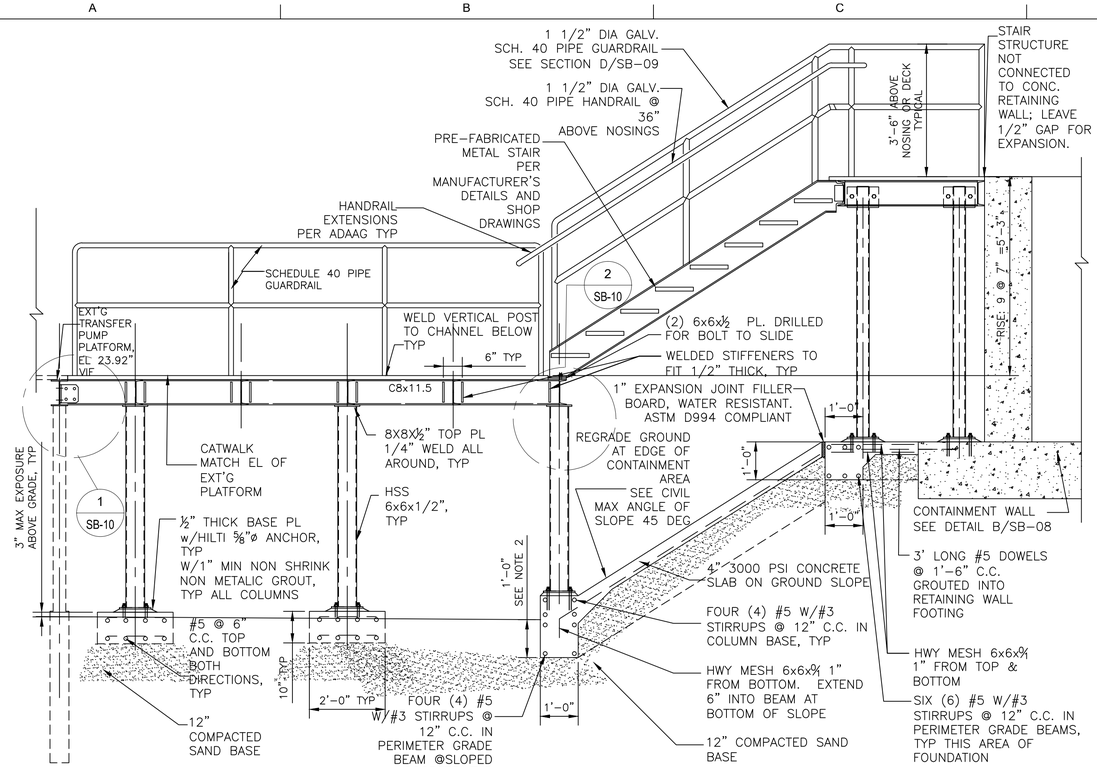
FUEL STORAGE TANK AREA STAIR DETAILS

DR:	K MCALLISTER
CK:	I MANDICH
AP:	I MANDICH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

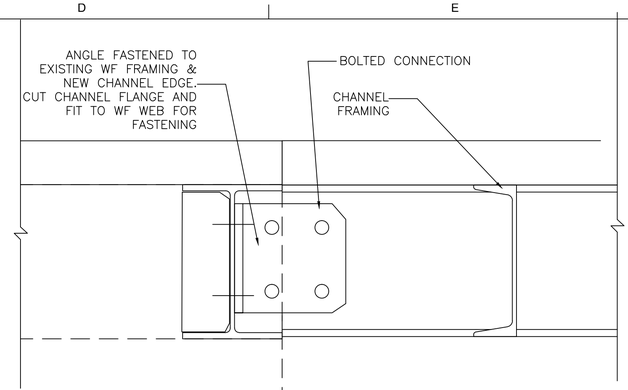
DWG. No. 12098-W8

SET NO: SHEET NO: 26 OF 72



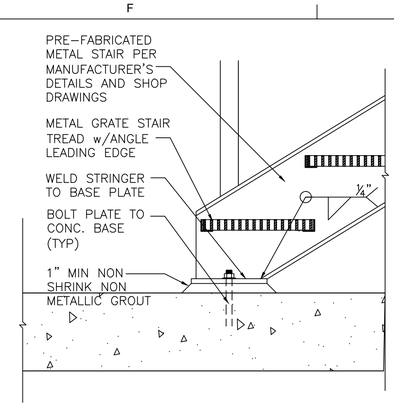
A SB-10 **SECTION- CATWALK AND STAIR**

SCALE: 1/2"=1□0"



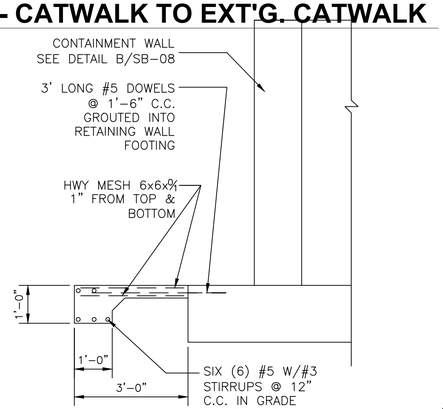
1 SB-10 **DETAIL- CATWALK TO EXT'G. CATWALK**

SCALE: 3"=1□0"



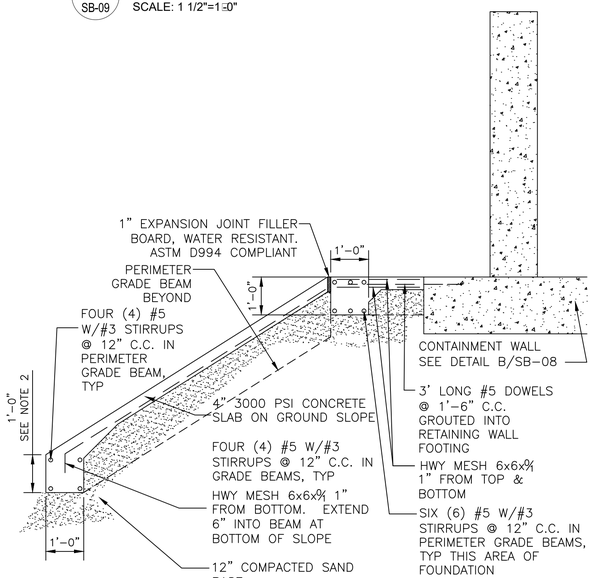
3 SB-09 **DETAIL-TYPICAL STAIR BASE PLATE**

SCALE: 1 1/2"=1□0"



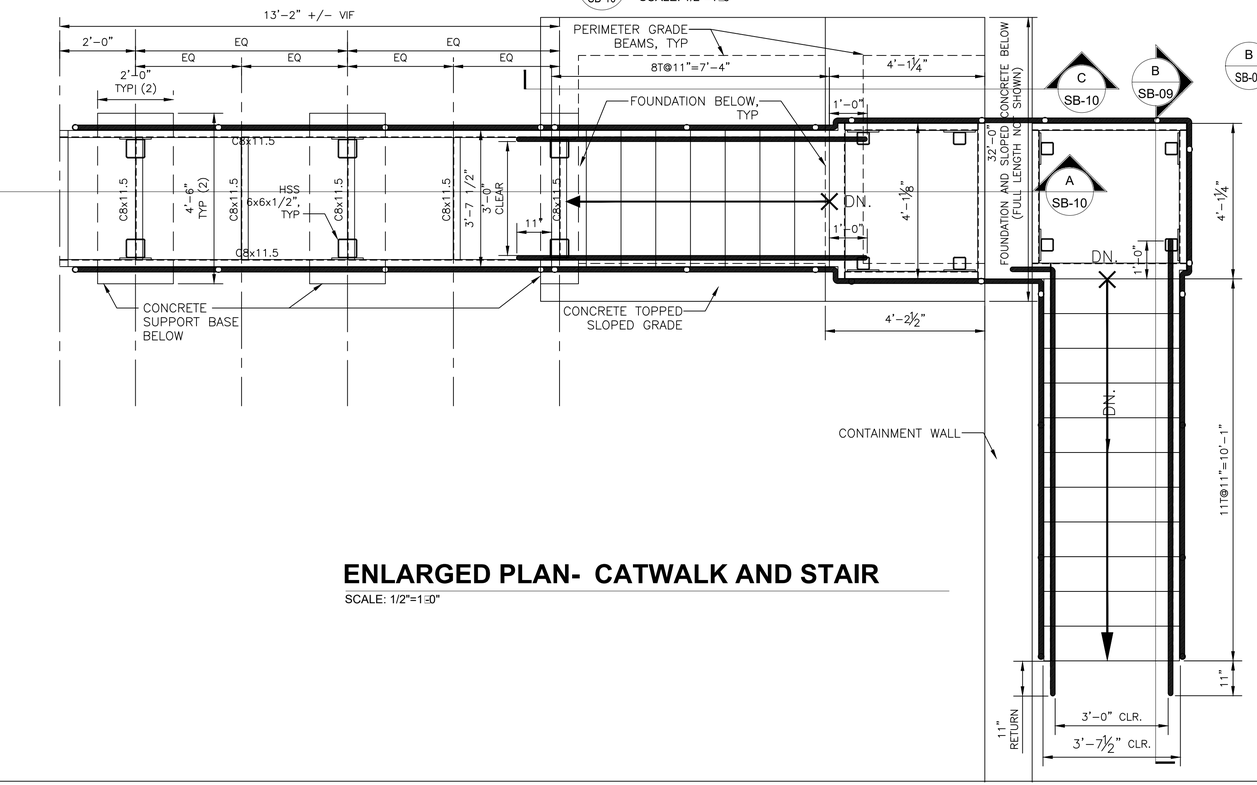
B SB-02 **SECTION- LADDER LANDING**

SCALE: 1/2"=1□0"



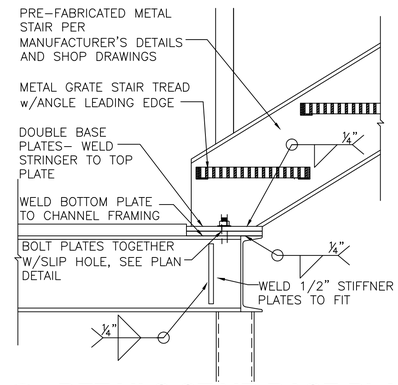
C SB-10 **SECTION- SLOPED CONCRETE**

SCALE: 1/2"=1□0"



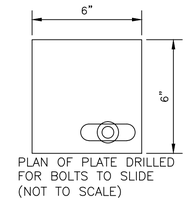
ENLARGED PLAN- CATWALK AND STAIR

SCALE: 1/2"=1□0"



2 SB-10 **DETAILS-STAIR BASE PLATE**

SCALE: 1 1/2"=1□0"



PLAN OF PLATE DRILLED FOR BOLTS TO SLIDE (NOT TO SCALE)

NOTES:

1. SEE SPECIFICATION 05 51 16 INDUSTRIAL METAL STAIRS FOR STAIRS AND HANDRAILS
2. EL 17.31' TOP OF GRADE BEAM, VERIFY IN FIELD TO ENSURE MIN 6" BELOW TOS OF TANK SLAB

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEE SUL-0241 FOR BASELINE AS-BUILTS

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

TRIGON DWG. NO. SB-10

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLE□

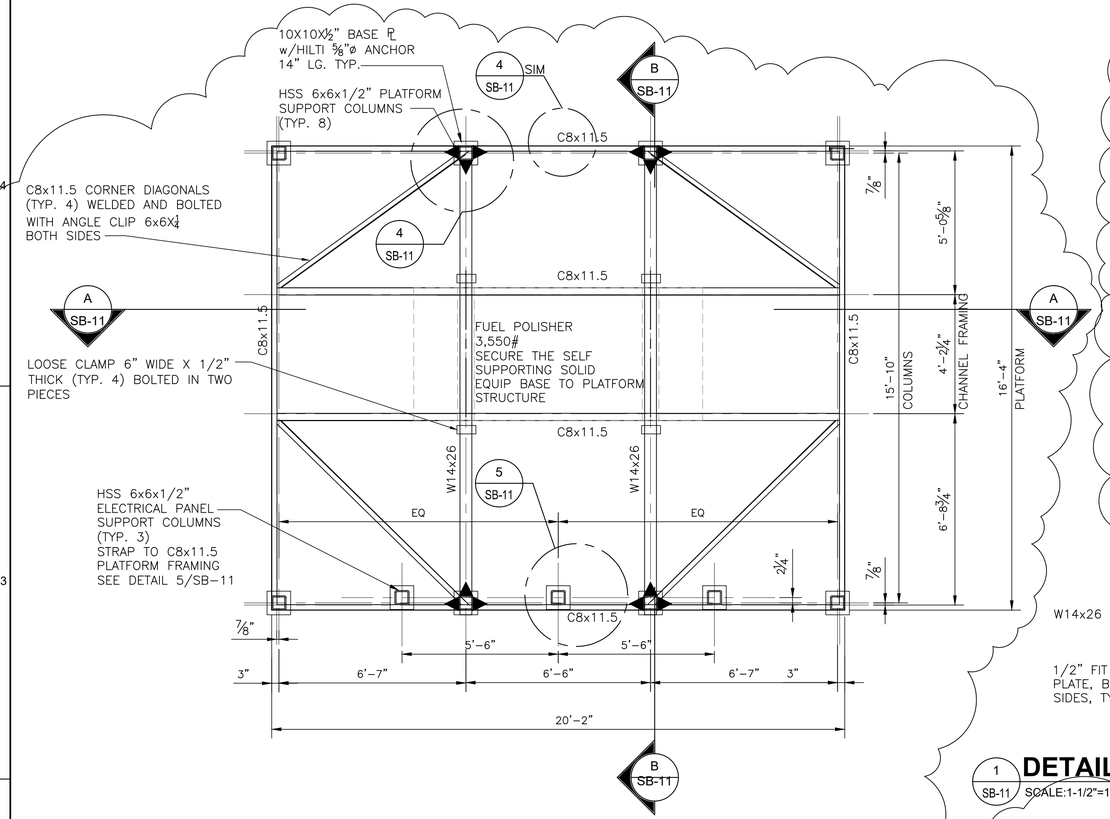
FUEL STORAGE TANK AREA CATWALK / STAIR/ DETAILS

DR:	K MCALLISTER
CK:	I MANDICH
AP:	I MANDICH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

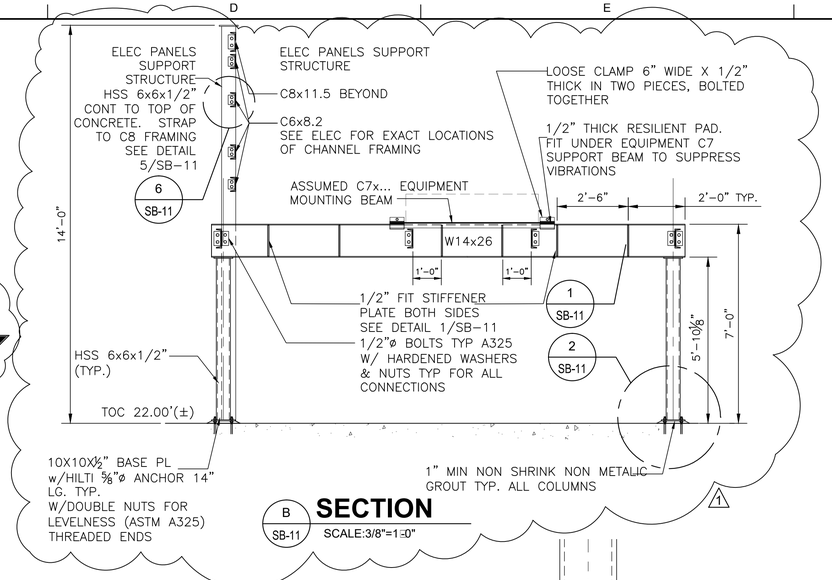
DWG. No. 12098-W8

SET NO: SHEET NO: 27 OF 72



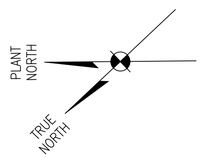
FRAMING PLAN-FUEL POLISHER PLATFORM

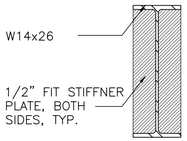
SCALE:3/8"=1□0"



B SB-11 SECTION

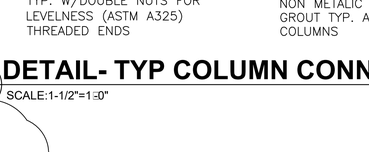
SCALE:3/8"=1□0"





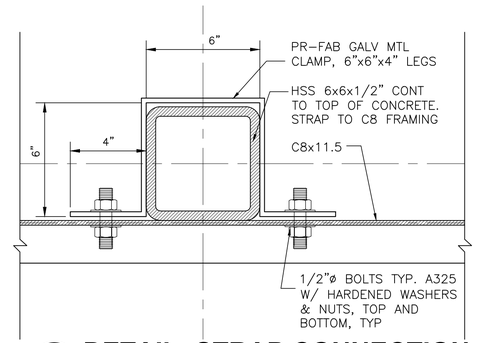
1 SB-11 DETAIL- STIFFNER PLATE

SCALE:1-1/2"=1□0"



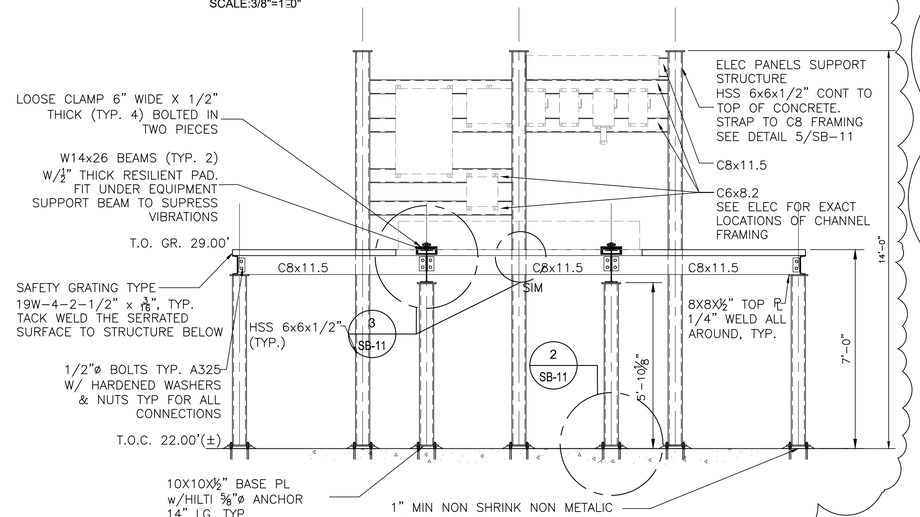
2 SB-11 DETAIL- TYP COLUMN CONNECTION

SCALE:1-1/2"=1□0"



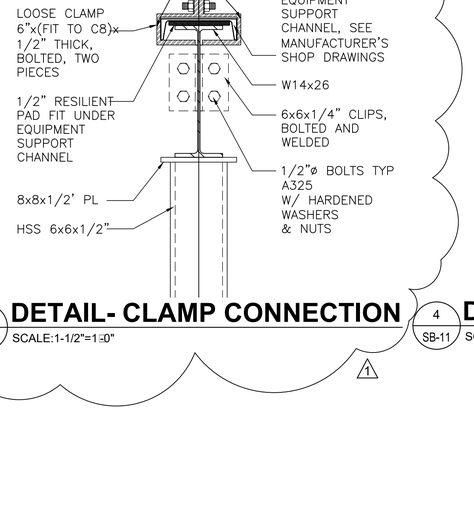
5 SB-11 DETAIL- STRAP CONNECTION

SCALE:3"=1□0"



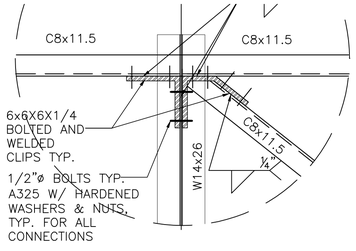
A SB-11 SECTION

SCALE:3/8"=1□0"



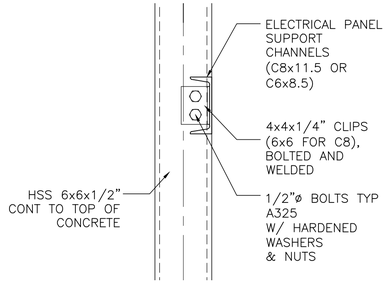
3 SB-11 DETAIL- CLAMP CONNECTION

SCALE:1-1/2"=1□0"



4 SB-11 DETAIL- FRAMING CONNECTIONS

SCALE:1-1/2"=1□0"



6 SB-11 DETAIL-ELEC PANEL SUPPORT

SCALE:1-1/2"=1□0"

SEE SUL-0241 FOR BASELINE AS-BUILTS. A
SHEET REVISED PER RESPONSE TO RFI-0116.

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN
1	12/14/18	RFI 116 E□UIPMENT COORDINATION	KM / IM

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLE□

FUEL STORAGE TANK AREA
FUEL POLISHER PLATFORM

Trigon
Quality ▲ Commitment ▲ Client Service
TRIGON DWG. NO. SB-11

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

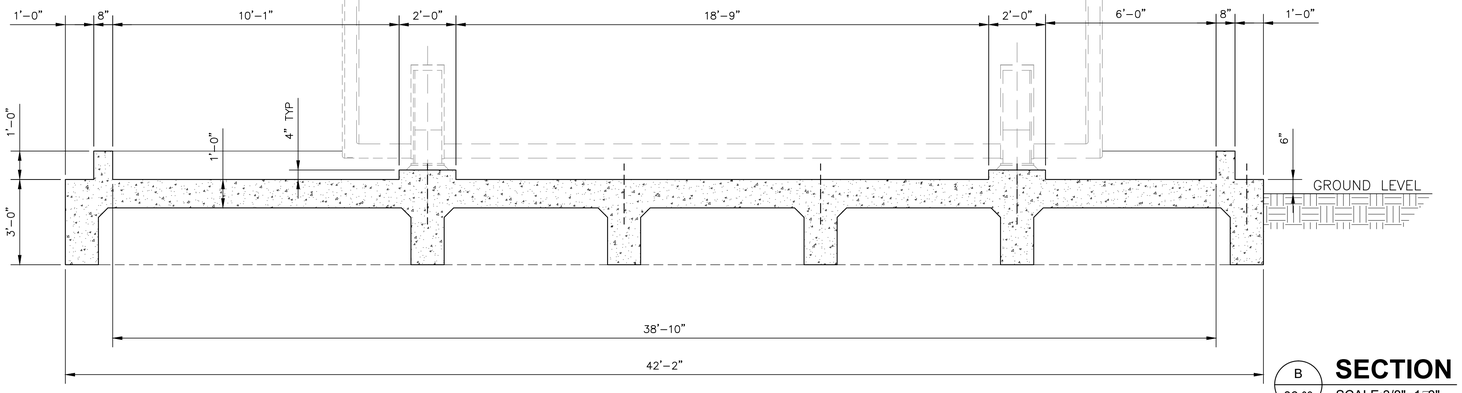
DR:	K MCALLISTER
CK:	I MANDICH
AP:	I MANDICH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

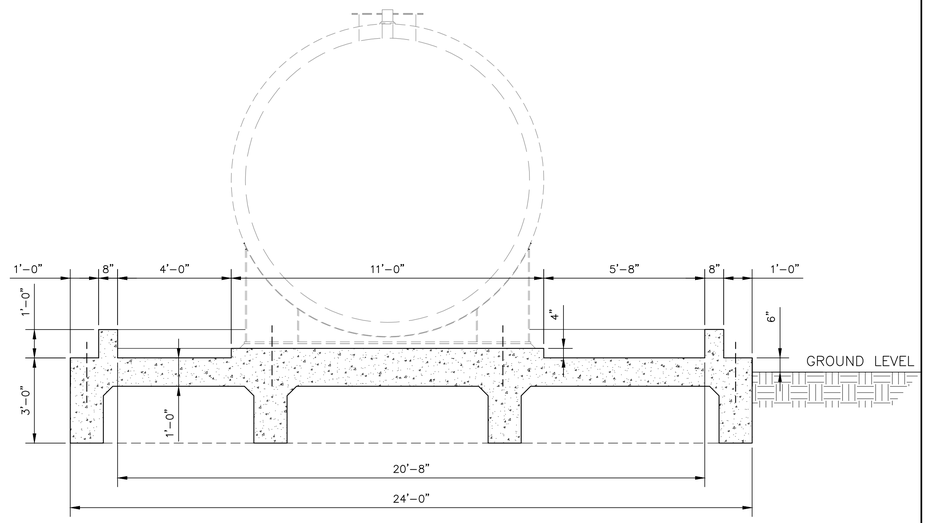
DWG. No. 12098-W8

SET NO: SHEET NO: 28 OF 72

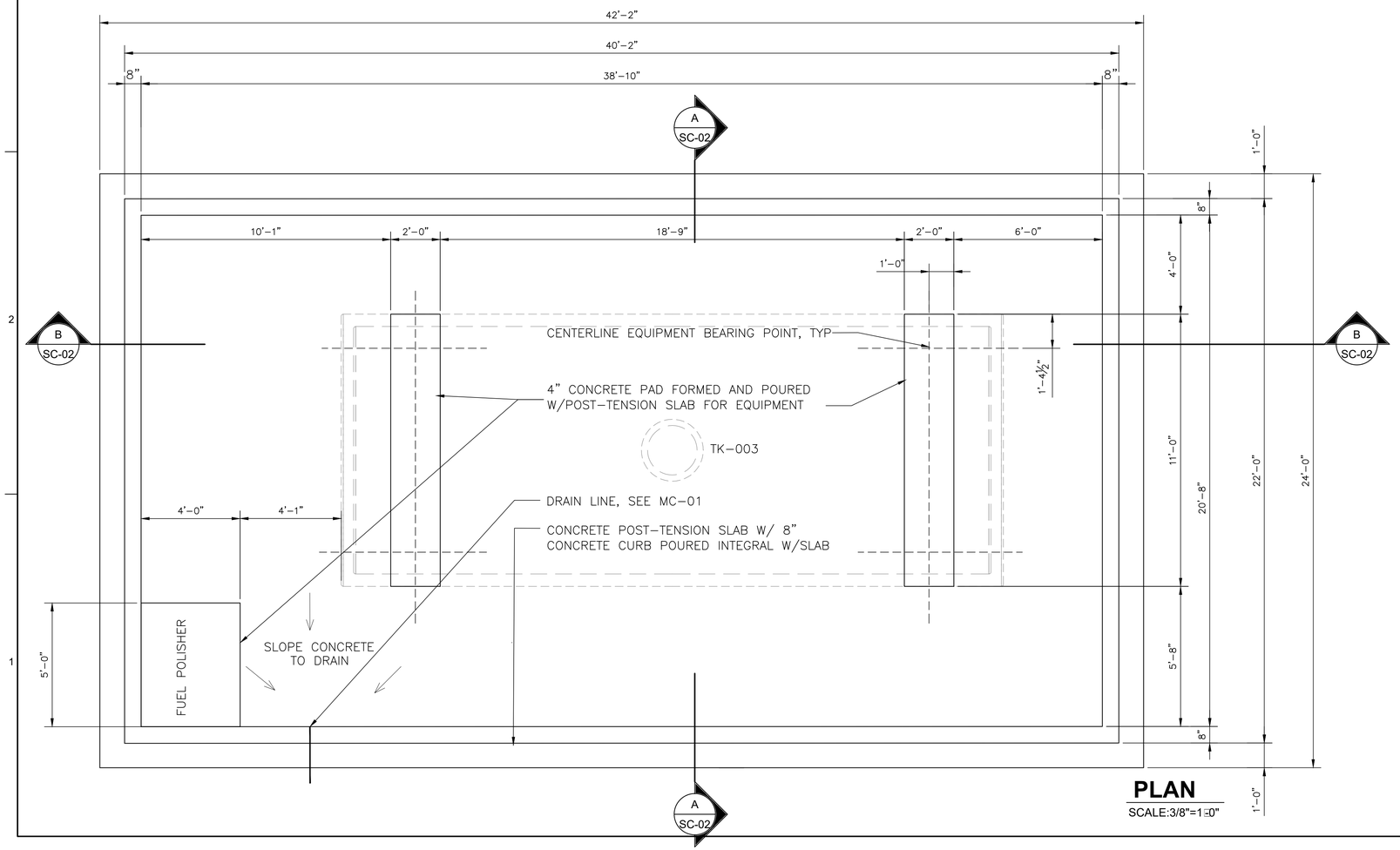
TK-003
EMERGENCY FUEL DAY TANK
(15,000 GALLON CAPACITY)



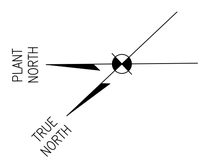
B SC-02 **SECTION**
SCALE:3/8"=1'-0"



A SC-02 **SECTION**
SCALE:3/8"=1'-0"



PLAN
SCALE:3/8"=1'-0"



REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD
OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLE□

DAY TANK (TK-003)
PLAN AND SECTIONS

A AS-BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR.

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

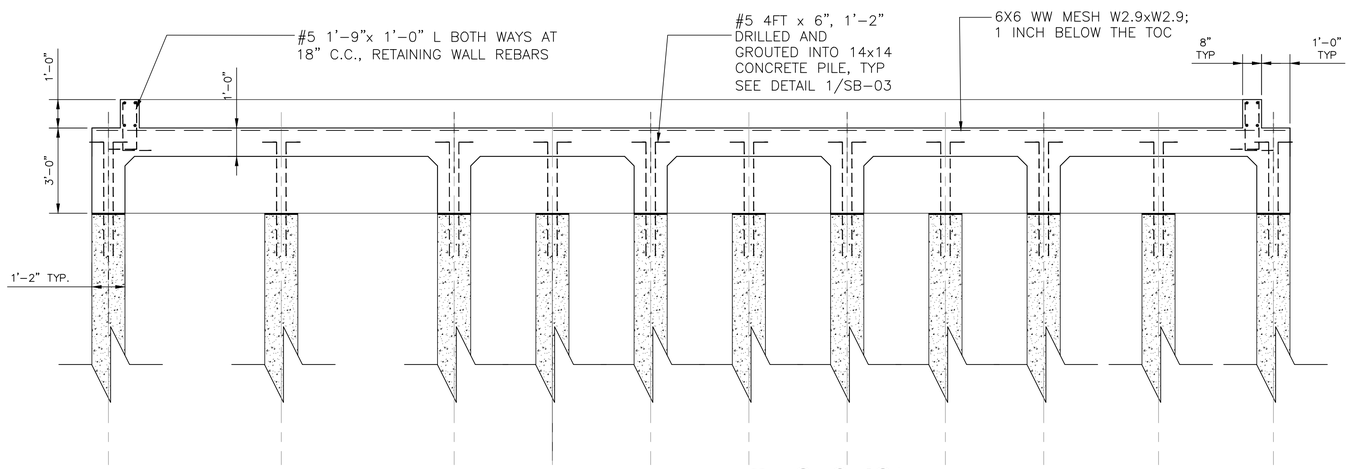
DR.	K MCALLISTER
CK:	I MANDICH
AP:	I MANDICH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

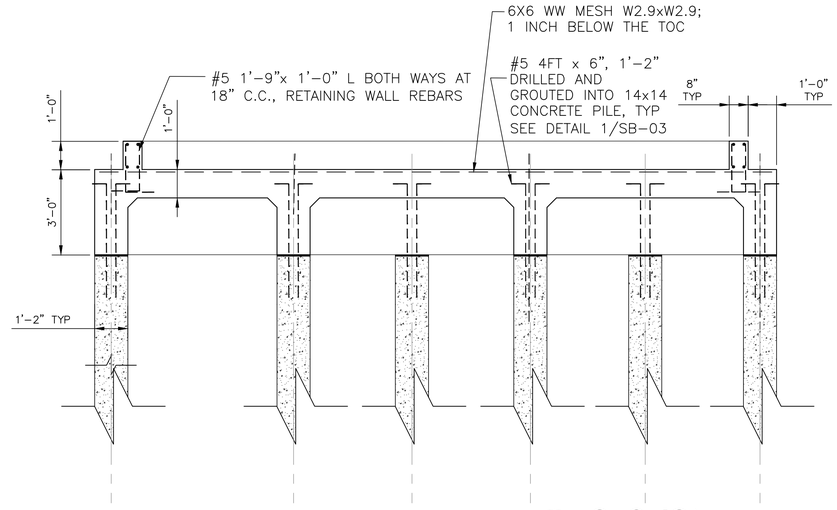
DWG. No. 12098-W8

TRIGON DWG. NO. SC-02

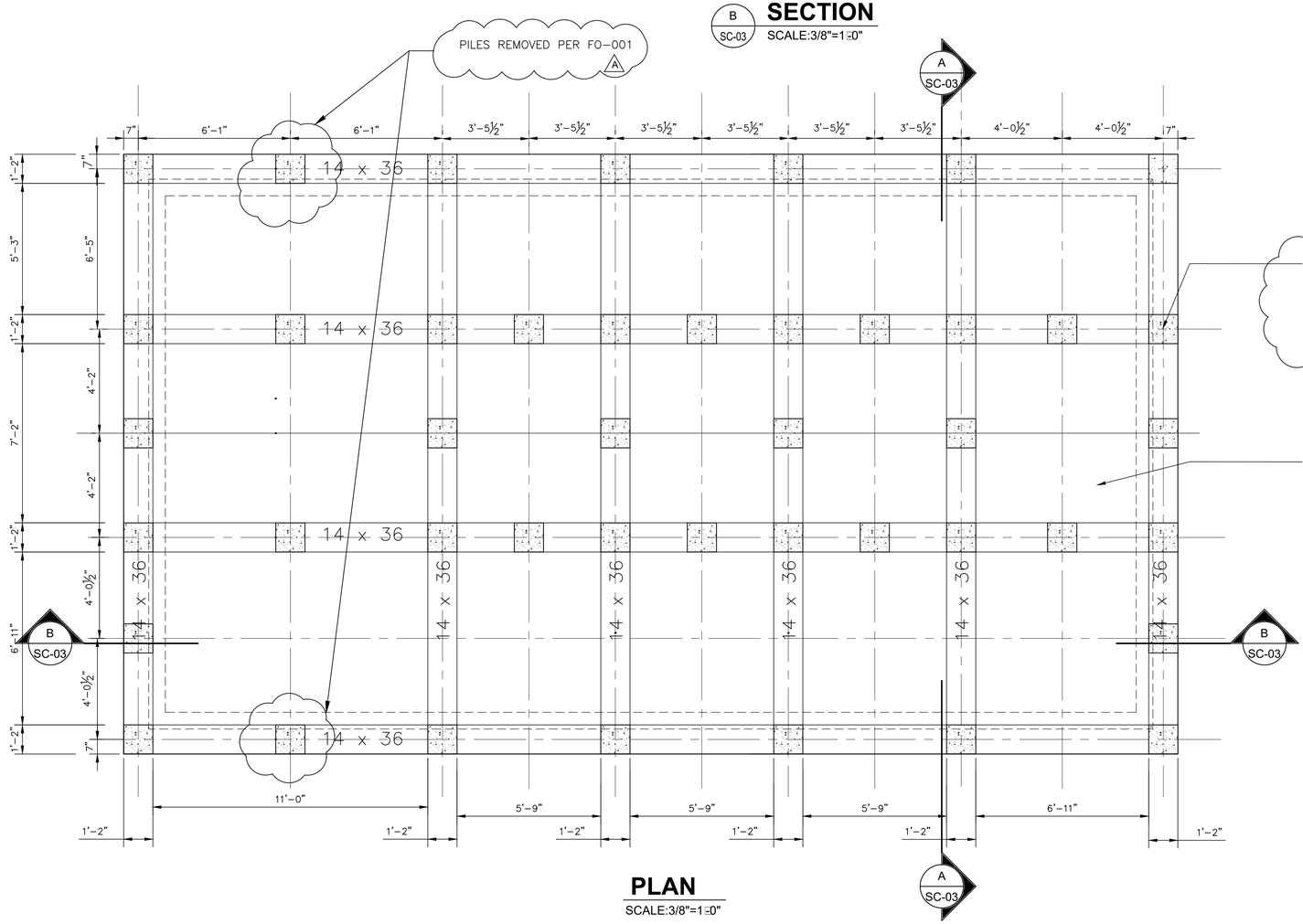
SET NO: SHEET NO: 29 OF 72



B SC-03 **SECTION**
SCALE:3/8"=1'–0"



A SC-03 **SECTION**
SCALE:3/8"=1'–0"



PLAN
SCALE:3/8"=1'–0"

42 EACH, 40 FT. LONG, 25 T PER PILE, SF=2;
PRESTRESSED 14" SQ. TYP. CONC. PILINGS, SEE SPECIFICATIONS FOR PILE DRIVING

A PILE QUANTITY AND LENGTH CHANGED PER FO–001

12" SLAB THICKNESS, SEE REINFORCING PLANPS

PLANT NORTH
TRUE NORTH

NOTES:

1. SEE SPECIFICATION 31 62 13.19 PRECAST CONCRETE PILES FOR PILE DRIVING.
2. (A) TYP. 14x14 PRE–STRESSED CONCRETE PILES 42 TOTAL, 40' LONG, 25T LOAD CAPACITY, ULTIMATE LOAD CAPACITY 50T/PILE, SF.=2

REV.	DATE	DESCRIPTION	BY
A	10–25–19	AS–BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLE□

DAY TANK (TK-003) FOUNDATION/ PILE PLAN AND SECTIONS

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

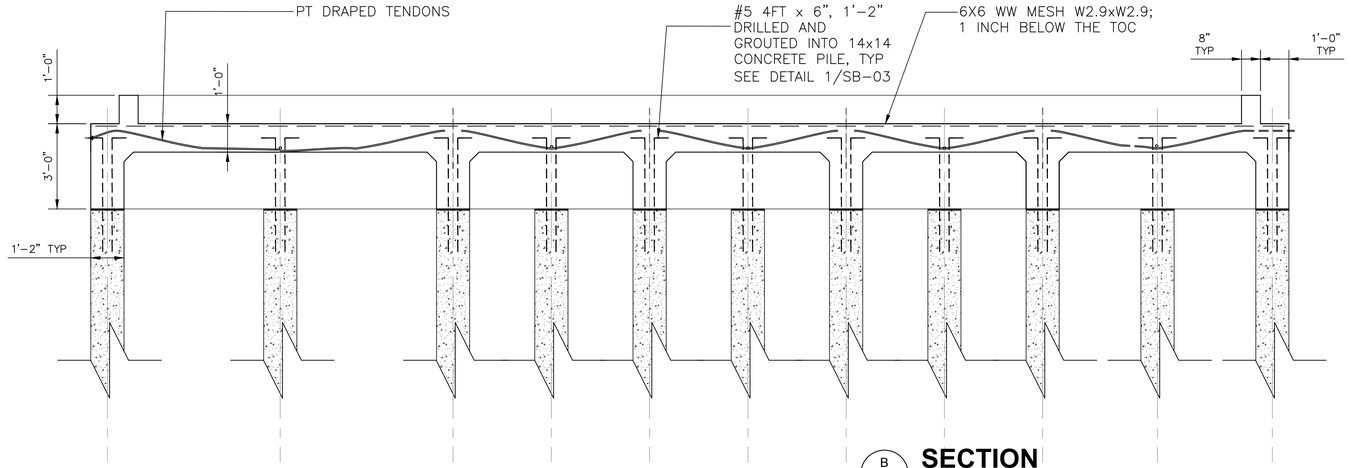
DR:	K MCALLISTER
CK:	I MANDICH
AP:	I MANDICH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015
SET NO:	

GENERAL SUPERINTENDENT

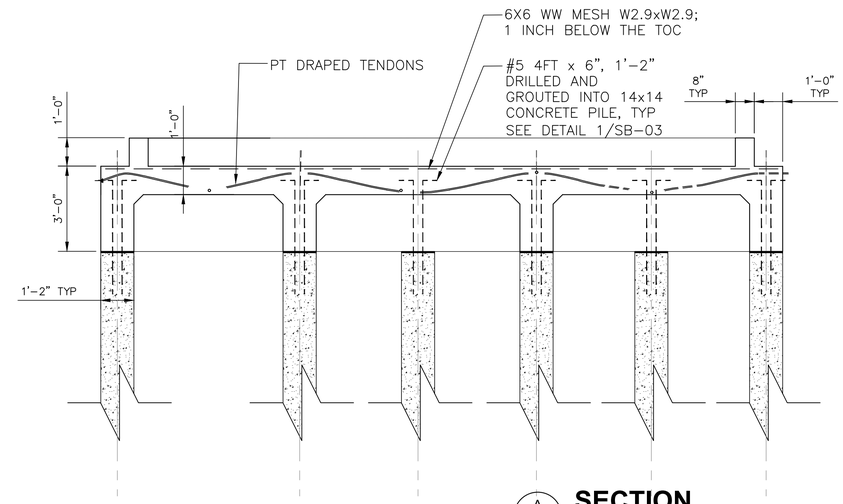
DWG. No. 12098-W8

TRIGON DWG. NO. SC-03

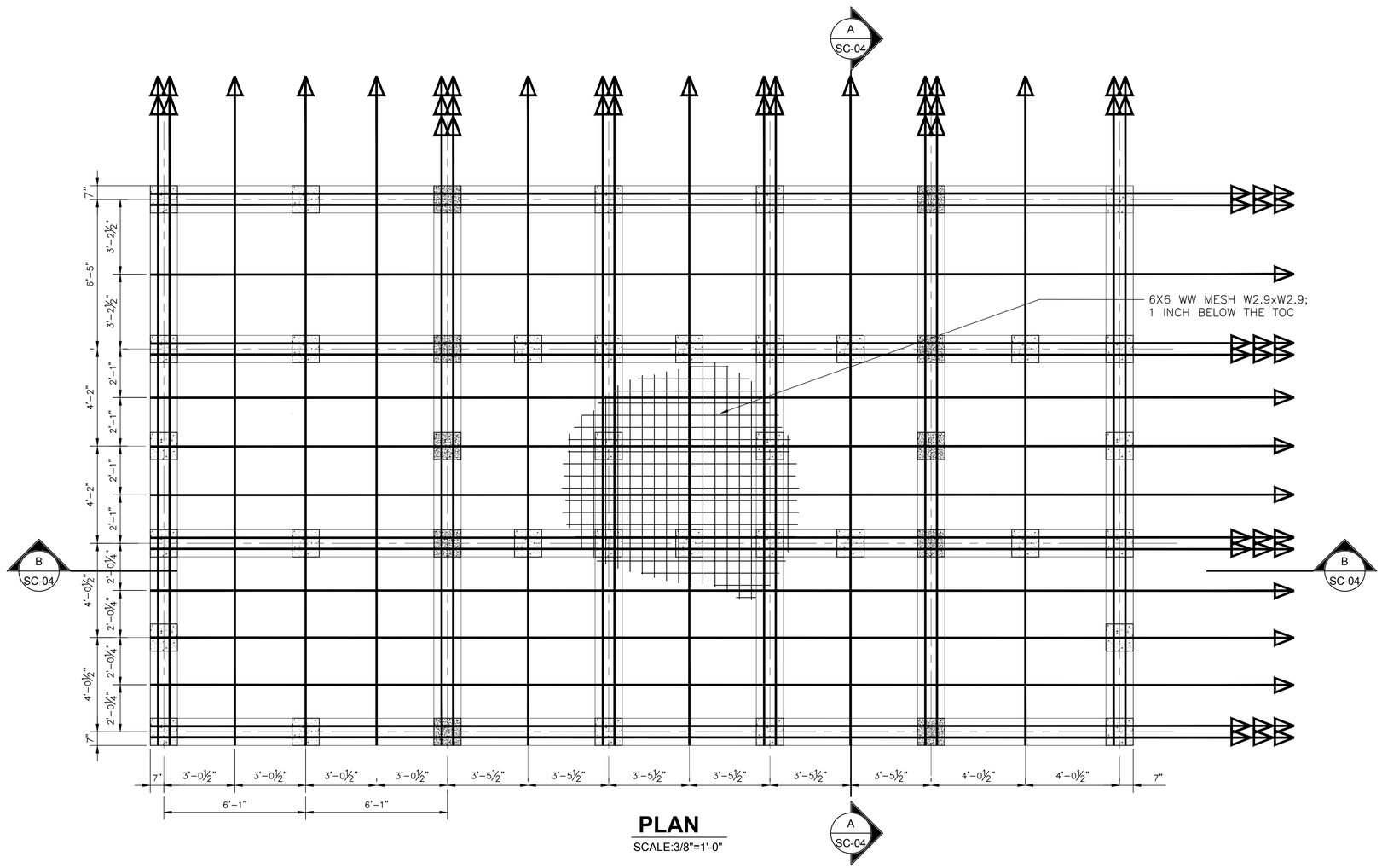
SHEET NO: 30 OF 72



B SC-04 **SECTION**
SCALE:3/8"=1'-0"



A SC-04 **SECTION**
SCALE:3/8"=1'-0"

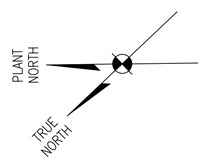


PLAN
SCALE:3/8"=1'-0"

NOTES:

1. SEE SPECIFICATION 03 38 16 POST TENSIONED CONCRETE FOR POST TENSION SLAB
2. CONTRACTOR TO USE CONTINUOUS CABLES, PREPARED FOR THE ENTIRE LENGTH, AND TENSIONED BOTH DIRECTIONS.
3. CONTRACTOR TO USE ANCHORING FROM FACE TO FACE ON THE CONTINUOUS CABLES.
4. MESH 6X6 W2.9xW2.9 WILL BE INSTALLED 1 INCH BELLOW THE TOP OF THE FINISHED SLAB IN THE ENTIRE SLAB AREA.
5. NOTES ON ELONGATION:
   CONTRACTOR WILL INFORM THE ENGINEER OF THE TENSIONING FORCES USED IN OBTAINING THE GIVEN ELONGATION. IF FOUND THAT THE ELONGATION FALLS SHORTER THAN THE PULLING FORCES AS PER CALIBRATED GAUGES, CONTRACTOR WILL PROCEED TO OBTAIN THOSE FORCES. CONTRACTOR TO ACHIEVE THE SPECIFIED ELONGATION. CHECK THE PHYSICAL PROPERTIES OF THE CABLES USED TO MATCH THE MODULUS AND ELONGATION GIVEN.
6. ELONGATION CALCULATIONS SAMPLE:

   PT CONTRACTOR MUST CALCULATE THE ELONGATION AS FOLLOWS:
   LENGTH OF THE CABLE IN FEET TIMES 9.37% AND TENSIONED TO SPECIFICATIONS AND TO THE ALIGNMENT AS SHOWN SEE TYP SECTIONS.



REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

A THIS SHEET WAS REPLACED ENTIRELY WITH THE VECP DESIGNED BY CARUBBA ENGINEERING, SEE SUL-0159 FOR VECP DESIGN. AS-BUILT DRAWINGS FOR CONTAINMENT PROVIDED BY RLH ARE INCLUDED AS AN APPENDIX TO THIS SET OF AS-BUILT RECORD DRAWINGS.

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. SC-04

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

DAY TANK (TK-003)
POST TENSION PLAN AND SECTIONS

DR:	K MCALLISTER
CK:	I MANDICH
AP:	I MANDICH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 31 OF 72

PIPE AND FITTING SYMBOLS

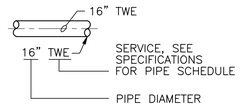
DOUBLE LINE	SINGLE LINE	
		EXISTING PIPE
		NEW PIPE
		EXISTING PIPE TO BE ABANDONED
		EXISTING PIPE TO BE REMOVED
		WELDED JOINT
		GROOVED END JOINT
		FLANGED JOINT
		MECHANICAL JOINT & PROPRIETARY RESTRAINED JOINT
		BELL & SPIGOT JOINT (LEADED)
		HUB & SPIGOT JOINT (RUBBER GASKET)
		BALL JOINT
		ADAPTER SIDE GROOVED END ADAPTER FLANGE
		FLANGED COUPLING ADAPTER
		FLEXIBLE COUPLING
		METAL BELLOWS EXP JOINT
		ELASTOMER BELLOWS EXP JOINT
		ELBOW UP
		ELBOW DOWN
		TEE UP
		TEE DOWN
		LATERAL UP
		LATERAL DOWN
		CONCENTRIC REDUCER
		ECCENTRIC REDUCER
		REDUCING BUSHING
		UNION
		CAP
		ANCHOR
		ELBOW, 90 DEGREE
		CROSS
		TEE
		ELBOW, 45 DEGREE
		LATERAL

FITTING NOTES:

1. ONLY FLANGED END CONNECTIONS ARE SHOWN HERE FOR DOUBLE LINE FITTINGS. FITTINGS WITH OTHER END PATTERNS ARE SHOWN SIMILARLY ON THE CONSTRUCTION DRAWINGS. ALSO SEE PIPING SPECIFICATIONS.
2. SYMBOLS SHOWN HERE FOR SINGLE LINE FITTINGS ARE GENERIC ONLY. REFER TO PIPING SPECIFICATIONS FOR SPECIFIC END CONNECTIONS FOR SINGLE LINE PIPE AND FITTINGS.
3. EXISTING PIPE AND EQUIPMENT IS SHOWN LIGHTER THAN NEW AND IS NOTED AS EXISTING. NEW PIPING AND EQUIPMENT IS SHOWN HEAVY-LINED.

PIPING DESIGNATION

EXAMPLE:



VALVE SYMBOLS

SINGLE LINE	DOUBLE LINE
GATE	
KNIFE GATE	OR
BUTTERFLY	OR
GLOBE	OR
BALL	OR
SEATING PORT	
ECCENTRIC PLUG	OR
PLUG OR COCK	OR
NEEDLE	OR
DIAPHRAGM	OR
PINCH	OR
SWING CHECK	OR
BALL CHECK	OR

HOSE VALVE (HV- X) OR (V-X)
X = NO. IN SPECS

SAMPLE

MUD

PRESSURE RELIEF

AIR AND/OR VACUUM RELEASE

REGULATED SIDE

PRESSURE CONTROL (INTERNAL PILOT)

REGULATED SIDE

PRESSURE CONTROL (EXTERNAL PILOT)

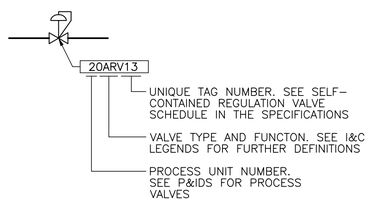
MULTI-PORT VALVE, ARROWS INDICATE FLOW PATTERN. SEATING PORTS ARE IMPLIED BY INDICATED FLOW PATTERN.

TELESCOPING SCUM VALVE

ACTUATOR SYMBOLS

PNEUMATIC DIAPHRAGM	HYDRAULIC
PNEUMATIC CYLINDER	MANUAL
ELECTRIC MOTOR	SOLENOID
	ELECTRO HYDRAULIC

SELF-CONTAINED REGULATING VALVES

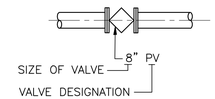


ELEVATION CONVENTION EXAMPLE

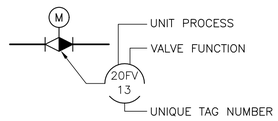
NOTE:
SPILLWAY ELEVATION IS 22.06 FT NGVD 29.

VALVE DESIGNATIONS

MANUAL VALVES AND CHECK VALVES



CONTROL VALVES



PIPING NOTES:

1. LAY PIPE TO UNIFORM GRADE BETWEEN INDICATED ELEVATION POINTS.
2. SIZE OF FITTINGS SHOWN ON DRAWINGS SHALL CORRESPOND TO ADJACENT STRAIGHT RUN OF PIPE, UNLESS OTHERWISE INDICATED. TYPE OF JOINT AND FITTING MATERIAL SHALL BE THE SAME AS SHOWN FOR ADJACENT STRAIGHT RUN OF PIPE.
3. LOCATION AND NUMBER OF PIPE HANGERS AND PIPE SUPPORTS SHOWN IS APPROXIMATE. CONTRACTOR SHALL DESIGN SUPPORTS AS SPECIFIED.
4. ALL JOINTS SHALL BE WATERTIGHT. WALL PIPES SHALL BE USED WHEREVER PIPING PASSES FROM A STRUCTURE TO BACKFILL.
5. ALL FLEXIBLE CONNECTORS AND COUPLING ADAPTERS SHALL BE PROVIDED WITH THRUST PROTECTION AS SPECIFIED, UNLESS OTHERWISE NOTED. THRUST PROTECTION SHALL BE PROVIDED AT PIPE BENDS AND BE ADEQUATE FOR TEST PRESSURES SPECIFIED.
6. SYMBOLS, LEGENDS, AND PIPE USE IDENTIFICATIONS SHOWN SHALL BE FOLLOWED THROUGHOUT THE DRAWINGS, WHEREVER APPLICABLE. NOT ALL OF THE VARIOUS PIPING COMPONENTS ARE NECESSARILY USED IN THE PROJECT.
7. NUMBER AND LOCATION OF UNIONS SHOWN ON DRAWINGS IS APPROXIMATE. PROVIDE ALL UNIONS NECESSARY TO FACILITATE CONVENIENT REMOVAL OF VALVES AND MECHANICAL EQUIPMENT.
8. WHERE A GROOVED END COUPLING IS SHOWN, IT SHALL BE THE RIGID JOINT TYPE, UNLESS OTHERWISE SPECIFIED. WHERE A FLANGED COUPLING ADAPTER IS SHOWN, A STANDARD FLANGE SHALL BE JOINED TO THE COUPLING ADAPTER.
9. PROVIDE NEEDLE VALVES AT BENDS IN ABOVE GRADE FUEL PIPING.
10. TRANSITIONS FROM ABOVE GRADE TO BELOW GRADE PIPING AND FROM CONTAINMENT SHALL INCLUDE FLEXIBLE COUPLINGS TO ACCOMMODATE DIFFERENTIAL SETTLEMENT.
11. SEE PIPING SPECIFICATIONS FOR PIPE WELDING AND SECTION 05 12 00 FOR PIPE SUPPORT WELDING SYMBOL LEGEND.

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

AS-BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR.

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY LISBETH HABANS NAGRATH, LICENCE No. 36792 ON 2-6-15. THIS DOCUMENT SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT.

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

MECHANICAL SYMBOLOGY AND LEGEND

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

TRIGON DWG. NO. MA-01

DR:	SJ CLARK
CK:	RA CASSANOVA
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	NONE
DATE:	JANUARY 28, 2015

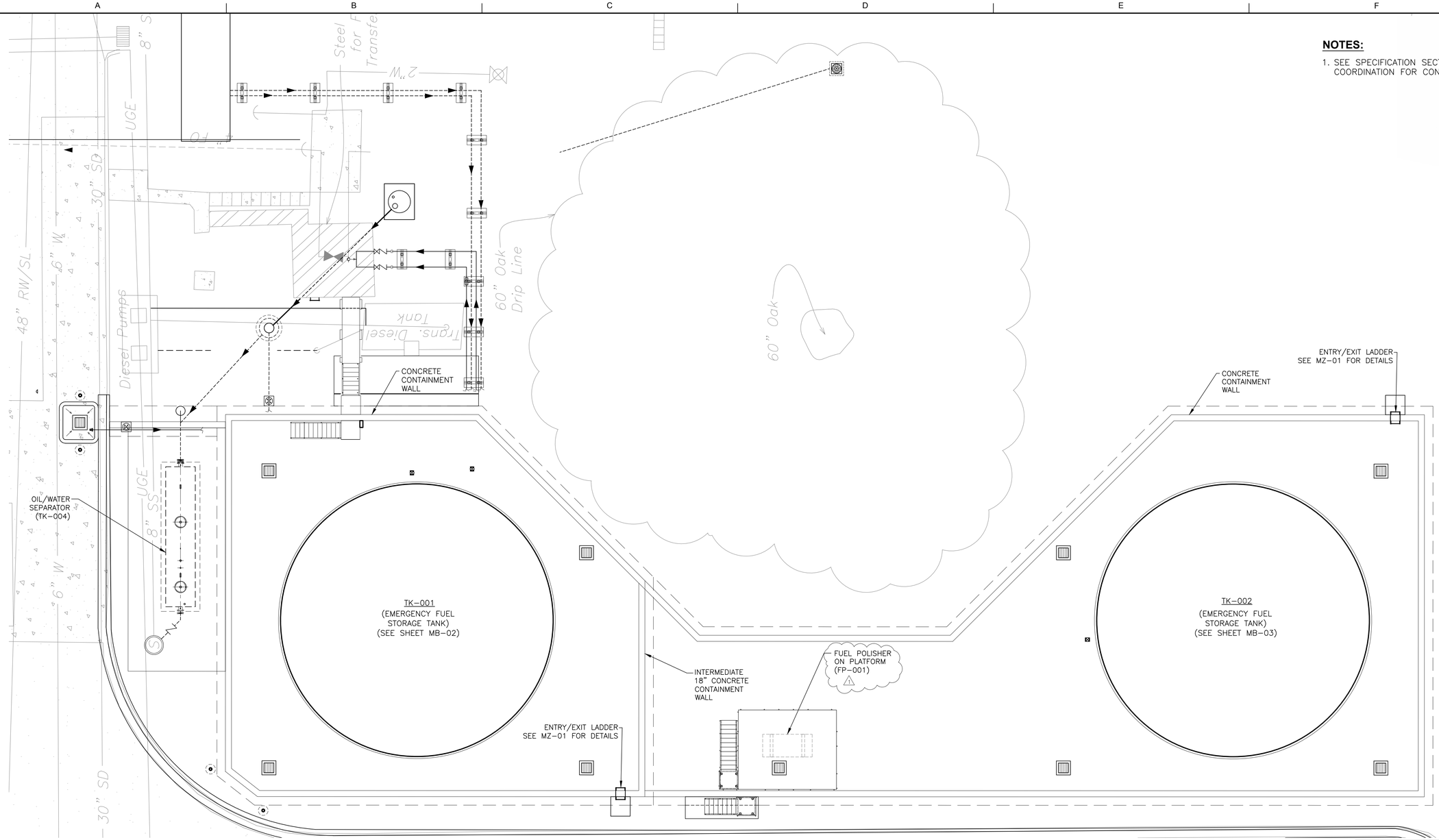
GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 32 OF 72

NOTES:

1. SEE SPECIFICATION SECTION SECTION 01 31 13 PROJECT COORDINATION FOR CONSTRUCTION SEQUENCING.



PLAN

SCALE:3/32"=1'-0"

A AS-BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR.

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN
1	3-16-15	REVISED CALL-OUT (ADD.1)	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

FUEL STORAGE TANK CONTAINMENT GENERAL ARRANGEMENT PLAN

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

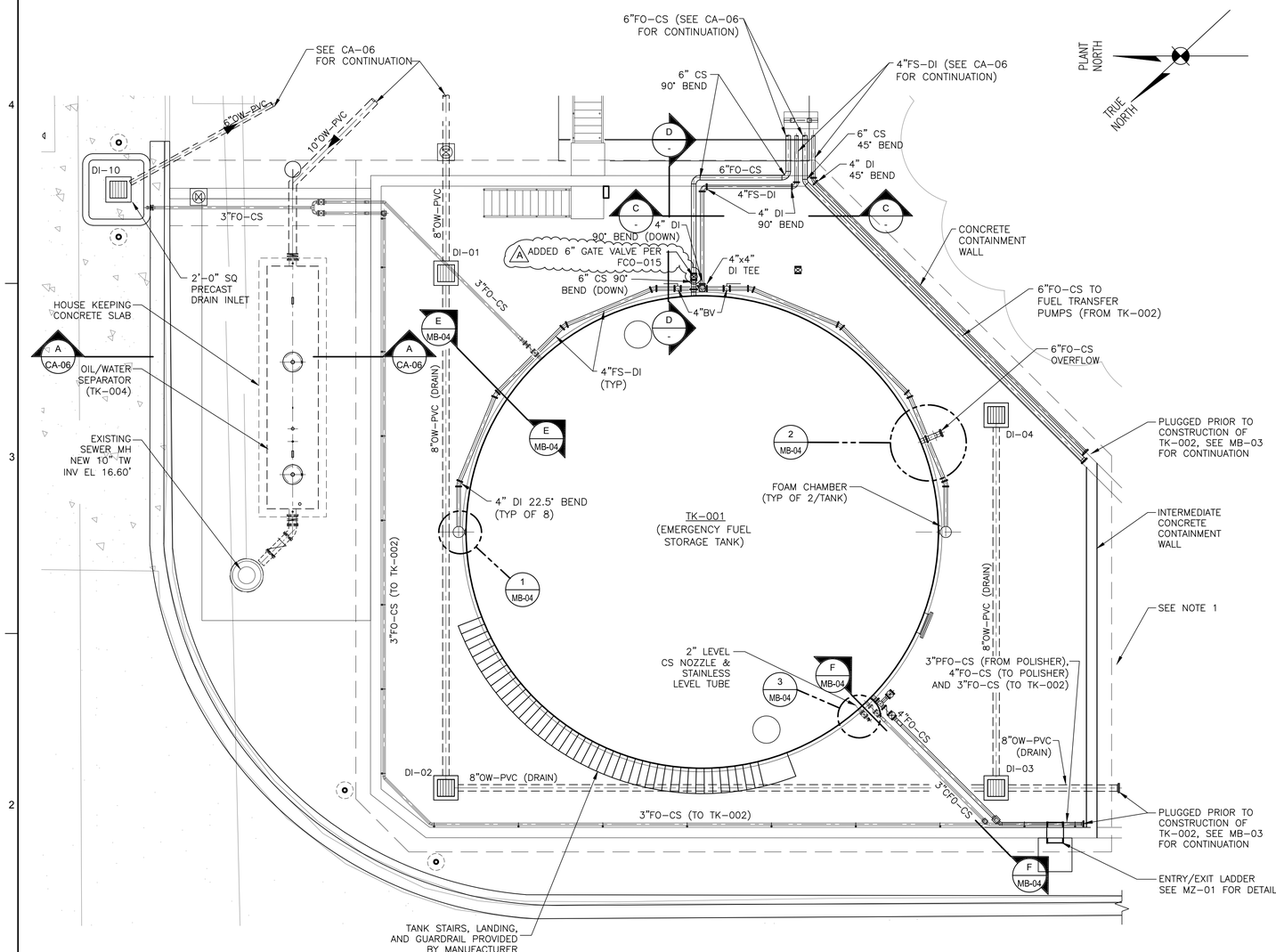
TRIGON DWG. NO. MB-01

DR.	SJ CLARK
CK:	RA CASSANOVA
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

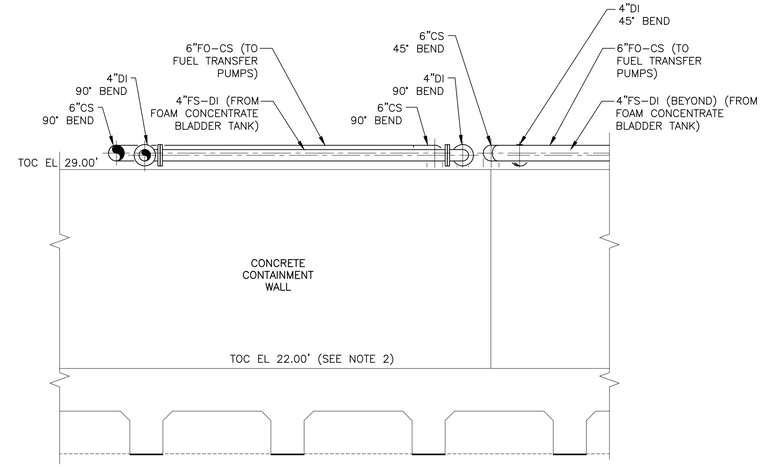
SET NO: SHEET NO. 33 OF 72



TK-001- PLAN

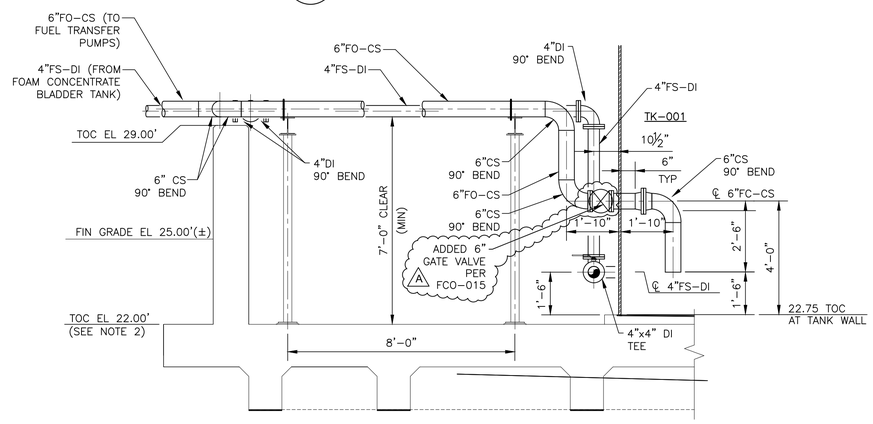
SCALE: 1/8"=1'-0"

SEE SUL-0242 FOR ICFP AS-BUILTS OF FIRE SUPPRESSION SYSTEM PIPING



C SECTION

SCALE:3/8"=1'-0"



D SECTION

SCALE:3/8"=1'-0"

NOTES:

1. SEE SPECIFICATION SECTION 01 31 13 PROJECT COORDINATION FOR CONSTRUCTION SEQUENCING.
2. THE LOWEST ELEVATION OF THE CONTAINMENT CONCRETE SLAB SHALL BE EL 22.00' AND TOC OF TANK FOUNDATION AT TANK WALL IS 22.75. BOTH ARE REFERENCED AS BASE ELEVATION ON THIS DRAWING. CONTRACTOR TO ADJUST VERTICAL MEASUREMENTS ACCORDING TO CONTAINMENT SLOPING. SEE SHEET SB-01 FOR SLOPING PLAN.
3. PROVIDE NEEDLE VALVES AT BENDS IN FUEL PIPING, NOT SHOWN AT ALL BENDS.

DRAIN INLET	PLANT DIRECTION	INV EL (FT)
DI-01	E	18.47
DI-01	W	18.67
DI-02	E	18.81
DI-02	S	19.01
DI-03	N	19.16
DI-03	S	19.46
DI-03	E	19.46
DI-04	W	19.56
DI-10	S	18.50

SEE MB-03 FOR ADDITIONAL DI LOCATIONS

A OWS PIPING AND DI INVERTS UPDATED PER FCO-014/RFQ-002

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

FUEL STORAGE TANK (TK-001) CONTAINMENT PLAN

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

TRIGON DWG. NO. MB-02

DR: SJ CLARK
CK: RA CASSANOVA
AP: LH NAGRATH
LAST EDIT:
SCALE: AS NOTED
DATE: JANUARY 28, 2015

GENERAL SUPERINTENDENT

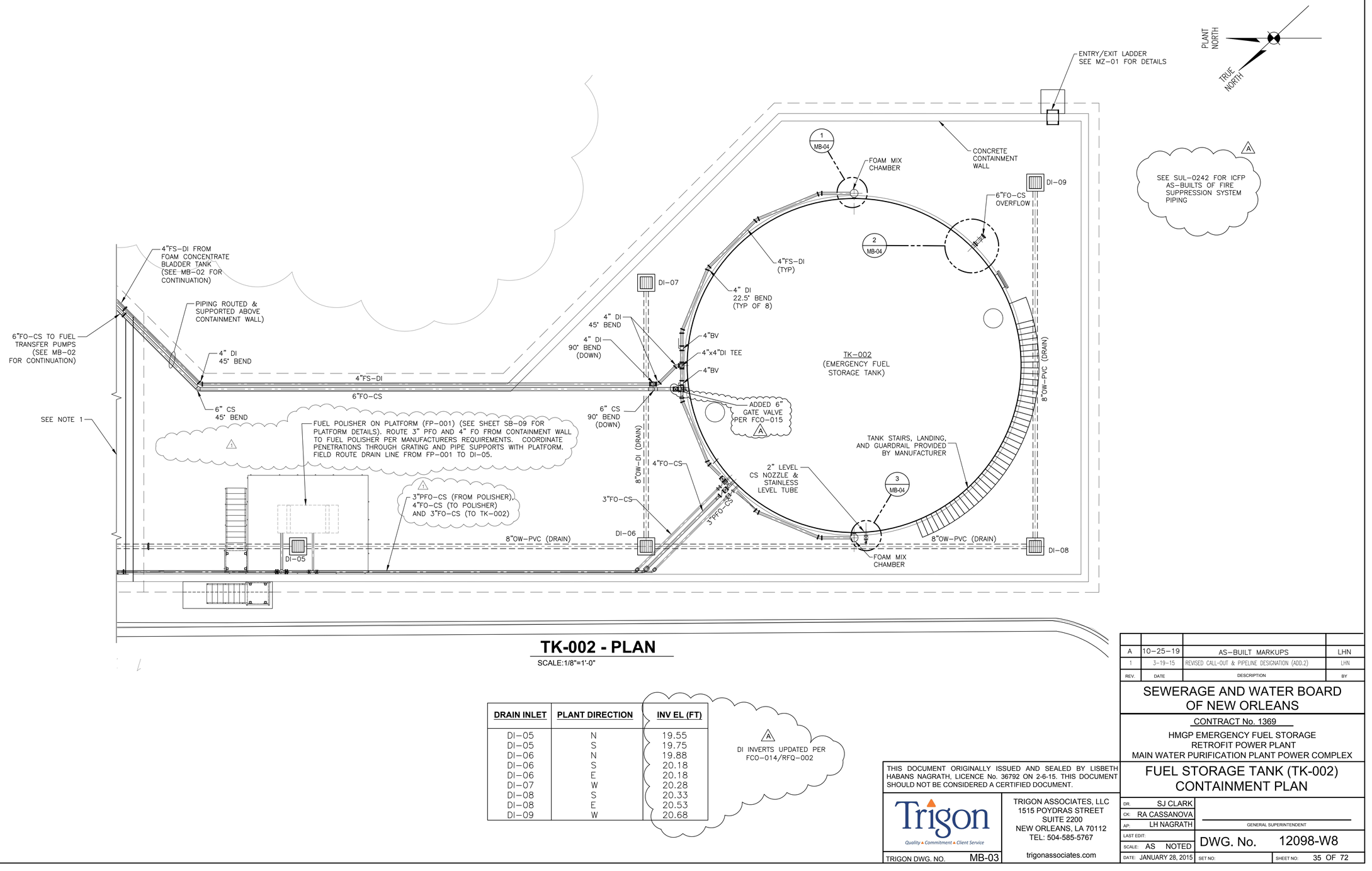
DWG. No. 12098-W8

SET NO:

SHEET NO: 34 OF 72

NOTES:

1. SEE SPECIFICATION SECTION 01 31 13 PROJECT COORDINATION FOR CONSTRUCTION SEQUENCING.
2. THE LOWEST ELEVATION OF THE CONTAINMENT CONCRETE SLAB SHALL BE EL 22.00' AND TOC OF TANK FOUNDATION AT TANK WALL IS 22.75, BOTH ARE REFERENCED AS BASE ELEVATION ON THIS DRAWING. CONTRACTOR TO ADJUST VERTICAL MEASUREMENTS ACCORDING TO CONTAINMENT SLOPING. SEE SHEET SB-01 FOR SLOPING PLAN.
3. PROVIDE NEEDLE VALVES AT BENDS IN FUEL PIPING, NOT SHOWN AT ALL BENDS.



TK-002 - PLAN

SCALE:1/8"=1'-0"

DRAIN INLET	PLANT DIRECTION	INV EL (FT)
DI-05	N	19.55
DI-05	S	19.75
DI-06	N	19.88
DI-06	S	20.18
DI-06	E	20.18
DI-07	W	20.28
DI-08	S	20.33
DI-08	E	20.53
DI-09	W	20.68

A DI INVERTS UPDATED PER FCO-014/RFQ-002

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN
1	3-19-15	REVISED CALL-OUT & PIPELINE DESIGNATION (ADD.2)	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

FUEL STORAGE TANK (TK-002) CONTAINMENT PLAN

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

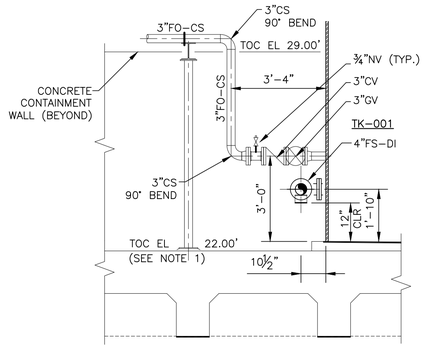
TRIGON DWG. NO. MB-03

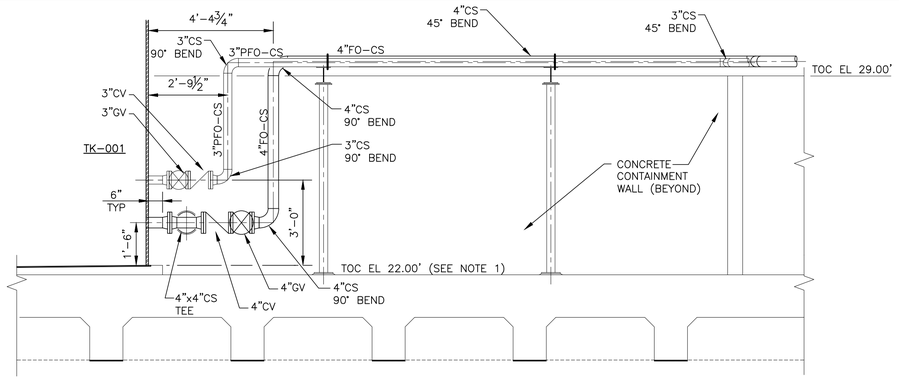
DR:	SJ CLARK
CK:	RA CASSANOVA
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 35 OF 72

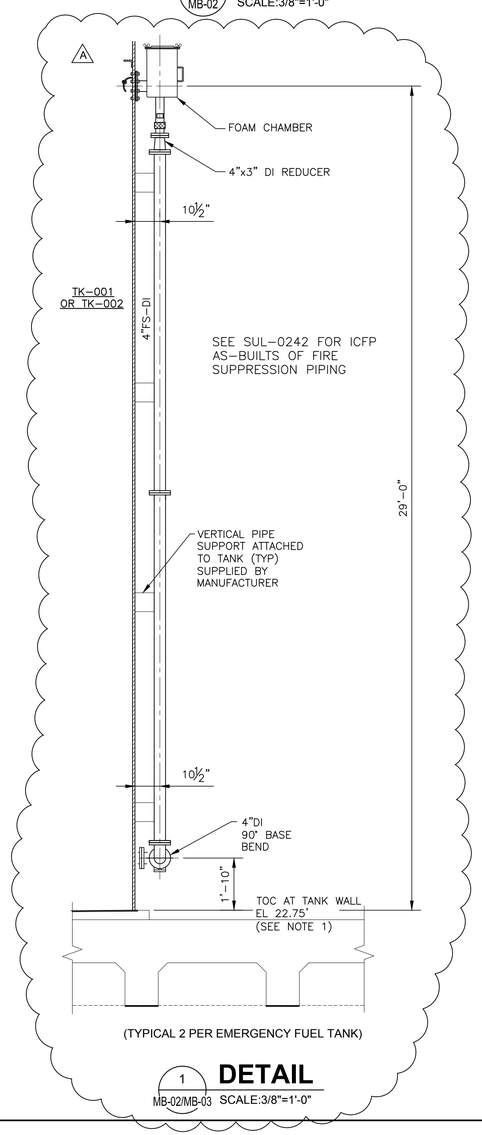




NOTES:

1. THE LOWEST ELEVATION OF THE CONTAINMENT CONCRETE SLAB SHALL BE EL 22.00' AND TOC OF TANK FOUNDATION AT TANK WALL IS 22.75. BOTH ARE REFERENCED AS BASE ELEVATION ON THIS DRAWING. CONTRACTOR TO ADJUST VERTICAL MEASUREMENTS ACCORDING TO CONTAINMENT SLOPING. SEE SHEET SB-01 FOR SLOPING PLAN.
2. PROVIDE NEEDLE VALVES AT BENDS IN FUEL PIPING, NOT SHOWN AT ALL BENDS.

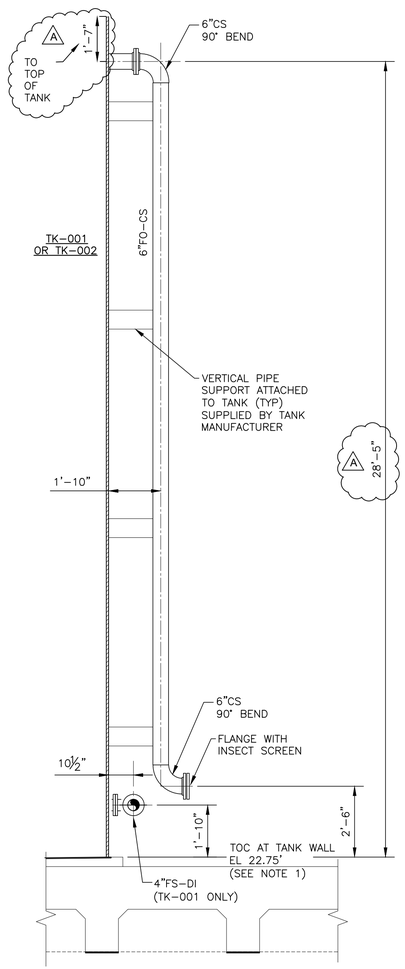
E SECTION
MB-02 SCALE:3/8"=1'-0"



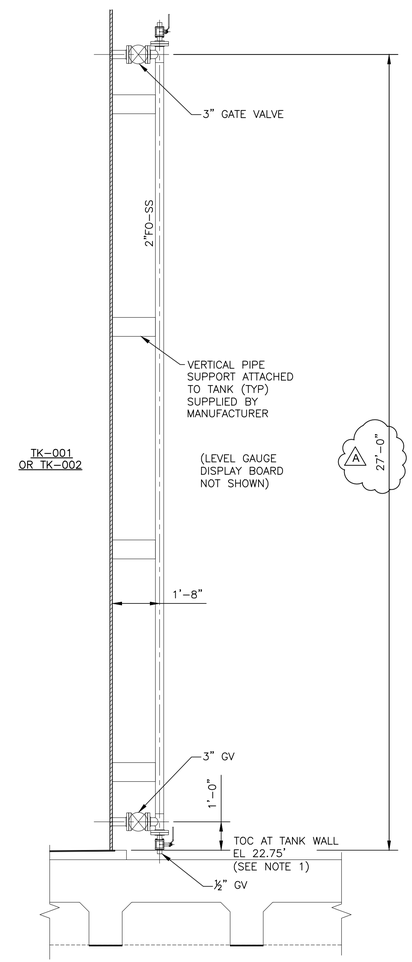
(TYPICAL 2 PER EMERGENCY FUEL TANK)

1 DETAIL
MB-02/MB-03 SCALE:3/8"=1'-0"

F SECTION
MB-02 SCALE:3/8"=1'-0"



2 DETAIL
MB-02/MB-03 SCALE:3/8=1'-0"



3 DETAIL
MB-02/MB-03 SCALE:3/8=1'-0"

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

FUEL STORAGE TANK CONTAINMENT SECTIONS AND DETAILS

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

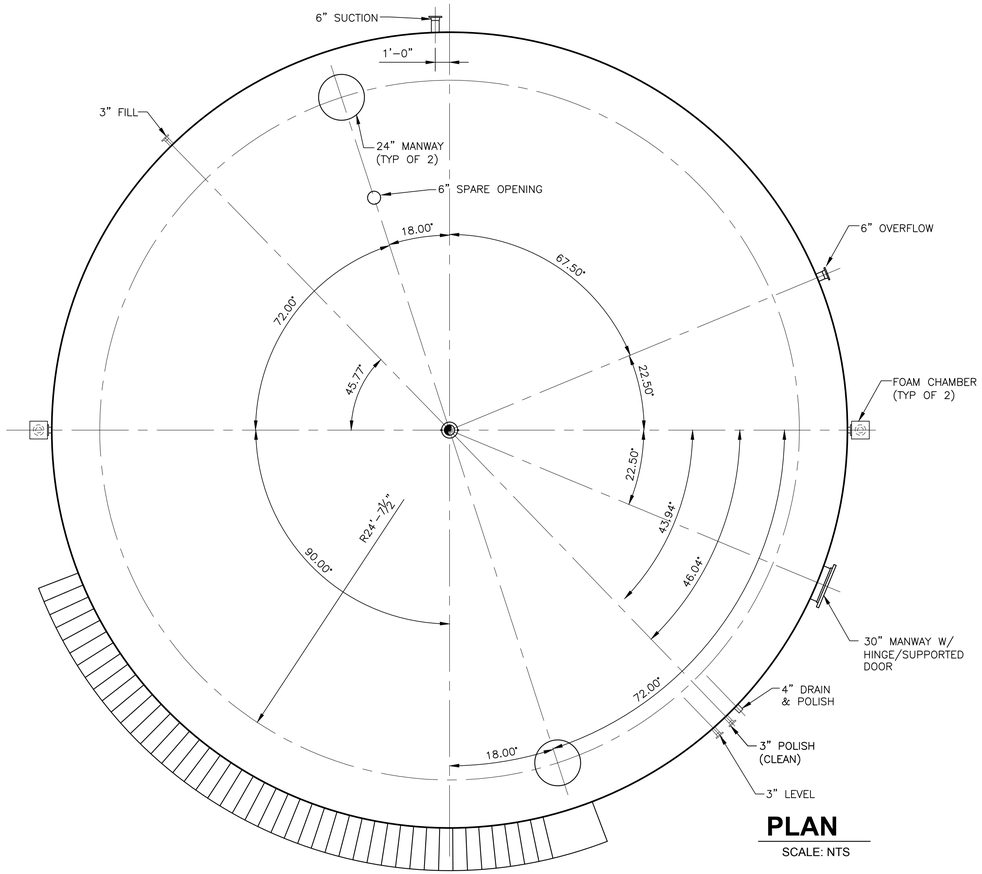
TRIGON DWG. NO. MB-04

DR:	SJ CLARK
CK:	GA KOLENOVSKY
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

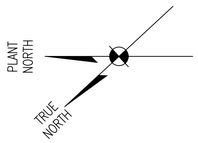
DWG. No. 12098-W8

SET NO: SHEET NO: 36 OF 72



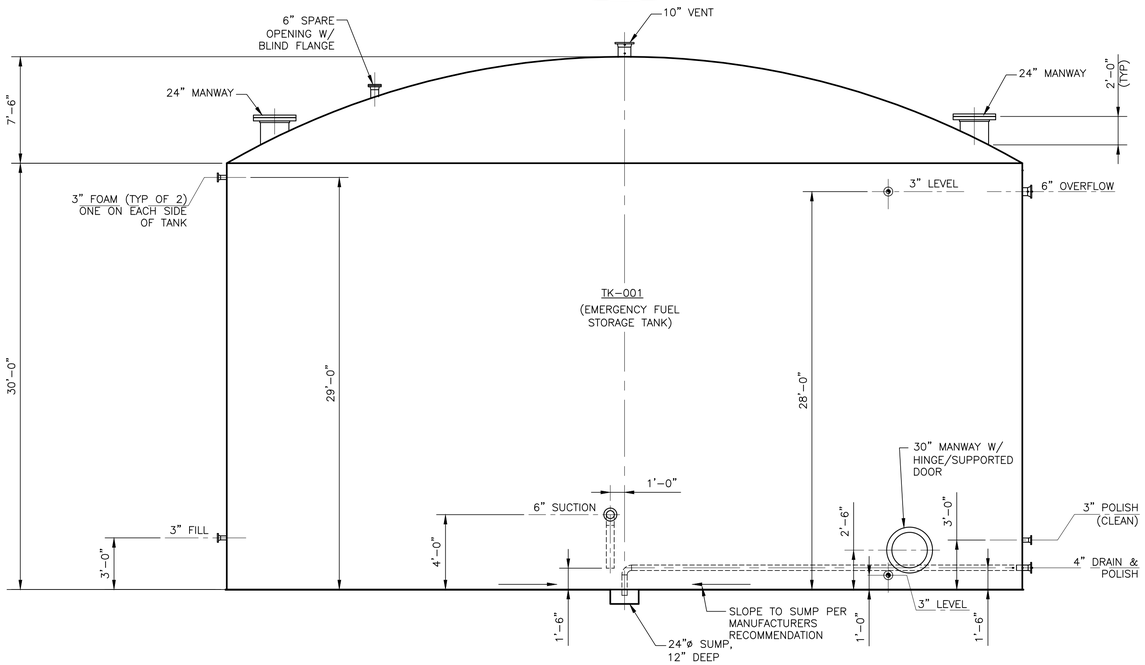
PLAN

SCALE: NTS



FUEL STORAGE TANK (TK-001) NOTES:

1. FLANGE BOLT HOLES TO STRADDLE NORMAL VESSEL CENTERLINES, UNLESS OTHERWISE NOTED.
2. VESSEL SHALL BE CLEANED INSIDE & OUTSIDE; FREE OF DIRT, GREASE, DEBRIS, WELD SPLATTER, LOOSE MILL SCALE, ETC.
3. ITEMS APPEARING IN ELEVATION VIEW ARE FOR VERTICAL INFORMATION ONLY. SEE PLAN VIEW FOR HORIZONTAL INFORMATION.
4. INTERIOR OF TANK SHALL BE FULLY COATED IN ACCORDANCE WITH THE SPECIFICATIONS.



ELEVATION

SCALE: NTS

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

FUEL STORAGE TANK (TK-001)
NOZZLE & DESIGN DATA

A TK-001 AS-BUILT INFORMATION PROVIDED BY JMW IN SUL-0222

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

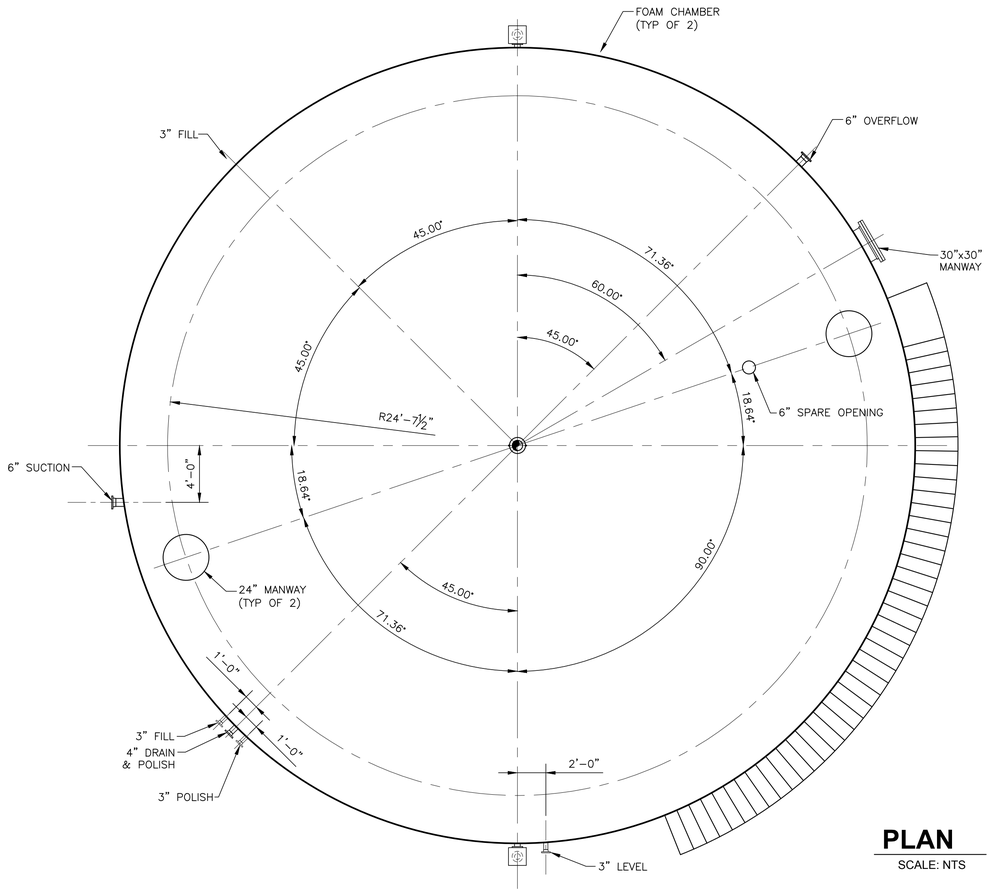
TRIGON DWG. NO. MB-05

DR.	SJ CLARK
CK:	RA CASSANOVA
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

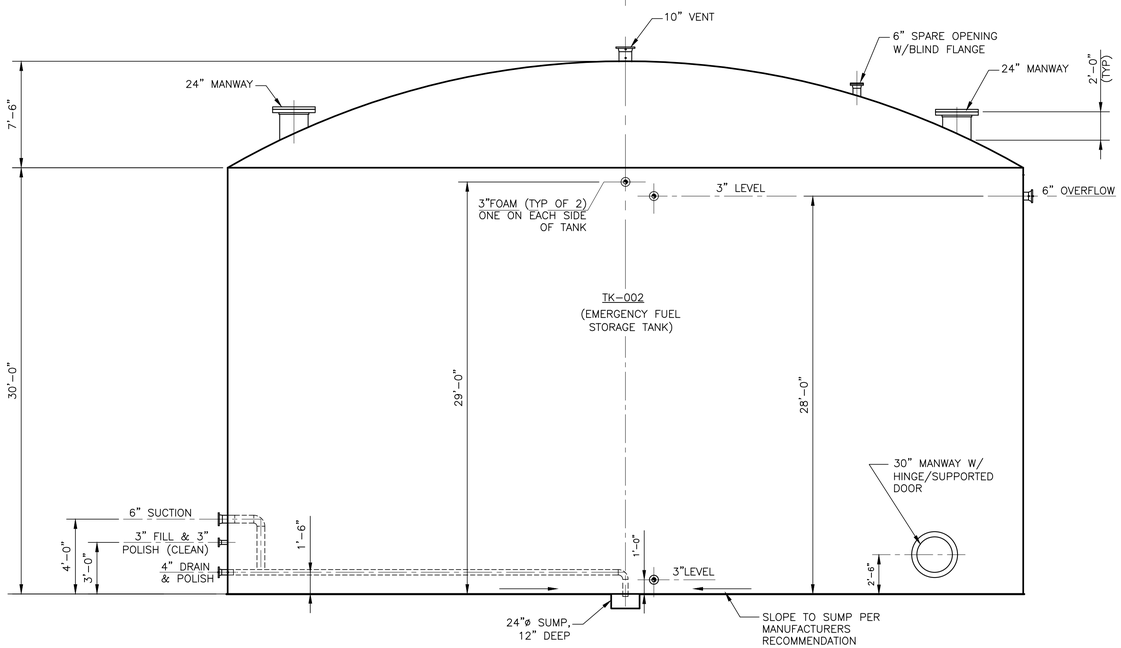
DWG. No. 12098-W8

SET NO: SHEET NO: 37 OF 72



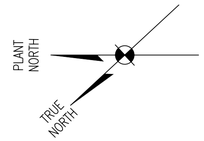
PLAN

SCALE: NTS



ELEVATION

SCALE: NTS



FUEL STORAGE TANK (TK-002) NOTES:

1. FLANGE BOLT HOLES TO STRADDLE NORMAL VESSEL CENTERLINES, UNLESS OTHERWISE NOTED.
2. VESSEL SHALL BE CLEANED INSIDE & OUTSIDE; FREE OF DIRT, GREASE, DEBRIS, WELD SPLATTER, LOOSE MILL SCALE, ETC.
3. ITEMS APPEARING IN ELEVATION VIEW ARE FOR VERTICAL INFORMATION ONLY. SEE PLAN VIEW FOR HORIZONTAL INFORMATION.
4. INTERIOR OF TANK SHALL BE FULLY COATED IN ACCORDANCE WITH THE SPECIFICATIONS.

A TK-002 AS-BUILT INFORMATION PROVIDED BY JMW IN SUL-0237

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

FUEL STORAGE TANK (TK-002)
NOZZLE & DESIGN DATA

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

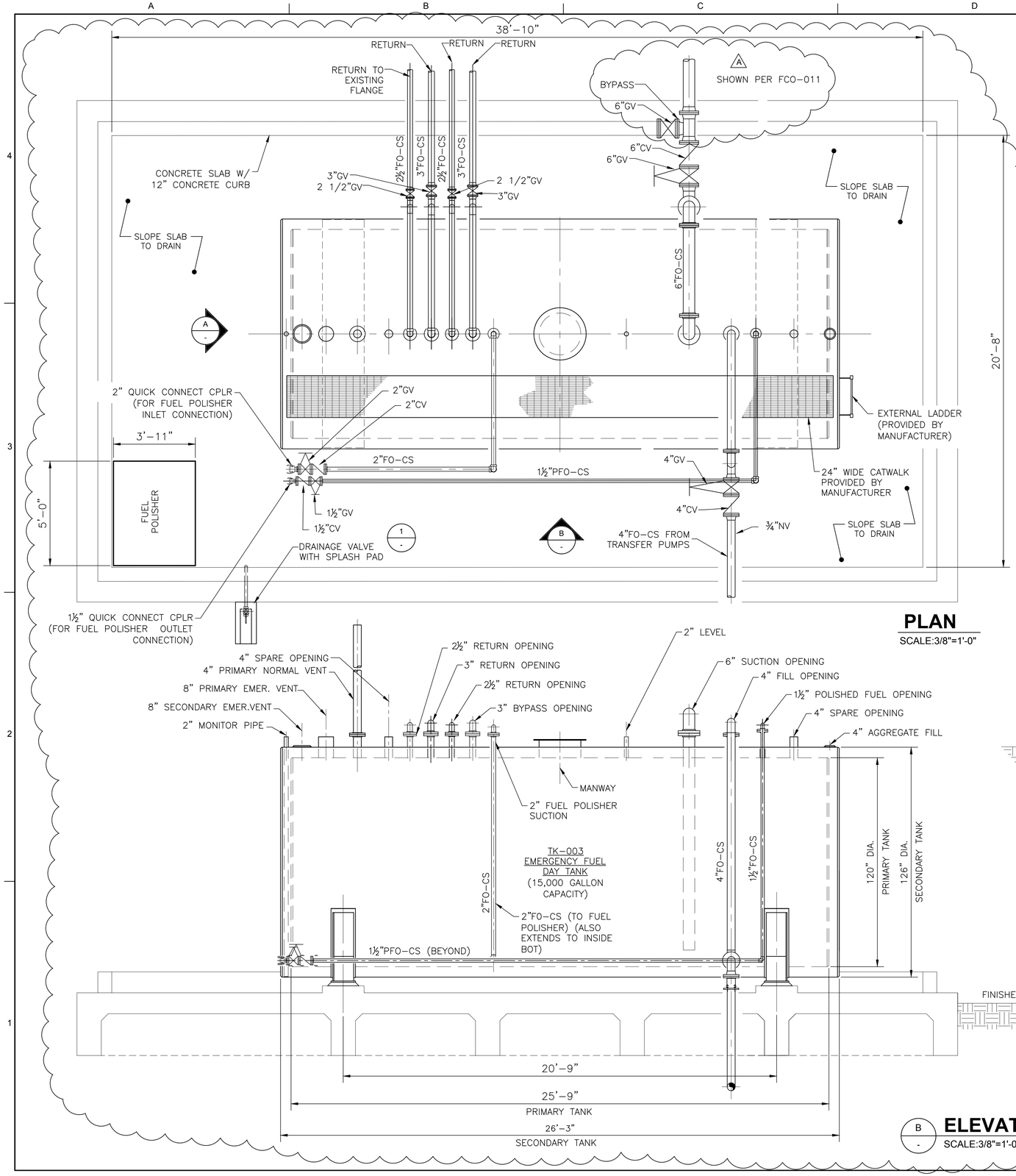
DR:	SJ CLARK
CK:	RA CASSANOVA
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

TRIGON DWG. NO. MB-06

SET NO: SHEET NO: 38 OF 72

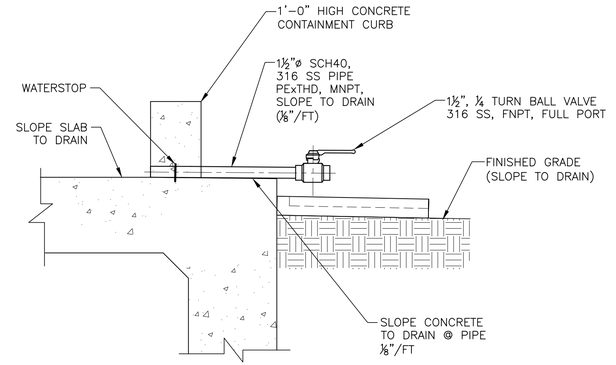


PLAN
SCALE:3/8"=1'-0"

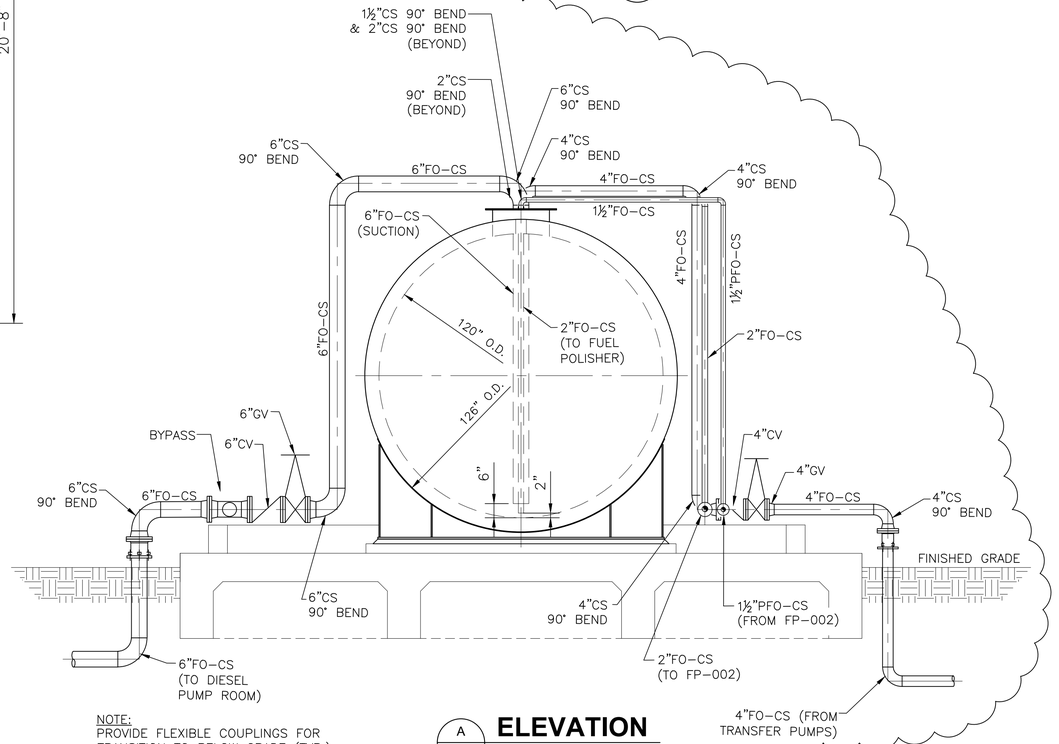
B ELEVATION
SCALE:3/8"=1'-0"

PLANT NORTH
TRUE NORTH

A
PIPING AND NOZZLE MODIFICATIONS PER DAY TANK SUL-0088 AND SUL-0243 HAND SKETCHED DRAWINGS



1 - DETAIL
SCALE:1"=1'-0"



NOTE:
PROVIDE FLEXIBLE COUPLINGS FOR TRANSITION TO BELOW GRADE (TYP.)

A ELEVATION
SCALE:3/8"=1'-0"

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

DAY TANK (TK-003) PLAN, ELEVATION AND SECTION

Trigon
Quality ▲ Commitment ▲ Client Service
TRIGON DWG. NO. MC-01

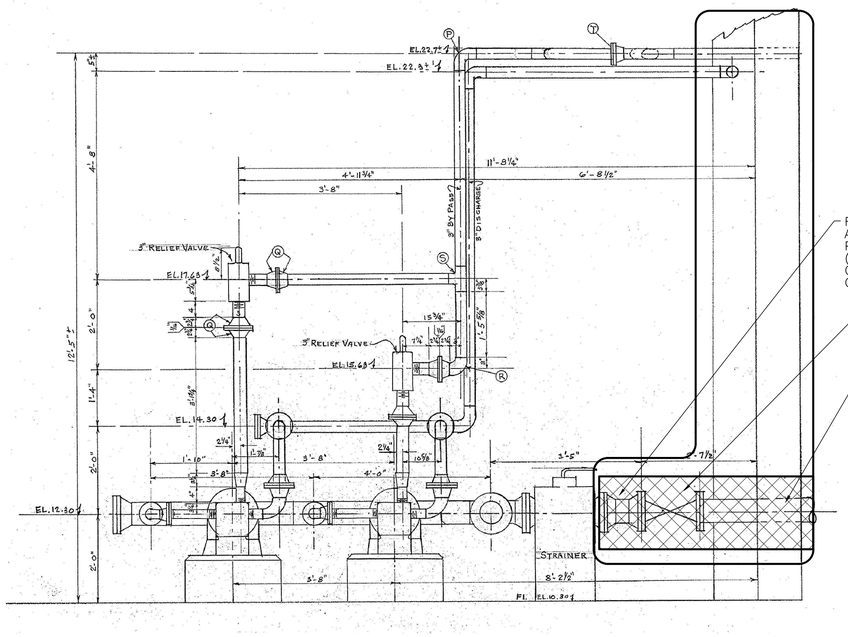
TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

DR:	SJ CLARK
CK:	RA CASSANOVA
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 39 OF 72

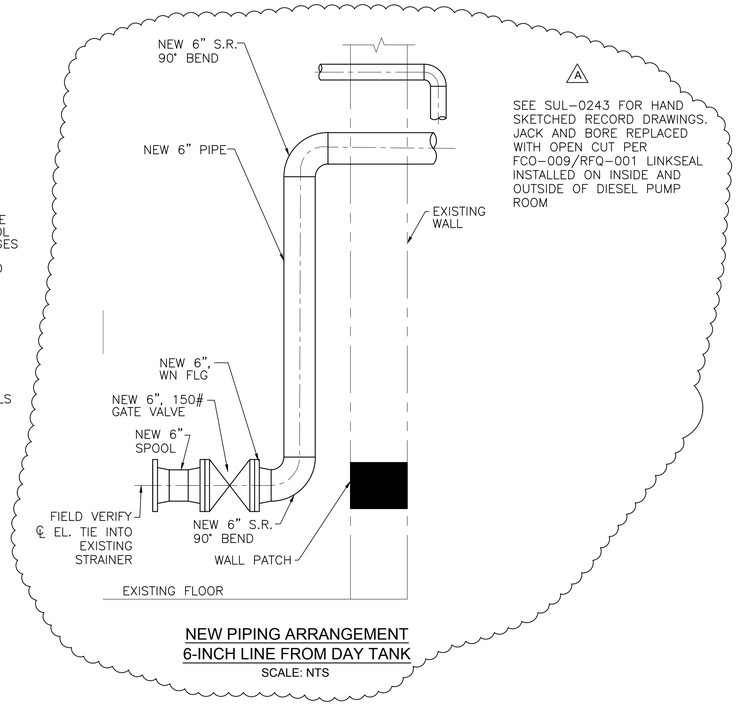


REMOVE EXISTING SPOOL PIECE AND REPLACE WITH NEW SPOOL PIECE WITH WELD NECK FLANGES (8) BOLT HOLE FLANGE FOR CONNECTION TO STRAINER AND CONNECTION TO VALVE.

REMOVE EXISTING 6" PLUG VALVE

REMOVE EXISTING 6" PIPE THRU WALL & PATCH WITH LIKE MATERIALS

REFERENCE SECTION
DIESEL PUMP ROOM (BASEMENT)
SCALE: NTS (SEE NOTE 1)

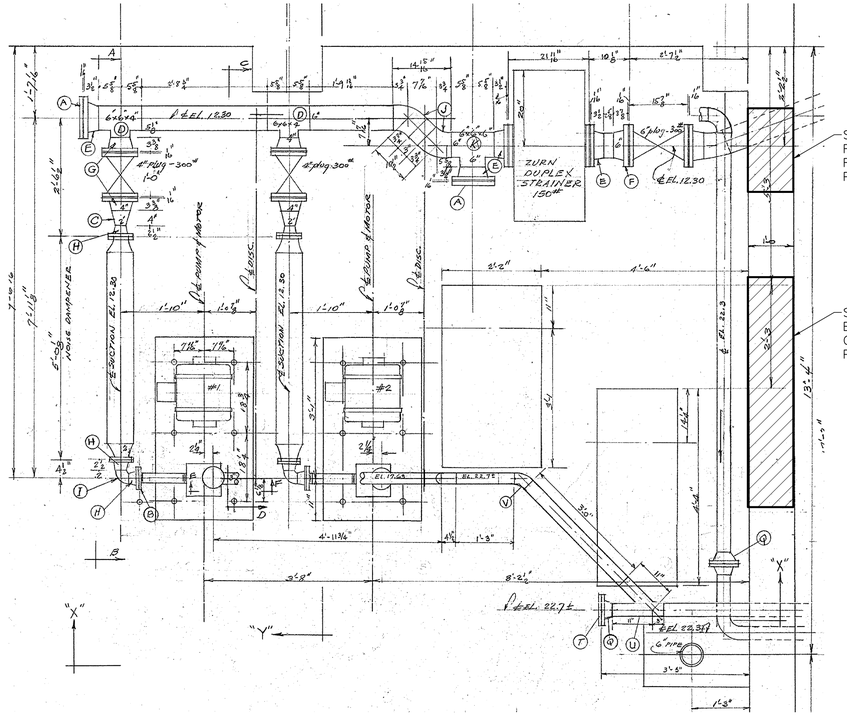


SEE SUL-0243 FOR HAND SKETCHED RECORD DRAWINGS. JACK AND BORE REPLACED WITH OPEN CUT PER FCO-009/RFQ-001 LINKSEAL INSTALLED ON INSIDE AND OUTSIDE OF DIESEL PUMP ROOM

NEW PIPING ARRANGEMENT
6-INCH LINE FROM DAY TANK
SCALE: NTS

FIELD ROUTE EXISTING PIPING TO NEW 6-INCH PIPE

DIESEL PUMP ROOM (BASEMENT)
SCALE: NTS



SEE DETAIL 2/SA-02 FOR 6-INCH FO PIPING WALL PENETRATION

SEE DETAIL 1/SA-02 FOR ELECTRICAL AND CONTROLS WALL PENETRATION

REFERENCE PLAN
DIESEL PUMP ROOM (BASEMENT)
SCALE: NTS (SEE NOTE 1)

GENERAL NOTES:

1. THE BACKGROUNDS SHOWN ON THIS DRAWING ARE COPIES OF SWBNO DRAWING NO. 10974-W2, SHEETS 4 OF 5 AND 5 OF 5, DATED 8-23-63 AND 9-5-63. THIS BACKGROUND HAS BEEN INCLUDED FOR REFERENCE ONLY.
2. ELEVATIONS SHOWN ON REFERENCE SECTION DO NOT CORRESPOND TO SURVEY DATUM. FIELD VERIFY PIPING ELEVATIONS.

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

DIESEL PUMP ROOM - PIPE PENETRATIONS/VALVE REPLACEMENT

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

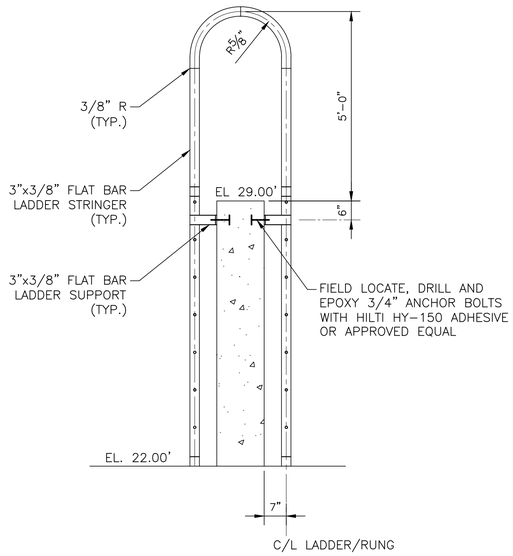
TRIGON DWG. NO. MD-01

DR:	SJ CLARK
CK:	RA CASSANOVA
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

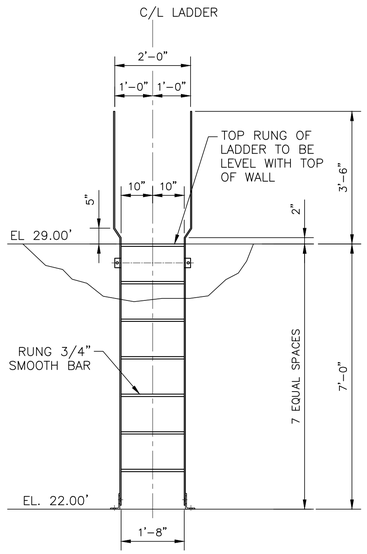
GENERAL SUPERINTENDENT

DWG. No. 12098-W8

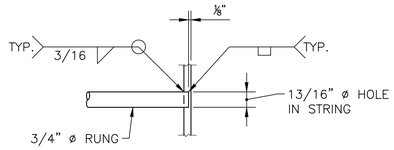
SET NO: SHEET NO: 40 OF 72



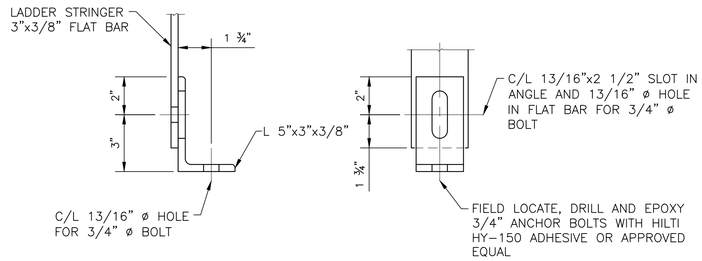
SIDE-VIEW



FRONT-VIEW



RUNG CONNECTION



FEET CONNECTION

CONTAINMENT LADDER

1 / - TYPICAL CONTAINMENT LADDER DETAIL

SCALE:1/2"=1'-0"

A AS-BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR.

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY LISBETH HABANS NAGRATH, LICENCE No. 36792 ON 2-6-15. THIS DOCUMENT SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT.

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. MZ-01

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD
OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

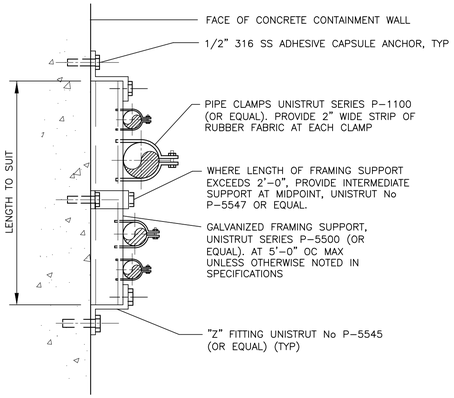
MECHANICAL
DETAILS

DR: SJ CLARK
CK: RA CASSANOVA
AP: LH NAGRATH
LAST EDIT:
SCALE: AS NOTED
DATE: JANUARY 28, 2015

GENERAL SUPERINTENDENT

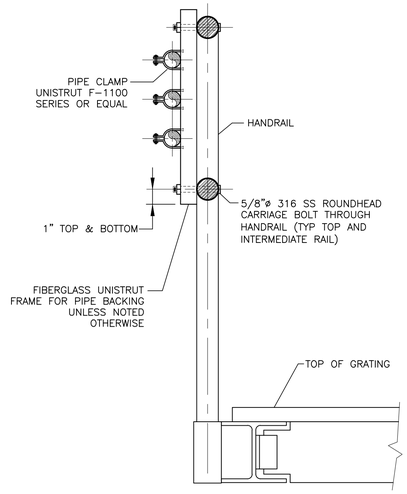
DWG. No. 12098-W8

SET NO: SHEET NO: 41 OF 72



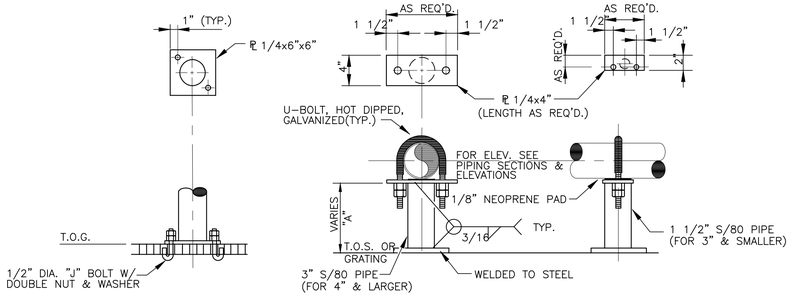
FLUSH MOUNTED PIPE SUPPORT

1 / - **DETAIL** SCALE: NOT TO SCALE



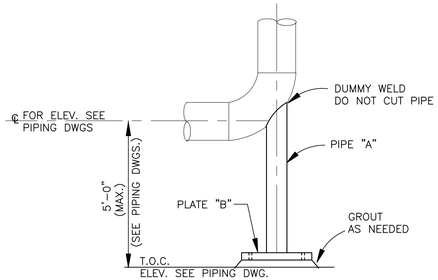
HANDRAIL SUPPORTED PIPE

2 / - **DETAIL** SCALE: NOT TO SCALE



PIPE SUPPORT ON GRATING OR STEEL

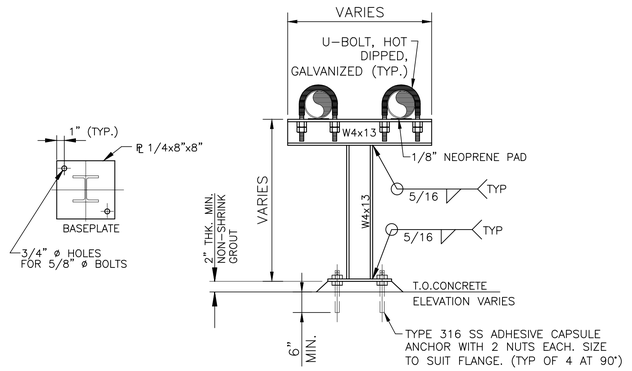
5 / - **DETAIL** SCALE: NOT TO SCALE



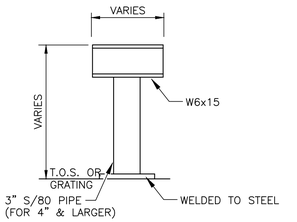
LINE SIZE	PIPE "A"	PLATE "B"
2"	1 1/2" SCH. 80	7"x7"x3/8"
3" & 4"	2" SCH. 40	8"x8"x3/8"
6" & 8"	3" SCH. 40	9"x9"x1/2"
10" & 12"	4" SCH. 40	10"x10"x1/2"
14" & 16"	6" SCH. 40	12"x12"x1/2"
18" & 24"	8" SCH. 40	14"x14"x3/4"
26" & 36"	12"-3/8" WALL	18"x18"x3/4"

PIPE SUPPORT @ BASE ELL

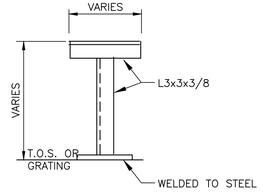
6 / - **DETAIL** SCALE: NOT TO SCALE



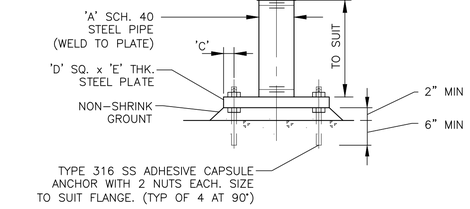
7 / - **DETAIL** SCALE: NOT TO SCALE



8 / - **DETAIL** SCALE: NOT TO SCALE



9 / - **DETAIL** SCALE: NOT TO SCALE

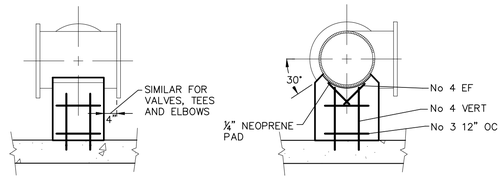


DIMENSIONS IN INCHES (APPROXIMATE)							
PIPE SIZE	A	B	C	D	E	F (APPROXIMATE)	
						MINIMUM	MAXIMUM
3	2½"	1½"	1⅛"	7½"	½"	8¼"	11¾"
4	3	2½"	1⅛"	7½"	½"	10¼"	14
6	3	2½"	1⅛"	7½"	½"	11⅝"	15¼"
8	3	2½"	1⅛"	7½"	½"	13⅜"	16½"
10	3	2½"	1⅛"	7½"	½"	14⅝"	18¼"

ADJUSTABLE U-BOLT PIPE SUPPORT

3 / - **DETAIL** SCALE: NTS

10 / - **DETAIL** SCALE: NOT TO SCALE



CONCRETE BASE SUPPORT

4 / - **DETAIL** SCALE: NOT TO SCALE

PIPE SUPPORT NOTES:

1. UNDER VALVES, METERS OR OTHER SPECIAL APPURTENANCES, A FABRICATED SUPPORT PIECE MAY BE UTILIZED AS ACCEPTABLE TO ENGINEER.
2. FOR ADDITIONAL REQUIREMENTS SEE SPECIFICATIONS FOR PIPE SUPPORTS.
3. PIPE SUPPORT FOUNDATION FOR PIPING IN EARTHEN CONTAINMENT AREA SHALL BE SIMILAR TO CATWALK SUPPORTS FOUNDATION, SEE SHEET SB-10, SECTION A.
4. PIPE SUPPORTS SHOWN ARE TYPICAL. CONTRACTOR SHALL SUBMIT PIPE SUPPORT DETAILS AND PLAN FOR PIPING ON AND OFF CONTAINMENT.
5. 1/4" NEOPRENE PAD SHALL BE PROVIDED UNDER PIPING AT PIPE SUPPORTS.

REV.	DATE	DESCRIPTION	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

A AS-BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR.

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. MZ-02

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

MECHANICAL DETAILS

DR:	SJ CLARK
CK:	GA KOLENOVSKY
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 42 OF 72

ABBREVIATIONS

A	AMPS
AFF	ABOVE FINISHED FLOOR
AIC	AMPERE INTERRUPTING CAPACITY
BLDG	BUILDING
C	CONDUIT
CO	CONDUIT ONLY
CKT	CIRCUIT
CPB	CONTROL PULL BOX
CTB	CONTROL TERMINAL BLOCK
DBC	DEAD BREAK CONNECTOR ELBOW
DISC SW	DISCONNECT SWITCH
C (E)	EMPTY CONDUIT
EMT	ELECTRICAL METAL TUBING
EPM	ELECTRONIC POWER METER
EW	EACH WAY
EWC	ELECTRIC WATER COOLER
F	FUSE, FUSIBLE
FACP	FIRE ALARM CONTROL PANEL
FCI	FAULT CIRCUIT INDICATOR
FL	FLOOR
GFI	GROUND FAULT INTERRUPTOR
GFS	GROUND FAULT SENSOR
GND	GROUND
HP	HORSEPOWER
KW	KILOWATT
KVA	KILOVOLTAMPERES
LBC	LOAD BREAK CONNECTOR ELBOW
LC	LIGHTING CONTACTOR
LRFI	LOAD BREAK ROTATABLE FEED THRU INSERT
MCB	MAIN CIRCUIT BREAKER
MH or M/H	MANHOLE
MLO	MAIN LUGS ONLY
MOVE	METAL OXIDE VARISTOR ELBOW
MT	MOUNT
MTD	MOUNTED
MTR	MOTOR
NF	NON-FUSED
NTS	NOT TO SCALE
PC	PHOTOCELL
PPB	POWER PULL BOX
PTB	POWER TERMINAL BLOCK
PVC	POLYVINYL CHLORIDE
REC, RECPT	RECEPTACLE
RGS	RIGID GALVANIZED STEEL
SBJ	SYSTEM BONDING JUMPER
SSBJ	SUPPLY SIDE BONDING JUMPER
SC	SECTIONALIZING CABINET
TTB	TELEPHONE TERMINAL BOARD
TYP	TYPICAL
UG	UNDERGROUND
UON	UNLESS OTHERWISE NOTED
VFI	VACUUM FAULT INTERRUPTER
WP	WEATHERPROOF

COLOR CODE ABBREVIATIONS

BK	BLACK
W	WHITE
R	RED
G	GREEN
O	ORANGE
BU	BLUE
A	AMBER
Y	YELLOW
R BK	RED BASE W/BLACK TRACER (TYP)

PLAN DRAWING SYMBOLS

- XX-XXX — CONDUIT OR CABLE TAG (SEE CONDUIT SCHEDULE)
- CONDUIT RUN ABOVE GROUND
- CONDUIT RUN UNDERGROUND
- CONDUIT TURNING UP OR TOWARDS
- CONDUIT TURNING DOWN OR AWAY
- G — COPPER GROUND WIRE
- LIGHTING AND RECEPTACLE PANELBOARD
- DISTRIBUTION PANELBOARD
- LA-1,3 — HOMERUN TO PANELBOARD "LA" SMALL CROSSMARKS INDICATE HOT WIRE, LARGE CROSSMARK INDICATES NEUTRAL. GROUND WIRE NOT SHOWN BUT SHALL BE INCLUDED IN ALL CIRCUITS. WIRING #12 IN 3/4"C. UNLESS INDICATED OTHERWISE.
- DISCONNECT SWITCH
- MOTOR STARTER
- COMBINATION MOTOR STARTER
- THERMAL OVERLOAD SWITCH
- SINGLE POLE SWITCH – 20A, 120/277V, MTD. 48" AFF.
- SINGLE POLE DIMMING SWITCH
- 3 WAY SWITCH – 20A, 120/277V, MTD. 48" AFF.
- KEYLOCK LIGHT SWITCH, MTD. 48" AFF.
- JUNCTION BOX – USE RAISED COVER & BLANK PANEL IN FINISHED AREAS
- GFI — RECEPTACLE WITH GROUND FAULT INTERRUPTER
- RECEPTACLE – DUPLEX, 20A, 1ø, 120V, 3 POLES, GROUNDED
- RECEPTACLE LOCATED ABOVE COUNTER
- WP — WEATHERPROOF RECEPTACLE
- RECEPTACLE CONNECTED TO EMERGENCY POWER
- RECEPTACLE – FOURPLEX, 20A, 1ø, 120V, GROUNDED
- RECEPTACLE – 208V, 1ø, GROUNDED
- RECEPTACLE – 208V, 3ø, GROUNDED
- RECEPTACLE – 240V, 1ø, GROUNDED
- ELECTRIC MOTOR
- GROUND ROD
- GROUND TEST WELL
- MH — MANHOLE
- X — ELECTRICAL NOTE DESIGNATION TAG (SPECIFIC TO EACH SHEET)

ANSI DEVICE NUMBERS

27	UNDERVOLTAGE RELAY
32	DIRECTIONAL POWER RELAY
60	VOLTAGE BALANCE RELAY
63	SUDDEN PRESSURE RELAY
67	AC DIRECTIONAL OVERCURRENT RELAY
86	LOCK OUT RELAY

ONE LINE SYMBOLS

- HORN GAP SWITCH
- POWER CIRCUIT AND EQUIPMENT
- FUTURE
- EXISTING
- POLE MOUNTED FUSED DISCONNECT SWITCH
- DISCONNECT SWITCH
- FUSED DISCONNECT SWITCH
- AIR BREAK LOAD INTERRUPTER SWITCH
- DRAWOUT FUSE SWITCH
- FUSE * INDICATES RATING AMPERES (* 100A)
- DRAWOUT VACUUM BREAKER
- DRAWOUT AIR BREAKER
- CURRENT LIMITING BREAKER
- 200/5 / 3 — CURRENT TRANSFORMER INDICATES RATIO AND NUMBER
- POTENTIAL TRANSFORMER
- GROUND
- RISER POLE LIGHTNING ARRESTOR
- MOVE SURGE ARRESTOR ELBOW
- SURGE CAPACITOR & LIGHTNING ARRESTOR
- 3 POSITION (GROUND, OPEN, CLOSED) LOAD INTERRUPTER SWITCH
- 3 POSITION (GROUND, OPEN, CLOSED) LOAD INTERRUPTER SWITCH WITH OVERCURRENT CONTROL
- STRESS CONE
- BUS DUCT
- DRAWOUT CONTACTOR (ATS)
- B SOURCE / A SOURCE / COIL — FOUR POSITION SWITCH (LOOP FEED) "T-BLADE"
  AB – CLOSE TO COIL
  B – COIL
  A – COIL
  AB – OPEN TO COIL

LIGHTING SYMBOLS

- 2x4 FLUORESCENT LIGHTING FIXTURE
- 2x2 FLUORESCENT LIGHTING FIXTURE
- 1x4 FLUORESCENT LIGHTING FIXTURE
- WALL MOUNTED FLUORESCENT LIGHTING FIXTURE
- FLOURESCENT STRIP LIGHT
- SURFACE MOUNTED INCANDESCENT/H.I.D. FIXTURE
- WALL MOUNTED H.I.D. FIXTURE
- WALL MOUNTED SELF-CONTAINED EMERGENCY LIGHTS
- EXIT LIGHT

TELEPHONE/COMMUNICATIONS SYMBOLS

- TELEPHONE OUTLET 1-GANG J.B. W/ 3/4" C (E) STUBBED UP ABOVE CEILING W/ PULL STRING
- COMBINATION TEL./DATA OUTLET 1-GANG J.B. W/ 3/4" C (E) STUBBED UP ABOVE CEILING W/ PULL STRING
- DATA OUTLET 1-GANG J.B. W/ 3/4" C (E) STUBBED UP ABOVE CEILING

GENERAL NOTES: (PERTAINS TO ALL SHEETS)

1. CONTRACTOR SHALL INSURE THAT ALL ELECTRICAL WORK SHALL COMPLY WITH THE MINIMUM REQUIREMENTS OF THE 2011 NATIONAL ELECTRICAL CODE (NEC) AND ANY LOCAL, STATE AND FEDERAL CODES AND/OR RESTRICTIONS.
2. THE INTENT OF THESE DRAWINGS IS TO DEFINE THE CONCEPTUAL SCOPE OF WORK. IT IS THE CONTRACTOR'S RESPONSIBILITY TO SUPPLY ALL NECESSARY MATERIAL AND LABOR TO FURNISH A COMPLETE AND OPERABLE ELECTRICAL SYSTEM.
3. THE CONTRACTOR IS RESPONSIBLE FOR PAYING ALL TAXES AND LICENSES AS A RESULT OF HIS WORK.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OR REPLACE/REPAIR AT HIS OWN EXPENSE ANY AND ALL CONSTRUCTION THAT IS DAMAGED BY HIS WORK TO MATCH EXISTING. THIS NEW REPAIR OR REPLACEMENT WORK SHALL BE DONE TO THE OWNER'S SATISFACTION, OR THE OWNER SHALL HAVE THE RIGHT TO REPAIR OR REPLACE ON HIS OWN AT THE OWNER'S EXPENSE.
5. A FULL TIME SUPERINTENDENT, EXPERIENCED IN AND SKILLED IN THIS TYPE OF WORK SHALL BE ON THE JOB AT ALL TIMES DURING THE WORK. THE SUPERINTENDENT SHALL REPRESENT THE CONTRACTOR IN HIS ABSENCE AND ALL DIRECTIONS GIVEN TO HIM SHALL BE AS BINDING AS IF GIVEN DIRECTLY TO THE CONTRACTOR.
6. HAZARDOUS OR FLAMMABLE MATERIALS SHALL NOT BE STORED AT THE JOB SITE AT ANY TIME.
7. THE CONTRACTOR SHALL RELOCATE ANY ELECTRICAL OR MECHANICAL DEVICES THAT ARE IN CONFLICT WITH THE NEW WORK AS A PART OF THIS CONTRACT. CONTRACTOR SHALL CONSULT WITH THE CONTRACTING OFFICER'S REPRESENTATIVE FOR EXACT LOCATION OF RELOCATED DEVICES.
8. GROUNDING SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC). CONTRACTOR SHALL INSTALL A PROPERLY SIZED GROUND WIRE IN EVERY CONDUIT RUN.
9. ALL ABOVE GROUND CONDUIT AND FITTINGS SHALL BE RIGID ALUM.
10. ALL MATERIALS AND TESTING OF ELECTRICAL EQUIPMENT SHALL CONFORM TO THE LATEST PUBLISHED STANDARDS OF THE IEEE, NEMA, ANSI AND ASTM CODES WHERE APPLICABLE.
11. WHERE TWO OR MORE REGULATIONS OR CODES ARE APPLICABLE, THE MOST STRINGENT SHALL APPLY.
12. ALL ELECTRICAL MATERIAL AND EQUIPMENT SHALL BE LISTED OR LABELED UL (UNDERWRITERS LABORATORIES), FM (FACTORY MUTUAL), OR EQUIVALENT TESTING LABORATORY, FOR THE SERVICE IN WHICH IT IS USED, AND SHALL BEAR THEIR LABEL OR LISTING.
13. BREATHERS AND DRAINS SHALL BE PROVIDED AT HIGH AND LOW POINTS OF THE CONDUIT SYSTEM TO PREVENT THE ACCUMULATION OF CONDENSED WATER.
14. CONTRACTOR SHALL FIELD ROUTE AND SUPPORT CONDUITS FROM NEW & EXISTING RACKS OR STRUCTURES.
15. ALL MATERIAL & DEVICES SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
16. ALL REQUIRED DIMENSIONS SHALL BE VERIFIED AT THE JOB SITE BEFORE INSTALLATION OF EQUIPMENT.
17. ALL ITEMS ARE TO BE PROVIDED AS NEW UNDER THIS CONTRACT UNLESS ITEM IS MARKED "EXISTING".
18. ALL ELECTRICAL SHALL BE PERFORMED BY A LICENSED ELECTRICAL CONTRACTOR.
19. USE OXIDATION INHIBITING COMPOUND ON ALL CONDUCTOR TERMINATIONS INSIDE SERVICE EQUIPMENT, DISCONNECT SWITCHES, FUSE HOLDERS AND ON FUSE FERRULES, TERMINAL BOXES, ELECTRICAL PANELS, CONTROL PANELS AND GROUNDING CONNECTIONS. CONTROL WIRING SIZES #12 AND SMALLER INSIDE CONTROL PANELS IS EXEMPT FROM REQUIREMENT.
20. OBTAIN A CITY OF NEW ORLEANS PERMIT AND ELECTRICAL INSPECTION.

SHEET NUMBERING SYSTEM

EZ-01

- EZ — SEQUENTIAL SHEET NUMBER
- DISCIPLINE
  - G-GENERAL
  - C-CIVIL
  - S-STRUCTURAL
  - M-MECHANICAL
  - E-ELECTRICAL
  - I-INSTRUMENTATION
- -01 — DENOTES AREA OR STANDARD DETAIL SHEETS
  - A – GENERAL DISCIPLINE SHEETS
  - B – EMERGENCY FUEL STORAGE TANK AREA
  - C – DAY TANK / BOILER ROOM BASEMENT AREA
  - Z – STANDARD DETAIL SHEETS

DEPICTED IS STANDARD ELECTRICAL DETAIL SHEET NO. 1

A — AS-BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

E

Trigon — Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EA-01

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

REV.	DATE	AS-BUILT MARKUPS	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

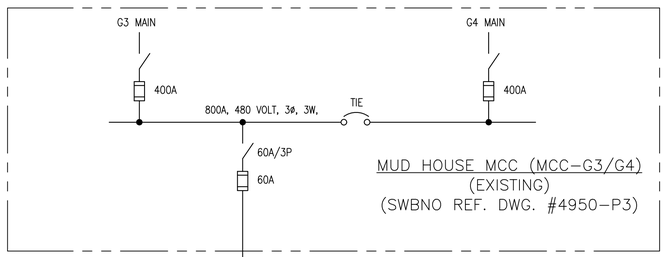
ELECTRICAL NOTES & SYMBOLS SCHEDULES

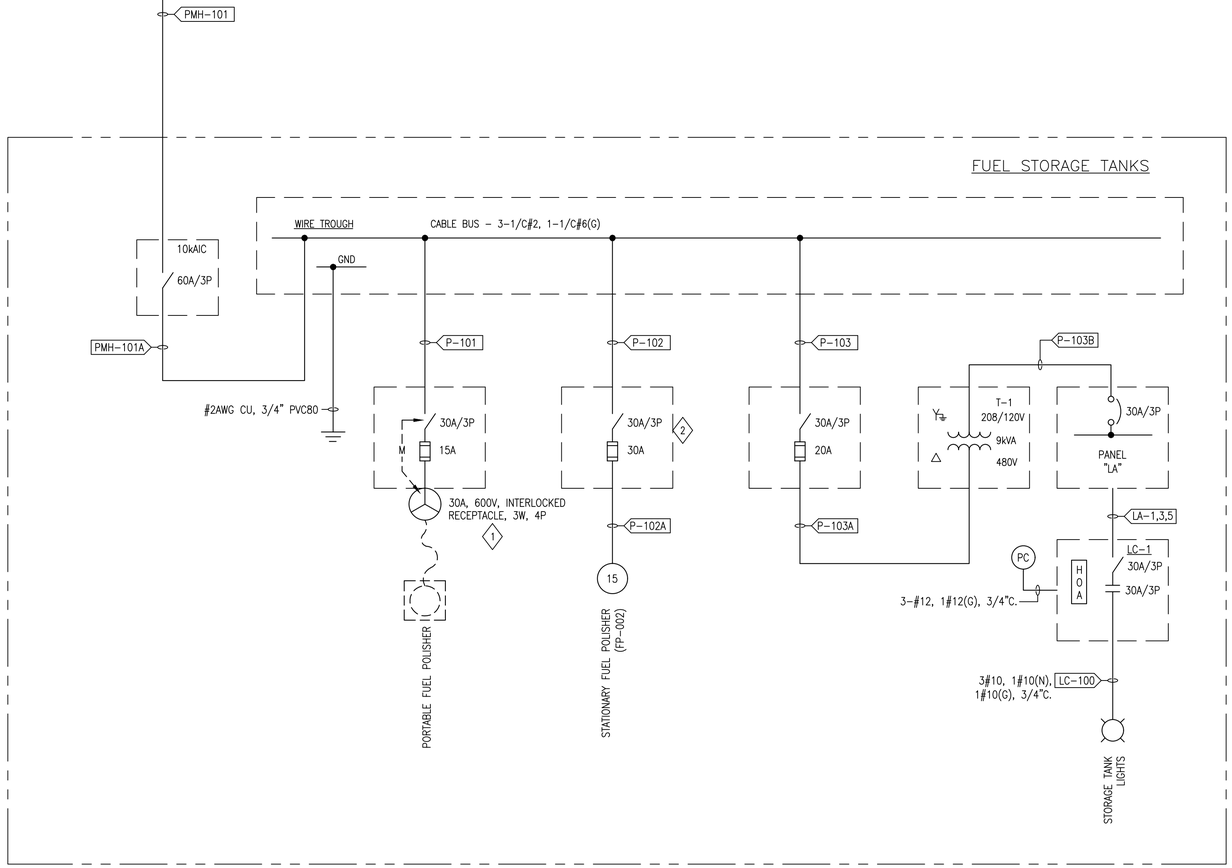
DR:	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 43 OF 72

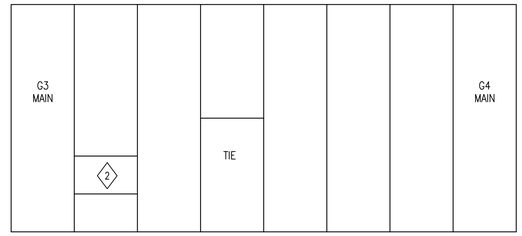




FUEL STORAGE TANKS ONE LINE DIAGRAM

A – DIAGRAM

NTS



MUD HOUSE MCC-G3/G4 FRONT ELEVATION 1

NOTES:

1. MCC G3/G4 IS GE 800 LINE, CAT#605X0120L01.
2. 60A, 600V, 3P, SPARE SWITCH IS EXISTING. FUSE WITH 60A CLASS R FUSES & USE AS "OIL STORAGE TANKS FEEDER". RE-LABEL MCC DOOR.

NOTES:

1. 30A, 600V, 3P, 4W, INTERLOCKED RECEPTACLE, HP RATED (7½HP), NEMA 4X 304SS, FUSED, VIEWING WINDOW, CROUSE HINDS WSRDW3352 SM S901, WITH MATING 3W, 4P PLUG, CROUSE HINDS APJ3485 OR EQUAL.
2. VERIFY SIZE AND FUSING WITH STATIONARY POLISHER MANUFACTURER.

REV.	DATE		BY
A	10-25-19	AS-BUILT MARKUPS	LHN

A AS-BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

E

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EA-02

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

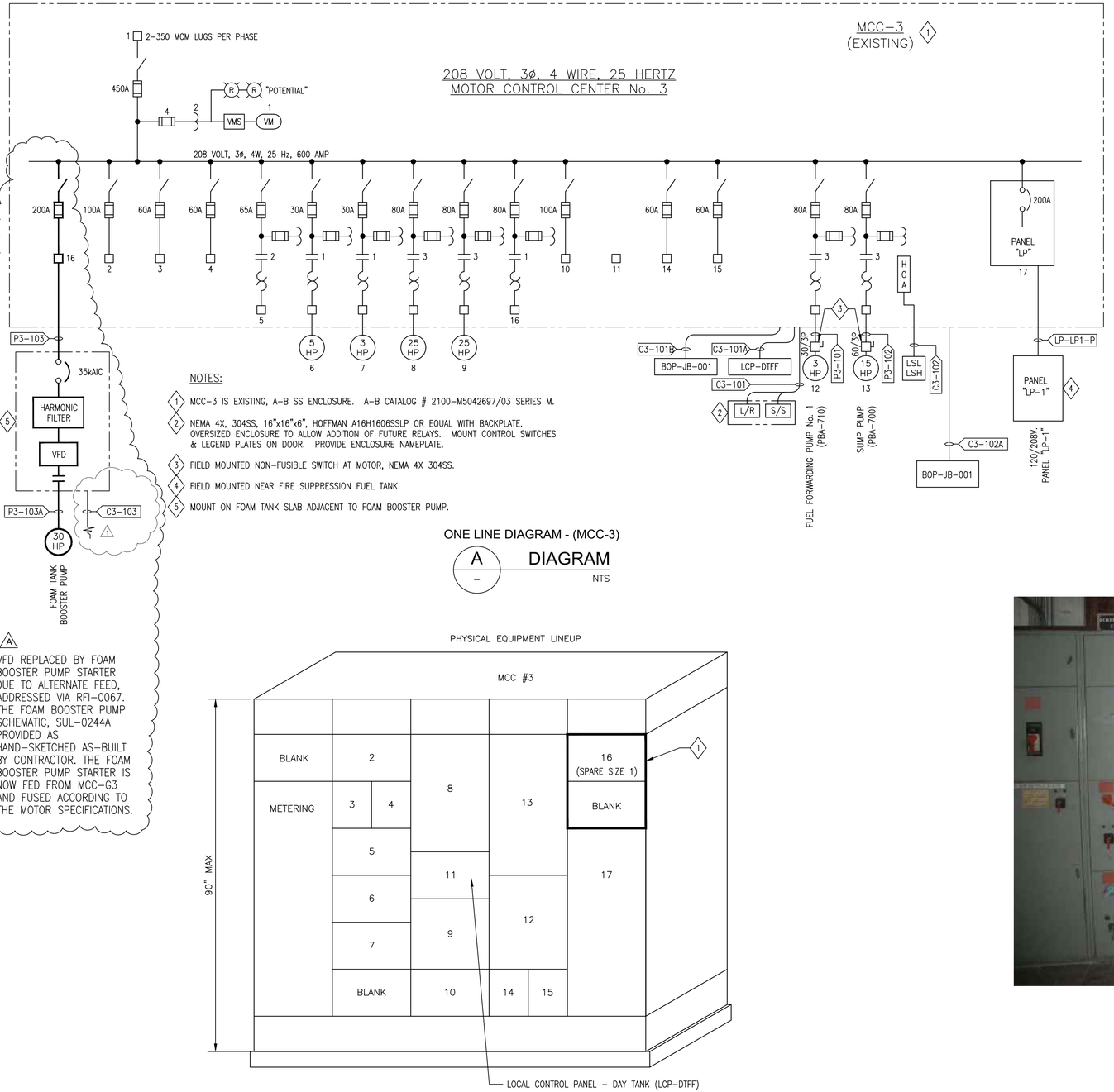
FUEL STORAGE TANKS ONE LINE DIAGRAM

DR.	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 44 OF 72



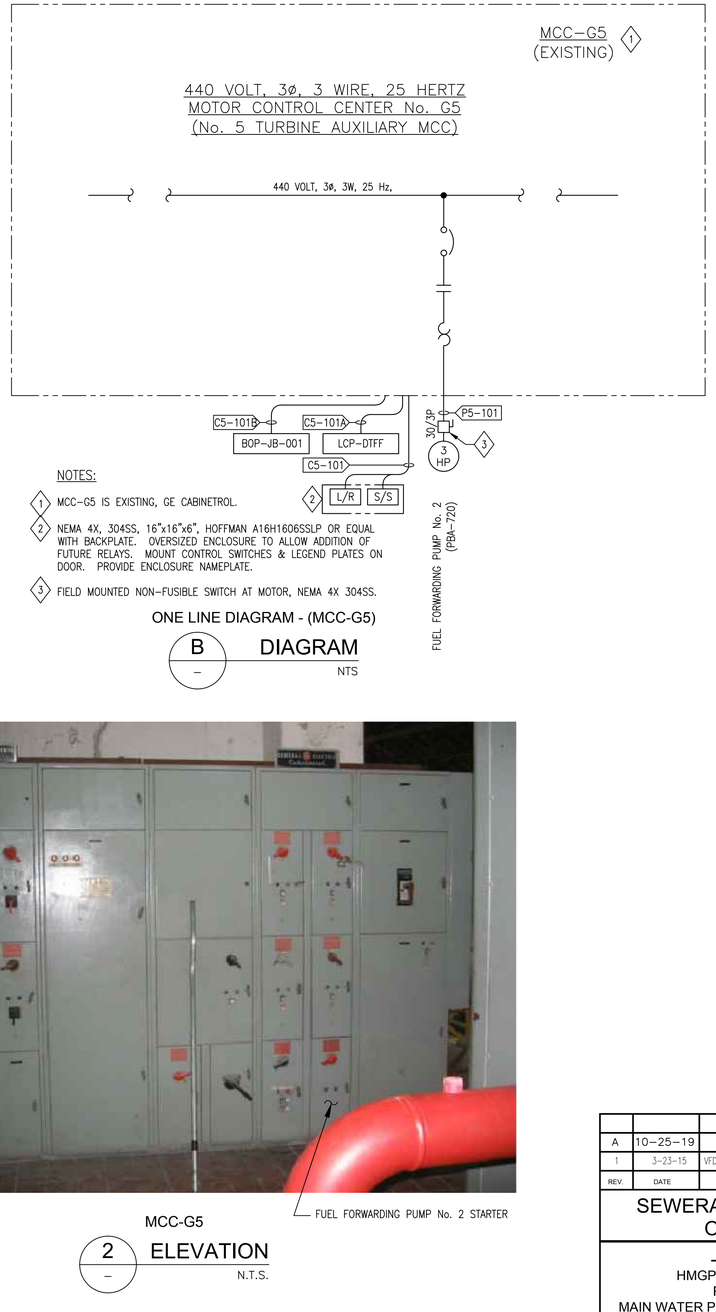
NOTES:

1. MCC–3 IS EXISTING, A–B SS ENCLOSURE. A–B CATALOG # 2100–M5042697/03 SERIES M.
2. NEMA 4X, 304SS, 16"x16"x6", HOFFMAN A16H1606SSLP OR EQUAL WITH BACKPLATE. OVERSIZED ENCLOSURE TO ALLOW ADDITION OF FUTURE RELAYS. MOUNT CONTROL SWITCHES & LEGEND PLATES ON DOOR. PROVIDE ENCLOSURE NAMEPLATE.
3. FIELD MOUNTED NON–FUSIBLE SWITCH AT MOTOR, NEMA 4X 304SS.
4. FIELD MOUNTED NEAR FIRE SUPPRESSION FUEL TANK.
5. MOUNT ON FOAM TANK SLAB ADJACENT TO FOAM BOOSTER PUMP.

ONE LINE DIAGRAM - (MCC-3)

A – DIAGRAM NTS

A. VFD REPLACED BY FOAM BOOSTER PUMP STARTER DUE TO ALTERNATE FEED, ADDRESSED VIA RFI–0067. THE FOAM BOOSTER PUMP SCHEMATIC, SUL–0244A PROVIDED AS HAND–SKETCHED AS–BUILT BY CONTRACTOR. THE FOAM BOOSTER PUMP STARTER IS NOW FED FROM MCC–G3 AND FUSED ACCORDING TO THE MOTOR SPECIFICATIONS.



NOTES:

1. MCC–G5 IS EXISTING, GE CABINETROL.
2. NEMA 4X, 304SS, 16"x16"x6", HOFFMAN A16H1606SSLP OR EQUAL WITH BACKPLATE. OVERSIZED ENCLOSURE TO ALLOW ADDITION OF FUTURE RELAYS. MOUNT CONTROL SWITCHES & LEGEND PLATES ON DOOR. PROVIDE ENCLOSURE NAMEPLATE.
3. FIELD MOUNTED NON–FUSIBLE SWITCH AT MOTOR, NEMA 4X 304SS.

ONE LINE DIAGRAM - (MCC-G5)

B – DIAGRAM NTS

PHYSICAL EQUIPMENT LINEUP

MCC-3

1 – ELEVATION SCALE: 3/4"=1'–0"

NOTES:

1. REMOVE SPARE SIZE 1 & BLANK DOOR. INSTALL MCC BUCKET WITH 200AMP/3P FUSED SWITCH. FUSE WITH 200AMP CLASS R FUSES. OBTAIN SERVICES OF AB FIELD ENGINEER TO MAKE ALL MCC MODIFICATIONS.

MCC-G5

2 – ELEVATION N.T.S.

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

E

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EA-03

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

REV.	DATE		BY
A	10–25–19	AS–BUILT MARKUPS	LHN
1	3–23–15	VFD SPACE HEATER REVISION, DIAGRAM "A" (ADD.3)	HGH

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

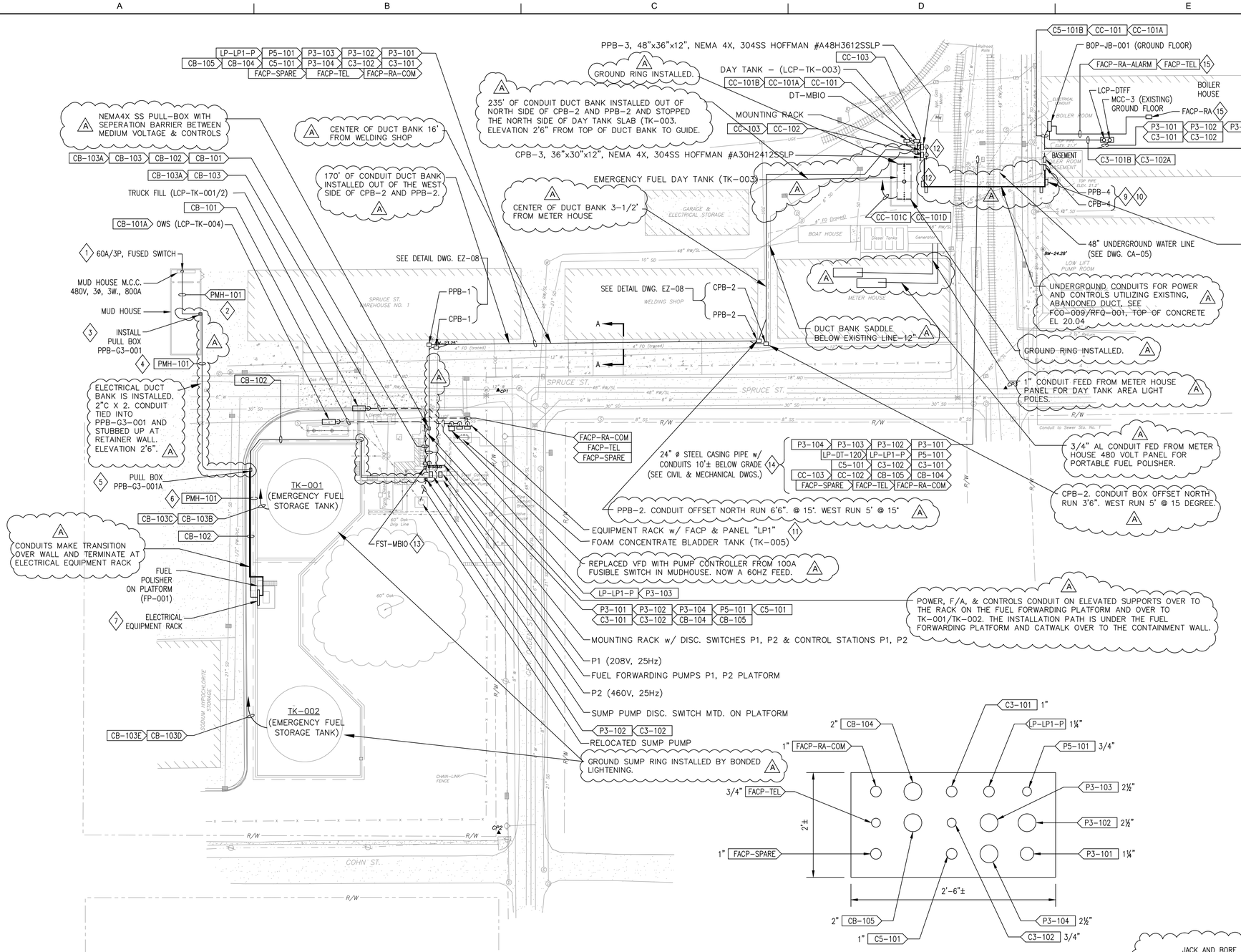
MCC-3 & G5 ONE LINE DIAGRAMS & EQUIPMENT LAYOUT

DR:	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 45 OF 72



DUCT BANK - SECTION A-A

N.T.S.

(INSTALL PER DETAILS ON DWG. EZ-04)

1 OVERALL ELECTRICAL PLAN

SCALE: 1"=40'

A JACK AND BORE CROSSING OF EAGLE STREET REPLACED WITH OPEN CUT/TROUGH INSTALLATION FCO-009/RFQ-001. SEE SUL-0243 FOR CONTRACTOR PROVIDED HAND-DRAWN SKETCHES OF AS-BUILTS. USE OF 60 HZ FEED FROM MUD PUMP ROOM MCC-G3 IN LIEU OF 25 CYCLE WITH VFD FOR FIRE SUPPRESSION SYSTEM EQUIPMENT WAS APPROVED WITH RFI-0067.

GENERAL NOTES:

A CONDUITS SHALL NOT PENETRATE STORAGE TANK FLOOR INSIDE CONTAINMENT AREA. RUN CONDUITS EXPOSED ALONG CONTAINMENT WALLS.

NOTES:

1. USE SPARE 60A/3P SWITCH IN EXISTING MCC-G3.
2. RUN OVERHEAD INSIDE BUILDING.
3. NEMA 4X 304SS POWER PULL BOX PPB-G3-001.
4. UNDERGROUND CONCRETE ENCASED DUCT BANK WITH REBAR.
5. NEMA 4X 304SS POWER PULL BOX PPB-G3-001A. RISE OUTSIDE CONTAINMENT WALL.
6. RUN ON OUTSIDE OF CONTAINMENT WALL.
7. SEE ONE LINE DIAGRAM, DWG. No. 12098-W8-EA-02.
8. RUN CONDUITS EXPOSED. DROP FROM 2nd FLOOR TO BASEMENT. RUN IN BASEMENT.
9. STEEL CASING PIPE ENTRY TO BASEMENT SHALL BE WATERPROOF. PROVIDE A TEE-FITTING WITH A BREATHER/DRAIN FITTING ON EACH CONDUIT PRIOR TO ENTRY TO PPB-4, CPB-4 TO ALLOW CONDUITS TO DRAIN. RUN DRAIN TO SUMP IN BASEMENT. SEAL ALL CONDUITS WITH SEALING BUSHING (OZ GEDNEY OR EQUAL) WHERE CONDUITS ENTER PPB-4, CPB-4. PROVIDE BREATHER/DRAIN FITTING IN PPB-4, CPB-4.
10. EXTEND CONDUITS PASSING THROUGH PPB-4, CPB-4 AS CALLED FOR ON SCHEMATICS AND ON CONDUIT & CABLE SCHEDULE.
11. FACP CONDUITS AND PANEL LP1 DISTRIBUTION CIRCUITS ARE NOT SHOWN ON THIS DWG. SEE DWG. EB-04.
12. THE DUCT BANKS SHALL RISE AS CONCRETE ENCASED WITH REBAR PER "ABOVE GROUND CONDUIT TERMINATION DETAIL" ON EZ-04. WELD REBAR TO STEEL PIPE AND COVER WITH 3" OF CONCRETE.
13. MOUNT ON FUEL TRANSFER PLATFORM. PROVIDE EQUIPMENT MOUNTING RACK.
14. 24"ø STEEL CASING PIPE TO BE INSTALLED BY JACK & BORE. SEE DWG. EZ-07.
15. LOCATE IN OPERATOR'S OFFICE.
16. MOUNT VFD ENCLOSURE ON SLAB ALONG WITH FACP & PANEL LP1. SECURE ENCLOSURE TO SLAB AND TO EQUIPMENT RACK SUCH THAT STRUCTURE IS RATED FOR 150MPH WIND LOADING.

REV.	DATE	AS-BUILT MARKUPS	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

E

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EA-04

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLE□

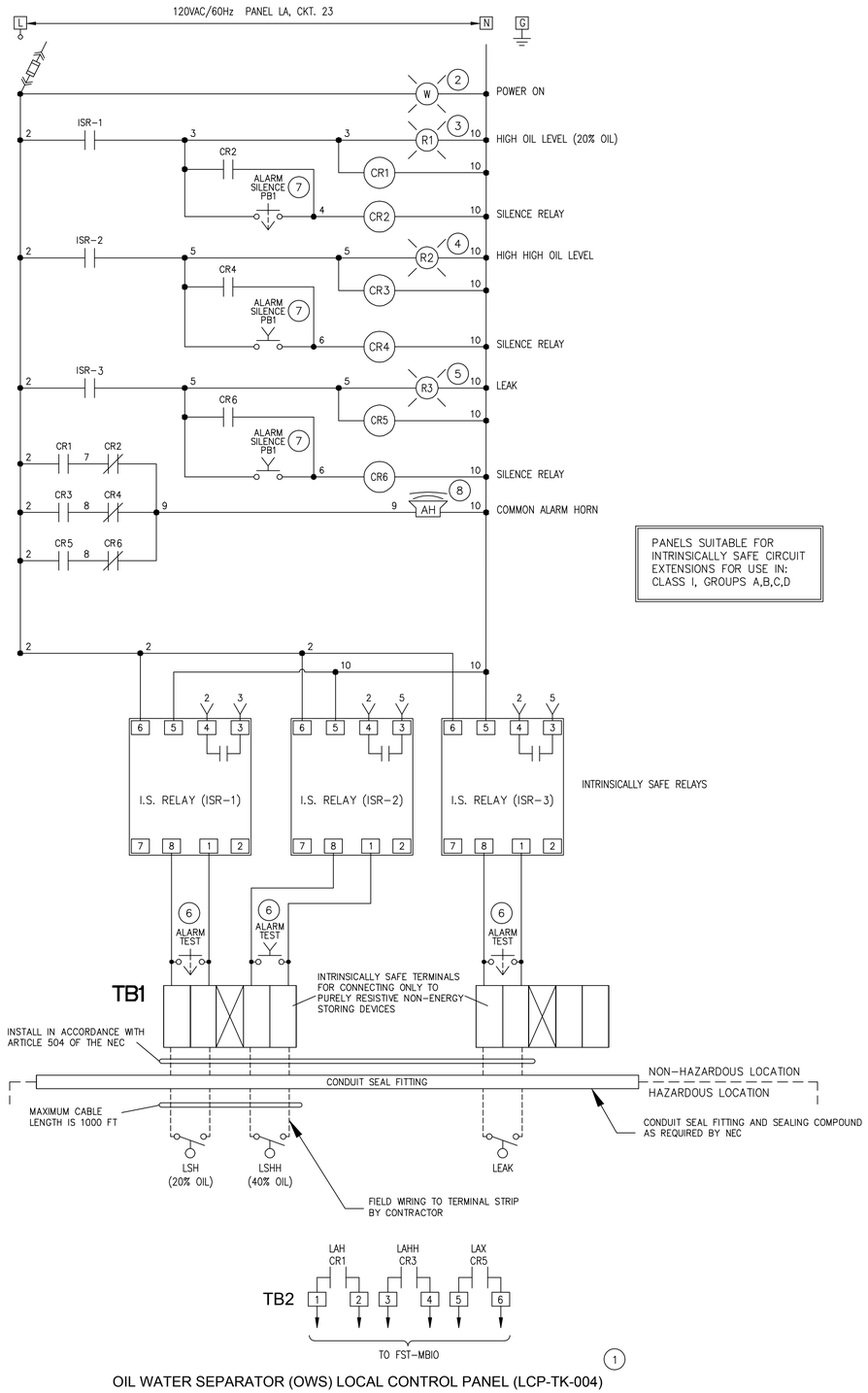
OVERALL ELECTRICAL PLAN

DR.	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

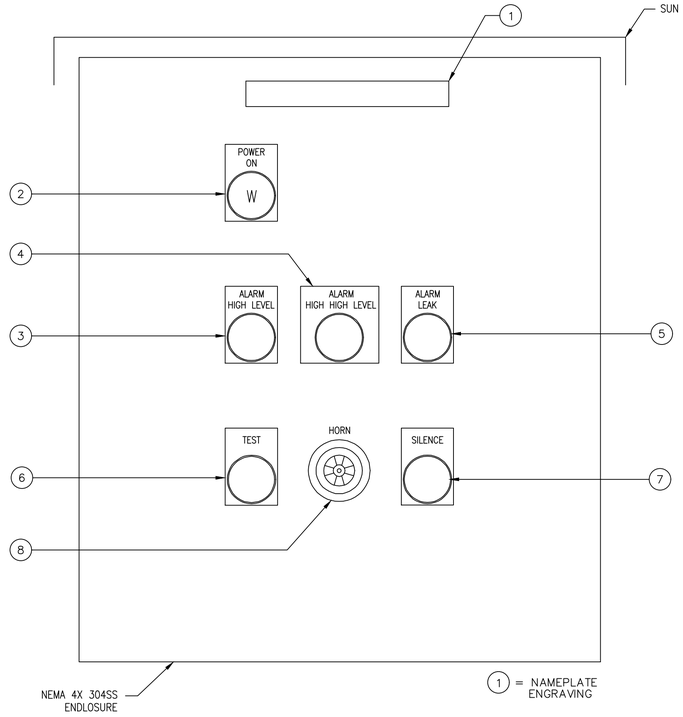
SET NO: SHEET NO: 46 OF 72



PANELS SUITABLE FOR INTRINSICALLY SAFE CIRCUIT EXTENSIONS FOR USE IN: CLASS I, GROUPS A,B,C,D

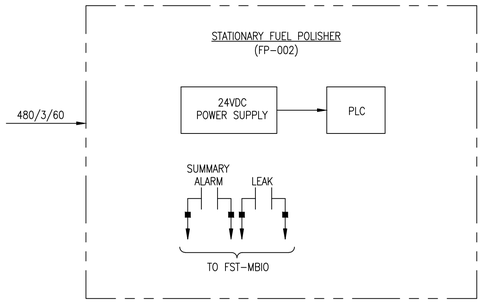
(1) OIL WATER SEPARATOR (OWS) LOCAL CONTROL PANEL (LCP-TK-004)

1 SCHEMATIC
– NTS



(1) OWS ALARM RELAY PANEL (LCP-TK-004)

A DIAGRAM
– NTS



B DIAGRAM
– NTS

GENERAL NOTES:

(A) FOR CONTROL PANEL COMPONENTS, SEE SPECIFICATION SECTION 26 61 00.

(A) CONTROL PANEL AS-BUILTS PROVIDED BY RED GROUP VIA SUL-0244

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

E

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EB-01

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

REV.	DATE		BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

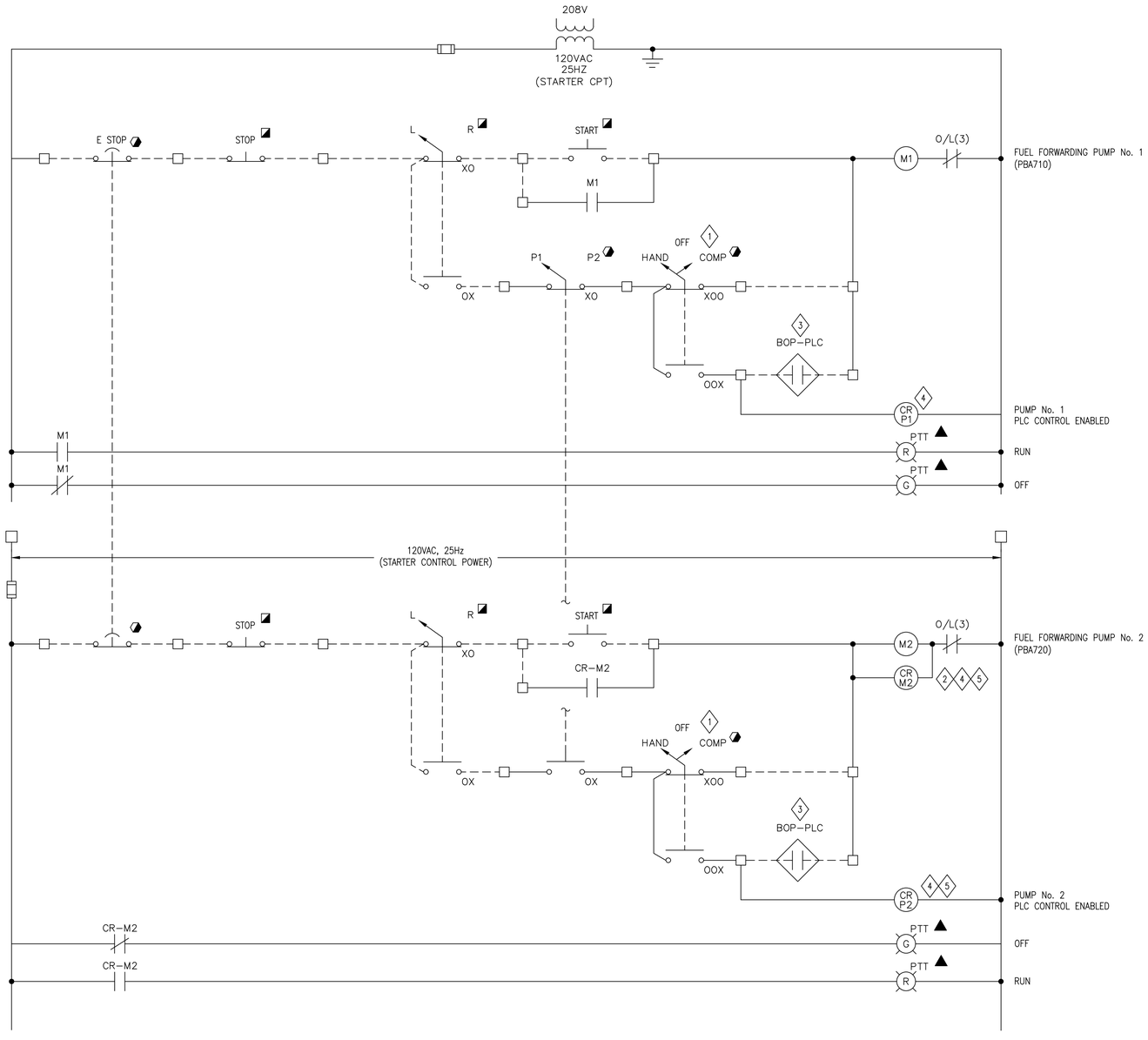
OIL WATER SEPARATOR SCHEMATIC & LOCAL CONTROL PNL.

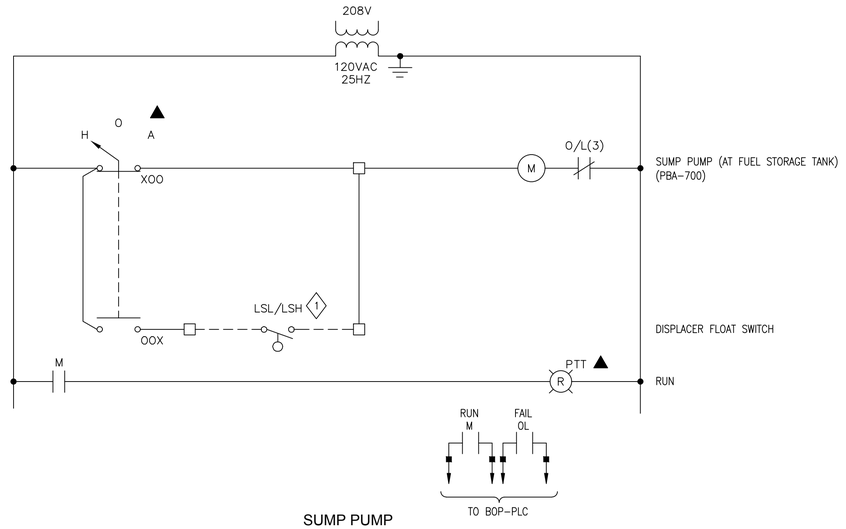
DR:	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 47 OF 72





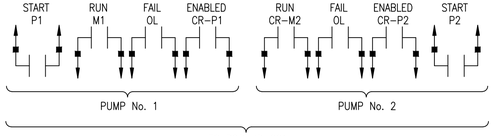
SUMP PUMP

2 – SCHEMATIC

NTS

NOTES:

1. DISPLACER FLOAT SWITCH – HIGH/LOW: EXISTING IN FIELD.



FUEL FORWARDING PUMP No. 1, No. 2

1 – SCHEMATIC

NTS

LEGEND:

- DEVICE LOCATED IN FIELD AT MOTOR
- DEVICE LOCATED AT DIESEL DAY TANK LCP (LCP–DTFF)
- DEVICE LOCATED ON STARTER
- FIELD WIRING
- TERMINAL

NOTES:

1. HAND/OFF/COMPUTER: 3 POSITION SELECTOR SWITCH; SPRING RETURN FROM HAND TO OFF, MAINTAINED POSITIONS – "OFF" & "COMPUTER" ALLEN BRADLEY 800H
2. ADD RELAY CR–M2.
3. PLC OUTPUT: PLC OUTPUT IS MAINTAINED OUTPUT. PLC CONTROL OF FORWARDING PUMPS WILL AUTOMATICALLY START/STOP PUMPS, BASED ON DAY TANK HI/LO LEVELS. REFERENCE PROJECT CP1370 AND BOP–PLC.
4. ALLEN BRADLEY RELAY #700P–401–A22. 220V/60Hz COIL TO OPERATE AT 120V/25Hz.
5. SPACE WITHIN STARTER CUBICLE IS LIMITED. MOUNT RELAYS IN EXTERNAL NEMA 12, 304SS ENCLOSURE. ATTACH LAMECOID LABEL ON ENCLOSURE WITH INSTRUCTIONS ON HOW TO KILL POWER BEFORE OPENING.

A AS–BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

E

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EB-02

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

REV.	DATE		BY
A	10–25–19	AS–BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

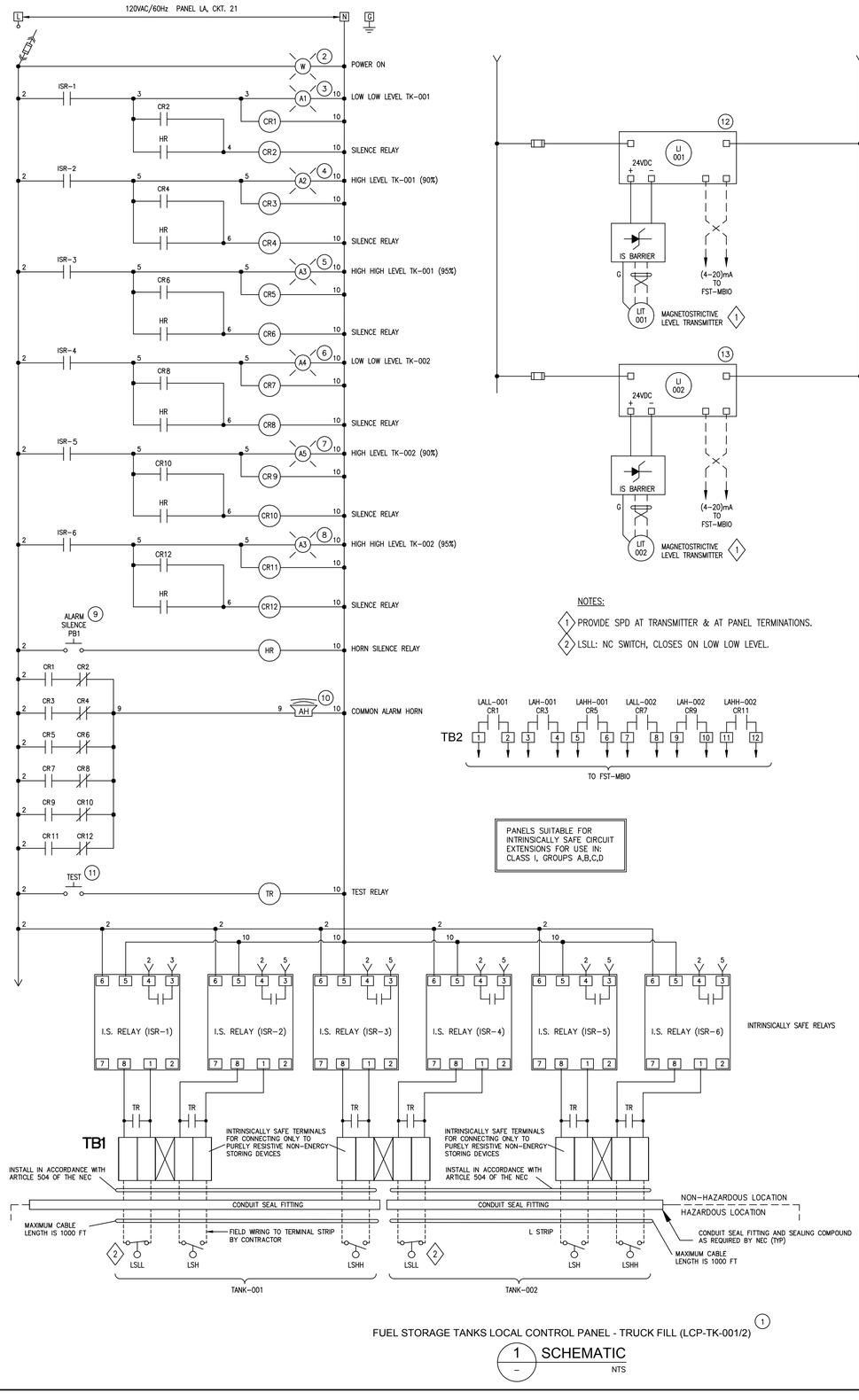
FUEL FORWARDING PUMPS & SUMP PUMP SCHEMATICS

DR:	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 48 OF 72

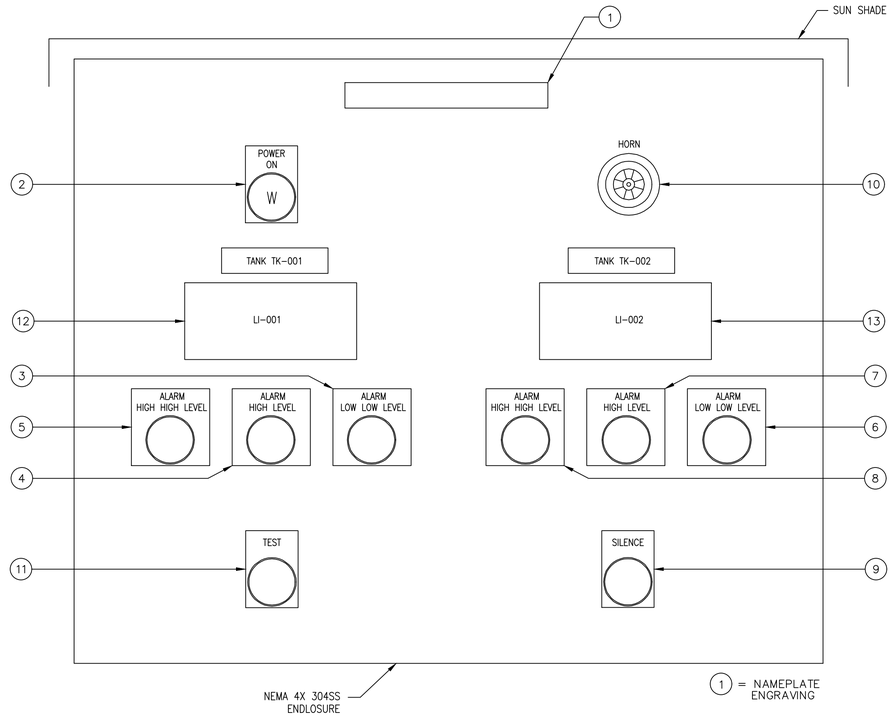


NOTES:

1. PROVIDE SPD AT TRANSMITTER & AT PANEL TERMINATIONS.
2. LSLL: NC SWITCH, CLOSES ON LOW LOW LEVEL.

(1) FUEL STORAGE TANKS LOCAL CONTROL PANEL - TRUCK FILL (LCP-TK-001/2)

1 – SCHEMATIC
NTS



(1) FUEL STORAGE TANKS LOCAL CONTROL PANEL - TRUCK FILL (LCP-TK-001/2)

A – DIAGRAM
NTS

GENERAL NOTES:

A. FOR CONTROL PANEL COMPONENTS, SEE SPECIFICATION SECTION 26,6100.

REV.	DATE		BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

FUEL STORAGE TANKS SCHEMATIC

A CONTROL PANEL AS-BUILTS PROVIDED BY RED GROUP VIA SUL-0244

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

E

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EB-03

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

DR:	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

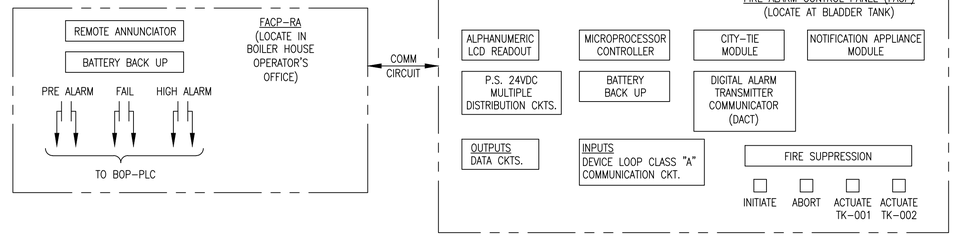
GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 49 OF 72

SYMBOL LEGEND

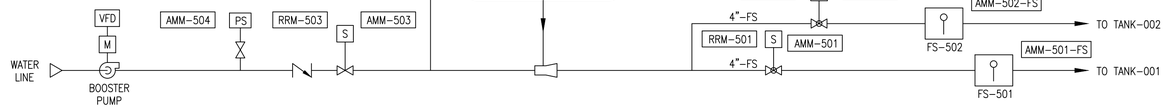
- ⬡ UVIR-XXX : ULTRAVIOLET/INFRARED DETECTOR; TAG NO. "XXX"
- AMM-XXX : AMM-XXX : ADDRESSABLE MONITOR MODULE; TAG NO. "XXX"
- RRM-XXX : RRM-XXX : REMOTE RELEASING MODULE; TAG NO. "XXX"
- FACP : FACP : FIRE ALARM CONTROL PANEL
- S◀ STROBE
- PSL : PRESSURE SWITCH (LOW PRESS ALARM)
- FS-XXX : FLOW SWITCH: TAG No. "XXX"
- AMM-202-24VDC : CONDUIT TAG (TYP)
- L/R : LOCAL/REMOTE
- VFD : VARIABLE FREQUENCY DRIVE

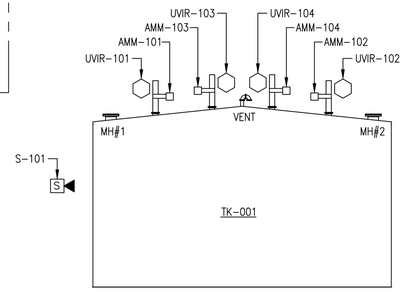


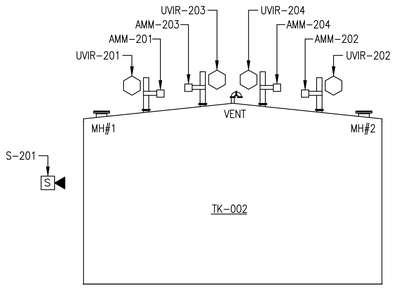
GENERAL NOTES:

A. THE SYSTEM AS SHOWN IS A GENERAL CONCEPTUAL LAYOUT. THE CONTRACTOR SHALL COORDINATE THE EQUIPMENT REQUIRED WITH HIS SUPPLIERS/MANUFACTURERS TO PROVIDE AN INTEGRATED FIRE ALARM & FIRE CONTROL SYSTEM. ALL ITEMS REQUIRED FOR A COMPLETE SYSTEM SHALL BE PROVIDED, WHETHER OR NOT SHOWN ON THIS DRAWING.

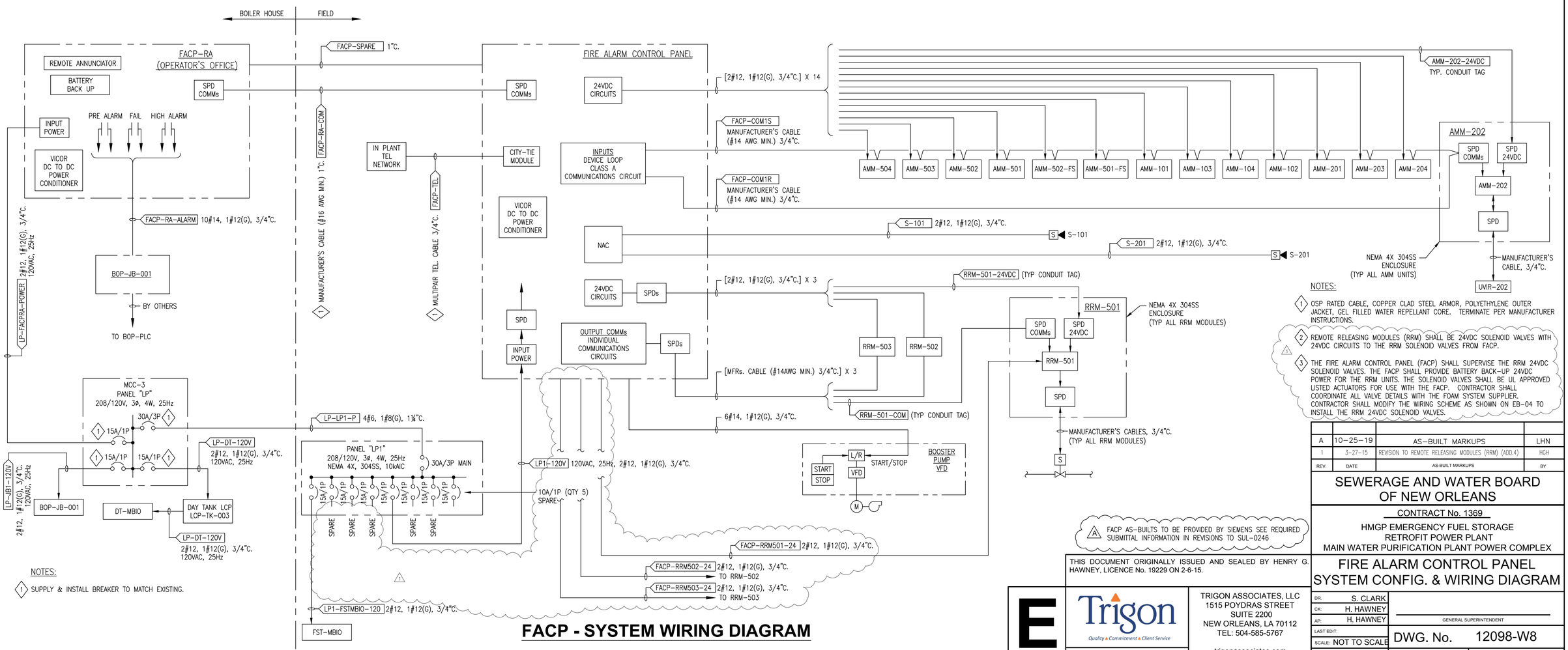
B. THE FACP CONDUITS & CABLES ARE SHOWN ON THIS DRAWING. THEY ARE NOT SHOWN ON THE CONDUIT & CABLE SCHEDULE, DWG. EZ-02.







FACP - SYSTEM CONFIGURATION



FACP - SYSTEM WIRING DIAGRAM

NOTES:

1. SUPPLY & INSTALL BREAKER TO MATCH EXISTING.

NOTES:

1. OSP RATED CABLE, COPPER CLAD STEEL ARMOR, POLYETHYLENE OUTER JACKET, GEL FILLED WATER REPELLANT CORE. TERMINATE PER MANUFACTURER INSTRUCTIONS.
2. REMOTE RELEASING MODULES (RRM) SHALL BE 24VDC SOLENOID VALVES WITH 24VDC CIRCUITS TO THE RRM SOLENOID VALVES FROM FACP.
3. THE FIRE ALARM CONTROL PANEL (FACP) SHALL SUPERVISE THE RRM 24VDC SOLENOID VALVES. THE FACP SHALL PROVIDE BATTERY BACK-UP 24VDC POWER FOR THE RRM UNITS. THE SOLENOID VALVES SHALL BE UL APPROVED LISTED ACTUATORS FOR USE WITH THE FACP. CONTRACTOR SHALL COORDINATE ALL VALVE DETAILS WITH THE FOAM SYSTEM SUPPLIER. CONTRACTOR SHALL MODIFY THE WIRING SCHEME AS SHOWN ON EB-04 TO INSTALL THE RRM 24VDC SOLENOID VALVES.

A FACP AS-BUILTS TO BE PROVIDED BY SIEMENS SEE REQUIRED SUBMITTAL INFORMATION IN REVISIONS TO SUL-0246

REV.	DATE	AS-BUILT MARKUPS	BY
A	10-25-19	AS-BUILT MARKUPS	LHN
1	3-27-15	REVISION TO REMOTE RELEASING MODULES (RRM) (ADD.4)	HGH

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

FIRE ALARM CONTROL PANEL SYSTEM CONFIG. & WIRING DIAGRAM

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

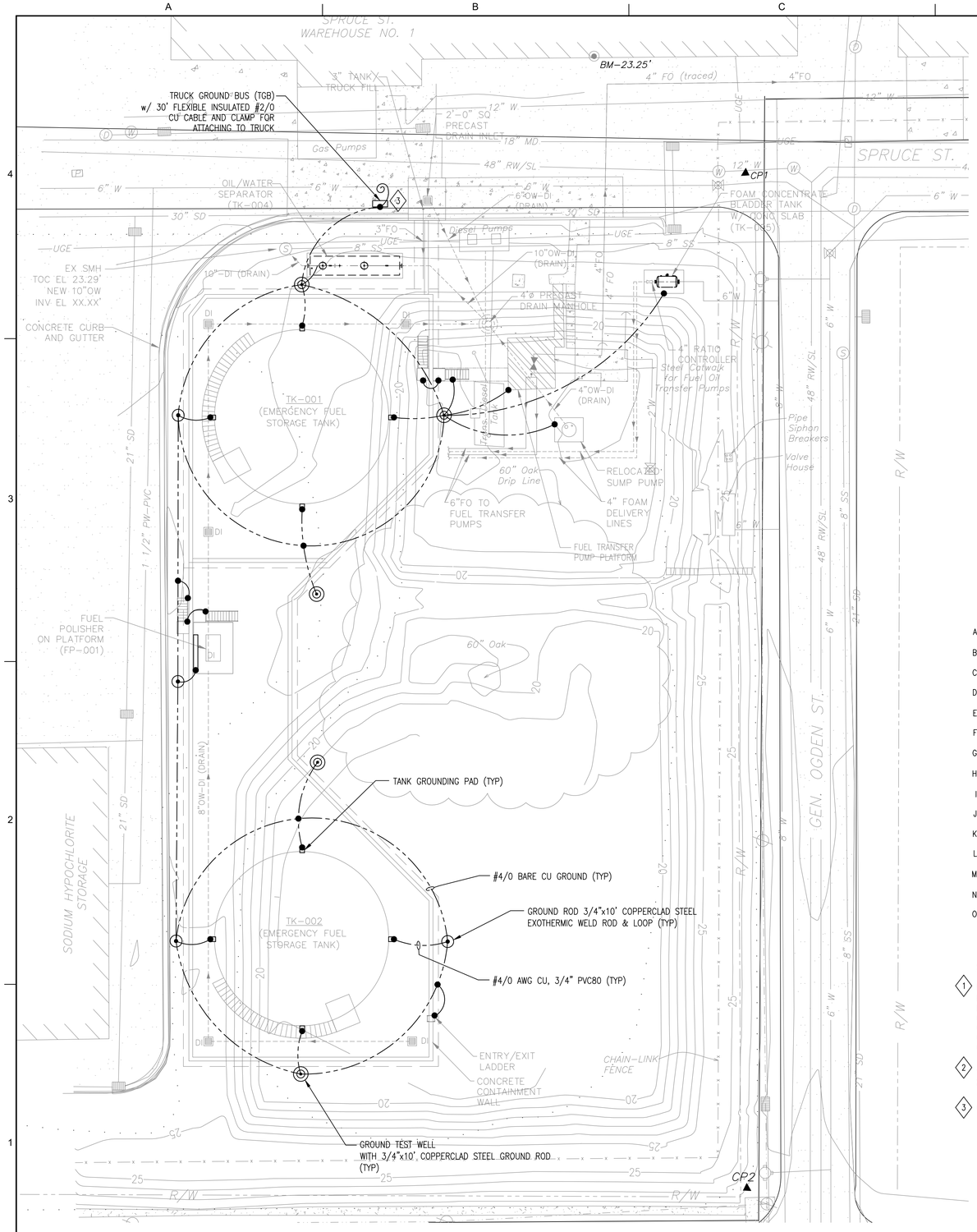
TRIGON DWG. NO. EB-04

DR.	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

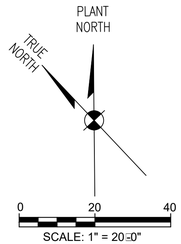
SET NO: SHEET NO: 50 OF 72

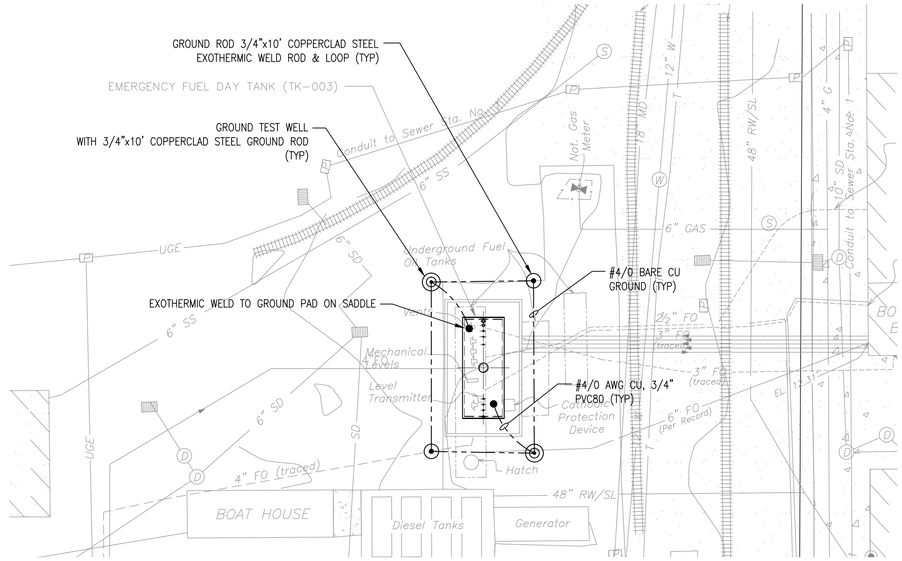


FUEL STORAGE TANKS - GROUNDING PLAN

1 / – PLAN

SCALE: 1"=20'





DAY TANK - GROUNDING PLAN

2 / – PLAN

SCALE: 1"=20'

GENERAL NOTES:

A. ALL EXTERIOR CONNECTIONS SHALL BE EXOTHERMIC WELDS.

B. INTERIOR CONNECTIONS SHALL USE CADWELD OR 2-HOLE (COMPRESSION) CONNECTORS FOR WIRES AND APPROVED GROUND CLAMPS FOR PIPES.

C. CONDUIT AND SLEEVES SHALL BE PVC (SCH. 80).

D. NO METALLIC SLEEVES, STRAPS, HANGERS, CLAMPS, ETC. SHALL ENCIRCLE ANY GROUND WIRE IN THE GROUND SYSTEM. USE PVC, NYLON AND FIBERGLASS WHERE POSSIBLE.

E. NO "T" CONNECTIONS (EXCEPT RING GROUND TO ROD) ARE ALLOWED IN ANY GROUND WIRE – USE PARALLEL CONNECTORS.

F. LIMIT THE RUNNING LENGTH OF ANY GROUND WIRE TO 200 FEET.

G. PHOTOGRAPHS OF ALL BURIED CONNECTIONS (TO PIPES, CONDUIT, ETC.), ARE REQUIRED.

H. A "WELDING PERMIT" IS REQUIRED FOR CADWELDING, WELDING ON OR INSIDE THE STRUCTURE.

I. MINIMUM BENDING RADIUS FOR ALL GROUND WIRES IS 12".

J. COAT ALL BOLTED CONNECTIONS WITH ANTI-OXIDANT.

K. BOND ALL METALLIC CONDUITS TO CLOSEST GROUND BUS (-GB) WHERE THEY ENTER A ROOM OR DEDICATED SPACE. USE BURNDY TIN PLATED 'GAR'.

L. RUN GROUNDING CONDUCTOR AS SHORT AND AS STRAIGHT AS POSSIBLE.

M. ALL BENDS AND CURVES SHALL BE TOWARD THE GROUND LOCATION (GROUNDED END) OF CONDUCTOR.

N. GROUNDING CONDUCTORS SHALL BE SECURELY FASTENED AT INTERVALS NOT EXCEEDING 36".

O. TINNED COPPER, TIN PLATED CONNECTORS SHALL BE USED WHEN CONNECTING TO GALVANIZED STEEL.

SPECIFIC NOTES:

1. PROVIDE LIGHTNING PROTECTION SYSTEM (LPS) ON STORAGE TANKS PER SPECIFICATIONS. LIGHTNING PROTECTION SYSTEM (LPS) DOWN CONDUCTORS ARE EXOTHERMICALLY CONNECTED TO 4/0 GROUND LOOP. COORDINATE SYSTEM PROTECTION LOCATION OF DOWN CONDUCTORS, ETC. WITH LPS CONTRACTOR. LPS CONTRACTOR TO COORDINATE GROUNDING CONNECTIONS WITH ELECTRICAL CONTRACTOR SUCH THAT ALL METAL ITEMS ARE BONDED AND ALL OUTSIDE BLDG. STEEL IS GROUNDED AND DESIGN COORDINATED PER NEC AND NFPA STANDARDS. KEEP LPS DOWN CONDUCTORS MINIMUM 6' AWAY FROM ELECTRONIC GEAR. COORDINATE WITH CONTRACTOR.
2. AT STORAGE TANK FACILITY, THERMOWELD INCOMING DUCT BANK GROUND WIRE TO GROUND LOOP. AT OPPOSITE END OF DUCT BANK, BOND DUCT BANK GROUND TO CONDUITS USING TIN PLATED "GAR" CONNECTORS.
3. CONNECT WITH 2 HOLE COMPRESSION CONNECTORS.

LEGEND:

- TGB — TRUCK GROUND BUS, 4"x ¼"x6" TIN PLATED Cu BAR (SEE SPECS)
- EXOTHERMIC CONNECTION
- 2-HOLE UL LISTED COMPRESSION GROUNDING CONNECTOR
- GROUND WIRE
- GROUND ROD: 3/4"x10', COPPER CLAD STEEL, THERMOWELD GROUND LOOP TO ROD
- GROUND TEST WELL WITH GROUND ROD: 3/4"x10', COPPER CLAD STEEL

A LIGHTNING PROTECTION AS-BUILTS PROVIDED BY BONDED VIA SUL-0240

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

REV.	DATE	AS-BUILT MARKUPS	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLE□

FUEL STORAGE □ DAY TANKS GROUNDING PLANS

E

Trigon — Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EB-05

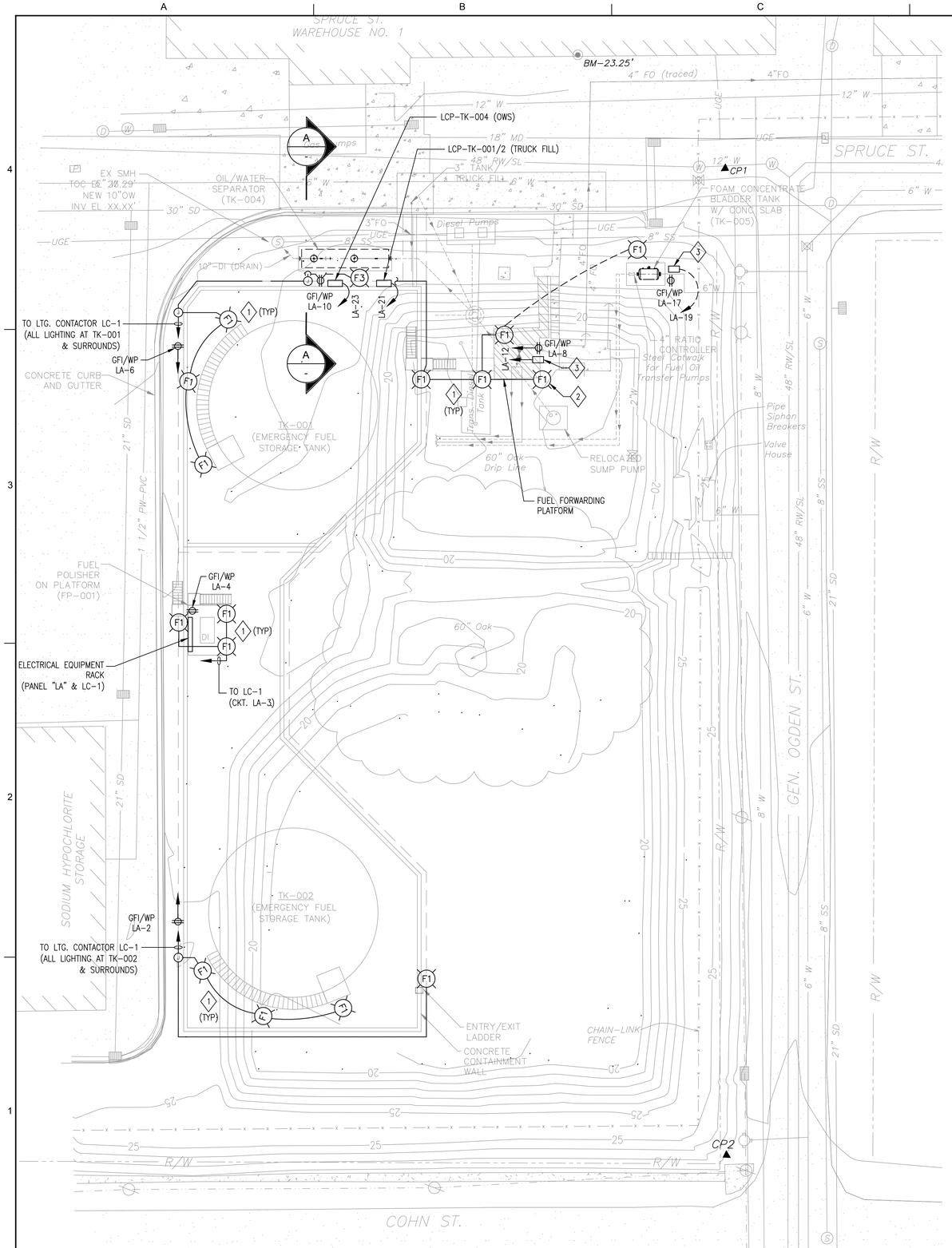
TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

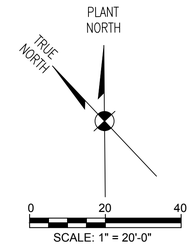
DR:	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	1"=20'-0"
DATE:	JANUARY 28, 2015

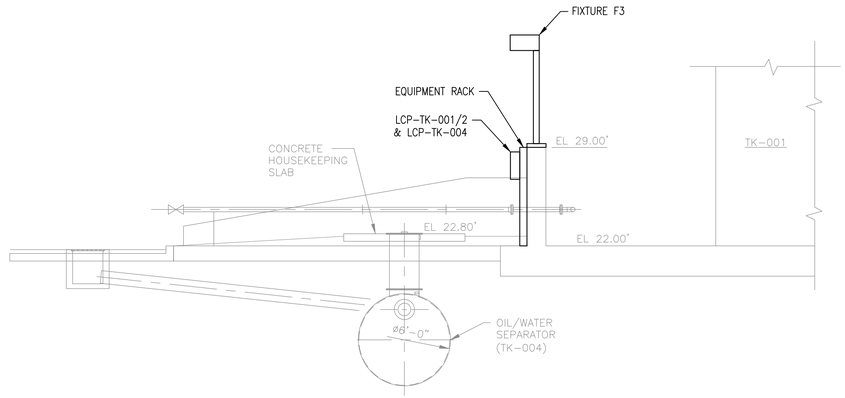
GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 51 OF 72







A - **SECTION**
SCALE:1"=5'-0"

GENERAL NOTES:

A CONDUITS SHALL NOT PENETRATE STORAGE TANK FLOOR INSIDE CONTAINMENT AREA. RUN CONDUITS EXPOSED ALONG CONTAINMENT WALLS.

NOTES:

1. FIXTURE F1: WHERE MOUNTED ON PROPOSED EQUIPMENT, CONTRACTOR SHALL COORDINATE WITH HIS SUPPLIERS, TO PROVIDE A MOUNTING BASE PLATE FOR FIXTURE F1. THE ENTIRE ASSEMBLED FIXTURE SUPPORT SHALL BE RATED FOR 150MPH WIND LOAD ON THE FIXTURE.
2. FIXTURE F1: MOUNTED ON EXISTING FUEL FORWARDING PLATFORM: CONTRACTOR SHALL PROVIDE A FIXTURE BASE PLATE, BOLTED TO THE EXISTING STRUCTURE, RATED FOR 150MPH WIND LOAD ON THE FIXTURE.
3. SPARE CIRCUIT: TERMINATE IN NEMA 4X 304SS ENCLOSURE 6"x4"x4".
4. SEE DWG. EZ-03 FOR FIXTURE SCHEDULE.

REV.	DATE		BY
A	10-25-19	AS-BUILT MARKUPS	LHN

A AS-BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

FUEL STORAGE TANKS SITE PLAN LIGHTING & RECEPTACLES

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

E

Trigon — Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EB-06

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

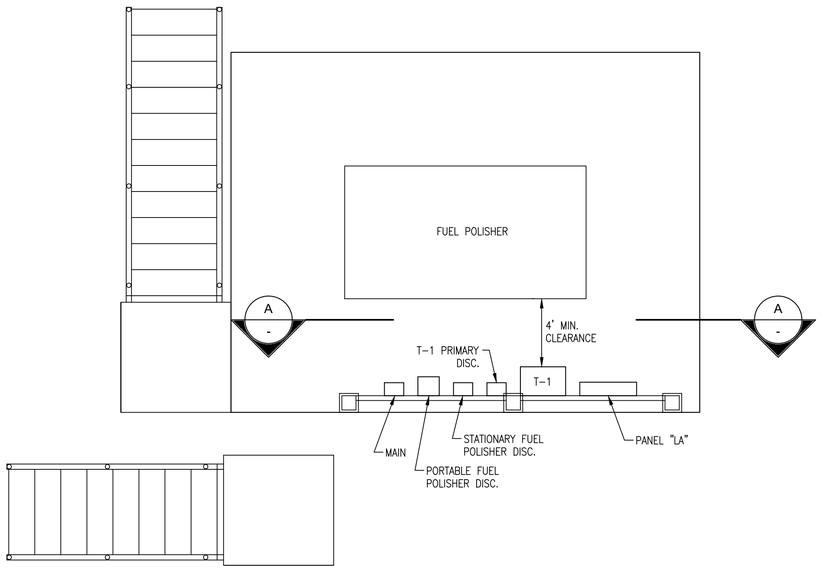
trigonassociates.com

DR:	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	1"=20'-0"
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

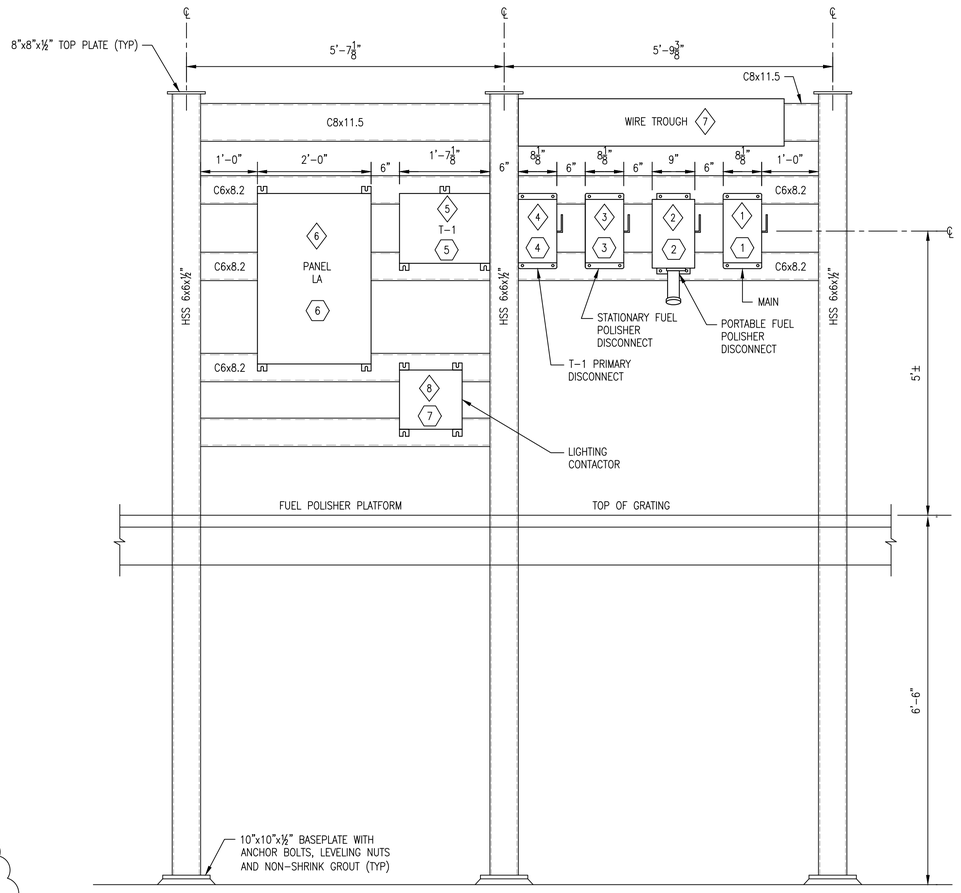
SET NO: SHEET NO: 52 OF 72



FUEL POLISHER PLATFORM - ENLARGED PLAN

1 / – PLAN

SCALE: 3/8"=1'-0"



FUEL POLISHER ELECTRICAL EQUIPMENT MOUNTING RACK

A / – SECTION

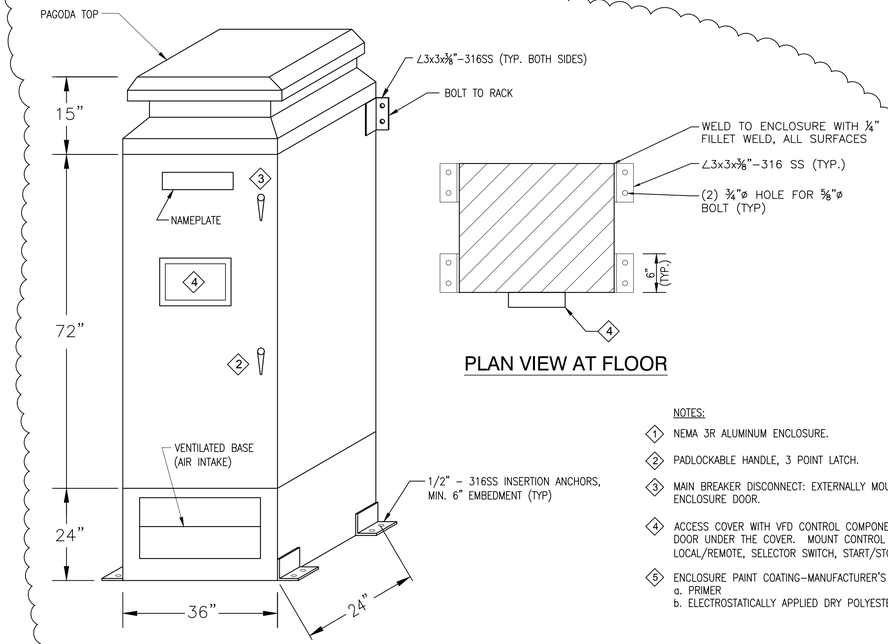
SCALE: 3/4"=1'-0"

NAME PLATE LEGEND:

1. 480V. MAIN DISCONNECT
2. PORTABLE FUEL POLISHER
3. STATIONARY FUEL POLISHER
4. 480V. FDS, TRANSFORMER T-1
5. TRANSFORMER T-1, 9kVA, 120/208V, 3ø, 4W.
6. PANEL LA, 120/208V, 3ø, 4W.
7. LIGHTING CONTACTOR (LC-1) STORAGE TANKS

NOTES:

1. HEAVY DUTY, NON FUSED SAFETY SWITCH, 60A, 600V, 3P, 3W, NEMA 4X, 304SS.
2. HEAVY DUTY, FUSED SAFETY SWITCH, 30A, 600V, 3P, 4W. INTERLOCKED RECEPTACLE, NEMA 4X, 304SS, FUSED, VIEWING WINDOW, AND MATING PLUG.
3. HEAVY DUTY, FUSED SAFETY SWITCH, 30A, 600V, 3P, 3W, NEMA 4X, 304SS.
4. HEAVY DUTY, FUSED SAFETY SWITCH, 30A, 600V, 3P, 3W, NEMA 4X, 304SS.
5. TRANSFORMER, 316SS ENCLOSURE, NEMA 4X, EPOXY ENCAPSULATED.
6. PANELBOARD, NEMA 4X, 304SS ENCLOSURE, 3 POINT LATCHING HANDLE ON DOOR.
7. WIRING TROUGH, 316SS NEMA 4X WITH BOLT-ON GASKETED COVER, SIZE PER NEC.
8. 3 POLE COMBINATION LIGHTING CONTACTOR, H/O/A, 120V. CONTROL TRANSFORMER, 30A, 240V, NEMA 4X, 304SS ENCLOSURE.
9. RACK SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION.
10. CONTRACTOR SHALL COORDINATE DETAILS WITH PLATFORM SUPPLIER. SEE DRAWING SB-11.



PLAN VIEW AT FLOOR

NOTES:

1. NEMA 3R ALUMINUM ENCLOSURE.
2. PADLOCKABLE HANDLE, 3 POINT LATCH.
3. MAIN BREAKER DISCONNECT: EXTERNALLY MOUNTED OPERATIONS HANDLE ON DRIVE ENCLOSURE DOOR.
4. ACCESS COVER WITH VFD CONTROL COMPONENTS MOUNTED ON OUTSIDE ENCLOSURE DOOR UNDER THE COVER. MOUNT CONTROL SWITCHES, PILOT LIGHTS, SUCH AS LOCAL/REMOTE, SELECTOR SWITCH, START/STOP PUSHBUTTONS, AND SPEED POT.
5. ENCLOSURE PAINT COATING-MANUFACTURER'S STANADARD GENERALLY AS FOLLOWS:
   a. PRIMER
   b. ELECTROSTATICALLY APPLIED DRY POLYESTER POWDER COATING - WHITE COLOR.

FOAM TANK BOOSTER PUMP - ~~VFD DRIVE~~ ENCLOSURE

N.T.S.

A FOAM TANK BOOSTER PUMP WAS REPLACED WITH NEMA 4X STARTER PER HAND SKETCHED SCHEMATIC SUBMITTED BY RED GROUP VIA SUL-0244.A

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

E

Trigon — Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EB-07

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

REV.	DATE		BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

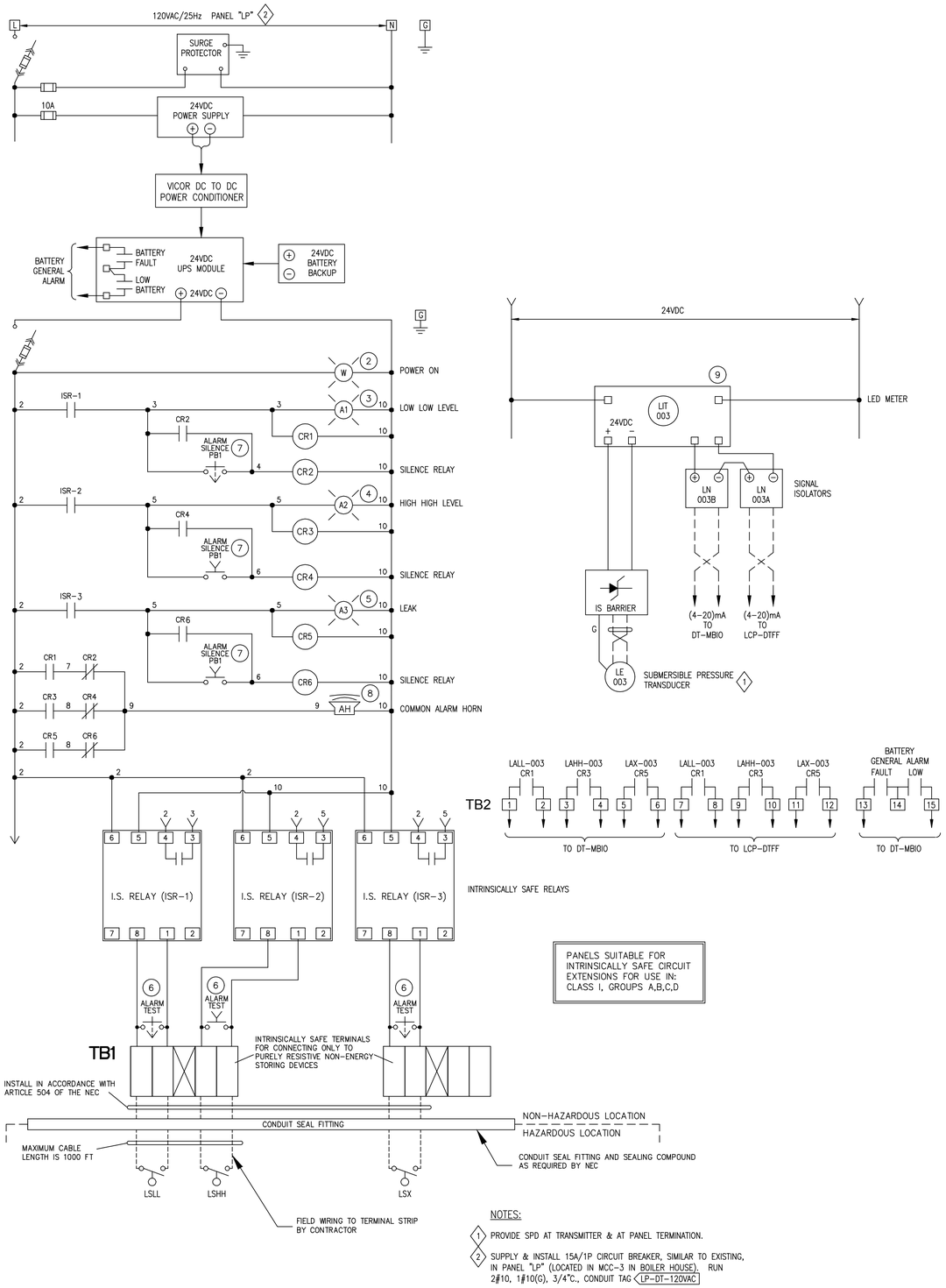
FUEL POLISHER PLATFORM LAYOUT FOAM TANK BOOSTER PUMP

DR:	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 53 OF 72



PANELS SUITABLE FOR INTRINSICALLY SAFE CIRCUIT EXTENSIONS FOR USE IN: CLASS I, GROUPS A,B,C,D

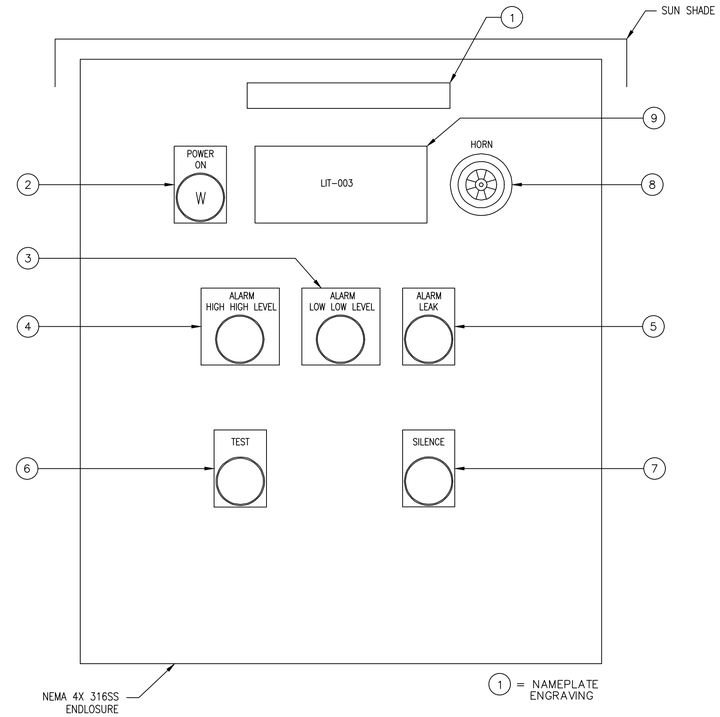
NOTES:

1. PROVIDE SPD AT TRANSMITTER & AT PANEL TERMINATION.
2. SUPPLY & INSTALL 15A/1P CIRCUIT BREAKER, SIMILAR TO EXISTING, IN PANEL "LP" (LOCATED IN MCC-3 IN BOILER HOUSE). RUN 2#10, 1#10(G), 3/4"C., CONDUIT TAG LP-DT-120VAC

DAY TANK LOCAL CONTROL PANEL (LCP-TK-003)

1 SCHEMATIC

NTS



1 DAY TANK LOCAL CONTROL PANEL (LCP-TK-003)

A DIAGRAM

NTS

GENERAL NOTES:

A FOR CONTROL PANEL COMPONENTS, SEE SPECIFICATION SECTION 26 61 00.

A CONTROL PANEL AS-BUILTS PROVIDED BY RED GROUP VIA SUL-0244

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

REV.	DATE		BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

DAY TANK SCHEMATIC & LOCAL CONTROL PANEL

DR:	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

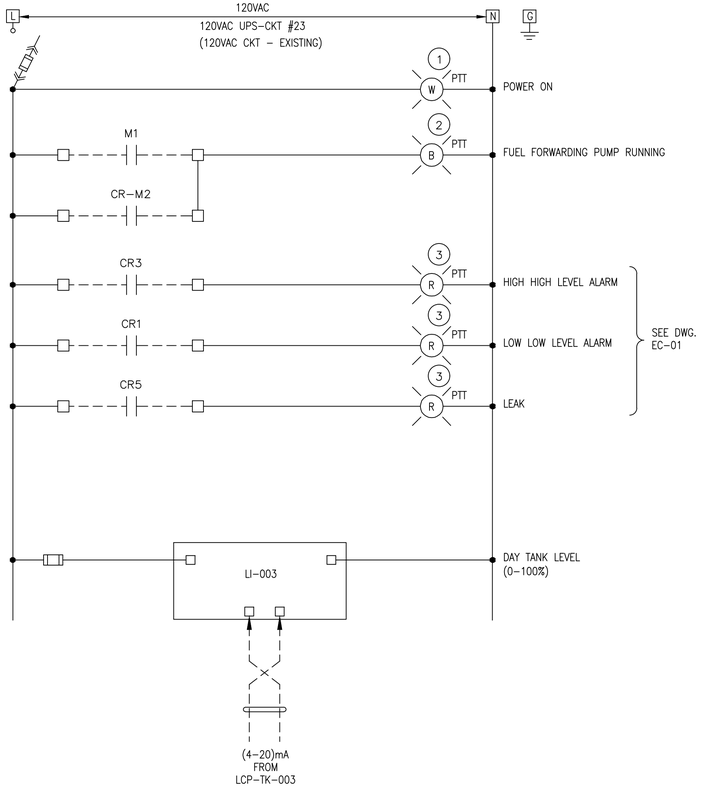
SET NO: SHEET NO: 54 OF 72

E

Trigon
Quality ▲ Commitment ▲ Client Service

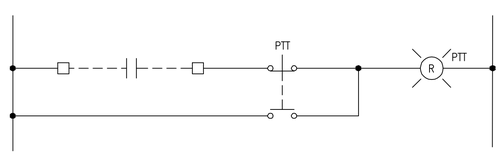
TRIGON DWG. NO. EC-01

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com



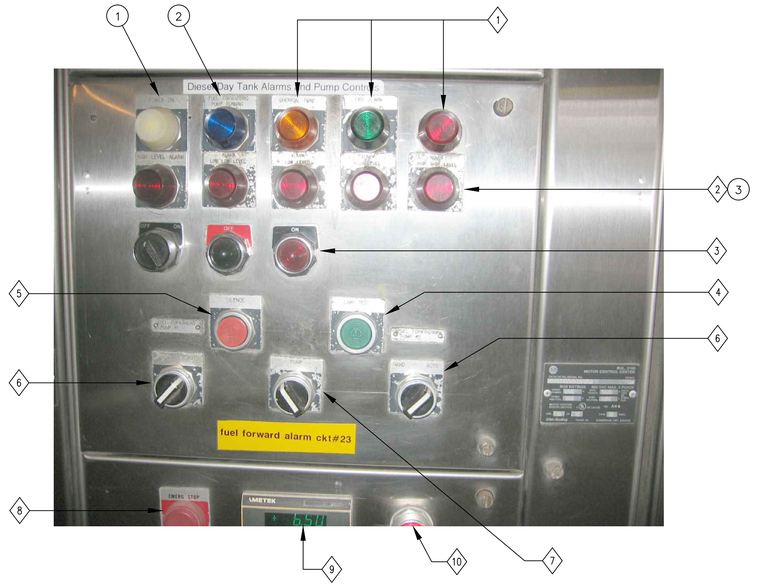
LOCAL CONTROL PANEL - DAY TANK & FUEL FORWARDING PUMPS (LCP-DTFF)

1 SCHEMATIC
– NTS



PTT SCHEMATIC - TYPICAL ALL PTT PILOT LIGHTS

2 SCHEMATIC
– NTS



LOCAL CONTROL PANEL - DAY TANK (LCP-DTFF): MODIFICATIONS

A – DETAIL NTS

GENERAL NOTES:

A. PRIOR TO PERFORMING ANY WORK, CONTRACTOR SHALL TRACE OUT ALL EXISTING CONTROL WIRING & GENERATE A DRAWING SHOWING EXISTING CONDITIONS. CONSULT WITH ENGINEER BEFORE PROCEEDING TO MODIFY THE PANEL.

B. PILOT LIGHTS: REPLACE ALL PILOT LIGHTS WITH LED TYPE, NEMA 4, PUSH TO TEST, A-B #800H.

SPECIFIC NOTES:

1. CONTRACTOR TO FIELD DETERMINE THE INITIATING SIGNAL FOR PILOT LIGHTS. IF INITIATING SIGNAL EQUIPMENT IS NOT IN USE, REMOVE PILOT LIGHTS, WIRING, & COVER WITH A BLANK FILLER PLATE.
2. LEVEL PILOT LIGHTS:
REPLACE THE HIGH HIGH LEVEL AND LOW LOW LEVEL PILOT LIGHTS WITH LED, PTT TYPE. REMOVE THE REMAINING PILOT LIGHTS, ASSOCIATED WIRING & COVER WITH A BLANK FILLER PLATE.
3. OFF/ON & PILOT LIGHTS:
THESE ITEMS ARE CURRENTLY USED FOR CHEMICAL FUEL ADDITIVE AND SHALL REMAIN.
4. LAMP TEST:
REMOVE AND COVER WITH A BLANK FILLER PLATE.
5. SILENCE:
REMOVE THIS PUSH BUTTON & COVER WITH A BLANK FILLER PLATE.
6. FUEL FORWARDING PUMP 1, PUMP 2 HAND/AUTO:
REPLACE SWITCH AND NAMEPLATE WITH HAND/OFF/COMP, 3 POSITION SELECTOR SWITCH, SPRING RETURN FROM HAND TO OFF, ALLEN BRADLEY 800H.
7. PUMP 1/PUMP 2 SELECTOR SWITCH:
SELECTOR SWITCH TO REMAIN. ADD CONTACT BLOCKS AS REQUIRED.
8. EMERGENCY STOP:
REPLACE WITH MUSHROOM HEAD E-STOP, PUSH/PULL, ALLEN BRADLEY 800H.
9. DAY TANK LEVEL INDICATOR LI-003:
REUSE THE INDICATOR. PROVIDE A FULL NAMEPLATE WITH DESCRIPTION AND TAG NUMBER.
10. RESET PILOT LIGHT:
CONTRACTOR TO FIELD INVESTIGATE FUNCTION. CONSULT WITH ENGINEER IF LIGHT SHOULD BE LEFT IN PLACE OR REMOVED.

REV.	DATE		BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

DAY TANK SCHEMATIC & LOCAL CONTROL PANEL

A CONTROL PANEL AS-BUILTS PROVIDED BY RED GROUP VIA SUL-0244

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

Trigon
Quality ▲ Commitment ▲ Client Service

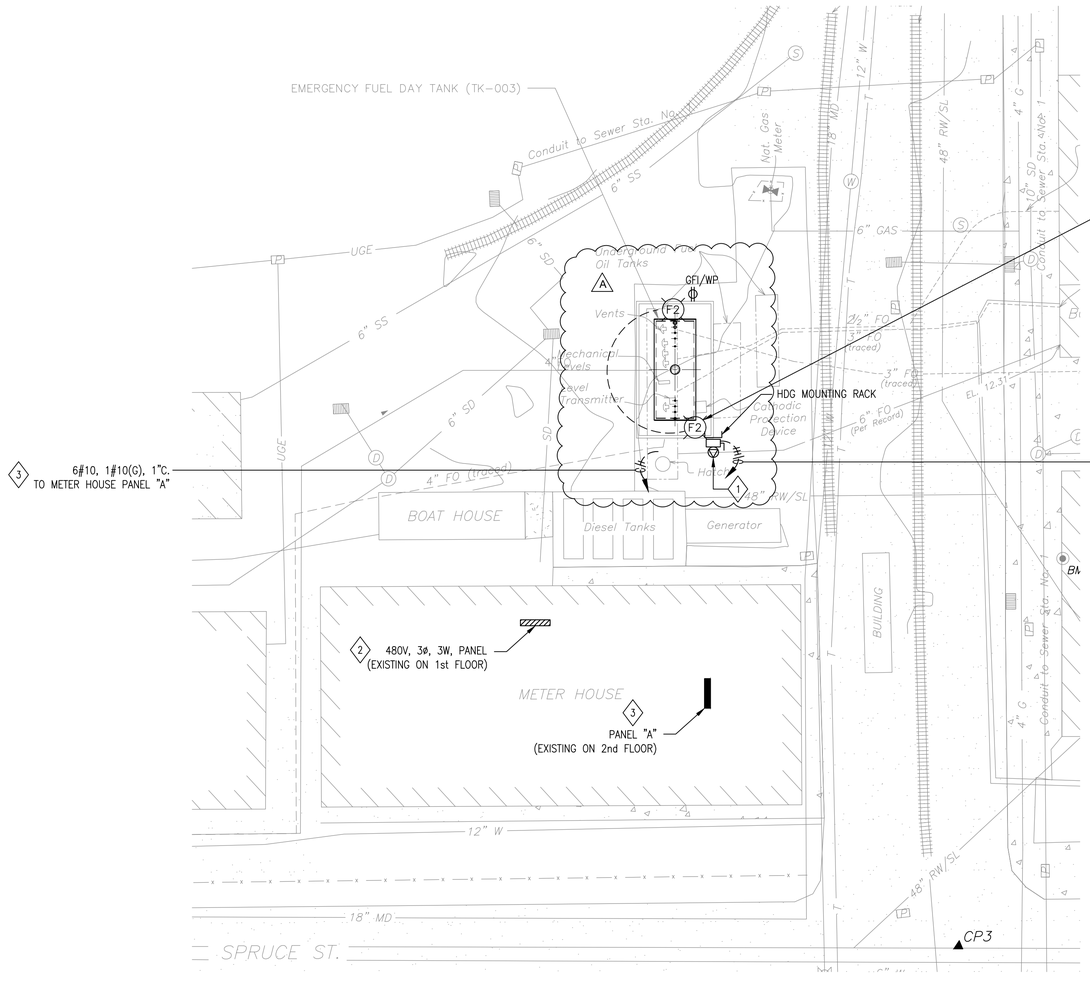
TRIGON DWG. NO. EC-02

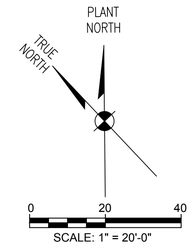
DR: S. CLARK
CK: H. HAWNEY
AP: H. HAWNEY
LAST EDIT:
SCALE: NOT TO SCALE
DATE: JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO:
SHEET NO: 55 OF 72





NOTES:

1. 30A, 3P, 4W, INTERLOCKED RECEPTACLE, HP RATED (7½HP), NEMA 4X 304SS, FUSED, VIEWING WINDOW, CROUSE HINDS WSRDW3352 SM S901, WITH MATING 3W, 4P PLUG, CROUSE HINDS APJ3485 OR EQUAL.
2. 480V, 3ø, 3W. PANEL: (EXISTING): SQ-D, I LINE, HCM CAT# 2347-4. INSTALL 30A/3P, 480V, CIRCUIT BREAKER IN PANEL FOR 480V. RECEPTACLE AT DAY TANK. RECEPTACLE IS FOR PORTABLE FUEL POLISHER.
3. INSTALL 3-20A/1P BREAKERS IN PANEL "A" TO MATCH EXISTING. RUN 1 CIRCUIT FOR DRY TANK LIGHTING. RUN 1 CIRCUIT AS SPARE TO DAY TANK LCP MOUNTING RACK. TERMINATE THE SPARE CIRCUIT IN 6"x4"x4" NEMA 4X, 304SS ENCLOSURE. RUN 1 CIRCUIT TO GFI/WP RECEPTACLE. RUN UNDERGROUND FROM METER HOUSE. ROUTE UNDERGROUND AROUND EXISTING EQUIPMENT.
4. FOR FIXTURE SCHEDULE, SEE DWG. EZ-03.

REV.	DATE		BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

DAY TANK ELECTRICAL SITE PLAN

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

E

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EC-03

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

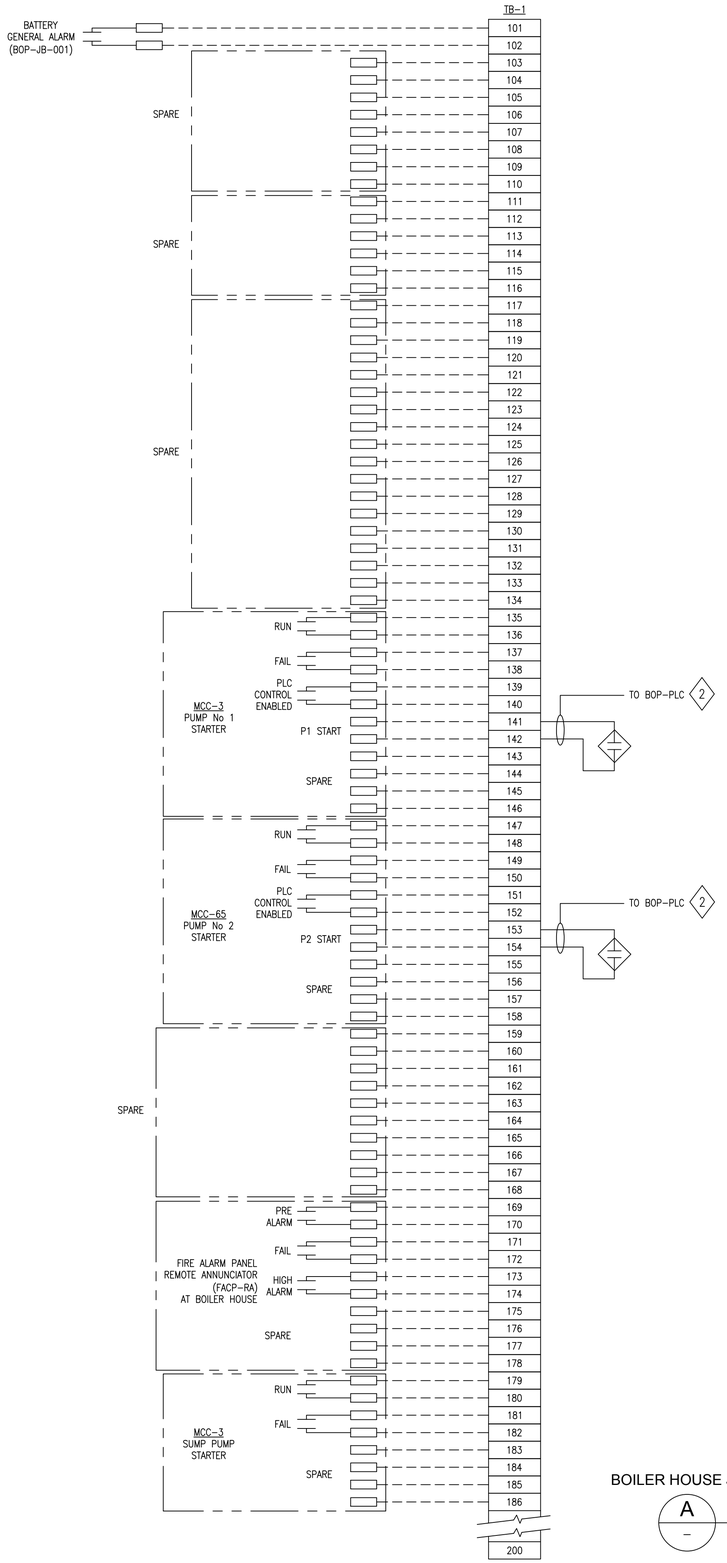
trigonassociates.com

DR:	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	1"=20'-0"
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

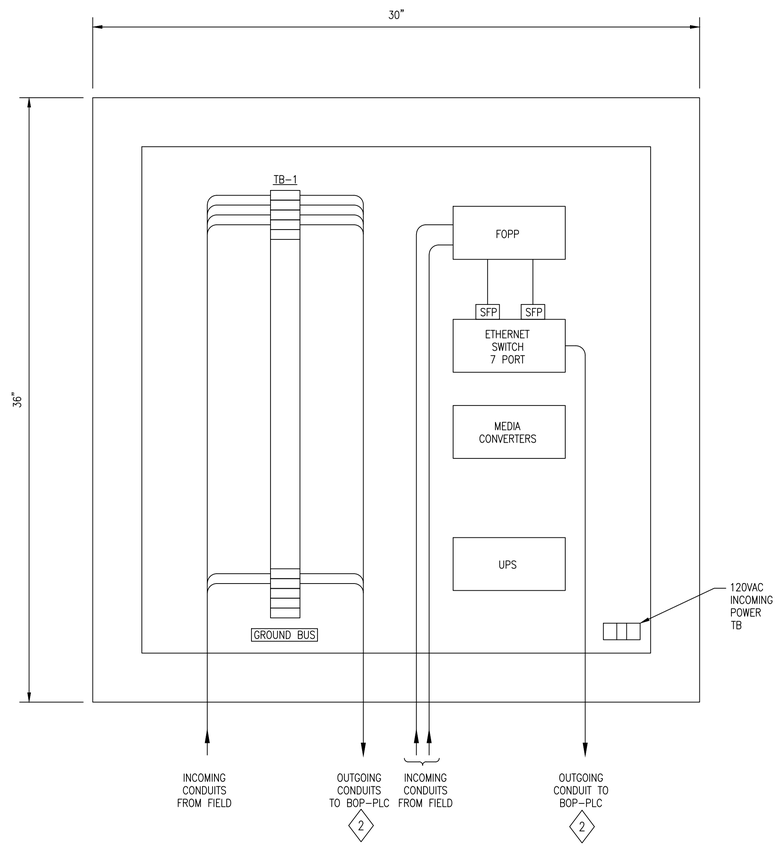
SET NO: SHEET NO: 56 OF 72



BOILER HOUSE JUNCTION BOX #1 (BOP-JB-001)

A — WIRING DIAGRAM

NTS



BOILER HOUSE JUNCTION BOX #1 (BOP-JB-001)

1 — DETAIL

NTS

NOTES:

1. BOP-JB-001: NEMA 4X, 304SS, 36"H x 30"W x 10"D, 3 POINT LATCH, HOFFMAN CAT # A36H3010SS6LP3PT OR EQUAL.
2. SEE PROJECT CP1370 FOR INTERCONNECTION TO BOP-JB-001.

REV.	DATE	AS-BUILT MARKUPS	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

A AS-BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

BOILER HOUSE JB #1 (BOP-JB-001) WIRING DIAGRAM

E

Trigon — Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EC-04

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

DR:	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

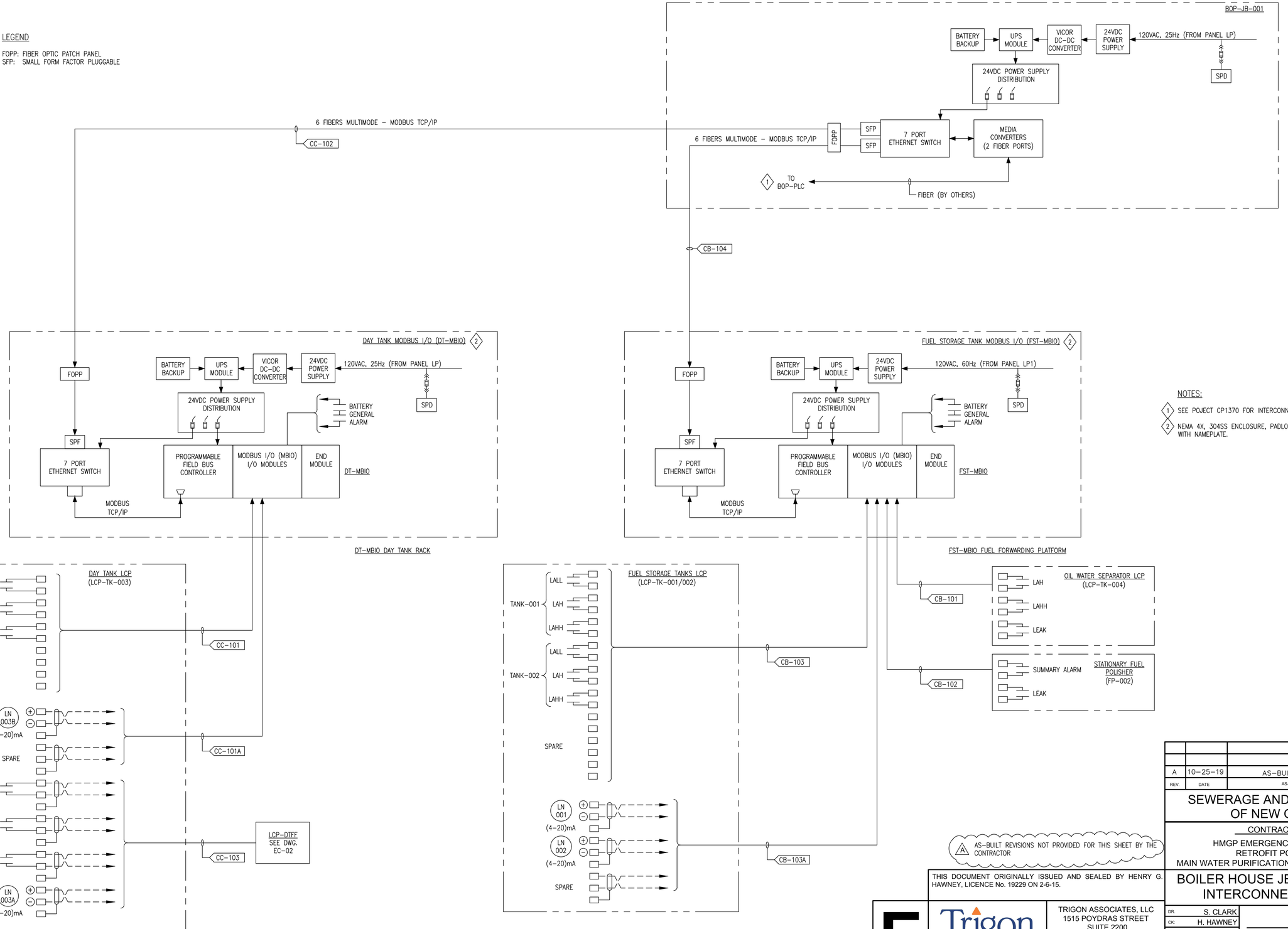
GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 57 OF 72

LEGEND

FOPP: FIBER OPTIC PATCH PANEL
SFP: SMALL FORM FACTOR PLUGGABLE



NOTES:

1. SEE POJECT CP1370 FOR INTERCONNECTION TO BOP-JB-001.
2. NEMA 4X, 304SS ENCLOSURE, PADLOCKABLE HANDLE, 3 POINT LATCH, WITH NAMEPLATE.

A AS-BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

REV.	DATE		BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

BOILER HOUSE JB #1 (BOP-JB-001) INTERCONNECT DIAGRAM

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

Trigon — Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EC-05

DR.	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

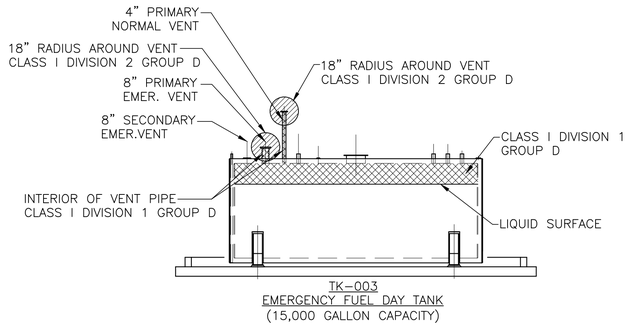
DWG. No. 12098-W8

SET NO: SHEET NO: 58 OF 72

EMERGENCY FUEL TANKS

TYPICAL SECTION

SCALE:1/8"=1'-0"



DAY TANK

TYPICAL SECTION

SCALE:1/8"=1'-0"

AREA CLASSIFICATION NOTES:

1. CLASSIFIED AREAS ARE HATCHED AND NOTED.
2. UNCLASSIFIED AREAS ARE UNHATCHED.

LEGEND

- CLASS 1, DIVISION 1, GROUP D
- CLASS 1, DIVISION 2, GROUP D
- UNCLASSIFIED

REV.	DATE		BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

FUEL STORAGE TANKS / DAY TANK AREA CLASSIFICATION

A AS-BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

E

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EZ-01

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

DR.	SI CLARK
CK:	LH NAGRATH
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	AS NOTED
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 59 OF 72

CONDUIT/CABLE SCHEDULE

CABLE		CONDUIT		FUNCTION	FROM	TO	ROUTE	REMARKS
TAG NO.	CONDUCTORS	TAG NO.	SIZE					
PMH-101	3-1/C#2, 1-1/C#6(G)	PMH-101	2" X 2	480V. POWER	MUD HOUSE MCC	FUEL STORAGE TANKS MAIN DISC. SWITCH	U/G & EXPOSED	RUN 1-2"C. SPARE CONDUIT FROM MUD HOUSE MCC (G3) TO PULL BOX PPB-G3-001A.
PMH-101A	3-1/C#2, 1-1/C#6(G)	PMH-101A	1½"	480V. POWER	FUEL STORAGE TANKS MAIN DISC. SWITCH	WIRE TROUGH	EXPOSED	–
–	–	–	–	–	–	–	–	–
P-101	3-1/C#10, 1-1/C#10(G)	P-101	3/4"	480V. POWER	WIRE TROUGH	PORTABLE FUEL POLISHER DISC. SWITCH	EXPOSED	–
P-102	3-1/C#10, 1-1/C#10(G)	P-102	3/4"	480V. POWER	WIRE TROUGH	STATIONARY FUEL POLISHER DISC. SWITCH	EXPOSED	–
P-102A	3-1/C#10, 1-1/C#10(G)	P-102A	3/4"	480V. POWER	STATIONARY FUEL POLISHER DISC. SWITCH	STATIONARY FUEL POLISHER	EXPOSED	–
P-103	3-1/C#10, 1-1/C#10(G)	P-103	3/4"	480V. POWER	WIRE TROUGH	TRANSFORMER T-1 PRIMARY DISC. SWITCH	EXPOSED	–
P-103A	3-1/C#12, 1-1/C#12(G)	P-103A	3/4"	480V. POWER	TRANSFORMER T-1 PRIMARY DISC. SWITCH	TRANSFORMER T-1	EXPOSED	–
P-103B	4-1/C#8, 1-1/C#8(G)	P-103B	1"	208/120V. POWER	TRANSFORMER T-1	PANEL "LP"	EXPOSED	–
P3-101	3-1/C#4, 1-1/C#8(G)	P3-101	1¼"	208V. POWER	MCC-3	FUEL FORWARDING PUMP No. 1	U/G & EXPOSED	–
P3-102	3-1/C#2, 1-1/C#6	P3-102	2½"	208V. POWER	MCC-3	SUMP PUMP	U/G & EXPOSED	FOAM BOOSTER –
P3-103	3-1/C#2, 1-1/C#6 (A)	P3-103	2½"	208V. POWER	MCC G3/G4 (A)	FOAM BOOSTER PUMP STARTER (A)	U/G & EXPOSED	–
P3-103A	1-3/C#1, WITH GROUND	P3-103A	2½"	208V. POWER	FOAM BOOSTER PUMP STARTER	BOOSTER PUMP	U/G & EXPOSED	SERVICE WIRE VFD CABLE (XHHW-2) (3)
P3-104	EMPTY	P3-104	2½"	POWER	MCC-3	FUEL FORWARDING PLATFORM	U/G & EXPOSED	SPARE CONDUIT
P5-101	3-1/C#10, 1-1/C#10(G)	P5-101	3/4"	440V. POWER	MCC-5	FUEL FORWARDING PUMP No. 2	U/G & EXPOSED	–
C3-101	1-8/C#10 (7#10, 1#10G)	C3-101	1"	CONTROL	MCC-3	FUEL FORWARDING PUMP No. 1	U/G & EXPOSED	START/STOP, L/R (3#10 SPARE)
C3-101A	8-1/C#14, 1-1/C#12(G)	C3-101A	3/4"	CONTROL	MCC-3	LCP-DTFF	EXPOSED	3#14 SPARE
C3-101B	12-1/C#14, 1-1/C#12(G)	C3-101B	3/4"	CONTROL	MCC-3 (FUEL FORWARDING PUMP No. 1)	BOP-JB-001	EXPOSED	4#14 SPARE
C3-102	1-8/C#10 (7#10, 1#10G)	C3-102	1"	CONTROL	MCC-3	SUMP PUMP	U/G & EXPOSED	LSL/LSH (4#12 SPARE)
C3-102A	8-1/C#14, 1-1/C#12(G)	C3-102A	3/4"	CONTROL	MCC-3 (SUMP PUMP)	BOP-JB-001	EXPOSED	4#14 SPARE
1 C3-103	2-1/C#12, 1-1/C#12(G)	C3-103	3/4"	120V.	FOAM TANK BOOSTER PUMP VFD	BOOSTER PUMP	U/G & EXPOSED	SPACE HEATER
C5-101	1-8/C#10 (7#10, 1#10G)	C5-101	1"	CONTROL	MCC-G5	FUEL FORWARDING PUMP No. 2	U/G & EXPOSED	START/STOP, L/R (3#10 SPARE)
C5-101A	8-1/C#10, 1-1/C#10(G)	C5-101A	1"	CONTROL	MCC-G5	LCP-DTFF	EXPOSED	3#12 SPARE
C5-101B	12-1/C#14, 1-1/C#12(G)	C5-101B	3/4"	CONTROL	MCC-G5 (FUEL FORWARDING PUMP No. 2)	BOP-JB-001	EXPOSED	4#14 SPARE
CB-101	10-1/C#14, 1-1/C#12(G)	CB-101	3/4"	SIGNAL	OWS LCP-TK-004	FST-MBIO	U/G & EXPOSED	(4#14 SPARE)
CB-101A	8-1/C#14, 1-1/C#12(G)	CB-101A	3/4"	CONTROL	OWS LCP-TK-004	TANK LEVEL SWITCHES	U/G & EXPOSED	(2#14 SPARE) INTRINSICALLY SAFE CIRCUITS
CB-102	6-1/C#14, 1-1/C#12(G)	CB-102	3/4"	SIGNAL	STATIONARY FUEL POLISHER	FST-MBIO	U/G & EXPOSED	(2#14 SPARE)
CB-103	18-1/C#14, 1-1/C#12(G)	CB-103	1"	SIGNAL	FUEL TANKS LCP-TK-001/002	FST-MBIO	U/G & EXPOSED	(6#14 SPARE)
CB-103A	3-TW PR SH #18 AWG	CB-103A	1"	SIGNAL	FUEL TANKS LCP-TK-001/002	FST-MBIO	U/G & EXPOSED	(1 TW PR SH SPARE)
CB-103B	8-1/C#14, 1-1/C#12(G)	CB-103B	3/4"	CONTROL	LCP-TK-001/2	TANK #001 LEVEL SWITCHES	EXPOSED	(2#14 SPARE) INTRINSICALLY SAFE CIRCUITS
CB-103C	1-TW PR SH #18 AWG	CB-103C	3/4"	CONTROL	LCP-TK-001/2	TANK #001 LIT-001	EXPOSED	INTRINSICALLY SAFE CIRCUIT
CB-103D	8-1/C#14, 1-1/C#12(G)	CB-103D	3/4"	CONTROL	LCP-TK-001/2	TANK #002 LEVEL SWITCHES	EXPOSED	(2#14 SPARE) INTRINSICALLY SAFE CIRCUITS
CB-103E	1-TW PR SH #18 AWG	CB-103E	3/4"	CONTROL	LCP-TK-001/2	TANK #002 LIT-002	EXPOSED	INTRINSICALLY SAFE CIRCUIT
CB-104	1-6 STRAND FIBER OPTIC CABLE 62.5 MICRON	CB-104	2"	COMMUNICATION	FUEL TANKS 001/2 PLATFORM (FST-MBIO)	BOP-JB-001	U/G & EXPOSED	LOSE TUBE CONSTRUCTION
CB-105	EMPTY	CB-105	2"	CONTROL	FUEL TANK PLATFORM	BOP-JB-001	U/G & EXPOSED	SPARE
CC-101	10-1/C#14, 1-1/C#12(G)	CC-101	3/4"	SIGNAL	DAY TANK LCP-TK-003	DT-MBIO	U/G & EXPOSED	(4#14 SPARE)
CC-101A	3-TW PR SH #18 AWG	CC-101A	1"	SIGNAL	DAY TANK LCP-TK-003	DT-MBIO	U/G & EXPOSED	(1 TW PR SH SPARE)
CC-101B	2-1/C#12, 1-1/C#12(G)	CC-101B	3/4"	120V. POWER	DAY TANK LCP-TK-003	DT-MBIO	EXPOSED	
CC-101C	8-1/C#14, 1-1/C#12(G)	CC-101C	3/4"	CONTROL	LCP-TK-003	DAY TANK LEVEL SWITCHES	EXPOSED	(2#14 SPARE) INTRINSICALLY SAFE CIRCUITS
CC-101D	1-TW PR SH #18 AWG	CC-101D	3/4"	CONTROL	LCP-TK-003	DAY TANK LE-003	EXPOSED	INTRINSICALLY SAFE CIRCUIT
CC-102	1-6 STRAND FIBER OPTIC CABLE 62.5 MICRON	CC-102	2"	COMMUNICATION	DAY TANK LCP-TK-003 (DT-MBIO)	BOP-JB-001	U/G & EXPOSED	LOSE TUBE CONSTRUCTION
CC-103	5-TW PR SH #18 AWG	CC-103	1¼"	CONTROL	DAY TANK LCP-TK-003	LCP-DTFF	U/G & EXPOSED	1 SPARE

SPECIFIC NOTES:

1. ALL CONDUIT AND WIRE TO BE INSTALLED AS NEW UNDER THIS CONTRACT.
2. FACP & ASSOCIATED CONDUIT/CABLE ARE NOT LISTED ON THIS DWG. SEE DWG. EB-04.
3. TERMINATE CABLE WITH MANUFACTURER'S TERMINATION KITS PER MANUFACTURER'S INSTRUCTIONS.

(A) VFD REPLACED BY FOAM BOOSTER PUMP STARTER VIA RFI-0067

REV.	DATE	AS-BUILT MARKUPS	BY
A	10-25-19	AS-BUILTS ADDED	LHN
1	3-23-15	VFD SPACE HEATER REVISON (ADD.3)	HGH

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLE□

CONDUIT □ CABLE SCHEDULE

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

E

Trigon — Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EZ-02

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

DR:	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 60 OF 72

PANEL SCHEDULE

PANEL NAME LA

LOCATION FUEL STORAGE TANK AREA

FOUND ON DWG. NO. -

FED FROM -

AVAILABLE FAULT CURRENT - SYM. AMPS

PANEL AIC RATING 10,000
- ✖ FULLY RATED
- ☐ SERIES RATED FOR ____ KAIC FROM _____

FEEDER _____
- ☐ FEEDER PROTECTED BY OVERCURRENT DEVICE

VOLTAGE
- ☐ 480/277V, 3Ø 4W, WYE
- ✖ 208/120V, 3Ø 4W, WYE
- ☐ 240/120V, 3Ø 4W, DELTA W/BØ "STINGER"

MAINS, 30 AMP
- ✖ FACTORY MAIN CIRCUIT BREAKER
- ☐ SHUNT TRIP MAIN CB
- ☐ MAIN LUGS ONLY
- ☐ UL LISTED FEED-THRU LUGS
- ☐ MAIN FUSIBLE SWITCH, FURNISH FUSES: ≤ 600A, CLASS RK5, >600A, CLASS L, ALL RATED 200,000 AIC
- ✖ LIGHTNING SURGE PROTECTIVE DEVICE (SPD)

NEUTRAL ✖ 100% ☐ 200%

MOUNTING ✖ SURFACE ☐ FLUSH

ENCLOSURE ☐ NEMA1 ☐ NEMA3R ☐ NEMA12 ✖ NEMA4X STAINLESS STEEL
- ☐ LOCKABLE COVER

FEED ☐ TOP ✖ BOTTOM ☐ MOUNT IN MCC

BRANCHES
- ✖ BOLT-ON, PANELBOARD CONSTR.
- ☐ STAB-IN, LOAD CENTER CONSTR.
- ☐ FUSIBLE SWITCHES W/ CLASS R FUSE REJ. CLIPS, FURNISH ALL FUSES, CLASS RK5, 200,000 AIC

PANEL HAS FRONT ACCESS ONLY
ALL COPPER BUSSING
FURNISH COPPER GROUND BAR KIT
- ☐ ALSO FURNISH ADDITIONAL ISOLATED GROUND BAR KIT
- ☐ SERVICE ENTRANCE LABEL
- ✖ PANEL NAMEPLATE, 2"x4" ENGRAVED PLASTIC LAMINATE
  USE 1/4" LETTERING FOR PANEL NAME, ON 1 LINE
  USE 1/8" LETTERING FOR VOLTS, AMPS, WHERE FED FROM, MO./YR. INSTALLED, ON 4 LINES
- ✖ BLACK FIELD, WHITE LETTERS
- ☐ RED FIELD, WHITE LETTERS

CKT. #	# OF POLES	TRIP AMPS	LOAD DESCRIPTION	VOLT-AMPS A	VOLT-AMPS B	VOLT-AMPS C	LTS	REC	MIS	MIS	REC	LTS	VOLT-AMPS A	VOLT-AMPS B	VOLT-AMPS C	LOAD DESCRIPTION	TRIP AMPS	# OF POLES	CKT. #
1	3	20	LIGHTING CONTACTOR "LC"	240									360			STORAGE TANK -002 RECEPTACLES	20	1	2
3					180									180		FUEL POLISHER PLATFORM RECEPTACLE	20	1	4
5						600									360	STORAGE TANK -001 RECEPTACLES	20	1	6
7	1	15	-	-									180			FUEL TRANSFER PLATFORM 1 RECEPTACLE	20	1	8
9	1	15	-		-									180		TRUCK LOADING AREA RECEPTACLE	20	1	10
11	1	15	-			-									-	FUEL TRANSFER PLATFORM (SPARE CKT.)	15	1	12
13	1	15	-	-									-			-	20	1	14
15	1	15	-		-									-		-	20	1	16
17	1	20	FOAM CONCENTRATE TANK RECEPTACLE			-									-	-	20	1	18
19	1	15	FOAM CONCENTRATE TANK (LCP-TK-005)	100									-			SPD	20	3	20
21	1	15	STORAGE TANKS PANEL (LCP-TK-001/002)		100									-					22
23	1	15	OWS PANEL (LCP-TK-004)			100									-				24
TRIP AMPS = FUSE SIZE IF FUSIBLE SWITCHES			SUBTOTAL ODD SIDE	340	280	700				SUBTOTAL EVEN SIDE			540	360	360				
										SUBTOTAL ODD SIDE			340	280	700				
										TOTAL CONNECTED LOAD			880	640	1060				

= 2.6 KVA

= 7 AMPS

REMARKS:

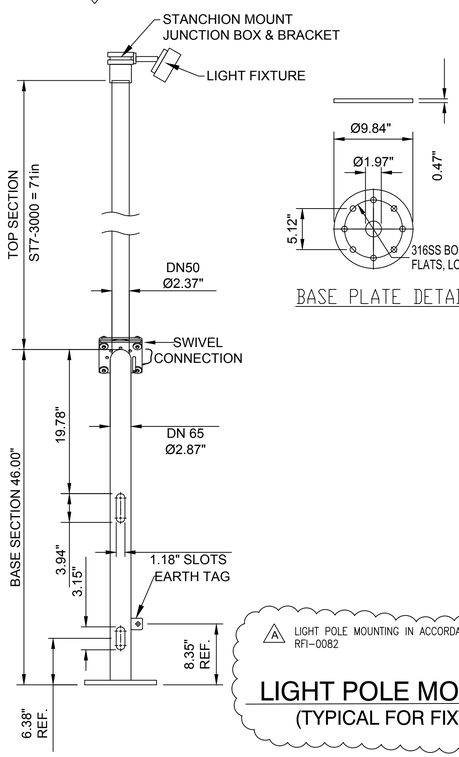
1. ALL CIRCUITS 2#12, 1#12(G), 3/4"C. UNLESS NOTED OTHERWISE.
2. RUN 3#10, 1#10(N), 1#10(G), 3/4"C. TO ALL LIGHTING LOCATIONS. BALANCE PHASE LOAD AT EACH LOCATION.
3. TERMINATE IN 6"x4"x4" 304SS NEMA 4X ENCLOSURE MOUNTED ON PLATFORM.

LIGHTING FIXTURE SCHEDULE (2)

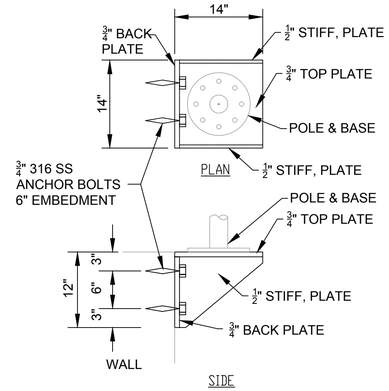
TYPE	MANUFACTURER & CATALOG No.	DESCRIPTION	LAMP QTY.	TYPE	VOLTS
F1	DIALIGHT # STWWC2N200SW3	AREA LIGHT, EPOXY POWDER COATED COPPER FREE ALUMINUM HOUSING, POLYCARBONATE LENS, NEMA4X, UL1598/A, L70 >100,000 HOURS, FACTORY SEALED, WIDE THROW, CCT=5000K, 4100 LUMENS, POLE MOUNT, THD <15%, 5-YEAR WARRANTY, 2" SLIP FILT STANCHION MOUNT JUNCTION BOX, DIALIGHT CATALOG NO. HZSTAN200S, AND BRACKET MOUNTING HARDWARE DIALIGHT CATALOG NO. HZXW3, 10' ALUMINUM SWIVELPOLE CATALOG NO. ST7-3000-P-AL	-	60W LED	120
F2	DIALIGHT #FLW266NC2NG200S LYTEPOLES # 305-5015-16-T2-SBF	FLOODLIGHT WITH MOUNTING BRACKET, NEMA4X, UL1598/A, (-40°c TO +65°c) 20KV SURGE PROTECTION, THD <15%, PF>0.9, NEMA6 BEAM PATTERN, cri=70, CCT=5000K, L70 RATED >100,000 HOUR AT 25°C, EPOXY POWDER COATED COPPER FREE ALUMINUM HOUSING, TEMPERED GLASS LENS, FACTORY SEALED, 10-YEAR WARRANTY. 2" SLIP-FIT STANCHION MOUNT JUNCTION BOX, DIALIGHT CATALOG NO. HZXSTAN200S, 16' ROUND TAPERED ALUMINUM POLE X 0.188" SATIN FINISH WITH FIXTURE MOUNTING ADAPTER (LYTEPOLES) PHOTOCELL INTERMATIC #LED4536SC WITH REMOTE POLE BRACKET/TWIST-LOCK RECEPTACLE CAT #K122.	-	107W LED	120
F3	DIALIGHT #FLW266NC2NG200S	IDENTICAL TO FIXTURE F2 WITH 10' SWIVEL POLE (SIMILAR TO FIXTURE F1)	-	107W LED	120

LIGHTING FIXTURE SCHEDULE NOTES:

1. ABOVE FIXTURES ARE BASIS OF DESIGN.
2. ALL POLES AND ATTACHED LIGHT FIXTURES TO BE RATED FOR 170 MPH WIND LOADING. SUBMIT DATA FOR ENGINEER APPROVAL.



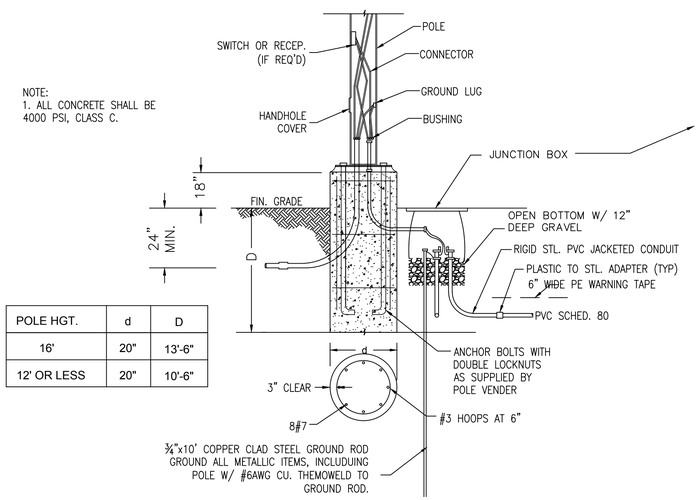
BASE PLATE DETAIL



WALL MOUNTING BRACKET
(STRUCTURE MOUNT SIMILAR, EXCEPT BOLTED TO STRUCTURE)

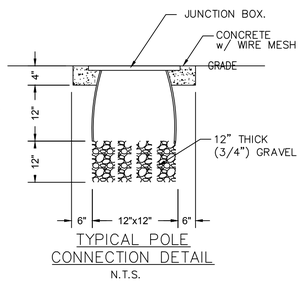
NOTES:

1. THE MOUNTING ARRANGEMENT SHOWN IS GENERIC. CONTRACTOR SHALL COORDINATE MOUNTING DETAILS FOR ACTUAL EQUIPMENT SUPPLIEC AND THE SPECIFICS OF EACH MOUNTING LOCATION.
2. HOT DIP GALVANIZED AFTER FABRICATION.



POLE HGT.	d	D
16'	20"	13'-6"
12' OR LESS	20"	10'-6"

LIGHT POLE MOUNTING AT GRADE ELEVATION
(TYPICAL FOR FIXTURE F2) N.T.S.



TYPICAL POLE CONNECTION DETAIL
N.T.S.

NOTES:

1. FOR LIGHTS MOUNTED ON ELEVATED STRUCTURES (NEW OR EXISTING), PROVIDE A FABRICATED BASE PLATE FOR POLE MOUNTING. UNIT SHALL BE BOLTED IN PLACE IN FIELD. ASSEMBLY SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION. THE ENTIRE ASSEMBLED STRUCTURE SHALL BE RATED FOR 150MPH WIND LOAD ON POLE AND FIXTURE.

A. LIGHT POLE MOUNTING IN ACCORDANCE WITH RFI-0081 AND RFI-0082

LIGHT POLE MOUNTING
(TYPICAL FOR FIXTURE F1) N.T.S.

REV.	DATE		BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

PANEL SCHEDULE & LIGHT FIXTURE SCHEDULE

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

E

Trigon — Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EZ-03

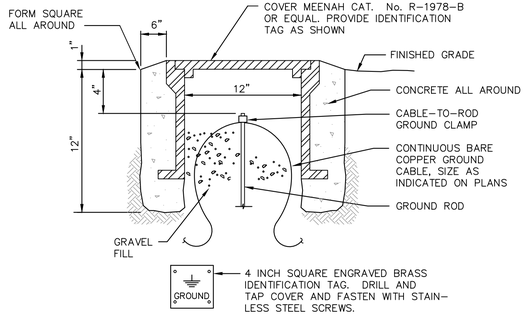
TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

DR: S. CLARK
CK: H. HAWNEY
AP: H. HAWNEY
LAST EDIT:
SCALE: NOT TO SCALE
DATE: JANUARY 28, 2015

GENERAL SUPERINTENDENT

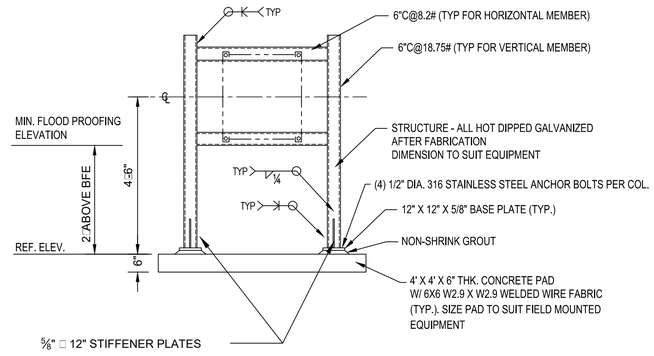
DWG. No. 12098-W8

SET NO: SHEET NO: 61 OF 72



TYPICAL GROUND TEST WELL DETAIL

N.T.S.

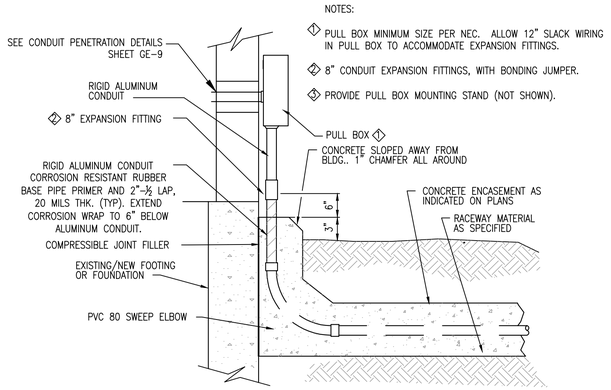


ENCLOSURE MOUNTING RACK - OUTDOOR DETAIL

N.T.S.

WELDING NOTES:

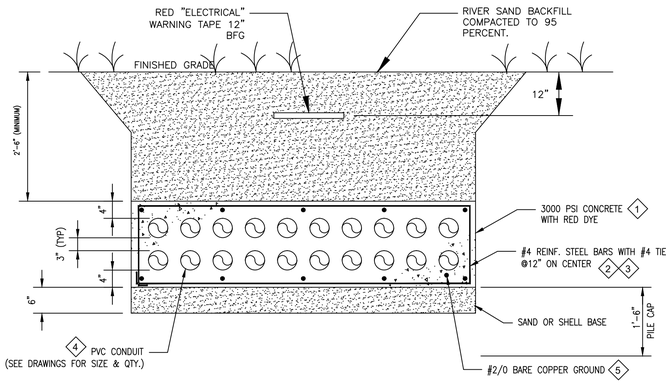
1. ALL PRIMARY MEMBERS SHALL HAVE FULL PENETRATION WELDS.
2. ALL SECONDARY MEMBERS SUCH AS PLATES AND STIFFENERS SHALL BE 1/4" FILLET WELDS MINIMUM.



ABOVE GROUND CONDUIT TERMINATION DETAIL

RE□UIRED ON ALL CONDUITS EMERGING FROM U/G

N.T.S.

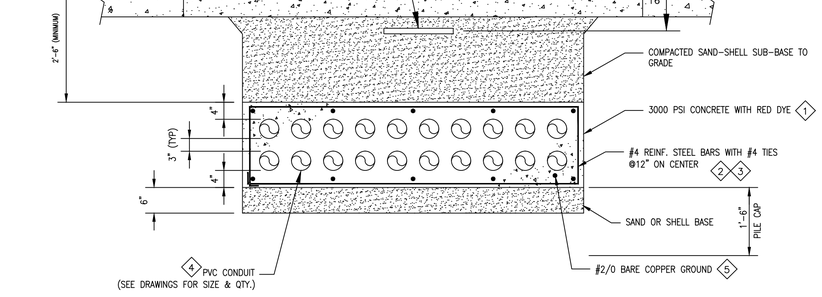


DUCT BANK NOTES:

1. DUCT BANK RED THROUGHOUT. MIX 8# RED DYE PER CUBIC YARD CONCRETE.
2. REINFORCEMENT STEEL 60KSI. 4 #4 CONTINUOUS FOR 1 CONDUIT, 6 #4 FOR 2 CONDUITS. ADD 2 MORE #4 CONTINUOUS FOR EACH ADDITIONAL 7" OF DUCTBANK WIDTH.
3. MINIMUM 3" CONCRETE COVER ON REINFORCEMENT STEEL.
4. POWER & FIBER OPTIC CABLES: 6" SEPARATION.
   13.8kV & SHIELDED SIGNAL CABLE: 24" SEPARATION.
   480V VFD & CONTROL OR SHIELDED CABLE 18" SEPARATION.
   480V. & SHIELDED SIGNAL CABLE: 15" SEPARATION.
   208OV. & SHIELDED SIGNAL CABLE: 6" SEPARATION.
5. ATTACH TO GROUND BUS AT BOTH ENDS OF DUCT BANK RUN.

DUCTBANK SECTION INPLANT INSTALLATION 1 (TYP)

N.T.S.

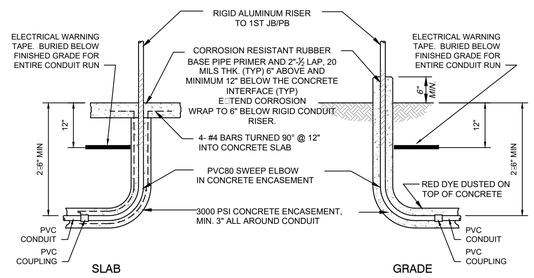


DUCT BANK NOTES:

1. DUCT BANK RED THROUGHOUT. MIX 8# RED DYE PER CUBIC YARD CONCRETE.
2. REINFORCEMENT STEEL 60KSI. 4 #4 CONTINUOUS FOR 1 CONDUIT, 6 #4 FOR 2 CONDUITS. ADD 2 MORE #4 CONTINUOUS FOR EACH ADDITIONAL 7" OF DUCTBANK WIDTH.
3. MINIMUM 3" CONCRETE COVER ON REINFORCEMENT STEEL.
4. POWER & FIBER OPTIC CABLES: 6" SEPARATION.
   13.8kV & SHIELDED SIGNAL CABLE: 24" SEPARATION.
   480V VED & CONTROL OR SHIELDED CABLE 18" SEPARATION.
   480V. & SHIELDED SIGNAL CABLE: 15" SEPARATION.
   208OV. & SHIELDED SIGNAL CABLE: 6" SEPARATION.
5. ATTACH TO GROUND BUS AT BOTH ENDS OF DUCT BANK RUN.

DUCTBANK SECTION INPLANT INSTALLATION 2 (TYP)

N.T.S.



CONDUIT RISERS DETAIL

N.T.S.

REV.	DATE		BY
A	10-25-19	AS-BUILT MARKUPS	LHN

AS-BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

E

Trigon — Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EZ-04

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLE□

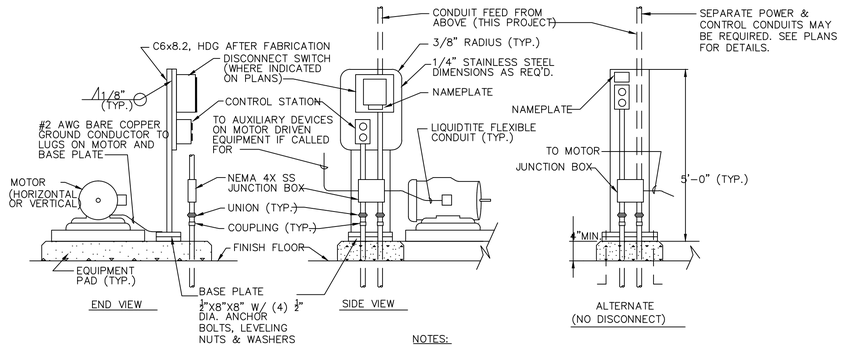
ELECTRICAL DETAILS SHEET 1

DR:	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 62 OF 72



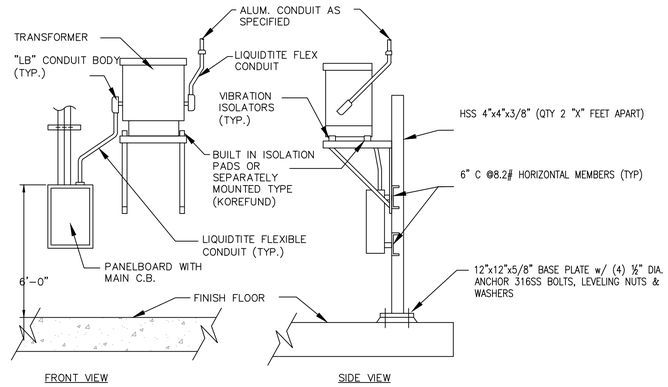
NOTES:

1. MOUNTING STAND MAY BE OMITTED IF MOTOR IS LOCATED WITHIN 5'-0" OF A WALL OR HANDRAIL, IN WHICH CASE THE DISCONNECT AND CONTROL STATION SHALL BE MOUNTED ON THE WALL OR HANDRAIL.

2. DO NOT INSTALL MOUNTING STAND SO AS TO OBSTRUCT THE REMOVAL OF THE MOTOR OR DRIVEN EQUIPMENT FOR MAINTENANCE OR REPAIR.

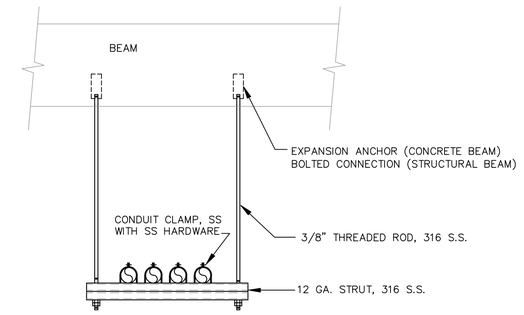
TYPICAL MOTOR INSTALLATION

NOT TO SCALE



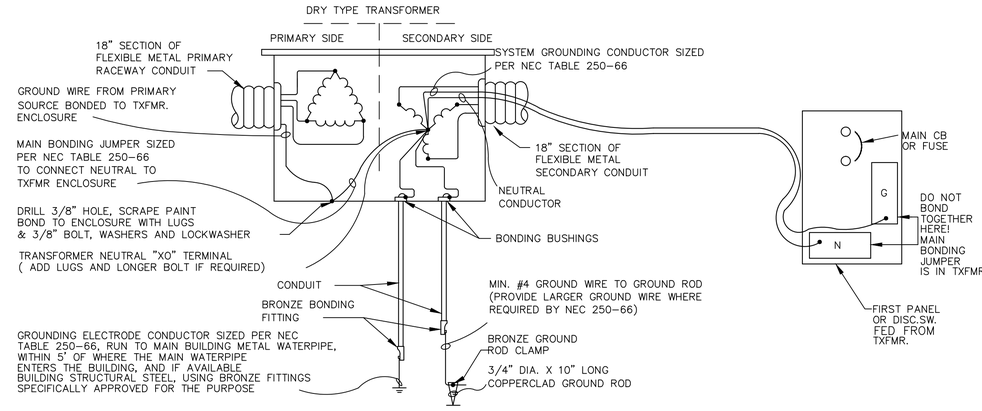
TYPICAL LIGHTING PANEL INSTALLATION DETAIL

NOT TO SCALE



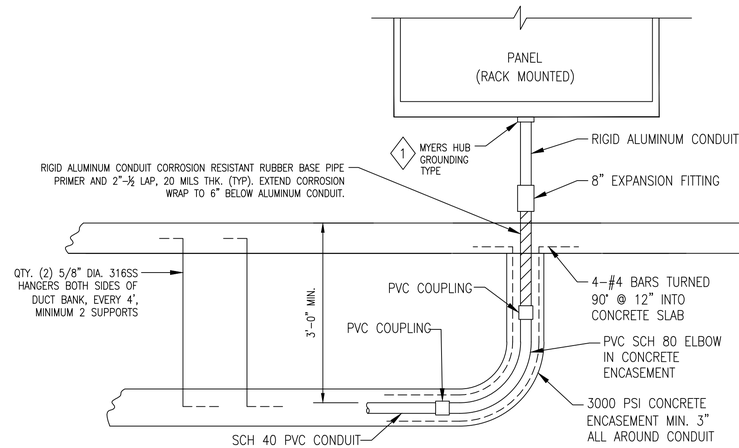
TYPICAL INTERIOR CONDUIT SUPPORT DETAIL

NOT TO SCALE



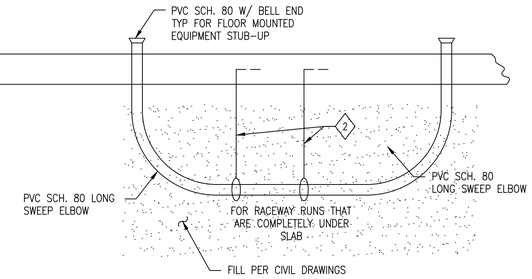
TYPICAL TRANSFOMER GROUNDING DETAIL

NOT TO SCALE



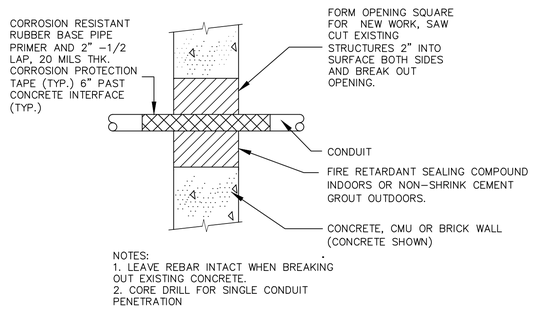
NOTES:

1. BOND ALL HUBS TO ENCLOSURE WITH SAME SIZE WIRE AS EQUIPMENT GROUNDING CONDUCTOR (EGC), WHERE THE HUB FITTING IS THE ENCLOSURE BOND, LOOP EGC THROUGH MYERS HUB GROUND LUG BEFORE TERMINATING ON GROUND BUS.
2. 3/8"ø, 316SS PIPE HANGER EVERY 4'. MIN. 2 PER CONDUIT RUN.



CONDUIT RISER - UNDER SLAB

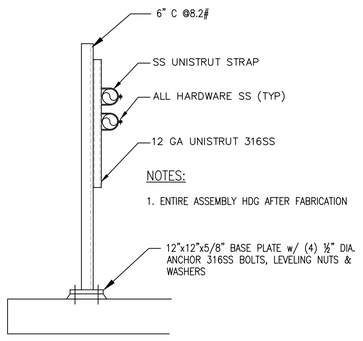
NOT TO SCALE



NOTES:
1. LEAVE REBAR INTACT WHEN BREAKING OUT EXISTING CONCRETE.
2. CORE DRILL FOR SINGLE CONDUIT PENETRATION

TYPICAL CONDUIT PENETRATION DETAIL
(Block Or Concrete Wall Or Floor)

NOT TO SCALE

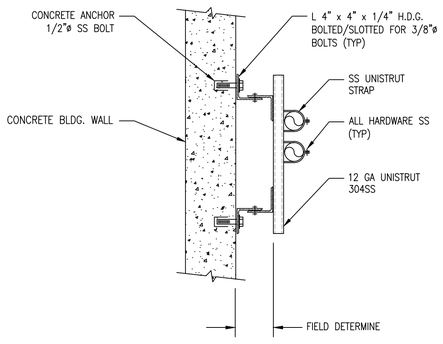


NOTES:

1. ENTIRE ASSEMBLY HDG AFTER FABRICATION

TYPICAL CONDUIT SUPPORT DETAIL

NOT TO SCALE



TYPICAL CONDUIT SUPPORT AT WALLS

NOT TO SCALE

A AS-BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR.

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

REV.	DATE		BY
A	10-25-19	AS-BUILD MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLE□

ELECTRICAL DETAILS SHEET 2

E

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EZ-05

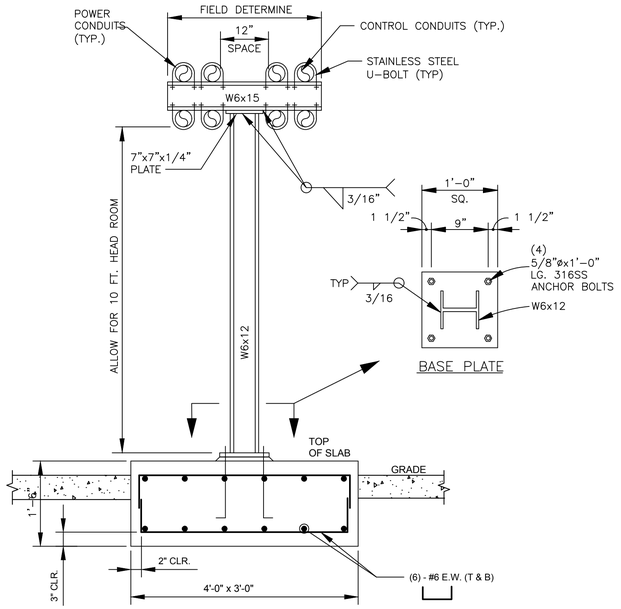
TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

DR:	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 63 OF 72



FABRICATION NOTES:

1. ALL STRUCTURAL STEEL, PLATES AND STRUCTURAL MEMBERS SHALL BE FABRICATED FROM A36 STEEL, AND SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.

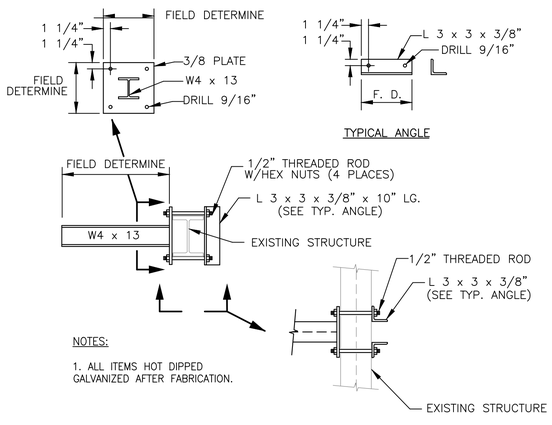
2. PROVIDE LEVELING NUTS AND FILL WITH NON SHRINK GROUT BETWEEN PLATE AND CONCRETE.

3. ABOVE DETAIL SHOWS CONDUITS SUPPORTED FROM ONE(1) VERTICAL W BEAM. WHERE ADDITIONAL SPACE IS REQUIRED, CONTRACTOR SHALL PROVIDE TWO (2) VERTICAL W BEAMS WITH AN ATTACHED HORIZONTAL BEAM. DUE TO PLANT SPACE AVAILABLE, CONTRACTOR SHALL CO-ORDINATE ROUTING, MOUNTING LOCATIONS, ETC. WITH ALL OTHER TRADES. CONTRACTOR SHALL MODIFY TO SUIT FIELD INSTALLATION CONDITIONS.

4. RACEWAY SEPARATION:
TO AVOID INTERFERENCE, KEEP A SEPARATION DISTANCE BETWEEN POWER RACEWAYS AND RACEWAYS FOR CONTROL/SIGNAL/COMMUNICATION
480V VFD RACEWAY – 18" SEPARATION
480V LINEAR POWER RACEWAY – 15" SEPARATION

OVERHEAD RACEWAY PIPE RACK - SUPPORT DETAIL

NOT TO SCALE

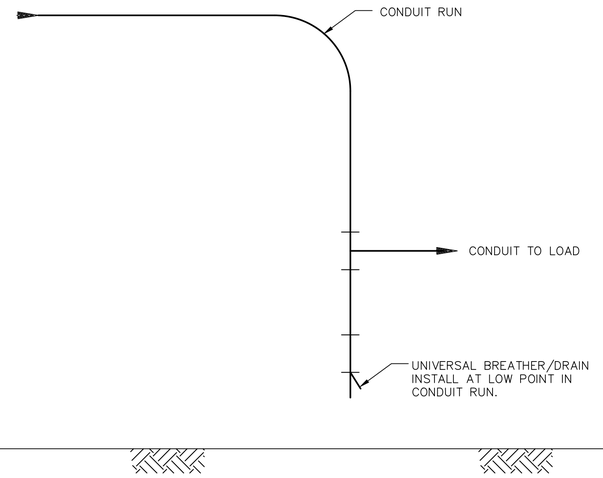


NOTES:

1. ALL ITEMS HOT DIPPED GALVANIZED AFTER FABRICATION.

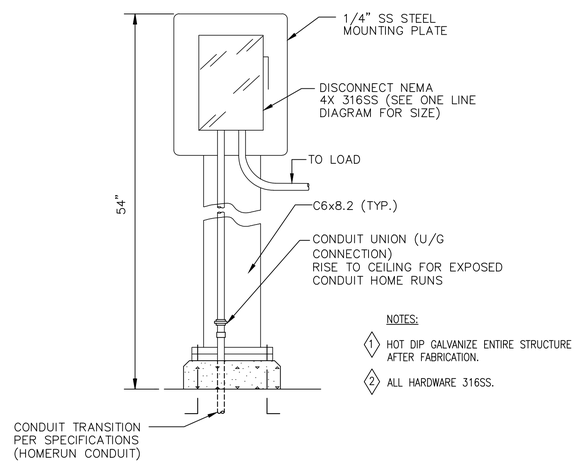
TYPICAL CONDUIT SUPPORT DETAILS

NOT TO SCALE



CONDUIT INSTALLATION - LOW POINT

NOT TO SCALE

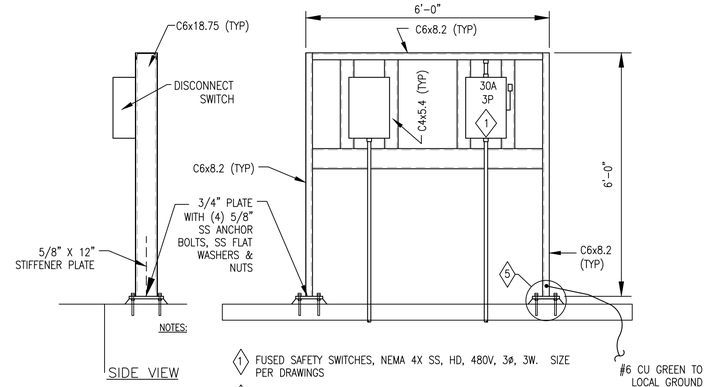


NOTES:

1. HOT DIP GALVANIZE ENTIRE STRUCTURE AFTER FABRICATION.
2. ALL HARDWARE 316SS.

TYPICAL DISCONNECT SWITCH MOUNTING STAND DETAIL

NOT TO SCALE

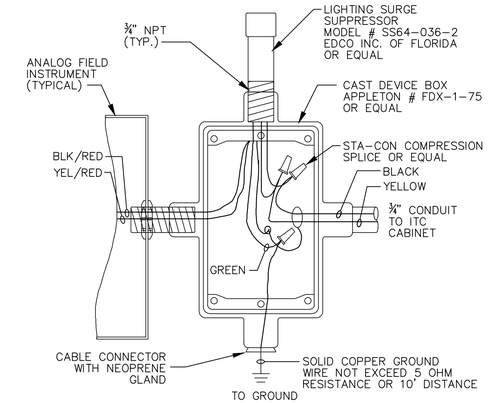


NOTES:

1. FUSED SAFETY SWITCHES, NEMA 4X SS, HD, 480V, 3ø, 3W. SIZE PER DRAWINGS
2. HOT DIP GALVANIZE ENTIRE STRUCTURE AFTER FABRICATION.
3. ALL HARDWARE 316SS.
4. COORDINATE RACK MOUNTING DETAIL WITH MOUNTING LOCATION
5. USE EXISTING STRUCTURE IF AVAILABLE. OTHERWISE PROVIDE 8" HIGH 4000 PSI CONCRETE PAD (MIN 4" ABOVE GRADE) WITH #3 REBAR EACH WAY AT 12" CENTERS AND 4x4-4/4 WIRE MESH. PAD SIZE TO ACCOMODATE RACK & MIN. 4' CLEAR SPACE IN FRONT OF RACK. EXTEND PAD MIN. 12" BEYOND EACH SIDE OF RACK.

TYPICAL EQUIPMENT RACK MOUNTING DETAIL

NOT TO SCALE



TYPICAL LIGHTNING SURGE SUPPRESSOR DEVICE (SPD) INSTALLATION

N.T.S.

REV.	DATE	AS-BUILT MARKUPS	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

ELECTRICAL DETAILS SHEET 3

A AS-BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

E

Trigon — Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EZ-06

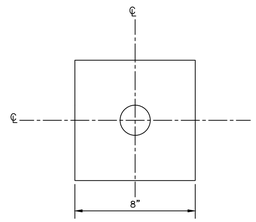
TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

DR:	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

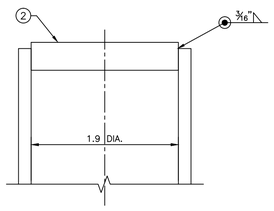
GENERAL SUPERINTENDENT

DWG. No. 12098-W8

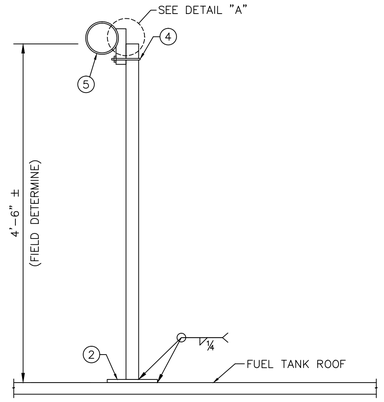
SET NO: SHEET NO: 64 OF 72



PLAN



DETAIL "A"



NO.	QTY.	DESRIPTION
1	6'	2" SCHEDULE 80 PIPE, HOT DIPPED GALVANIZED
2	AR	PLATE, HOT DIPPED GALVANIZED
3	4	NOT USED
4	1	MTG BRACKET SUPPLIED BY INST. VENDOR
5	1	TRANSMITTER

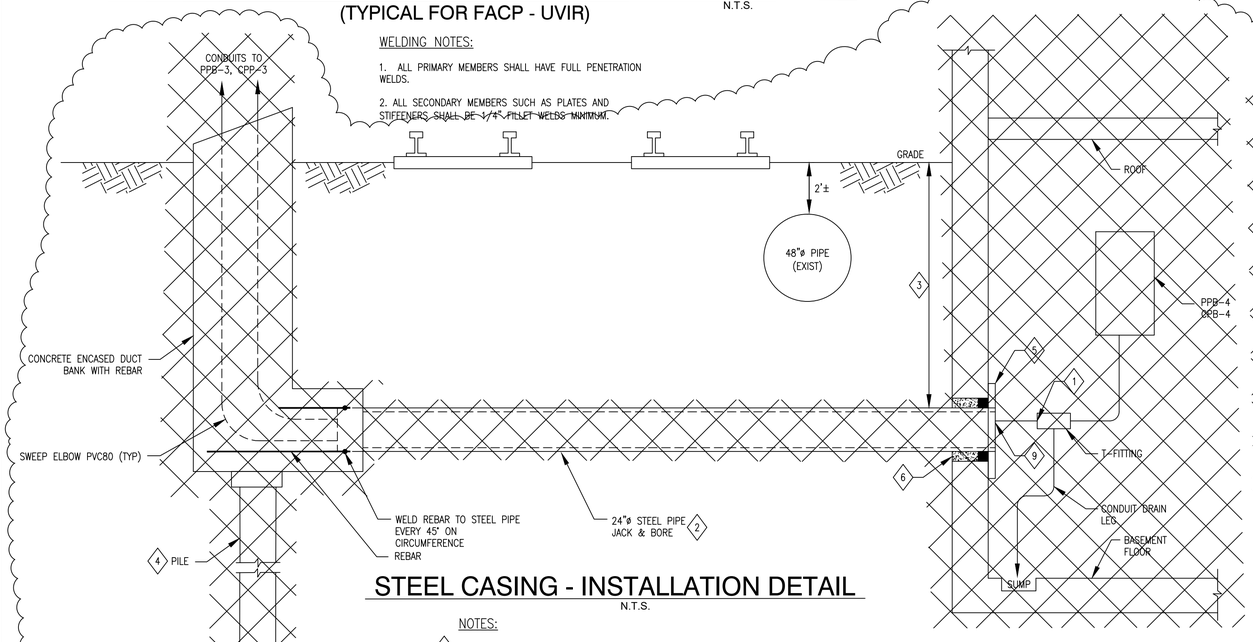
NOTES:

1. FIELD WELD TO FUEL TANK ROOF (TK-001, -002)

TYPICAL FLOOR MOUNT, MULTIPLE OR SINGLE INSTRUMENT

(TYPICAL FOR FACP - UVIR)

N.T.S.



WELDING NOTES:

1. ALL PRIMARY MEMBERS SHALL HAVE FULL PENETRATION WELDS.
2. ALL SECONDARY MEMBERS SUCH AS PLATES AND STIFFENERS SHALL BE 1/4" FILLET WELDS MINIMUM.

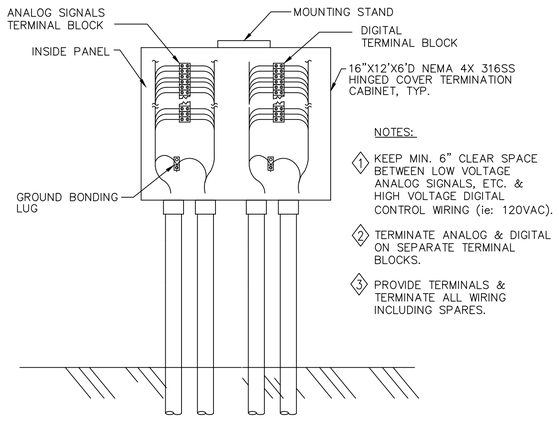
STEEL CASING - INSTALLATION DETAIL

N.T.S.

NOTES:

1. SEAL EACH CONDUIT WITH POLYWATER FST-250 SEALANT.
2. 24" STEEL PIPE: ASTM A-139, GRADE B, 35,000 PSI MINIMUM YIELD STRENGTH. WELD PIPE SECTIONS. EACH WELD SHALL BE X-RAYED WHEN COMPLETED.
3. SEE CIVIL/STRUCTURAL DRAWINGS FOR DEPTH. MINIMUM 2' UNDER 48"ø WATER MAIN.
4. SEE CIVIL/STRUCTURAL DRAWINGS FOR PILE.
5. LINK SEAL FITTING: 316SS.
6. FILL WITH NON-SHRINK CEMENT GROUT.
7. SEE CIVIL/STRUCTURAL DRAWINGS FOR INSTALLATION DETAILS.
8. SEE CIVIL/STRUCTURAL SPECIFICATIONS FOR JACK & BORE SPECIFICATION.
9. PROVIDE A CLOSURE PLATE (⅜" THICK) ON THE 24" PIPE (NOT SHOWN ON ABOVE DETAIL). PROVIDE OPENINGS FOR CONDUITS. ALL OPENINGS SHALL BE SEALED TO PREVENT WATER LEAKAGE INGRESS. SUBMIT CONSTRUCTION DETAILS TO ENGINEER.

A JACK AND BORE REPLACED WITH OPEN CUT PER FCO-009/RFQ-001



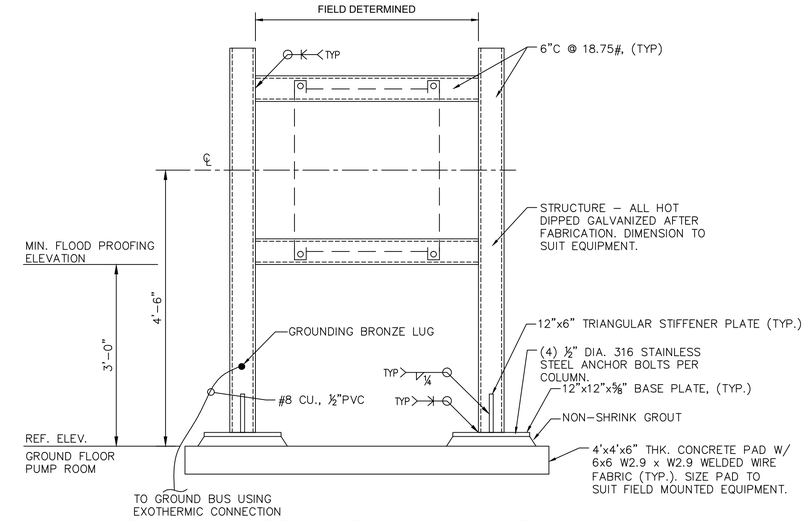
NOTES:

1. KEEP MIN. 6" CLEAR SPACE BETWEEN LOW VOLTAGE ANALOG SIGNALS, ETC. & HIGH VOLTAGE DIGITAL CONTROL WIRING (ie: 120VAC).
2. TERMINATE ANALOG & DIGITAL ON SEPARATE TERMINAL BLOCKS.
3. PROVIDE TERMINALS & TERMINATE ALL WIRING INCLUDING SPARES.

FIELD TERMINATION CABINET (TC) OR JUNCTION BOX

N.T.S.

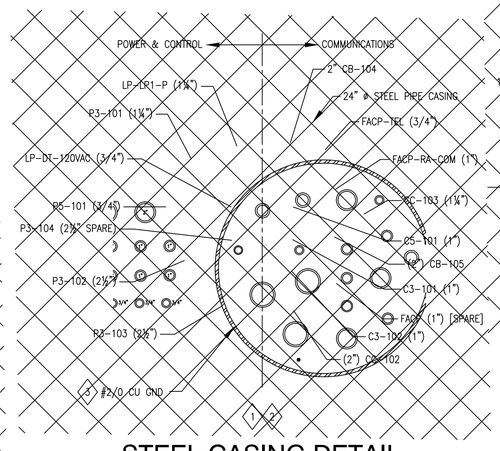
NOTE: FLOOR MOUNTING RACK NOT SHOWN BUT REQUIRED.



TYPICAL FIELD CONTROL PANEL - MOUNTING DETAIL

(TYPICAL FOR MISC. PANELS, ETC.)

N.T.S.



STEEL CASING DETAIL

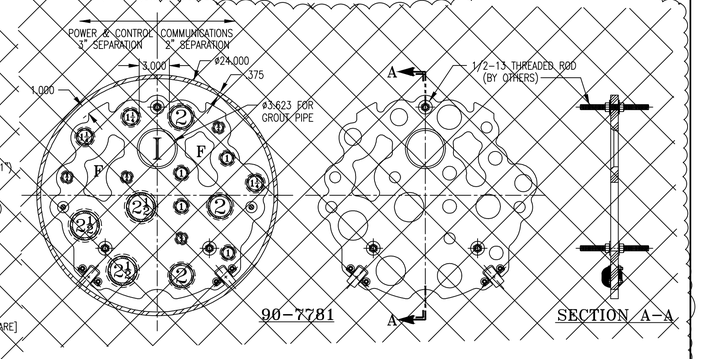
SCALE: 1½"=1'-0"

NOTES:

1. PROVIDE CONDUIT SPACERS AT 5' INTERVALS. MAINTAIN 3" SEPARATION BETWEEN POWER CONDUITS AND 2" SEPARATION BETWEEN CONTROL CONDUITS.
2. CONDUITS SHALL MAINTAIN THE SAME POSITION ENTERING AND LEAVING THE CASING. AFTER THE CONDUITS ARE IN PLACE, A SAND/CEMENT SLURRY (MINIMUM OF SIX SACKS OF CEMENT PER CUBIC YARD) SHALL BE USED TO FILL ALL VOIDS.
3. BOND GROUND WIRE AT BOTH ENDS TO PROVIDE GROUND CONTINUITY FROM SOURCE TO LOAD.

WELDING NOTES:

1. ALL PRIMARY MEMBERS SHALL HAVE FULL PENETRATION WELDS.
2. ALL SECONDARY MEMBERS SUCH AS PLATES AND STIFFENERS SHALL BE 1/4" FILLET WELDS MINIMUM.



CASING INSERT DETAIL

SCALE: NONE

REV.	DATE	AS-BUILT MARKUPS	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLE□

ELECTRICAL DETAILS SHEET 4

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

E

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EZ-07

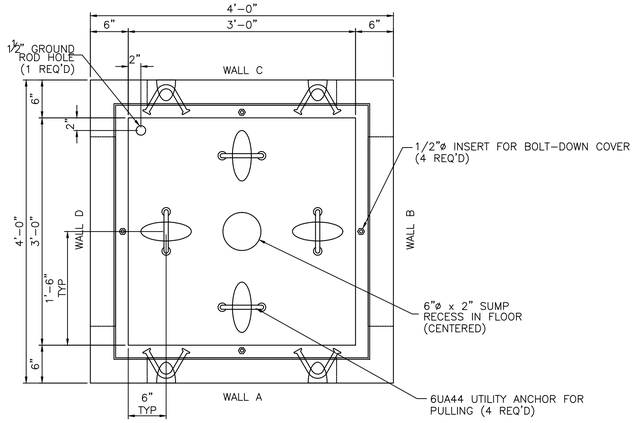
TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767
trigonassociates.com

DR:	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

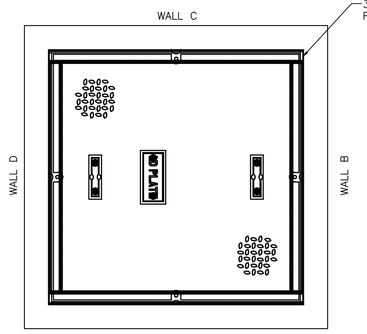
GENERAL SUPERINTENDENT

DWG. No. 12098-W8

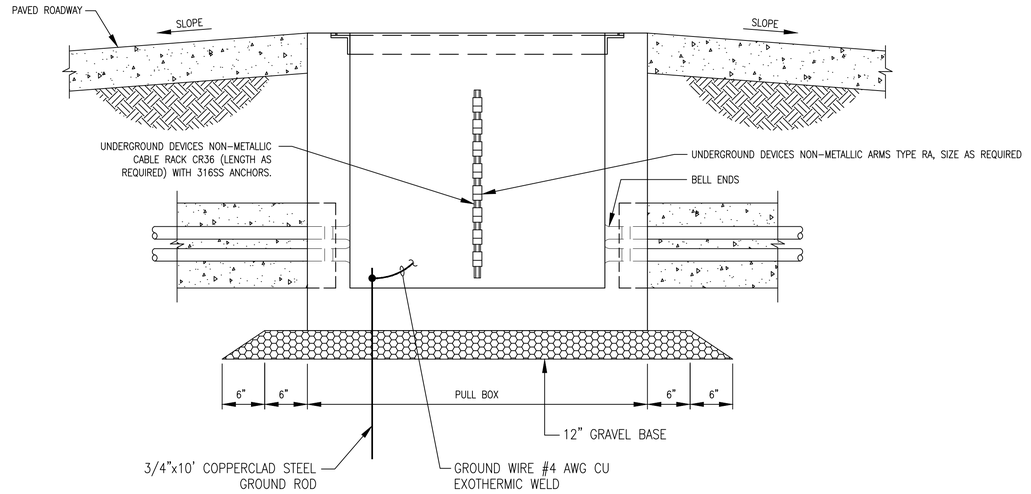
SET NO: SHEET NO: 65 OF 72

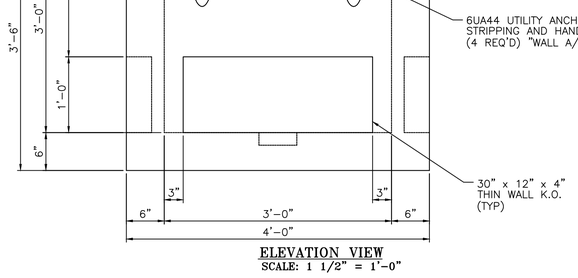


PLAN VIEW
SCALE: 1 1/2" = 1'-0"



PLAN VIEW W/ FRAME & COVER
SCALE: 1 1/2" = 1'-0"





ELEVATION VIEW
SCALE: 1 1/2" = 1'-0"

PPB-1, PPB-2 – 36"x36"x36"
CPB-1, CPB-2 – 36"x36"x36"

PRECAST IN-GROUND PULL BOX (TYP)

NOTES:

1. COVER TO BE INSCRIBED "ELECTRIC POWER" OR "ELECTRIC CONTROL".

GENERAL NOTES:

DESIGN LOAD : AASHTO H-20-44, CONTINOUS TRAFFIC (FULL H-20).

STRUCTURAL CONCRETE : CONCRETE SHALL BE 6000 PSI MIN. CEMENT SHALL BE ASTM C150.

REINFORCING STEEL : REINFORCING STEEL SHALL BE ASTM A-615 GRADE 60UNLESS OTHERWISE NOTED. DIMENSIONS FOR FABRICATED REINFORCING STEEL ARE OUT TO OUT. ALL OTHER DIMENSIONS RELATING TO REINFORCING STEEL ARE TO BAR CENTERS UNLESS OTHERWISE NOTED.

FINISH OF CONCRETE : BOTTOM OF BASE SHALL BE A STEEL TROWEL FINISH . ALL OTHER SURFACES SHALL BE AN INDUSTRIAL FORM FINISH .

NOTES:

1. SEE PLAN DRAWINGS FOR ORIENTATION OF DUCTS ENTERING PULL BOX. PROVIDE A PULLING-IN IRON OPPOSITE EACH SIDE IN WHICH DUCTS ENTER.

2. NUMBER OF NON-METALLIC ARMS AND EXACT LOCATION OF RACKS SHALL BE AS REQUIRED FOR NUMBER OF FEEDERS IN PULL BOX. (MINIMUM OF 4 RACKS SHALL BE PROVIDED IN EACH PULL BOX.)

3. BOND ALL METAL INCLUDING COVER, PULLING IRONS & FRAME TO GROUND RODS WITH #4 B.C. BOND TO DUCT BANK GROUND WIRE.

4. WHERE CABLE PULL BOX ENTRY AND EXIT POINTS ARE AT RIGHT ANGLES TO ONE ANOTHER, THE CABLES SHALL RUN AROUND THE INSIDE PULL BOX PERIMETER, AND BE NEATLY TIED AND STRAPPED TO THE SUPPORTING ARMS. WHERE CABLE PULL BOX ENTRY AND EXIT POINTS ARE IN THE SAME HORIZONTAL PLANE, THE CABLES SHALL BE RUN ON THE PULL BOX PERIMETER WALL, AND BE NEATLY TIED AND STRAPPED TO THE SUPPORTING ARMS.

5. THIS STRUCTURE SHALL BE DESIGNED AT THE CONTRACTOR'S EXPENSE BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF LOUISIANA. STRUCTURAL SIGN & SEAL CALCULATIONS & DESIGN DETAILS. SUBMIT FOR ENGINEER APPROVAL.

REV.	DATE	AS-BUILT MARKUPS	BY
A	10-25-19	AS-BUILT MARKUPS	LHN

AS-BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY HENRY G. HAWNEY, LICENCE No. 19229 ON 2-6-15.

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLE□

ELECTRICAL DETAILS
SHEET 5

E

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. EZ-08

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

DR:	S. CLARK
CK:	H. HAWNEY
AP:	H. HAWNEY
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 66 OF 72

INSTRUMENT VALVE DESIGNATIONS

	BV	BALL VALVE
	GV	GATE VALVE
	NV	NEEDLE VALVE
	CV	CHECK VALVE
	BFV	BUTTERFLY VALVE
TP		TEST POINT
S / DV		SOLENOID DELUGE VALVE
WPBV		WATER POWERED BALL VALVE
		REDUCED PRESSURE BACKFLOW PREVENTER
	NO	NORMALLY OPEN
	NC	NORMALLY CLOSED

PIPE AND FITTING SYMBOLS

	REDUCER
	QUICK CONNECT COUPLING

MISCELLANEOUS EQUIPMENT DESIGNATIONS

VENT
FOAM CHAMBER
INSECT SCREEN
STROBE/HORN
SIGHT GAUGE
RATIO CONTROLLER
MANWAY
BOOSTER PUMP
FILTER
POSITIVE DISPLACEMENT PUMP

INSTRUMENTATION SYMBOLS

XX / XX	HS	HORN STROBE
XX / XX	LAH	LEVEL ALARM HIGH
HS	LAHH	LEVEL ALARM HIGH HIGH
	LAL	LEVEL ALARM LOW
XX	LALL	LEVEL ALARM LOW LOW
	LAX	LEAK DETECTION
XX	LG	LEVEL GAUGE
	LI	LEVEL INDICATOR
	LIT	LEVEL INDICATING TRASMITTER
	LIT	LEVEL INDICATING GAUGE
	LSH	LEVEL SENSING HIGH
	LSHH	LEVEL SENSING HIGH HIGH
	LSL	LEVEL SENSING LOW
	LSLL	LEVEL SENSING LOW LOW
	LSX	LEVEL DETECTION
	TP	TEST POINT DETECTOR
	UA	MULTI-FUNCTION ALARM
	UVIR	ULTRAVIOLET INFRARED DETECTOR
	YC	EVENT CONTROL
	CS	CARBON STEEL
	CU	COPPER
	DI	DUCTILE IRON
	PVC	POLYVINYL CHLORIDE
	FLH	FLEXIBLE HOSE
	SS	STAINLESS STEEL

PIPING LINE DESIGNATIONS

XXX	CONTINUATION ARROW (SHEET NO)
NEW AG / EXISTING AG	NEW ABOVE GROUND/EXISTING ABOVE GROUND INTERFACE
AG / UG	ABOVE GROUND/BELOW GROUND INTERFACE
	FLANGED CONNECTION

LINE SERVICE DESIGNATIONS

FO	FUEL OIL
OW	OIL WATER
FS	FIRE SUPPRESSION
PW	POTABLE WATER
FC	FOAM CONCENTRATE
PFO	POLISHED FUEL OIL
TW	TREATED WATER

REV.	DATE	DESCRIPTION	BY
A	10–25–19	AS–BUILT MARKUPS	LHN

A AS–BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

PIPING AND INSTRUMENTATATION DIAGRAM - SYMBOLOGY AND LEGEND

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

TRIGON DWG. NO.	IA-01
DR.	SJ CLARK
CK:	RA CASSANOVA
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 67 OF 72

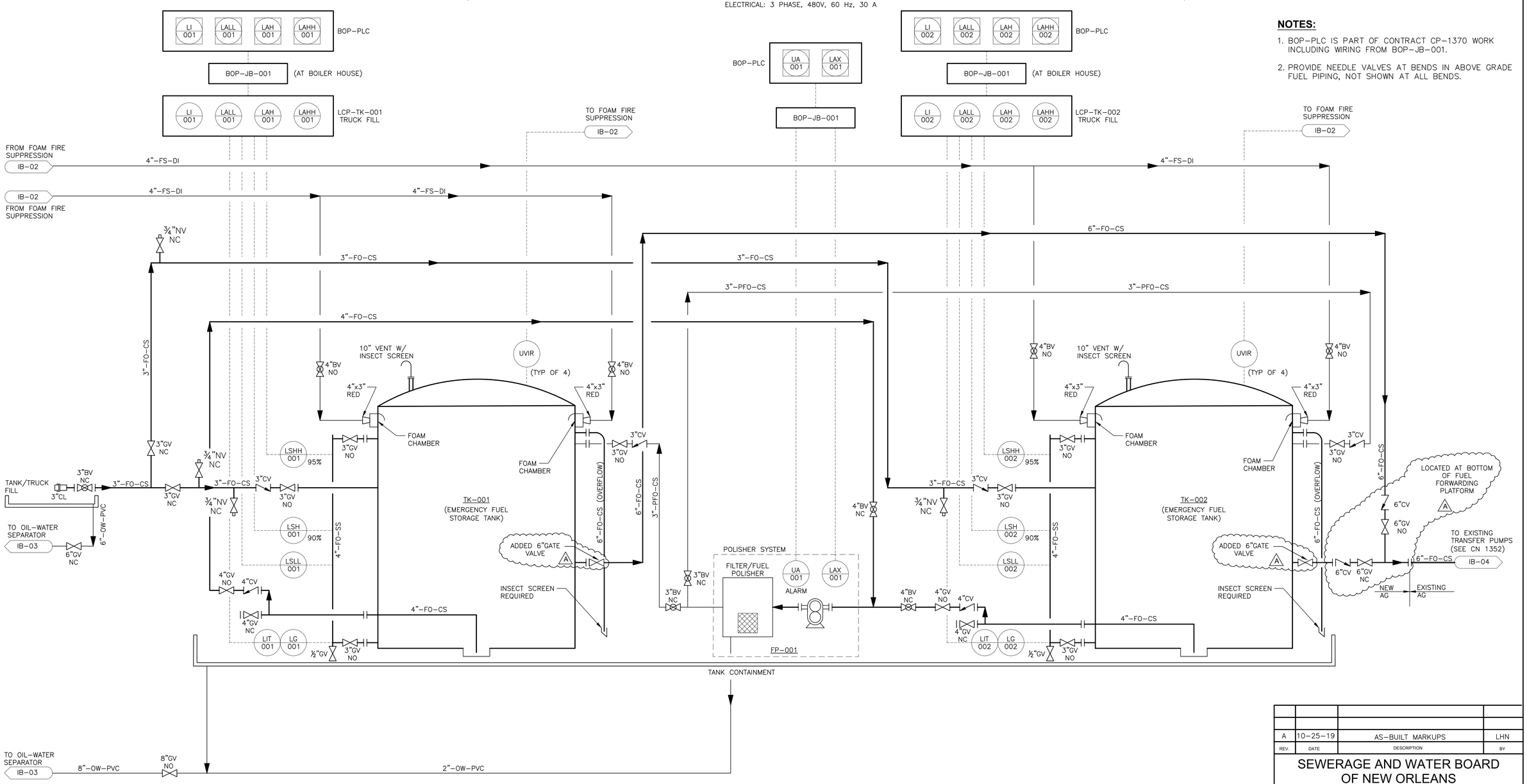
TK-001
EMERGENCY FUEL STORAGE TANK
DESIGN: 522,000 GALLONS
TYPE: ABOVE GROUND, VERTICAL

FP-001
FUEL POLISHER
DESIGN: 220 GPM
MOTOR: 15 HP
ELECTRICAL: 3 PHASE, 480V, 60 Hz, 30 A

TK-002
EMERGENCY FUEL STORAGE TANK
DESIGN: 522,000 GALLONS
TYPE: ABOVE GROUND, VERTICAL

NOTES:

1. BOP–PLC IS PART OF CONTRACT CP–1370 WORK INCLUDING WIRING FROM BOP–JB–001.
2. PROVIDE NEEDLE VALVES AT BENDS IN ABOVE GRADE FUEL PIPING, NOT SHOWN AT ALL BENDS.



REV.	DATE	DESCRIPTION	BY
A	10–25–19	AS–BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

FUEL STORAGE (TK-001 & TK-002) P&ID

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

TRIGON DWG. NO. IB-01

DR: SJ CLARK
CK: RA CASSANOVA
AP: LH NAGRATH
LAST EDIT:
SCALE: NOT TO SCALE
DATE: JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

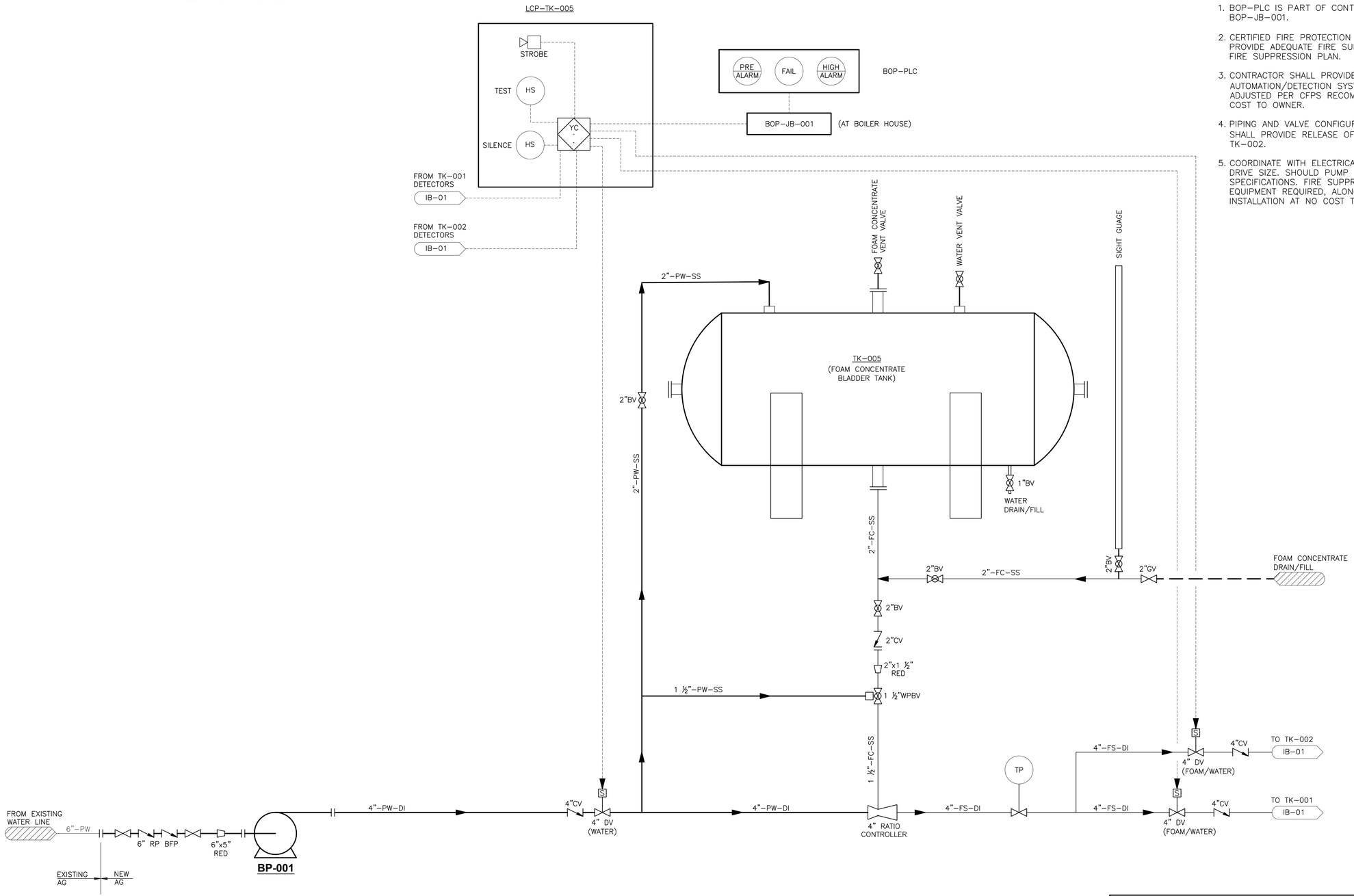
SET NO:
SHEET NO: 68 OF 72

BP-001
POTABLE WATER BOOSTER PUMP

DESIGN: 500 GPM, 100 FT HEAD
MOTOR: 30 HP
ELECTRICAL: 3 PHASE, 208V, 60 Hz

TK-005
FOAM CONCENTRATE BLADDER TANK

DESIGN: 400 GALLONS
TYPE: ABOVE GROUND, HORIZONTAL BLADDER TANK



NOTES:

1. BOP–PLC IS PART OF CONTRACT CP–1370 WORK INCLUDING WIRING FROM BOP–JB–001.
2. CERTIFIED FIRE PROTECTION SPECIALIST (CFPS) SHALL VERIFY SIZING OF SYSTEM TO PROVIDE ADEQUATE FIRE SUPPRESSION COVERAGE FOR TK–001 AND TK–002. SUBMIT FIRE SUPPRESSION PLAN.
3. CONTRACTOR SHALL PROVIDE A COMPLETE FUNCTIONING FIRE SUPPRESSION AND AUTOMATION/DETECTION SYSTEM. LAYOUT AND SIZE OF PROPOSED SLAB SHALL BE ADJUSTED PER CFPS RECOMMENDATIONS AND MANUFACTURER REQUIREMENTS, AT NO COST TO OWNER.
4. PIPING AND VALVE CONFIGURATION SHALL BE THE RESPONSIBILITY OF THE CFPS AND SHALL PROVIDE RELEASE OF AFFF SOLUTION TO BOTH OR EITHER TK–001 AND/OR TK–002.
5. COORDINATE WITH ELECTRICAL ENGINEER ON ELECTRICAL REQUIREMENTS, INCLUDING VFD DRIVE SIZE. SHOULD PUMP HP VARY FROM SIZE SHOWN ON DRAWING AND LISTED IN SPECIFICATIONS. FIRE SUPPRESSION SUPPLIER SHALL BE RESPONSIBLE TO SUPPLY THE EQUIPMENT REQUIRED, ALONG WITH ASSOCIATED ELECTRICAL EQUIPMENT AND INSTALLATION AT NO COST TO OWNER.

A SEE SUL–0242 FOR ICFP AS–BUILTS

REV.	DATE	DESCRIPTION	BY
A	10–25–19	AS–BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

FIRE SUPPRESSION (TK-005) P&ID

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

TRIGON DWG. NO. IB-02

DR: SJ CLARK
CK: RA CASSANOVA
AP: LH NAGRATH
LAST EDIT:
SCALE: NOT TO SCALE
DATE: JANUARY 28, 2015

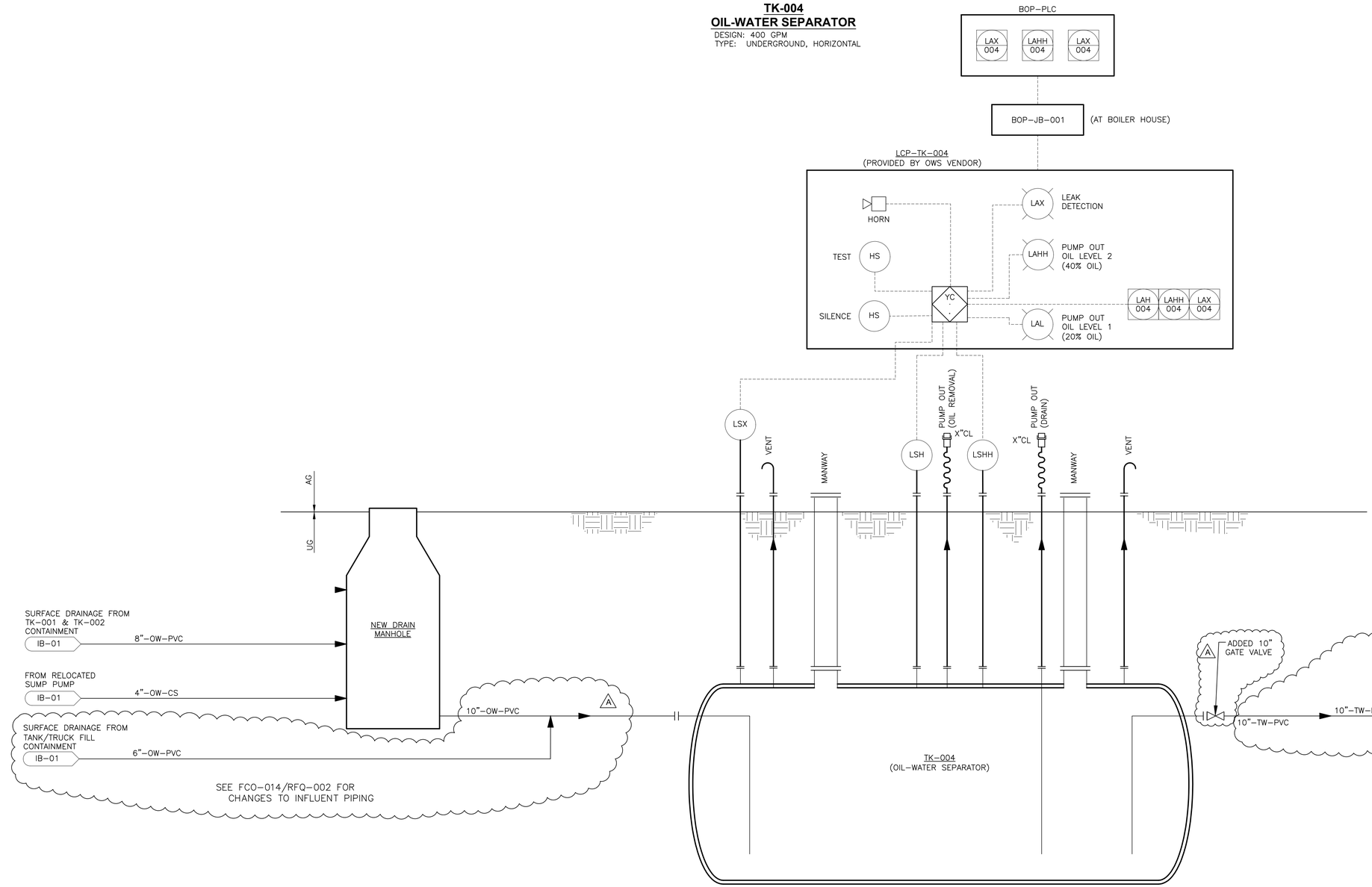
GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 69 OF 72

TK-004
OIL-WATER SEPARATOR

DESIGN: 400 GPM
TYPE: UNDERGROUND, HORIZONTAL



NOTES:

1. BOP–PLC IS PART OF CONTRACT CP–1370 WORK INCLUDING WIRING FROM BOP–JB–001.

REV.	DATE	DESCRIPTION	BY
A	10–25–19	AS–BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

OIL-WATER SEPARATOR (TK-004)
P&ID

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

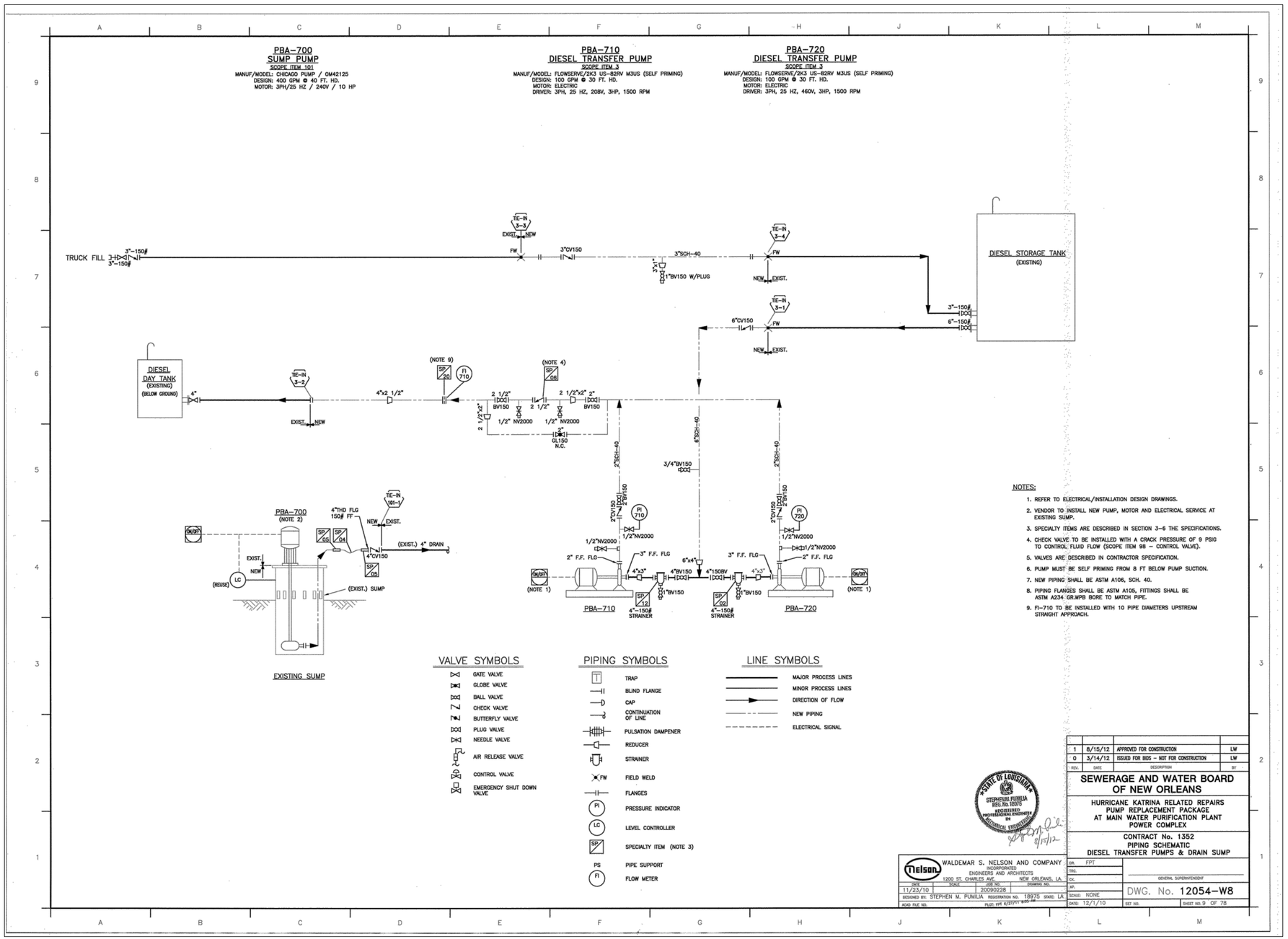
TRIGON DWG. NO. IB-03

DR:	SJ CLARK
CK:	RA CASSANOVA
AP:	LH NAGRATH
LAST EDIT:	
SCALE:	NOT TO SCALE
DATE:	JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 70 OF 72



FOR REFERENCE ONLY

AS–BUILT REVISIONS NOT PROVIDED FOR THIS SHEET BY THE CONTRACTOR

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY LISBETH HABANS NAGRATH, LICENCE No. 36792 ON 2-6-15. THIS DOCUMENT SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT.

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON DWG. NO. IB-04

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

REV.	DATE	DESCRIPTION	BY
A	10–25–19	AS–BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLE□

CN 1352-PIPING SCHEMATIC-DIESEL TRANSFER PUMPS AND DRAIN SUMP

DR. SJ CLARK
CK. RA CASSANOVA
AP. LH NAGRATH
GENERAL SUPERINTENDENT
LAST EDIT:
SCALE: NOT TO SCALE
DWG. No. 12098-W8
DATE: JANUARY 28, 2015
SET NO:
SHEET NO: 71 OF 72

FP-002
FUEL POLISHER

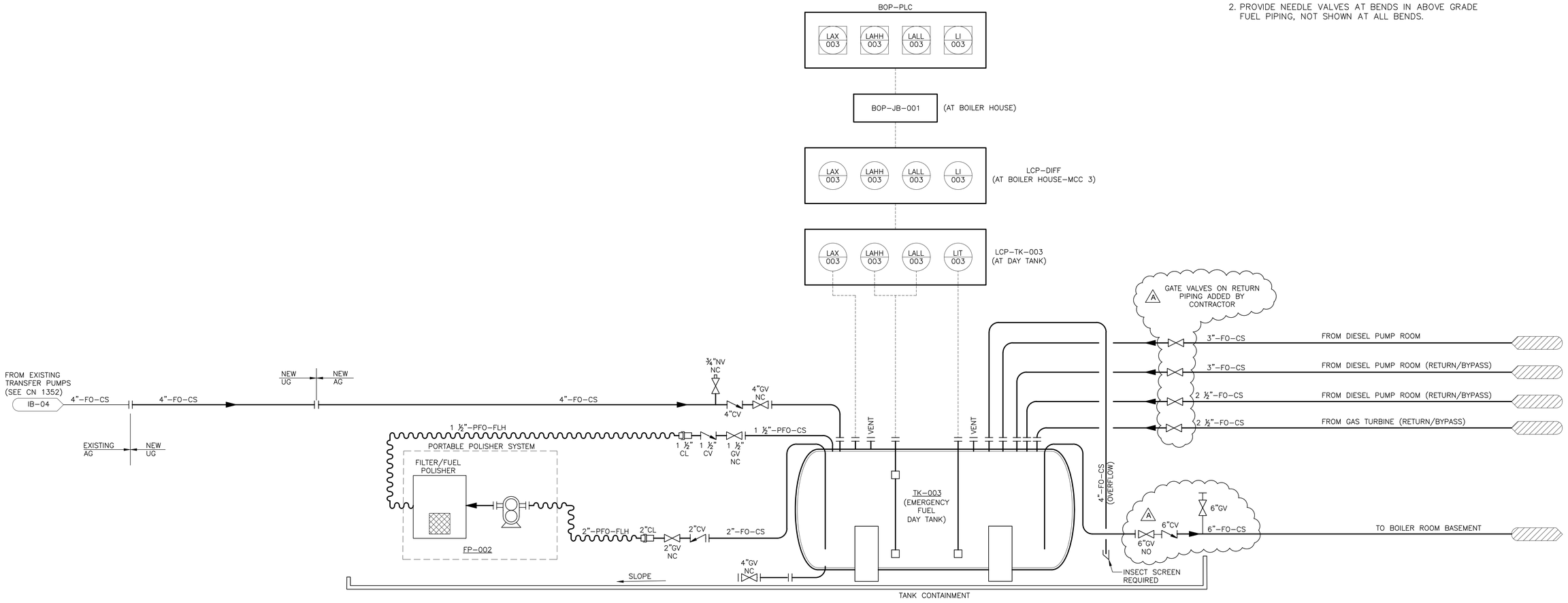
DESIGN: 10–90 GPM
MOTOR: 3 HP
ELECTRICAL: THREE PHASE, 480V, 60 Hz, 30 A

TK-003
EMERGENCY FUEL DAY TANK

DESIGN: 15,000 GALLONS
TYPE: ABOVE GROUND, VERTICAL

NOTES:

1. BOP–PLC IS PART OF CONTRACT CP–1370 WORK INCLUDING WIRING FROM BOP–JB–001.
2. PROVIDE NEEDLE VALVES AT BENDS IN ABOVE GRADE FUEL PIPING, NOT SHOWN AT ALL BENDS.



REV.	DATE	DESCRIPTION	BY
A	10–25–19	AS–BUILT MARKUPS	LHN

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1369

HMGP EMERGENCY FUEL STORAGE
RETROFIT POWER PLANT
MAIN WATER PURIFICATION PLANT POWER COMPLEX

DAY TANK (TK-003) P&ID

Trigon
Quality ▲ Commitment ▲ Client Service

TRIGON ASSOCIATES, LLC
1515 POYDRAS STREET
SUITE 2200
NEW ORLEANS, LA 70112
TEL: 504-585-5767

trigonassociates.com

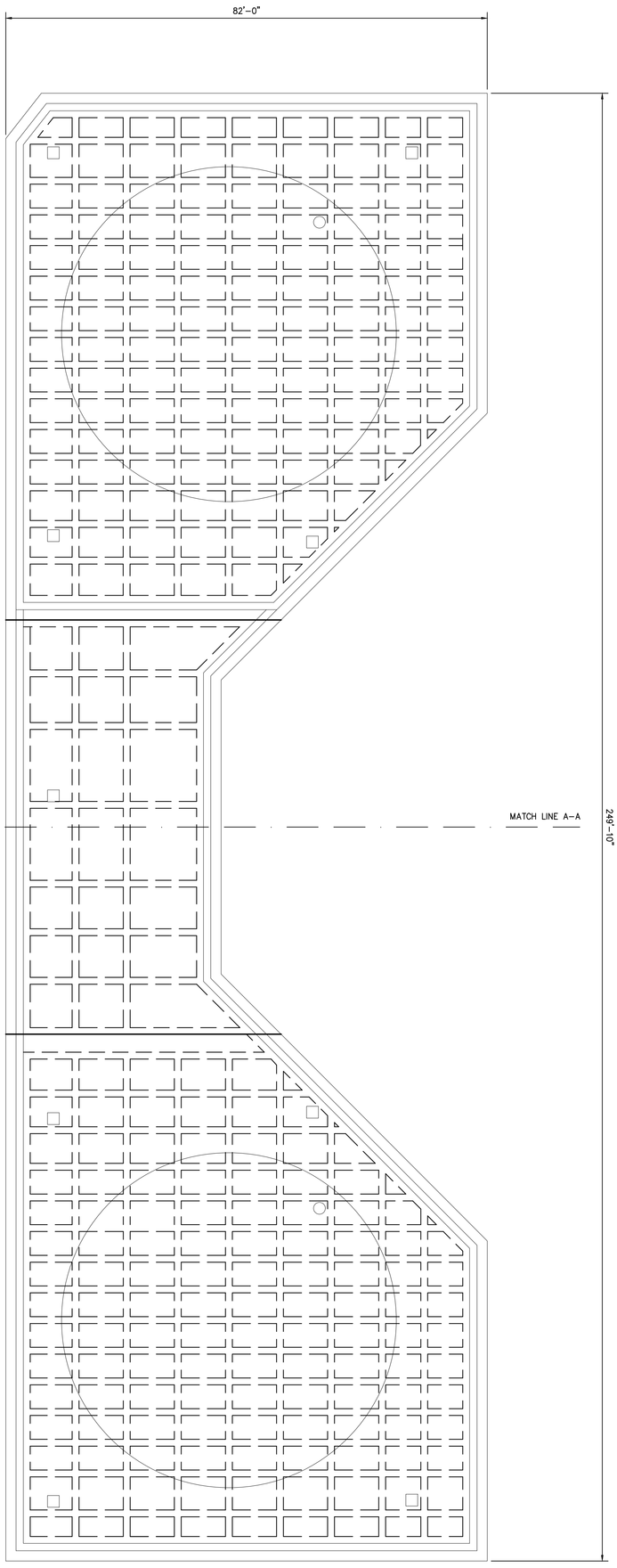
TRIGON DWG. NO. IC-01

DR: SJ CLARK
CK: RA CASSANOVA
AP: LH NAGRATH
LAST EDIT:
SCALE: NOT TO SCALE
DATE: JANUARY 28, 2015

GENERAL SUPERINTENDENT

DWG. No. 12098-W8

SET NO: SHEET NO: 72 OF 72



FOUNDATION PLAN
SCALE: 3/32"=1'-0"

APPENDIX

SEE VERSIONS OF SUL-0159 FOR VECP DESIGNED BY CARUBBA ENGINEERING

D:\Carubba\Standard Drawings\U2203\Sheet Logo.tif

DRAWN MD	RLH INVESTMENTS, LLC		3400 Hessmer Avenue Metairie,LA 70002 Phone: 504.888.1490 Fax: 504.888.1491 www.carubbaengineering.com		
CHECKED RMC	NEW ORLEANS	LOUISIANA			
DATE 8/23/16	SEWERAGE AND WATER BOARD OF NEW ORLEANS HMGP NO. 1369 STORAGE TANK FOUNDATIONS FOUNDATION PLAN				
CEI PROJECT NO. 16-065					
SHEET S1.0					

MARK	DESCRIPTION	DATE	BY
A	FOR APPROVAL	8/23/16	RMC

ENLARGED FOUNDATION PLAN

SCALE: 3/16"=1'-0"

D:\Carubba\Standard Drawings\LOGOS\20thSeal Logo.tif

APPENDIX

SEE VERSIONS OF SUL-0159 FOR VECP DESIGNED BY CARUBBA ENGINEERING

MARK	DESCRIPTION	DATE	BY
4	REVISION	5/7/2019	RAH
3	REVISION	07/19/2017	
2	FOR CONSTRUCTION	07/05/2017	RMC
D	GENERAL REVISION	04/10/2017	RAH
C	FOR APPROVAL	11/21/2016	RMC
B	FOR APPROVAL	10/04/2016	RMC
A	FOR APPROVAL	8/23/16	RMC

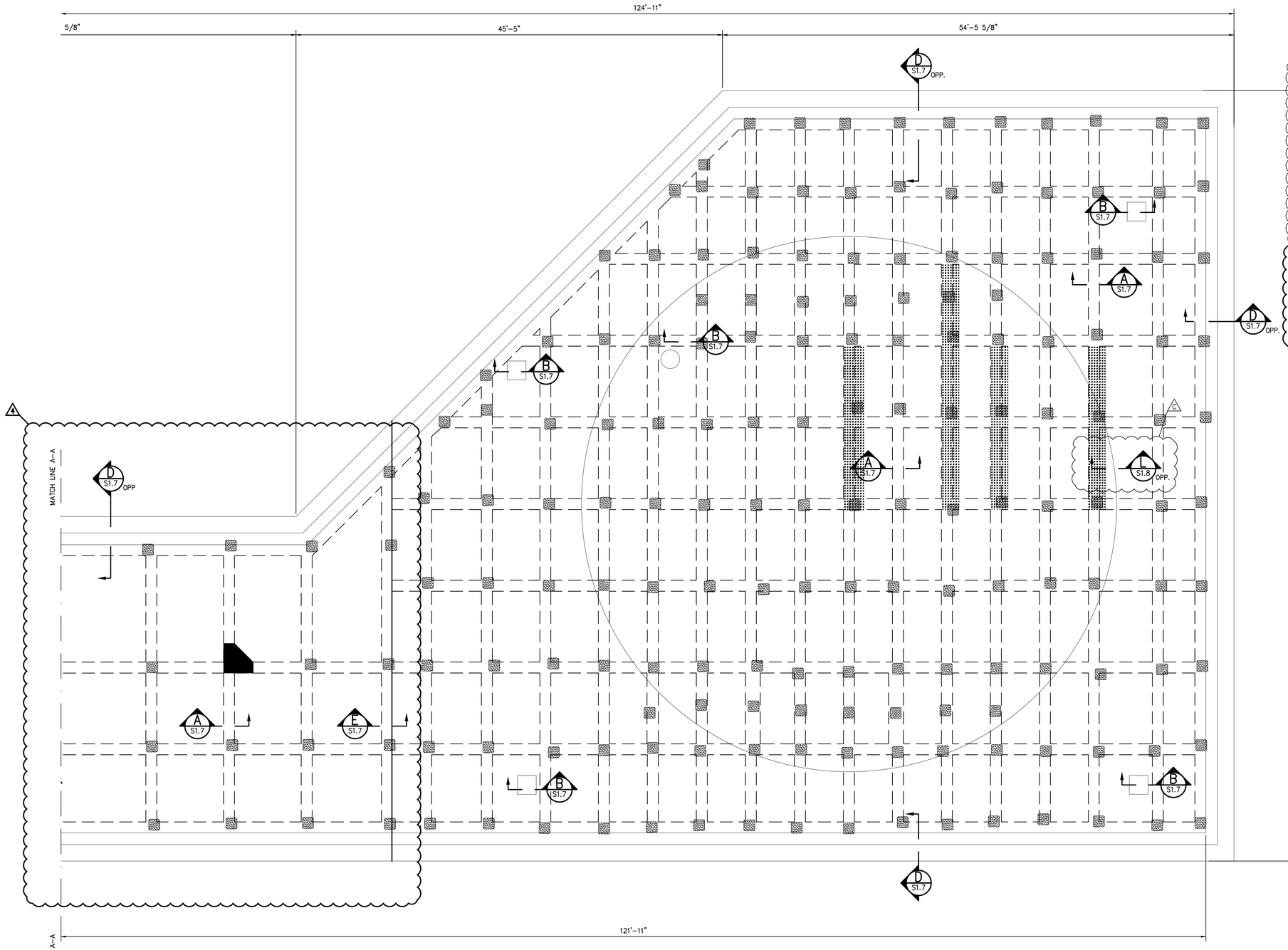
3400 Hessmer Avenue
Metairie,LA
70002
Phone:
504.888.1490
FAX:
504.888.1491
www.carubbaengineering.com
LOUISIANA

NEW ORLEANS

RLH INVESTMENTS, LLC

SEWERAGE AND WATER BOARD OF NEW ORLEANS
HMGP NO. 1369 STORAGE TANK FOUNDATIONS
FOUNDATION PLAN

DRAWN	MD
CHECKED	RMC
DATE	8/23/16
CEI PROJECT NO.	16-065
SHEET	S1.1



ENLARGED FOUNDATION PLAN
SCALE: 3/16"=1'-0"

NOTES

1. 15" SLAB MINIMUM (SEE S1.4 FOR SLOPES)
2. REINFORCEMENT: #8'S @ 18" O.C. E.W. TOP AND BOTTOM

LEGEND

EXISTING PRE-CAST CONCRETE PILES (BY OTHERS) (VERIFY LOCATION IN FIELD)

F.D. FIELD DETERMINE
V.I.F. VERIFY IN FIELD
V.W.A. VERIFY WITH ARCHITECT

WIDEN CONCRETE BEAM SO MINIMUM 3" CONCRETE COVER OVER PILE. FOR EVERY 3" OF ADDITIONAL WIDTH, ADD (1) ADDITIONAL #6 BAR CONTINUOUS T&B. TIE INTO EXISTING BEAM REINFORCEMENT AND OVERLAP MINIMUM 36"

CHAMFER CORNER OF CONCRETE BEAM 24" X 24" INSTALL (2) #6 BARS T&B

18
36
18

SEE VERSIONS OF SUL-0159 FOR VECP DESIGNED BY CARUBBA ENGINEERING

APPENDIX

D:\Carubba\Standard Drawings\LOGOS\20thSeal Logo.tif

MARK	DESCRIPTION	DATE	BY
4	REVISION	05/06/2019	RAH
E	FOR APPROVAL	02/04/2019	RAH
D	FOR APPROVAL	01/28/2019	RAH
C	FOR APPROVAL	11/21/2016	RMC
A	FOR APPROVAL	8/23/16	RMC

3400 Hessmer Avenue
Metairie,LA
70002
Phone:
504.888.1490
FAX:
504.888.1491
www.carubbaengineering.com
LOUISIANA
NEW ORLEANS

RLH INVESTMENTS, LLC

SEWERAGE AND WATER BOARD OF NEW ORLEANS
HMGP NO. 1369 STORAGE TANK FOUNDATIONS
FOUNDATION PLAN

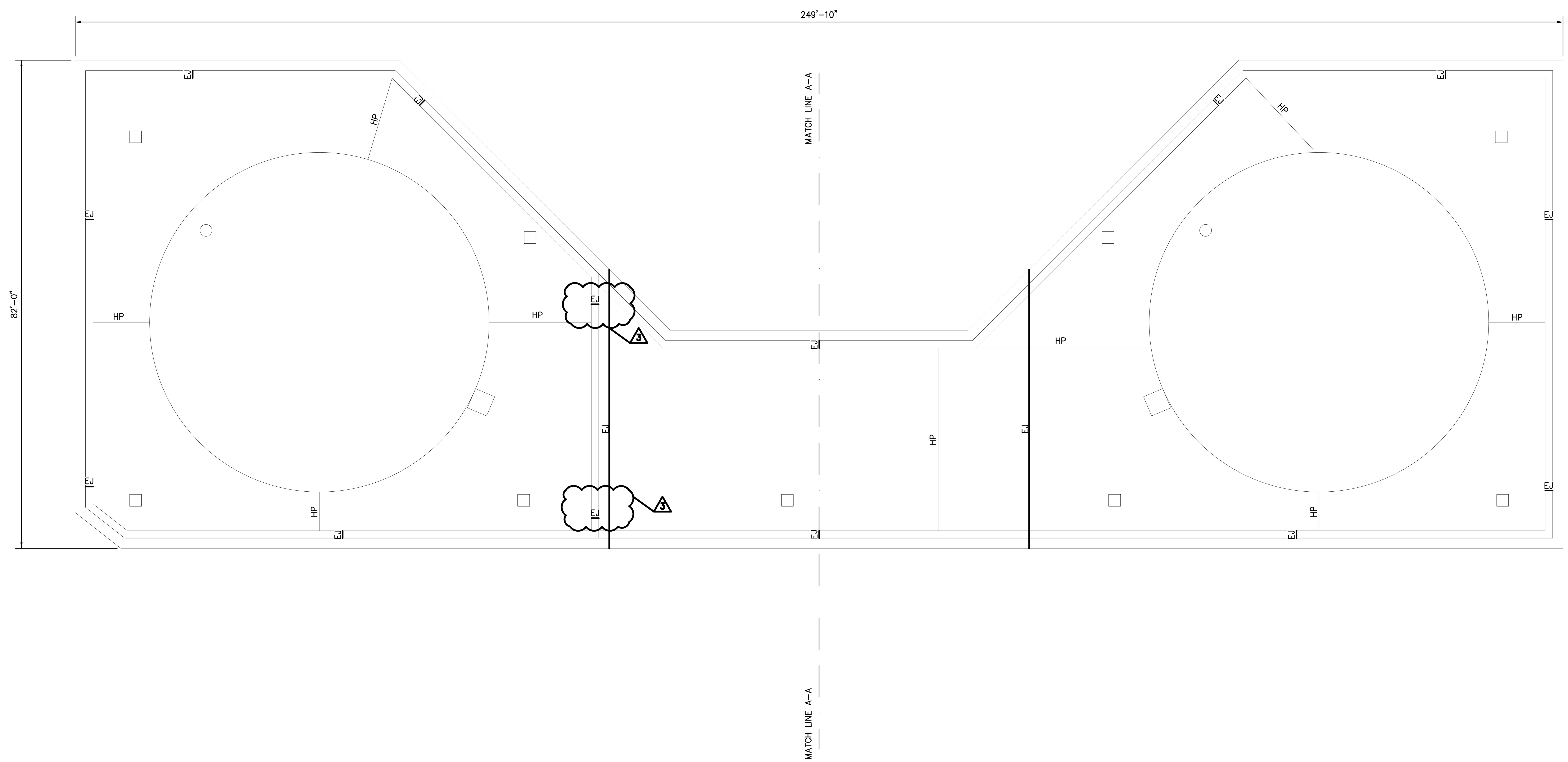
DRAWN	MD
CHECKED	RMC
DATE	8/23/16
CEI PROJECT NO.	16-065
SHEET	S1.2

NOTES

1. SLAB AREA = 16,500 SQ. FT.

LEGEND

EJ EXPANSION JOINT (SEE DETAIL)
HP HIGH POINT



SLAB PLAN
SCALE: 3/32"=1'-0"

SEE VERSIONS OF SUL-0159 FOR VECP DESIGNED BY CARUBBA ENGINEERING

APPENDIX

MARK	DESCRIPTION	DATE	BY
3	REVISION	7/19/17	RMC
A	FOR APPROVAL	8/23/16	

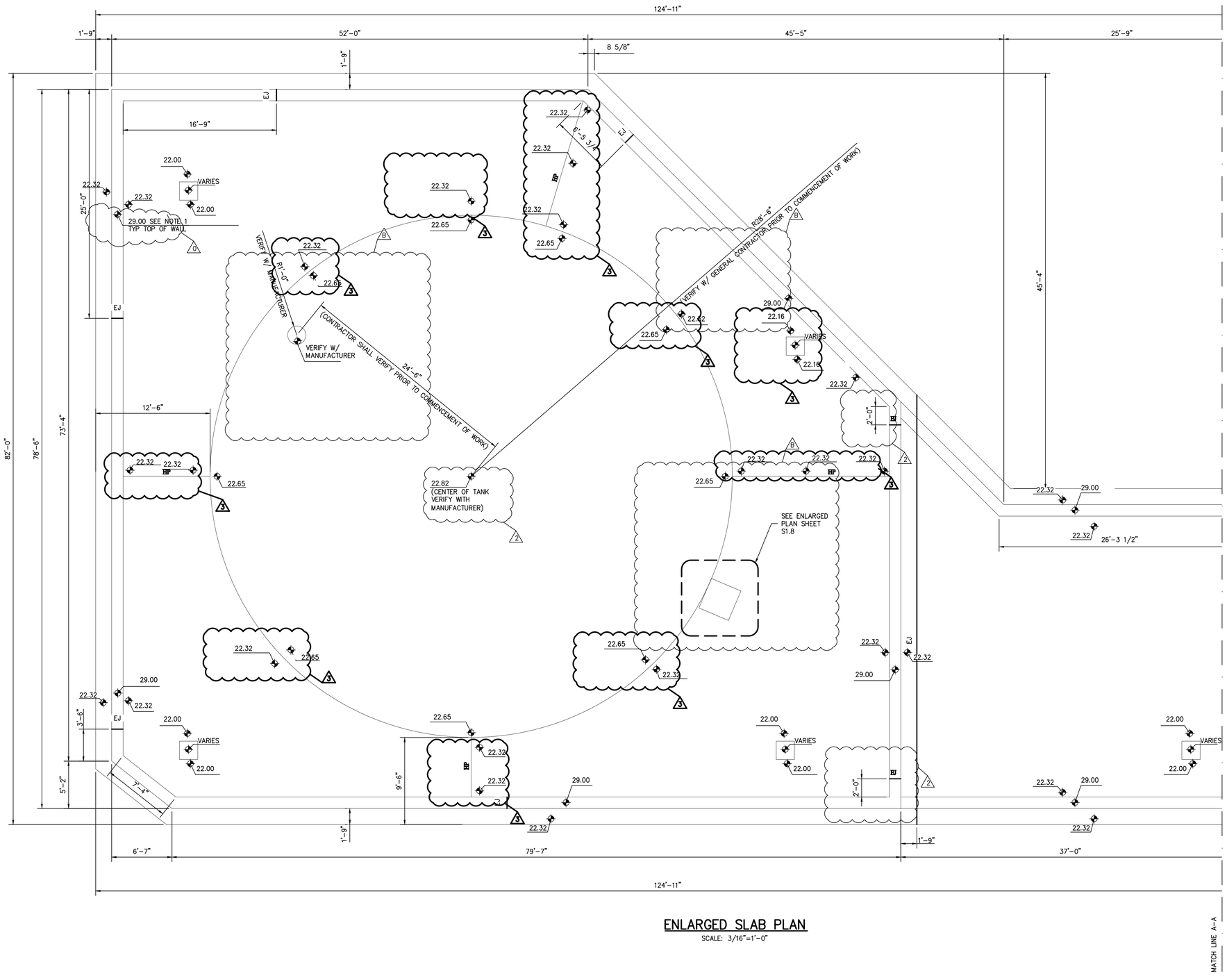
3400 Hessmer Avenue
Metairie,LA
70002
Phone:
504.888.1490
Fax:
504.888.1491
www.carubbaengineering.com

NEW ORLEANS LOUISIANA

RLH INVESTMENTS, LLC

SEWERAGE AND WATER BOARD OF NEW ORLEANS
HMGP NO. 1369 STORAGE TANK FOUNDATIONS
SLAB PLAN

DRAWN
MD
CHECKED
RMC
DATE
8/23/16
CEI PROJECT NO.
16-065
SHEET
S1.3



ENLARGED SLAB PLAN

SCALE: 3/16"=1'-0"

0

NOTES

1. TOP OF WALL ELEVATION BASED OFF SECTION B/SB-02 DWG NO. 12098-W8
2. SLOPE CONCRETE FROM RIDGES TO EDGES FOR POSITIVE FALL TO SUMPS

LEGEND

HP HIGH POINT
EJ EXPANSION JOINT (SEE DETAIL)

3

MARK	DESCRIPTION	DATE	BY
3	REVISION	7/19/17	
2	FOR CONSTRUCTION	07/05/2017	RMC
B	FOR APPROVAL	11/17/16	RMC
A	FOR APPROVAL	8/23/16	RMC

APPENDIX

SEE VERSIONS OF SUL-0159 FOR VECP DESIGNED BY CARUBBA ENGINEERING

3400 Hessmer Avenue
Metairie,LA
70002
Phone:
504.888.1490
FAX:
504.888.1491
www.carubbaengineering.com
LOUISIANA
NEW ORLEANS

RLH INVESTMENTS, LLC

SEWERAGE AND WATER BOARD OF NEW ORLEANS
HMGP NO. 1369 STORAGE TANK FOUNDATIONS
SLAB PLAN

DRAWN	MD
CHECKED	RMC
DATE	8/23/16
CEI PROJECT NO.	16-065
SHEET	S1.4

D:\Carubba\Standard Drawings\LOGOS\20thSeal Logo.tif

1.

NOTES

SLOPE CONCRETE FROM RIDGES TO EDGES FOR POSITIVE FALL TO SUMPS

LEGEND

HP HIGH POINT
EJ EXPANSION JOINT (SEE DETAIL) 3

MATCH LINE A–A

124'–11"
25'–9" 45'–5" 52'–0" 1'–9"
8 5/8"
1'–9"
18'–0"
25'–0"
17'–3"
9'–9"
82'–0"
28'–3"
26'–3"
20'–0" 15'–3" 44'–11" 3'–9" 1'–9" 39'–3" 1'–9"

22.32 29.00 HP EJ 22.65 22.16 VARIES 22.00 22.88 (CENTER OF TANK VERIFY WITH MANUFACTURER)

VERIFY W/ MANUFACTURER R1'–0" 45'–4"

(CONTRACTOR SHALL VERIFY PRIOR TO COMMENCEMENT OF WORK) 24'–6" R26'–6"

SEE ENLARGED PLAN SHEET S1.8 (OPP.)

MATCH LINE A–A

ENLARGED SLAB PLAN

SCALE: 3/16"=1'–0"

SEE VECP VERSIONS OF SUL–0159 FOR VECP DESIGNED BY CARUBBA ENGINEERING

APPENDIX

MARK	DESCRIPTION	DATE	BY
3	REVISION	7/19/17	RMC
2	FOR CONSTRUCTION	07/05/2017	RMC
B	FOR APPROVAL	11/17/16	RMC
A	FOR APPROVAL	8/23/16	RMC

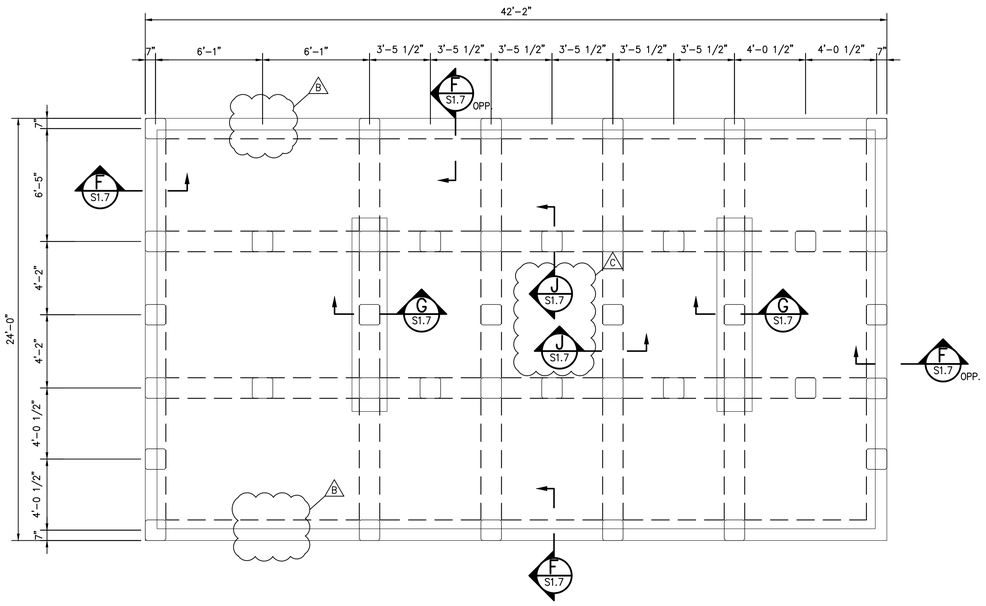
3400 Hessmer Avenue
Metairie,LA
70002
Phone:
504.888.1490
FAX:
504.888.1491
www.carubbaengineering.com

RLH INVESTMENTS, LLC
NEW ORLEANS LOUISIANA

SEWERAGE AND WATER BOARD OF NEW ORLEANS
HMGP NO. 1369 STORAGE TANK FOUNDATIONS
SLAB PLAN

DRAWN MD
CHECKED RMC
DATE 8/23/16
CEI PROJECT NO. 16–065
SHEET S1.5

D:\Carubba\Standard Drawings\LOGOS\20thSeal Logo.tif



FOUNDATION PLAN–DAY TANK

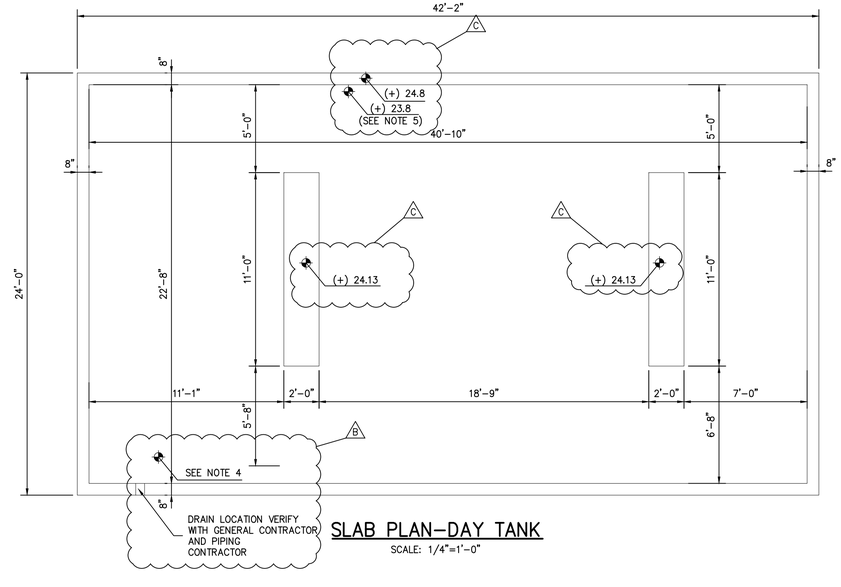
SCALE: 1/4"=1'-0"

NOTES

1. SLAB AREA = 1,012 SQ. FT.
2. 12" SLAB TYP. U.N.O.
3. REINFORCEMENT: #8'S @ 18" O.C. E.W. TOP AND BOTTOM

LEGEND

☐	EXISTING PRE–CAST CONCRETE PILES (BY OTHERS) (VERIFY LOCATION IN FIELD)
F.D.	FIELD DETERMINE
V.I.F.	VERIFY IN FIELD
V.W.A.	VERIFY WITH ARCHITECT



SLAB PLAN–DAY TANK

SCALE: 1/4"=1'-0"

NOTE:
4. SLOPE TO DRAIN PER PROJECT SPECIFICATIONS
5. VERIFY WITH PIPING CONTRACTOR

APPENDIX

SEE VERSIONS OF SUL–0159 FOR VECP DESIGNED BY CARUBBA ENGINEERING

D:\Carubba\Standard Drawings\LOGOS\20thSeal Logo.tif

MARK	DESCRIPTION	DATE	BY
C	FOR APPROVAL	11/21/2016	RMC
B	FOR APPROVAL	10/04/2016	RMC
A	FOR APPROVAL	8/23/16	RMC

3400 Hessmer Avenue
Metairie,LA
70002
Phone:
504.888.1490
FAX:
504.888.1491
www.carubbaengineering.com

RLH INVESTMENTS, LLC

SEWERAGE AND WATER BOARD OF NEW ORLEANS
HMGP NO. 1369 STORAGE TANK FOUNDATIONS
FOUNDATION PLAN DAY TANK

NEW ORLEANS LOUISIANA

DRAWN	MD
CHECKED	RMC
DATE	8/23/16
CEI PROJECT NO.	16–065
SHEET	S1.6

CWPGTG6-6-EMV60-SG-300

NEW 15kV SWGR VERTICAL SECTION

13.8kV, 3PH., 3W., 1200A, 60Hz, 25kAIC

02B — 04A — 04B

FU _A(3) 13.8kV / 120V — FU _A(3)

1200/5A C200 — IW1 — IW2

SEL-787-2 (50, 51, 51N, 87T)

86BF FROM GTG6 BKR (UNIT 03B)

86BF FROM PFC BKR (UNIT 01A)

125VDC CTRL PWR.

86DT — 86T CM

1200AF 52 TC

(NOTE 1) SEE DWG. 5134-P475 & P476

1200AF SEE DWG. 5134-P477 & P478

1200/5A MRCT C200

1200AF SEE DWG. 5134-P479 & P480

SEL751 (50, 51, 51N)

SPARE BKR

BUS DIFF.

50/5A

(3) 5°C., 3-1/C 750 kcmil 15kV SHLD w/ #1/0 GND (DB001.00 & DB002.00)

(3) 3-1/C 750 kcmil 15kV SHLD w/ #1/0 GND (DB001.00 & DB003.01)

ALARM TO PDCS (GAS MONITOR) — 74

ALARM TO PDCS (TEMP., PRESS., LEVEL) — 71, 63, 49, 26

TRIP TO PDCS (HI TEMP.) — 49, 26

TRIP TO PDCS (RAPID PRESS. RISE) — 63

CWPYRD-0-EMV60-XFMR-201A 15/20/25MVA KNAN/KNAF/KNAF 24/13.8kV x 4160V 6.75%Z

CWPYRD-0-EMV60-XFMR-201B 15/20/25MVA KNAN/KNAF/KNAF 24/13.8kV x 4160V 6.75%Z

3000/5A C200

LRG

400A 10 SEC

XFMR CTRL ENCL.

(3) #8 W/ G

480VAC FROM PANEL CWPYRD-0-ELV60-PP-201 CKT. 20,22,24

CKT. 26,28,30

12/C #14 (DB009.00) 3/C #10 (DB009.00)

12/C #14 (DB010.00) 3/C #10 (DB010.00)

(8) 5°C., 3 #1000kcmil 5kV SHLD, (PH. A,B,C, EA. DUCT, DB013.00)

(8) 5°C., 3 #1000kcmil 5kV SHLD, (PH. A,B,C, EA. DUCT, DB014.00)

12/C #14 (DB006.02, 006.00, 004.00) 3/C #10 w/GND (DB006.02, 006.00, 004.00)

SPD

IE(4) 4200V / 120V *201A-03A — FUH5 7A(2) — FUH7 3A(3) — FUH6 3A(3) — SEL-735

IE(4) 4200V / 120V *201B-02A

SEL-587Z — 86DA — 86DB

SEL751 (50N, 51, 25, 86)

N.C. 3000AF — N.O. 3000AF

125VDC CTRL PWR

*201A-04B — FUH11 3A(2) — *201B-01B

IE(4) 4200/120V BUS 'A' PT — FUH4 7A(2) — IE(4) 4200/120V BUS 'B' PT

*201A-03A — *201B-00B

IE(2) 4200V / 120V *201A-02A — FUH6 7A(2) — IE(2) 4200V / 120V *201A-04A

*201A-05B — *201A-01B — *201A-03B — *201A-01A — *201A-02B — *201A-02B — *201B-00B — *201B-02A — *201B-04B — *201B-03A — *201B-02B — *201B-03B — *-201B-05B

4.16kV, 3PH., 3W., 3000A, 60Hz

CO

MH2 — SPARE

(NOTE 2) MH2 — MH8 — CWPPH-0-PW-P-01A/60 POTABLE WATER PUMP VFD — 2250 Hp — CWPPH-0-PW-P-01A/60 POTABLE WATER PUMP

MH8 — CWPPH-0-PW-P-01B/60 POTABLE WATER PUMP VFD — 2250 Hp — CWPPH-0-PW-P-01B/60 POTABLE WATER PUMP

MH3 — (NOTE 2)

(4) 5°C., SPARE TO MH-2 (DB004.00)

3-1/C #750kcmil 5kV SHLD w/ #1/0 INSUL. GND (DB004.00, 006.00, 006.01)

3-1/C #750kcmil 5kV SHLD w/ #1/0 INSUL. GND (DB005.00, 007.00)

3-1/C #1000kcmil 5kV SHLD w/ #1/0 INSUL. GND (DB005.00, 007.00)

(3) 3-1/C #750kcmil 5kV SHLD w/ #1/0 INSUL. GND (DB005.00, 007.00, 008.00)

CWPPFC-0-EMV60-* (CARROLTON WATER PLANT PLANT FREQUENCY CHANGER BUILDING SWGR)

*SG-201A — 4.16kV, 3PH., 3W., 2000A, 60Hz — 107 — 52 1200AF (NOTE 1 & 3) SEE DWG. 5134-P472

DPS01-0-EMV60-* (DRAINAGE PUMP STATION No. 1 SWGR)

*SG-201B — 4.16kV, 3PH., 3W., 1200A, 60Hz — 52 1200AF

*SG-201A — 4.16kV, 3PH., 3W., 1200A, 60Hz — 103A — 52 1200AF

SSCFC-0-EMV60-* (SUBSTATION CARROLTON FREQUENCY CHANGER SWGR)

*SG-201B — 4.16kV, 3PH., 3W., 2000A, 60Hz — 213 — 52 1200AF

*SG-201A — 4.16kV, 3PH., 3W., 2000A, 60Hz — 206 — 52 1200AF

(NOTE 2) MH2 — 3-1/C #750kcmil 5kV SHLD w/ #1/0 INSUL. GND (DB004.00, 006.00, 006.01)

RSOS-0-EMV60-* (RIVER SUBSTATION OAK STREET SWGR)

*SG-201B — 4.16kV, 3PH., 3W., 2000A, 60Hz — 52 1200AF

MH3 — SPARE — (4) 5°C., SPARE TO MH-3 (DB005.00)

CWPYRD-0-EMV60-SG-201A (ARC RES. METAL CLAD SWGR)

CWPYRD-0-EMV60-SG-201B (ARC RES. METAL CLAD SWGR)

SSCLA-EMV60-* (CLAIBORNE SUBSTATION SWGR) *SG-201

4.16kV, 3PH., 3W., 2000A, 60Hz

09 — 52 1200AF (NOTE 1) — MAIN BKR FROM PFC SEE DWG. 5134-P488

10 — 52 1200AF (NOTE 1) — MAIN BKR FROM UTIL. SEE DWG. 5134-P490

CO

SSSYC-EMV60-* (SYCAMORE SUBSTATION SWGR) *SG-201

4.16kV, 3PH., 3W., 2000A, 60Hz

04 — 52 1200AF (NOTE 1) — MAIN BKR FROM UTIL. SEE DWG. 5134-P512

09 — 52 1200AF (NOTE 1) — MAIN BKR FROM PFC SEE DWG. 5134-P510

CO

SSHAM-EMV60-* (HAMILTON SUBSTATION SWGR) *SG-201A *SG-201B

4.16kV, 3PH., 3W., 2000A, 60Hz

05 — 52 1200AF (NOTE 1) — MAIN BKR FROM PFC SEE DWG. 5134-P499

52 — 14 — 52 1200AF (NOTE 1) — MAIN BKR FROM UTIL SEE DWG. 5134-P501

CO

NOTES:

1) WHERE IDENTIFIED, EXISTING BREAKERS IN MEDIUM VOLTAGE SWITCHGEAR SHALL BE "MODERNIZED" PER THIS CONTRACT. MODERNIZATION OF BREAKERS SHALL INCLUDE, BUT NOT BE LIMITED TO, A NEW SWITCHGEAR BAY DOOR, WITH NEW PROTECTIVE RELAYING, CONTROL & INDICATION DEVICES, INTERCONNECTING WIRING WITH NEW POWER DISTRIBUTION CONTROL SYSTEM (PDCS), AND REPLACE ALL IN-CUBICLE WIRING. EXISTING BREAKERS, RACKING MECHANISM, AND INTERFACE HARDWARE SHALL REMAIN AS-IS. SEE BREAKER CONTROL SCHEMATIC FOR MODERNIZATION OF CONTROL WIRING AND DEVICES (REFERENCED THIS DRAWING AND ON ONE-LINE DIAGRAM DRAWINGS: 5134-P401, 5134-P402, AND 5134-P403).

2) ITEMS CLOUDED THIS DRAWING ARE WITHIN THE SCOPE OF WORK FOR CONTRACT CP-1370A, EXCEPT AS NOTED IN LEGEND THIS DRAWING, PORTIONS OF OUTGOING FEEDERS SHALL BE PROVIDED UNDER SEPARATE CONTRACTS.

3) YARD SWGR FEEDER BREAKER CWPYRD-0-EMV60-SG-201A-02B FEEDS CWPPFC-0-EMV60-SG-201A-107 LOCATED IN THE PLANT FREQUENCY CHANGER BUILDING. THE EXISTING BREAKER IS IN SERVICE AND WILL REQUIRE COORDINATION WITH OWNER TO FACILITATE RE-FEED TIE-IN TO NEW YARD SWITCHGEAR.

LEGEND:

25	SYNCHRONISM CHECK	SCTB	SHORT CIRCUIT TERMINAL BLOCK
50	INSTANTANEOUS OVERCURRENT	52	DRAW-OUT VACUUM-BREAK BKR
50N	NEUTRAL INSTANTANEOUS OVERCURRENT	86CM	LOCK-OUT RELAY COIL MONITOR
51	AC TIME OVERCURRENT	TCM	TRIP COIL MONITOR
51N	NEUTRAL TIME OVERCURRENT	52CS	CIRCUIT BREAKER CLOSE CIRCUIT
		43LR	MANUAL TRIP LOCK-OUT RELAY
86*	86 - 86LOR (LOCK OUT RELAY) 86DT - 86LOR (ENERGIZED BY XFMR DIFF. PROTECTIVE RELAY OUTPUT) 86DA - 86LOR (ENERGIZED BY SWGR BUS 'A' DIFF., PROT. RELAY OUTPUT) 86DB - 86LOR (ENERGIZED BY SWGR BUS 'B' DIFF., PROT. RELAY OUTPUT)	A	INDICATING LIGHT, AMBER
		B	INDICATING LIGHT, BLUE
87A	BUS DIFFERENTIAL, PHASE A	G	INDICATING LIGHT, GREEN
87B	BUS DIFFERENTIAL, PHASE B	R	INDICATING LIGHT, RED
87C	BUS DIFFERENTIAL, PHASE C		5kV CABLE
			CONTROL CABLE
			5kV FEEDER INSTALLED UNDER SEPARATE CONTRACT
		MH_	PULL BOX/ MANHOLE

4.16kV YARD SWGR CELL TAG NOMENCLATURE:

* 201A-04A

PLACEHOLDER WHERE * = CWPYRD-0EMV60-SG-

201 = SWGR SEQ. No.

ROW 'A' = TOP
ROW 'B' = BTM
COLUMN
'A' = WEST BUS (FACING SWGR OPER. MECHANISM)
'B' = EAST BUS (FACING SWGR OPER. MECHANISM)

STATE OF LOUISIANA
3/8/21
SIDNEY A. GAUDET IV
License No. 36308
PROFESSIONAL ENGINEER IN ELECTRICAL ENGINEERING

ISSUED FOR CONSTRUCTION
03/08/2021

REV	DATE	DESCRIPTION	BY
CO	03/08/21	ISSUED FOR CONSTRUCTION	MJZ
A0	11/10/20	ISSUED FOR APPROVAL	JET

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. CP-1370A

60 HZ TRANSFORMER / SWITCHGEAR
HAZARD MITIGATION GRANT PROGRAM (HMGP)
MAIN WATER PURIFICATION PLANT POWER COMPLEX

CWPYRD0EMV60SG201A/201B SWITCHGEAR
PROJECT OVERALL ONE LINE DIAGRAM
4160V, 3PH, 3000A, 60HZ, MEDIUM VOLTAGE SWGR

MSB FILE NAME: 5134-P400_E-386.DWG

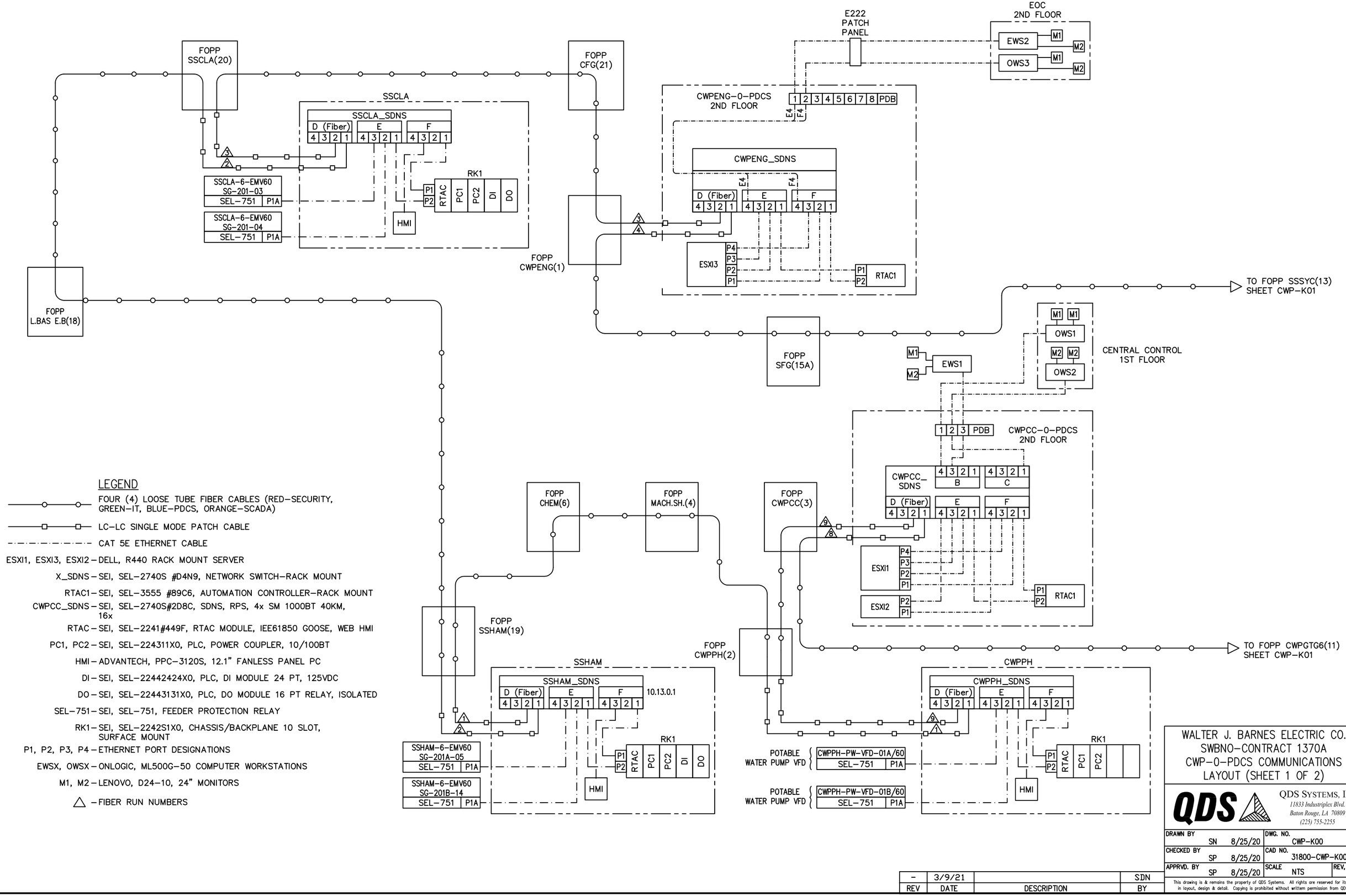
M S BENBOW & ASSOCIATES
CONSULTING ENGINEERS
Louisiana Registered Engineering Firm No. 868

DR:	J. THOMPSON
CK:	—
AP:	S. GAUDET
LAST EDIT:	02/23/2021
SCALE:	NONE
DATE:	10/23/2020

E-386

DWG. No. 5134-P400

SET NO: — SHEET NO: OF



LEGEND

- FOUR (4) LOOSE TUBE FIBER CABLES (RED–SECURITY, GREEN–IT, BLUE–PDCS, ORANGE–SCADA)
- LC–LC SINGLE MODE PATCH CABLE
- CAT 5E ETHERNET CABLE

ESXI1, ESXI3, ESXI2 – DELL, R440 RACK MOUNT SERVER

X_SDNS – SEI, SEL–2740S #D4N9, NETWORK SWITCH–RACK MOUNT

RTAC1 – SEI, SEL–3555 #89C6, AUTOMATION CONTROLLER–RACK MOUNT

CWPCC_SDNS – SEI, SEL–2740S#2D8C, SDNS, RPS, 4x SM 1000BT 40KM, 16x

RTAC – SEI, SEL–2241#449F, RTAC MODULE, IEE61850 GOOSE, WEB HMI

PC1, PC2 – SEI, SEL–224311X0, PLC, POWER COUPLER, 10/100BT

HMI – ADVANTECH, PPC–3120S, 12.1" FANLESS PANEL PC

DI – SEI, SEL–22442424X0, PLC, DI MODULE 24 PT, 125VDC

DO – SEI, SEL–22443131X0, PLC, DO MODULE 16 PT RELAY, ISOLATED

SEL–751 – SEI, SEL–751, FEEDER PROTECTION RELAY

RK1 – SEI, SEL–2242S1X0, CHASSIS/BACKPLANE 10 SLOT, SURFACE MOUNT

P1, P2, P3, P4 – ETHERNET PORT DESIGNATIONS

EWSX, OWSX – ONLOGIC, ML500G–50 COMPUTER WORKSTATIONS

M1, M2 – LENOVO, D24–10, 24" MONITORS

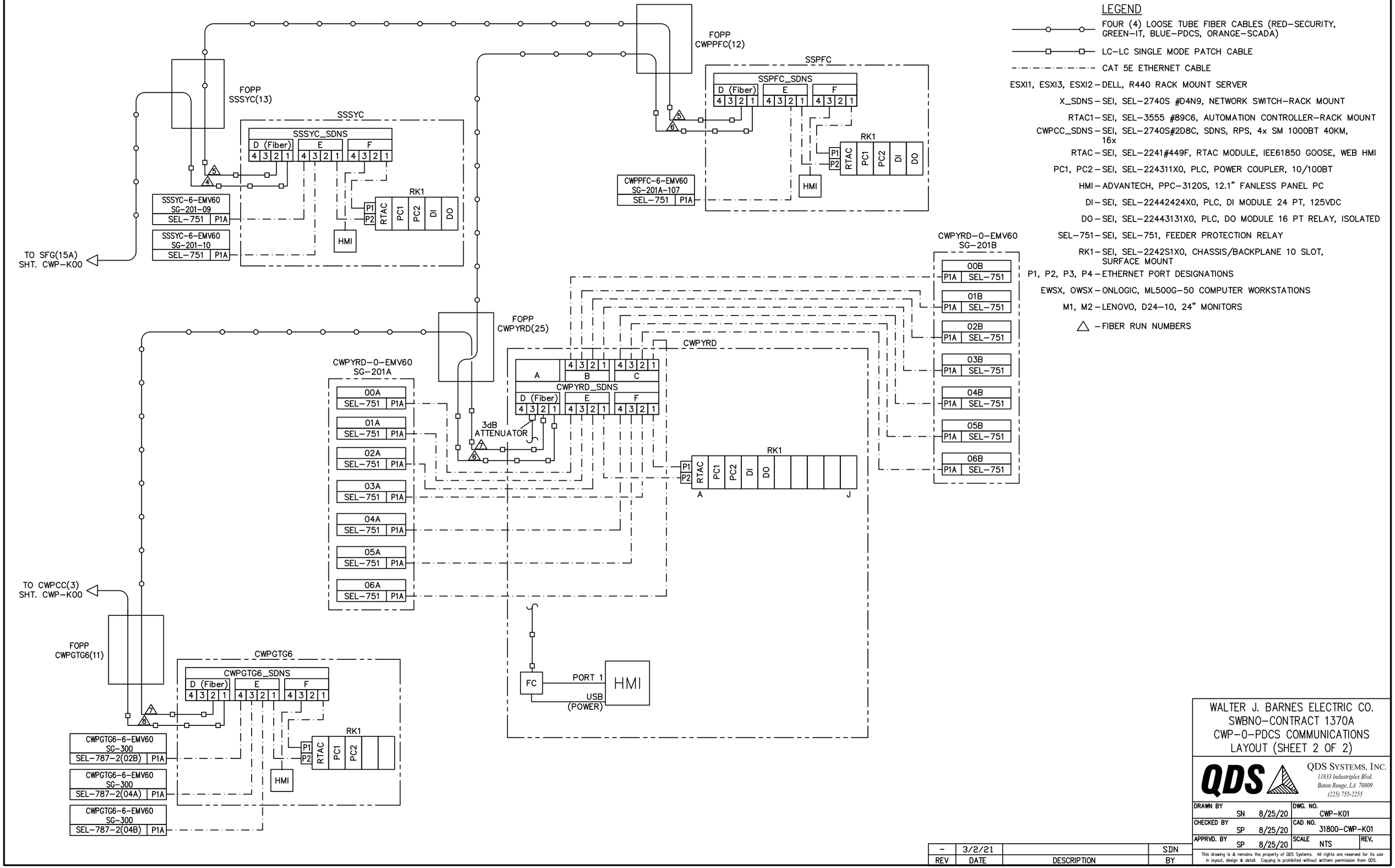
△ – FIBER RUN NUMBERS

REV	DATE	DESCRIPTION	BY
–	3/9/21		SDN

WALTER J. BARNES ELECTRIC CO.
SWBNO–CONTRACT 1370A
CWP–0–PDCS COMMUNICATIONS LAYOUT (SHEET 1 OF 2)

QDS SYSTEMS, INC.
11833 Industriplex Blvd.
Baton Rouge, LA 70809
(225) 755-2255

DRAWN BY	SN 8/25/20	DWG. NO.	CWP–K00
CHECKED BY	SP 8/25/20	CAD NO.	31800–CWP–K00
APPRVD. BY	SP 8/25/20	SCALE	NTS
		REV.	



LEGEND

- FOUR (4) LOOSE TUBE FIBER CABLES (RED–SECURITY, GREEN–IT, BLUE–PDCS, ORANGE–SCADA)
- LC–LC SINGLE MODE PATCH CABLE
- CAT 5E ETHERNET CABLE

ESXI1, ESXI3, ESXI2 – DELL, R440 RACK MOUNT SERVER

X_SDNS – SEI, SEL–2740S #D4N9, NETWORK SWITCH–RACK MOUNT

RTAC1 – SEI, SEL–3555 #89C6, AUTOMATION CONTROLLER–RACK MOUNT

CWPCC_SDNS – SEI, SEL–2740S#2D8C, SDNS, RPS, 4x SM 1000BT 40KM, 16x

RTAC – SEI, SEL–2241#449F, RTAC MODULE, IEE61850 GOOSE, WEB HMI

PC1, PC2 – SEI, SEL–224311X0, PLC, POWER COUPLER, 10/100BT

HMI – ADVANTECH, PPC–3120S, 12.1" FANLESS PANEL PC

DI – SEI, SEL–22442424X0, PLC, DI MODULE 24 PT, 125VDC

DO – SEI, SEL–22443131X0, PLC, DO MODULE 16 PT RELAY, ISOLATED

SEL–751 – SEI, SEL–751, FEEDER PROTECTION RELAY

RK1 – SEI, SEL–2242S1X0, CHASSIS/BACKPLANE 10 SLOT, SURFACE MOUNT

P1, P2, P3, P4 – ETHERNET PORT DESIGNATIONS

EWSX, OWSX – ONLOGIC, ML500G–50 COMPUTER WORKSTATIONS

M1, M2 – LENOVO, D24–10, 24" MONITORS

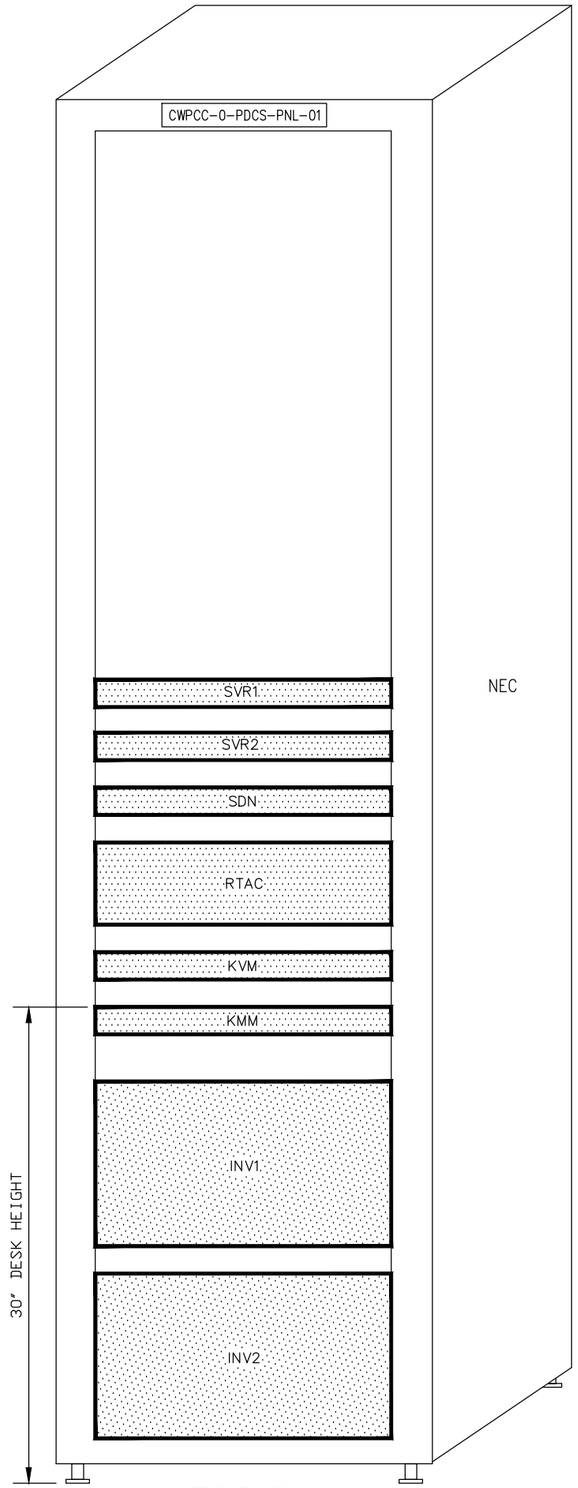
△ – FIBER RUN NUMBERS

REV	DATE	DESCRIPTION	BY
–	3/2/21		SDN

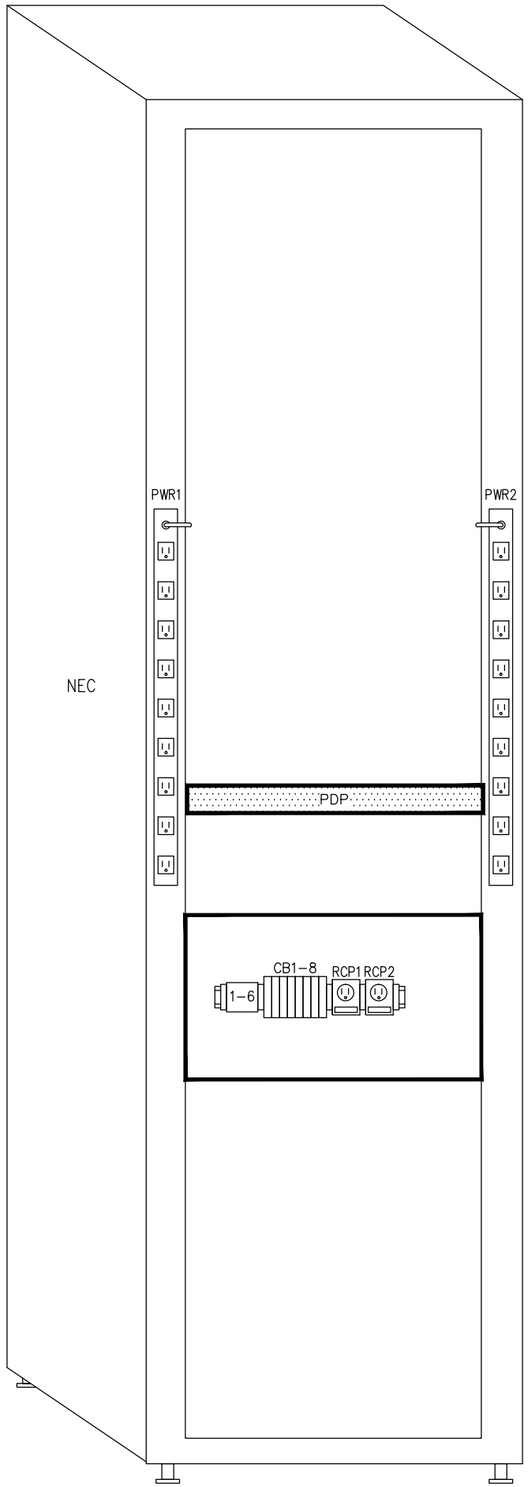
WALTER J. BARNES ELECTRIC CO.
SWBNO–CONTRACT 1370A
CWP–0–PDCS COMMUNICATIONS
LAYOUT (SHEET 2 OF 2)

QDS SYSTEMS, INC.
11833 Industriplex Blvd.
Baton Rouge, LA 70809
(225) 755-2255

DRAWN BY	SN 8/25/20	DWG. NO.	CWP–K01
CHECKED BY	SP 8/25/20	CAD NO.	31800–CWP–K01
APPRVD. BY	SP 8/25/20	SCALE	NTS
		REV.	



FRONT VIEW



REAR VIEW

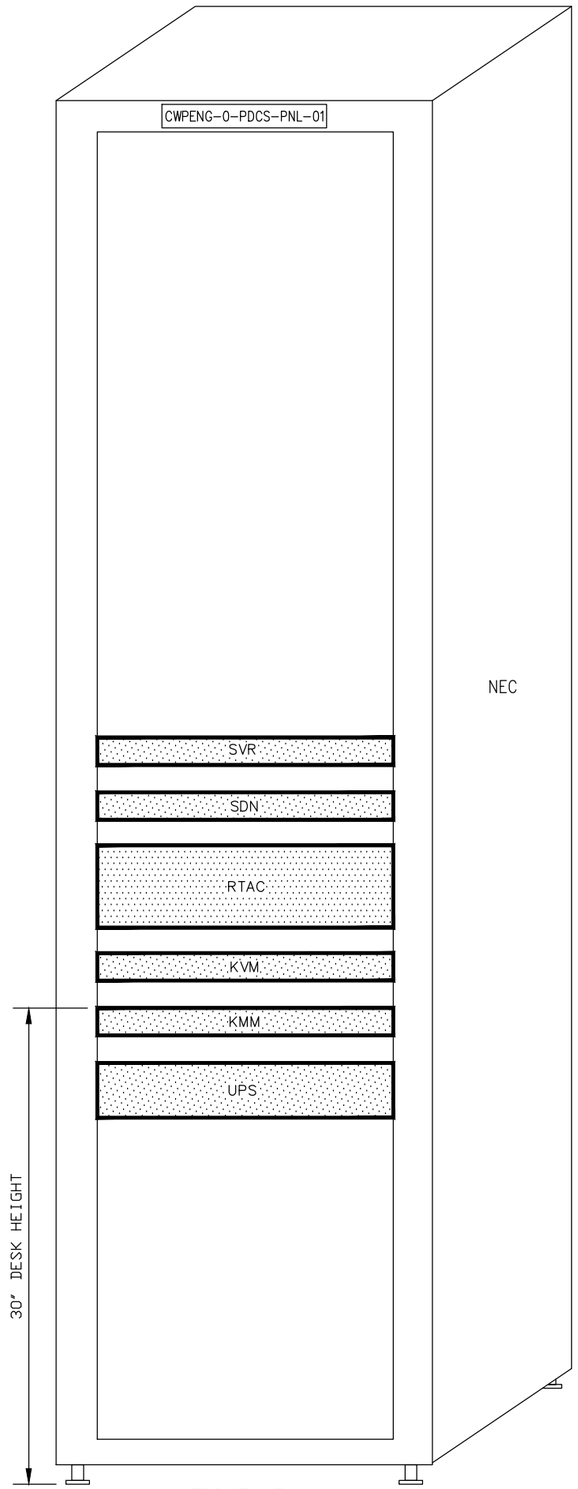
BILL OF MATERIAL				
ID	QTY	MANUFACTURER	PART NO.	DESCRIPTION
NEC	1	EXM	Q600-60-0015	87H x 24W x 40D NETWORK CABINET
NEC	1	EXM	886 PHD-K	MTRX PULL HANDLE KIT
NEC	1	EXM	6500 MXMR0619X	MTRX 19" RACK PANEL
SDN	1	SEL	SEL-2740S #D4N9	SOFTWARE DEFINED NETWORK SWITCH W/2 125VAC/VDC POWER SUPPLIES, 4 SM40KLC, 8 100/10 BT
RTAC	1	SEL	SEL-3555 #89C6	REAL TIME AUTOMATION CONTROLLER, ETH IP, (2) 125VAC/VDC POWER SUPPLIES, 61850 GOOSE
SVR1	1	DELL	R440	SERVER
SVR2	1	DELL	R440	SERVER
	2	VMWARE	VSPHERE 7.0	SERVER VIRTUALIZATION SOFTWARE
	1	MICROSOFT	SERVER 2016	OS AS NEEDED FOR APPLICATIONS
	1	MICROSOFT	SERVER 2019	OS AS NEEDED FOR APPLICATIONS
KMM	1	DELL	FPM185	RACKMOUNT LED CONSOLE
KVM	1	TRIPPLITE	B042-008	RACKMOUNT 8 PORT KVM SWITCH
INV1	1	NOVA ELEC	NGL-3.5K60-120-120	DC-AC INVERTER W/RACK MOUNT KIT
INV2	1	NOVA ELEC	NGL-3.5K60-120-120	DC-AC INVERTER W/RACK MOUNT KIT
CB1	1	EATON	FAZ-C15/2-NA-DC	15A 125VDC CIRCUIT BREAKER-2 POLE
CB2	1	EATON	FAZ-C15/2-NA-DC	15A 125VDC CIRCUIT BREAKER-2 POLE
CB3	1	EATON	FAZ-C3/1-NA-DC-SP	3A 125VDC CIRCUIT BREAKER
CB4	1	EATON	FAZ-C3/1-NA-DC-SP	3A 125VDC CIRCUIT BREAKER
CB5	1	EATON	FAZ-C2/1-NA-DC-SP	2A 125VDC CIRCUIT BREAKER
CB6	1	EATON	FAZ-C2/1-NA-DC-SP	2A 125VDC CIRCUIT BREAKER
CB7	1	EATON	FAZ-C10/1-NA-DC-SP	10A 125VDC CIRCUIT BREAKER
CB8	1	EATON	FAZ-C10/1-NA-DC-SP	10A 125VDC CIRCUIT BREAKER
PDP	1	TRIPPLITE	N252-024	24 PORT PUNCH DOWN PATCH PANEL
RCPx	2	WAGO	51015188	15A, 120VAC RECEPTACLE
PWRx	2	TRIPPLITE	PS2408	8 OUTLET POWER STRIP
	3	TRIPPLITE	P780-006	KVM CABLE VGA/USB

REV	DATE	DESCRIPTION	BY
A	11/6/20	RE-SUBMITTAL	sdn

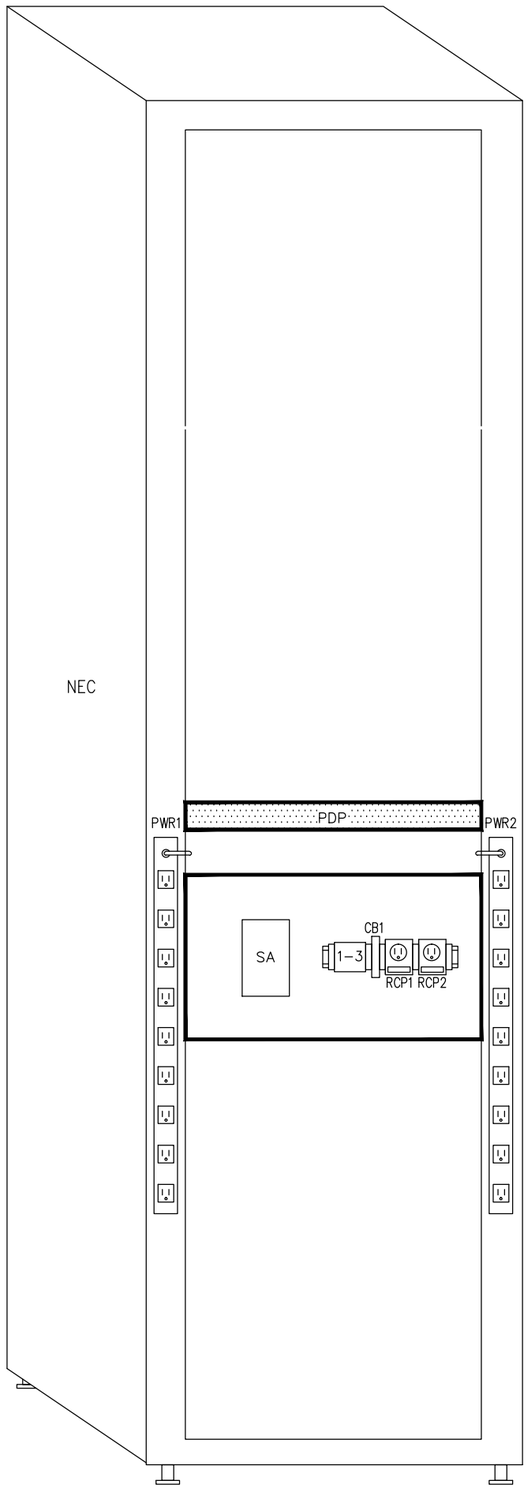
WALTER J. BARNES ELECTRIC CO.
SWBNO – CONTRACT 1370A
CWPCC NETWORK ENCLOSURE
EQUIPMENT LAYOUT

QDS SYSTEMS, INC.
11833 Industriplex Blvd.
Baton Rouge, LA 70809
(225) 755-2255

DRAWN BY	SN 8/07/20	DWG. NO.	CC-E0
CHECKED BY	SP 8/07/20	CAD NO.	31800-CC-E0
APPRVD. BY	SP 8/07/20	SCALE	1/10



FRONT VIEW



REAR VIEW

BILL OF MATERIAL				
ID	QTY	MANUFACTURER	PART NO.	DESCRIPTION
NEC	1	EXM	Q600-60-0015	87H x 24W x 40D NETWORK CABINET
NEC	2	EXM	886-PHD-K	MTRX PULL HANDLE KIT
NEC	1	EXM	6500 MXMR0619X	MTRX 19" RACK PANEL
SDN	1	SEL	SEL-2740S #D4N9	SOFTWARE DEFINED NETWORK SWITCH WITH (2) 125VAC/VDC POWER SUPPLIES, 4 SM40K LC, 8 100/10BT
SA	1	ASCO/EDCO	HSP121BT-1RU	120VAC SURGE ARRESTER
SVR	1	DELL	R440	SERVER
	1	VMWARE	VSPHERE 7.0	SERVER VIRTUALIZATION SOFTWARE
	2	VMWARE	VM WORKSTATION	VM LICENSES FOR EWS & OWS
		MICROSOFT	SERVER 2016	OS AS NEEDED FOR APPLICATIONS
		MICROSOFT	SERVER 2019	OS AS NEEDED FOR APPLICATIONS
KMM	1	DELL	FPM185	RACKMOUNT LED CONSOLE
KVM	1	TRIPPLITE	B042-008	RACKMOUNT 8 PORT KVM SWITCH
CB1	1	EATON	FAZ-C10-1-NA-SP	10A, 120VAC CIRCUIT BREAKER
PDP	1	TRIPPLITE	N252-024	24 PORT PUNCH DOWN PATCH PANEL
PWRx	2	TRIPPLITE	PS2408	8 OUTLET POWER STRIP
RCP	2	WAGO	51015188	15A, 120VAC RECEPTACLE
UPS	1	MINUTEMAN	PRO1500RT2U	RACK MOUNT UPS, 1500VA
	3	TRIPPLITE	P780-006	KVM CABLE VGA/USB
RTAC	1	SEL	SEL-3555 #89C6	REAL TIME AUTOMATION CONTROLLER, ETH IP, (2) 125VAC/VDC POWER SUPPLIES, 61850 GOOSE

REV	DATE	DESCRIPTION	BY
A	11/6/20	RE-SUBMITTALS	sdn

WALTER J. BARNES ELECTRIC CO.
SWBNO - CONTRACT 1370A
CWPENG NETWORK ENCLOSURE
EQUIPMENT LAYOUT

QDS SYSTEMS, INC.
11833 Industriplex Blvd.
Baton Rouge, LA 70809
(225) 755-2255

DRAWN BY	SN 8/07/20	DWG. NO.	ENG-E0
CHECKED BY	SP 8/07/20	CAD NO.	31800-ENG-E0
APPRVD. BY	SP 8/07/20	SCALE	1/10

LIQUID FILLED TRANSFORMER

SL# 45015MA057-D457A 3 PHASE 60 Hz CLASS: KNAN/KNAF/KNAF
HV : 24000 x 13800 150 KV BIL LIQUID: ENVIROTEMP FR3
LV : 4160 Y/2402 60 KV BIL
KVA: 15000/20000/25000 AT 65°C RISE MONTH/YEAR OF MANUFACTURE: 04/2021
IMPEDANCE: 6.52 % AT 15000 kVA BETWEEN 4.16-13.8kV; 6.50 % AT 15000 kVA BETWEEN 4.16-24kV
HV WINDING MATERIAL : COPPER LV WINDING MATERIAL: COPPER
CONTAINS NO DETECTABLE LEVEL OF PCB (< 1 PPM) AT THE TIME OF MANUFACTURE

APPROXIMATE WEIGHTS LBS

CORE & COILS	32460
TANK & FITTINGS	31410
TANK FR3 OIL 3452 GALS	26480
APPROX TOTAL WT	94600
UNTANKING MASS	36710

MAX. OPERATING PRESS. 9 PSI POS., 7 PSI NEG.
TANK DESIGNED FOR 15 PSI VACUUM
25°C OIL LEVEL TO TOP FLG. OF MANHOLE, 16.38 IN .
LIQ. LEVEL CHGS. 0.85 IN PER 10°C CHG. IN LIQ. TEMP.

REFER TO INSTRUCTION MANUAL LF-4 BEFORE ENERGIZATION.

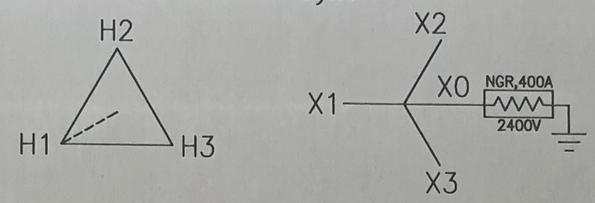
* SWITCH POSITION -1

13.8 KV HIGH VOLTAGE SWITCH CONNECTION	VOLTS	AMPS AT 25000 KVA	DETC POS.	DETC CONNECTION
12A-14A & 13A-15A 12B-14B & 13B-15B 12C-14C & 13C-15C	14490	996	1	T4-T3 & B4-B3
	14145	1020	2	T3-T5 & B3-B5
	13800	1046	3	T5-T2 & B5-B2
	13455	1073	4	T2-T6 & B2-B6
	13110	1101	5	T6-T1 & B6-B1
LOW VOLTAGE	4160	3470		

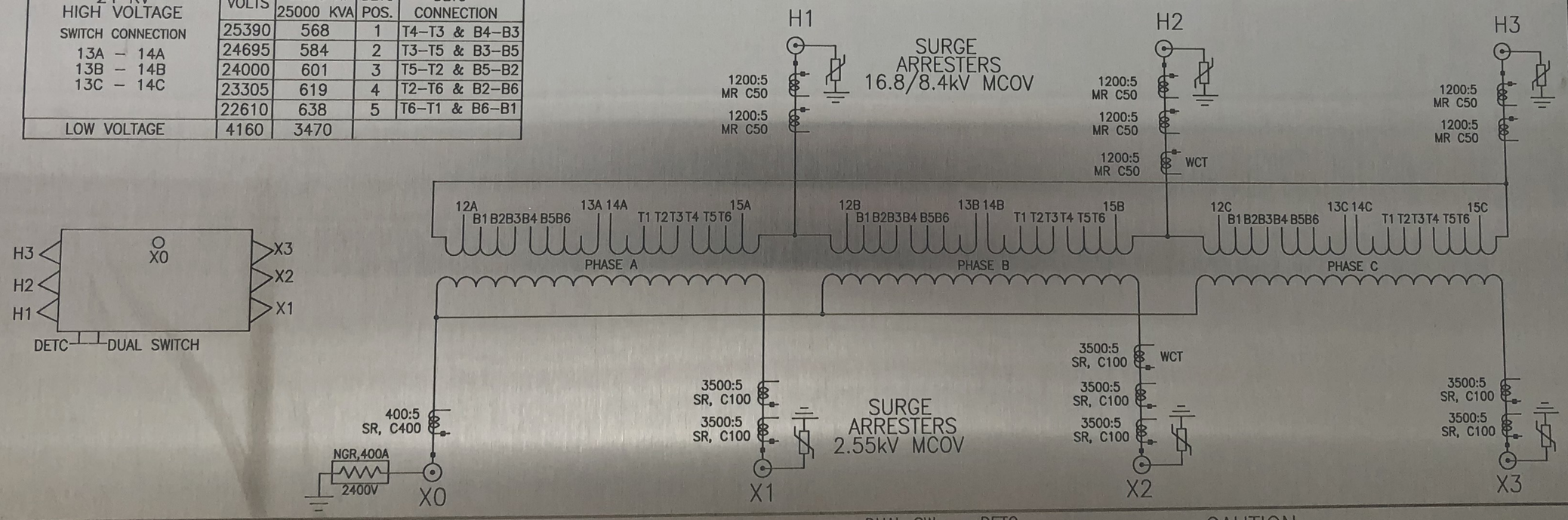
* SWITCH POSITION -2

24 KV HIGH VOLTAGE SWITCH CONNECTION	VOLTS	AMPS AT 25000 KVA	DETC POS.	DETC CONNECTION
13A - 14A 13B - 14B 13C - 14C	25390	568	1	T4-T3 & B4-B3
	24695	584	2	T3-T5 & B3-B5
	24000	601	3	T5-T2 & B5-B2
	23305	619	4	T2-T6 & B2-B6
	22610	638	5	T6-T1 & B6-B1
LOW VOLTAGE	4160	3470		

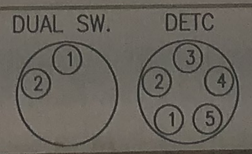
VECTOR: Dyn1



ENVIROTEMP WARNING
DO NOT OPERATE TAP CHANGER FOR LIQUID TEMPERATURES -10°C OR BELOW.
FOLLOW IEEE INSTRUCTIONS FOR ENERGIZATION UNDER COLD CONDITIONS.

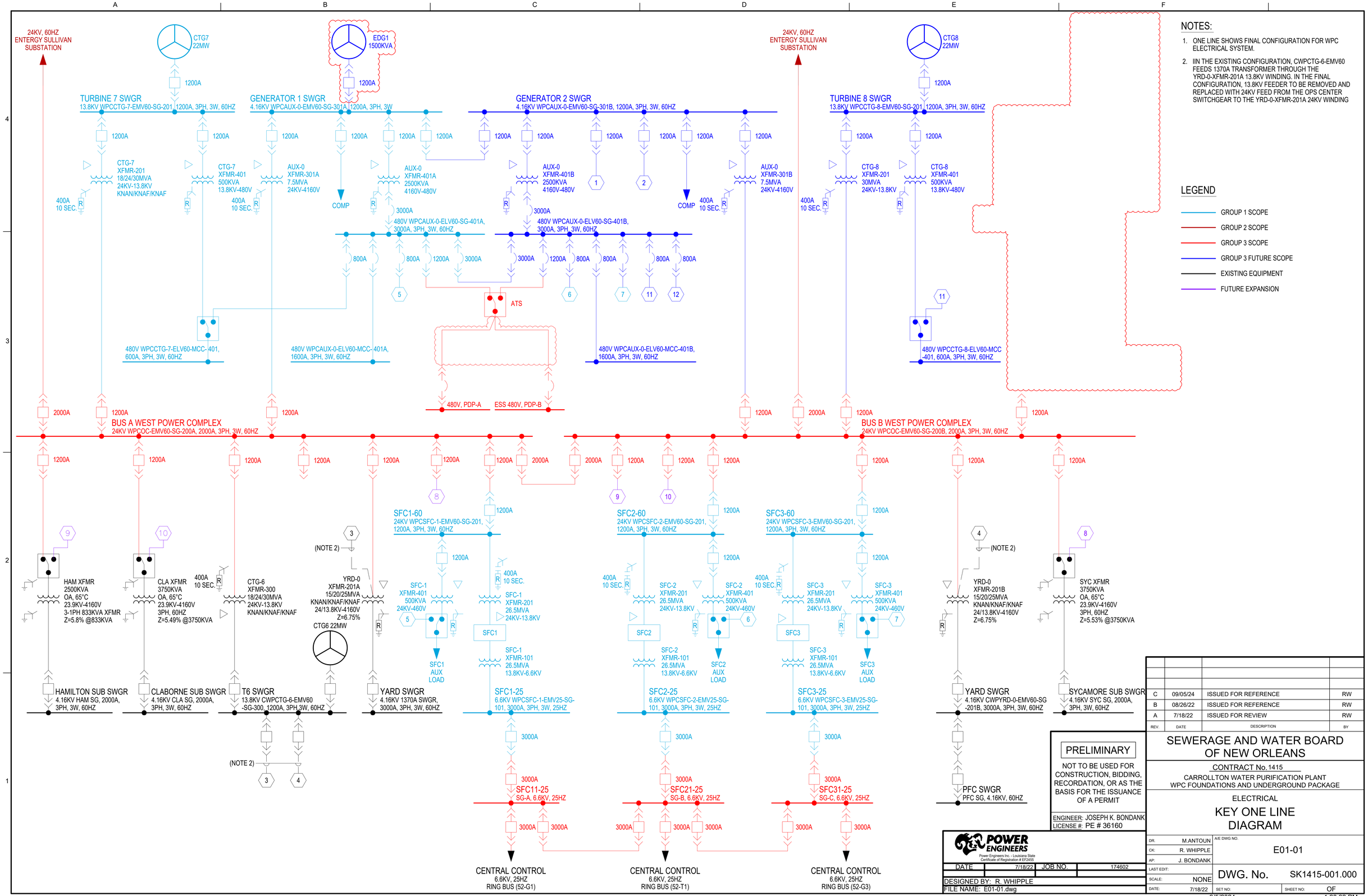


VIRGINIA TRANSFORMER CORP.
ROANOKE, VA.



CAUTION
OPERATE MANUAL TAP CHANGER & HV DUAL SWITCH ONLY WHEN TRANSFORMER IS DE-ENERGIZED.

CONTROL



NOTES:

1. ONE LINE SHOWS FINAL CONFIGURATION FOR WPC ELECTRICAL SYSTEM.
2. IIN THE EXISTING CONFIGURATION, CWPCTG-6-EMV60 FEEDS 1370A TRANSFORMER THROUGH THE YRD-0-XFMR-201A 13.8KV WINDING. IN THE FINAL CONFIGURATION, 13.8KV FEEDER TO BE REMOVED AND REPLACED WITH 24KV FEED FROM THE OPS CENTER SWITCHGEAR TO THE YRD-0-XFMR-201A 24KV WINDING

LEGEND

- GROUP 1 SCOPE
- GROUP 2 SCOPE
- GROUP 3 SCOPE
- GROUP 3 FUTURE SCOPE
- EXISTING EQUIPMENT
- FUTURE EXPANSION

REV.	DATE	DESCRIPTION	BY
C	09/05/24	ISSUED FOR REFERENCE	RW
B	08/26/22	ISSUED FOR REFERENCE	RW
A	7/18/22	ISSUED FOR REVIEW	RW

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION, BIDDING, RECORDATION, OR AS THE BASIS FOR THE ISSUANCE OF A PERMIT

ENGINEER: JOSEPH K. BONDANK
LICENSE #: PE # 36160

POWER ENGINEERS
Power Engineers Inc. - Louisiana State Certificate of Registration # EF2455

DATE	7/18/22	JOB NO.	174602

DESIGNED BY: R. WHIPPLE
FILE NAME: E01-01.dwg

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1415

CARROLLTON WATER PURIFICATION PLANT
WPC FOUNDATIONS AND UNDERGROUND PACKAGE

ELECTRICAL

KEY ONE LINE DIAGRAM

DR.	M.ANTOUN
CK:	R. WHIPPLE
AP:	J. BONDANK
LAST EDIT:	
SCALE:	NONE
DATE:	7/18/22

A/E DWG NO. E01-01

DWG. No. SK1415-001.000

SET NO: OF SHEET NO:

9/5/2024 1:28:32 PM

ISSUED FOR REVIEW - NOT FOR CONSTRUCTION

SIEMENS
Ingenuity for life

End customer	SEWERAGE & WATER BOARD OF NEW ORLEANS
Higher-level function	STATIC FREQUENCY CONVERTER
Plant part	SINAMICS SH150

Type	SINAMICS SH150 FREQUENZUMRICHTER / AC DRIVE
Artikelnummer (MLFB)	A5E51274298 A06+C41+C55+C68+G24+G28+G47+K90+L45+L50+L66+M08+M54+M61+T94+V23
	SAP: 56OP-00617
	A5E51274298B REV AC
	5/18/2022
Number of pages	22

APPROVED _____ X
APPROVED AS NOTED _____ ☐
REVISE AND RESUBMIT _____ ☐
REJECTED _____ ☐
NOT SUBJECT TO REVIEW _____ ☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/28/2022
JACOBS Date

A5E51274298B

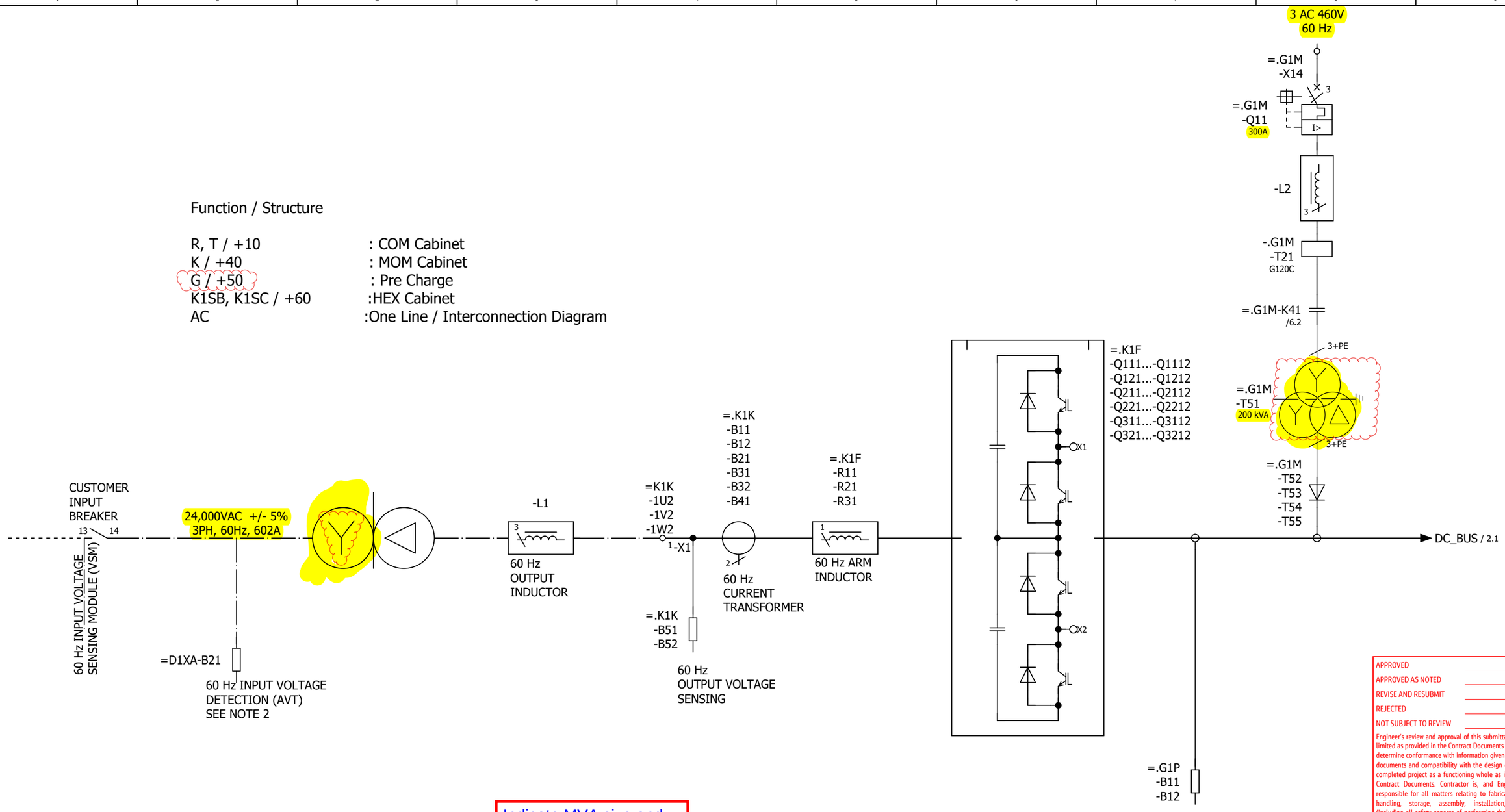
&EFA/1

			Date	5/10/2022	SH150 A/C SCHEMATICS	SIEMENS AG	Cover sheet	Referenz =
			Ed	MARSDX				Stichwort +
			Appr			LDA PLM R&D-D-US 2		A5E51274298B REV AC — Page 1
Modification	Date	Name	Original		Replacement of / Replaced by	NKN		Page 1 / 22

0	1	2	3	4	5	6	7	8	9

Function / Structure

R, T / +10 : COM Cabinet
K / +40 : MOM Cabinet
G / +50 : Pre Charge
K1SB, K1SC / +60 :HEX Cabinet
AC :One Line / Interconnection Diagram



Indicate MVA size and respective voltage. (TYP)

60 Hz, Input Transformer

60Hz CONVERTER

60 Hz DC-link voltage detection

Pre-charging

APPROVED						
APPROVED AS NOTED						X
REVISE AND RESUBMIT						
REJECTED						
NOT SUBJECT TO REVIEW						

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/28/2022
JACOBS Date

NOTES:
1. DASHED LINES ----- CUSTOMER CONNECTIONS
2. MAXIMUM CABLE LENGTH FROM AVT TO CONTROL CABINET IS 30 METERS.
3. DASHED LINES -.-.-.-CONTRACTOR CONNECTIONS.

2

&EAA/1

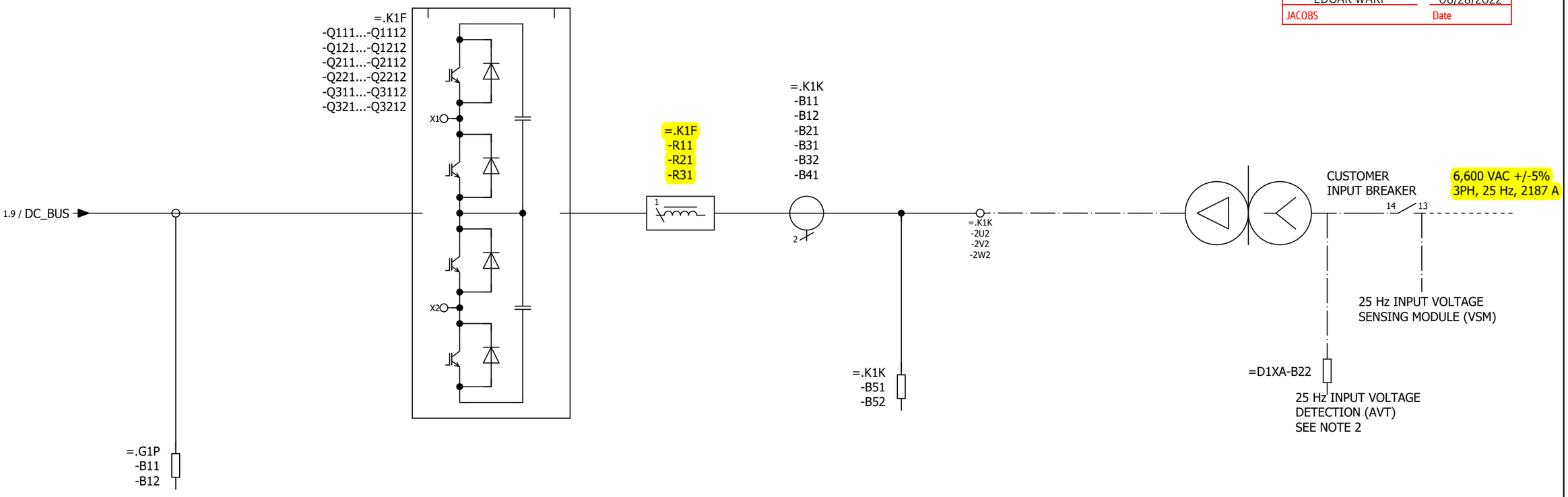
			Date	5/12/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150	Referenz	=
			Ed	MARSDX		LDA PLM R&D-D-US 2	BASIC LINE MODULE	Stichwort	+
			Appr			NKN	ONE-LINE DIAGRAM	A5E51274298B REV AC	Page 1
Modification	Date	Name	Original		Replacement of / Replaced by				Page 2 / 22

0	1	2	3	4	5	6	7	8	9

APPROVED ☐
APPROVED AS NOTED ☒ X
REVISE AND RESUBMIT ☐
REJECTED ☐
NOT SUBJECT TO REVIEW ☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 06/28/2022
JACOBS — Date



Indicate voltage also. (TYP)

25 Hz DC-LINK VOLTAGE DETECTION

25 Hz Converter

25 Hz Arm inductor

25 Hz CURRENT TRANSFORMER

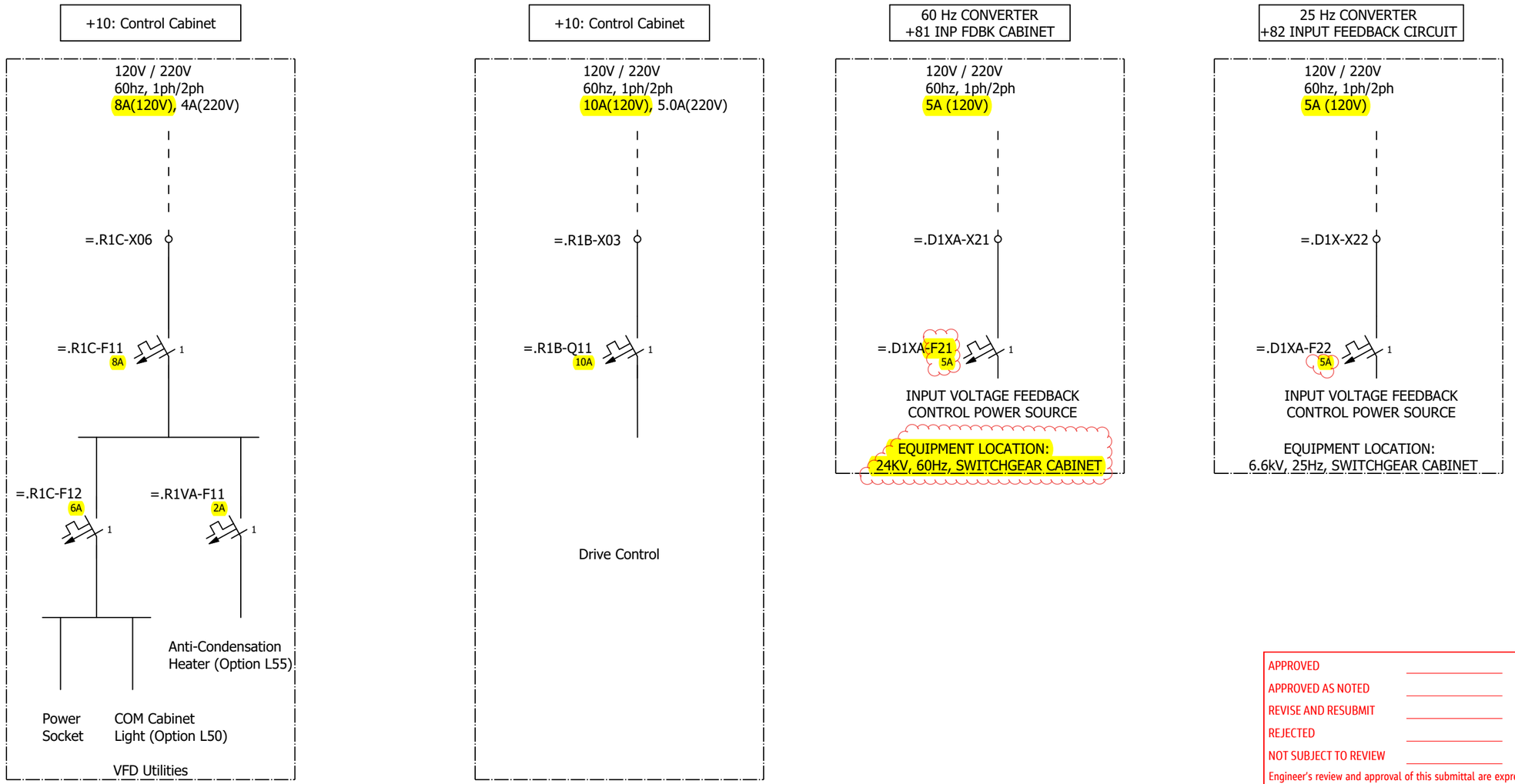
25 Hz OUTPUT VOLTAGE SENSING

25 Hz OUTPUT CONNECTION

25 Hz, 25MVA TRANSFORMER

NOTES:
1. DASHED LINES ---- CUSTOMER CONNECTIONS.
2. MAXIMUM CABLE LENGTH FROM AVT TO CONTROL CABINET IS 30 METERS.
3. DASHED LINES -.-.-.- CONTRACTOR CONNECTIONS.

			Date	10/21/2021	SH150 A/C SCHEMATICS		SIEMENS AG	SINAMICS SH150 MOTOR MODULE	Referenz =
			Ed	MARSDX			LDA PLM R&D-D-US 2	ONE-LINE DIAGRAM	Stichwort +
			Appr				NKN	A5E51274298B REV AC	Page 2
Modification	Date	Name	Original		Replacement of	Replaced by			Page 3 / 22



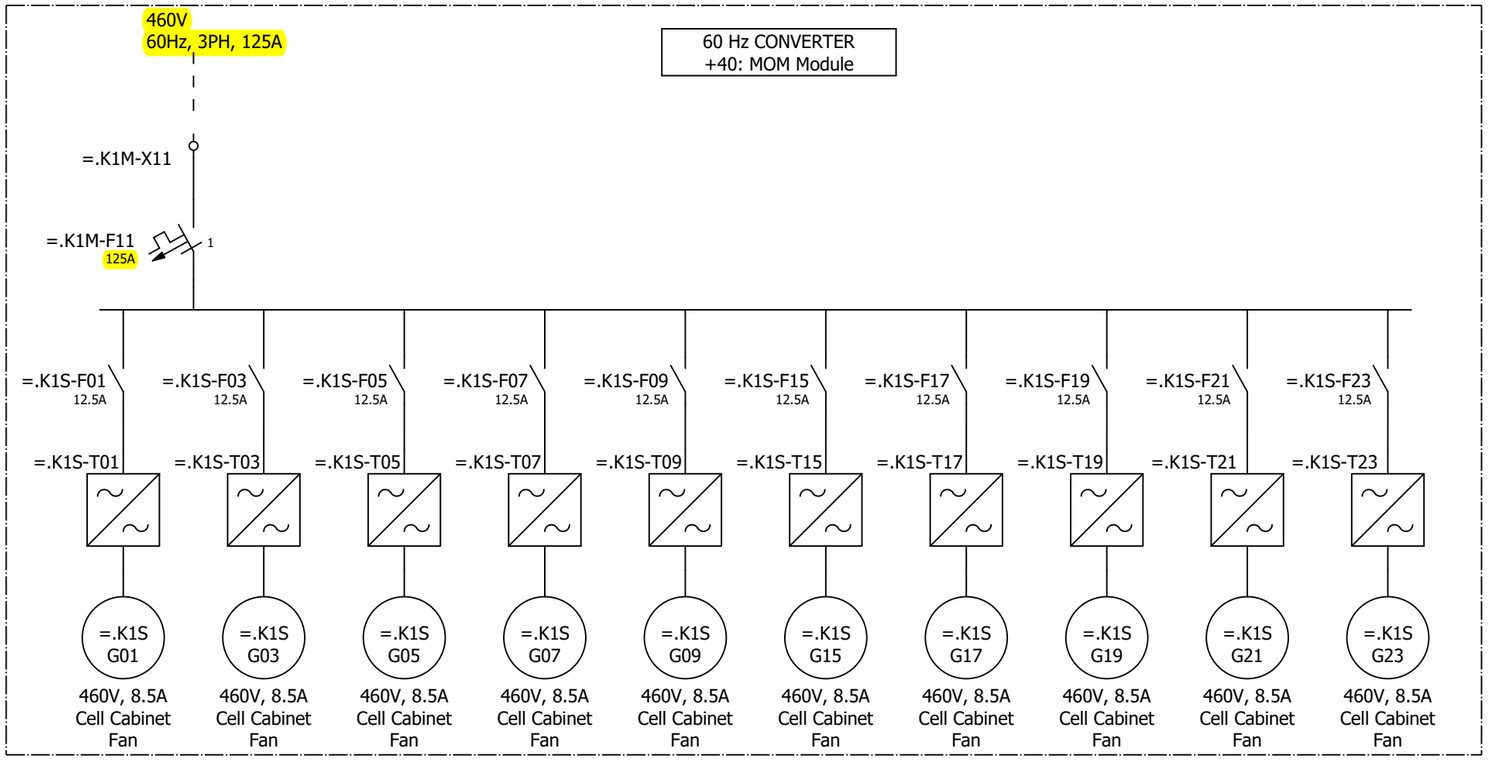
APPROVED	X
APPROVED AS NOTED	
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

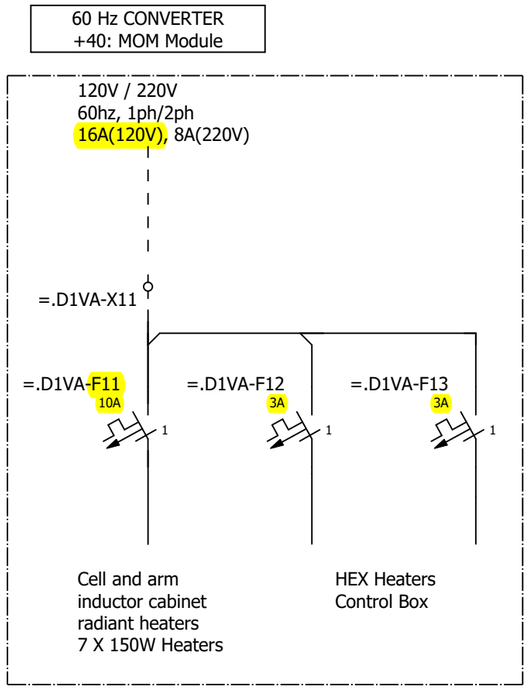
Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

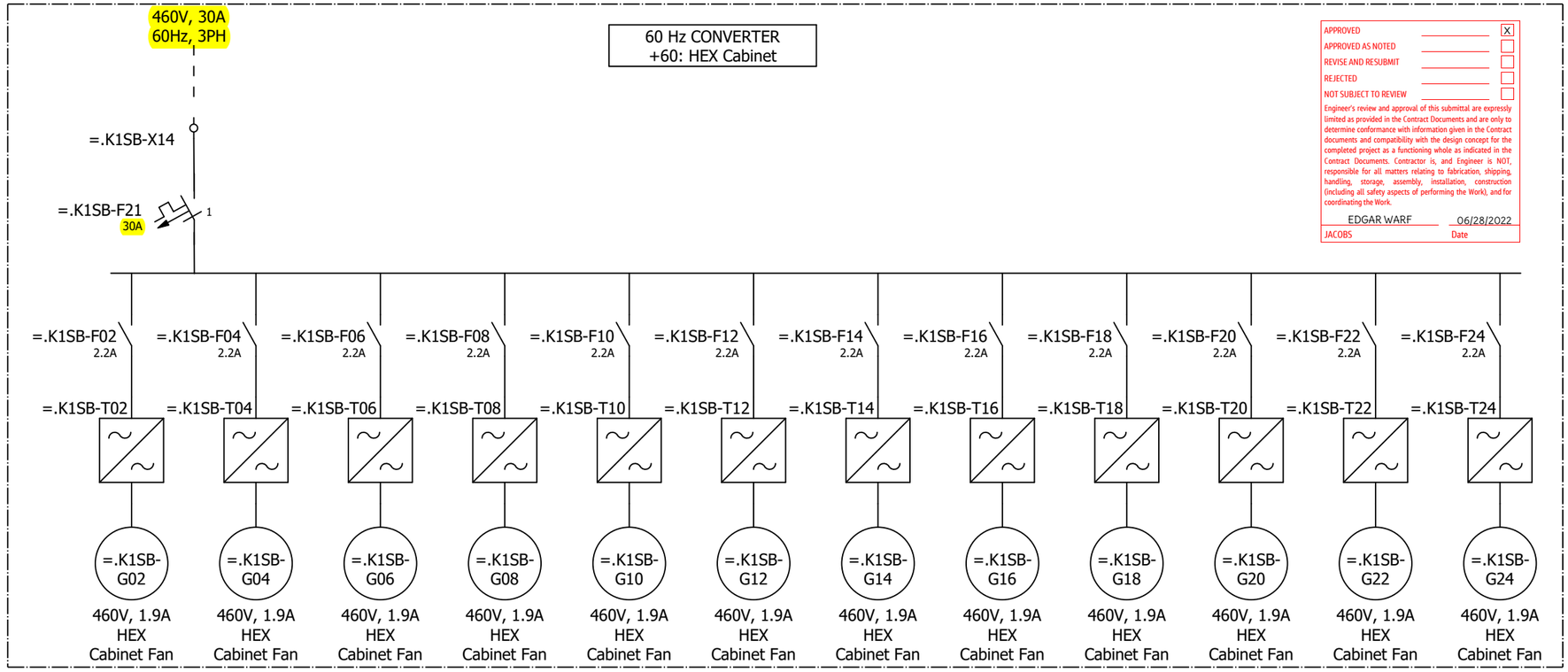
EDGAR WARF — 06/28/2022

JACOBS — Date

			Date	5/11/2022	SH150 A/C SCHEMATICS		SIEMENS AG	SINAMICS SH150 MOTOR MODULE	Referenz =
			Ed	MARSDX			LDA PLM R&D-D-US 2	ONE-LINE DIAGRAM	Stichwort +
			Appr				NKN	A5E51274298B REV AC	Page 3
Modification	Date	Name	Original		Replacement of	Replaced by			Page 4 / 22



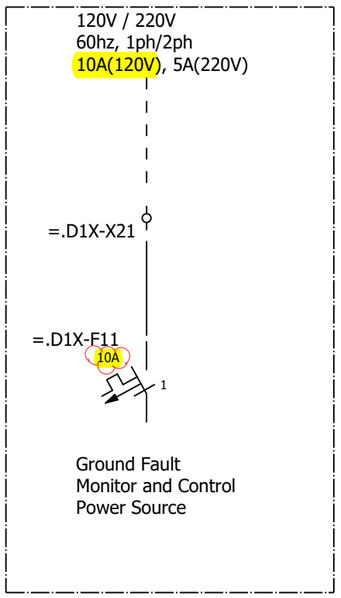




APPROVED _____ X
APPROVED AS NOTED _____ ☐
REVISE AND RESUBMIT _____ ☐
REJECTED _____ ☐
NOT SUBJECT TO REVIEW _____ ☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/28/2022
JACOBS Date

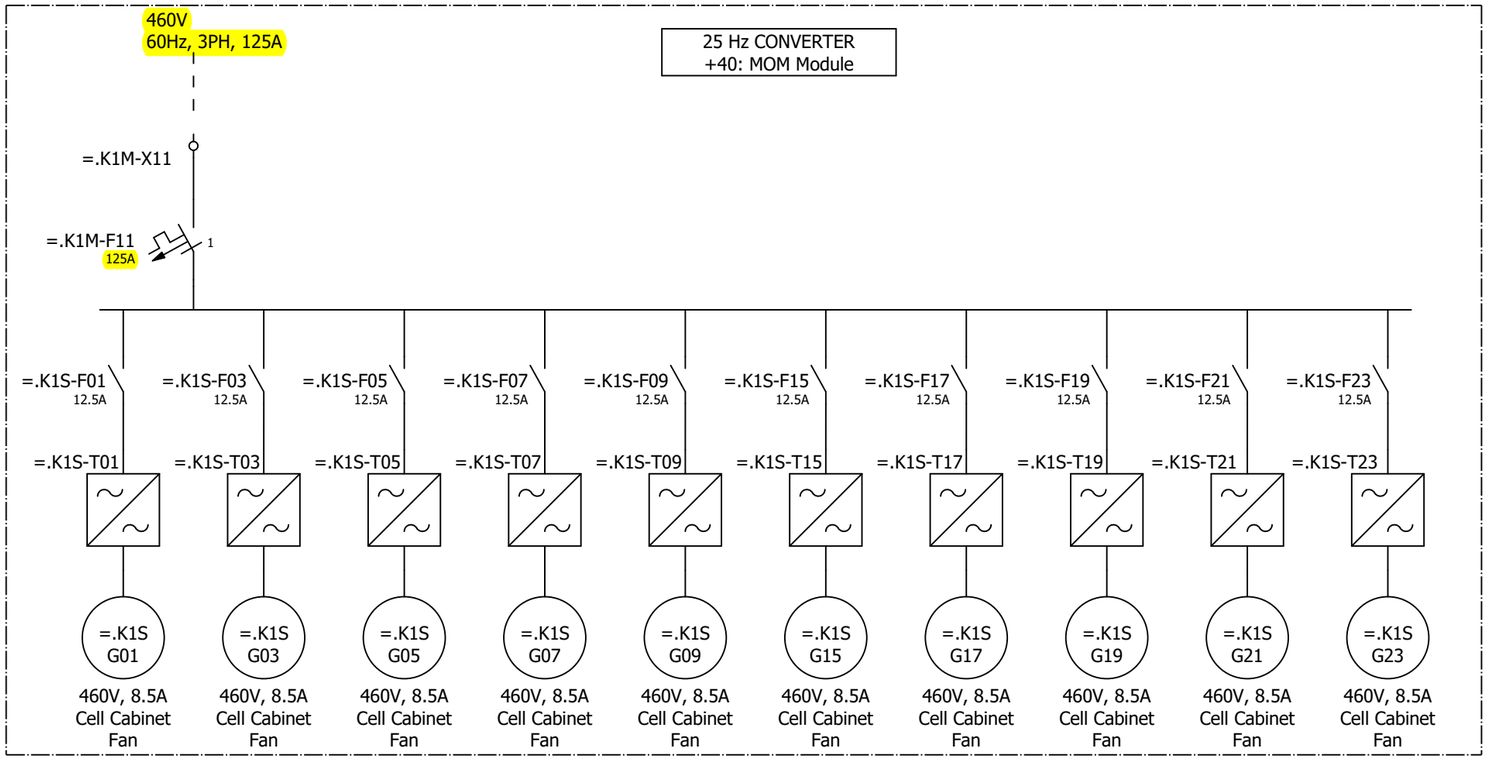


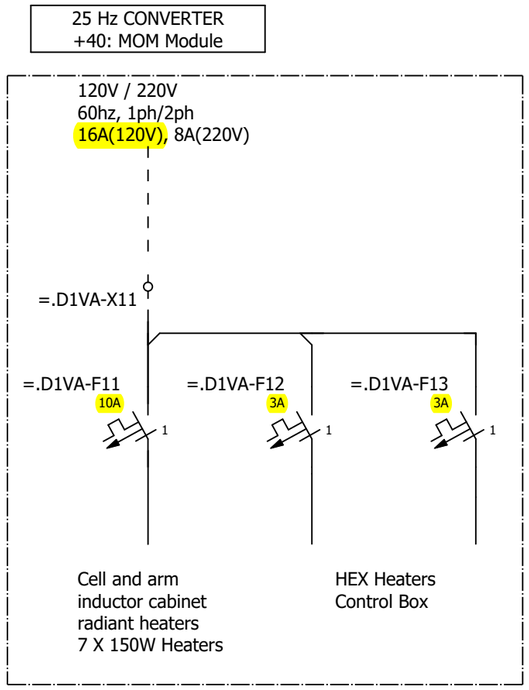
5

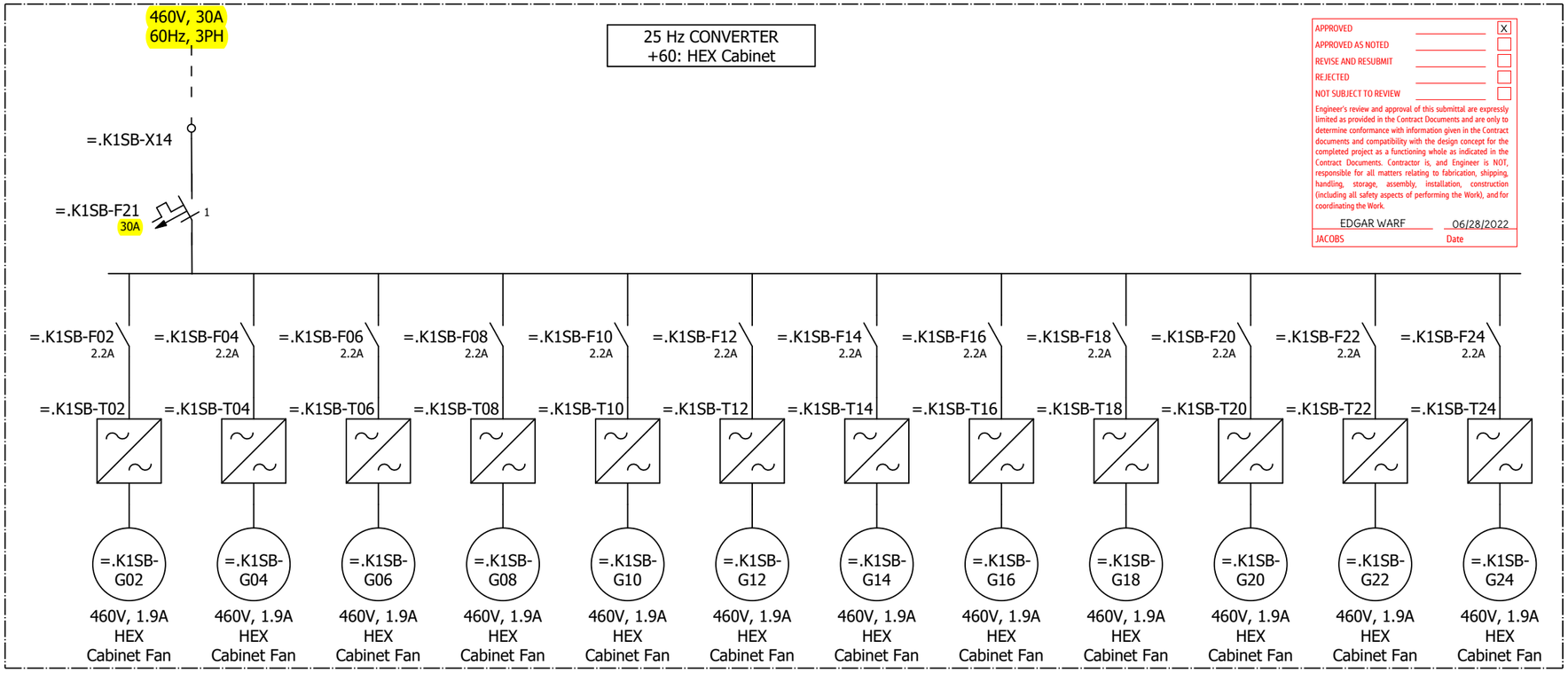
3

			Date	5/10/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150
			Ed	MARSDX		LDA PLM R&D-D-US 2	MOTOR MODULE
			Appr			NKN	ONE-LINE DIAGRAM
Modification	Date	Name	Original		Replacement of / Replaced by		

Referenz	=
Stichwort	+
A5E51274298B REV AC	Page 4
	Page 5 / 22



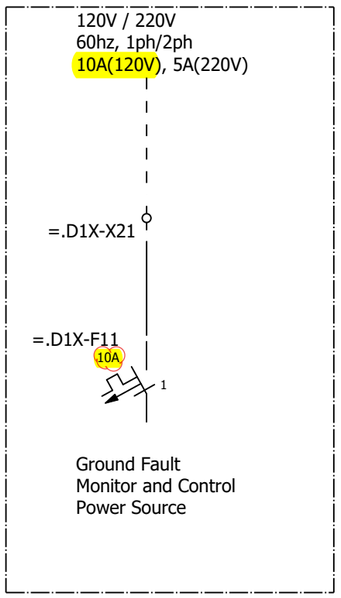




APPROVED [X]
APPROVED AS NOTED [ ]
REVISE AND RESUBMIT [ ]
REJECTED [ ]
NOT SUBJECT TO REVIEW [ ]

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/28/2022
JACOBS Date



6

4

			Date	5/10/2022	SH150 A/C SCHEMATICS	
			Ed	MARSDX		
			Appr			
Modification	Date	Name	Original		Replacement of	Replaced by

SIEMENS AG
LDA PLM R&D-D-US 2
NKN

SINAMICS SH150
MOTOR MODULE
ONE-LINE DIAGRAM

Referenz	=
Stichwort	+
A5E51274298B REV AC	Page 5
	Page 6 / 22

+50: Precharge Cabinet

460V, 300A Max
60Hz, 3PH

=.G1M-X14

=.G1M-Q11
300A

1

-L3

3

-T21

=.G1M-K41
/1.8

=.G1M-T51
/21.7

Precharge Circuit

+50: Precharge Cabinet

120V / 220V
60hz, 1ph/2ph
2A(120V), 1A(220V)

=.G1VA-X11

=.G1VA-F11
2A

1

=.G1VA-X11

Precharge Circuit
Radiant Heater

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

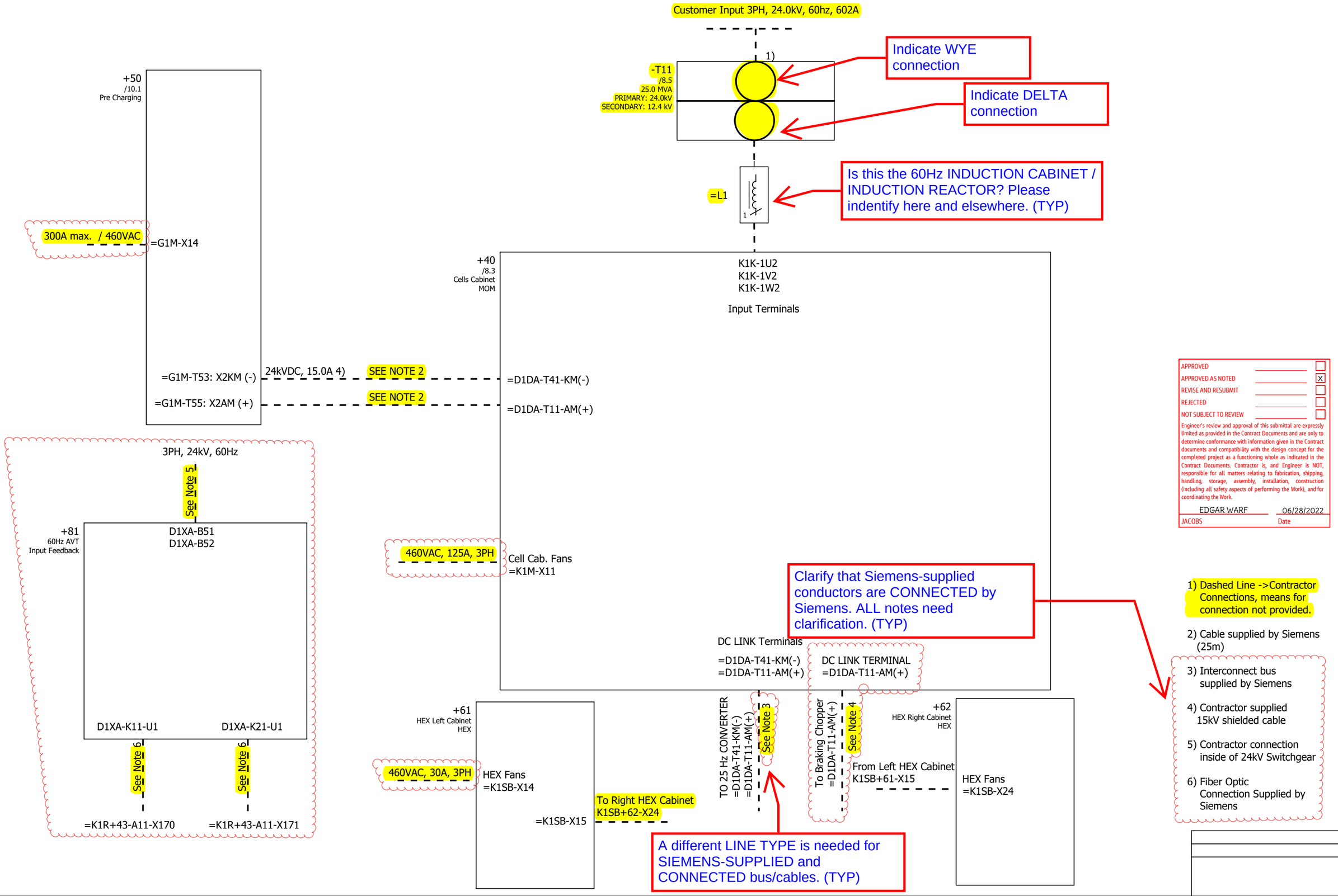
EDGAR WARF — 06/28/2022

JACOBS — Date

7

5

			Date	10/20/2021	SH150 A/C SCHEMATICS		SIEMENS AG	SINAMICS SH150 MOTOR MODULE	Referenz =
			Ed	MARSDX			LDA PLM R&D-D-US 2	ONE-LINE DIAGRAM	Stichwort +
			Appr				NKN	A5E51274298B REV AC	Page 6
Modification	Date	Name	Original		Replacement of	Replaced by			Page 7 / 22

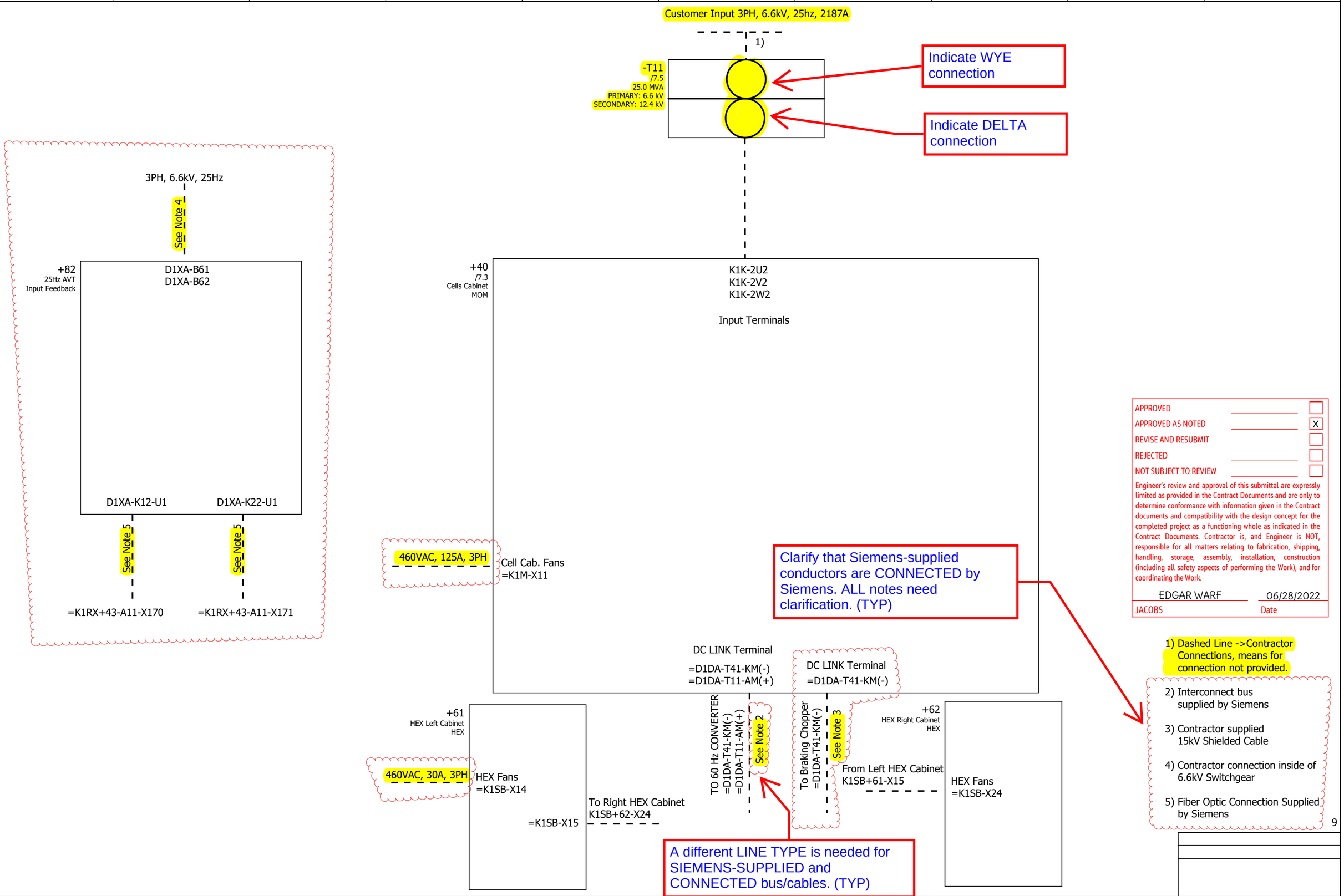


APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/28/2022
JACOBS Date

			Date	5/18/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150 (60 Hz CONVERTER)	Referenz	=
			Ed	MARSDX		LDA PLM R&D-D-US 2	CUSTOMER INTERCONNECTIONS OVERVIEW	Stichwort	+
			Appr			NKN	POWER SYSTEM (V>300V)	A5E51274298B REV AC	Page 7 / Page 8 / 22
Modification	Date	Name	Original		Replacement of / Replaced by				



APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/28/2022
JACOBS Date

			Date	5/18/2022	SH150 A/C SCHEMATICS	SIEMENS AG
			Ed	MARSDX		LDA PLM R&D-D-US 2
			Appr			NKN
Modification	Date	Name	Original		Replacement of	Replaced by

SINAMICS SH150 (25 Hz CONVERTER)
CUSTOMER INTERCONNECTIONS OVERVIEW
POWER SYSTEM (V>300V)

Referenz =
Stichwort +
A5E51274298B REV AC
Page 8
Page 9 / 22

To 60 Hz Converter
=D1DA-T11-AM(+)

To 25 Hz Converter
=D1DA-T41-KM(-)

See Note 1

See Note 1

+90
/12.3
Braking Chopper
Cell Cabinet

DC Link Terminals
=D1DA-T11-AM(+)
=D1DA-T41-KM(-)

460VAC, 25A, 3PH

Braking Chopper Cell
Cabinet Fans
= H1S-X11

Braking Resistor Connections
=AM_Res(+)
=KM_Res(-)

See Note 2

See Note 2

To Braking Resistor
Input

To Braking Resistor
Output

APPROVED X
APPROVED AS NOTED
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/28/2022
JACOBS Date

1) Contractor supplied 15kV Shielded Cable

2) Customer supplied 15kV Shielded Cable

3) Dashed line-> Contractor Connections, means for connection not provided.

10

8

			Date	5/11/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150 (Braking Chopper)	Referenz =
			Ed	MARSDX		LDA PLM R&D-D-US 2	CUSTOMER INTERCONNECTIONS OVERVIEW	Stichwort +
			Appr			NKN	POWER SYSTEM (V>300V)	Page 9
Modification	Date	Name	Original		Replacement of / Replaced by		A5E51274298B REV AC	Page 10 / 22

+50
/7.1
Pre Charging

Customer Input
120/220VAC, 1ph/2ph,
2A/1A
Heater
=G1VA-X11

=R1D+10-X12, 24Vdc, 5A
24VCC Supply
=G1Q-X11

+10
Control Cabinet
COM

Customer Input
120/220VAC, 1ph/2ph,
5A/2.5A
Control Voltage
=R1B-X03

Customer Input
120/220VAC, 1ph/2ph,
8A/4A
Heaters, Outlet, Light
=R1C-X06

24VCC Supply
=R1D-X12
=G1Q+50-X11

24VCC Supply
=R1D-X12

24VCC Supply
=R1D-X12
=1K1Q+43-X11

60 Hz
Input Voltage Sensing Feedback
3 PHASE AC, 100V, 0.25A
=T1CA-X01

25 Hz
Input Voltage Sensing Feedback
3 PHASE AC, 100V, 0.25A
=T1CA-X02

+40
/7.3
60Hz Cells Cabinet (Motor Mod.)
MOM

Customer Input, 120/220VAC,
1ph/2ph, 10A/5A

Control and
Ground Fault Monitoring
Power Source
1D1X-X21

A different LINE TYPE is needed for SIEMENS-SUPPLIED and CONNECTED cables. (TYP)

+43
/11.4
60Hz PSA Cabinet

D1XA+81-K11-U1
See Note 2

D1XA+81-K21-U1
See Note 2

60Hz AVT Input
Voltage Feedback
=K1R-A11-X170

=K1R-A11-X171

+42
/11.4
60Hz Cells Cabinet Roof

10A 24Vdc

24VCC Supply
=1K1Q-X11

Customer Input 120/220VAC
1ph/2ph, 10A/5A

Heater
=1D1VA-X11

Clarify that Siemens-supplied cables are CONNECTED by Contractor. (TYP)

120V Heaters HEX
=1D1VA-X11

=1K1VB+60-X12
=1K1VB+60-X13

+61
60Hz HEX Left Cabinet
HEX

120/220VAC, 1ph/2ph, 3A/1.5A
=1D1VA+42-X11

120V HEX Heaters
=1K1VB+61-X12

+62
60Hz HEX Right Cabinet
HEX

120/220VAC, 1ph/2ph, 3A/1.5A
=1D1VA+42-X11

120V HEX Heaters
=1K1VB+62-X13

1) Dashed Line ->Contractor Connections, means for connection not provided.

2) Fiber Optic Connection Supplied by Siemens

11

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/28/2022
JACOBS Date

9

			Date	5/17/2022	SH150 A/C SCHEMATICS	SIEMENS AG
			Ed	MARSDX		LDA PLM R&D-D-US 2
			Appr			NKN
Modification	Date	Name	Original		Replacement of	Replaced by

SINAMICS SH150
CUSTOMER INTERCONNECTIONS OVERVIEW
POWER SYSTEM (V<300V)

Referenz =
Stichwort +

A5E51274298B REV AC

Page 10
Page 11 / 22

+40
/7.3
25Hz Cells Cabinet (Motor Mod.)
MOM

Customer Input, 120/220VAC,
1ph/2ph, 10A/5A

Control and
Ground Fault Monitoring
Power Source
2D1X-X21

A different LINE TYPE is needed for SIEMENS-SUPPLIED and CONNECTED cables. (TYP)

+43
/10.4
25Hz PSA Cabinet

D1XA+82-K12-U1
See Note 2

D1XA+82-K22-U1
See Note 2

25Hz AVT Input
Voltage Feedback
=K1RX-A11-X170

=K1RX-A11-X171

+42
/10.4
25Hz Cells Cabinet Roof

24VCC Supply
=R1D+10-X12

10A 24Vdc

Customer Input 120/220VAC
1ph/2ph, 10A/5A

24VCC Supply
=2K1Q-X11

Heater
=2D1VA-X11

120V Heaters HEX
=2D1VA-X11

=2K1VB+60-X12
=2K1VB+60-X13

Clarify that Siemens-supplied cables are CONNECTED by Contractor. (TYP)

+61
25Hz HEX Left Cabinet
HEX

120/220VAC, 1ph/2ph, 3A/1.5A
=2D1VA+42-X11

120V HEX Heaters
=2K1VB+61-X12

+62
25Hz HEX Right Cabinet
HEX

120/220VAC, 1ph/2ph, 3A/1.5A
=2D1VA+42-X11

120V HEX Heaters
=2K1VB+62-X13

1) Dashed Line ->Contractor Connections, means for connection not provided.

2) Fiber Optic Connection Supplied by Siemens

APPROVED				☐
APPROVED AS NOTED				☒
REVISE AND RESUBMIT				☐
REJECTED				☐
NOT SUBJECT TO REVIEW				☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 06/28/2022
JACOBS — Date

12

10

			Date	5/17/2022	SH150 A/C SCHEMATICS	
			Ed	MARSDX		
			Appr			
Modification	Date	Name	Original		Replacement of	Replaced by

SIEMENS AG
LDA PLM R&D-D-US 2
NKN

SINAMICS SH150
CUSTOMER INTERCONNECTIONS OVERVIEW
POWER SYSTEM (V<300V)

Referenz =
Stichwort +

A5E51274298B REV AC

Page 11
Page 12 / 22

+90
/9.3
Braking Chopper
Cell Cabinet

Customer Input
120VAC, 10A, 3PH

Control Voltage
= H1P-X11

Customer Input
120VAC, 5A, 3PH

Space Heaters
= H1VA-X11

APPROVED	X
APPROVED AS NOTED	
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 06/28/2022
JACOBS — Date

1) Dashed line-> Contractor Connections, means for connection not provided.

13

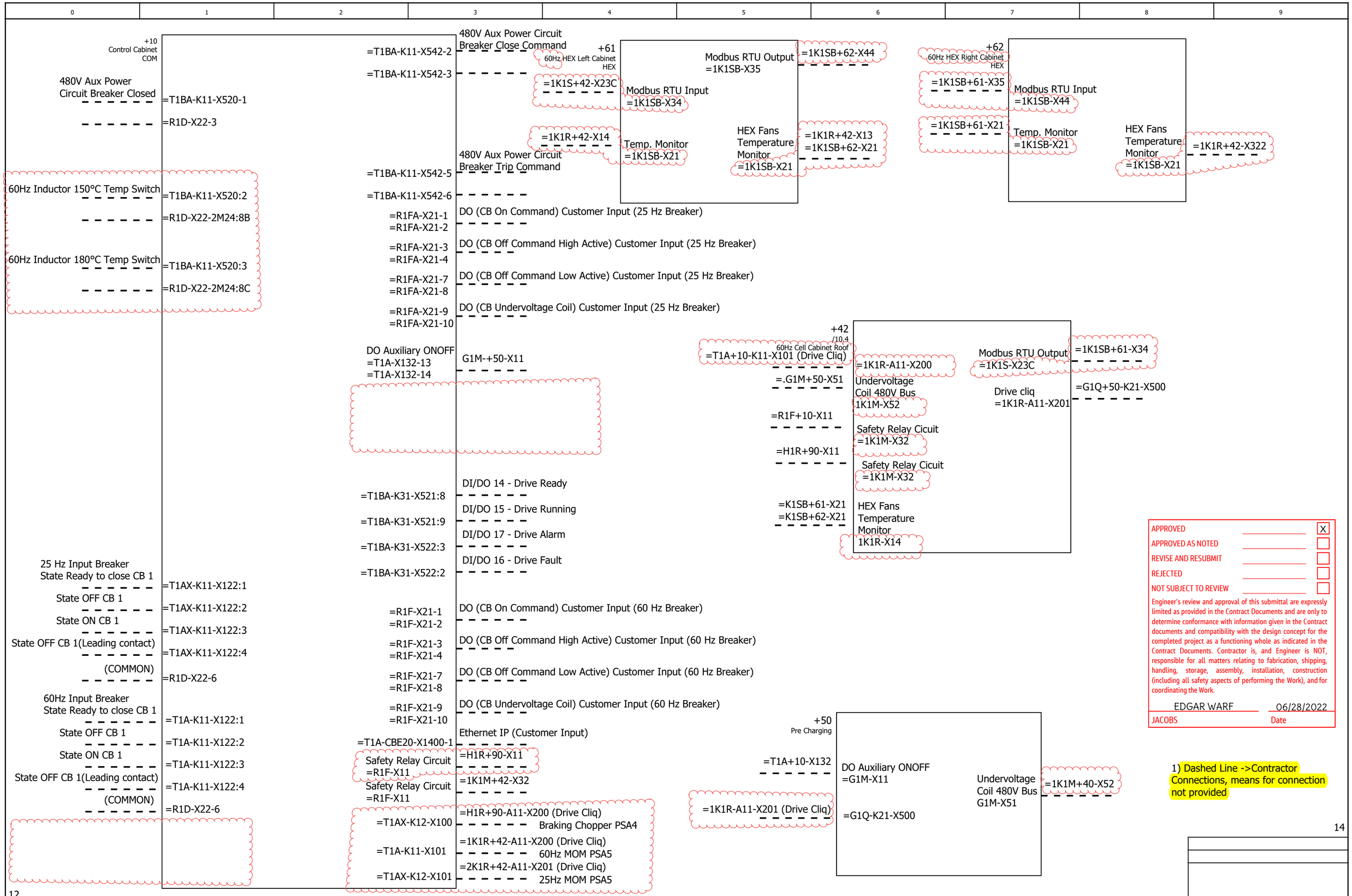
11

			Date	5/17/2022	SH150 A/C SCHEMATICS	
			Ed	MARSDX		
			Appr			
Modification	Date	Name	Original		Replacement of	Replaced by

SIEMENS AG
LDA PLM R&D-D-US 2
NKN

SINAMICS SH150 (Braking Chopper)
CUSTOMER INTERCONNECTIONS OVERVIEW
POWER SYSTEM (V<300V)

Referenz =
Stichwort +
A5E51274298B REV AC
Page 12
Page 13 / 22



			Date	5/17/2022	SH150 A/C SCHEMATICS	SIEMENS AG
			Ed	MARSDX		LDA PLM R&D-D-US 2
			Appr			NKN
Modification	Date	Name	Original		Replacement of	Replaced by

SINAMICS SH150
CUSTOMER INTERCONNECTIONS OVERVIEW
CONTROL SYSTEM

Referenz	=
Stichwort	+
A5E51274298B REV AC	Page 13
	Page 14 / 22

+61
25Hz HEX Left Cabinet HEX

=2K1S+42-X23C

=2K1R+42-X14

Modbus RTU Input
=2K1SB-X34

Temp. Monitor
=2K1SB-X21

Modbus RTU Output
=2K1SB-X35

HEX Fans Temperature Monitor
=2K1SB-X21

=2K1SB+62-X44

=2K1R+42-X13
=2K1SB+62-X21

+62
25Hz HEX Right Cabinet HEX

=2K1SB+61-X35

=2K1SB+61-X21

Modbus RTU Input
=2K1SB-X44

Temp. Monitor
=2K1SB-X21

HEX Fans Temperature Monitor
=2K1SB-X21

=2K1R+42-X322

+42
/10.4
25Hz Cell Cabinet Roof

=T1A+10-K11-X101 (Drive Cliq)

=.G1M+50-X51

=R1F+10-X11

=H1R+90-X11

=K1SB+61-X21
=K1SB+62-X21

=2K1R-A11-X200

Undervoltage Coil 480V Bus
2K1M-X52

Safety Relay Cicuit
=2K1M-X32

Safety Relay Cicuit
=2K1M-X32

HEX Fans Temperature Monitor
2K1R-X14

Modbus RTU Output
=2K1S-X23C

Drive cliq
=2K1R-A11-X201

=2K1SB+61-X34

=G1Q+50-K21-X500

APPROVED	X
APPROVED AS NOTED	
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 06/28/2022
JACOBS — Date

1) Dashed Line ->Contractor Connections, means for connection not provided

15

13

			Date	5/11/2022	SH150 A/C SCHEMATICS		SIEMENS AG	SINAMICS SH150 CUSTOMER INTERCONNECTIONS OVERVIEW CONTROL SYSTEM	Referenz =
			Ed	MARSDX			LDA PLM R&D-D-US 2		Stichwort +
			Appr				NKN		A5E51274298B REV AC — Page 14 / 22
Modification	Date	Name	Original		Replacement of	Replaced by			

0	1	2	3	4	5	6	7	8	9

APPROVED _____ X

APPROVED AS NOTED _____ ☐

REVISE AND RESUBMIT _____ ☐

REJECTED _____ ☐

NOT SUBJECT TO REVIEW _____ ☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/28/2022

JACOBS Date

+90
/9.3
Braking Chopper
Cell Cabinet

T1AX-K12-X100 (Drive Cliq) - - - - - - - - =H1R-A11-X200

Braking Chopper Resistor
PT100 Temperature Sensors - - - - - - - - =H1R-X12

=R1F+10-X11

=R1FA+10-X11

MV Circuit Breakers Off Commands
(Undervoltage Coil)
=H1R-X11

=K1M+43-X32

=K1MA+43-X32

1) Dashed line-> Contractor Connections, means for connection not provided.

16

14

			Date	5/17/2022	SH150 A/C SCHEMATICS	
			Ed	MARSDX		
			Appr			
Modification	Date	Name	Original		Replacement of	Replaced by

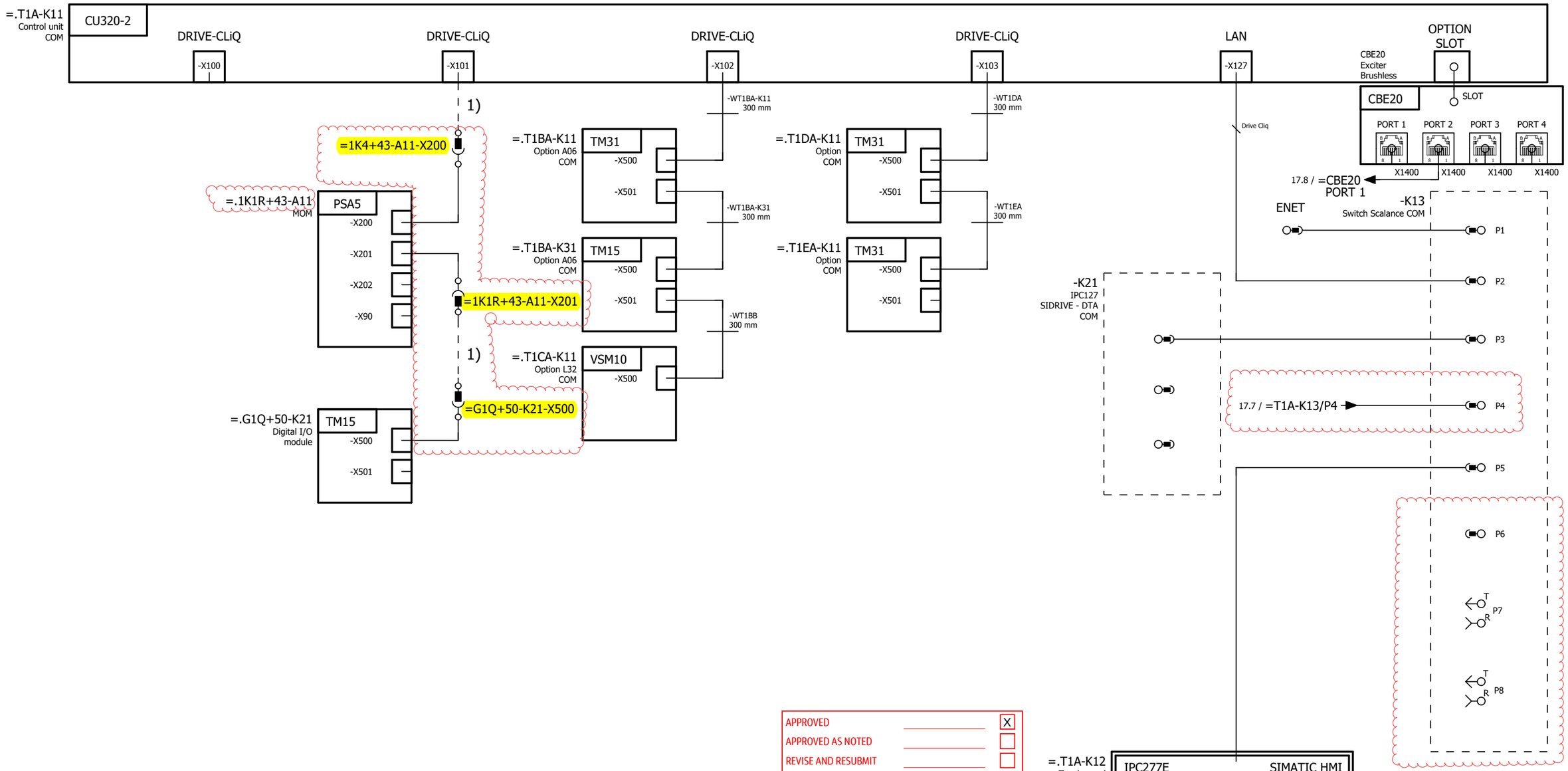
SIEMENS AG
LDA PLM R&D-D-US 2
NKN

SINAMICS SH150 (Braking Chopper)
CUSTOMER INTERCONNECTIONS OVERVIEW
Control System

Referenz =
Stichwort +

A5E51274298B REV AC

Page 15
Page 16 / 22



APPROVED _____ X

APPROVED AS NOTED _____ ☐

REVISE AND RESUBMIT _____ ☐

REJECTED _____ ☐

NOT SUBJECT TO REVIEW _____ ☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/28/2022

JACOBS Date

1) Drive Cliq Cable 22m (72'): 6FX2002-1DC00-1CC0

2) Drive Cliq Cable 15m (49'): 6FX2002-1DC00-1BF0

17

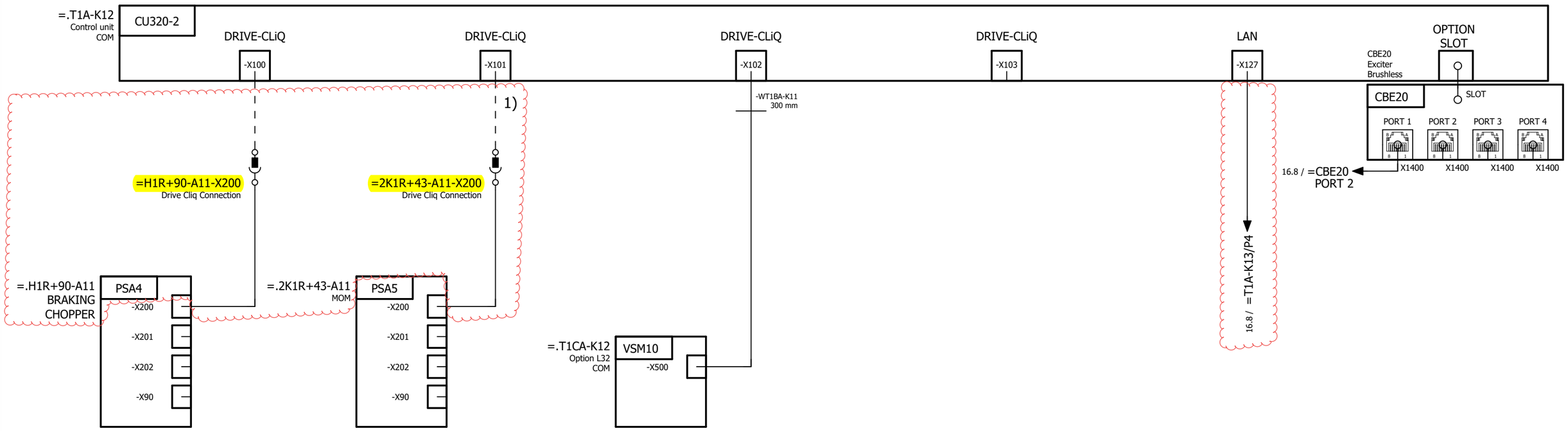
15

			Date	5/11/2022	SH150 A/C SCHEMATICS	
			Ed	MARSDX		
			Appr			
Modification	Date	Name	Original		Replacement of	Replaced by

SIEMENS AG
LDA PLM R&D-D-US 2
NKN

SINAMICS SH150
DRIVE-CLIQ TOPOLOGY

Referenz	=
Stichwort	+
A5E51274298B REV AC	Page 16
	Page 17 / 22



1) Drive Cliq Cable 22m (72'):
6FX2002-1DC00-1CC0

2) Drive Cliq Cable 15m (49'):
6FX2002-1DC00-1BF0

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/28/2022
JACOBS Date

18

16

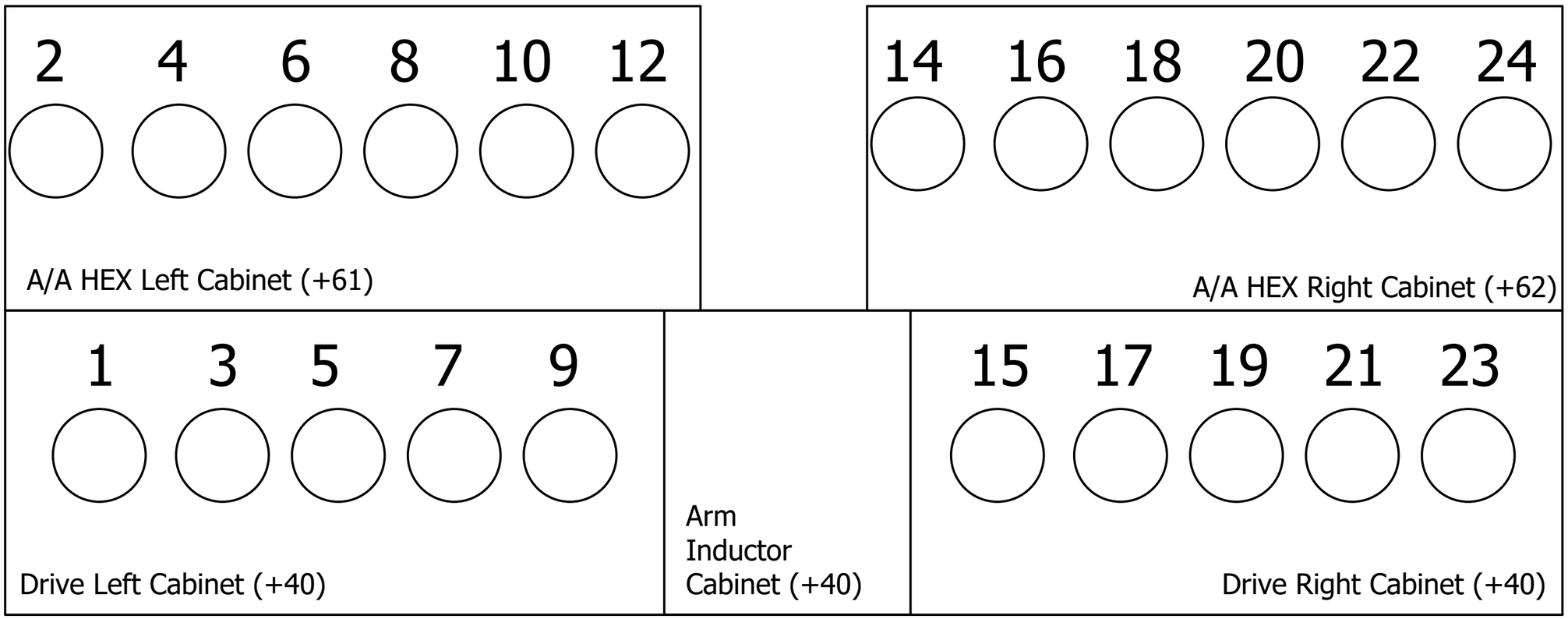
			Date	5/12/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150 DRIVE-CLIQ TOPOLOGY	Referenz =
			Ed	MARSDX		LDA PLM R&D-D-US 2		Stichwort +
			Appr			NKN	A5E51274298B REV AC	Page 17
Modification	Date	Name	Original		Replacement of / Replaced by			Page 18 / 22

NOTE:
THIS DRAWING REPRESENTS THE TWO CONVERTERS (25 Hz AND 60 Hz)
ONLY ONE SET OF CABINETS WAS SHOWN FOR CLAIRITY.

APPROVED	X
APPROVED AS NOTED	
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 06/28/2022
JACOBS — Date



19

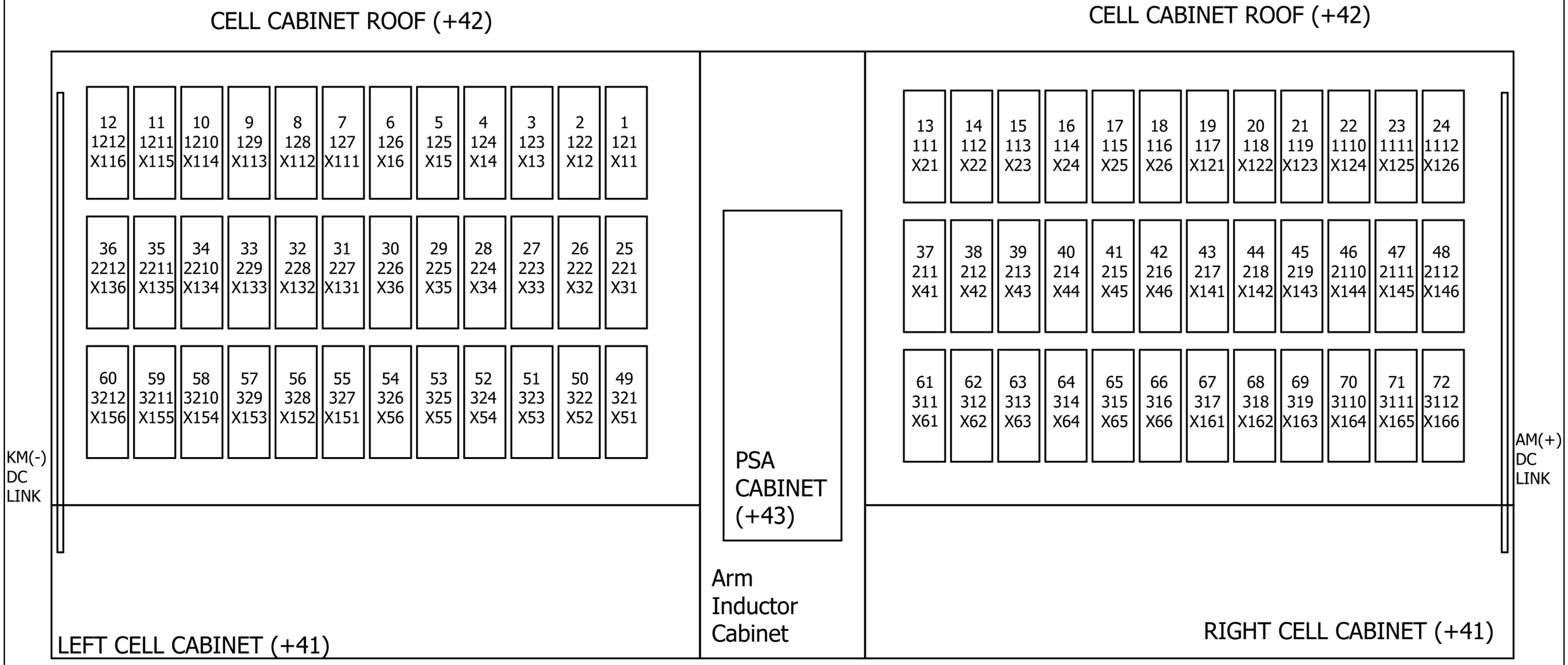
17

			Date	5/10/2022	SH150 A/C SCHEMATICS	SIEMENS AG
			Ed	MARSDX		LDA PLM R&D-D-US 2
			Appr			NKN
Modification	Date	Name	Original		Replacement of	Replaced by

SINAMICS SH150 FANS DISPOSITION
TOP VIEW

Referenz	=
Stichwort	+
A5E51274298B REV AC	Page 18
	Page 19 / 22

NOTE:
THIS DRAWING REPRESENTS THE TWO CONVERTERS (25 Hz AND 60 Hz)
ONLY ONE SET OF CABINETS WAS SHOWN FOR CLAIRITY.



APPROVED X
APPROVED AS NOTED
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

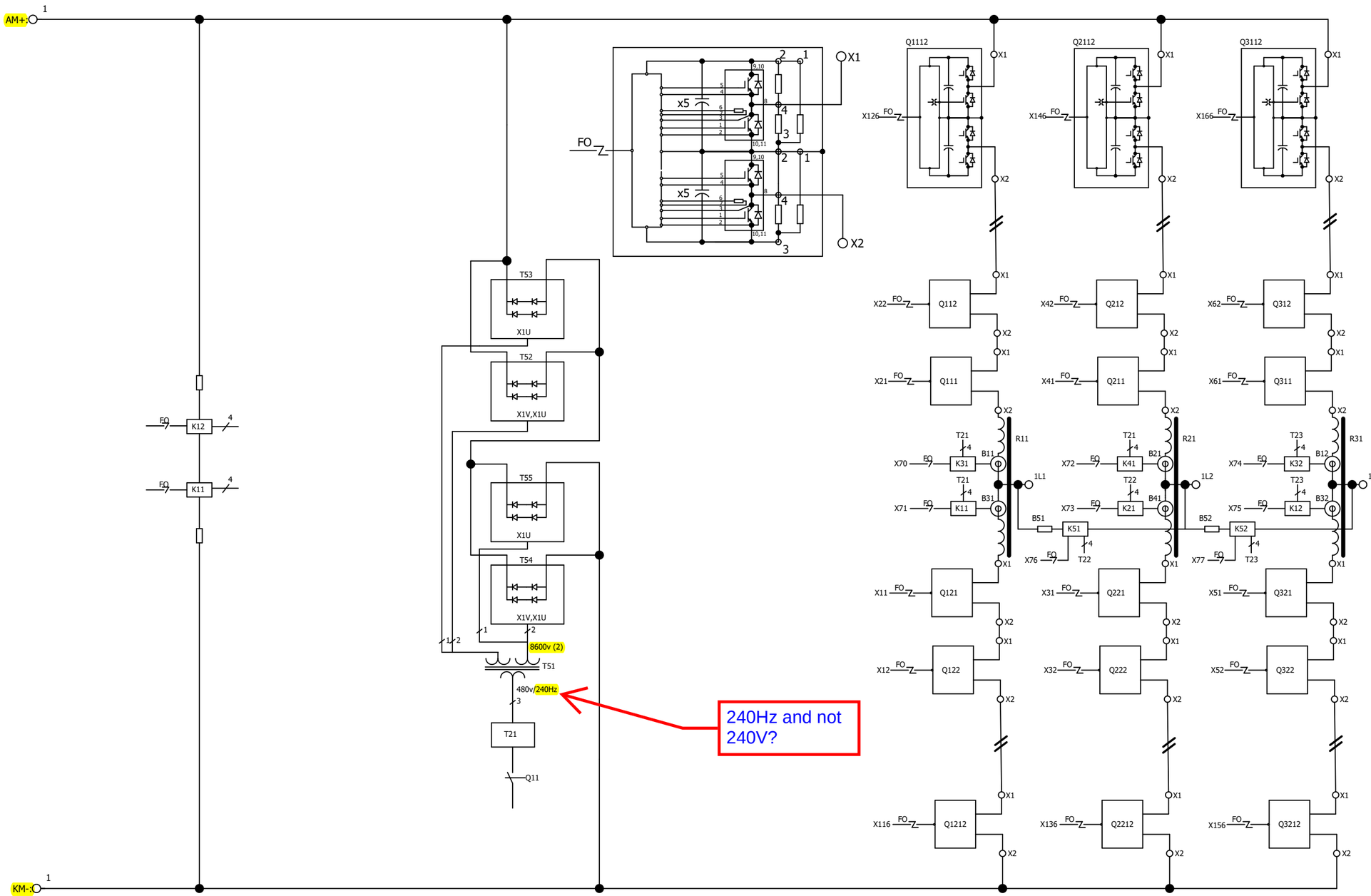
Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/28/2022
JACOBS Date

20

18

			Date	5/10/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150 CELLS AND DIODE STACKS DISPOSITION	Referenz =
			Ed	MARSDX		LDA PLM R&D-D-US 2	FRONT VIEW	Stichwort +
			Appr			NKN	A5E51274298B REV AC	Page 19
Modification	Date	Name	Original		Replacement of / Replaced by			Page 20 / 22



NOTE:
THIS DRAWING REPRESENTS THE TWO CONVERTERS (25 Hz AND 60 Hz)
THE COMMON/CONNECTION POINT BETWEEN THE TWO CONVERTERS IS THE AM+ AND KM - POINTS.

			Date	5/10/2022	SH150 A/C SCHEMATICS	SIEMENS AG
			Ed	MARSDX		LDA PLM R&D-D-US 2
			Appr			NKN
Modification	Date	Name	Original		Replacement of	Replaced by

SINAMICS SH150
OVERVIEW DRIVE TOPOLOGY

Referenz =
Stichwort +
A5E51274298B REV AC
Page 20
Page 21 / 22

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/28/2022
JACOBS Date

19
21

0	1	2	3	4	5	6	7	8	9

13 14 = Customer Circuit Breaker

-F1 1 = Circuit Breaker

=.G1M
-Q11
300A
3 I> = Circuit Breaker with TOL

=.K1S
G01 = Cooling Fan Motor

=.G1M-K41
/1.8 = Contactor

T53
X1U = Diode

=D1XA-B21 = Resistor

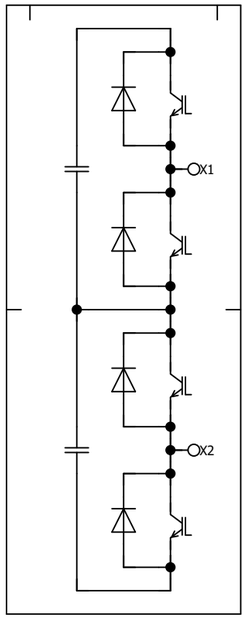
EQ K12 4 = Resistor

=.G1M
-X14 = Terminal Block / Connection

= Network Bus Cable Connection

= Variable Frequency Drive

T R = Fiber Optic Port



=.K1F
-Q111...-Q1112
-Q121...-Q1212
-Q211...-Q2112
-Q221...-Q2212
-Q311...-Q3112
-Q321...-Q3212

= SFC Power Cell

Q121 = SFC Power Cell

= Transformer

2 = Current Transformer

3+PE
=.G1M
-T51
200 kVA
3 = Transformer

=.G1M-T51
/6.2 = Transformer

T51 = Transformer

= Current Transformer

= Inductor

-L1
3 = Inductor

APPROVED _____ X
APPROVED AS NOTED _____ ☐
REVISE AND RESUBMIT _____ ☐
REJECTED _____ ☐
NOT SUBJECT TO REVIEW _____ ☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/28/2022
JACOBS Date

20

			Date	5/12/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150 SYMBOL SHEET	Referenz =
			Ed	MARSDX				Stichwort +
			Appr			LDA PLM R&D-D-US 2		A5E51274298B REV AC — Page 21
Modification	Date	Name	Original		Replacement of / Replaced by	NKN		Page 22 / 22

NOTES:

1. RATINGS

DESCRIPTION	UNITS	VALUE
RATED POWER	MVA	25
INPUT VOLTAGE	KV, 3PH	13,800
INPUT CURRENT	A	1100
OUTPUT VOLTAGE (MAX)	KV, 3PH	13,800
OUTPUT (POWER CELL) CURRENT, NOMINAL	A	1100
FREQUENCY	HZ	60/25
3 PH AUXILIARY VOLTAGE	V, 3PH	460
3 PH AUXILIARY CURRENT	A, 3PH	517
1 PH AUXILIARY VOLTAGE, CURRENT	V, A	120, 10
ELEVATION, (MAX)	M	1000
AMBIENT TEMPERATURE, OPERATION (SFC CABINETS)	°C(F)	0 TO 40 (32 TO 104)
AMBIENT TEMPERATURE, OPERATION (AIR TO AIR HEX)	°C(F)	−40 TO +40 (−40 TO 104)
AMBIENT TEMPERATURE, STORAGE	°C(F)	−25 TO +70 (−13 TO 158)
AMBIENT TEMPERATURE, TRANSPORT	°C(F)	−25 TO +70 (−13 TO 158)
SFC WEIGHT	LBS	65,878
SFC WEIGHT	KG	29,882
BRAKING CHOPPER WEIGHT	LBS	8,462
BRAKING CHOPPER WEIGHT	KG	3,846
POWER LOSSES OF SFC CONVERTERS ONLY	KW	897
RADIATED HEAT LOSSES FROM SFC CONVERTER @ 40°C	KW	45

2. ELECTRICAL CONNECTIONS

DESCRIPTION	UNITS	VALUE
INPUT POWER CABLE, MAX CABLE CROSS−SECTION PER PHASE WITH M10−1.5x40mm (or 3/8−16x1.5") SCREW	AWG/MCM (NEC,CEC)	4 X 1000 MCM PER TERMINAL
	MM2 (DIN, VDE)	4 X 508 MM2 PER TERMINAL
OUTPUT POWER CABLE, MAX CABLE CROSS−SECTION PER PHASE WITH M10−1.5x40mm (or 3/8−16x1.5")	AWG/MCM (NEC,CEC)	4 X 1000 MCM PER TERMINAL
	MM2 (DIN, VDE)	4 X 508 MM2 PER TERMINAL
DC LINK TO BRAKING CHOPPER POWER CABLE, MAX CABLE PER PHASE WITH M12−1.75 X 40 mm (OR 1/2−13 X 1.5")	AWG/MCM (NEC,CEC)	4 X 1000 MCM PER TERMINAL
	MM2 (DIN, VDE)	4 X 508 MM2 PER TERMINAL
PROTECTIVE EARTH CONNECTION, MAX CONNECTION CROSS−SECTION AT ENCLOSURE WITH M12 SCREW	AWG/MCM (NEC,CEC)	4/0 AWG
	MM2 (DIN, VDE)	107 MM2

3. MECHANICAL CONNECTIONS

DESCRIPTION	VALUE
OUTPUT POWER (60Hz CONVERTER)	OUTPUT BUS (K1K−1U2, K1K−1V2, K1K−1W2) NEMA 6 HOLE PATTERN
OUTPUT POWER (25Hz CONVERTER)	OUTPUT BUS (K1K−1U2, K1K−1V2, K1K−1W2) NEMA 6 HOLE PATTERN
DC LINK TO BRAKING CHOPPER	OUTPUT BUS NEMA 4 HOLE PATTERN
BRAKING CHOPPER	INPUT/OUTPUT BUS NEMA 4 HOLE PATTERN
CONTROL	PRESSURE SCREW TERMINALS FOR #24−#6 AWG WIRE
AUXILIARY	PRESSURE SCREW TERMINALS FOR #24−#6 AWG WIRE

4. INPUT CURRENT REQUIREMENTS FOR HEATER CIRCUITS

DESCRIPTION	UNITS	120V	
		WATTS	AMPS
(HEATER CIRCUIT DESC.)	1PH	3800	32

5. ENCLOSURE

DESCRIPTION	UNITS	VALUE
ENCLOSURE COLOR	RAL	7035
ENCLOSURE TYPE	IP	54

6. PRECAUTIONS
   - A. LETHAL VOLTAGES ON CIRCUITS INSIDE CABINET. DO NOT DISCONNECT MOTOR IN OPEN CIRCUIT WHILE INVERTER IS RUNNING.
   - B. CAPACITIVE VOLTAGE INSIDE CABINET. DO NOT REMOVE PANELS FOR TEN (10) MINUTES AFTER INPUT POWER IS DISCONNECTED.
   - C. DO NOT BLOCK INTAKE OR EXHAUST OPENINGS OR OVERHEATING COULD OCCUR.

7. UPSTREAM PROTECTION REQUIREMENTS
   - A. THE VFD REQUIRES INSTALLATION OF A COORDINATED MECHANICAL INTERLOCK SYSTEM.

DRAWING INDEX	
SHEET	DESCRIPTION
1	INDEX, CONFIGURATION AND GENERAL NOTES
2	OUTLINE, MECHANICAL AND ELECTRICAL INTERFACES
3	OUTLINE, MECHANICAL AND ELECTRICAL INTERFACES
4	OUTLINE, MECHANICAL AND ELECTRICAL INTERFACES
5	TRANSPORTATION, SHIPPING, AND HANDLING INFORMATION
6	COM CABINET DETAIL INFORMATION
7	COM PANEL DETAIL INFORMATION
8	VFD INPUT/OUTPUT CONNECTIONS
9	PRECHARGE CABINET INFORMATION
10	AIR−AIR HEX DETAIL INFORMATION
11	AIR−AIR HEX SHROUD DETAIL INFORMATION
12	SFC INTERCONNECTION AND WIRE ENTRY LOCATION
13	KEY INTERLOCK INFORMATION
14	BRAKING CHOPPER VIEWS
15	BRAKING CHOPPER VIEWS
16	CUSTOMER CONNECTION TRANSITION BOXES

VFD IDENTIFICATION NUMBER − A5E51274298	
MLFB OPTION CODES	
CODE	DESCRIPTION
A06	Additional Remote I/O
C41	Aux V 460V, 60Hz
C55	Auxiliary control voltage 60 Hz 120 V 1 AC
C68	SIDRIVE IQ Communication Converter
G24	PROFINET Interface
G28	Modbus TCP
G47	Ethernet Port
G61	TM31 module
G62	2nd TM31 module
G63	Addl. TM15 module
K20	Indicator Lights
K90	CU320−2 (PROFIBUS)
L45	Emergency Pushbutton
L50	Cabinet Lighting COM
L55	Anti Condensing Heater
L66	Emergency Stop, 24VDC
M08	Mech. Interlock −Sup
M34	Top entry Aux & Signal
M54	IP54 Degree of protection
M61	Redundant Fan
T94	Manufactured in the USA
V23	13.8 kV output voltage
Y50	Remotely located COM

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 06/22/2022

JACOBS — Date

ESD SENSITIVE EQUIPMENT

WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

DFTG CODE NO.		
REVISIONS	P5A00408460 REVISED FOR RE−SUBMITTALS. SEE CLOUDED AREAS. RAB/CW	P5A00421791 P5R00282948 DGM/CW 04/27/2022
	AB	AC

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M−1994 ASME Y14.35−1999 ASME Y14.3−2003 ASME Y14.1−2005
TOLERANCES: .XX ± .03, .XXX ± .015, ANGLES ± 1°
THIRD ANGLE PROJECTION

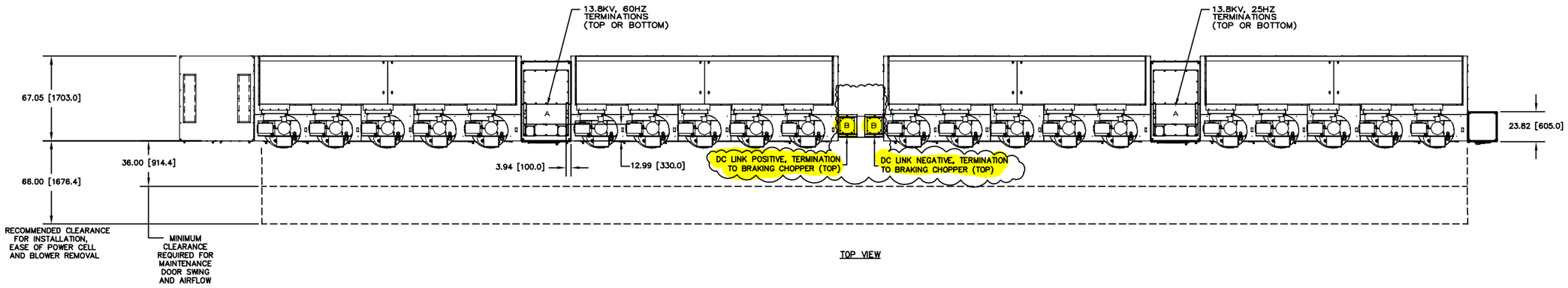
SCALE 1:1 | LAYER XXXX | DATE 08/30/21 | DWGSZ D | DFTR C.DENGLER | ENGR C.WENSKOVITCH

Siemens Industry, Inc.
Large Drive Applications

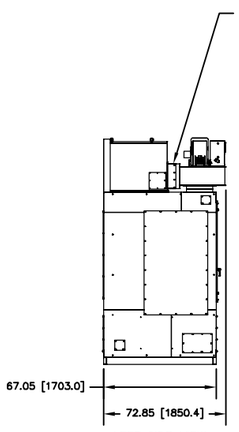
CUSTOMER BARNES ELECTRIC_SWBNO
CUST ORDER NUMBER 560P−00617

TITLE SYSTEM OUTLINE SH150AC,25MVA,144C,TYPE 7 13.8kVin/out,60Hz TO 25Hz
DWG NO A5E51274298A | REV AC
CAD FILE A5E51274298A001 | SHEET NO 1 OF 16

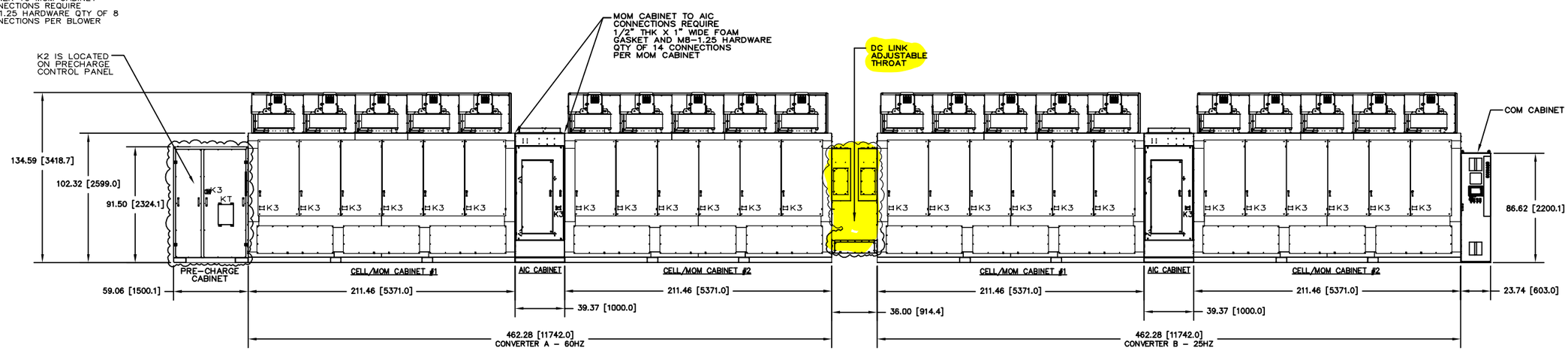
DBORDF



TOP VIEW



LEFT SIDE VIEW
CELL/MOM CABINET



FRONT VIEW

CABINET ACCESS:
A – CUSTOMER MEDIUM VOLTAGE POWER CONNECTIONS: 31.50 [800.0] X 16.14 [410.0]
B – CUSTOMER DC LINK CONNECTIONS TO BRAKING CHOPPER: 9.84 [250.0] X 10.62 [270.0]

APPROVED	X
APPROVED AS NOTED	
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/22/2022
JACOBS Date

ESD SENSITIVE EQUIPMENT

WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

OPTG CODE NO.	
REVISIONS	

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES
INTERPRET DRAWING PER ASME Y14.5M-1994 ASME Y14.38-1999 ASME Y14.5-2003 ASME Y14.1-2005
TOLERANCES: XX ± .03, XXX ± .015, ANGLES ± 1°
THIRD ANGLE PROJECTION

SCALE	1:1
LAYER	XXXX
DATE	08/30/21
DWGSZ	D
DFTR	C.DENGLER
ENGR	C.WENSKOVITCH

Siemens Industry, Inc.
Large Drive Applications

CUSTOMER	BARNES ELECTRIC_SWBNO
CUST. ORDER NUMBER	560P-00617

TITLE	SYSTEM OUTLINE SH150AC,25MVA,144C,TYPE 7 13.8kVin/out,60Hz to 25Hz
DWG NO	A5E51274298A
REV	AC
CAD FILE	A5E51274298A002
SHEET NO	2 OF 16

DBORDF

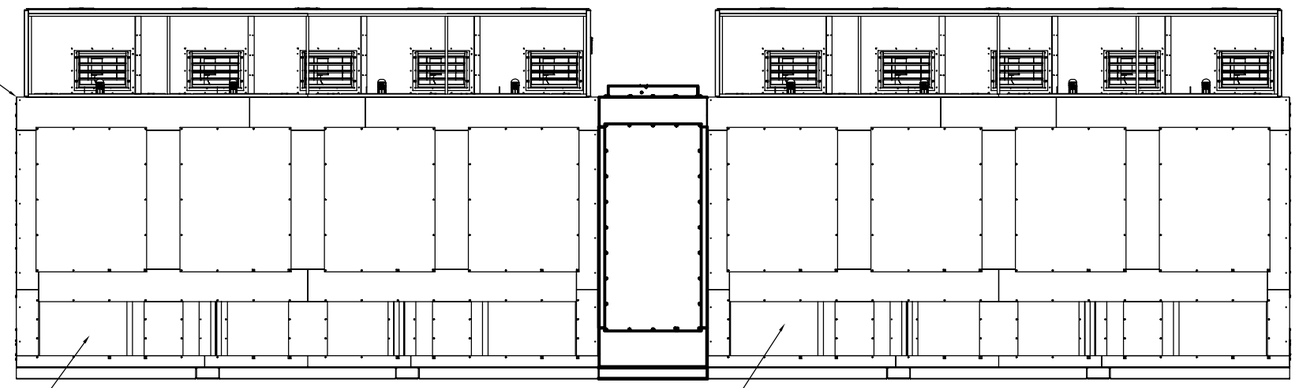
APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

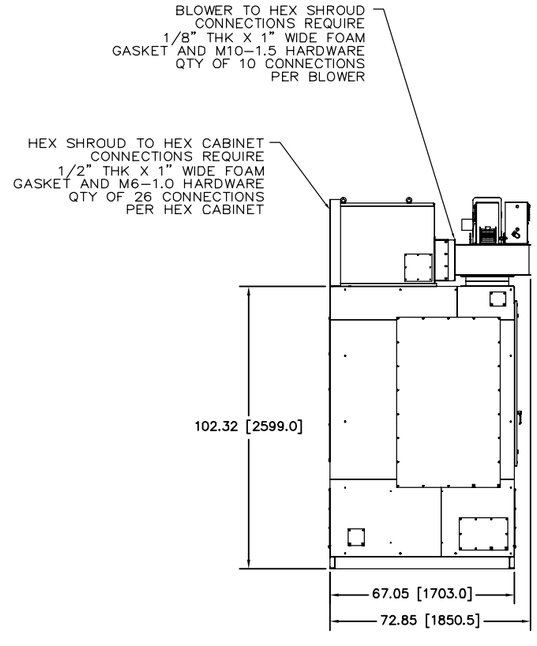
EDGAR WARF — 06/22/2022

JACOBS — Date

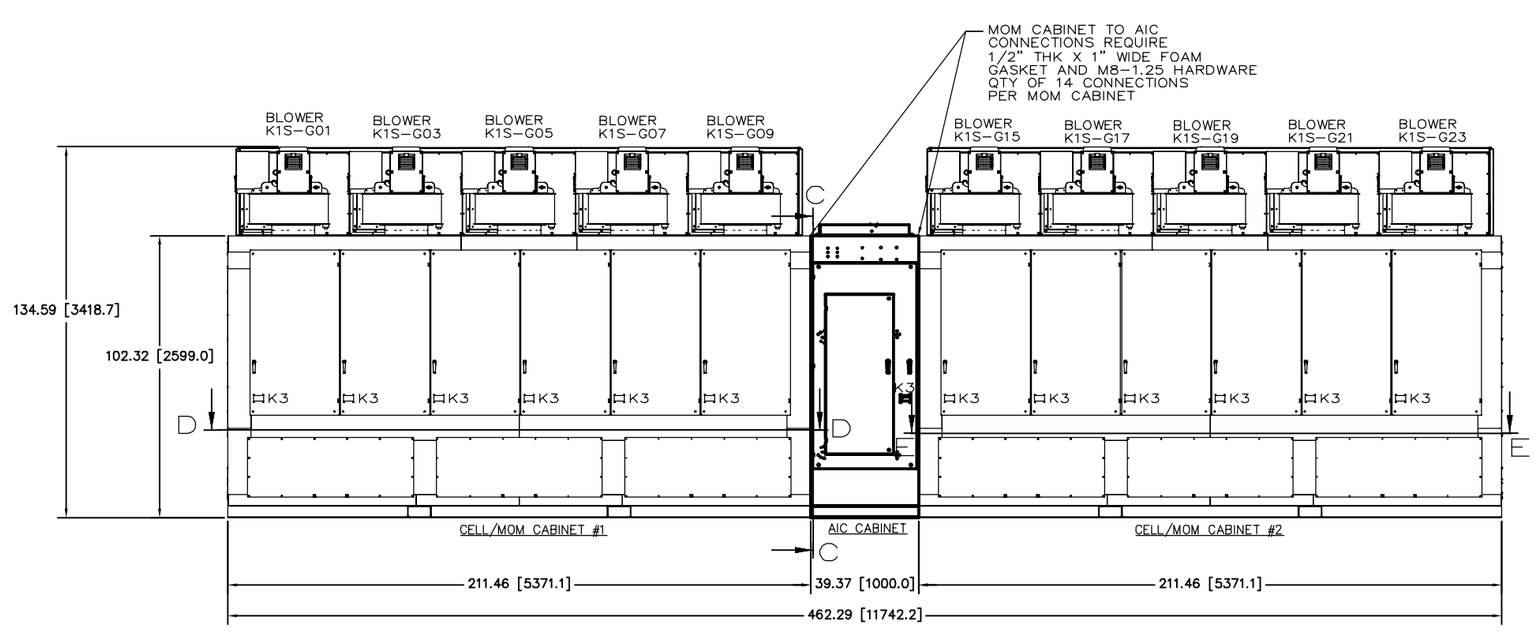
NOTE: THIS DRAWING SET, REPRESENTS THE TWO CONVERTERS (25HZ AND 60HZ). ONLY ONE SET OF CABINETS WAS SHOWN ON THIS DRAWING SO THAT THE VIEWS COULD BE MADE LARGER AND MORE CLEAR. SEE SHEET 2 FOR COMPLETE LINEUP.



REAR VIEW



LEFT SIDE VIEW



FRONT VIEW

NOTE: SECTION VIEWS C-C, D-D, AND E-E ARE SHOWN ON SHEET 8.

ESD SENSITIVE EQUIPMENT

WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

DFTG CODE NO.

REVISIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M-1994 ASME Y14.35-1999 ASME Y14.3-2003 ASME 114.1-2005
TOLERANCES: .XX ± .03, XXX ± .015, ANGLES ± 1°
THIRD ANGLE PROJECTION

SCALE	1:1
LAYER	XXXX
DATE	08/30/21
DWGSZ	D
DFTR	C.DENGLER
ENGR	C.WENSKOVITCH

Siemens Industry, Inc.
Large Drive Applications

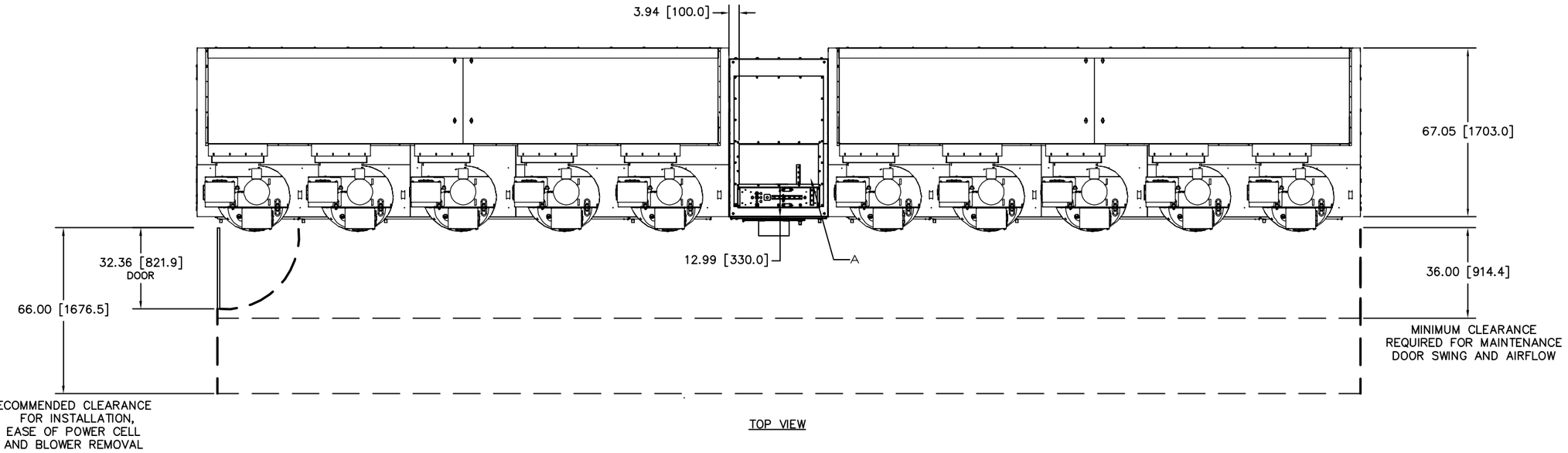
CUSTOMER	BARNES ELECTRIC_SWBNO
CUST ORDER NUMBER	560P-00617

TITLE: SYSTEM OUTLINE
SH150AC,25MVA,144C,TYPE 7
13.8kVin/out,60Hz to 25Hz

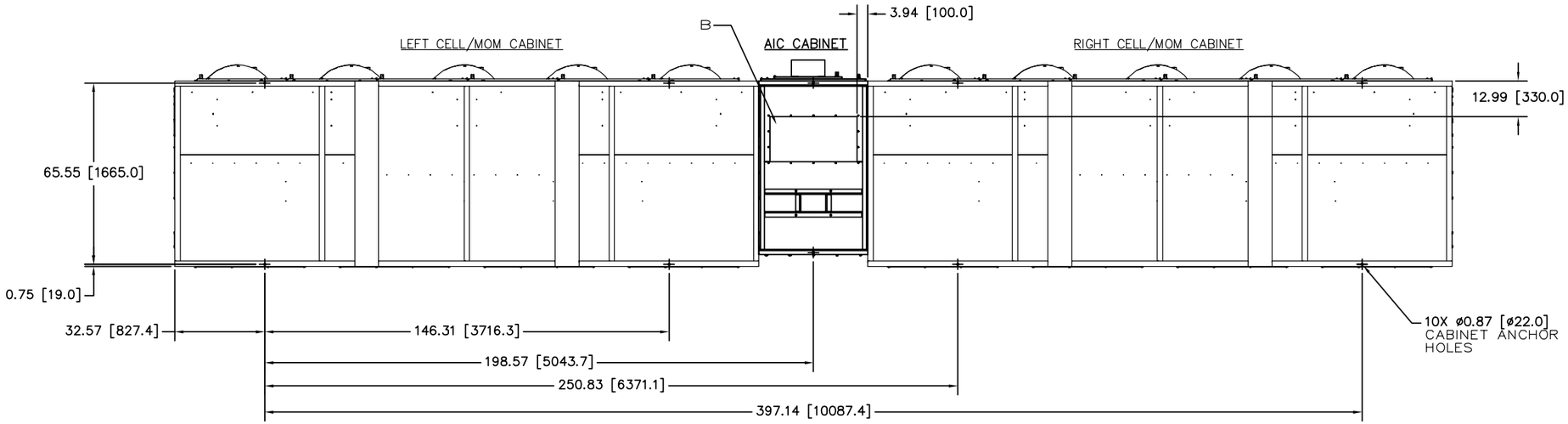
DWG NO	A5E51274298A
REV	AC
CAD FILE	A5E51274298A003
SHEET NO	3 OF 16

DBORDF

NOTE: THIS DRAWING SET, REPRESENTS THE TWO CONVERTERS (25HZ AND 60HZ). ONLY ONE SET OF CABINETS WAS SHOWN ON THIS DRAWING SO THAT THE VIEWS COULD BE MADE LARGER AND MORE CLEAR. SEE SHEET 2 FOR COMPLETE LINEUP.



TOP VIEW



BOTTOM VIEW

CABINET ACCESS:

A – CUSTOMER OUTPUT POWER CONNECTIONS (TOP ENTRY): 31.50 [800,0] X 16.14 [410,0]
B – CUSTOMER OUTPUT POWER CONNECTIONS (BOTTOM ENTRY): 31.50 [800,0] X 16.14 [410,0]

APPROVED	X
APPROVED AS NOTED	
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/22/2022
JACOBS Date

ESD SENSITIVE EQUIPMENT

WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

DFTG CODE NO.

REVISIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M-1994 ASME Y14.38-1999 ASME Y14.3-2003 ASME Y14.1-2005
TOLERANCES: XX ± .03, XXX ± .015, ANGLES ± 1°
THIRD ANGLE PROJECTION

SCALE	1:1
LAYER	XXXX
DATE	08/30/21
DWGSZ	D
DFTR	C.DENGLER
ENGR	C.WENSKOVITCH

Siemens Industry, Inc.
Large Drive Applications

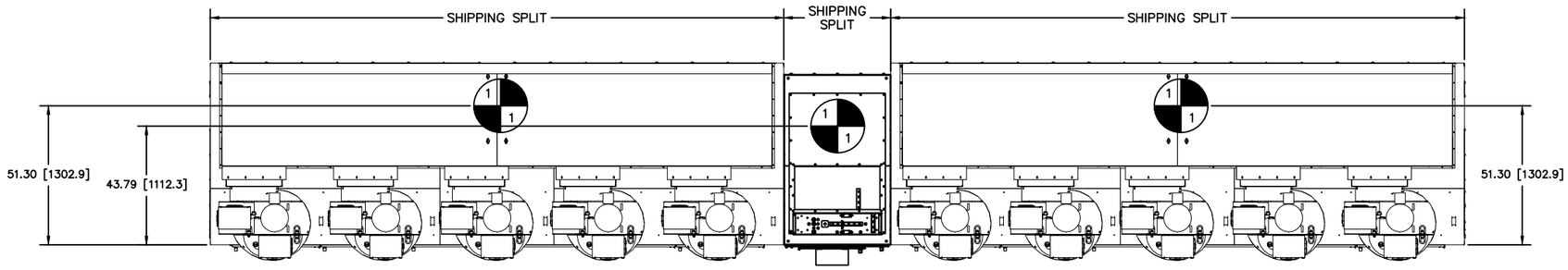
CUSTOMER BARNES ELECTRIC_SWBNO
CUST. ORDER NUMBER 560P-00617

TITLE SYSTEM OUTLINE
SH150AC,25MVA,144C,TYPE 7
13.8kVin/out,60Hz to 25Hz

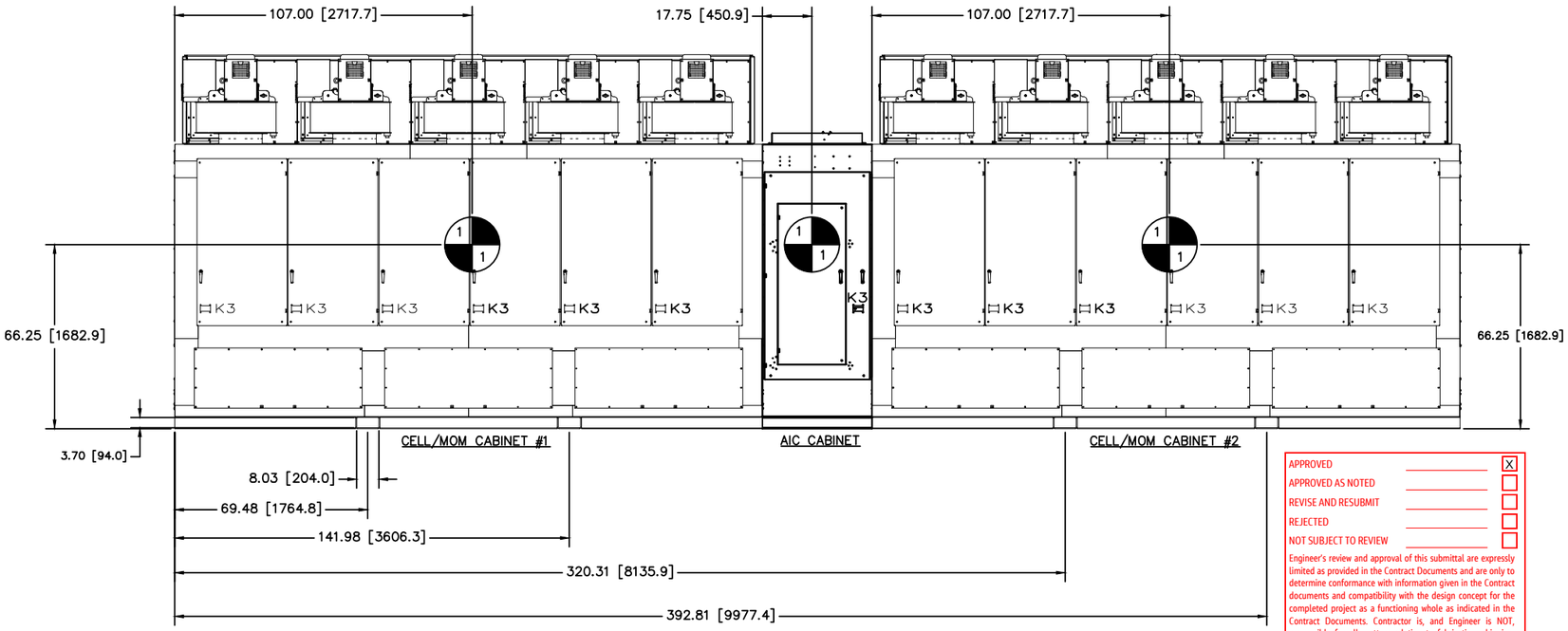
DWG NO A5E51274298A REV AC
CAD FILE A5E51274298A004 SHEET NO 4 OF 16

DBORDF

NOTE: THIS DRAWING SET, REPRESENTS THE TWO CONVERTERS (25HZ AND 60HZ). ONLY ONE SET OF CABINETS WAS SHOWN ON THIS DRAWING SO THAT THE VIEWS COULD BE MADE LARGER AND MORE CLEAR. SEE SHEET 2 FOR COMPLETE LINEUP.



TOP VIEW



FRONT VIEW

TRANSPORTATION, HANDLING, AND STORAGE NOTES:

1. TRANSPORTATION, HANDLING AND STORAGE REQUIREMENTS
   - A. TRANSPORTATION, HANDLING, AND STORAGE SHALL BE IN ACCORDANCE WITH CHAPTER 4 OF THE GH150AC OPERATING INSTRUCTION MANUAL, MEDIUM VOLTAGE VARIABLE FREQUENCY DRIVE, SINAMICS PERFECT HARMONY GH150.
   - B. THE CUSTOMER IS RESPONSIBLE FOR THE PROPER PLANNING AND LIFTING OF ALL CABINETS AND SHIPPING SECTIONS. SIEMENS IS NOT RESPONSIBLE FOR ANY DAMAGE INCURRED AS A RESULT OF THE BUYER OR THEIR REPRESENTATIVE, UNLOADING OR HANDLING ANY CABINET OR SHIPPING SECTION.
2. TRANSPORTATION, HANDLING AND STORAGE GUIDELINES
   - A. THE GENERIC GUIDELINES BELOW ARE INTENDED TO PROVIDE SAFEGUARDS TO BE TAKEN WHEN HANDLING OR LIFTING A CABINET OR SHIPPING SECTION.
   - B. ALL DOORS AND PANELS MUST BE FULLY INSTALLED AND SECURED WITH ALL REQUIRED HARDWARE PRIOR TO LIFTING ANY CABINET OR SHIPPING SECTION.
   - C. THE CABINETS OR SHIPPING SECTIONS MUST BE LEVEL DURING THE LIFT.
   - D. SPEADER BEAMS OR BARS MAY BE NECESSARY TO OBTAIN A LEVEL LIFT AND/OR PREVENT DEFORMING CABINETS.
   - E. PRECAUTIONS MUST BE TAKEN TO ENSURE THE LIFTING STRAPS OR CABLES DO NOT MAR, SCRATCH, OR OTHERWISE DAMAGE CABINETS.
3. CENTER OF GRAVITY
   - A. CENTER OF BALANCE (CB) STICKERS APPLIED TO THE PACKING MATERIAL ON THE CABINET PROVIDE GUIDANCE FOR LIFTING. IF STICKERS ARE MISSING, REFERENCE THE CENTER OF LIFTING DATA SHOWN ON THIS DRAWING.
   - B. WEIGHTS AND CENTER OF GRAVITIES ARE ESTIMATED BASED ON TYPICAL VFD CONFIGURATION. EXACT WEIGHT MAY VARY.
4. VFD MOUNTING SURFACE
   - A. THE VFD MOUNTING SURFACE MUST SATISFY A FLOOR FLATNESS NUMBER OF 38 (MIN. LOCAL, 32) AND A FLOOR LEVELNESS NUMBER OF 25 (MIN. LOCAL, 20) AS PER ACI 117-90 SECTION 4.5.6.1 (AS MEASURED IN ACCORDANCE WITH ASTM E 1155-87).
   - B. ADJACENT MOUNTING SURFACES MUST QUALIFY AS CLASS A PER ACI 117-90 SECTION 4.5.4.
   - C. COMPARABLE VALUES FROM COMPARABLE STANDARDS SUCH AS DIN 18202 - TABLE 3, CSN EN 15620, OR APPROPRIATE NON-CONCRETE SUBSTRATE STANDARDS, WILL SUFFICE.

CABINET	WEIGHT
CELL/MOM #1	17,085LBS [7,750KG]
CELL/MOM #2	17,085LBS [7,750KG]
ARM INDUCTOR	3,747LBS [1,700KG
COMM	966LBS [440KG]
PRECHARGE	4,061LBS [1,842KG]
MOM CABINET FANS (EACH)	352LBS [160KG]
HEX CABINET #1	8,707LBS [3,949KG]
HEX CABINET #2	8,707LBS [3,949KG]
MOM CABINET AIR SHROUDS (EACH)	1,000LBS [453KG]
BRAKING CHOPPER	8,462LBS [3846KG]

*WEIGHTS ARE ESTIMATED AND CAN VARY BASED ON DRIVE CONFIGURATION

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/22/2022

JACOBS Date

1 1 — INDICATES CENTER OF GRAVITY

ESD SENSITIVE EQUIPMENT

WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

DFTG CODE NO.

REVISIONS

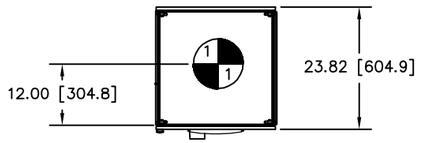
UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M-1994 ASME Y14.38-1999 ASME Y14.3-2003 ASME Y14.1-2005
TOLERANCES: XX ± .03, XXX ± .015, ANGLES ± 1°
THIRD ANGLE PROJECTION

SCALE 1:1
LAYER XXXX
DATE 08/30/21
DWGSZ D
DFTR C.DENGLER
ENGR C.WENSKOVITCH

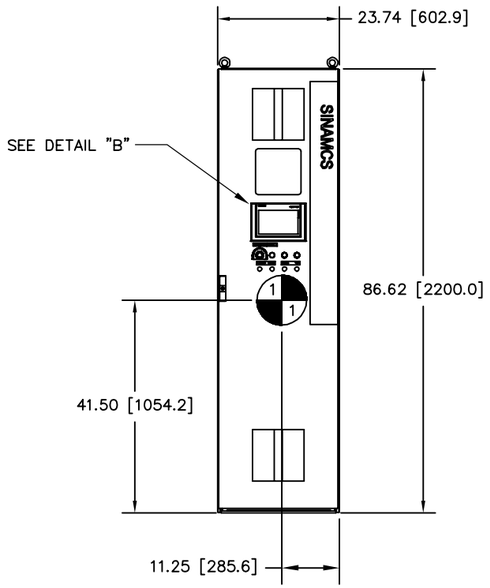
Siemens Industry, Inc.
Large Drive Applications
CUSTOMER BARNES ELECTRIC_SWBNO
CUST ORDER NUMBER 560P-00617

TITLE SYSTEM OUTLINE
SH150AC,25MVA,144C,TYPE 7
13.8kVin/out,60Hz to 25Hz
DWG NO A5E51274298A
REV AC
CAD FILE A5E51274298A005
SHEET NO 5 OF 16

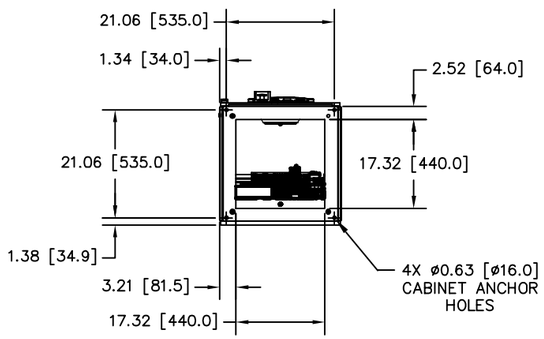
DBORDF



TOP VIEW

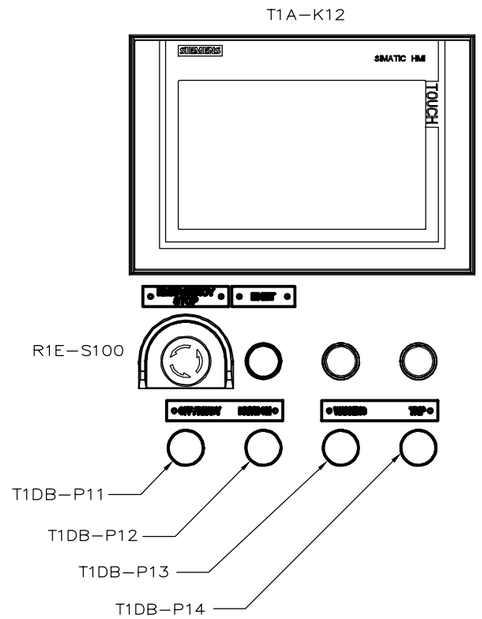


FRONT VIEW



BOTTOM VIEW

COM CABINET ACCESS TOP OR BOTTOM
- CONTRACTOR SUPPLIED 120V CONTROL POWER (R1B–X03 TERMINALS)
- CONTRACTOR SUPPLIED 120V HEATER POWER (R1C–X06 TERMINALS)
- CONTRACTOR SUPPLIED 120V MOTOR SPACE HEATER PWER (R1BD–X01 TERMINALS)
- INPUT VOLTAGE SENSING FEEDBACK 100V (T1CA–X1 TERMINALS)
- INTERCONNECT 24VDC TO MOM CABINET (R1D–X12 TERMINALS)
- INTERCONNECT 24VDC TO PRECHARGE CABINET (R1D–X12 TERMINALS)
- MOTOR SPACE HEATER OUTPUT CONNECTION (R1BD–X01 TERMINALS)
- INTERCONNECT DO AUXILIARY ONOFF SIGNAL TO PRECHARGE CABINET (T1A–X132 TERMINALS)
- INTERCONNECT SAFETY RELAY CIRCUIT (RIF–X11 TERMINALS)
- INTERCONNECT DRIVE CLIQ CONNECTION TO MOM CABINET (T1A–K11–X101 TERMINAL)
- CONTRACTOR EMERGENCY STOP STATUS (R1E–X11 TERMINALS)
- CONTRACTOR REMOTE EMERGENCY STOP INPUT (R1E–X11 TERMINALS)
- CONTRACTOR DRIVE ENABLE INPUT (T1A–K1–X132 TERMINAL)



DETAIL "B"

DOOR DEVICE NOMENCLATURE:

T1EB–S11	– OFF–LOCAL–REMOTE
R1E–S100	– E–STOP
T1A–K12	– HMI MONITOR
T1DB–P11	– WH, OFF/READY
T1DB–P12	– GN, DRIVE ON
TIDB–P13	– YE, WARNING
T1DB–P14	– RD, TRIP

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF	06/22/2022
JACOBS	Date

1 1 – INDICATES CENTER OF GRAVITY

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

COM CABINET

DFTG CODE NO.	
REVISIONS	

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994 ASME Y14.38–1999 ASME Y14.3–2003 ASME Y14.1–2005
TOLERANCES: .XX ± .03 .XXX ± .015
ANGLES ± 1°
THIRD ANGLE PROJECTION

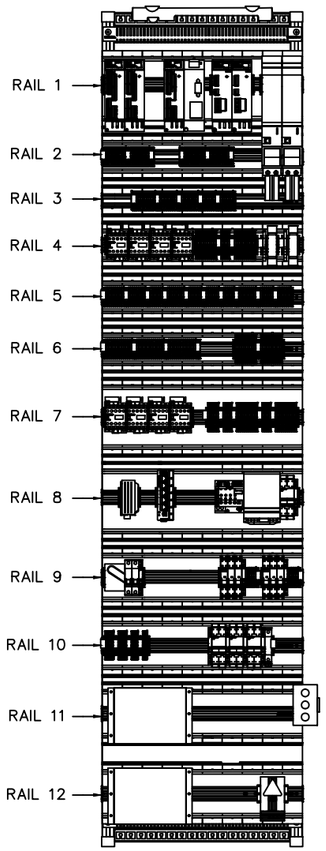
SCALE	1:1
LAYER	XXXX
DATE	08/30/21
DWGSZ	D
DFTR	C.DENGLER
ENGR	C.WENSKOVITCH

Siemens Industry, Inc.
Large Drive Applications

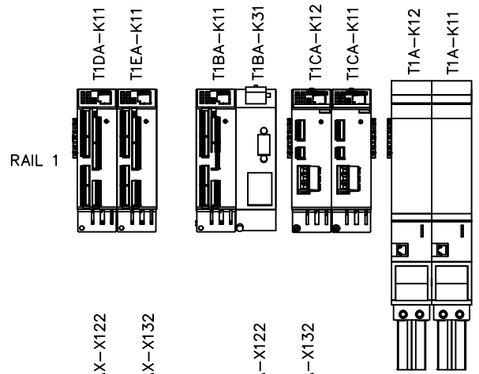
CUSTOMER	BARNES ELECTRIC_SWBNO
CUST ORDER NUMBER	560P–00617

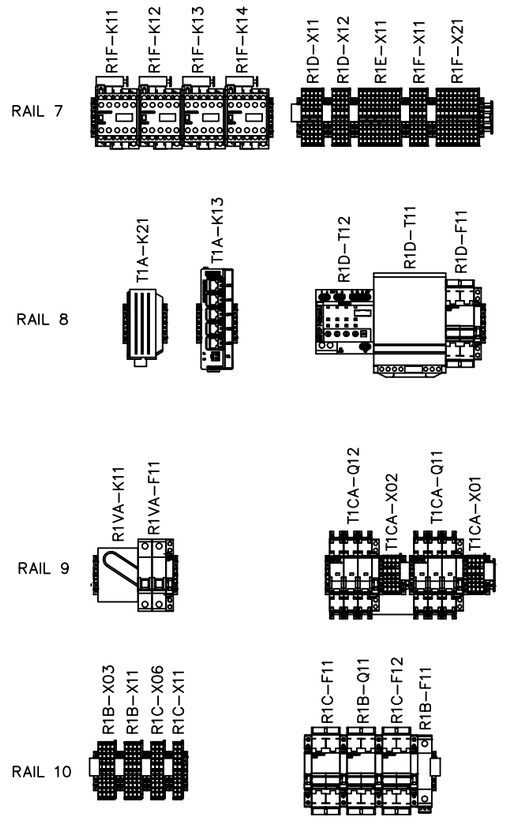
TITLE	SYSTEM OUTLINE SH150AC,25MVA,144C,TYPE 7 13.8kVin/out,60Hz to 25Hz
DWG NO	A5E51274298A
REV	AC
CAD FILE	A5E51274298A006
SHEET NO	6 OF 16

DBORDF



F–F
COM PANEL
SCALE 1:8
CABINET NOT SHOWN





DEVICE NOMENCLATURE:

T1DA–K11	– TERMINAL MODULE
T1EA–K11	– TERMINAL MODULE
T1BA–K11	– TERMINAL MODULE
T1BA–K31	– DEVICE MONITOR
T1CA–K12	– VOLTAGE SENSING MODULE
T1CA–K11	– VOLTAGE SENSING MODULE
T1A–K12	– CONTROL UNIT
T1A–K11	– CONTROL UNIT
T1AX–X122	– TERMINAL MOD QUATTRO
T1AX–X132	– TERMINAL MOD QUATTRO
T1A–X122	– TERMINAL MOD QUATTRO
T1A–X132	– TERMINAL MOD QUATTRO
T1EA–X520	– TERMINAL MOD QUATTRO
T1EA–X521	– TERMINAL MOD QUATTRO
T1EA–X530	– TERMINAL MOD QUATTRO
T1EA–X541	– TERMINAL MOD QUATTRO
T1EA–X542	– TERMINAL MOD QUATTRO
R1FA–K11	– ACC CONTACTOR
R1FA–K12	– ACC CONTACTOR
R1FA–K13	– ACC CONTACTOR
R1FA–K14	– ACC CONTACTOR
R1EA–X11	– TERMINAL MOD QUATTRO
R1FA–X11	– TERMINAL MOD QUATTRO
R1EA–X21	– TERMINAL MOD QUATTRO
T1A–K23	– TERMINAL PLC–RSC
R1EA–K11	– RELAY
T1A–K22	– TERMINAL PLC–RSC
R1E–K11	– RELAY
T1BA–K11–X520	– TERMINAL MOD QUATTRO
T1BA–K11–X521	– TERMINAL MOD QUATTRO
T1BA–K1–X522	– TERMINAL MOD QUATTRO
T1BA–K1–X530	– TERMINAL MOD QUATTRO
T1BA–K1–X541	– TERMINAL MOD QUATTRO
T1BA–K1–X542	– TERMINAL MOD QUATTRO
T1DA–X520	– TERMINAL MOD QUATTRO
T1DA–X521	– TERMINAL MOD QUATTRO
T1DA–X530	– TERMINAL MOD QUATTRO
T1DA–X542	– TERMINAL MOD QUATTRO
T1BA–K31–X520	– TERMINAL MOD QUATTRO
T1BA–K31–X521	– TERMINAL MOD QUATTRO
T1BA–K31–X522	– TERMINAL MOD QUATTRO
R1D–X21	– TERMINAL MOD QUATTRO
R1D–X22	– TERMINAL MOD QUATTRO
R1F–K11	– ACC CONTACTOR
R1F–K12	– ACC CONTACTOR
R1F–K13	– ACC CONTACTOR
R1F–K14	– ACC CONTACTOR
R1D–X11	– TERMINAL MOD QUATTRO
R1D–X12	– TERMINAL MOD QUATTRO
R1E–X11	– TERMINAL MOD QUATTRO
R1F–X11	– TERMINAL MOD QUATTRO
R1F–X21	– TERMINAL MOD QUATTRO
T1A–K21	– COMPUTER (PC) DRIVE
T1A–K13	– IE ENTRY LEVEL SWITCH UNMANAGED X005
R1D–T12	– SITOP 10A
R1D–T11	– POWER SUPPLY 6EF
R1D–F11	– FUSE DEVISE 2P
R1VA–K11	– CONTROL TEMP 8MR2170
R1VA–F11	– CIRCUIT BRKR 16A 2P
T1CA–Q12	– FUSE DEVICE 0.3A, 3P
T1CA–X02	– TERMINAL MOD QUATTRO 2P 24A
T1CA–Q11	– FUSE DEVICE 0.3A, 3P
T1CA–X01	– TERMINAL MOD QUATTRO 2P 24A
R1B–X03	– TERM MOD QUATTRO 2P 24A
R1B–X11	– TERM MOD QUATTRO 2P 24A
R1C–X06	– TERM MOD QUATTRO 2P 24A
R1C–X11	– TERM MOD QUATTRO 2P 24A
R1C–F11	– ACC FUSE 5ST, SWITCH PWR 25A 2P
R1B–Q11	– ACC FUSE 5ST, SWITCH PWR 25A 2P
R1C–F12	– ACC FUSE 5ST, SWITCH PWR 25A 2P
R1B–F11	– FUSE DEVICE 10A 2P
R1B–K11	– FILTER 1PH 250VAC 50/60 HZ
R1C–K11	– FILTER 1PH 250VAC 50/60 HZ
R1VA–E11	– HEATING ELEMENT 100E 240V

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 06/22/2022
JACOBS — Date

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

COM CABINET PANEL

DFTG CODE NO.

REVISIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994 ASME Y14.36–1999 ASME Y14.3–2003 ASME Y14.1–2005
TOLERANCES: .XX ± .03, .XXX ± .015, ANGLES ± 1°
THIRD ANGLE PROJECTION

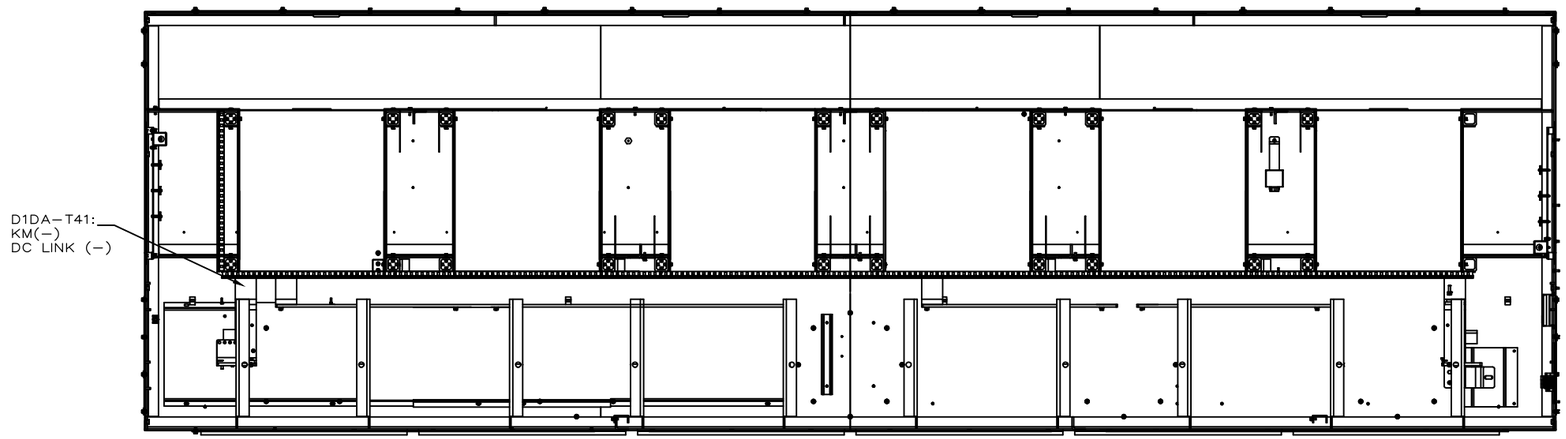
SCALE	1:1
LAYER	XXXX
DATE	08/30/21
DWGSZ	D
DFTR	C.DENGLER
ENGR	C.WENSKOVITCH

Siemens Industry, Inc.
Large Drive Applications

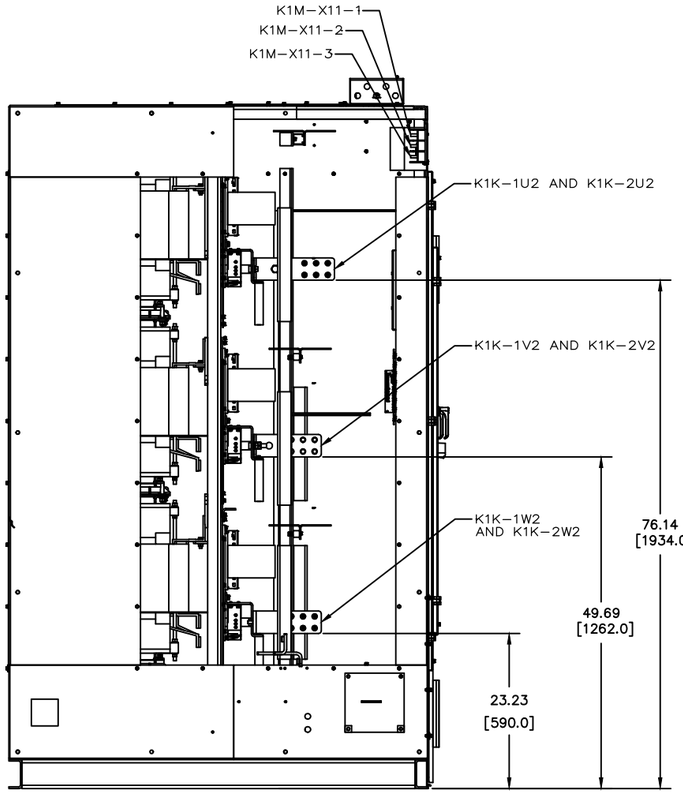
CUSTOMER BARNES ELECTRIC_SWBNO
CUST ORDER NUMBER 560P–00617

TITLE: SYSTEM OUTLINE SH150AC,25MVA,144C,TYPE 7 13.8kVin/out,60Hz to 25Hz
DWG NO: A5E51274298A
REV: AC
CAD FILE: A5E51274298A007
SHEET NO: 7 OF 16

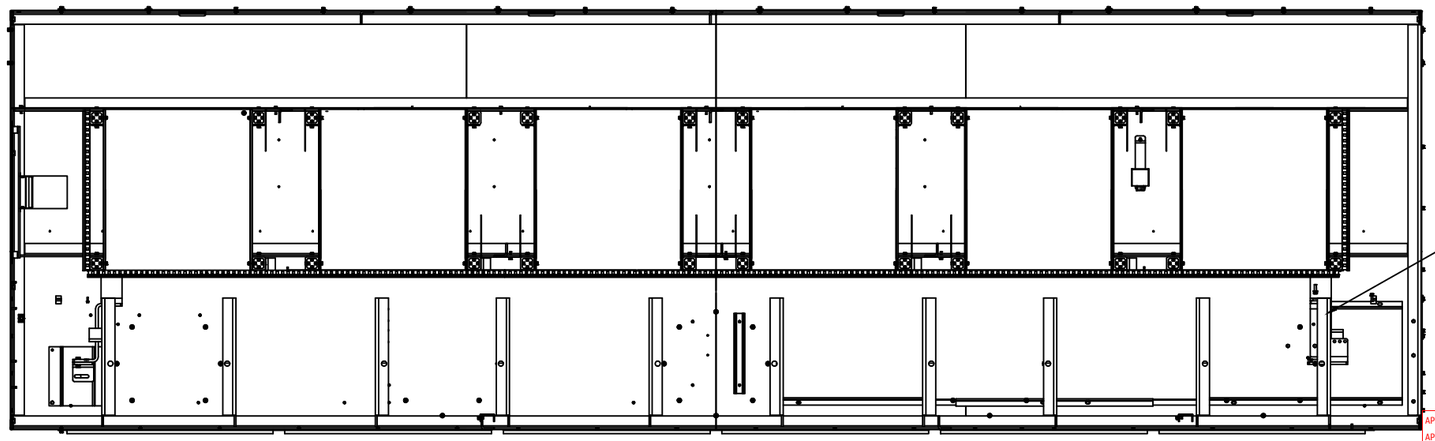
DBORDF



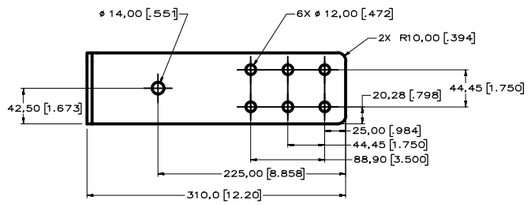
D–D
SCALE 1:10



C–C
SCALE 1:10



E–E
SCALE 1:10



BUS DETAIL
(ENLARGED FOR CLARITY)

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 06/22/2022
JACOBS — Date

DEVICE NOMENCLATURE:

K1K–1U2	– 60Hz OUTPUT POWER CONNECTION
K1K–1V2	– 60Hz OUTPUT POWER CONNECTION
KIK–1W2	– 60Hz OUTPUT POWER CONNECTION
K1K–2U2	– 25Hz OUTPUT POWER CONNECTION
K1K–2V2	– 25Hz OUTPUT POWER CONNECTION
KIK–2W2	– 25Hz OUTPUT POWER CONNECTION

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

DFTG CODE NO.

REVISIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994 ASME Y14.36–1999 ASME Y14.3–2003 ASME Y14.1–2005
TOLERANCES: .XX ± .03 .XXX ± .015 ANGLES ± 1°
THIRD ANGLE PROJECTION

SCALE 1:1
LAYER XXXX
DATE 08/30/21
DWGSZ D
DFTR C.DENGLER
ENGR C.WENSKOVITCH

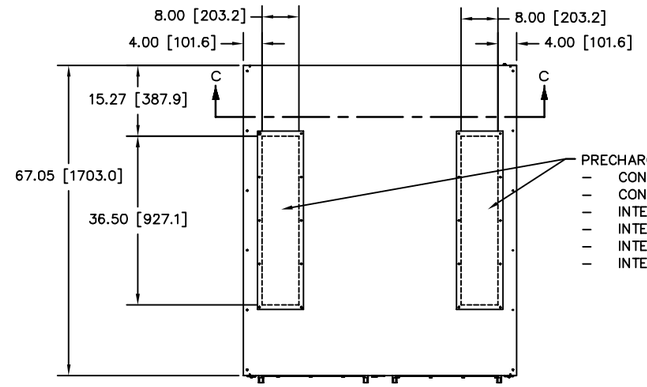
Siemens Industry, Inc.
Large Drive Applications
CUSTOMER BARNES ELECTRIC_SWBNO
CUST ORDER NUMBER 560P–00617

TITLE SYSTEM OUTLINE
SH150AC,25MVA,144C,TYPE 7
13.8kVin/out,60Hz to 25Hz
DWG NO A5E51274298A
REV AC
CAD FILE A5E51274298A008
SHEET NO 8 OF 16

DBORDF

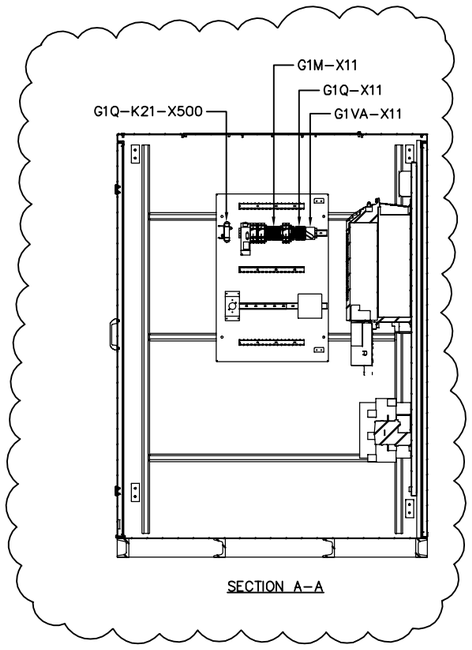
DEVICE NOMENCLATURE:

G1M–X14–1	– AUXILIARY POWER CONNECTION
G1M–X14–2	– AUXILIARY POWER CONNECTION
G1M–X14–3	– AUXILIARY POWER CONNECTION
G1Q–X11	– 24VDC INTERCONNECT
G1M–X11	– AUX ON/OFF SIGNAL INTERCONNECT
G1VA–X11	– SPACE HEATER POWER CONNECTION
G1Q–K21–X500	– DRIVE CLIQ CABLE INTERCONNECT
KT	– KEY INTERLOCK TRANSFER BOX
K2	– PRECHARGE CIRCUIT BREAKER KEY INTERLOCK
K3	– DOOR KEY INTERLOCK
AM	– POSITIVE DC LINK CONNECTION
KM	– NEGATIVE DC LINK CONNECTION

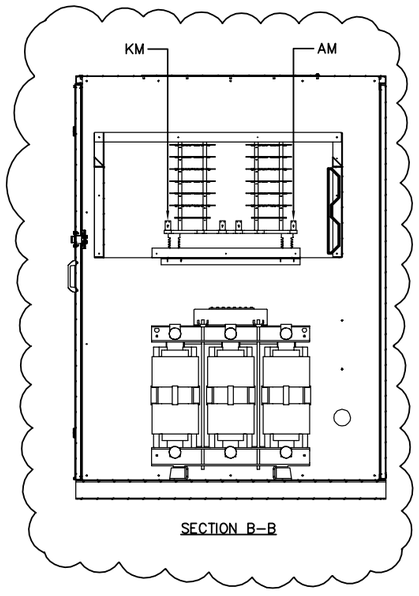


PRECHARGE CABINET ACCESS TOP
- CONTRACTOR SUPPLIED 460V AUX POWER FOR PRECHARGE CIRCUIT (G1M–X14 TERMINALS)
- CONTRACTOR SUPPLIED 120V HEATER POWER (G1VA–X11 TERMINALS)
- INTERCONNECT 24VDC FROM CONTROL CABINET (G1Q–X11 TERMINALS)
- INTERCONNECT DC BUS VOLTAGE FROM BLM CABINET (G1M–T53, G1M–T55 TERMINALS)
- INTERCONNECT DO AUXILIARY ONOFF SIGNAL TO COM CABINET (G1M–X11 TERMINALS)
- INTERCONNECT DRIVE CLIQ CONNECTION TO COM CABINET (G1Q–K21–X500 TERMINAL)

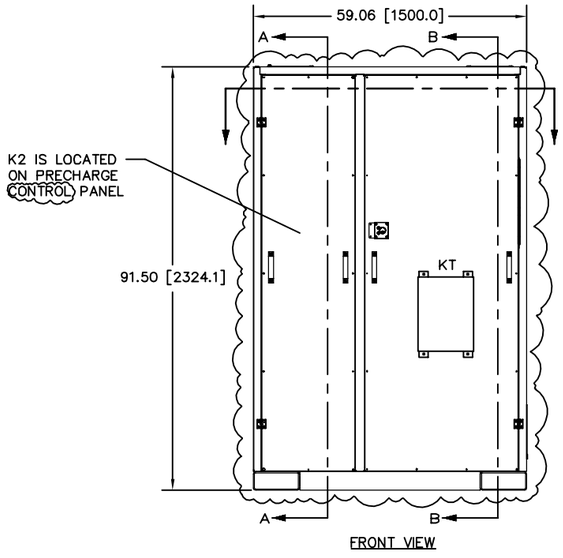
TOP VIEW



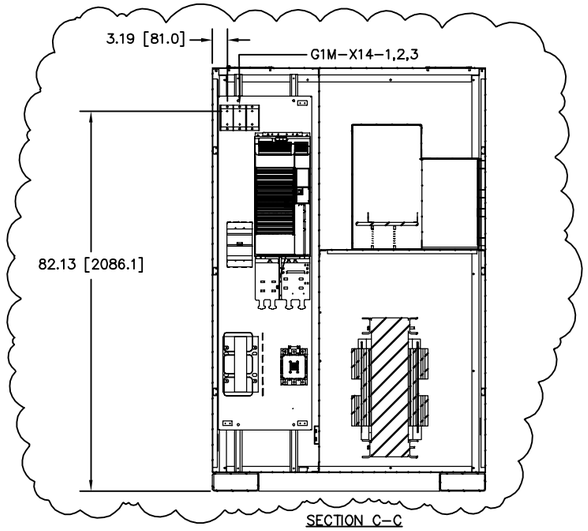
SECTION A–A



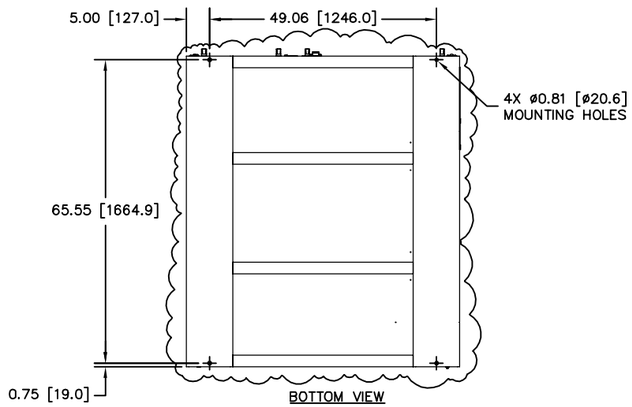
SECTION B–B



FRONT VIEW



SECTION C–C



BOTTOM VIEW

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/28/2022
JACOBS Date

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

PRE–CHARGE CABINET

DFTG CODE NO.
REVISIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994 ASME Y14.36–1996 ASME Y14.3–2003 ASME Y14.1–2005
TOLERANCES: XX ± .03, XXX ± .015, ANGLES ± 1°
THIRD ANGLE PROJECTION

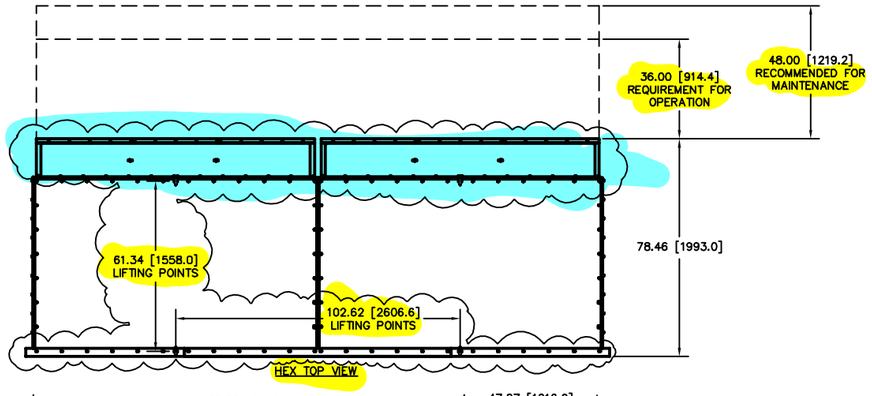
SCALE	1:1
LAYER	XXXX
DATE	08/30/21
DWGSZ	D
DFTR	C.DENGLER
ENGR	C.WENSKOVITCH

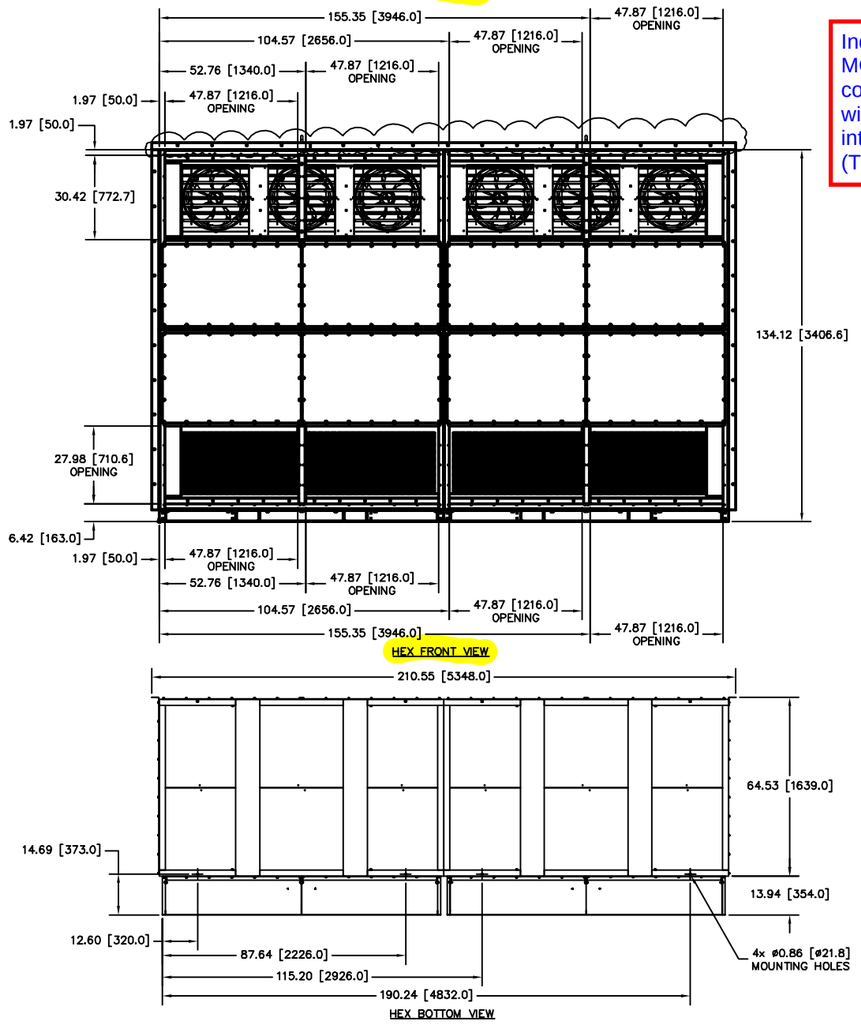
Siemens Industry, Inc.
Large Drive Applications

CUSTOMER	BARNES ELECTRIC_SWBNO
CUST ORDER NUMBER	560P–00617

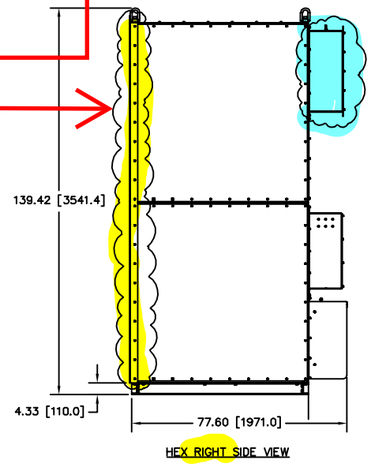
TITLE: SYSTEM OUTLINE SH150AC,25MVA,144C,TYPE 7 13.8kVin/out,60Hz to 25Hz
DWG NO: A5E51274298A REV: AC
CAD FILE: A5E51274298A009
SHEET NO: 9 OF 16

DBORDF

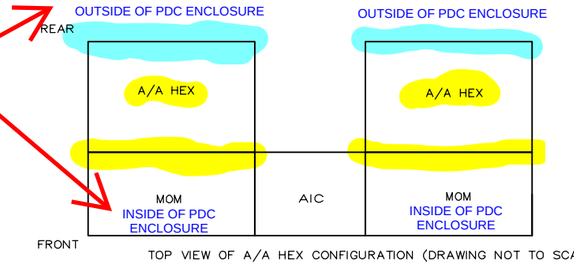




Indicate HEX to MOM cabinet connection, along with PDC wall interface. (TYP)

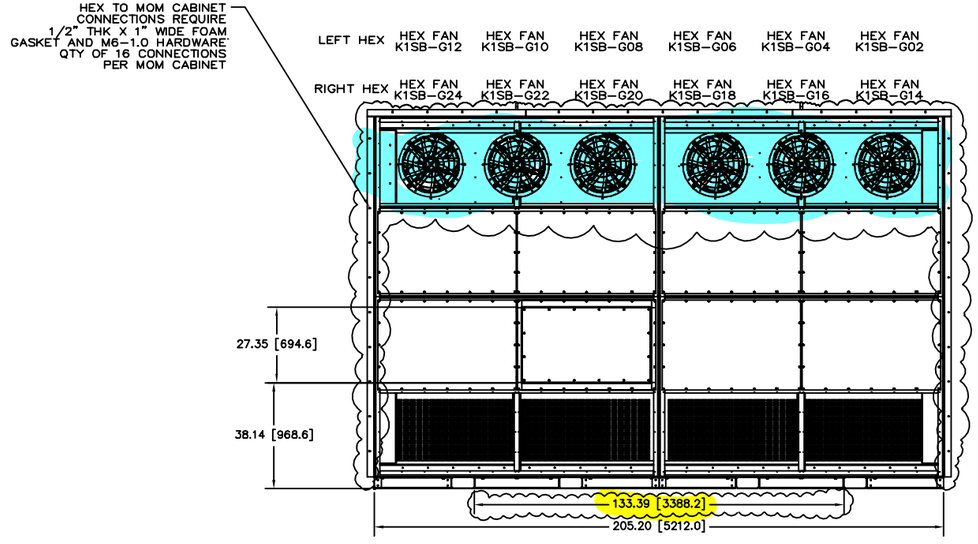


Add text. (TYP)



TOP VIEW OF A/A HEX CONFIGURATION (DRAWING NOT TO SCALE)

NOTE: FOOTPRINT OF DRIVE WILL INCREASE BY DIMENSIONS OF HEX SHOWN ON THIS SHEET.



HEX REAR VIEW

Add text:
(FACING OUTSIDE OF SFC PDC ENCLOSURE)

APPROVED
APPROVED AS NOTED [X]
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/22/2022
JACOBS Date

ESD SENSITIVE EQUIPMENT

WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

DFTG CODE, NO.	
REVISIONS	

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS IN INCHES
INTERPRET DRAWING PER
ASME Y14.5M-1994
ASME Y14.38-1999
ASME Y14.5-2003
ASME Y14.1-2005
TOLERANCES: .XX ± .03
.XXX ± .015
ANGLES ± 1°
THIRD ANGLE PROJECTION

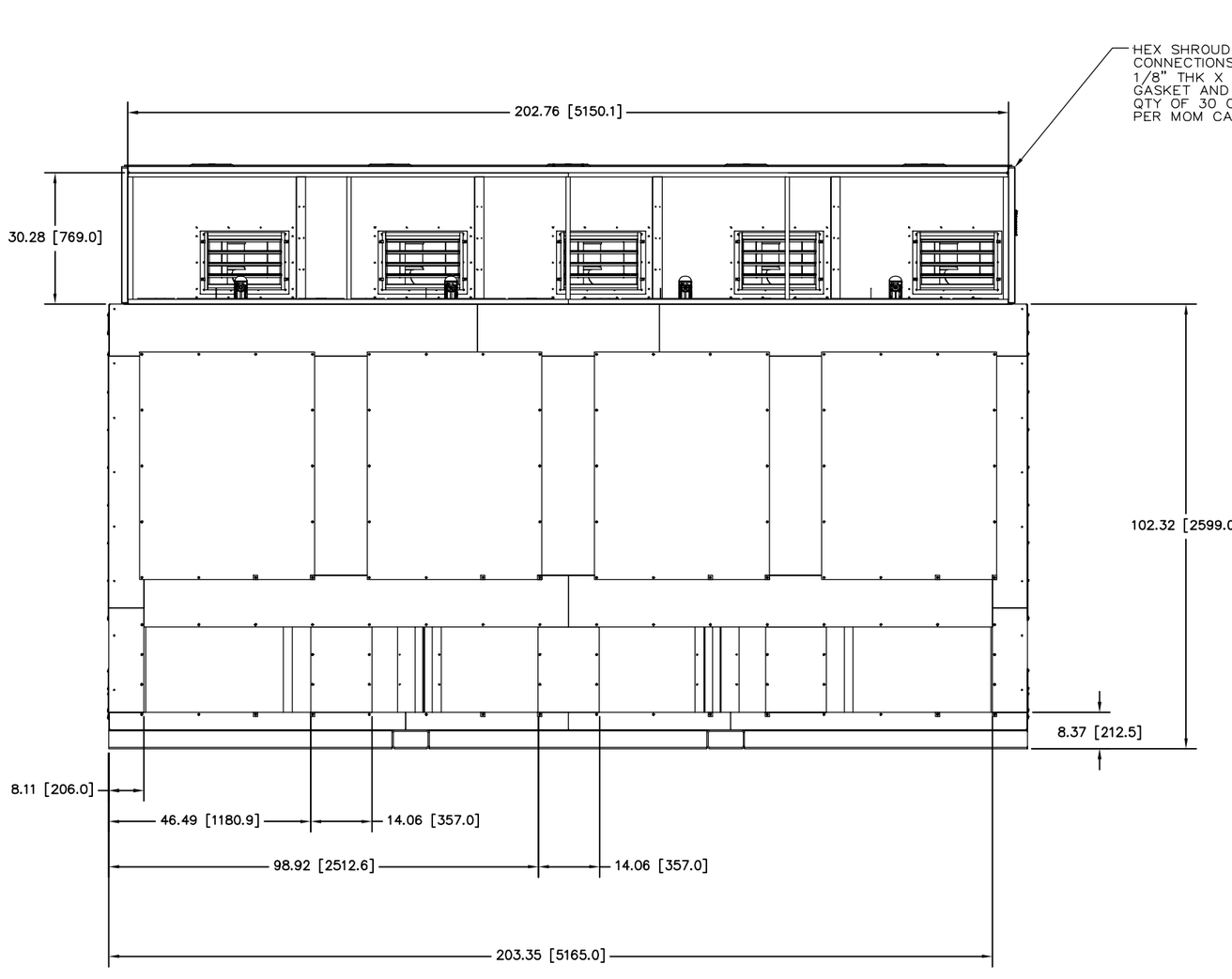
SCALE	1:1
LAYER	XXXX
DATE	08/30/21
DWGSIZ	D
DFTR	C.DENGLER
ENGR	C.WENSKOVITCH

Siemens Industry, Inc.
Large Drive Applications

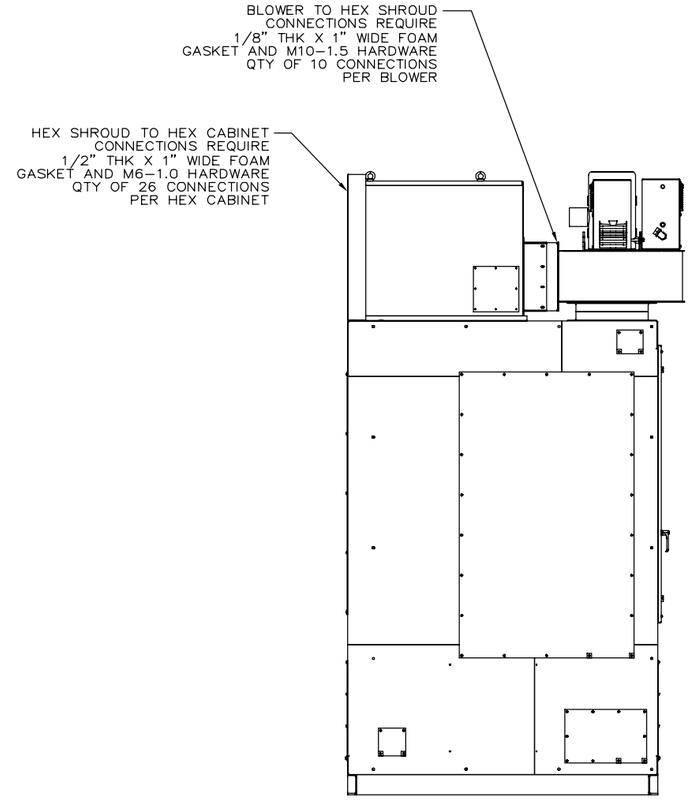
CUSTOMER	BARNES ELECTRIC_SWBNO
CUST ORDER NUMBER	560P-00617

TITLE	SYSTEM OUTLINE SH150AC,25MVA,144C,TYPE 7 13.8kVin/out,60Hz to 25Hz
DWG NO	A5E51274298A
REV	AC
CAD FILE	A5E51274298A010
SHEET NO	10 OF 16

DBORDF



REAR VIEW WITH AIR–AIR HEX SHROUD



Indicate RIGHT or LEFT view, along with what portion of HEX is inside or outside of SFC PDC enclosure. (TYP)

APPROVED		☐
APPROVED AS NOTED		☒
REVISE AND RESUBMIT		☐
REJECTED		☐
NOT SUBJECT TO REVIEW		☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/22/2022
JACOBS Date

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

DFTG CODE NO.

REVISIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994 ASME Y14.38–1999 ASME Y14.3–2003 ASME Y14.1–2005
TOLERANCES: .XX ± .03 .XXX ± .015 ANGLES ± 1°
THIRD ANGLE PROJECTION

SCALE	1:1
LAYER	XXXX
DATE	08/30/21
DWGSZ	D
DFTR	C.DENGLER
ENGR	C.WENSKOVITCH

Siemens Industry, Inc.
Large Drive Applications

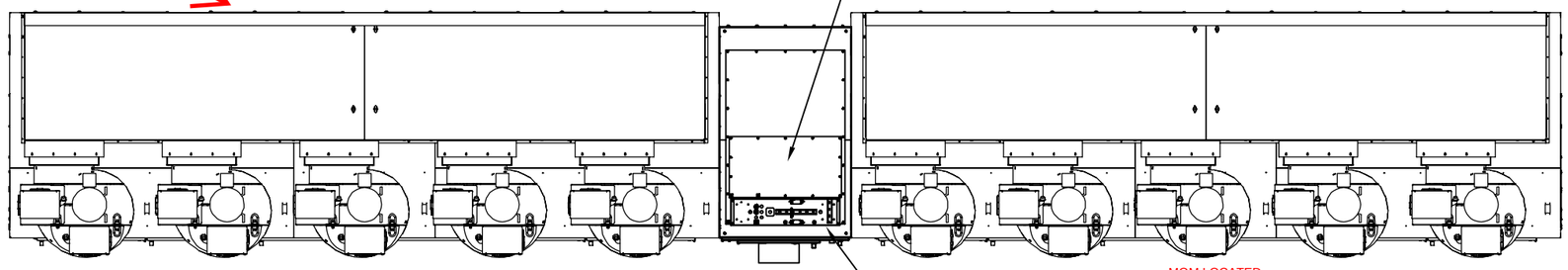
CUSTOMER BARNES ELECTRIC_SWBNO
CUST ORDER NUMBER 560P–00617

TITLE SYSTEM OUTLINE
SH150AC,25MVA,144C,TYPE 7
13.8kVin/out,60Hz to 25Hz

DWG NO A5E51274298A REV AC
CAD FILE A5E51274298A011 SHEET NO 11 OF 16

DBORDF

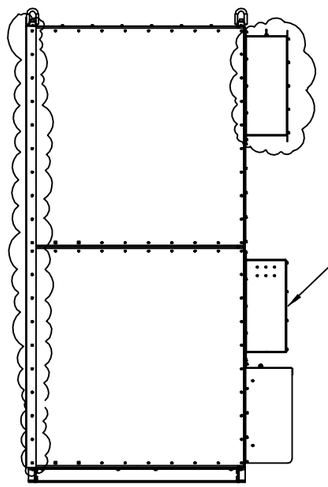
Indicate MOM to HEX interface?



TOP VIEW

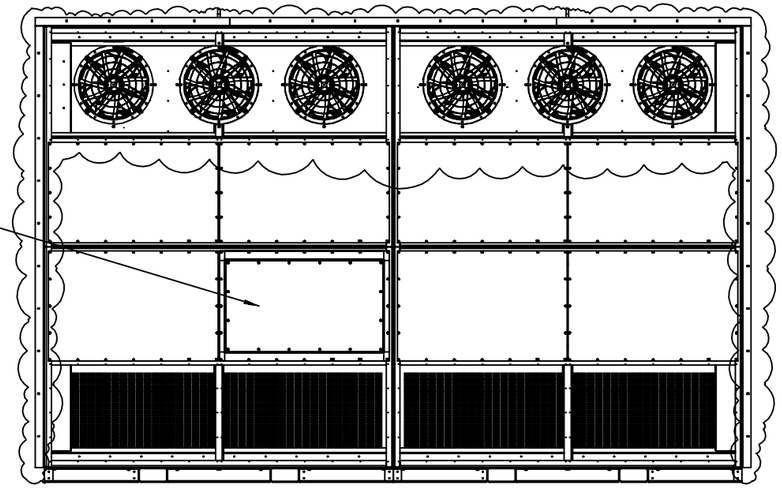
AIC CABINET / MOM CABINET ACCESS TOP OR BOTTOM
– OUTPUT POWER TERMINALS (K1K–1U2, K1K–1V2 AND K1K–1W2 TERMINALS)

AIC CABINET / COM CABINET AUXILIARY POWER ACCESS TOP OR BOTTOM
- CONTRACTOR SUPPLIED 120V HEATER POWER (D1VA–X11 TERMINALS)
- CONTRACTOR SUPPLIED 120V CONTROL POWER FOR CONTROL AND GROUND FAULT MONITORING (D1X–X21 TERMINALS)
- INTERCONNECT SAFETY RELAY CIRCUIT (K1M–X32 TERMINALS)
- INTERCONNECT DRIVE CLIQ CONNECTION TO COM CABINET (K1R–A11–X200 TERMINAL)
- INTERCONNECT MODBUS RTU TO MOM CABINET BLOWER VFDS (K1R–X16 TERMINALS)
- INTERCONNECT DRIVE CLIQ CONNECTION TO PRECHARGE CABINET (K1R–A11–X201 TERMINALS)
- INTERCONNECT 24VDC FROM CONTROL CABINET
- INPUT AVT 24KV VOLTAGE SENSING FEEDBACK FIBER OPTIC INTERCONNECT
- INPUT AVT 6.6KV VOLTAGE SENSING FEEDBACK FIBER OPTIC INTERCONNECT
- CONTRACTOR SUPPLIED 460V AUX POWER FOR CELL CABINET FANS (K1SE–X11 TERMINALS)
- INTERCONNECT WIRING TO HEX SPACE HEATERS (D1VA–X11 TERMINALS)



HEX LEFT SIDE

- CONTRACTOR SUPPLIED 460V AUX POWER FOR HEX FANS (K1SE–X14 TERMINALS)
- INTERCONNECT MODBUS RTU TO MOM CABINET (K1SE–X34 TERMINAL)
- INTERCONNECT WIRING TO 120V SPACE HEATER POWER (K1VB–X12 TERMINALS)



HEX REAR

APPROVED ____ [ ]
APPROVED AS NOTED ____ [X]
REVISE AND RESUBMIT ____ [ ]
REJECTED ____ [ ]
NOT SUBJECT TO REVIEW ____ [ ]

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/22/2022
JACOBS Date

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

DFTG CODE NO.

REVISIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994 ASME Y14.38–1999 ASME Y14.3–2003 ASME Y14.1–2005
TOLERANCES: .XX ± .03 .XXX ± .015 ANGLES ± 1°
THIRD ANGLE PROJECTION

SCALE 1:1
LAYER XXXX
DATE 08/30/21
DWGSZ D
DFTR C.DENGLER
ENGR C.WENSKOVITCH

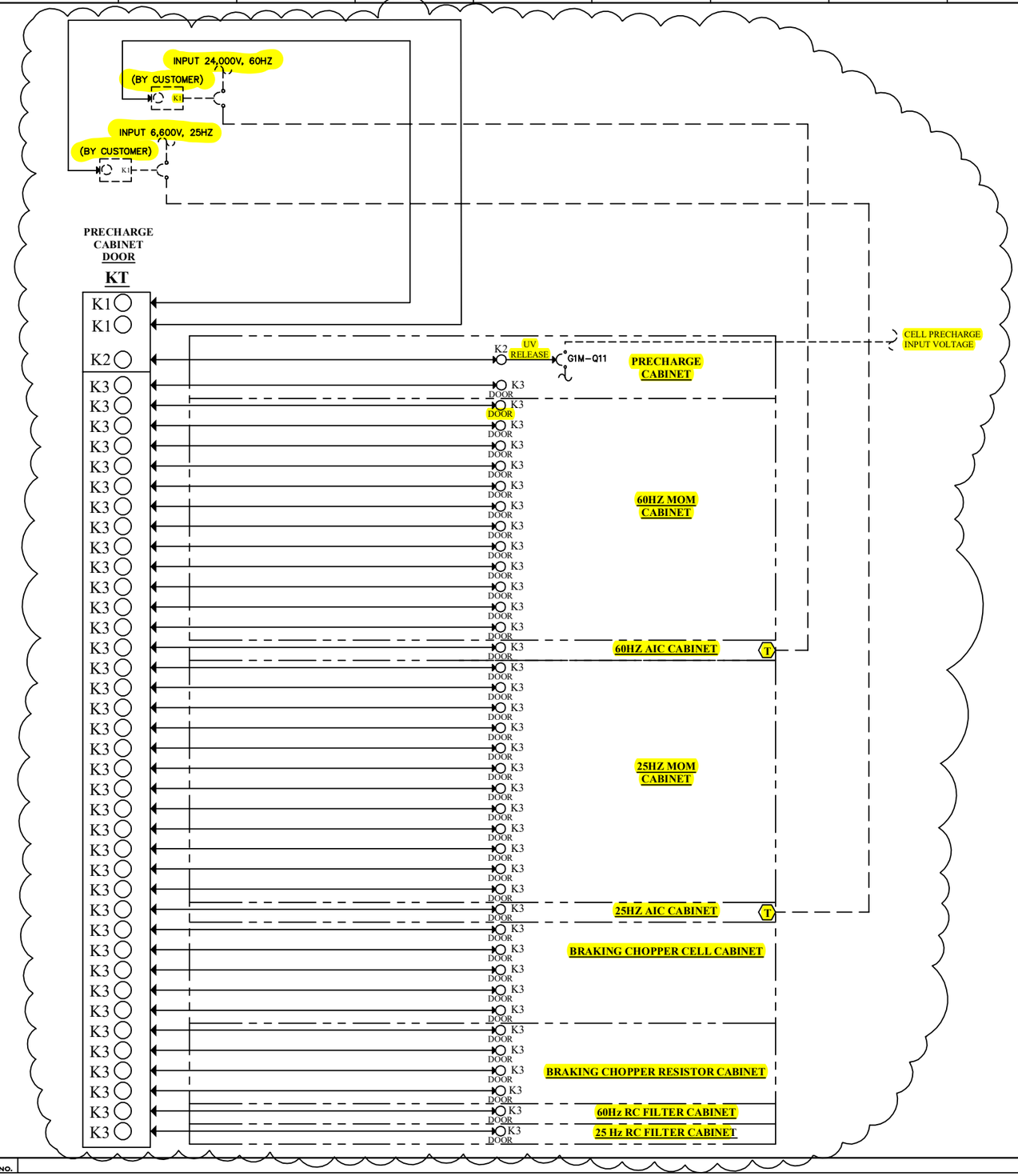
Siemens Industry, Inc.
Large Drive Applications

CUSTOMER BARNES ELECTRIC_SWBNO
CUST ORDER NUMBER 560P–00617

TITLE SYSTEM OUTLINE
SH150AC,25MVA,144C,TYPE 7
13.8kVin/out,60Hz to 25Hz

DWG NO A5E51274298A REV AC
CAD FILE A5E51274298A012 SHEET NO 12 OF 16

DBORDF



KEY INTERLOCK HARDWARE

K1 – INTERLOCK TO LOCK–OUT INPUT MEDIUM VOLTAGE
K2 – INTERLOCK TO LOCK–OUT THE AUXILIARY 480V SUPPLY FOR PRECHARGE
K3 – INTERLOCK TO LOCK ALL OF THE MEDIUM VOLTAGE SECTION DOORS

MECHANICAL KEY INTERLOCKS

SIEMENS HAS INSTALLED MECHANICAL KEY INTERLOCKS ON ALL THE MEDIUM VOLTAGE SECTION DOORS OF THE PERFECT HARMONY GH150 VFD. A DOOR IS DEFINED AS A HINGED PANEL, NOT A BOLTED ON PANEL. THE INTERLOCK SYSTEM IS DESIGNED TO PREVENT ACCESS INTO THE MEDIUM VOLTAGE SECTIONS WHEN THE VFD IS CONNECTED TO THE INPUT MEDIUM VOLTAGE POWER.

THE K1 KEY, WITH SERIAL NUMBER, IS THE INPUT MEDIUM VOLTAGE LOCKING MECHANISM. THIS MECHANISM MUST BE PROPERLY INSTALLED BY THE CUSTOMER ON THE INPUT CIRCUIT BREAKER PRIOR TO VFD COMMISSIONING. THE K1 KEY MUST BE INTEGRATED WITH THE INPUT CIRCUIT BREAKER TO LOCKOUT THE VFD INPUT MEDIUM VOLTAGE WHEN THE BREAKER IS IN THE OPEN AND RACKED OUT POSITION. FOR A CSA OR UL LISTED PERFECT HARMONY GH150 VFD THE LISTING IS VOID IF VFD MEDIUM VOLTAGE SECTIONS ARE NOT MECHANICALLY INTERLOCKED WITH THE MAIN UPSTREAM DISCONNECTING MEANS.

DESCRIPTION OF OPERATION – OBTAINING ACCESS TO KEY INTERLOCKED VFD MEDIUM VOLTAGE SECTIONS

1. THE K1 KEY IS RETAINED IN THE K1 LOCK ON INPUT CIRCUIT BREAKER.
2. THE K2 KEY IS RETAINED IN THE K2 LOCK LOCATED IN THE VFD PRECHARGE CABINET.
3. BY TURNING AND REMOVING THE K1 KEY, THE K1 LOCK MECHANICALLY LOCKS–OUT THE CIRCUIT BREAKER, WHICH SUPPLIES THE INPUT MEDIUM VOLTAGE TO THE VFD. BY TURNING AND REMOVING THE K2 KEY, THE K2 LOCK ELECTRICALLY LOCKS–OUT CIRCUIT BREAKER G1M–Q11, WHICH SUPPLIES THE LOW VOLTAGE CELL PRECHARGE POWER.
4. INSERTION OF THE K1 & K2 KEYS IN THE TRANSFER KT ON THE VFD RELEASES THE VFD MEDIUM VOLTAGE SECTION DOOR K3 KEYS. THE K3 KEYS CAN THEN BE USED TO OPEN VFD MEDIUM VOLTAGE SECTION DOORS.
5. THE K1 & K2 KEYS ARE HELD CAPTIVE IN THE KEY TRANSFER KT WHEN ONE OR MORE K3 KEYS HAVE BEEN RELEASED (REMOVED) FROM THE KEY TRANSFER KT.

DESCRIPTION OF OPERATION – PREVENTING ACCESS TO KEY INTERLOCKED VFD MEDIUM VOLTAGE SECTIONS

1. CLOSE AND SECURE ALL VFD MEDIUM VOLTAGE SECTION DOORS AND RETURN ALL K3 KEYS TO THE KEY TRANSFER KT.
2. REMOVE THE K1 & K2 KEYS FROM THE KEY TRANSFER KT. REMOVAL OF EITHER OR BOTH THE K1 & K2 KEYS CAUSES THE K3 KEYS TO BE CAPTIVE IN THE KEY TRANSFER KT. NEITHER THE K1 NOR K2 KEY CAN BE REMOVED UNLESS ALL THE K3 KEYS HAVE BEEN RETURNED.
3. RETURN THE K1 KEY TO THE K1 LOCK ON THE INPUT MEDIUM VOLTAGE CIRCUIT BREAKER CB1.
4. RETURN THE K2 KEY TO THE K2 LOCK IN THE VFD PRECHARGE CABINET.

WARNING: SOME SIEMENS DRIVES ARE EQUIPPED WITH A PRE–CHARGE DESIGN TO LIMIT INRUSH ON ENERGIZATION. THE PRE–CHARGE DESIGN IS A LOW VOLTAGE (LV) CIRCUIT, BUT IT CAN PRODUCE MEDIUM VOLTAGE (MV) ON THE ISOLATION TRANSFORMER PRIMARY AS WELL AS UPSTREAM DEVICES. CONSIDER THIS VOLTAGE SOURCE DURING DRIVE AND UPSTREAM SWITCHGEAR MAINTENANCE.

DANGER – THIS EQUIPMENT DOES NOT PROVIDE ISOLATION. SEPARATE ISOLATING MEANS REQUIRED. SEE INSTRUCTIONS ON THIS PAGE FOR FURTHER INFORMATION.

DANGER – ELECTRICAL HAZARDS, ENSURE THE SYSTEM IS ELECTRICALLY ISOLATED AND THAT NO HAZARDOUS VOLTAGES ARE PRESENT BEFORE PROCEEDING.

WARNING – THE SYSTEM CONTAINS CAPACITORS THAT STORE HAZARDOUS ENERGY. DO NOT SERVICE UNTIL THESE CAPACITORS HAVE BEEN SAFELY DISCHARGE.

NOTE – FOR OTHER HAZARDS PLEASE CONSULT THE OPERATION AND MAINTENANCE MANUAL(S) SUPPLIED WITH THE EQUIPMENT, SPECIFICALLY THE PRODUCT USER MANUAL.

LEGEND:

◯ – DRIVE KEY LOCK CYLINDER

⬡ – CUSTOMER MV POWER CONNECTIONS

⟷ – KEY SEQUENCE

---- – INDICATES CUSTOMER CONNECTION

KEY INTERLOCK SERIAL NUMBERS		
VFD P/N	–	–
K1	–	–
K2	–	–
K3	–	–

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/22/2022
JACOBS Date

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

DFTG CODE NO.

REVISIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994 ASME Y14.38–1999 ASME Y14.3–2003 ASME Y14.1–2005
TOLERANCES: .XX ± .03 .XXX ± .015 ANGLES ± 1°
THIRD ANGLE PROJECTION

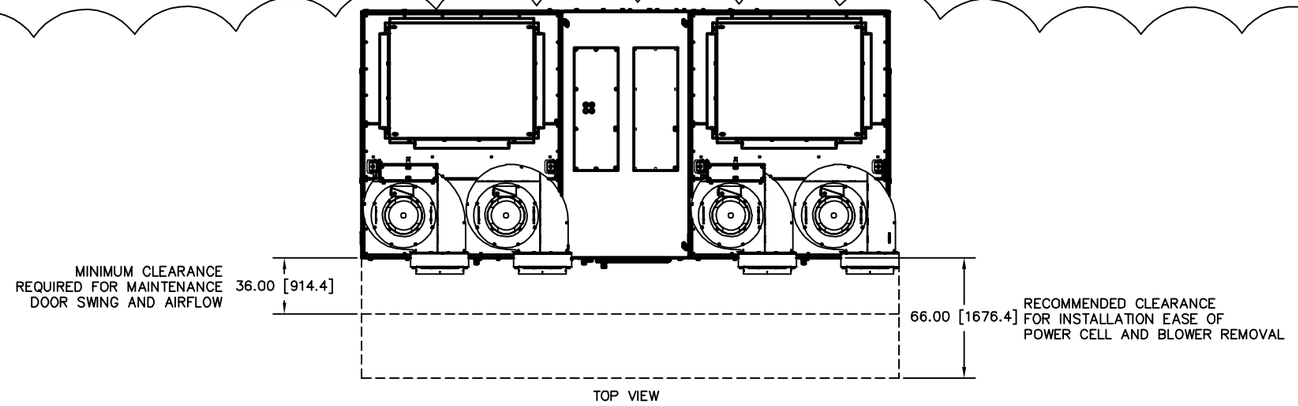
SCALE	1:1
LAYER	XXXX
DATE	08/30/21
DWGSZ	D
DFTR	C.DENGLER
ENGR	C.WENSKOVITCH

Siemens Industry, Inc.
Large Drive Applications

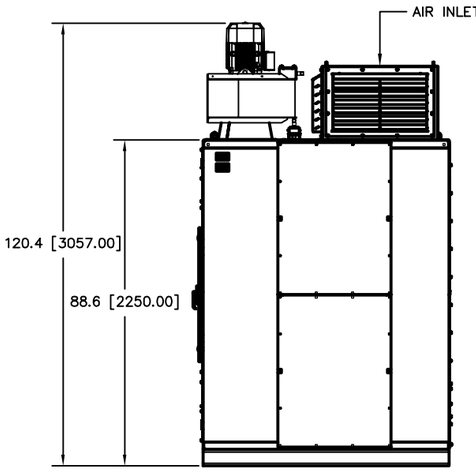
CUSTOMER	BARNES ELECTRIC_SWBNO
CUST ORDER NUMBER	560P–00617

TITLE: SYSTEM OUTLINE SH150AC,25MVA,144C,TYPE 7 13.8kVin/out,60Hz to 25Hz
DWG NO: A5E51274298A
REV: AC
CAD FILE: A5E51274298A013
SHEET NO: 13 OF 16

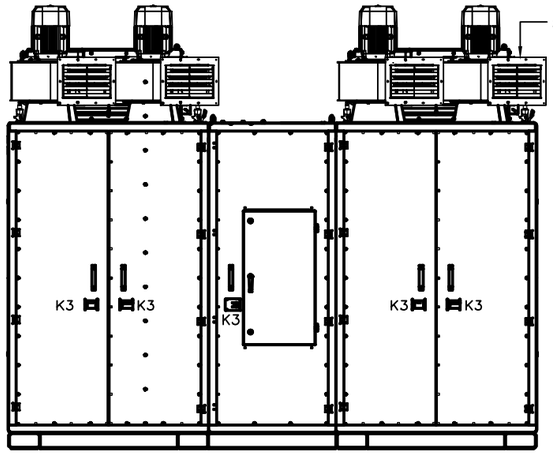
DBORDF



TOP VIEW

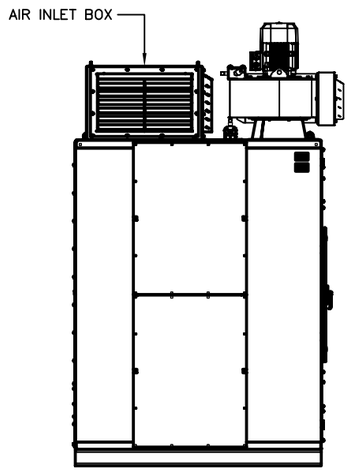


RIGHT SIDE VIEW

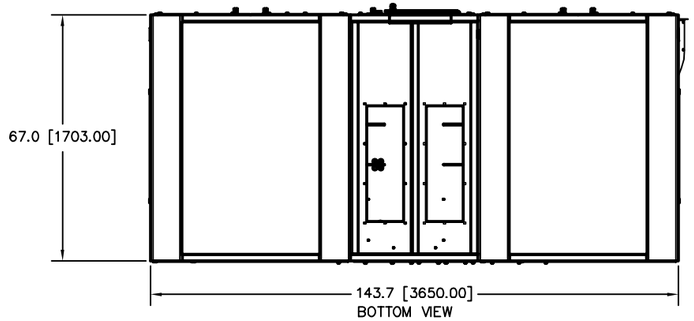


NEGATIVE CELL CABINET | INPUT/OUTPUT TERMINATION CABINET | POSITIVE CELL CABINET

FRONT VIEW



LEFT SIDE VIEW



BOTTOM VIEW

APPROVED	X
APPROVED AS NOTED	
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/28/2022
JACOBS Date

NOTE:

1. NOISE LEVEL FROM BRAKING CHOPPER CABINET MAY EXCEED 85dB.
2. CENTER OF GRAVITY TO BE DETERMINED AND UPDATED LATER.

ESD SENSITIVE EQUIPMENT

WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

DFTG CODE NO.

REVISIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M-1994 ASME Y14.35-1999 ASME Y14.3-2003 ASME Y14.1-2005
TOLERANCES: .XX ± .03, .XXX ± .015
ANGLES ± 1°
THIRD ANGLE PROJECTION

SCALE	1:1
LAYER	XXXX
DATE	08/30/21
DWGSZ	D
DFTR	C.DENGLER
ENGR	C.WENSKOVITCH

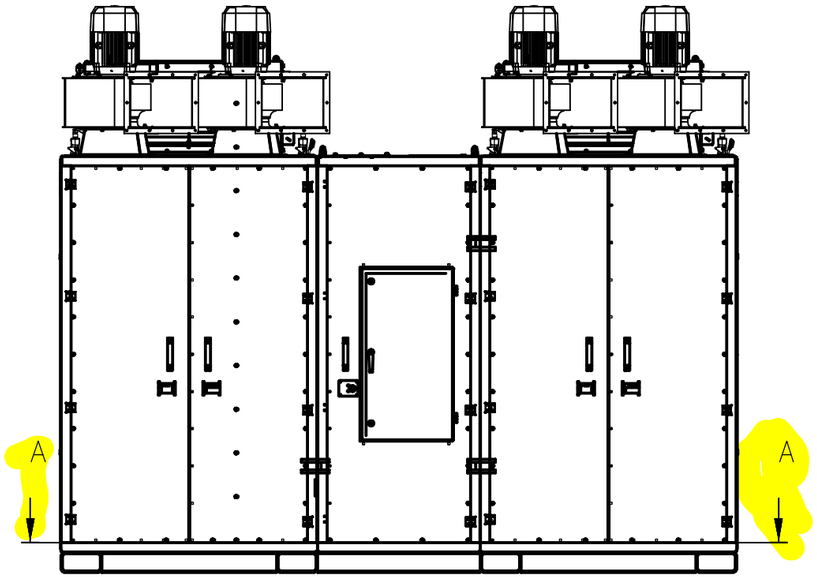
Siemens Industry, Inc.
Large Drive Applications

CUSTOMER BARNES ELECTRIC_SWBNO
CUST. ORDER NUMBER 560P-00617

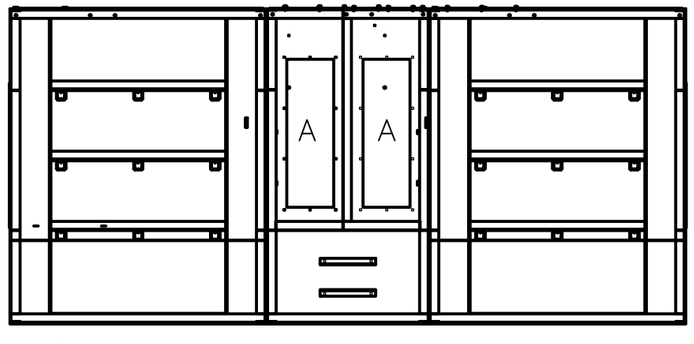
TITLE SYSTEM OUTLINE
SH150AC,25MVA,144C,TYPE 7
13.8kVin/out,60Hz TO 25Hz

DWG NO A5E51274298A REV AC
CAD FILE A5E51274298A014
SHEET NO 14 OF 16

DBORDF

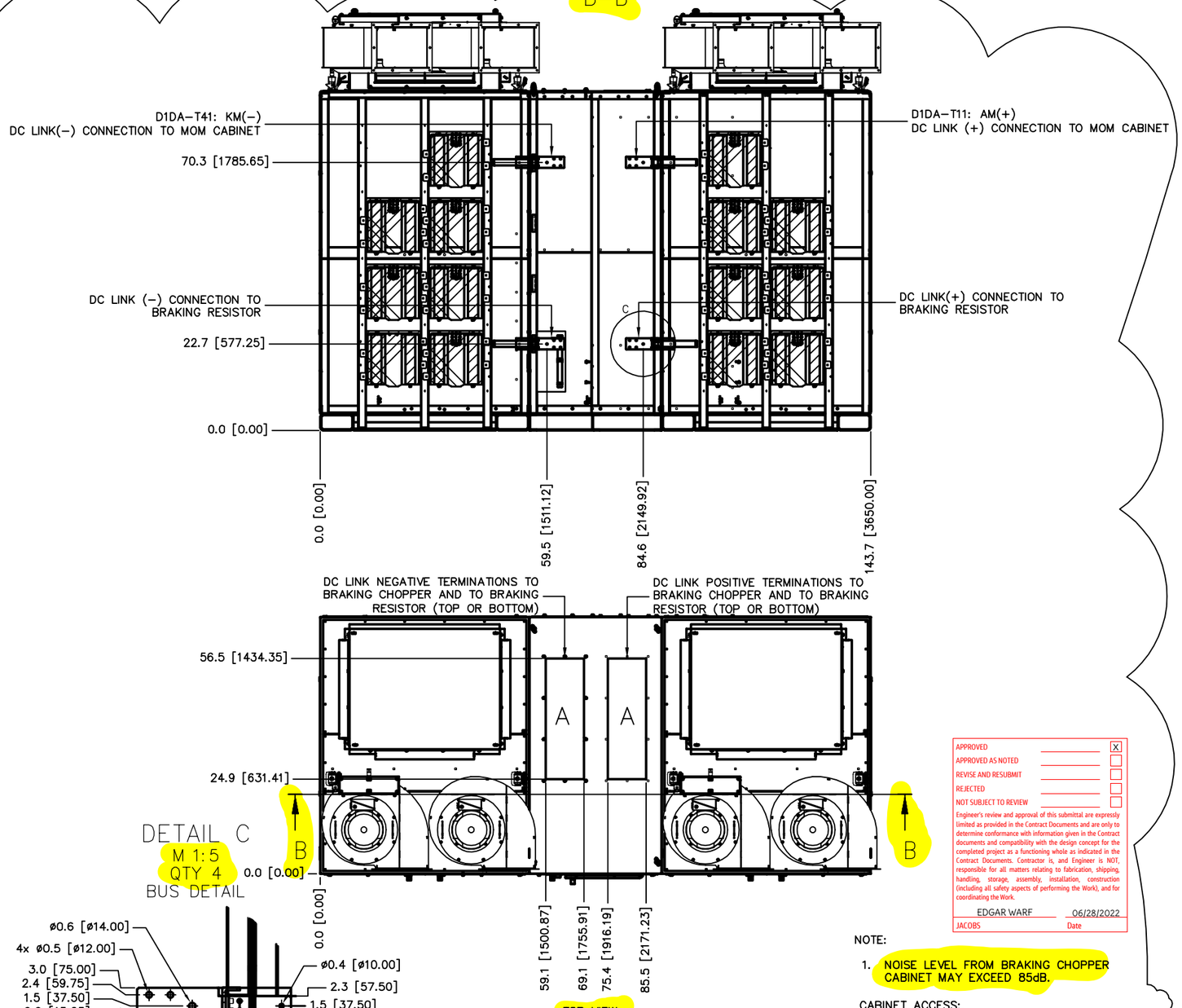


FRONT VIEW



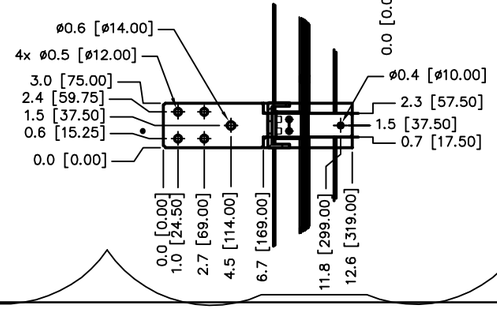
A–A

B–B



TOP VIEW

DETAIL C
M 1:5
QTY 4
BUS DETAIL



APPROVED	X
APPROVED AS NOTED	
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/28/2022
JACOBS Date

NOTE:

1. NOISE LEVEL FROM BRAKING CHOPPER CABINET MAY EXCEED 85dB.

CABINET ACCESS:

A – CUSTOMER BRAKING CHOPPER MEDIUM VOLTAGE CONNECTIONS: 10.00 [254.0] X 31.6 [802.6]

ESD SENSITIVE EQUIPMENT

WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

DFTG CODE NO.

REVISIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994 ASME Y14.35–1999 ASME Y14.3–2003 ASME Y14.1–2005
TOLERANCES: XX ± .03, XXX ± .015, ANGLES ± 1°
THIRD ANGLE PROJECTION

SCALE	1:1
LAYER	XXXX
DATE	08/30/21
DWGSZ	D
DFTR	C.DENGLER
ENGR	C.WENSKOVITCH

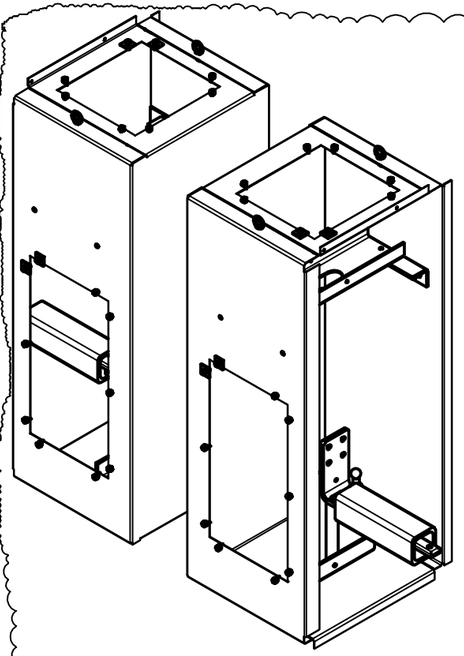
Siemens Industry, Inc.
Large Drive Applications

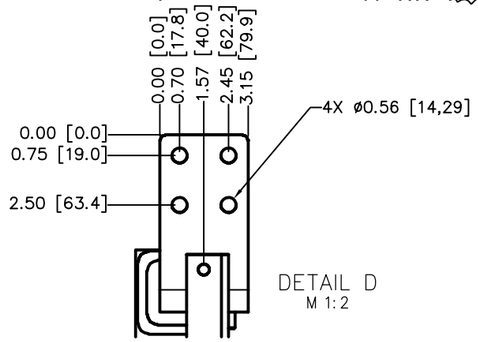
CUSTOMER BARNES ELECTRIC_SWBNO
CUST ORDER NUMBER 560P–00617

TITLE SYSTEM OUTLINE
SH150AC,25MVA,144C,TYPE 7
13.8kVin/out,60Hz TO 25Hz

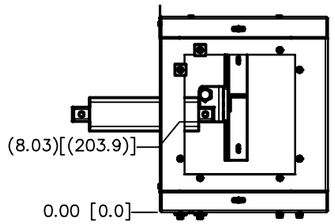
DWG NO A5E51274298A REV AC
CAD FILE A5E51274298A015 SHEET NO 15 OF 16

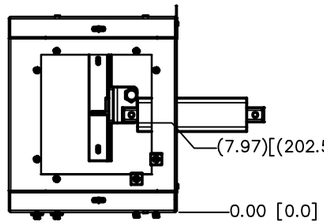
DBORDF

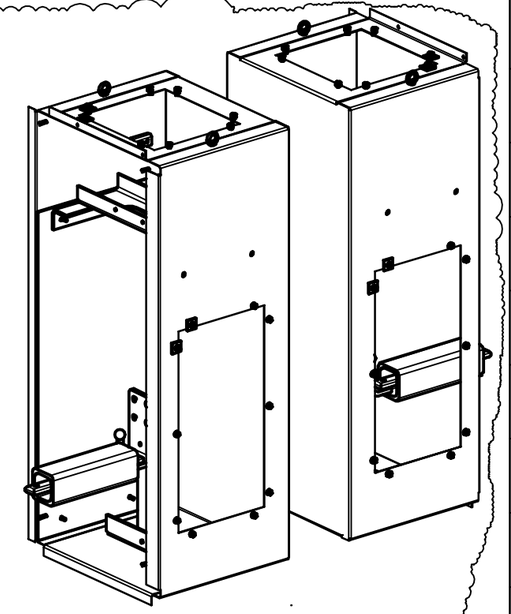




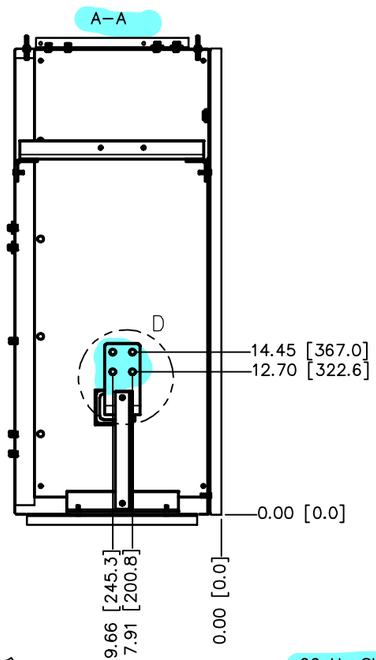
DETAIL D
M 1:2





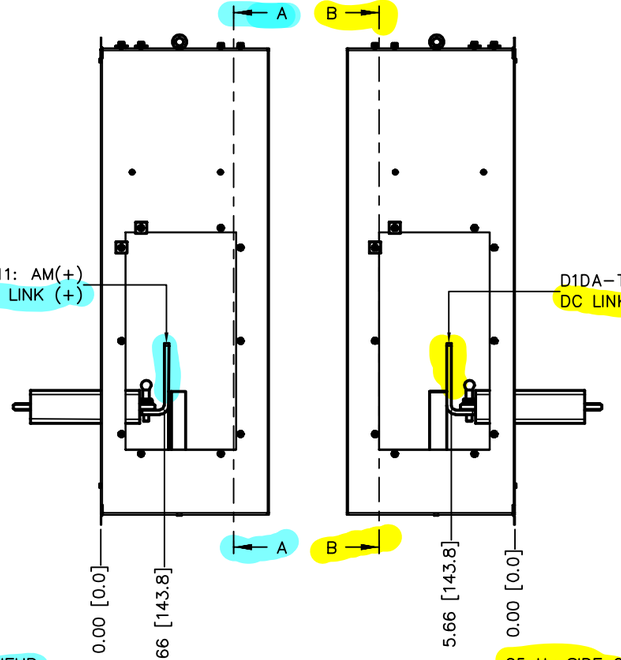


A–A

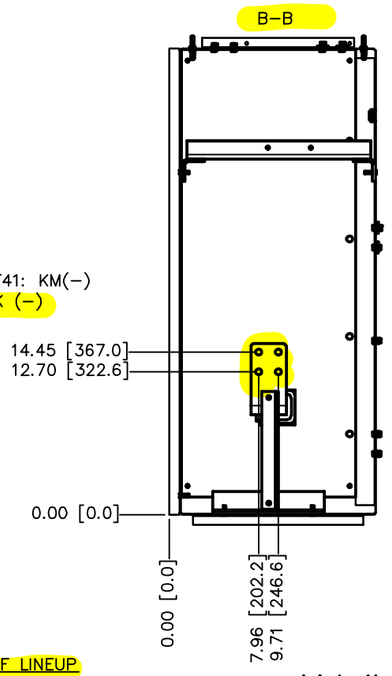


A

B



B–B



60 Hz SIDE OF LINEUP

25 Hz SIDE OF LINEUP

APPROVED	X
APPROVED AS NOTED	
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/22/2022

JACOBS Date

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

DFTG CODE NO.

REVISIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994 ASME Y14.35–1999 ASME Y14.3–2003 ASME Y14.1–2005
TOLERANCES: XX ± .03, XXX ± .015, ANGLES ± 1°
THIRD ANGLE PROJECTION

SCALE	1:1
LAYER	XXXX
DATE	08/30/21
DWGSZ	D
DFTR	C.DENGLER
ENGR	C.WENSKOVITCH

Siemens Industry, Inc.
Large Drive Applications

CUSTOMER BARNES ELECTRIC_SWBNO
CUST ORDER NUMBER 560P–00617

TITLE SYSTEM OUTLINE
SH150AC,25MVA,144C,TYPE 7
13.8kVin/out,60Hz TO 25Hz

DWG NO A5E51274298A REV AC

CAD FILE A5E51274298A016 SHEET NO 16 OF 16

DBORDF

DIMENSIONS IN INCHES UNLESS NOTED OTHERWISE.

PROJECTION:

NIAGARA POWER TRANSFORMER
Powering Possible.

BUFFALO, NEW YORK, U.S.A.
(716) 896–6500
www.niagarapowertransformer.com

SERIAL NO. N40073

MFG.DATE

CONVERTOR DUTY TRANSFORMER

KVA 26000

LOW VOLTAGE: 12400 △ L.V. BIL: 110 KV

HIGH VOLTAGE: 24000/13856Y H.V. BIL: 150 KV

3 PHASE 60 Hz 75 °C RISE CLASS KNAN

IMPEDANCE ____ % AT 26000 KVA

TRANSFORMER FILLED WITH 3528 GALLONS OF ENVIRO–TEMP FR3

CONTAINED NO DETECTABLE PCB (<1 PPM) AT TIME OF MANUFACTURE

READ INSTRUCTION BOOK 600 BEFORE HANDLING, INSTALLING AND ENERGIZING TRANSFORMER

K–FACTOR: 2 VECTOR GROUP: Yd1

LV windings LAG HV windings by 30 degrees

MAXIMUM OPERATING PRESSURE
7.6 P.S.I. POS. 3.9 P.S.I. NEG.
TANK SUITABLE FOR 14.7 P.S.I.

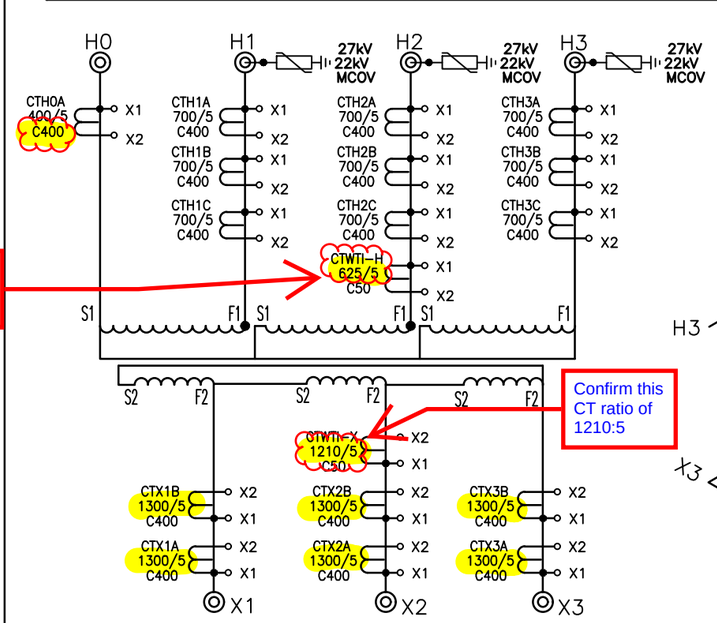
THE 25°C LIQUID LEVEL IS 16 1/2" INCHES BELOW TOP OF HIGHEST HANDHOLE FLANGE AND WILL CHANGE 0.94 INCHES FOR EACH 10°C CHANGE IN LIQUID TEMPERATURE.

CONDUCTOR MATERIAL
COPPER

APPROXIMATE WEIGHTS

CORE & COILS	38,761 LB.
TANK & FITTINGS	35,026 LB.
LIQUID	27,163 LB.
TOTAL	100,950 LB.

L.V. CONNECTION	12400 VOLTS	1210.6 AMPS AT 26000 KVA
H.V. CONNECTIONS	24000 VOLTS	625.5 AMPS AT 26000 KVA



Confirm this CT ratio of 625:5

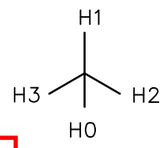
Confirm this CT ratio of 1210:5

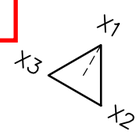
CT ratio should be 1300:5

HV CT 700:5A, SR, C400, 2.0 RF	
CONNECT	RATIO
X1 – X2	700/5

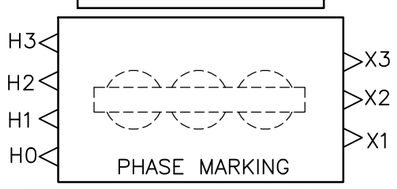
LV CT 1200:5A, SR, C400, 2.0 RF	
CONNECT	RATIO
X1 – X2	1200/5

H0 CT 400:5A, SR, C200, 2.0 RF	
CONNECT	RATIO
X1 – X2	400/5





RADIATORS



RADIATORS

ACCESSORY SIDE

BNS40073 Rev.1

9"

[1] Does %Z estimated range still hold true for 26MVA rating?

[2] Will a specific %Z (and NOT a range) be stamped on nameplate at fabrication completion?

NOTES:

1. *NAMEPLATE MATERIAL IS STAINLESS STEEL, SATIN FINISH ALL ETCHING IN BLACK.*
2. *MEASURED VALUE FOR IMPEDANCE WILL BE STAMPED ON NAMEPLATE WHEN UNIT IS COMPLETED. (GUARANTEED @ 7.0–8.0% @ ~~25000~~ KVA)*
3. *DATE OF MANUFACTURE WILL BE STAMPED ON NAMEPLATE WHEN UNIT IS COMPLETED.*

Comments on THIS (nameplate) drawing apply elsewhere in the entirety of the submittal package (i.e., submittal SN-029, Rev1). (TYP)

APPROVED		☐
APPROVED AS NOTED		☒
REVISE AND RESUBMIT		☐
REJECTED		☐
NOT SUBJECT TO REVIEW		☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 04/22/2022
JACOBS Date

Typo? Remove.

CT class was previously C400 and that's what's shown in the winding schematic to the left

REVISIONS

Rev.1 AS/MM 3/15/22
Updated KVA from 25000 to 26000, Temp. Temp. Rise from 65 to 75 and current transformer.
LV CT's ratios revised, H0 ct added.
HV was delta.
Total weights, gallons of oil and pressures revised.
Dwg. no. was CNS40073

NIAGARA CUSTOMER:	SIEMENS INDUSTRY INC.
CUSTOMER P.O. NO.	4509663191
PROJECT:	NEW ORLEANS SEWERAGE & WATER
SPECIFICATION No.:	A5E51176940, REV. AD
NIAGARA JOB No.:	N40073
REFERENCE DRAWINGS:	DXS40073 TRANSFORMER OUTLINE
	DWS40073 SCHEMATIC & WIRING

Confirm/ Fix (TYP)

NIAGARA POWER TRANSFORMER
Powering Possible

1755 DALE ROAD
BUFFALO, NEW YORK, U.S.A.
(716) 896–6500
www.niagaratransformer.com

TRANSFORMER NAMEPLATE

Dr: AS/MML	Date: 11/05/21	Dwg No: BNS40073	Rev: 1
Ck: RAB	Scale: 1:1		

THIS FILE (CNS40073.001a) APPEARS TO BE A DUPLICATE OF DWG BNS40073 REV 1 WITH FILE NAME CNS40073.001. BOTH FILES WERE INCLUDED IN SN-029-01 FOR REVIEW.

DIMENSIONS IN INCHES UNLESS NOTED OTHERWISE.

PROJECTION:

NIAGARA POWER TRANSFORMER
Powering Possible.

BUFFALO, NEW YORK, U.S.A.
(716) 896–6500
www.niagarapowertransformer.com

SERIAL NO. N40073

MFG.DATE

CONVERTOR DUTY TRANSFORMER

KVA 26000

LOW VOLTAGE: 12400 △ L.V. BIL: 110 KV

HIGH VOLTAGE: 24000/13856Y H.V. BIL: 150 KV

3 PHASE 60 Hz 75 °C RISE CLASS KNAN

IMPEDANCE _____ % AT 26000 KVA

TRANSFORMER FILLED WITH 3528 GALLONS OF ENVIRO–TEMP FR3
CONTAINED NO DETECTABLE PCB (<1 PPM) AT TIME OF MANUFACTURE

READ INSTRUCTION BOOK 600 BEFORE HANDLING, INSTALLING AND ENERGIZING TRANSFORMER

K–FACTOR: 2 VECTOR GROUP: Yd1

L.V. CONNECTION	12400 VOLTS	1210.6 AMPS AT 26000 KVA
H.V. CONNECTIONS	24000 VOLTS	625.5 AMPS AT 26000 KVA

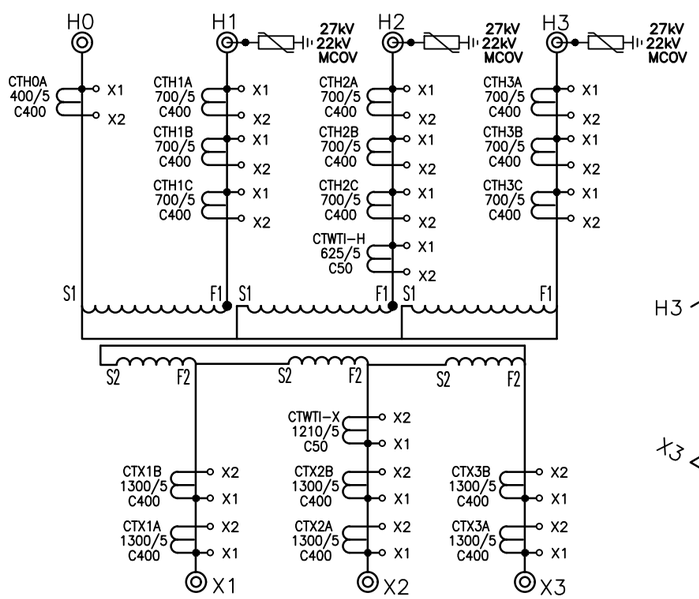
MAXIMUM OPERATING PRESSURE
7.6 P.S.I. POS. 3.9 P.S.I. NEG.
TANK SUITABLE FOR 14.7 P.S.I.

THE 25°C LIQUID LEVEL IS 16 1/2" INCHES BELOW TOP OF HIGHEST HANDHOLE FLANGE AND WILL CHANGE 0.94 INCHES FOR EACH 10°C CHANGE IN LIQUID TEMPERATURE.

CONDUCTOR MATERIAL
COPPER

APPROXIMATE WEIGHTS

CORE & COILS	38,761 LB.
TANK & FITTINGS	35,026 LB.
LIQUID	27,163 LB.
TOTAL	100,950 LB.



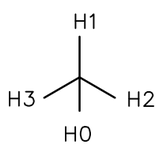
1300:5

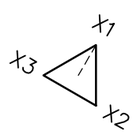
HV CT 700:5A, SR, C400, 2.0 RF	
CONNECT	RATIO
X1 – X2	700/5

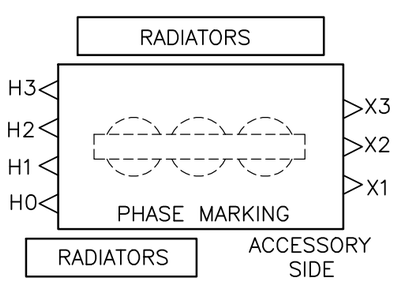
LV CT 1200:5A, SR, C400, 2.0 RF	
CONNECT	RATIO
X1 – X2	1200/5

H0 CT 400:5A, SR, C200, 2.0 RF	
CONNECT	RATIO
X1 – X2	400/5

The diagram to the left shows C400, which is correct?







BNS40073 Rev.1

9"

NOTES:

1. *NAMEPLATE MATERIAL IS STAINLESS STEEL, SATIN FINISH ALL ETCHING IN BLACK.*
2. *MEASURED VALUE FOR IMPEDANCE WILL BE STAMPED ON NAMEPLATE WHEN UNIT IS COMPLETED. (GUARANTEED @ 7.0–8.0% @ 25000 KVA)*
3. *DATE OF MANUFACTURE WILL BE STAMPED ON NAMEPLATE WHEN UNIT IS COMPLETED.*

[1] Comments on OTHER (nameplate) drawing (CNS40073.001) apply on this drawing (CNS40073.001a) and elsewhere throughout the entirety of the submittal package (i.e., submittal SN-029, Rev1). (TYP)

[2] See comments on drawing CNS40073.001.

APPROVED		☐
APPROVED AS NOTED		☒
REVISE AND RESUBMIT		☐
REJECTED		☐
NOT SUBJECT TO REVIEW		☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 04/22/2022
JACOBS Date

REVISIONS

Rev.1 AS/MM 3/15/22
Updated KVA from 25000 to 26000, Temp. Temp. Rise from 65 to 75 and current transformer.
LV CT's ratios revised, H0 ct added.
HV was delta.
Total weights, gallons of oil and pressures revised.
Dwg. no. was CNS40073

NIAGARA CUSTOMER:	SIEMENS INDUSTRY INC.
CUSTOMER P.O. NO.	4509663191
PROJECT:	NEW ORLEANS SEWERAGE & WATER
SPECIFICATION No.:	A5E51176940, REV. AD
NIAGARA JOB No.:	N40073
REFERENCE DRAWINGS:	DXS40073 TRANSFORMER OUTLINE
	DWS40073 SCHEMATIC & WIRING

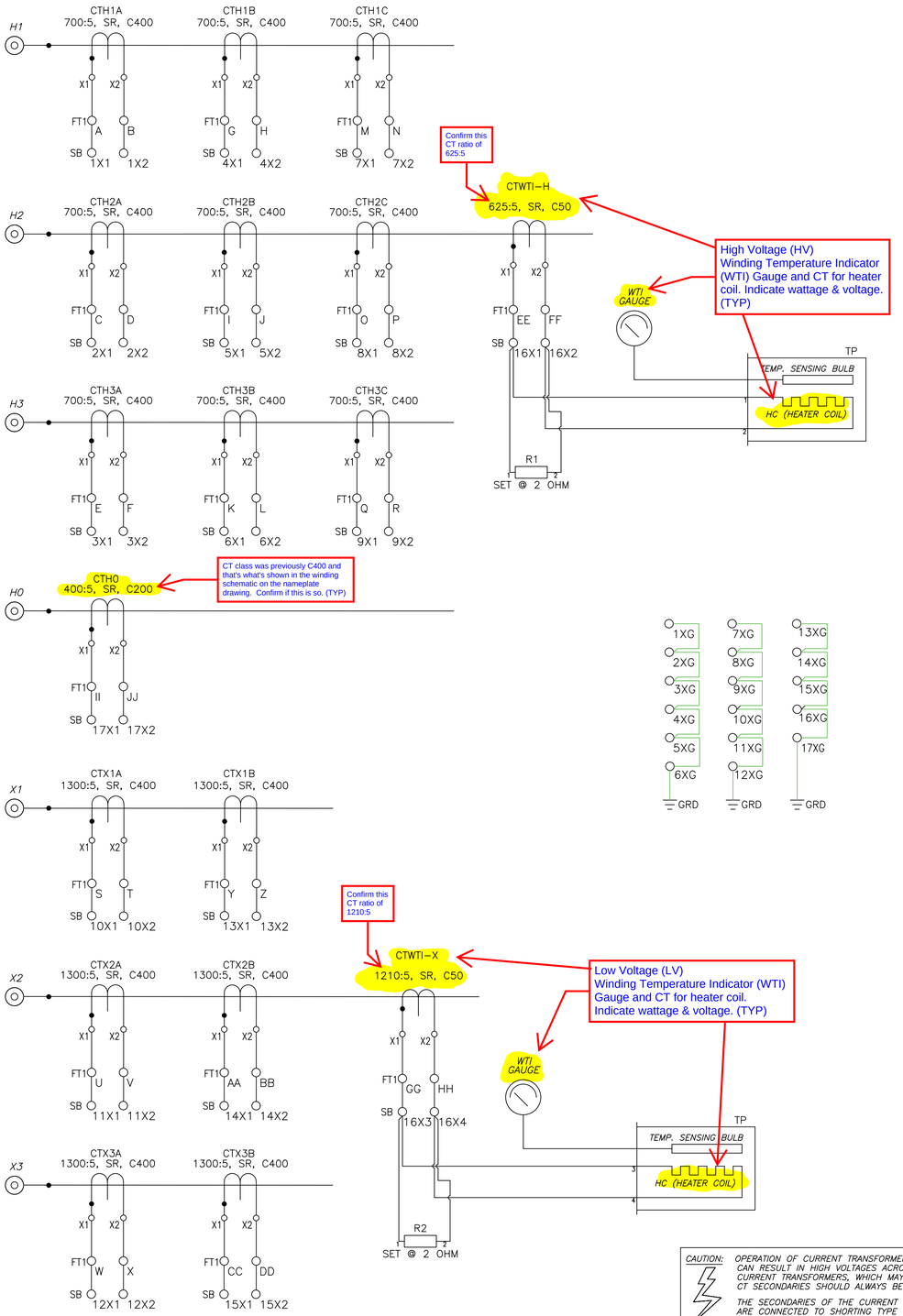
NIAGARA POWER TRANSFORMER
Powering Possible

1755 DALE ROAD
BUFFALO, NEW YORK, U.S.A.
(716) 896–6500
www.niagaratransformer.com

TRANSFORMER NAMEPLATE

Dr: AS/MML	Date: 11/05/21	Dwg No: BNS40073	Rev: 1
Ck: RAB	Scale: 1:1		

9"



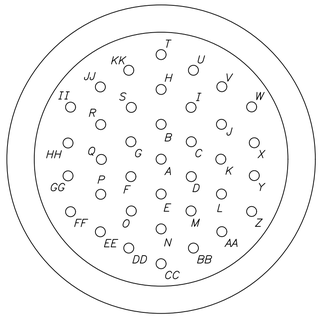
CAUTION: OPERATION OF CURRENT TRANSFORMERS WITH SECONDARY WINDINGS OPEN CIRCUITED CAN RESULT IN HIGH VOLTAGES ACROSS THE SECONDARY TERMINALS OF THE CURRENT TRANSFORMERS, WHICH MAY BE DANGEROUS TO PERSONNEL OR EQUIPMENT. CT SECONDARIES SHOULD ALWAYS BE SHORT CIRCUITED BEFORE OPENING THE CIRCUIT.

THE SECONDARIES OF THE CURRENT TRANSFORMERS USED ON THIS TRANSFORMER ARE CONNECTED TO SHORTING TYPE TERMINAL BLOCKS. THE TRANSFORMER IS SHIPPED WITH THE SECONDARIES SHORTED.

THE SECONDARIES OF CURRENT TRANSFORMERS MUST BE GROUNDED. REFER TO SECTION 250–170 OF THE NATIONAL ELECTRICAL CODE.

FT1 STUD DIAGRAM

37 STUD BUSHING FOR CT SECONDARY OUTLETS



POST IDENTIFICATION FOR MULTI–STUD BUSHING FT1		
EXTERNAL CONNECTION	TERMINAL STUD No.	INTERNAL CONNECTION
SB:1X1	A	CTH1A:X1
SB:1X2	B	CTH1A:X2
SB:2X1	C	CTH2A:X1
SB:2X2	D	CTH2A:X2
SB:3X1	E	CTH3A:X1
SB:3X2	F	CTH3A:X2
SB:4X1	G	CTH1B:X1
SB:4X2	H	CTH1B:X2
SB:5X1	I	CTH2B:X1
SB:5X2	J	CTH2B:X2
SB:6X1	K	CTH3B:X1
SB:6X2	L	CTH3B:X2
SB:7X1	M	CTH1C:X1
SB:7X2	N	CTH1C:X2
SB:8X1	O	CTH2C:X1
SB:8X2	P	CTH2C:X2
SB:9X1	Q	CTH3C:X1
SB:9X2	R	CTH3C:X2
SB:10X1	S	CTX1A:X1
SB:10X2	T	CTX1A:X2
SB:11X1	U	CTX2A:X1
SB:11X2	V	CTX2A:X2
SB:12X1	W	CTX3A:X1
SB:12X2	X	CTX3A:X2
SB:13X1	Y	CTX1B:X1
SB:13X2	Z	CTX1B:X2
SB:14X1	AA	CTX2B:X1
SB:14X2	BB	CTX2B:X2
SB:15X1	CC	CTX3B:X1
SB:15X2	DD	CTX3B:X2
SB:16X1	EE	CTWTI–H:X1
SB:16X2	FF	CTWTI–H:X2
SB:16X3	GG	CTWTI–X:X1
SB:16X4	HH	CTWTI–X:X2
SB:17X1	II	CTH0:X1
SB:17X2	JJ	CTH0:X2
SPARE	KK	SPARE

TRANSFORMER CONTROLS – DEVICE LEGEND

DEVICE No.	DEVICE DESCRIPTION
23–1	CONTROL BOX HEATER CONTROL THERMOSTAT, 120VAC
23–2	HV ATC HEATER CONTROL HUMIDISTAT/THERMOSTAT, 120VAC
23–3	LV ATC HEATER CONTROL HUMIDISTAT/THERMOSTAT, 120VAC
26Q	LIQUID TEMPERATURE INDICATOR (TRANSFORMER OIL) WITH CONTACTS
43–1	LIGHT SWITCH – DOOR OPERATED, LIGHT ON (HEATERS OFF) WHEN DOOR OPEN
49T1	SIMULATED WINDING TEMPERATURE INDICATOR, WITH CONTACTS
52–M1	CIRCUIT BREAKER, 480VAC, 2 POLE, 10 A (MAIN CB)
52–M2	CIRCUIT BREAKER, 120VAC, 1 POLE, 30 A (MAIN CB)
52–1	CIRCUIT BREAKER, 120VAC, 1 POLE, 20 A (GFI RECEPTACLE CIRCUIT)
52–2	CIRCUIT BREAKER, 120VAC, 1 POLE, 10 A (LIGHT & HEATER CIRCUIT)
52–3	CIRCUIT BREAKER, 120VAC, 1 POLE, 10 A (HV ATC)
52–4	CIRCUIT BREAKER, 120VAC, 1 POLE, 10 A (LV ATC)
52–5	CIRCUIT BREAKER, 120VAC, 1 POLE, 15 A (GAS MONITOR)
63L	NITROGEN CYLINDER ALARM SWITCH WITH CONTACT
63P	MECHANICAL PRESSURE RELIEF DEVICE WITH ALARM CONTACTS (TRANSFORMER TANK)
63PS	PRESSURE SWITCH WITH LOW AND HIGH PRESSURE ALARM
63RP	SUDDEN PRESSURE RELAY WITH ALARM CONTACT (TRANSFORMER TANK)
63X	SEAL IN RELAY FOR SUDDEN PRESSURE, 120VAC
71Q	LIQUID LEVEL GAUGE WITH LOW LEVEL ALARM CONTACT (TRANSFORMER TANK)
72–1	CIRCUIT BREAKER, 125VDC, 2 POLE, 10 A (SEAL IN RELAY)
CO	CONVENIENCE OUTLET, GFI TYPE, 120VAC, 20A
CPT	CONTROL POWER TRANSFORMER, 480–120VAC, 3KVA, ACME T–2–53013–S
CTH–1,2,3–A,B,C	BUSHING TYPE CURRENT TRANSFORMER, 700:5, SR, C400, 2.0 RF.
CTH0	BUSHING TYPE CURRENT TRANSFORMER, 400:5, SR, C200, 2.0 RF.
CTX–1,2,3–A,B	BUSHING TYPE CURRENT TRANSFORMER, 1300:5, SR, C400, 2.0 RF.
CTWTI–H	BUSHING TYPE CURRENT TRANSFORMER, 625:5, SR, C50, 2.0 RF.
CTWTI–X	BUSHING TYPE CURRENT TRANSFORMER, 1210:5, SR, C50, 2.0 RF.
FT1	37 PIN FEED THRU BUSHING FOR CURRENT TRANSFORMER SECONDARY LEADS
GM	GE HYDRAN 201Ti GAS MONITOR, MODEL H201Ti_CE_NE_X1_V1_VCO_H1_L1_FO_W24
GRD	COPPER GROUND BUS
HTR1–2	CONTROL BOX HEATER, 240 VOLT, 150 WATT (OPERATED AT 120 VOLT)
HTR3–4	HV AND LV ATC HEATER, 240 VOLT, 500 WATT (OPERATED AT 120 VOLT)
HTR5–6	HV AND LV ATC HEATER, 240 VOLT, 500 WATT (OPERATED AT 120 VOLT)
LT	CONTROL BOX LIGHT, MAGNETIC MOUNT, SWLED, 900 LUMIN
P	POWER TERMINAL BLOCK, 12 POLE, 75A, GE EB25B12
SB	TERMINAL BLOCK, SHORTING TYPE, 6 POLE, 30A, GE EB27B06S
R1 & 2	VARIABLE RESISTOR, 20HM, FOR WINDING TEMP
T	TERMINAL BLOCK, 12 POLE, 30A, GE EB25B12
TP	THERMAL PLATE FOR HV AND LV WINDING TEMP PROBE

[1] Confirm that device numbers are correct. (TYP)

[2] Do HTR1-2 and HTR3-4 device numbers correspond to LV & HV WTI heater elements shown in schematic at left??? If so, correct.

Confirm wattage. Sizes are inconsistent across drawings in submittal. (TYP)

WIRING NOTES:

1. TRANSFORMER CONTROL BOX IS NEMA 4X, 42"H X 48"W X 12"D WITH PADLOCKABLE DOORS, STAINLESS STEEL HINGE DOOR STOP AND REMOVABLE BOTTOM PLATE. HEATERS AND BREATHERS ARE PROVIDED FOR CONDENSATION FREE OPERATION.
2. EXTERNAL WIRING IS RUN IN RIGID GALVANIZED STEEL (RGS) CONDUIT WITH SHORT LENGTHS OF FLEXIBLE LIQUID–TIGHT CONDUIT AT DEVICE ENDS.
3. PANEL WIRING IS 600V, 90°C, SIS. WIRE IN CONDUIT IS 600V, 90°C, SIS/XHHW. GAUGE LEADS ARE #16 AWG MINIMUM VIA CABLES, CONTROL WIRING IS #14 AWG MINIMUM, POWER & CT WIRING IS #10 AWG. CT WIRES TO BE YELLOW
4. ALL GROUND CONDUCTORS ARE GREEN.
5. ALL LEADS ARE IDENTIFIED WITH HEAT SHRINK SLEEVE TYPE WIRE MARKERS AT BOTH ENDS OF WIRES.
6. ALARM CONTACT WIRING FROM GAUGES TO TERMINAL BLOCKS FOLLOW ANSI COLOR CODES.
7. TERMINAL BLOCKS FOR CURRENT TRANSFORMER CONNECTIONS ARE SHORTING TYPE, RATED FOR 30A, 600V. OTHER TERMINAL BLOCKS ARE RATED FOR 30A, 600V, WITH BINDING HEAD SCREWS AND WHITE MARKER STRIPS.
8. CRIMP TERMINALS FOR PANEL WIRING ARE SEAMLESS NON–INSULATED RING TYPE.
9. DEVICES IN CONTROL BOX ARE IDENTIFIED WITH INDOOR/OUTDOOR VINYL TYPE LABELS, SUITABLE FOR –40° TO +120°C.
10. ALARM CONTACTS ARE SHOWN IN THEIR NORMAL OPERATING CONDITION (NON–ALARM) UNLESS STATED OTHERWISE.
11. CURRENT TRANSFORMER CIRCUIT, 120VAC AND 125VDC POWER CIRCUITS SHALL BE RUN SEPARATE FROM EACH OTHER IN CONTROL WIRING.
12. WIRE TO BE BUNDLED TOGETHER AS PER VOLTAGE SEGREGATION AND TO BE TIED AT 15" INTERVAL BY CABLE TIES IN THE PANDUITS.

APPROVED		
APPROVED AS NOTED		X
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 04/22/2022

JACOBS Date

Confirm and/or Fix (TYP ALL DWGS)

DIMENSIONS IN INCHES UNLESS NOTED OTHERWISE.

PROJECTION:

REVISIONS

REV.1 GJS 3/15/22
CTH0 ADDED, LV CNGD TO 1300:5
FROM 1200:5, CTWTI–H CNGD TO 625:5
FROM 600:5, CTWTI–X CNGD TO 1210:5
FROM1165:5

CUSTOMERS NAME:	SIEMENS INDUSTRY INC.
CUSTOMER P.O. N.O	4509663191 ITEM 000020
PROJECT:	NEW ORLEANS SEWERAGE & WATER
SPECIFICATION NO.	A5E51176940, REV. AD
NIAGARA JOB No.	N40073
DRAWING REF:	TRANSFORMER NAMEPLATE CNS40073
	TRANSFORMER OUTLINE DWS40073

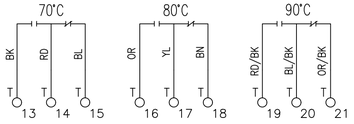
NIAGARA POWER TRANSFORMER
Powering Possible.
1755 DALE ROAD
BUFFALO, NEW YORK,
USA (716)–896–6500
www.niagarapowertransformer.com

XFMR CT, LEGENDS, SEAL IN AND N2 SYS SCHEMEMATICS

DWN: GJS	DATE: 9/1/21	Dwg No. DWS40073–1	Rev 1
CHK: JB	Plot Scale: 1/2		

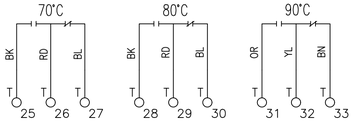
(THERMAL PLATE CIRCUIT SHOWN ON DWS40073-1)

49T1
HV WINDING TEMPERATURE GAUGE

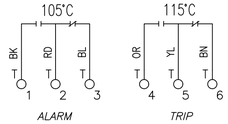


(THERMAL PLATE CIRCUIT SHOWN ON DWS40073-1)

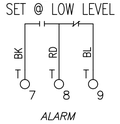
49T2
LV WINDING TEMPERATURE GAUGE



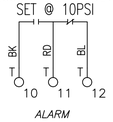
26Q
OIL TEMPERATURE GAUGE

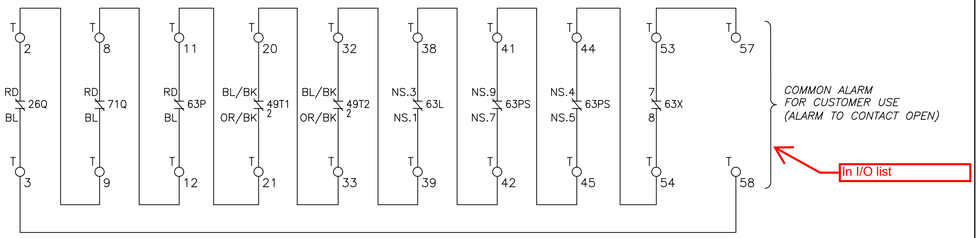


71Q
OIL LEVEL GAUGE
SET @ LOW LEVEL



63P
PRESSURE RELIEF DEVICE
SET @ 10PSI





FACTORY SETTING

63X SUPPLY VOLTAGE	JUMPER POSITION J1
120 AC	3-4
24 DC	1-2
48 DC	2-3
125 DC	3-4

WHERE $\frac{L(\text{HENRYS})}{R(\text{OHMS})} < .070$

COIL CONSUMPTION — 8.28 WATTS

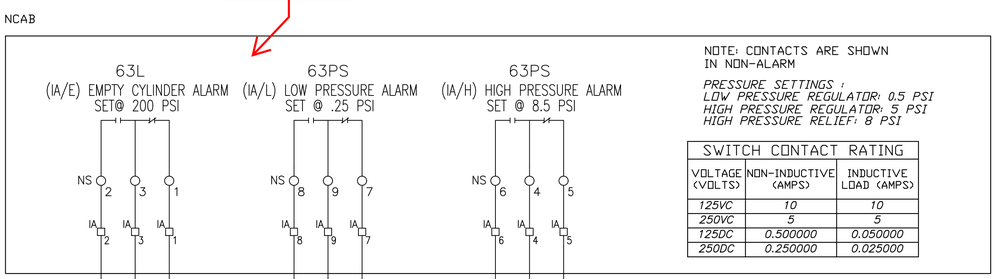
63X SEAL - IN - RELAY CONTACT RATING				
VOLTAGE (VOLTS)	MAKE (AMPS)	CARRY (AMPS)	BREAK (AMPS)	
			RESISTIVE	INDUCTIVE
120 AC	30	8	8	6.5
240 AC	15	8	8	3.5
24 DC	8	8	8	3
48 DC	0.58	2	2	1
125 DC	0.22	1	0.22	0.22
250 DC	0.11	1	0.11	0.11

I/O list says 3 signals in parallel for high temp. Which three? What of the others?

SWITCH RATINGS:
(RATINGS FOR DEVICES 26Q, 49T1&2,63P,71Q,63RP,63PV)
15 AMPS @ 125, 250 AND 480V AC
2 AMPS @ 48V, DC NON-INDUCTIVE
1/2 AMP @ 125V, DC NON-INDUCTIVE
1/4 AMP @ 250V, DC NON-INDUCTIVE

These signals are not shown in I/O list

NCAB

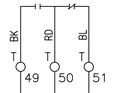


NOTE: CONTACTS ARE SHOWN IN NON-ALARM

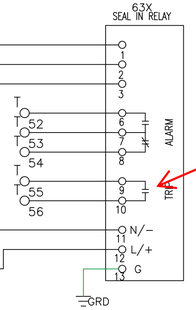
PRESSURE SETTINGS :
LOW PRESSURE REGULATOR: 0.5 PSI
HIGH PRESSURE REGULATOR: 5 PSI
HIGH PRESSURE RELIEF: 8 PSI

SWITCH CONTACT RATING		
VOLTAGE (VOLTS)	NON-INDUCTIVE (AMPS)	INDUCTIVE LOAD (AMPS)
125VC	10	10
250VC	5	5
125DC	0.500000	0.050000
250DC	0.250000	0.025000

63RP
RAPID PRESS RISE RELAY
MOMENTARY CONTACT

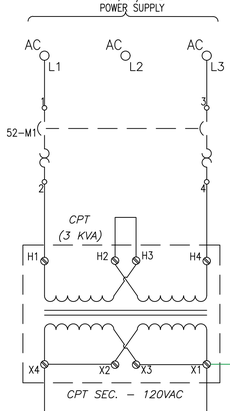


63X
SEAL IN RELAY



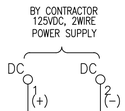
In I/O list.

BY CONTRACTOR
480V, 3ø/60HZ
POWER SUPPLY



GRD

BY CONTRACTOR
125VDC, 2WIRE
POWER SUPPLY



SEAL IN RELAY
72-1

GRD

GAS MONITOR(GM)
52-5
15A

LV ATC HEATER
52-4
15A

HV ATC HEATER
52-3
10A

LIGHT & HEATER
52-2
10A

RECEPTACLE
52-1
20A

MAIN
52-M2
30A

P X
P Y

CO

GRD

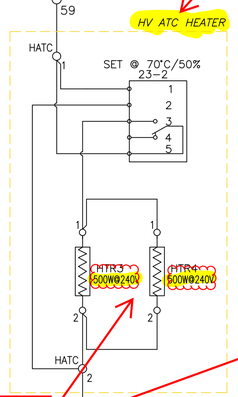
43-1 * SWITCH SHOWN IN DOOR CLOSED STATE

23-1
50°F

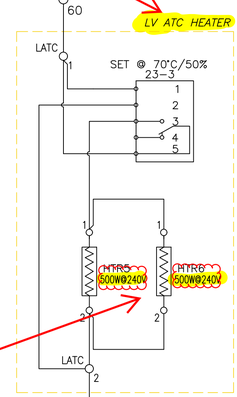
LT
LED LIGHT

Air Terminal Chamber (ATC)

HV ATC HEATER



LV ATC HEATER



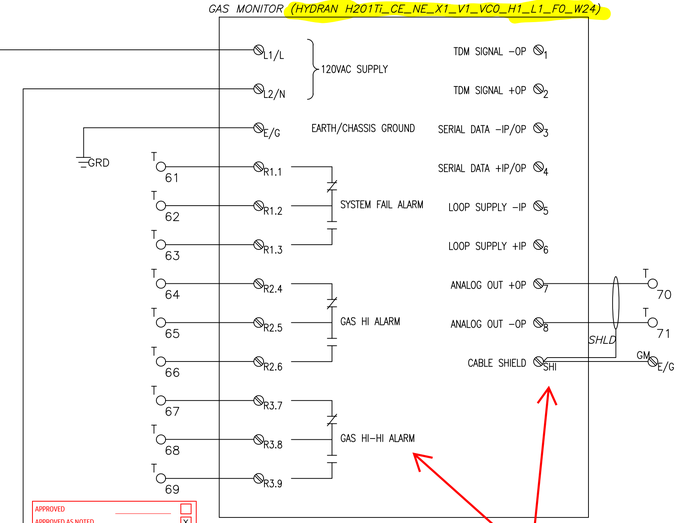
HTR1 250W@240V
HTR2 250W@240V

Confirm wattage ratings with those shown on other drawings and confirm operational voltage rating for all heaters. (TYP)

P N1
P N2
P N3

See commentary elsewhere in submittal Bill of Material (BOM) regarding GE Hydran SYSTEM model and apply here.

GM
GAS MONITOR (HYDRAN H201Ti_CE_NE_X1_V1_VC0_H1_L1_F0_W24)



3 signals in series shown on I/O list for 60 Hz xfmr common alarm. Is Analog brought in? It is not shown.

APPROVED
APPROVED AS NOTED [X]
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 04/22/2022
JACOBS Date

Confirm and/or Fix (TYP ALL DWGS)

DIMENSIONS IN INCHES UNLESS NOTED OTHERWISE.

PROJECTION:

REVISIONS
REV.1 GJS 3/22/22
REVISED ALARM CKT
PER CUSTOMER

CUSTOMERS NAME:	SIEMENS INDUSTRY INC.
CUSTOMER P.O. N.O	4509663191 ITEM 000020
PROJECT:	NEW ORLEANS SEWERAGE & WATER
SPECIFICATION NO.	A5E51176940, REV. AD
NIAGARA JOB No.	N40073
DRAWING REF:	TRANSFORMER NAMEPLATE CNS40073
	TRANSFORMER OUTLINE DXS40073

NIAGARA POWER TRANSFORMER
Powering Possible.
1755 DALE ROAD
BUFFALO, NEW YORK,
USA (716)-896-6500
www.niagarapowertransformer.com

FAN CONTROL & ALARM SCHEMATICS

DWN: GJS	DATE: 9/1/21	Dwg No. DWS40073-2	Rev 1
CHK: JB	Plot Scale: 1/2		

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 04/22/2022
JACOBS Date

DIMENSIONS IN INCHES UNLESS NOTED OTHERWISE.

PROJECTION:

REVISIONS

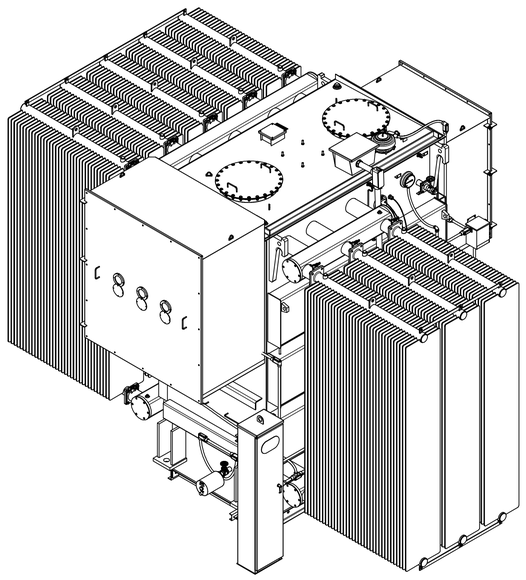
REV.1 GJS 3/15/22
JUMPER REVISED PER
ALARM CIRCUIT CHANGE

CUSTOMERS NAME:	SIEMENS INDUSTRY INC.
CUSTOMER P.O. N.O	4509663191 ITEM 000020
PROJECT:	NEW ORLEANS SEWERAGE & WATER
SPECIFICATION NO.	A5E51176940, REV. AD
NIAGARA JOB No.	N40073
DRAWING REF:	TRANSFORMER NAMEPLATE CNS40073
	TRANSFORMER OUTLINE DXS40073

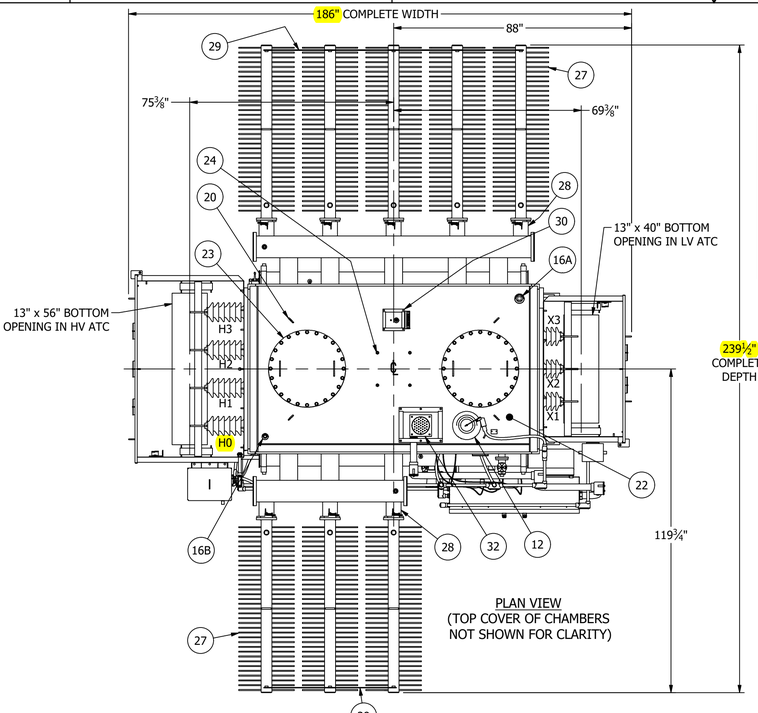
NIAGARA POWER TRANSFORMER
Powering Possible.
1755 DALE ROAD
BUFFALO, NEW YORK,
USA (716)-896-6500
www.niagarapowertransformer.com

TRANSFORMER CONTROL BOX ARRANGEMENT & WIRING DIAGRAM

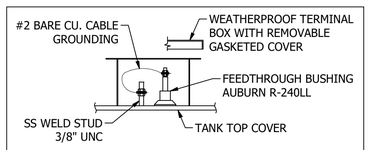
DWN: GJS	DATE: 9/1/21	Dwg No. DWS40073-3	Rev 1
CHK: JB	Plot Scale: 1/2		



ISOMETRIC VIEW



PLAN VIEW
(TOP COVER OF CHAMBERS
NOT SHOWN FOR CLARITY)



ACCESSIBLE CORE GROUND DETAIL
IT.#30

NOTES:

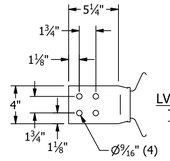
1. THIS OUTLINE CAN BE USED FOR INSTALLATION PURPOSES. IT IS NOT TO BE REGARDED AS INDICATING THE EXACT DETAILS OF CONSTRUCTION. READ INSTRUCTION BOOK 600 BEFORE HANDLING, INSTALLING AND ENERGIZING TRANSFORMER.
2. ALL VALVES HAVE THREADED ENDS UNLESS OTHERWISE SPECIFIED. ALL VALVES ARE FLANGE MOUNTED WITH PLUGS UNLESS OTHERWISE SPECIFIED.
3. THE TRANSFORMER TANK COVER MUST BE FASTENED IN PLACE ON THE TANK BEFORE LIFTING THE CORE & COIL ASSEMBLY AND TANK TOGETHER.
4. THE TRANSFORMER TANK IS DESIGNED TO WITHSTAND FULL VACUUM (14.7 PSI).
5. TRANSFORMER IS FILLED WITH ENVIROTEMP FR3 OIL, CONTAINING NO DETECTABLE LEVELS LEVELS OF PCB (LESS THAN 1 PPM) AT TIME OF MANUFACTURE.
6. SEALED TANK CONSTRUCTION PER ANSI C-57-12.10 WITH DRY NITROGEN BLANKET ABOVE OIL.
7. EXTERNAL WIRING FROM SIGNAL/INDICATION DEVICES AND CURRENT TRANSFORMERS TO CONTROL BOX ARE IN RIGID CONDUIT WITH SHORT RUNS OF LIQUID TIGHT FLEXIBLE CONDUIT.
8. PAINT: EXTERIOR FINISH : ANSI 70 LIGHT GRAY, 2 PART EPOXY WITH SHOTBLAST STEEL PREPARATION.
9. TRANSFORMER IS DESIGNED FOR OPERATION AT AN ALTITUDE OF 3300 FT OR LESS, NON-HAZARDOUS LOCATION, SEISMIC ZONE 1.
10. EXTERNAL FASTENERS: STAINLESS STEEL BOLTS AND WASHERS WITH SILICON BRONZE NUTS (TO PREVENT BINDING).
11. TRANSFORMER WILL BE SHIPPED WITH A THREE WAY IMPACT RECORDER TO PROVIDE A COMPLETE RECORD OF IMPACT OCCURANCE.
12. REFER TO OUTLINE PAGE 2 FOR COMPLETE PARTS LIST/ITEM DESCRIPTION AND PAGE 3 FOR SHIPPING CONFIGURATION.

⌖ - CENTER OF GRAVITY FOR COMPLETE ASSEMBLY.

ANSI 61 Gray per spec Section 26 05 75 (TYP)

ESTIMATED WEIGHTS		LBS
MAIN CORE & COILS		38,761
TANK & FITTINGS		18,243
REMOVABLE RADIATORS		16,783
LIQUID IN TRANSFORMER	(2,855 USG)	21,979
LIQUID IN RADIATORS	(673 USG)	5,184
APPROX. TOTAL WEIGHT (COMPLETE)		100,950
APPROX. TOTAL WEIGHT WITHOUT OIL		73,787

ENVIROTEMP FR3 OIL FILLED TRANSFORMER	
CLASS:	KNAN
MVA:	26
NUMBER OF PHASES:	3
FREQUENCY:	60 Hz
TEMPERATURE RISE:	75°C RISE
HV kV:	24000/13856 WYE
HV BIL:	150 kV
HV TAPS:	NONE
LV kV:	12400 DELTA
LV BIL:	110 kV
LV TAPS:	NONE



LV/HV BUSH 1/2" THK.
TIN PLATED SPADE

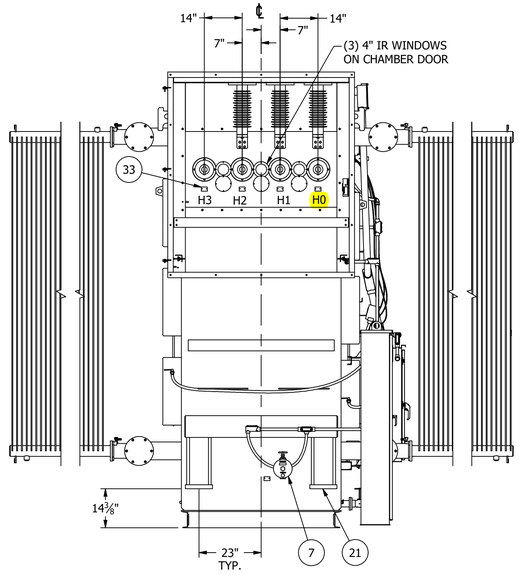
APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

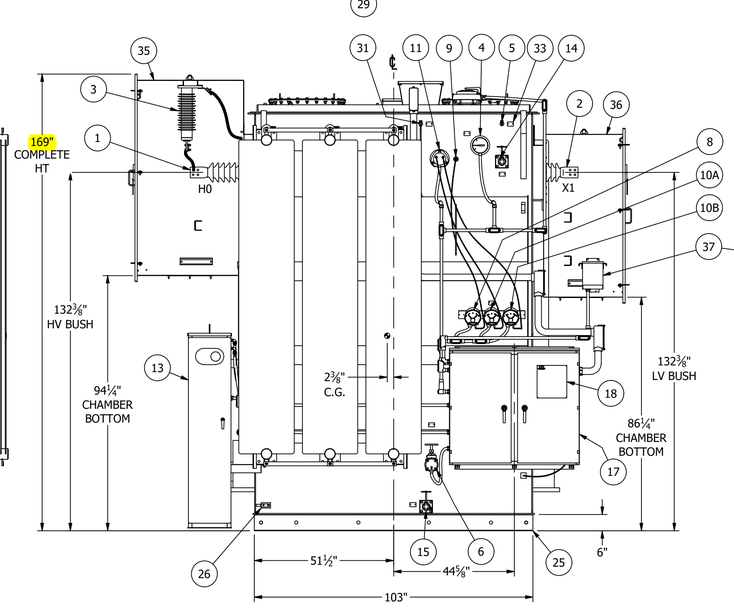
EDGAR WARF 04/22/2022
JACOBS Date

CUSTOMER:	SIEMENS INDUSTRY INC.
CUSTOMER P.O. No.:	4509663191
PROJECT:	NEW ORLEANS SEWERAGE & WATER
SPECIFICATION No.:	A5E51176940, REV. AE
NIAGARA REF.:	N40073
REFERENCE DRAWINGS:	TRANSFORMER NAMEPLATE BNS40073
REFERENCE DRAWINGS:	SCHEMATIC & WIRING DIAGRAM DWS40073

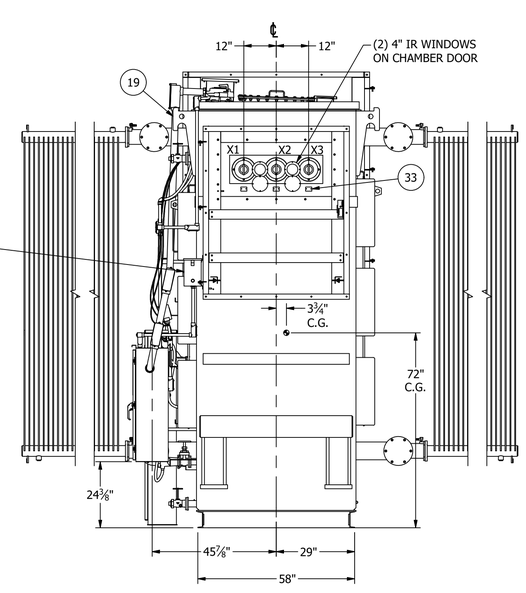
Confirm and/or Fix drawing number references for this submittal set. (TYP)



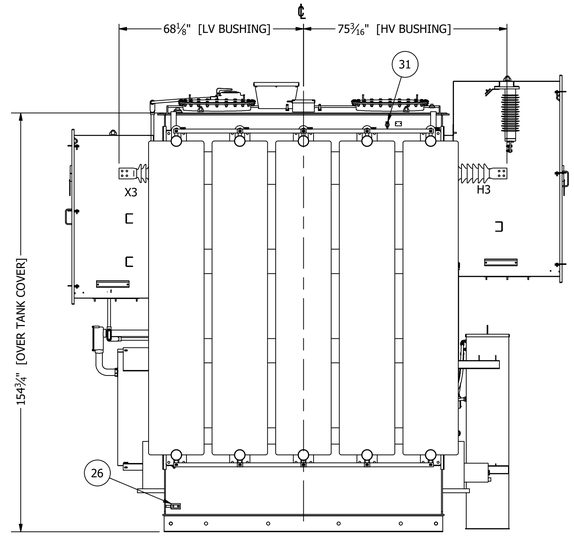
LEFT END VIEW (ANSI SEG.2)
(FRONT DOOR OF CHAMBER
NOT SHOWN FOR CLARITY)



FRONT VIEW (ANSI SEG.1)



RIGHT END VIEW (ANSI SEG.4)
(FRONT DOOR OF CHAMBER
NOT SHOWN FOR CLARITY)



REAR VIEW (ANSI SEG.3)

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WHICH CANNOT BE REPRODUCED, TRANSMITTED OR DISCLOSED IN WHOLE OR IN PART WITHOUT THE WRITTEN AUTHORIZATION OF NIAGARA POWER TRANSFORMER CORP.	DIMENSIONS IN INCHES UNLESS NOTED OTHERWISE.	REVISIONS: Rev1 MML 3/15/22 - MVA WERE 25. HV WAS DELTA. - TEMP. RISE WAS 65°. - OVERALL DIMS. REVISED. - TOTAL WEIGHTS & GALLONS OF OIL REVISED. - ACCESSORIES RELOCATED TO LV SIDE.
TANK SIZE: 102" x 57" x 148" HT.	PROJECTION:	

TRANSFORMER OUTLINE DIMENSIONS

1755 DALE ROAD
BUFFALO, NEW YORK, U.S.A.
(716) 896-6500
www.niagarapowertransformer.com
NIAGARA POWER TRANSFORMER
Powering Possible.

DRAWN: MML	DATE: 12/2/21	SIZE D	DWG NO: DXS40073-1
CHECKED: ORM	PLOT SCALE 1/28		REV 1

Confirm and/or Fix (TYP ALL DWGS)

ITEM	PART DESCRIPTION	QTY.	VENDOR	CATALOG No.	NOTES
1	PRIMARY BUSHINGS, 34 kV, 150 kV BIL, 800 A, BULK TYPE, PORCELAIN BODY WITH NEMA 4-HOLE TIN PLATED SPADE.	4	FOSTORIA	359218	BOTTOM CONNECTED WITH TD7000 GASKET
2	SECONDARY BUSHINGS, 15 kV, 110 kV BIL, 1700 A, BULK TYPE, PORCELAIN BODY WITH NEMA 4-HOLE TIN PLATED SPADE.	3	FOSTORIA	353232	BOTTOM CONNECTED WITH TD7000 GASKET
3	PRIMARY SURGE ARRESTER, STATION CLASS, 27 kV, 22 kV MCOV, POLYMER HOUSING.	3	ABB	Q027SA022AUH	
4	MAGNETIC LIQUID LEVEL GAUGE WITH ALARM CONTACTS, SEE WIRING AND SCHEMATIC DIAGRAM.	3	QUALITROL	032-092-01	
5	GAS SAMPLING VALVE.	1	GENERIC	-	
6	RAPID PRESSURE RISE RELAY, MAIN TANK, UNDER OIL TYPE MOUNTED ON A 2 INCH FLANGED BALL VALVE. SEE WIRING AND SCHEMATIC DIAGRAM.	1	QUALITROL	900-003-02	
7	GAS-IN-OIL MONITOR, HYDRAN 201Ti, MOUNTED ON A 1-1/2" BALL VALVE.	1	GE	H201Ti_CE_NE_X1_V1_VC0-H1-L1-F0-W24	
8	LIQUID TEMPERATURE GAUGE WITH ALARM CONTACTS, SEE WIRING AND SCHEMATIC DIAGRAM.	1	QUALITROL	TR6000B-00240717	
9	THERMAL WELL FOR LIQUID TEMPERATURE INDICATOR.	1	QUALITROL	167-50-3D	
10A	WINDING TEMPERATURE INDICATOR WITH ALARM CONTACTS, SEE WIRING AND SCHEMATIC DIAGRAM (PRIMARY WINDING).	1	QUALITROL	104-672-02	
10B	WINDING TEMPERATURE INDICATOR WITH ALARM CONTACTS, SEE WIRING AND SCHEMATIC DIAGRAM (SECONDARY WINDING).	1	QUALITROL	104-672-02	
11	THERMAL PLATE FOR WINDING TEMP. INDICATORS.	1	QUALITROL	2WT-1028-1	
12	MECHANICAL PRESSURE RELIEF DEVICE, SET FOR 10 PSI WITH ALARM SWITCH CONTACTS AND SEMAPHORE, SEE WIRING AND SCHEMATIC DIAGRAM.	1	QUALITROL	208-60E ; SWT-648-1; 207-60-3	
13	NITROGEN BLANKETING SYSTEM: EMPTY CYLINDER ALARM, HIGH/LOW PRESSURE ALARMS,PRESSURE VACUUM GAUGE, PURGE/TEST VALVE, AND SAMPLING VALVE.	1	ABB	RNC1	
14	TOP FILTER PRESS CONNECTION, 2" GLOBE VALVE, FLANGE MOUNTED TO TANK WALL.	1	UNITED BRASS	127TSB	
15	DRAIN VALVE, 2" GLOBE VALVE WITH 3/8" SIDE SAMPLER, FLANGE MOUNTED TO TANK WALL.	1	UNITED BRASS	127TSSB	
16A	FACTORY VACUUM FILL CONNECTION, 2" NPT WELD FLANGE AND PIPE PLUG.	1	GENERIC	-	
16B	FACTORY VACUUM FILL CONNECTION, 1" NPT WELD FLANGE AND PIPE PLUG.	1	GENERIC	-	
17	CONTROL BOX, NEMA 4X, WITH 3 POINT PADLOCKABLE LATCH AND BOTTOM OPENING WITH REMOVABLE GLAND PLATE.	1	SAGINAW	SCE-42EL4812SSWFLP	
18	DIAGRAM NAMEPLATE, STAINLESS STEEL, BLACK LINES AND LETTERS ON A CLEAR BACKGROUND.	1	MFG. STD.	BNS40073	
19	LIFTING LUGS, FOR COMPLETE TRANSFORMER, 40,000 LB. CAPACITY (EA).	4	MFG. STD.	BS000318	
20	LIFTING LUGS, FOR TANK COVER, 1,000 LB. CAPACITY (EA).	4	PHOENIX	SERIES 2-898-MIN	
21	JACKING PAD PROVISIONS, EACH WITH 2-1/2" DIA. HOLES FOR TOWING ATTACHMENT.	4	MFG. STD.	-	
22	TANK COVER, WELD-ON TYPE. SLOPED TO PREVENT WATER ACCUMULATION.	1	MFG. STD.	-	
23	MANHOLES, 24" DIA., WITH BOLTED GASKETED COVER. EACH COVER HAS LIFTING HANDLES.	2	MFG. STD.	BS000901	GASKET CONTAINED IN MACHINED GROOVE.
24	PROVISION TO MOUNT FALL PROTECTION EQUIPMENT (FACTORY)	2	MFG. STD.	-	
25	TRANSFORMER BASE, 6" STRUCTURAL CHANNEL CONSTRUCTION, SUITABLE FOR BI-DIRECTIONAL ROLLING OR SKIDDING.	1	MFG. STD.	-	
26	STAINLESS STEEL GROUND PADS, NEMA 2 HOLE. (1) EACH ON DIAGONALLY OPPOSITE TANK CORNER NEAR BASE, (1) INSIDE HV ATC FOR ARRESTER GROUNDING.	3	MFG. STD.	AS000325	W/(2) TWO-HOLE CABLE CRIMP LUG FOR 4/0 AWG CABLE
* 27	COOLING RADIATORS, 20 1/2" WIDE, HOT DIPPED GALVANIZED, UNPAINTED, COMPLETE WITH VENT AND DRAIN PLUGS.	8	TTP	RADP7B351160073	
28	SHUT-OFF VALVES FOR COOLING RADIATORS, BUTTERFLY TYPE, PADLOCKABLE, TOP & BOTTOM.	16	UNITED BRASS	150V0FS-4"	
* 29	RADIATOR BRACING AT TOP AND BOTTOM HEADERS.	4	MFG. STD.	-	
30	CORE GROUND BUSHING FOR MAIN, BUSHING IS HOUSED IN WEATHERPROOF TERMINAL BOX WITH BOLTED COVER.	1	AUBURN INC.	F-240LL	LOCATED TOP COVER OF THE TRANSFORMER
31	SHUT-OFF VALVES FOR GAS SPACE EXPANSION INTO TANK BRACES; VALVE IS TO BE CLOSE FOR VACUUM PROCESSING AND SHIPMENT, AND OPEN WHEN TRANSFORMER IS IN SERVICE.	2	GENERIC	-	ON FRONT & REAR WALL
32	MULTI-STUD FEEDTHROUGH BUSHING FOR CURRENT TRANSFORMER SECONDARY LEADS. WIRING EXTENDED TO TRANSFORMER CONTROL BOX. BUSHINGS HOUSED IN WEATHERPROOF TERMINAL BOX WITH BOLTED COVER.	1	POLYCAST	111-037-51	37 STUD EPOXY BUSHING
33	STAINLESS STEEL IDENTIFICATION TAGS FOR BUSHINGS, GAUGES AND VALVES.	19	MFG. STD.	-	
34	INTERNAL CURRENT TRANSFORMERS (ALSO REFER TO NAMEPLATE AND SCHEMATIC/WIRING DIAGRAMS).	-	-	-	
	HV CT: 700/5, SR, C400, RF 2.0	9	MERAMEC	TBD	(3) PER PHASE
	H0 CT: 400/5, SR, C200, RF 2.0	1	MERAMEC	TBD	
	WTI CT (HV): 625/5, SR, C50, RF 2.0	1	MERAMEC	TBD	(1) ON H2
	LV CT: 1300/5, SR, C400, RF 2.0	6	MERAMEC	TBD	(2) PER PHASE
	WTI CT (LV): 1210/5, SR, C50, RF 2.0	1	MERAMEC	TBD	(1) ON X2
35	PRIMARY AIR TERMINAL CHAMBER, PARTIAL HEIGHT, BOLTED-ON WITH REMOVABLE HINGED AND PADLOCKABLE FRONT DOOR, CABLE SUPPORTS, THERMOSTAT/HUMIDISTAT, STRIP HEATERS AND BOTTOM ENTRY WITH STEEL GLAND PLATE. (3) 4" IR WINDOWS ON CHAMBER DOOR.	1	MFG. STD.	-	CHAMBER DESIGNED FOR BOTTOM ENTRY.
36	SECONDARY AIR TERMINAL CHAMBER, PARTIAL HEIGHT, BOLTED-ON WITH REMOVABLE HINGED AND PADLOCKABLE FRONT DOOR, CABLE SUPPORTS, THERMOSTAT/HUMIDISTAT, STRIP HEATERS AND BOTTOM ENTRY WITH STEEL GLAND PLATE. (2) 4" IR WINDOWS ON CHAMBER DOOR.	1	MFG. STD.	-	CHAMBER DESIGNED FOR BOTTOM ENTRY.
37	CONTROL POWER TRANSFORMER; 3kVA, 1 PHASE, 240/480V TO 120/240V, 60Hz.	1	ACME	T-2-53013-S	

[1] GE HYDRAN 201Ti transmitter model indicated. Please identify what CONTROLLER will be used in conjunction with this transmitter also IF controller is used.

[2] Indicate "total" SYSTEM model as well (i.e., transmitter + controller combination model number; "Hydran 201R Model i", "Hydran 201i System", etc.).

Confirm CT Class as this disagrees with earlier schematic elsewhere in submittal. (TYP)

Confirm CT ratios (TYP)

Indicate MODEL numbers and DESCRIPTION. (TYP)

NOTES:
1. ITEM NUMBERS SHOWN ABOVE REFERENCE ITEM NUMBERS ON TRANSFORMER OUTLINE PAGE 1.
2. VENDOR AND/OR CATALOG No. MARKED WITH "TBD" WILL HAVE THE INFORMATION FILLED IN AT A LATER TIME WHEN IT BECOMES AVAILABLE.
3. PARTS INDICATED WITH AN ASTERISK (*) ARE REMOVED FOR SHIPPING.

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 04/22/2022
JACOBS Date

DIMENSIONS IN INCHES UNLESS NOTED OTHERWISE.

TANK SIZE: 102" x 57" x 148" HT.

PROJECTION:

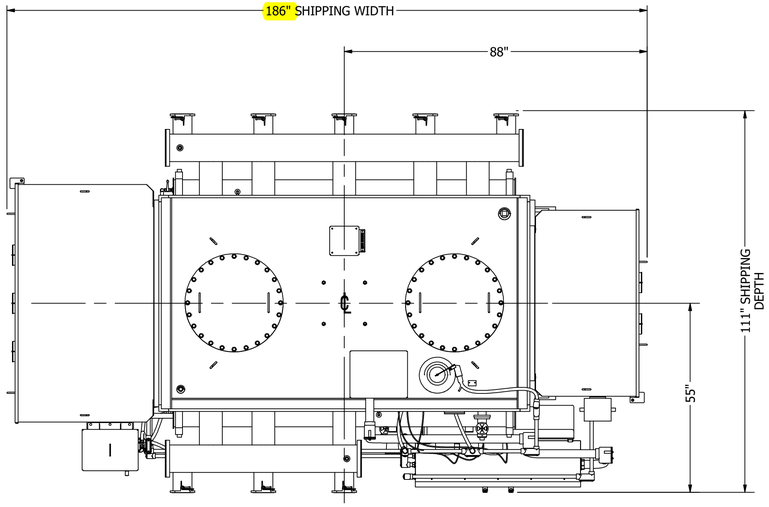
REVISIONS:
Rev1 MML 3/15/22
- MVA WERE 25. HV WAS DELTA.
- TEMP. RISE WAS 65°.
- HV BUSH WERE 3 AND 23kV.
- LV BUSH CHANGED FROM 1200A.
- CTs REVISED.
- RADS QTY. REVISED.

TRANSFORMER PART LIST

1755 DALE ROAD
BUFFALO, NEW YORK, U.S.A.
(716) 896-6500
www.niagarapowertransformer.com
NIAGARA POWER TRANSFORMER
Powering Possible.

DRAWN:	DATE:	SIZE	DWG NO:	REV
MML	12/2/21	D	DXS40073-2	1
CHECKED: ORM	PLOT SCALE -			

Confirm and/or Fix (TYP ALL DWGS)



PLAN VIEW

TRANSFORMER WILL BE SHIPPED WITH A 3-AXIS ELECTRONIC WITH GPS IMPACT RECORDER TO PROVIDE A COMPLETE RECORD OF IMPACT OCCURANCE.

SHIPPING NOTES:

1. ITEMS REMOVED FOR SHIPPING ARE LISTED IN THE TABLE BELOW. REFER TO OUTLINE PAGE 2 FOR OTHER ITEM DETAILS.
2. RADIATOR VALVES WILL BE COVERED FOR SHIPPING.

- CENTER OF GRAVITY FOR SHIPPING ASSEMBLY.

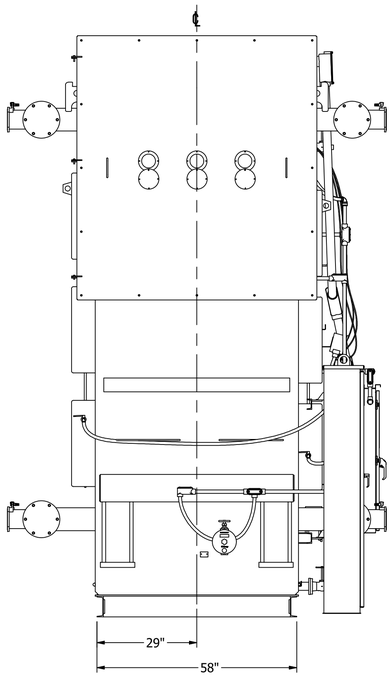
APPROVED		☐
APPROVED AS NOTED		☒
REVISE AND RESUBMIT		☐
REJECTED		☐
NOT SUBJECT TO REVIEW		☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

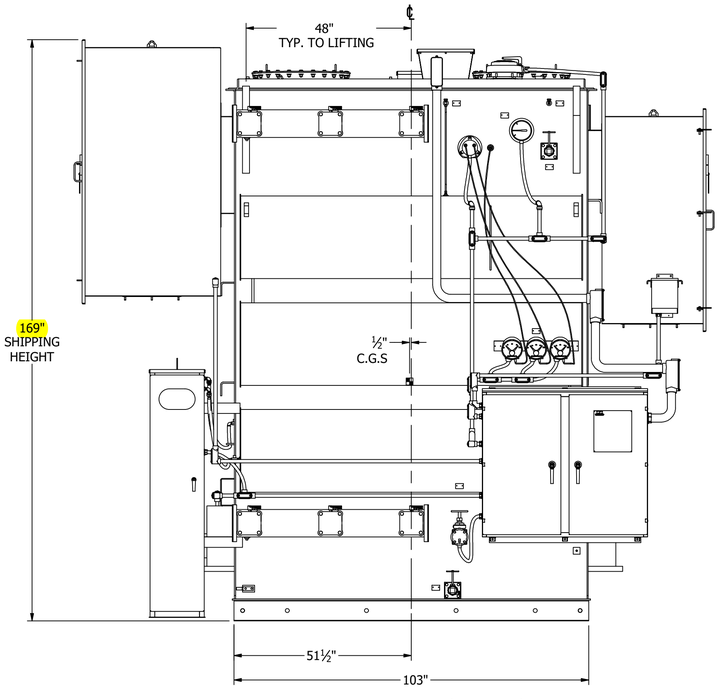
EDGAR WARF — 04/22/2022

JACOBS — Date

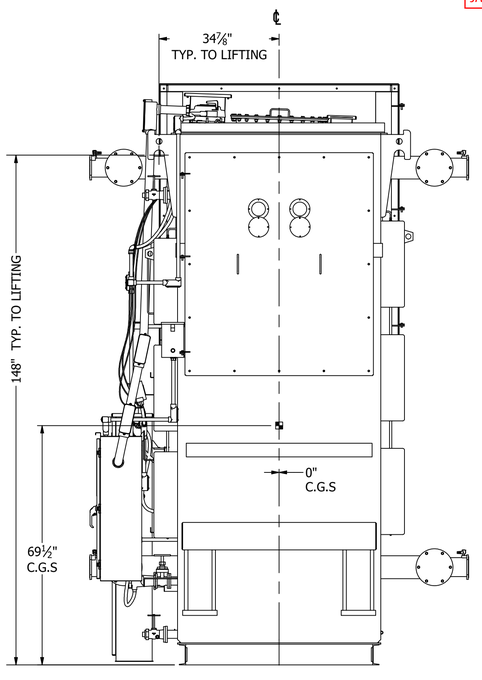
ITEMS REMOVED FOR SHIPPING		
PART DESCRIPTION	QTY.	LBS.
COOLING RADIATORS	8	16783
RADIATOR BRACING AT TOP AND BOTTOM HEADERS.	12	36
RADIATOR OIL	673	5184
TOTAL WEIGHT OF ITEMS REMOVED FOR SHIPMENT	-	22003
APPROX. SHIPPING WEIGHT (LARGEST PIECE)	-	78947



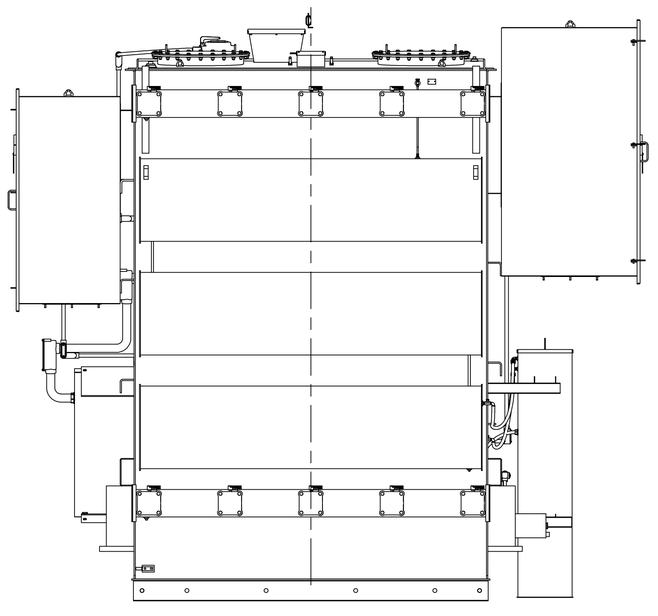
LEFT END VIEW (ANSI SEG.2)



FRONT VIEW (ANSI SEG.1)



RIGHT END VIEW (ANSI SEG.4)



REAR VIEW (ANSI SEG.3)

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WHICH CANNOT BE REPRODUCED, TRANSMITTED OR DISCLOSED IN WHOLE OR IN PART WITHOUT THE WRITTEN AUTHORIZATION OF NIAGARA POWER TRANSFORMER CORP.

DIMENSIONS IN INCHES UNLESS NOTED OTHERWISE.

TANK SIZE: 102" x 57" x 148" HT.

PROJECTION:

REVISIONS:

Rev1 MML 3/15/22
- MVA WERE 25. HV WAS DELTA.
- TEMP. RISE WAS 65°.
- OVERALL SHIPPING DIMS. REVISED.
- TOTAL WEIGHTS & GALLONS OF OIL REVISED.
- ACCESSORIES RELOCATED TO LV SIDE.

TRANSFORMER SHIPPING CONFIGURATION

1755 DALE ROAD
BUFFALO, NEW YORK, U.S.A.
(716) 896-6500
www.niagarapowertransformer.com
NIAGARA POWER TRANSFORMER
Powering Possible.

DRAWN:	DATE:	SIZE	DWG NO:	REV
MML	12/2/21	D	DXS40073-3	1
CHECKED: ORM	PLOT SCALE 1/22			

Confirm and/or Fix
(TYP ALL DWGS)

DIMENSIONS IN INCHES UNLESS NOTED OTHERWISE.

PROJECTION:

BUFFALO, NEW YORK, U.S.A.
(716) 896–6500
www.niagarapowertransformer.com

NIAGARA POWER TRANSFORMER
Powering Possible.

SERIAL NO. N40074

MFG.DATE

CONVERTOR DUTY TRANSFORMER

KVA 26000

LOW VOLTAGE: 6600Y/3810.5 Y L.V. BIL: 75 KV

HIGH VOLTAGE: 12400 △ H.V. BIL: 110 KV

3 PHASE 25 Hz 75 °C RISE CLASS KNAN

IMPEDANCE _____ % AT 26000 KVA

TRANSFORMER FILLED WITH 3923 GALLONS OF ENVIRO–TEMP FR3
CONTAINED NO DETECTABLE PCB (<1 PPM) AT TIME OF MANUFACTURE
READ INSTRUCTION BOOK 600 BEFORE HANDLING, INSTALLING
AND ENERGIZING TRANSFORMER

K–FACTOR: 2 VECTOR GROUP: Yd11

This shows Yd11 = HV WYE windings LAGGING LV DELTA windings by 30 degrees. VECTOR GROUP notation is NOT right. Please correct.

L.V. CONNECTION	6600 VOLTS	2275 AMPS AT 26000 KVA
H.V. CONNECTIONS	12400 VOLTS	1211 AMPS AT 26000 KVA

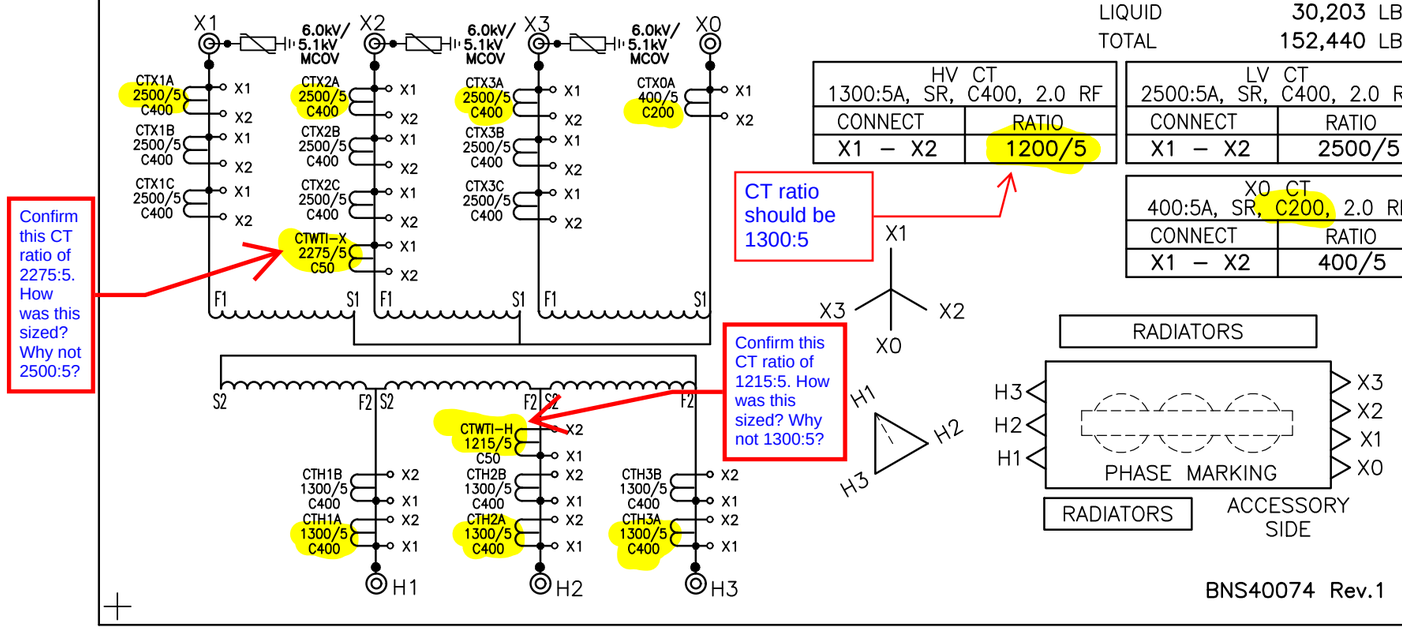
MAXIMUM OPERATING PRESSURE
7.7 P.S.I. POS. 3.9 P.S.I. NEG.
TANK SUITABLE FOR 14.7 P.S.I.

THE 25°C LIQUID LEVEL IS 17 3/8" INCHES BELOW TOP OF HIGHEST HANDHOLE FLANGE AND WILL CHANGE 0.86 INCHES FOR EACH 10°C CHANGE IN LIQUID TEMPERATURE.

CONDUCTOR MATERIAL
COPPER

APPROXIMATE WEIGHTS

CORE & COILS	77,980 LB.
TANK & FITTINGS	44,257 LB.
LIQUID	30,203 LB.
TOTAL	152,440 LB.



Confirm this CT ratio of 2275:5. How was this sized? Why not 2500:5?

Confirm this CT ratio of 1215:5. How was this sized? Why not 1300:5?

CT ratio should be 1300:5

HV CT 1300:5A, SR, C400, 2.0 RF	
CONNECT	RATIO
X1 – X2	1200/5

LV CT 2500:5A, SR, C400, 2.0 RF	
CONNECT	RATIO
X1 – X2	2500/5

X0 CT 400:5A, SR, C200, 2.0 RF	
CONNECT	RATIO
X1 – X2	400/5

BNS40074 Rev.1

9"

[1] Does %Z estimated range still hold true for 26MVA rating?

[2] Will a specific %Z (and NOT a range) be stamped on nameplate at fabrication completion?

Comments on THIS (nameplate) drawing apply elsewhere in the entirety of the submittal package (i.e., submittal SN-030, Rev1). (TYP)

APPROVED	☐
APPROVED AS NOTED	☒
REVISE AND RESUBMIT	☐
REJECTED	☐
NOT SUBJECT TO REVIEW	☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 04/26/2022
JACOBS Date

NOTES:

1. *NAMEPLATE MATERIAL IS STAINLESS STEEL, SATIN FINISH ALL ETCHING IN BLACK.*
2. *MEASURED VALUE FOR IMPEDANCE WILL BE STAMPED ON NAMEPLATE WHEN UNIT IS COMPLETED.*
   (GUARANTEED @ 7.0–8.0% @ 25000 KVA)
3. *DATE OF MANUFACTURE WILL BE STAMPED ON NAMEPLATE WHEN UNIT IS COMPLETED.*

26000 kVA

Typo? Remove.

REVISIONS

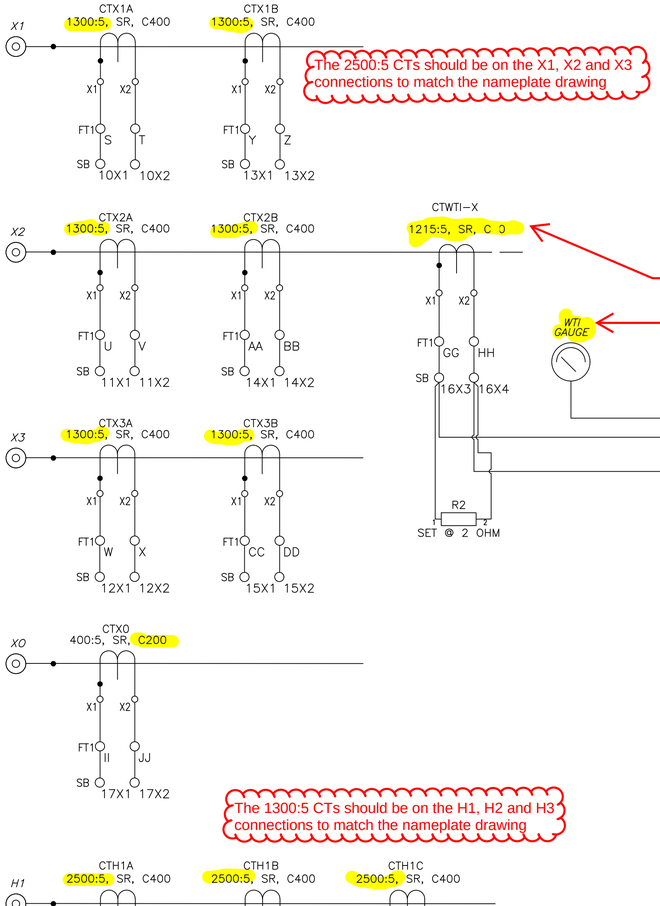
Rev.1 JM/MM 3/17/22
Updated KVA from 25000 to 26000, Temp. Temp. Rise from 65 to 75 and current transformer.
CT's ratios revised, X0 ct added.
Total weights, gallons of oil and pressures revised.

NIAGARA CUSTOMER:	SIEMENS INDUSTRY, INC.
CUSTOMER P.O. NO.	4509663191
PROJECT:	New Orleans Sewerage & Water
SPECIFICATION No.:	A5E51176931A_Rev_AE
NIAGARA JOB No.:	N40074
REFERENCE DRAWINGS:	DXS40074 TRANSFORMER OUTLINE
	DWS40074 CONTROL WIRING

NIAGARA POWER TRANSFORMER
Powering Possible.
1755 DALE ROAD
BUFFALO, NEW YORK, U.S.A.
(716) 896–6500
www.niagarapowertransformer.com

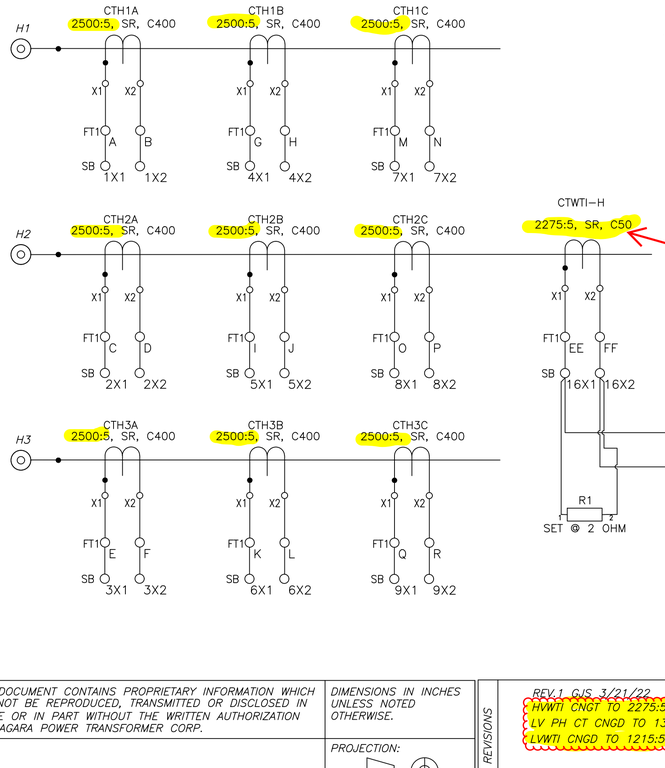
TRANSFORMER NAMEPLATE

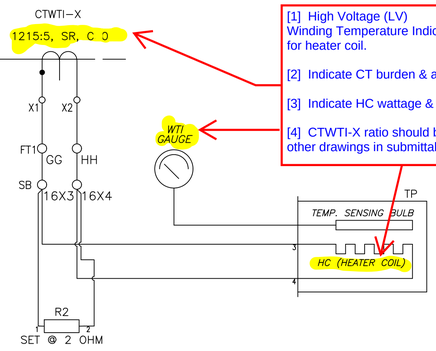
Dr: AS/ORM	Date: 11/12/21	Dwg No: BNS40074	Rev: 1
Ck: MML	Scale: 1:1		



The 2500:5 CTs should be on the X1, X2 and X3 connections to match the nameplate drawing

The 1300:5 CTs should be on the H1, H2 and H3 connections to match the nameplate drawing



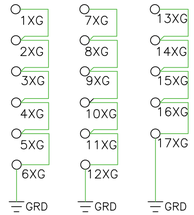


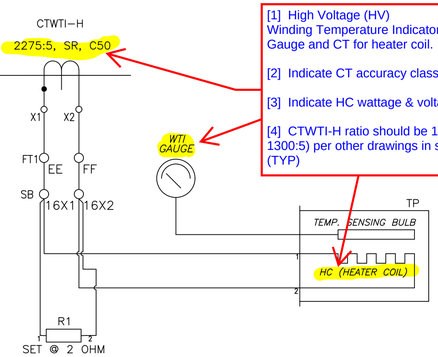
[1] High Voltage (LV)
Winding Temperature Indicator (WTI) Gauge and CT for heater coil.

[2] Indicate CT burden & accuracy class (TYP)

[3] Indicate HC wattage & voltage. (TYP)

[4] CTWTI-X ratio should be 2275:5 (or 2500:5) per other drawings in submittal. (TYP)





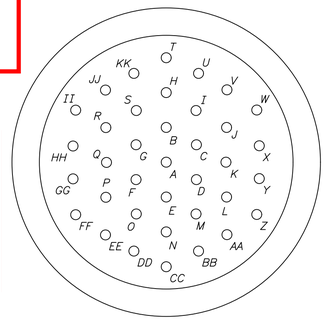
[1] High Voltage (HV)
Winding Temperature Indicator (WTI) Gauge and CT for heater coil.

[2] Indicate CT accuracy class (TYP)

[3] Indicate HC wattage & voltage. (TYP)

[4] CTWTI-H ratio should be 1215:5 (or 1300:5) per other drawings in submittal. (TYP)

FT1 STUD DIAGRAM
37 STUD BUSHING FOR CT SECONDARY OUTLETS



POST IDENTIFICATION FOR MULTI–STUD BUSHING FT1		
EXTERNAL CONNECTION	TERMINAL STUD No.	INTERNAL CONNECTION
SB:1X1	A	CTH1A:X1
SB:1X2	B	CTH1A:X2
SB:2X1	C	CTH2A:X1
SB:2X2	D	CTH2A:X2
SB:3X1	E	CTH3A:X1
SB:3X2	F	CTH3A:X2
SB:4X1	G	CTH1B:X1
SB:4X2	H	CTH1B:X2
SB:5X1	I	CTH2B:X1
SB:5X2	J	CTH2B:X2
SB:6X1	K	CTH3B:X1
SB:6X2	L	CTH3B:X2
SB:7X1	M	CTH1C:X1
SB:7X2	N	CTH1C:X2
SB:8X1	O	CTH2C:X1
SB:8X2	P	CTH2C:X2
SB:9X1	Q	CTH3C:X1
SB:9X2	R	CTH3C:X2
SB:10X1	S	CTX1A:X1
SB:10X2	T	CTX1A:X2
SB:11X1	U	CTX2A:X1
SB:11X2	V	CTX2A:X2
SB:12X1	W	CTX3A:X1
SB:12X2	X	CTX3A:X2
SB:13X1	Y	CTX1B:X1
SB:13X2	Z	CTX1B:X2
SB:14X1	AA	CTX2B:X1
SB:14X2	BB	CTX2B:X2
SB:15X1	CC	CTX3B:X1
SB:15X2	DD	CTX3B:X2
SB:16X1	EE	CTWTI–H:X1
SB:16X2	FF	CTWTI–H:X2
SB:16X3	GG	CTWTI–X:X1
SB:16X4	HH	CTWTI–X:X2
SB:17X1	II	CTX0:X1
SB:17X2	JJ	CTX0:X2
SPARE	KK	SPARE

CAUTION: OPERATION OF CURRENT TRANSFORMERS WITH SECONDARY WINDINGS OPEN CIRCUITED CAN RESULT IN HIGH VOLTAGES ACROSS THE SECONDARY TERMINALS OF THE CURRENT TRANSFORMERS, WHICH MAY BE DANGEROUS TO PERSONNEL OR EQUIPMENT. CT SECONDARIES SHOULD ALWAYS BE SHORT CIRCUITED BEFORE OPENING THE CIRCUIT.

THE SECONDARIES OF THE CURRENT TRANSFORMERS USED ON THIS TRANSFORMER ARE CONNECTED TO SHORTING TYPE TERMINAL BLOCKS. THE TRANSFORMER IS SHIPPED WITH THE SECONDARIES SHORTED.

THE SECONDARIES OF CURRENT TRANSFORMERS MUST BE GROUNDED. REFER TO SECTION 250–170 OF THE NATIONAL ELECTRICAL CODE.

TRANSFORMER CONTROLS – DEVICE LEGEND

DEVICE No.	DEVICE DESCRIPTION
23–1	CONTROL BOX HEATER CONTROL THERMOSTAT, 120VAC
23–2	HV ATC HEATER CONTROL HUMIDISTAT/THERMOSTAT, 120VAC
23–3	LV ATC HEATER CONTROL HUMIDISTAT/THERMOSTAT, 120VAC
26Q	LIQUID TEMPERATURE INDICATOR (TRANSFORMER OIL) WITH CONTACTS
43–1	LIGHT SWITCH – DOOR OPERATED, LIGHT ON (HEATERS OFF) WHEN DOOR OPEN
49T1	SIMULATED WINDING TEMPERATURE INDICATOR, WITH CONTACTS
52–M1	CIRCUIT BREAKER, 480VAC, 2 POLE, 10 A (MAIN CB)
52–M2	CIRCUIT BREAKER, 120VAC, 1 POLE, 30 A (MAIN CB)
52–1	CIRCUIT BREAKER, 120VAC, 1 POLE, 20 A (GFI RECEPTACLE CIRCUIT)
52–2	CIRCUIT BREAKER, 120VAC, 1 POLE, 10 A (LIGHT & HEATER CIRCUIT)
52–3	CIRCUIT BREAKER, 120VAC, 1 POLE, 10 A (HV ATC)
52–4	CIRCUIT BREAKER, 120VAC, 1 POLE, 10 A (LV ATC)
52–5	CIRCUIT BREAKER, 120VAC, 1 POLE, 15 A (GAS MONITOR)
63L	NITROGEN CYLINDER ALARM SWITCH WITH CONTACT
63P	MECHANICAL PRESSURE RELIEF DEVICE WITH ALARM CONTACTS (TRANSFORMER TANK)
63PS	PRESSURE SWITCH WITH LOW AND HIGH PRESSURE ALARM
63RP	SUDDEN PRESSURE RELAY WITH ALARM CONTACT (TRANSFORMER TANK)
63X	SEAL IN RELAY FOR SUDDEN PRESSURE, 120VAC
71Q	LIQUID LEVEL GAUGE WITH LOW LEVEL ALARM CONTACT (TRANSFORMER TANK)
72–1	CIRCUIT BREAKER, 125VDC, 2 POLE, 10 A (SEAL IN RELAY)
CO	CONVENIENCE OUTLET, GFI TYPE, 120VAC, 20A
CPT	CONTROL POWER TRANSFORMER, 480–120VAC, 3KVA, ACME T–2–53013–S
CTH–1,2,3–A,B,C	BUSHING TYPE CURRENT TRANSFORMER, 2500:5, SR, C400, 2.0 RF.
CTX–1,2,3–A,B	BUSHING TYPE CURRENT TRANSFORMER, 1300:5, SR, C400, 2.0 RF.
CTX0	BUSHING TYPE CURRENT TRANSFORMER, 400:5, SR, C200, 2.0 RF.
CTWTI–H	BUSHING TYPE CURRENT TRANSFORMER, 2275:5, SR, C50, 2.0 RF.
CTWTI–X	BUSHING TYPE CURRENT TRANSFORMER, 1215:5, SR, C50, 2.0 RF.
FT1	37 PIN FEED THRU BUSHING FOR CURRENT TRANSFORMER SECONDARY LEADS
GM	GE HYDRAN 201Ti GAS MONITOR, MODEL H201Ti_CE_NE_X1_V1_VC0_H1_L1_FO_W24
GRD	COPPER GROUND BUS
HTR1–2	CONTROL BOX HEATER, 240 VOLT, 150 WATT (OPERATED AT 120 VOLT)
HTR3–4	HV AND LV ATC HEATER, 240 VOLT, 500 WATT (OPERATED AT 120 VOLT)
HTR5–6	HV AND LV ATC HEATER, 240 VOLT, 500 WATT (OPERATED AT 120 VOLT)
LT	CONTROL BOX LIGHT, MAGNETIC MOUNT, 5W LED, 900 LUMIN
P	POWER TERMINAL BLOCK, 12 POLE, 75A, GE EB25B12
SB	TERMINAL BLOCK, SHORTING TYPE, 6 POLE, 30A, GE EB27B06S
R1 & 2	VARIABLE RESISTOR, 20HM, FOR WINDING TEMP
T	TERMINAL BLOCK, 12 POLE, 30A, GE EB25B12
TP	THERMAL PLATE FOR HV AND LV WINDING TEMP PROBE

[1] Confirm that device numbers are correct. (TYP)

HV & LV CT ratios are reversed.

Confirm wattage. Sizes are inconsistent across drawings in submittal. (TYP)

WIRING NOTES:

1. TRANSFORMER CONTROL BOX IS NEMA 4X, 42"H X 48"W X 12"D WITH PADLOCKABLE DOORS, STAINLESS STEEL HINGE DOOR STOP AND REMOVABLE BOTTOM PLATE. HEATERS AND BREATHERS ARE PROVIDED FOR CONDENSATION FREE OPERATION.
2. EXTERNAL WIRING IS RUN IN RIGID GALVANIZED STEEL (RGS) CONDUIT WITH SHORT LENGTHS OF FLEXIBLE LIQUID–TIGHT CONDUIT AT DEVICE ENDS.
3. PANEL WIRING IS 600V, 90°C, SIS. WIRE IN CONDUIT IS 600V, 90°C, SIS/XHHW. GAUGE LEADS ARE #16 AWG MINIMUM VIA CABLES, CONTROL WIRING IS #14 AWG MINIMUM, POWER & CT WIRING IS #10 AWG. CT WIRES TO BE YELLOW
4. ALL GROUND CONDUCTORS ARE GREEN.
5. ALL LEADS ARE IDENTIFIED WITH HEAT SHRINK SLEEVE TYPE WIRE MARKERS AT BOTH ENDS OF WIRES.
6. ALARM CONTACT WIRING FROM GAUGES TO TERMINAL BLOCKS FOLLOW ANSI COLOR CODES.
7. TERMINAL BLOCKS FOR CURRENT TRANSFORMER CONNECTIONS ARE SHORTING TYPE, RATED FOR 30A, 600V. OTHER TERMINAL BLOCKS ARE RATED FOR 30A, 600V, WITH BINDING HEAD SCREWS AND WHITE MARKER STRIPS.
8. CRIMP TERMINALS FOR PANEL WIRING ARE SEAMLESS NON–INSULATED RING TYPE.
9. DEVICES IN CONTROL BOX ARE IDENTIFIED WITH INDOOR/OUTDOOR VINYL TYPE LABELS, SUITABLE FOR –40° TO +120°C.
10. ALARM CONTACTS ARE SHOWN IN THEIR NORMAL OPERATING CONDITION (NON–ALARM) UNLESS STATED OTHERWISE.
11. CURRENT TRANSFORMER CIRCUIT, 120VAC AND 125VDC POWER CIRCUITS SHALL BE RUN SEPARATE FROM EACH OTHER IN CONTROL WIRING.
12. WIRE TO BE BUNDLED TOGETHER AS PER VOLTAGE SEGREGATION AND TO BE TIED AT 15" INTERVAL BY CABLE TIES IN THE PANDUITS.

APPROVED	☐
APPROVED AS NOTED	☒
REVISE AND RESUBMIT	☐
REJECTED	☐
NOT SUBJECT TO REVIEW	☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 04/26/2022
JACOBS Date

DIMENSIONS IN INCHES UNLESS NOTED OTHERWISE.

PROJECTION:

REVISIONS

REV.1 GJS 3/21/22
HVWTI CNGT TO 2275:5 FROM 2250:5
LV PH CT CNGD TO 1300:5 FROM 1200:5
LVWTI CNGD TO 1215:5 FROM 1200:5

HVWTI & LVWTI CT ratios are REVERSED from what's shown here. See commentary elsewhere on this sheet and in the larger submittal. (TYP)

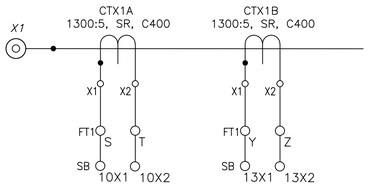
Confirm and/or Fix (TYP ALL DWGS)

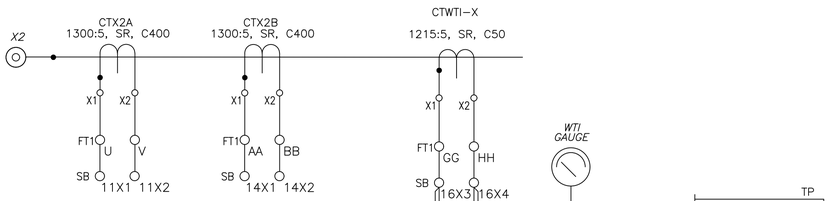
CUSTOMERS NAME:	SIEMENS INDUSTRY INC.
CUSTOMER P.O. N.O	4509663191 LINE 000010
PROJECT:	NEW ORLEANS SEWERAGE & WATER
NIAGARA JOB No.	N40074
DRAWING REF:	TRANSFORMER NAMEPLATE BNS40074
	TRANSFORMER OUTLINE DWL40074

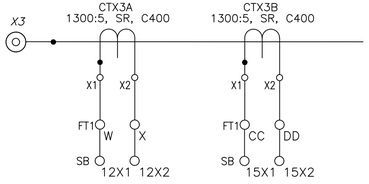
NIAGARA POWER TRANSFORMER
Powering Possible.
1755 DALE ROAD
BUFFALO, NEW YORK,
USA (716)–896–6500
www.niagarapowertransformer.com

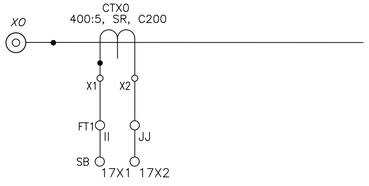
XFMR CT, LEGENDS, SEAL IN AND N2 SYS SCHEMEMATICS

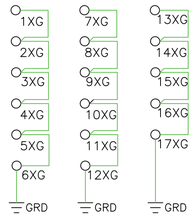
DWN: GJS	DATE: 12/6/21	Dwg No. DWS40074–1	Rev 1
CHK: JTB	Plot Scale: 1/2		

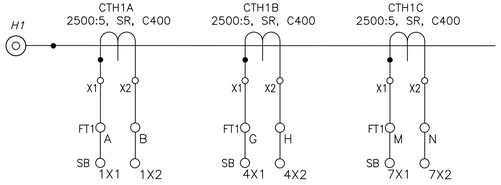


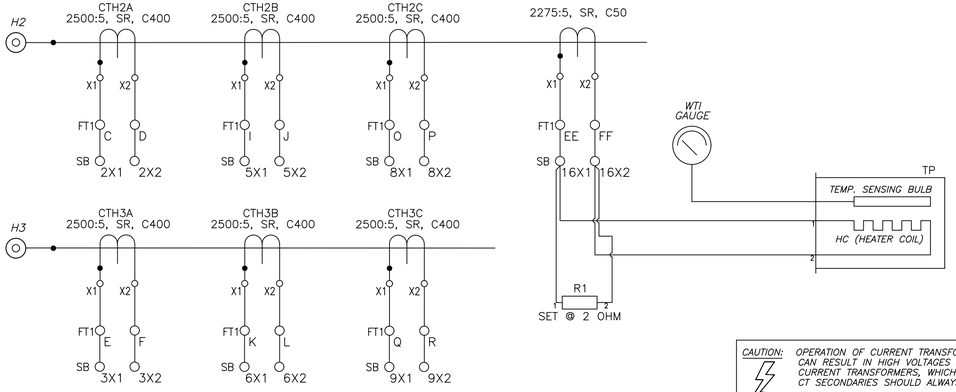












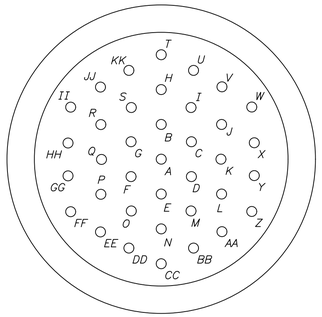
CAUTION: OPERATION OF CURRENT TRANSFORMERS WITH SECONDARY WINDINGS OPEN CIRCUITED CAN RESULT IN HIGH VOLTAGES ACROSS THE SECONDARY TERMINALS OF THE CURRENT TRANSFORMERS, WHICH MAY BE DANGEROUS TO PERSONNEL OR EQUIPMENT. CT SECONDARIES SHOULD ALWAYS BE SHORT CIRCUITED BEFORE OPENING THE CIRCUIT.

THE SECONDARIES OF THE CURRENT TRANSFORMERS USED ON THIS TRANSFORMER ARE CONNECTED TO SHORTING TYPE TERMINAL BLOCKS. THE TRANSFORMER IS SHIPPED WITH THE SECONDARIES SHORTED.

THE SECONDARIES OF CURRENT TRANSFORMERS MUST BE GROUNDED. REFER TO SECTION 250–170 OF THE NATIONAL ELECTRICAL CODE.

FT1 STUD DIAGRAM

37 STUD BUSHING FOR CT SECONDARY OUTLETS



POST IDENTIFICATION FOR MULTI–STUD BUSHING FT1		
EXTERNAL CONNECTION	TERMINAL STUD No.	INTERNAL CONNECTION
SB:1X1	A	CTH1A:X1
SB:1X2	B	CTH1A:X2
SB:2X1	C	CTH2A:X1
SB:2X2	D	CTH2A:X2
SB:3X1	E	CTH3A:X1
SB:3X2	F	CTH3A:X2
SB:4X1	G	CTH1B:X1
SB:4X2	H	CTH1B:X2
SB:5X1	I	CTH2B:X1
SB:5X2	J	CTH2B:X2
SB:6X1	K	CTH3B:X1
SB:6X2	L	CTH3B:X2
SB:7X1	M	CTH1C:X1
SB:7X2	N	CTH1C:X2
SB:8X1	O	CTH2C:X1
SB:8X2	P	CTH2C:X2
SB:9X1	Q	CTH3C:X1
SB:9X2	R	CTH3C:X2
SB:10X1	S	CTX1A:X1
SB:10X2	T	CTX1A:X2
SB:11X1	U	CTX2A:X1
SB:11X2	V	CTX2A:X2
SB:12X1	W	CTX3A:X1
SB:12X2	X	CTX3A:X2
SB:13X1	Y	CTX1B:X1
SB:13X2	Z	CTX1B:X2
SB:14X1	AA	CTX2B:X1
SB:14X2	BB	CTX2B:X2
SB:15X1	CC	CTX3B:X1
SB:15X2	DD	CTX3B:X2
SB:16X1	EE	CTWTI–H:X1
SB:16X2	FF	CTWTI–H:X2
SB:16X3	GG	CTWTI–X:X1
SB:16X4	HH	CTWTI–X:X2
SB:17X1	II	CTX0:X1
SB:17X2	JJ	CTX0:X2
SPARE	KK	SPARE

TRANSFORMER CONTROLS – DEVICE LEGEND	
DEVICE No.	DEVICE DESCRIPTION
23–1	CONTROL BOX HEATER CONTROL THERMOSTAT, 120VAC
23–2	HV ATC HEATER CONTROL HUMIDISTAT/THERMOSTAT, 120VAC
23–3	LV ATC HEATER CONTROL HUMIDISTAT/THERMOSTAT, 120VAC
26Q	LIQUID TEMPERATURE INDICATOR (TRANSFORMER OIL) WITH CONTACTS
43–1	LIGHT SWITCH – DOOR OPERATED, LIGHT ON (HEATERS OFF) WHEN DOOR OPEN
49T1	SIMULATED WINDING TEMPERATURE INDICATOR, WITH CONTACTS
52–M1	CIRCUIT BREAKER, 480VAC, 2 POLE, 10 A (MAIN CB)
52–M2	CIRCUIT BREAKER, 120VAC, 1 POLE, 30 A (MAIN CB)
52–1	CIRCUIT BREAKER, 120VAC, 1 POLE, 20 A (GFI RECEPTACLE CIRCUIT)
52–2	CIRCUIT BREAKER, 120VAC, 1 POLE, 10 A (LIGHT & HEATER CIRCUIT)
52–3	CIRCUIT BREAKER, 120VAC, 1 POLE, 10 A (HV ATC)
52–4	CIRCUIT BREAKER, 120VAC, 1 POLE, 10 A (LV ATC)
52–5	CIRCUIT BREAKER, 120VAC, 1 POLE, 15 A (GAS MONITOR)
63L	NITROGEN CYLINDER ALARM SWITCH WITH CONTACT
63P	MECHANICAL PRESSURE RELIEF DEVICE WITH ALARM CONTACTS (TRANSFORMER TANK)
63PS	PRESSURE SWITCH WITH LOW AND HIGH PRESSURE ALARM
63RP	SUDDEN PRESSURE RELAY WITH ALARM CONTACT (TRANSFORMER TANK)
63X	SEAL IN RELAY FOR SUDDEN PRESSURE, 120VAC
71Q	LIQUID LEVEL GAUGE WITH LOW LEVEL ALARM CONTACT (TRANSFORMER TANK)
72–1	CIRCUIT BREAKER, 125VDC, 2 POLE, 10 A (SEAL IN RELAY)
CO	CONVENIENCE OUTLET, GFI TYPE, 120VAC, 20A
CPT	CONTROL POWER TRANSFORMER, 480–120VAC, 3KVA, ACME T–2–53013–S
CTH–1,2,3–A,B,C	BUSHING TYPE CURRENT TRANSFORMER, 2500:5, SR, C400, 2.0 RF.
CTX–1,2,3–A,B	BUSHING TYPE CURRENT TRANSFORMER, 1300:5, SR, C400, 2.0 RF.
CTX0	BUSHING TYPE CURRENT TRANSFORMER, 400:5, SR, C200, 2.0 RF.
CTWTI–H	BUSHING TYPE CURRENT TRANSFORMER, 2275:5, SR, C50, 2.0 RF.
CTWTI–X	BUSHING TYPE CURRENT TRANSFORMER, 1215:5, SR, C50, 2.0 RF.
FT1	37 PIN FEED THRU BUSHING FOR CURRENT TRANSFORMER SECONDARY LEADS
GM	GE HYDRAN 201Ti GAS MONITOR, MODEL H201Ti_CE_NE_X1_V1_VCO_H1_L1_FO_W24
GRD	COPPER GROUND BUS
HTR1–2	CONTROL BOX HEATER, 240 VOLT, 150 WATT (OPERATED AT 120 VOLT)
HTR3–4	HV AND LV ATC HEATER, 240 VOLT, 500 WATT (OPERATED AT 120 VOLT)
HTR5–6	HV AND LV ATC HEATER, 240 VOLT, 500 WATT (OPERATED AT 120 VOLT)
LT	CONTROL BOX LIGHT, MAGNETIC MOUNT, 5W LED, 900 LUMIN
P	POWER TERMINAL BLOCK, 12 POLE, 75A, GE EB25B12
SB	TERMINAL BLOCK, SHORTING TYPE, 6 POLE, 30A, GE EB27B06S
R1 & 2	VARIABLE RESISTOR, 20HM, FOR WINDING TEMP
T	TERMINAL BLOCK, 12 POLE, 30A, GE EB25B12
TP	THERMAL PLATE FOR HV AND LV WINDING TEMP PROBE

[1] This FILE/DRAWING (i.e., DWS40074.001b, Rev. 1) looks like a DUPLICATE of file DWS40074.001a.R1. See comments on earlier drawing in this submittal.

[2] If these are the same drawings, all previous comments apply. (TYP)

[3] If this drawing is a duplicate, please remove from the set.

WIRING NOTES:

1. TRANSFORMER CONTROL BOX IS NEMA 4X, 42"H X 48"W X 12"D WITH PADLOCKABLE DOORS, STAINLESS STEEL HINGE DOOR STOP AND REMOVABLE BOTTOM PLATE. HEATERS AND BREATHERS ARE PROVIDED FOR CONDENSATION FREE OPERATION.
2. EXTERNAL WIRING IS RUN IN RIGID GALVANIZED STEEL (RGS) CONDUIT WITH SHORT LENGTHS OF FLEXIBLE LIQUID–TIGHT CONDUIT AT DEVICE ENDS.
3. PANEL WIRING IS 600V, 90°C, SIS. WIRE IN CONDUIT IS 600V, 90°C, SIS/XHHW. GAUGE LEADS ARE #16 AWG MINIMUM VIA CABLES, CONTROL WIRING IS #14 AWG MINIMUM, POWER & CT WIRING IS #10 AWG. CT WIRES TO BE YELLOW
4. ALL GROUND CONDUCTORS ARE GREEN.
5. ALL LEADS ARE IDENTIFIED WITH HEAT SHRINK SLEEVE TYPE WIRE MARKERS AT BOTH ENDS OF WIRES.
6. ALARM CONTACT WIRING FROM GAUGES TO TERMINAL BLOCKS FOLLOW ANSI COLOR CODES.
7. TERMINAL BLOCKS FOR CURRENT TRANSFORMER CONNECTIONS ARE SHORTING TYPE, RATED FOR 30A, 600V. OTHER TERMINAL BLOCKS ARE RATED FOR 30A, 600V, WITH BINDING HEAD SCREWS AND WHITE MARKER STRIPS.
8. CRIMP TERMINALS FOR PANEL WIRING ARE SEAMLESS NON–INSULATED RING TYPE.
9. DEVICES IN CONTROL BOX ARE IDENTIFIED WITH INDOOR/OUTDOOR VINYL TYPE LABELS, SUITABLE FOR –40° TO +120°C.
10. ALARM CONTACTS ARE SHOWN IN THEIR NORMAL OPERATING CONDITION (NON–ALARM) UNLESS STATED OTHERWISE.
11. CURRENT TRANSFORMER CIRCUIT, 120VAC AND 125VDC POWER CIRCUITS SHALL BE RUN SEPARATE FROM EACH OTHER IN CONTROL WIRING.
12. WIRE TO BE BUNDLED TOGETHER AS PER VOLTAGE SEGREGATION AND TO BE TIED AT 15" INTERVAL BY CABLE TIES IN THE PANDUITS.

APPROVED	
APPROVED AS NOTED	X
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 04/26/2022

JACOBS Date

DIMENSIONS IN INCHES UNLESS NOTED OTHERWISE.

PROJECTION:

REVISIONS

REV.1 GJS 3/21/22
HVWTI CNGT TO 2275:5 FROM 2250:5
LV PH CT CNGD TO 1300:5 FROM 1200:5
LVWTI CNGD TO 1215:5 FROM 1200:5

CUSTOMERS NAME:	SIEMENS INDUSTRY INC.
CUSTOMER P.O. N.O	4509663191 LINE 000010
PROJECT:	NEW ORLEANS SEWERAGE & WATER
NIAGARA JOB No.	N40074
DRAWING REF:	TRANSFORMER NAMEPLATE BNS40074
	TRANSFORMER OUTLINE DWL40074

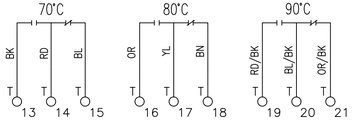
NIAGARA POWER TRANSFORMER
Powering Possible.
1755 DALE ROAD
BUFFALO, NEW YORK,
USA (716)–896–6500
www.niagarapowertransformer.com

XFMR CT, LEGENDS, SEAL IN AND N2 SYS SCHEMEMATICS

DWN: GJS	DATE: 12/6/21	Dwg No.	Rev
CHK: JTB	Plot Scale: 1/2	DWS40074–1	1

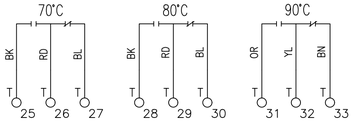
(THERMAL PLATE CIRCUIT SHOWN ON DWS40074-1)

49T1
HV WINDING TEMPERATURE GAUGE

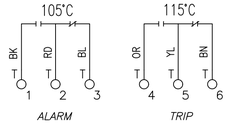


(THERMAL PLATE CIRCUIT SHOWN ON DWS40074-1)

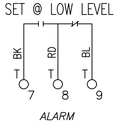
49T2
LV WINDING TEMPERATURE GAUGE



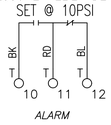
26Q
OIL TEMPERATURE GAUGE

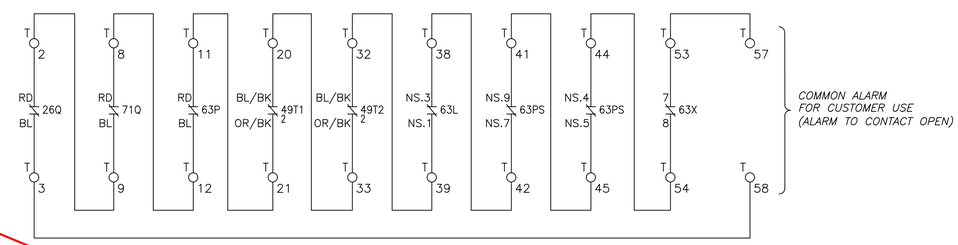


71Q
OIL LEVEL GAUGE
SET @ LOW LEVEL



63P
PRESSURE RELIEF DEVICE
SET @ 10PSI





SWITCH RATINGS:
(RATINGS FOR DEVICES 26Q, 49T1&2,63P,71Q,63RP,63PV)
15 AMPS @ 125, 250 AND 480V AC
2 AMPS @ 48V, DC NON-INDUCTIVE
1/2 AMP @ 125V, DC NON-INDUCTIVE
1/4 AMP @ 250V, DC NON-INDUCTIVE

63X SUPPLY VOLTAGE	JUMPER POSITION J1
120 AC	3-4
24 DC	1-2
48 DC	2-3
125 DC	3-4

FACTORY SETTING

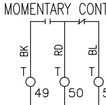
WHERE L(HENRYS)/R(OHMS) < .070

COIL CONSUMPTION — 8.28 WATTS

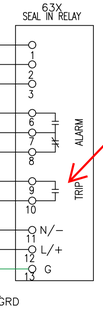
63X SEAL - IN - RELAY CONTACT RATING				
VOLTAGE (VOLTS)	MAKE (AMPS)	CARRY (AMPS)	BREAK (AMPS)	
			RESISTIVE	INDUCTIVE
120 AC	30	8	8	6.5
240 AC	15	8	8	3.5
24 DC	8	8	8	3
48 DC	0.58	2	2	1
125 DC	0.22	1	0.22	0.22
250 DC	0.11	1	0.11	0.11

I/O list shows 3 signals in parallel for high temp trips. Which 3 are being used?

63RP
RAPID PRESS RISE RELAY
MOMENTARY CONTACT

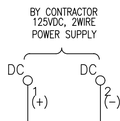


63X
SEAL IN RELAY

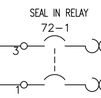


Pressure rise trip signal in I/O list.

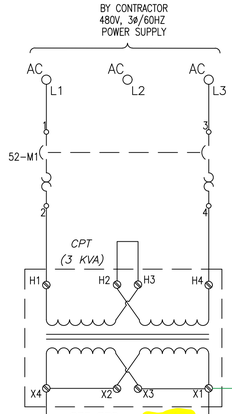
BY CONTRACTOR
125VDC, 2WIRE
POWER SUPPLY

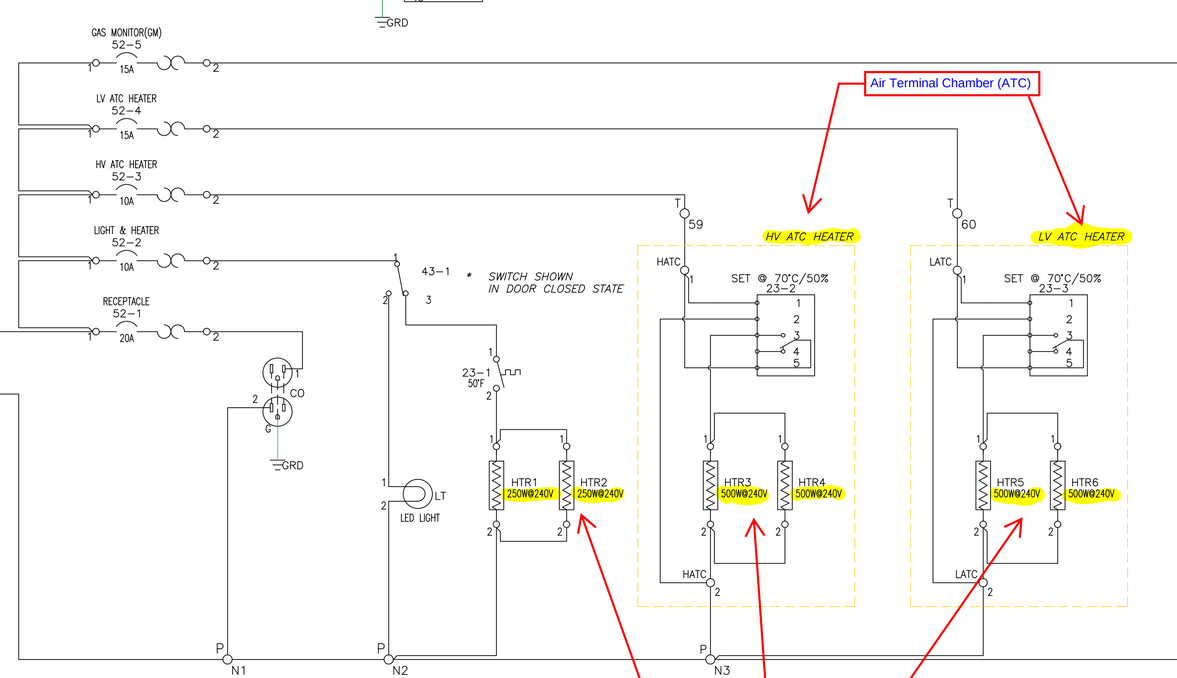


SEAL IN RELAY
72-1



BY CONTRACTOR
480V, 3ø/60HZ
POWER SUPPLY



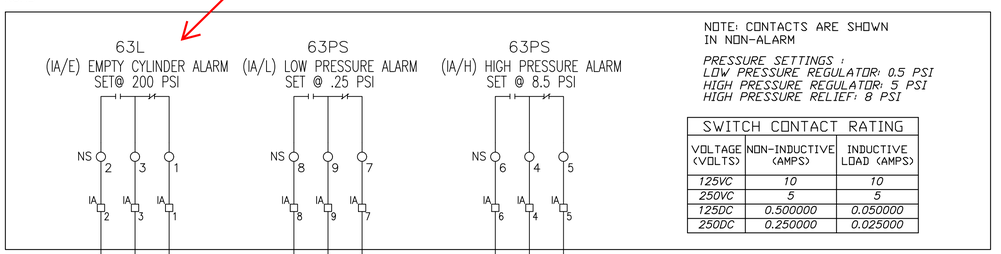


Air Terminal Chamber (ATC)

Confirm wattage ratings with those shown on other drawings and confirm operational voltage rating for all heaters. (TYP)

Do not see any of these signals in I/O list??

NCAB

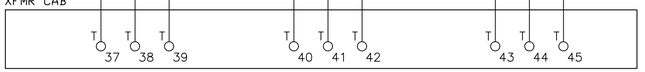


NOTE: CONTACTS ARE SHOWN IN NON-ALARM

PRESSURE SETTINGS :
LOW PRESSURE REGULATOR: 0.5 PSI
HIGH PRESSURE REGULATOR: 5 PSI
HIGH PRESSURE RELIEF: 8 PSI

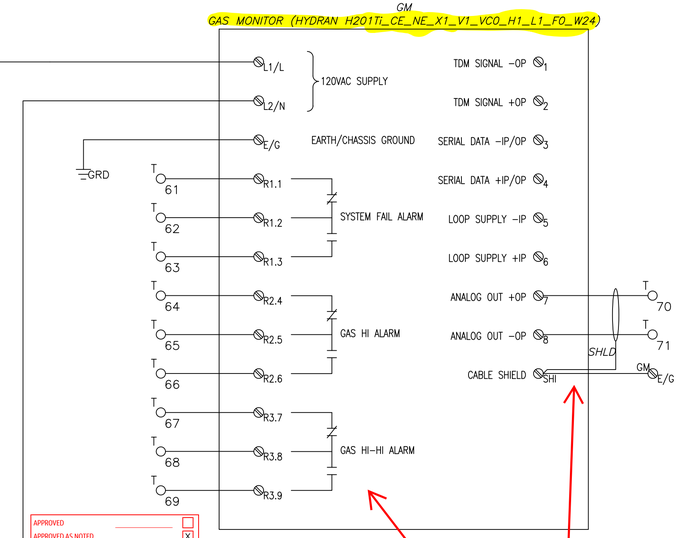
SWITCH CONTACT RATING		
VOLTAGE (VOLTS)	NON-INDUCTIVE (AMPS)	INDUCTIVE LOAD (AMPS)
125VC	10	10
250VC	5	5
125DC	0.500000	0.050000
250DC	0.250000	0.025000

XFMR CAB



See commentary elsewhere in submittal Bill of Material (BOM) regarding GE Hydran SYSTEM model and apply here.

GM
GAS MONITOR (HYDRAN H201Ti_CE_NE_X1_V1_VCO_H1_L1_FO_W24)



3 signals in series shown in I/O list for gas monitor common alarm. Analog not shown, is it being used?

Confirm and/or Fix (TYP ALL DWGS)

APPROVED	
APPROVED AS NOTED	X
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 04/26/2022
JACOBS Date

DIMENSIONS IN INCHES UNLESS NOTED OTHERWISE.

PROJECTION:

REVISIONS

REV.1 GJS 3/22/22
ALARM CKT REVISED
PER CUST

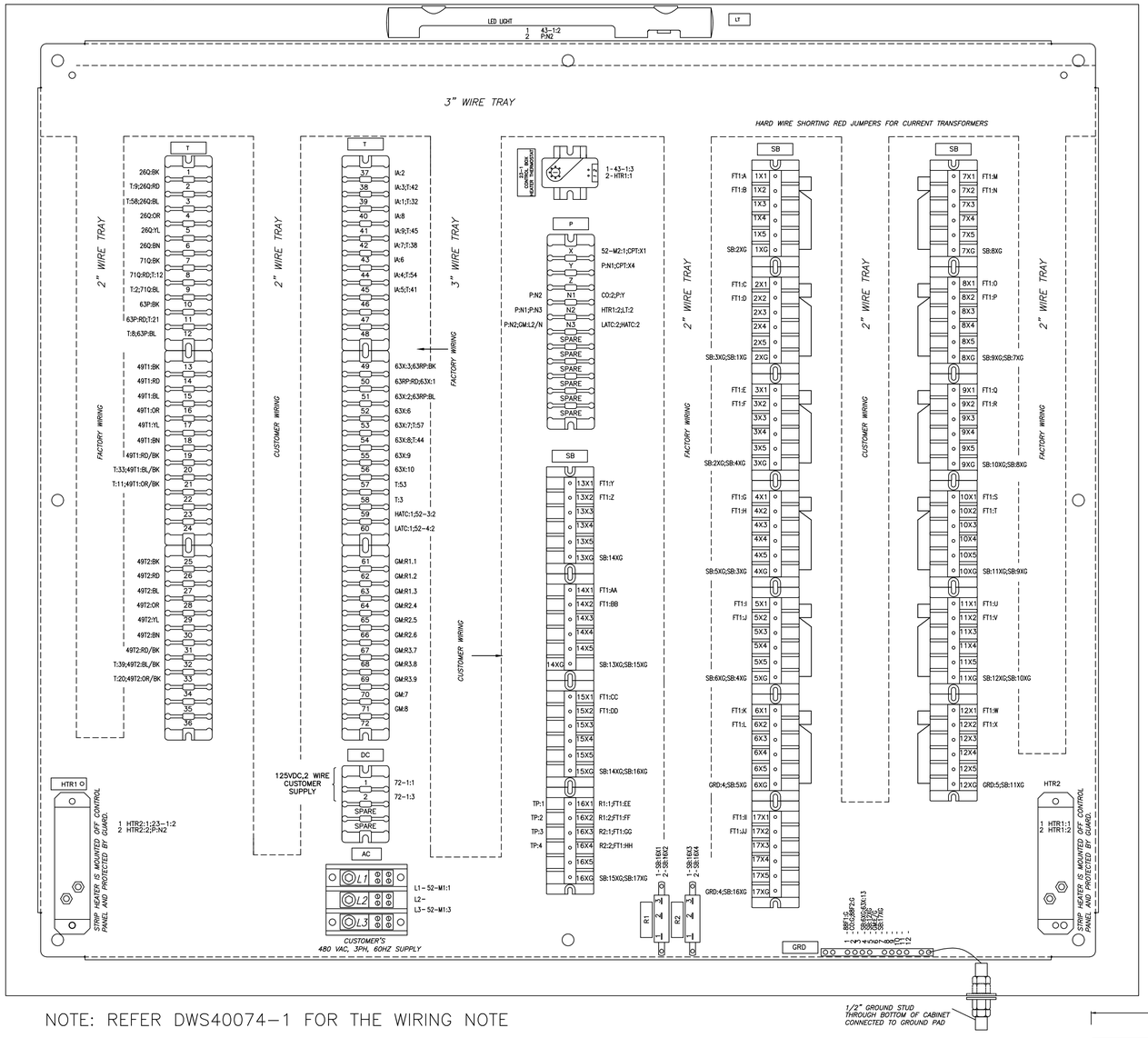
CUSTOMERS NAME:	SIEMENS INDUSTRY INC.
CUSTOMER P.O. N.O	4509663191 LINE 000010
PROJECT:	NEW ORLEANS SEWERAGE & WATER
NIAGARA JOB No.	N40074
DRAWING REF:	TRANSFORMER NAMEPLATE BNS40074
	TRANSFORMER OUTLINE DWL40074

NIAGARA POWER TRANSFORMER
Powering Possible.
1755 DALE ROAD
BUFFALO, NEW YORK,
USA (716)-896-6500
www.niagarapowertransformer.com

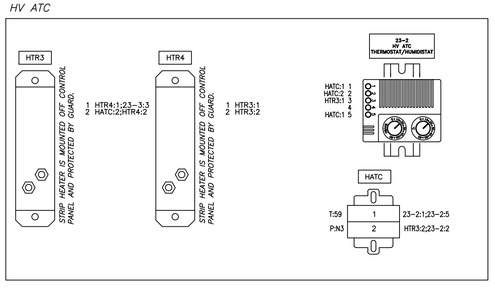
FAN CONTROL & ALARM SCHEMATICS

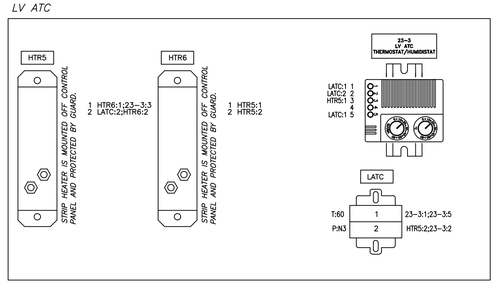
DWN: GJS	DATE: 12/6/21	Dwg No. DWS40074-2	Rev 1
CHK: JTB	Plot Scale: 1/2		

NEMA 4X CONTROL BOX: 42" H X 48" W X 12" D
STATIONARY REAR PANEL: 39" H X 44.75" W

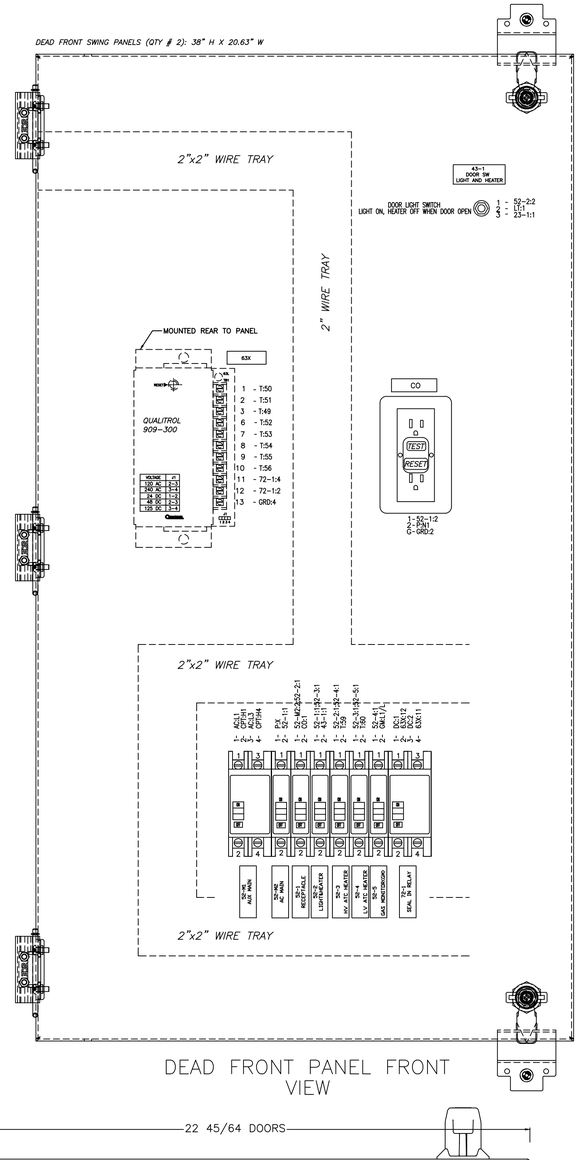


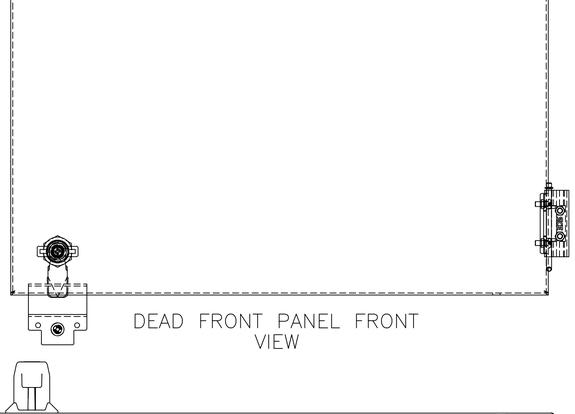
NOTE: REFER DWS40074–1 FOR THE WIRING NOTE

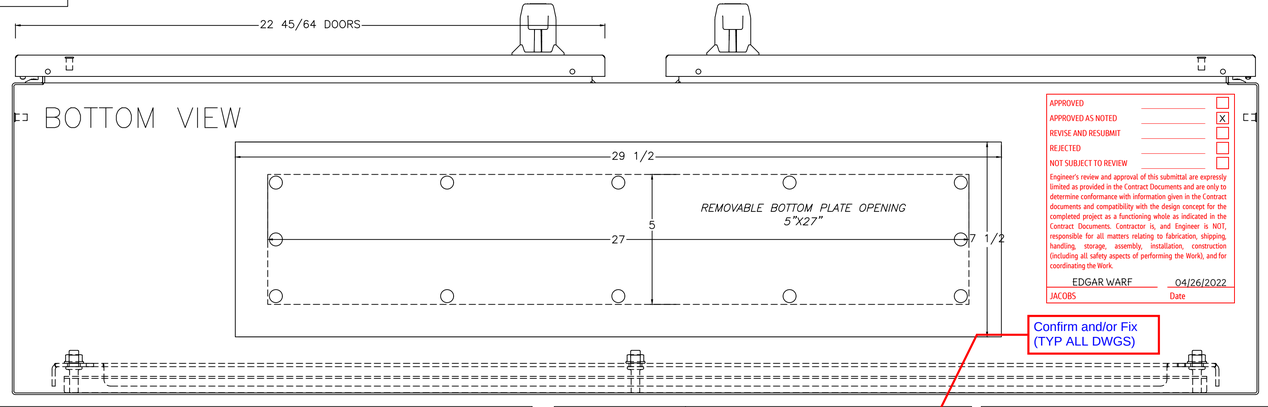




DEAD FRONT SWING PANELS (QTY # 2): 38" H X 20.63" W







APPROVED	
APPROVED AS NOTED	X
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 04/26/2022
JACOBS Date

Confirm and/or Fix (TYP ALL DWGS)

DIMENSIONS IN INCHES UNLESS NOTED OTHERWISE.

PROJECTION:

REVISIONS

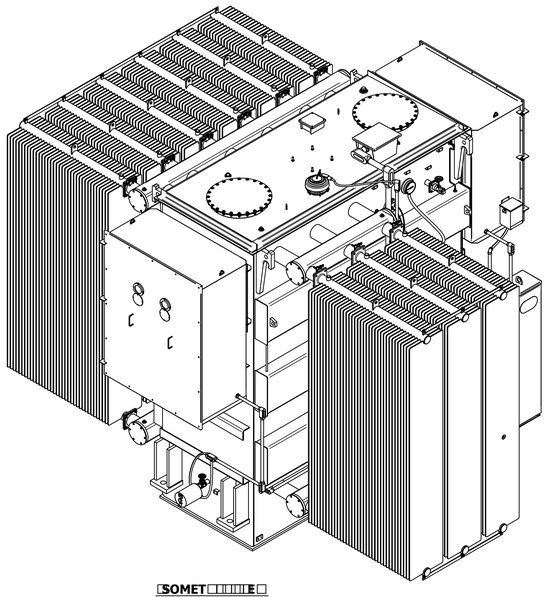
REV.1 GJS 3/22/22
JUMPER REVISED PER ALARM CIRCUIT CHANGE

CUSTOMERS NAME:	SIEMENS INDUSTRY INC.
CUSTOMER P.O. N.O	4509663191 LINE 000010
PROJECT:	NEW ORLEANS SEWERAGE & WATER
NIAGARA JOB No.	N40074
DRAWING REF:	TRANSFORMER NAMEPLATE BNS40074
	TRANSFORMER OUTLINE DWL40074

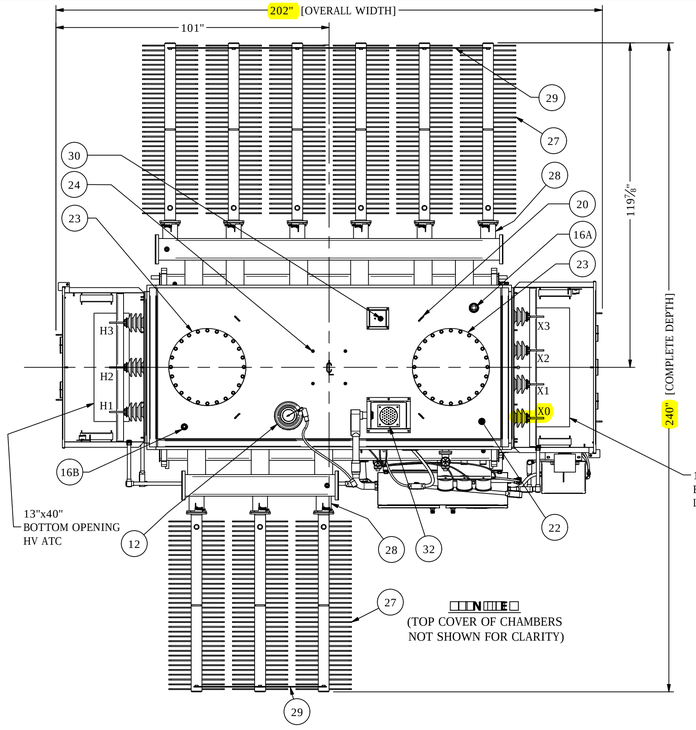
NIAGARA POWER TRANSFORMER
Powering Possible.
1755 DALE ROAD
BUFFALO, NEW YORK,
USA (716)–896–6500
www.niagarapowertransformer.com

TRANSFORMER CONTROL BOX ARRANGEMENT & WIRING DIAGRAM

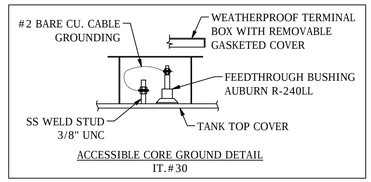
DWN: GJS	DATE: 12/6/21	Dwg No.	Rev
CHK: JTB	Plot Scale: 1/2	DWS40074–3	1



SOMETRONICS



SOMETRONICS
(TOP COVER OF CHAMBERS
NOT SHOWN FOR CLARITY)



ACCESSIBLE CORE GROUND DETAIL
IT.#30

NOTES:

1. THIS OUTLINE CAN BE USED FOR INSTALLATION PURPOSES. IT IS NOT TO BE REGARDED AS INDICATING THE EXACT DETAILS OF CONSTRUCTION. READ INSTRUCTION BOOK 600 BEFORE HANDLING, INSTALLING AND ENERGIZING TRANSFORMER.
2. ALL VALVES HAVE THREADED ENDS UNLESS OTHERWISE SPECIFIED. ALL VALVES ARE FLANGE MOUNTED WITH PLUGS UNLESS OTHERWISE SPECIFIED.
3. THE TRANSFORMER TANK COVER MUST BE FASTENED IN PLACE ON THE TANK BEFORE LIFTING THE CORE & COIL ASSEMBLY AND TANK TOGETHER.
4. THE TRANSFORMER TANK IS DESIGNED TO WITHSTAND FULL VACUUM (14.7 PSI).
5. TRANSFORMER IS FILLED WITH ENVIROTEMP FR3 OIL, CONTAINING NO DETECTABLE LEVELS LEVELS OF PCB (LESS THAN 1 PPM) AT TIME OF MANUFACTURE.
6. SEALED TANK CONSTRUCTION PER ANSI C-57-12.10 WITH DRY NITROGEN BLANKET ABOVE OIL.
7. EXTERNAL WIRING FROM SIGNAL/INDICATION DEVICES AND CURRENT TRANSFORMERS TO CONTROL BOX ARE IN RIGID CONDUIT WITH SHORT RUNS OF LIQUID TIGHT FLEXIBLE CONDUIT.
8. PAINT: EXTERIOR FINISH : ANSI 70 LIGHT GRAY, 2 PART EPOXY WITH SHOTBLAST STEEL PREPARATION.
9. TRANSFORMER IS DESIGNED FOR OPERATION AT AN ALTITUDE OF 3300 FT OR LESS, NON-HAZARDOUS LOCATION, SEISMIC ZONE 1.
10. EXTERNAL FASTENERS: STAINLESS STEEL BOLTS AND WASHERS WITH SILICON BRONZE NUTS (TO PREVENT BINDING).
11. TRANSFORMER WILL BE SHIPPED WITH A THREE WAY IMPACT RECORDER TO PROVIDE A COMPLETE RECORD OF IMPACT OCCURANCE.
12. REFER TO OUTLINE PAGE 2 FOR COMPLETE PARTS LIST/ITEM DESCRIPTION AND PAGE 3 FOR SHIPPING CONFIGURATION.

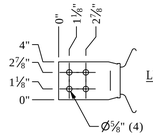
⊕ - CENTER OF GRAVITY FOR COMPLETE ASSEMBLY.

ANSI 61 Gray per spec Section 26 05 75 (TYP)

ESTIMATED WEIGHTS		LBS
MAIN CORE & COILS		77,980
TANK & FITTINGS		23,632
REMOVABLE RADIATORS		20,625
LIQUID IN TRANSFORMER	(3,093 USG)	23,816
LIQUID IN RADIATORS	(830 USG)	6,387
APPROX. TOTAL WEIGHT (COMPLETE)		152,440
APPROX. TOTAL WEIGHT WITHOUT OIL		122,237

ENVIROTEMP FR3 OIL FILLED TRANSFORMER	
CLASS:	KNAN
MVA:	26
NUMBER OF PHASES:	3
FREQUENCY:	25 Hz
TEMPERATURE RISE:	75ÅC RISE
HV kV:	12400 DELTA
HV BIL:	110 kV
HV TAPS:	NONE
LV kV:	6600Y / 3810.5
LV BIL:	75 kV
LV TAPS:	NONE

CUSTOMER:	SIEMENS INDUSTRY INC.
CUSTOMER P.O. No.:	4509663191
PROJECT:	NEW ORLEANS SEWERAGE & WATER
SPECIFICATION No.:	A5E51176931A, REV. AE
NIAGARA REF.:	N40074
REFERENCE DRAWINGS:	TRANSFORMER NAMEPLATE BNS40074
REFERENCE DRAWINGS:	SCHEMATIC & WIRING DIAGRAM DWS40074

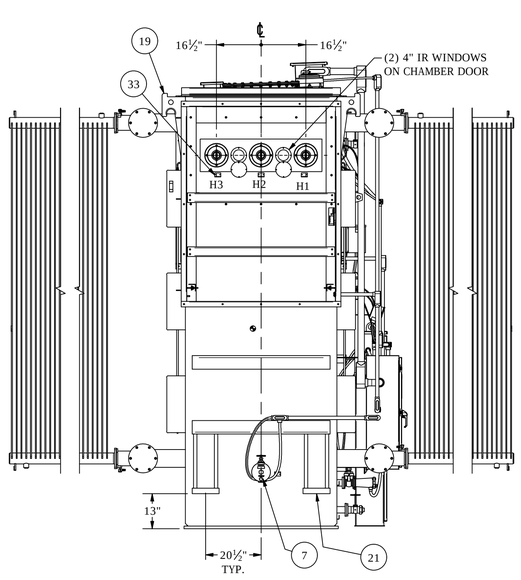


LV/HV BUSH 1/2" THK.
TIN PLATED SPADE

APPROVED		
APPROVED AS NOTED		X
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

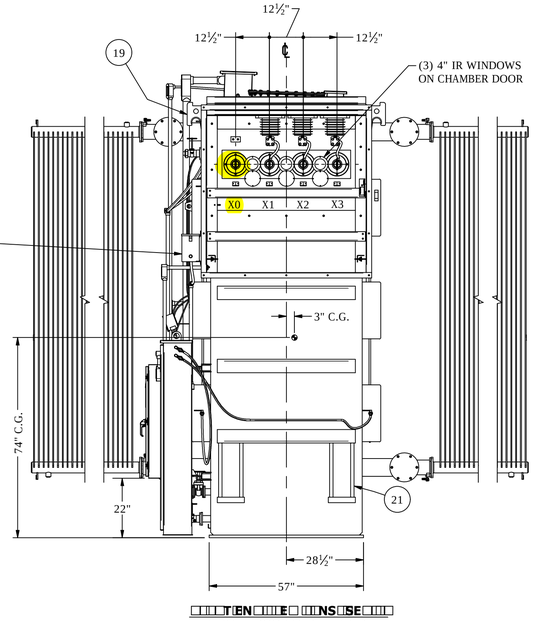
Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 04/26/2022
JACOBS Date

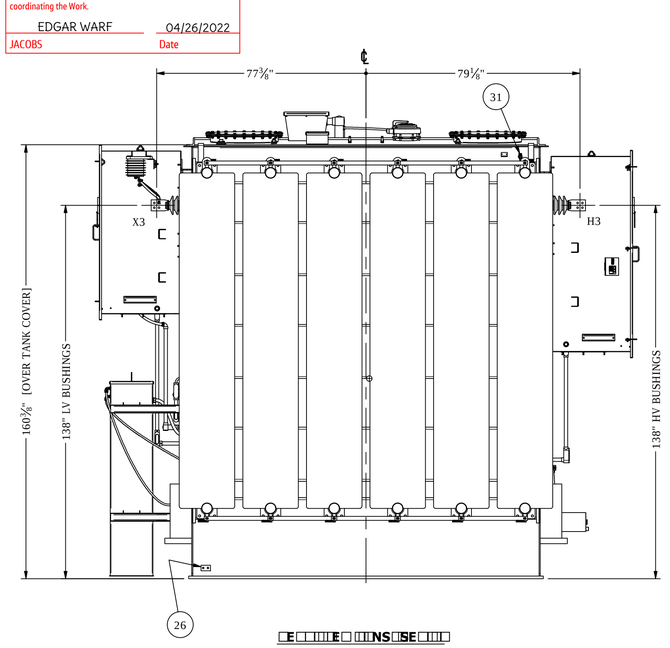


EXTENDED INSIDE
(FRONT DOOR OF CHAMBER
NOT SHOWN FOR CLARITY)

FRONT INSIDE



EXTENDED INSIDE
(FRONT DOOR OF CHAMBER
NOT SHOWN FOR CLARITY)



FRONT INSIDE

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WHICH CANNOT BE REPRODUCED, TRANSMITTED OR DISCLOSED IN WHOLE OR IN PART WITHOUT THE WRITTEN AUTHORIZATION OF NIAGARA POWER TRANSFORMER CORP.

DIMENSIONS IN INCHES UNLESS NOTED OTHERWISE.

PROJECTION:

TANK SIZE: 128" x 54" x 159" HT.

REVISIONS:
Rev1 MML 3/18/22
- MVA WERE 25. TEMP. RISE WAS 65Å.
- FREQUENCY TO BE 25Hz.
- OVERALL DIMS. WERE REVISED.
- TOTAL WEIGHTS & GALLONS OF OIL REVISED.
- TANK BASE REVISED.

TRANSFORMER OUTLINE DIMENSIONS

1755 DALE ROAD
BUFFALO, NEW YORK, U.S.A.
(716) 896-6500
www.niagarapowertransformer.com
NIAGARA POWER TRANSFORMER
Powering Possible.

DRAWN:	DATE:	SIZE	DWG NO:	REV
ORM	12/7/21	D	DXS40074-1	1
CHECKED: MML	PLOT SCALE 1/28			

Confirm and/or Fix
(TYP ALL DWGS)

ITEM	PART DESCRIPTION	QTY.	VENDOR	CATALOG No.	NOTES
1	HIGH VOLTAGE BUSHINGS, 15 kV, 110 kV BIL, 1700 A, BULK TYPE, PORCELAIN BODY WITH NEMA 4-HOLE TIN PLATED SPADE.	3	FOSTORIA	353232	BOTTOM CONNECTED WITH TD7000 GASKET
2	LOW VOLTAGE BUSHINGS, 8.4 kV, 95 kV BIL, 2300 A, BULK TYPE, PORCELAIN BODY WITH NEMA 4-HOLE TIN PLATED SPADE.	4	FOSTORIA	352243	BOTTOM CONNECTED WITH TD7000 GASKET
3	LV SURGE ARRESTER, STATION CLASS, 6 kV, 5.1 kV MCOV, POLYMER HOUSING.	3	ABB	Q006SA005AUH	
4	MAGNETIC LIQUID LEVEL GAUGE WITH ALARM CONTACTS, SEE WIRING AND SCHEMATIC DIAGRAM.	3	QUALITROL	032-092-01	
5	GAS SAMPLING VALVE.	1	GENERIC	-	
6	RAPID PRESSURE RISE RELAY, MAIN TANK, UNDER OIL TYPE MOUNTED ON A 2 INCH FLANGED BALL VALVE. SEE WIRING AND SCHEMATIC DIAGRAM.	1	QUALITROL	900-003-02	
7	GAS-IN-OIL MONITOR, HYDRAN 201Ti, MOUNTED ON A 1-1/2" BALL VALVE.	1	GE	H201Ti_CE_NE_X1_V1_VC0-H1-L1-F0-W24	
8	LIQUID TEMPERATURE GAUGE WITH ALARM CONTACTS, SEE WIRING AND SCHEMATIC DIAGRAM.	1	QUALITROL	TR6000B-00240717	
9	THERMAL WELL FOR LIQUID TEMPERATURE INDICATOR.	1	QUALITROL	167-50-3D	
10A	WINDING TEMPERATURE INDICATOR WITH ALARM CONTACTS, SEE WIRING AND SCHEMATIC DIAGRAM (HV WINDING).	1	QUALITROL	104-672-02	
10B	WINDING TEMPERATURE INDICATOR WITH ALARM CONTACTS, SEE WIRING AND SCHEMATIC DIAGRAM (LV WINDING).	1	QUALITROL	104-672-02	
11	THERMAL PLATE FOR WINDING TEMP. INDICATORS.	1	QUALITROL	2WT-1028-1	
12	MECHANICAL PRESSURE RELIEF DEVICE, SET FOR 10 PSI WITH ALARM SWITCH CONTACTS AND SEMAPHORE, SEE WIRING AND SCHEMATIC DIAGRAM.	1	QUALITROL	208-60E ; SWT-648-1; 207-60-3	
13	NITROGEN BLANKETING SYSTEM: EMPTY CYLINDER ALARM, HIGH/LOW PRESSURE ALARMS,PRESSURE VACUUM GAUGE, PURGE/TEST VALVE, AND SAMPLING VALVE.	1	ABB	RNC1	
14	TOP FILTER PRESS CONNECTION, 2" GLOBE VALVE, FLANGE MOUNTED TO TANK WALL.	1	UNITED BRASS	127TSB	
15	DRAIN VALVE, 2" GLOBE VALVE WITH 3/8" SIDE SAMPLER, FLANGE MOUNTED TO TANK WALL.	1	UNITED BRASS	127TSSB	
16A	FACTORY VACUUM FILL CONNECTION, 2" NPT WELD FLANGE AND PIPE PLUG.	1	GENERIC	-	
16B	FACTORY VACUUM FILL CONNECTION, 1" NPT WELD FLANGE AND PIPE PLUG.	1	GENERIC	-	
17	CONTROL BOX, NEMA 4X, WITH 3 POINT PADLOCKABLE LATCH AND BOTTOM OPENING WITH REMOVABLE GLAND PLATE.	1	SAGINAW	SCE-42EL4812SSWFLP	
18	DIAGRAM NAMEPLATE, STAINLESS STEEL, BLACK LINES AND LETTERS ON A CLEAR BACKGROUND.	1	MFG. STD.	BNS40074	
19	LIFTING LUGS, FOR COMPLETE TRANSFORMER, 37,000 LB. CAPACITY (EA).	4	MFG. STD.	BS000318	
20	LIFTING LUGS, FOR TANK COVER, 1,000 LB. CAPACITY (EA).	4	PHOENIX	SERIES 2-898-MIN	
21	JACKING PAD PROVISIONS, EACH WITH 2-1/2" DIA. HOLES FOR TOWING ATTACHMENT.	4	MFG. STD.	-	
22	TANK COVER, WELD-ON TYPE. SLOPED TO PREVENT WATER ACCUMULATION.	1	MFG. STD.	-	
23	MANHOLES, 24" DIA., WITH BOLTED GASKETED COVER. EACH COVER HAS LIFTING HANDLES.	2	MFG. STD.	BS000901	GASKET CONTAINED IN MACHINED GROOVE.
24	PROVISION TO MOUNT FALL PROTECTION EQUIPMENT (FACTORY)	2	MFG. STD.	-	
25	TRANSFORMER BASE, 1" THICK PLATE CONSTRUCTION, SUITABLE FOR BI-DIRECTIONAL ROLLING OR SKIDDING.	1	MFG. STD.	-	
26	STAINLESS STEEL GROUND PADS, NEMA 2 HOLE. (1) EACH ON DIAGONALLY OPPOSITE TANK CORNER NEAR BASE, (1) INSIDE LV ATC FOR ARRESTER GROUNDING.	3	MFG. STD.	AS000325	W/(2) TWO-HOLE CABLE CRIMP LUG FOR 4/0 AWG CABLE
* 27	COOLING RADIATORS, 20 1/2" WIDE, HOT DIPPED GALVANIZED, UNPAINTED, COMPLETE WITH VENT AND DRAIN PLUGS.	9	TTP	RADP7B36124074	
28	SHUT-OFF VALVES FOR COOLING RADIATORS, BUTTERFLY TYPE, PADLOCKABLE, TOP & BOTTOM.	18	UNITED BRASS	150V0FS-4"	
* 29	RADIATOR BRACING AT TOP AND BOTTOM HEADERS.	14	MFG. STD.	-	
30	CORE GROUND BUSHING FOR MAIN, BUSHING IS HOUSED IN WEATHERPROOF TERMINAL BOX WITH BOLTED COVER.	1	AUBURN INC.	F-240LL	LOCATED TOP COVER OF THE TRANSFORMER
31	SHUT-OFF VALVES FOR GAS SPACE EXPANSION INTO TANK BRACES; VALVE IS TO BE CLOSE FOR VACUUM PROCESSING AND SHIPMENT, AND OPEN WHEN TRANSFORMER IS IN SERVICE.	2	GENERIC	-	ON FRONT & REAR WALL
32	MULTI-STUD FEEDTHROUGH BUSHING FOR CURRENT TRANSFORMER SECONDARY LEADS. WIRING EXTENDED TO TRANSFORMER CONTROL BOX. BUSHINGS HOUSED IN WEATHERPROOF TERMINAL BOX WITH BOLTED COVER.	1	POLYCAST	111-037-51-600V	37 STUD EPOXY BUSHING
33	STAINLESS STEEL IDENTIFICATION TAGS FOR BUSHINGS, GAUGES AND VALVES.	18	MFG. STD.	-	
34	INTERNAL CURRENT TRANSFORMERS (ALSO REFER TO NAMEPLATE AND SCHEMATIC/WIRING DIAGRAMS).	-	-	-	
	LV CT: 2500/5, SR, C400, RF 2.0	9	MERAMEC	09A-070-423	(3) PER PHASE
	LV X0 CT: 400/5, SR, C200, RF 2.0	1	MERAMEC	09A-071-434	(1) ON X0
	WTI CT (LV): 2275/5, SR, C50, RF 2.0	1	MERAMEC	09A-071-433	(1) ON X2
	HV CT: 1300/5, SR, C400, RF 2.0	6	MERAMEC	09A-071-431	(2) PER PHASE
	WTI CT (HV): 1215/5, SR, C50, RF 2.0	1	MERAMEC	09A-071-432	(1) ON H2
35	HV AIR TERMINAL CHAMBER, PARTIAL HEIGHT, BOLTED-ON WITH REMOVABLE HINGED AND PADLOCKABLE FRONT DOOR, CABLE SUPPORTS, THERMOSTAT/HUMIDISTAT, STRIP HEATERS AND BOTTOM ENTRY WITH STEEL GLAND PLATE. (2) 4" IR WINDOWS ON CHAMBER DOOR.	1	MFG. STD.	-	CHAMBER DESIGNED FOR BOTTOM ENTRY.
36	LV AIR TERMINAL CHAMBER, PARTIAL HEIGHT, BOLTED-ON WITH REMOVABLE HINGED AND PADLOCKABLE FRONT DOOR, CABLE SUPPORTS, THERMOSTAT/HUMIDISTAT, STRIP HEATERS AND BOTTOM ENTRY WITH STEEL GLAND PLATE. (3) 4" IR WINDOWS ON CHAMBER DOOR.	1	MFG. STD.	-	CHAMBER DESIGNED FOR BOTTOM ENTRY.
37	CONTROL POWER TRANSFORMER; 3kVA, 1 PHASE, 240/480V TO 120/240V, 60Hz.	1	ACME	T-2-53013-S	

[1] GE HYDRAN 201Ti transmitter model indicated. Please identify what CONTROLLER will be used in conjunction with this transmitter also IF controller is used.

[2] Indicate "total" SYSTEM model as well (i.e., transmitter + controller combination model number; "Hydran 201R Model i", "Hydran 201i System", etc.).

NOTES:
1. ITEM NUMBERS SHOWN ABOVE REFERENCE ITEM NUMBERS ON TRANSFORMER OUTLINE PAGE 1.
2. VENDOR AND/OR CATALOG No. MARKED WITH "TBD" WILL HAVE THE INFORMATION FILLED IN AT A LATER TIME WHEN IT BECOMES AVAILABLE.
3. PARTS INDICATED WITH AN ASTERISK (*) ARE REMOVED FOR SHIPPING.

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 04/26/2022
JACOBS Date

DIMENSIONS IN INCHES UNLESS NOTED OTHERWISE.

PROJECTION:

TANK SIZE: 128" x 54" x 159" HT.

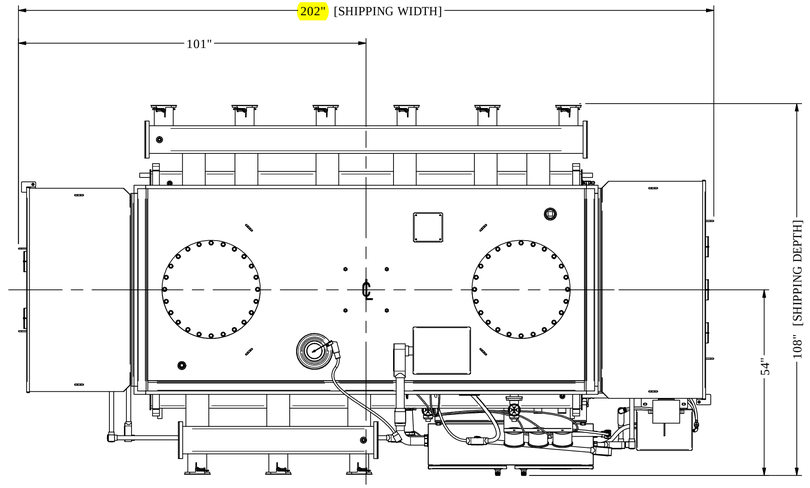
REVISIONS:
Rev1 MML 3/18/22
- IT.#1 HV BUSH WERE 1200A.
- REVISED QTY. OF IT.s#27,28,29.
- IT.#25 TANK BASE REVISED.
- IT.#34 CTs REVISED.

TRANSFORMER PART LIST

1755 DALE ROAD
BUFFALO, NEW YORK, U.S.A.
(716) 896-6500
www.niagarapowertransformer.com
NIAGARA POWER TRANSFORMER
Powering Possible.

DRAWN:	DATE:	SIZE	DWG NO:	REV
ORM	12/7/21	D	DXS40074-2	1
CHECKED: MML	PLOT SCALE -			

Confirm and/or Fix (TYP ALL DWGS)



PLAN VIEW

TRANSFORMER WILL BE SHIPPED WITH A 3-AXIS ELECTRONIC WITH GPS IMPACT RECORDER TO PROVIDE A COMPLETE RECORD OF IMPACT OCCURANCE.

SHIPPING NOTES:

1. ITEMS REMOVED FOR SHIPPING ARE LISTED IN THE TABLE BELOW. REFER TO OUTLINE PAGE 2 FOR OTHER ITEM DETAILS.
2. RADIATOR VALVES WILL BE COVERED FOR SHIPPING.

- CENTER OF GRAVITY FOR SHIPPING ASSEMBLY.

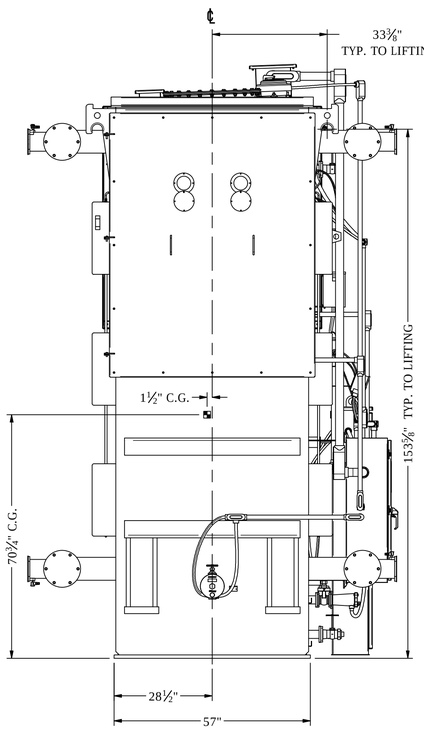
APPROVED		
APPROVED AS NOTED		X
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

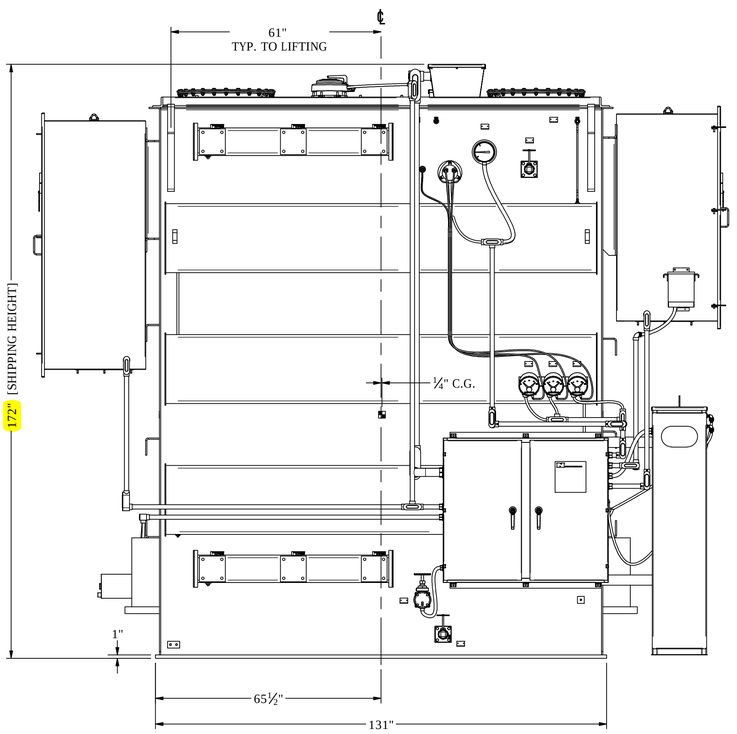
EDGAR WARF — 04/26/2022

JACOBS — Date

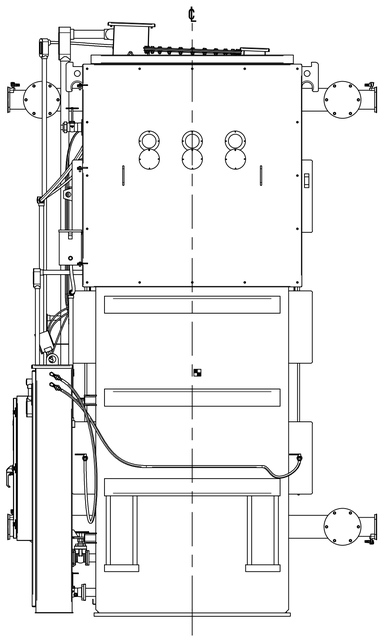
ITEMS REMOVED FOR SHIPPING		
PART DESCRIPTION	QTY.	LBS.
COOLING RADIATORS	9	20625
RADIATOR BRACING AT TOP AND BOTTOM HEADERS.	14	42
RADIATOR OIL	830	6387
TOTAL WEIGHT OF ITEMS REMOVED FOR SHIPMENT	-	27054
APPROX. SHIPPING WEIGHT (LARGEST PIECE)	-	125386



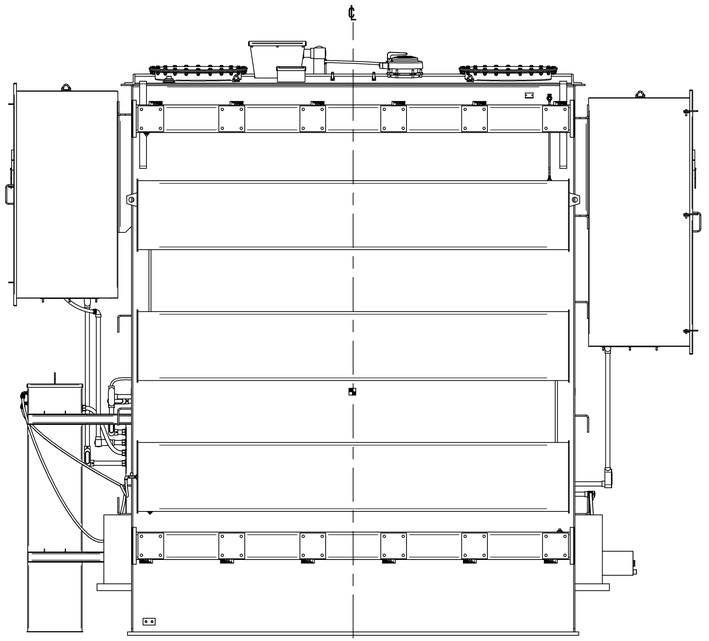
LEFT END VIEW (ANSI SEG.2)



FRONT VIEW (ANSI SEG.1)



RIGHT END VIEW (ANSI SEG.4)



REAR VIEW (ANSI SEG.3)

DIMENSIONS IN INCHES UNLESS NOTED OTHERWISE.

PROJECTION:

TANK SIZE: 128" x 54" x 159" HT.

REVISIONS:

Rev1 MML 3/18/22
- OVERALL DIMENSIONS REVISED.
- TOTAL WEIGHTS & GALLONS OF OIL REVISED.

TRANSFORMER SHIPPING CONFIGURATION

1755 DALE ROAD
BUFFALO, NEW YORK, U.S.A.
(716) 896-6500
www.niagarapowertransformer.com
NIAGARA POWER TRANSFORMER
Powering Possible.

DRAWN:	DATE:	SIZE	DWG NO:	REV
ORM	12/7/21	D	DXS40074-3	1
CHECKED: MML	PLOT SCALE 1/22			

Confirm and/or Fix (TYP ALL DWGS)

SIEMENS
Ingenuity for life

End customer	SEWERAGE & WATER BOARD OF NEW ORLEANS
Higher-level function	STATIC FREQUENCY CONVERTER
Plant part	SINAMICS SH150

Type	SINAMICS SH150 FREQUENZUMRICHTER / AC DRIVE
Artikelnummer (MLFB)	A5E51274298 A06+C41+C55+C68+G24+G28+G47+K90+L45+L50+L66+M08+M54+M61+T94+V23
	SAP: 56OP-00617
	A5E51274298B REV AC
	5/18/2022
Number of pages	22

All items in this drawing set highlighted in green are to be removed.

A5E51274298B

&EFA/1

			Date	5/10/2022	SH150 A/C SCHEMATICS	SIEMENS AG	Cover sheet	Referenz =
			Ed	MARSDX	APPROVED FOR PRODUCTION			Stichwort +
			Appr		SO# 3008150777.1101 Date 6/2/2022	LDA PLM R&D-D-US 2	A5E51274298B REV AC	Page 1
Modification	Date	Name	Original		Replacement of / Replaced by	NKN		Page 1 / 22

Function / Structure

R, T / +10 : COM Cabinet
F/+40, K/+50 : MOM Cabinet
G/+20 : Pre Charge
F1SB/+60, K1SB/+70 :HEX Cabinet
AC :One Line / Interconnection Diagram
H/+90 : Braking Chopper

3 AC 460V
60 Hz

=.G1M
-X14

=.G1M
-Q11
300A

-L2

-.G1M
-T21
G120C

=.G1M-K41
/6.2

=F1F
-Q111...-Q1112
-Q121...-Q1212
-Q211...-Q2112
-Q221...-Q2212
-Q311...-Q3112
-Q321...-Q3212

=.G1M
-T51
200 kVA
3+PE

=.G1M
-T52
-T53
-T54
-T55

CUSTOMER
INPUT
BREAKER
13 14

24,000VAC +/- 5%
3PH, 60Hz, 602A

60 Hz INPUT VOLTAGE
SENSING MODULE (VSM)

=D1XA-B21

60 Hz INPUT VOLTAGE
DETECTION (AVT)
SEE NOTE 2

-L1

60 Hz
OUTPUT
INDUCTOR

=F1K
-1U2
-1V2
-1W2
-X1

=F1K
-B11
-B12
-B21
-B31
-B32
-B41

60 Hz
CURRENT
TRANSFORMER

=F1K
-B51
-B52

60 Hz
OUTPUT VOLTAGE
SENSING

=F1F
-R11
-R21
-R31

60 Hz ARM
INDUCTOR

X1
X2

DC_BUS / 2.1

=.G1P
-B11
-B12

60 Hz, Input Transformer

60Hz CONVERTER

60 Hz DC-link
voltage
detection

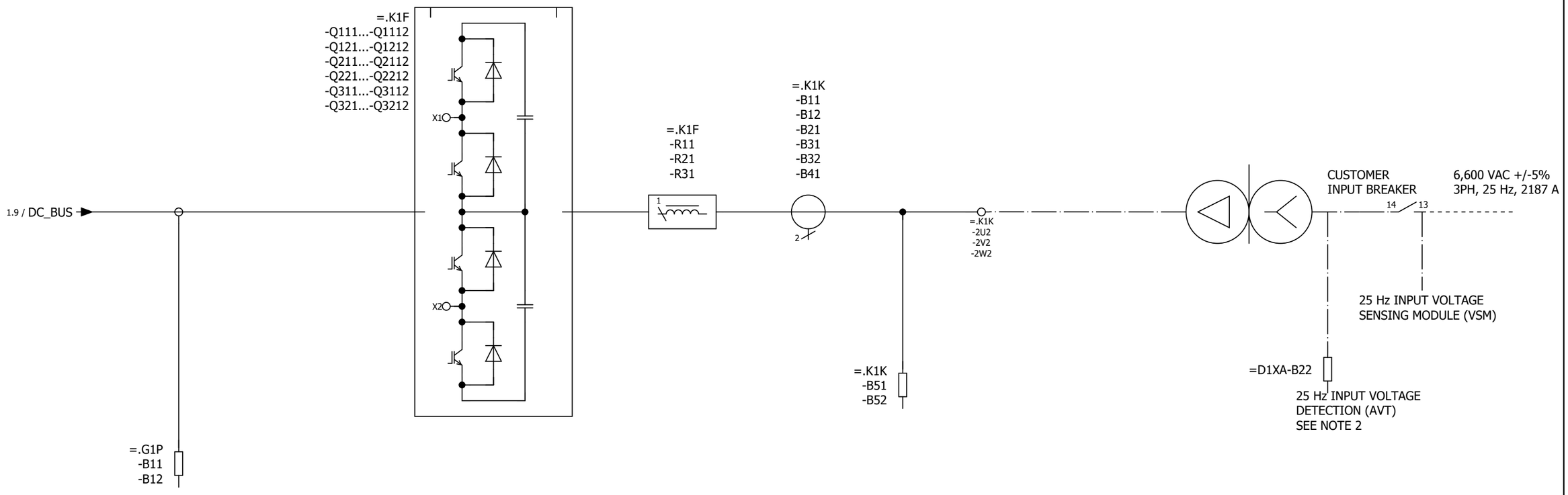
Pre-charging

NOTES:
1. DASHED LINES ----- CUSTOMER CONNECTIONS
2. MAXIMUM CABLE LENGTH FROM AVT TO CONTROL CABINET IS 30 METERS.
3. DASHED LINES -.-.-.-CONTRACTOR CONNECTIONS.

2

&EAA/1

			Date	5/12/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150 BASIC LINE MODULE ONE-LINE DIAGRAM	Referenz =
			Ed	MARSDX	APPROVED FOR PRODUCTION			Stichwort +
			Appr		SO# 3008150777.1101 Date 6/2/2022	LDA PLM R&D-D-US 2	A5E51274298B REV AC	Page 1
Modification	Date	Name	Original		Replacement of / Replaced by	NKN		Page 2 / 22



25 Hz DC-LINK VOLTAGE DETECTION

25 Hz Converter

25 Hz Arm inductor

25 Hz CURRENT TRANSFORMER

25 Hz OUTPUT VOLTAGE SENSING

25 Hz OUTPUT CONNECTION

25 Hz, 25MVA TRANSFORMER

NOTES:
1. DASHED LINES ---- CUSTOMER CONNECTIONS.
2. MAXIMUM CABLE LENGTH FROM AVT TO CONTROL CABINET IS 30 METERS.
3. DASHED LINES -.-.-.- CONTRACTOR CONNECTIONS.

			Date	10/21/2021	SH150 A/C SCHEMATICS		SIEMENS AG	SINAMICS SH150 MOTOR MODULE ONE-LINE DIAGRAM	Referenz =
			Ed	MARSDX	APPROVED FOR PRODUCTION				Stichwort +
			Appr		SO# 3008150777.1101	Date 6/2/2022	LDA PLM R&D-D-US 2		A5E51274298B REV AC
Modification	Date	Name	Original		Replacement of	Replaced by	NKN		Page 2 / Page 3 / 22

+10: Control Cabinet

120V / 220V
60hz, 1ph/2ph
8A(120V), 4A(220V)

=.R1C-X06

=.R1C-F11
8A
1

=.R1C-F12
6A
1

=.R1VA-F11
2A
1

Anti-Condensation
Heater (Option L55)

Power Socket

COM Cabinet
Light (Option L50)

VFD Utilities

+10: Control Cabinet

120V / 220V
60hz, 1ph/2ph
10A(120V), 5.0A(220V)

=.R1B-X03

=.R1B-Q11
10A
1

Drive Control

60 Hz CONVERTER
+81 INP FDBK CABINET

120V / 220V
60hz, 1ph/2ph
5A (120V)

=.D1XA-X21

=.D1XA-F21
5A
1

INPUT VOLTAGE FEEDBACK
CONTROL POWER SOURCE

EQUIPMENT LOCATION:
24KV, 60Hz, SWITCHGEAR CABINET

25 Hz CONVERTER
+82 INPUT FEEDBACK CIRCUIT

120V / 220V
60hz, 1ph/2ph
5A (120V)

=.D1X-X22

=.D1XA-F22
5A
1

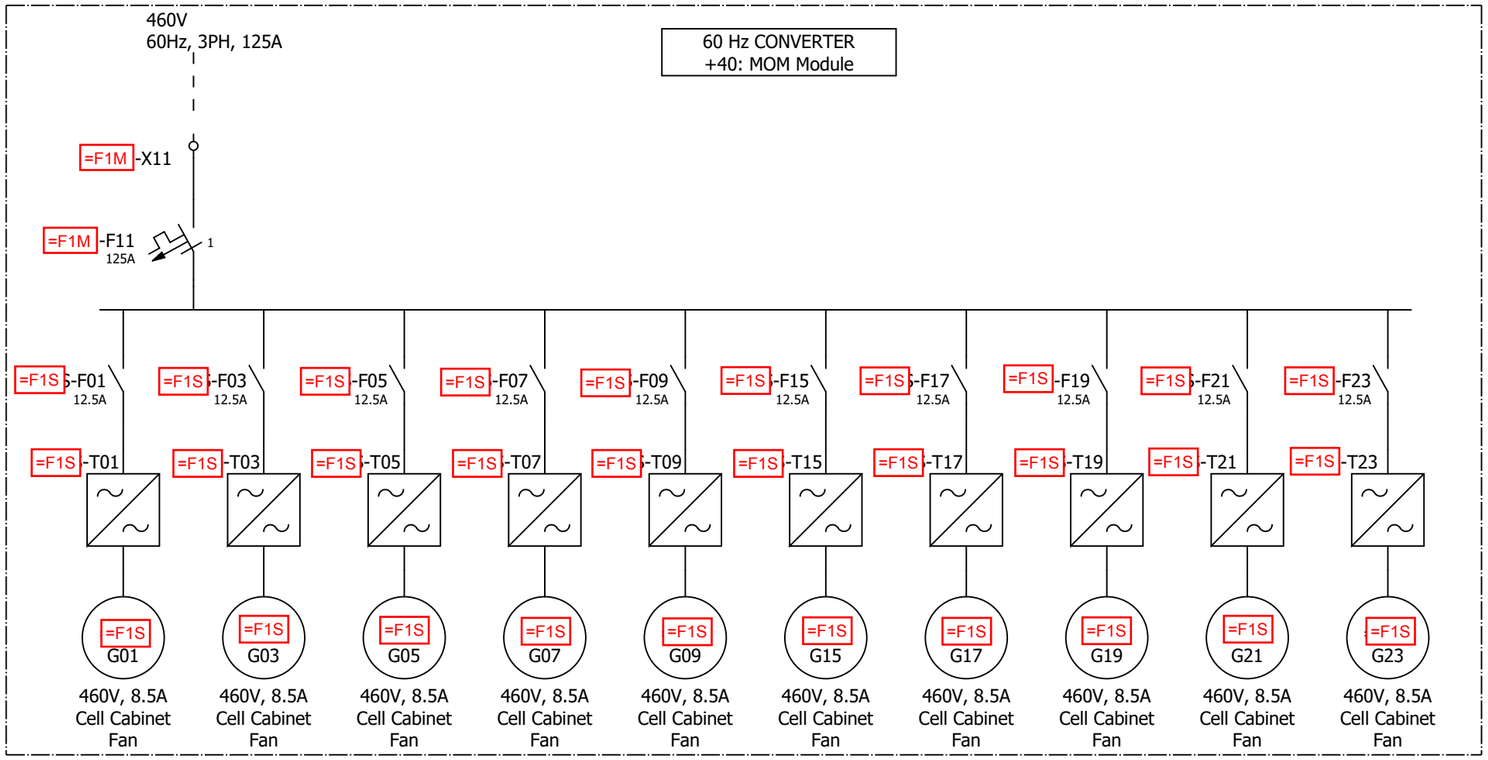
INPUT VOLTAGE FEEDBACK
CONTROL POWER SOURCE

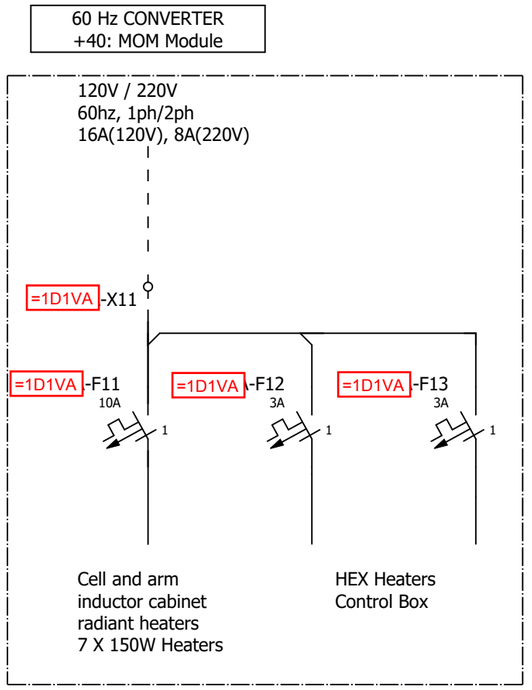
EQUIPMENT LOCATION:
6.6kV, 25Hz, SWITCHGEAR CABINET

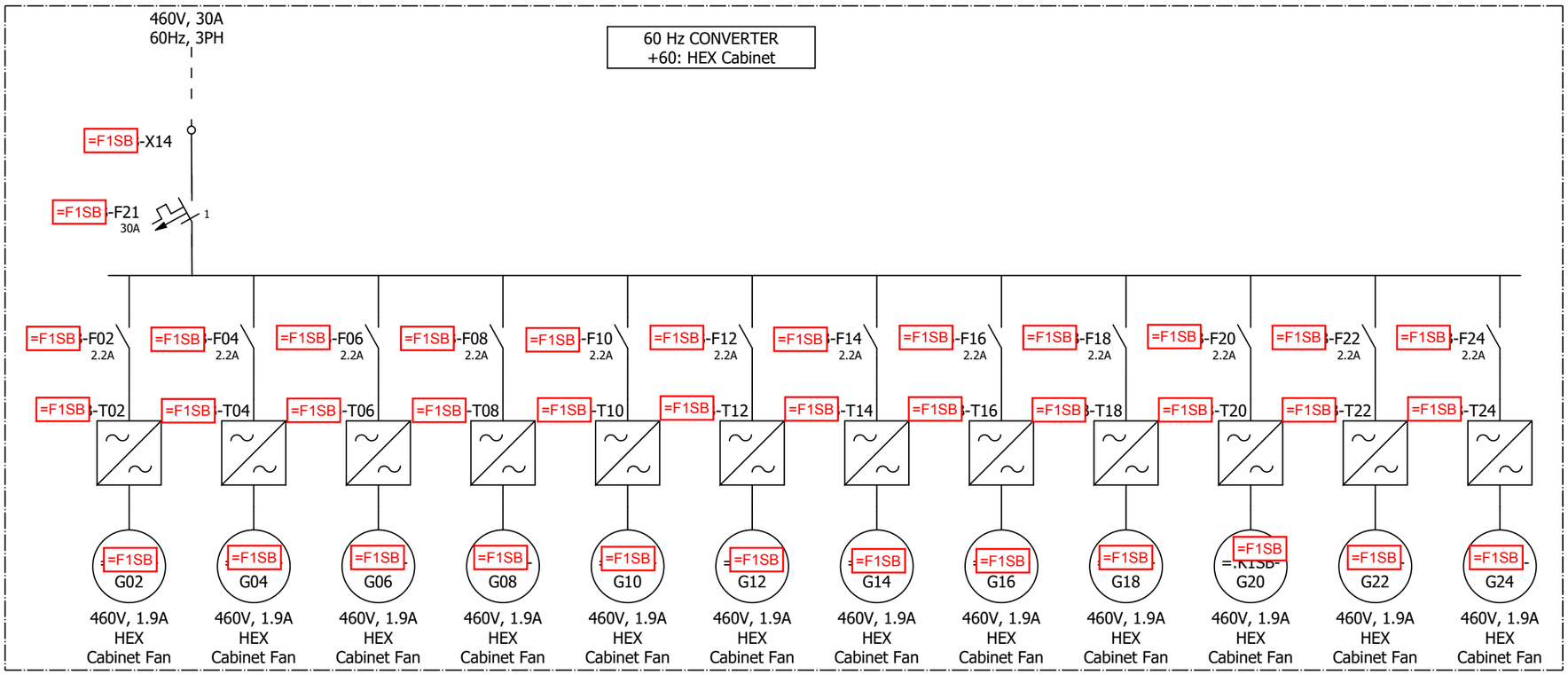
4

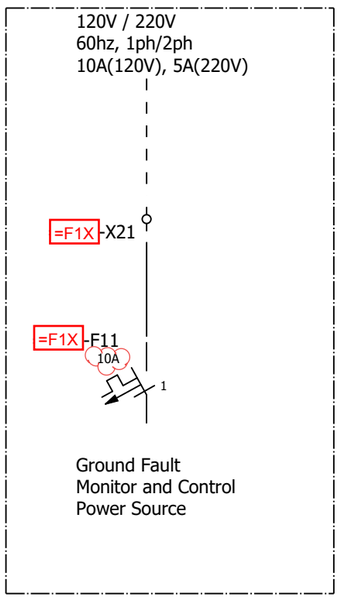
2

			Date	5/11/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150 MOTOR MODULE ONE-LINE DIAGRAM	Referenz	=
			Ed	MARSDX	APPROVED FOR PRODUCTION			Stichwort	+
			Appr		SO# 3008150777.1101 Date 6/2/2022	LDA PLM R&D-D-US 2		A5E51274298B REV AC	Page 3
Modification	Date	Name	Original		Replacement of / Replaced by	NKN			Page 4 / 22

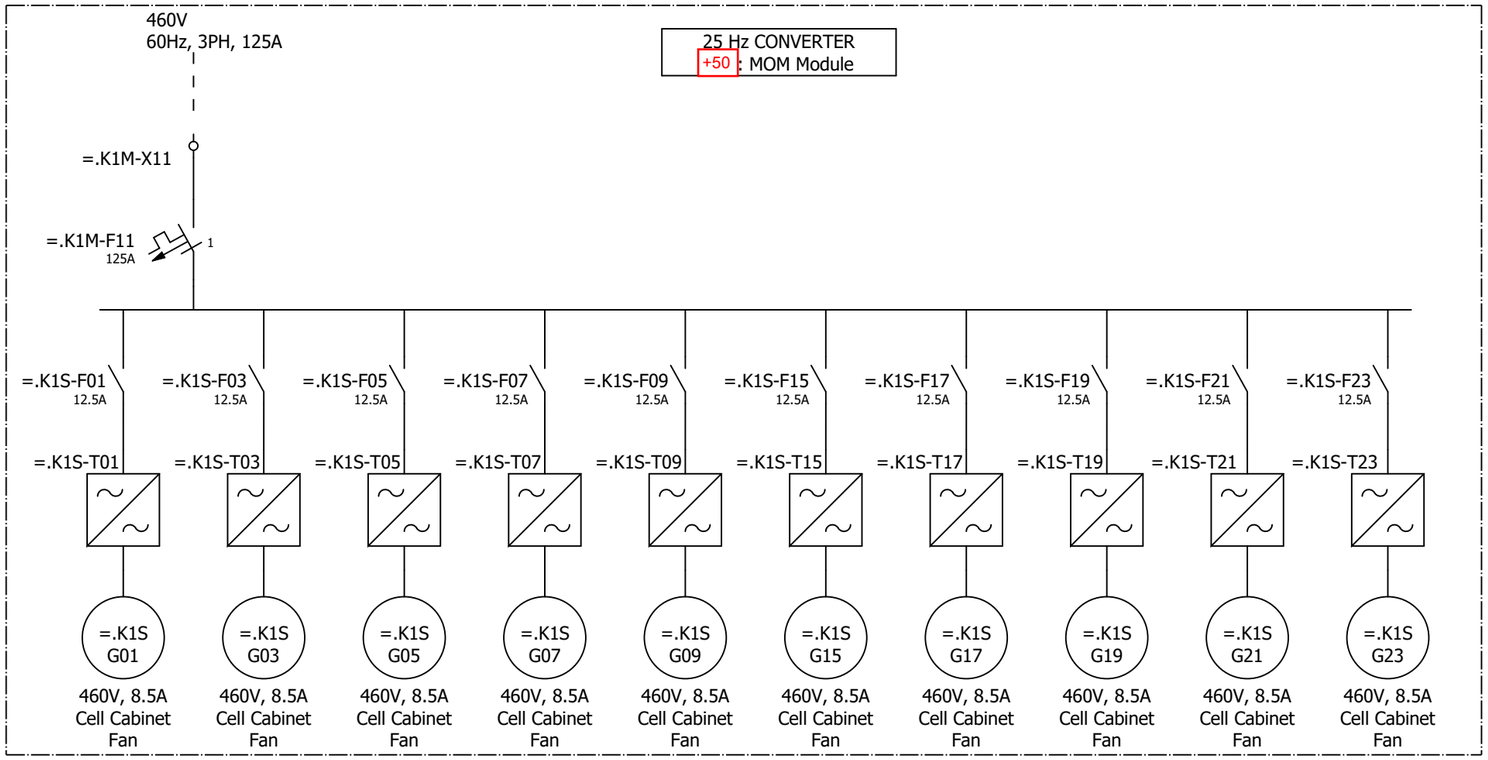


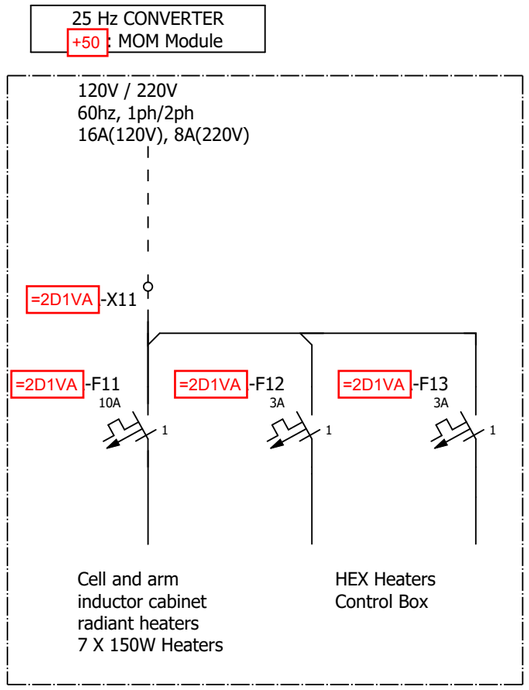


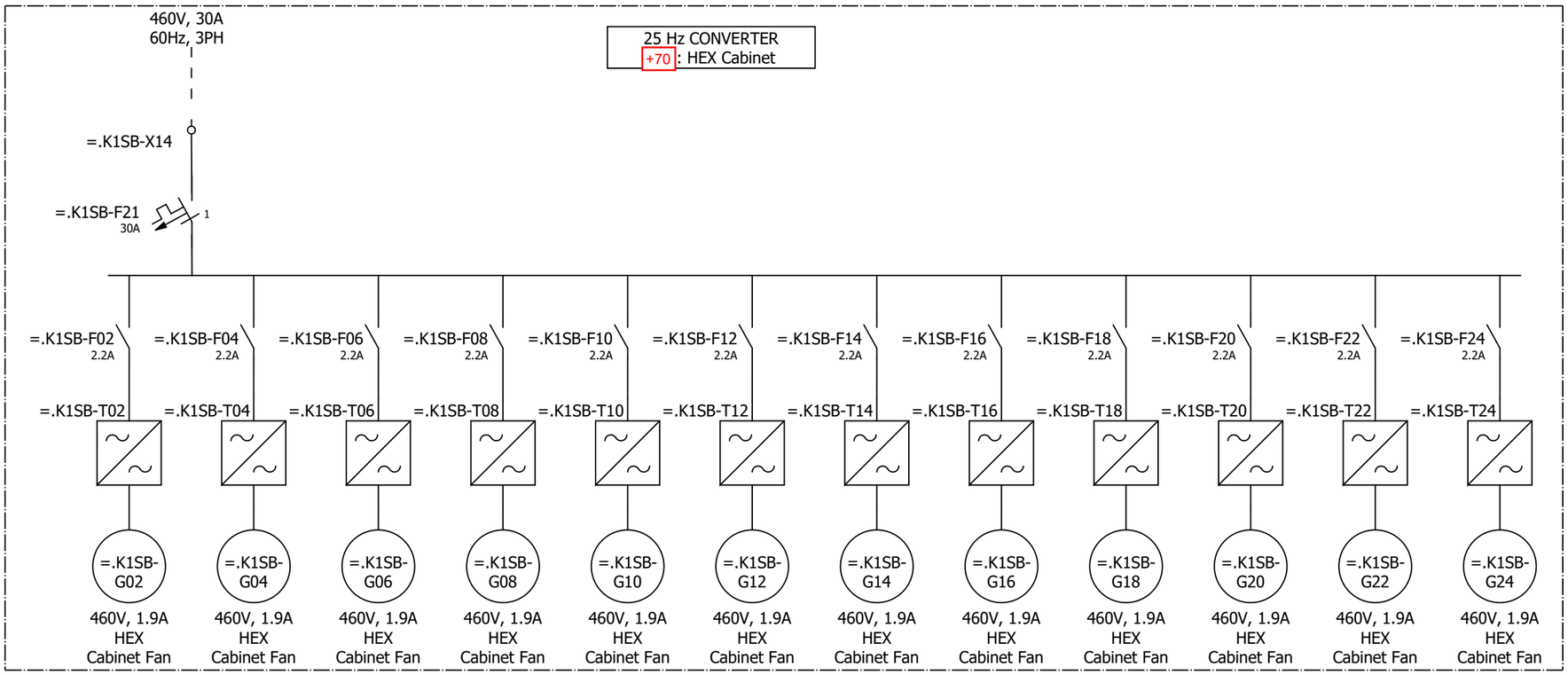


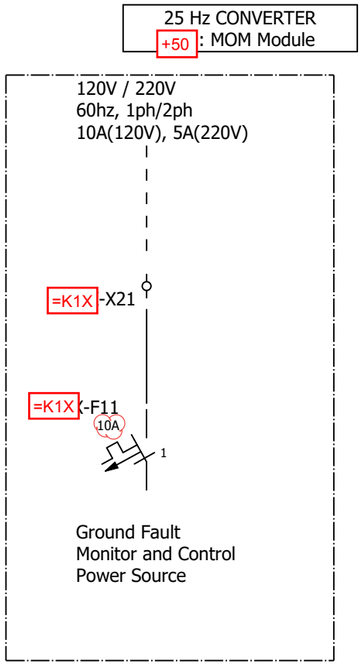


			Date	5/10/2022	SH150 A/C SCHEMATICS		SIEMENS AG	SINAMICS SH150 MOTOR MODULE ONE-LINE DIAGRAM	Referenz =
			Ed	MARSDX	APPROVED FOR PRODUCTION				Stichwort +
			Appr		SO# 3008150777.1101	Date 6/2/2022	LDA PLM R&D-D-US 2		A5E51274298B REV AC
Modification	Date	Name	Original		Replacement of	Replaced by	NKN		Page 4 / Page 5 / 22









4 6

			Date	5/10/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150 MOTOR MODULE ONE-LINE DIAGRAM	Referenz =
			Ed	MARSDX	APPROVED FOR PRODUCTION			Stichwort +
			Appr		SO# 3008150777.1101 Date 6/2/2022	LDA PLM R&D-D-US 2		A5E51274298B REV AC
Modification	Date	Name	Original		Replacement of / Replaced by	NKN		Page 5 / Page 6 / 22

+50: Precharge Cabinet

460V, 300A Max
60Hz, 3PH

=.G1M-X14

=.G1M-Q11
300A
1

-L3
3

-T21

=.G1M-K41
/1.8

=.G1M-T51
/21.7

Precharge Circuit

+50: Precharge Cabinet

120V / 220V
60hz, 1ph/2ph
2A(120V), 1A(220V)

=.G1VA-X11

=.G1VA-F11
2A
1

=.G1VA-X11

Precharge Circuit
Radiant Heater

+90 Braking Chopper

7

5

			Date	10/20/2021	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150	Referenz	=
			Ed	MARSDX	APPROVED FOR PRODUCTION		MOTOR MODULE	Stichwort	+
			Appr		SO# 3008150777.1101 Date 6/2/2022	LDA PLM R&D-D-US 2	ONE-LINE DIAGRAM	A5E51274298B REV AC	Page 6
Modification	Date	Name	Original		Replacement of / Replaced by	NKN			Page 7 / 22

0	1	2	3	4	5	6	7	8	9

Customer Input 3PH, 24.0kV, 60hz, 602A

1)

-T11
/8.5
25.0 MVA
PRIMARY: 24.0kV
SECONDARY: 12.4 kV

=L1

1

+50
/10.1
Pre Charging

300A max. / 460VAC =G1M-X14 #1,2,3 & PE

+40
/8.3
Cells Cabinet
MOM

F1K ~~K1K~~-1U2
F1K ~~K1K~~-1V2
F1K ~~K1K~~-1W2

Input Terminals

=G1M-T53: X2KM (-) 24kVDC, 15.0A 4) SEE NOTE 2 =D1DA-T41-KM(-)

=G1M-T55: X2AM (+) SEE NOTE 2 =D1DA-T11-AM(+)

3PH, 24kV, 60Hz

See Note 5

+81
60Hz AVT
Input Feedback

D1XA-B51
D1XA-B52

B51 & B52 are resistors that will be mounted directly to the 24kV bus in the Switchgear. Point Eight will need to do interconnecting from B51&B52 to other Siemens supplied components going in the switchgear.

These two connections at the bottom are fiber optic cables supplied by Siemens.

D1XA-K11-U1 D1XA-K21-U1

See Note 6 See Note 6

=K1R+43-A11-X170 =K1R+43-A11-X171

460VAC, 125A, 3PH Cell Cab. Fans =F1M-X11 #1,2,3 &PE

DC LINK Terminals
=D1DA-T41-KM(-)
=D1DA-T11-AM(+)

DC LINK TERMINAL
=D1DA-T11-AM(+)

TO 25 Hz CONVERTER
=D1DA-T41-KM(-)
=D1DA-T11-AM(+)

See Note 3

To Braking Chopper
=D1DA-T11-AM(+)

See Note 4

+61
HEX Left Cabinet
HEX

460VAC, 30A, 3PH HEX Fans =F1SB-X14 #1,2,3 & 4(PE)

=F1SB -X15 #1,2,3 & 4(PE)

To Right HEX Cabinet F1SB +62-X24

+62
HEX Right Cabinet
HEX

From Left HEX Cabinet F1SB +61-X15

HEX Fans =F1SB -X24 #1,2,3 & 4(PE)

1) Dashed Line ->Contractor Connections, means for connection not provided.

2) Cable supplied by Siemens (25m)

3) Interconnect bus supplied by Siemens

4) Contractor supplied 15kV shielded cable

5) Contractor connection inside of 24kV Switchgear

6) Fiber Optic Connection Supplied by Siemens

8

6

			Date	5/18/2022	SH150 A/C SCHEMATICS APPROVED FOR PRODUCTION	SIEMENS AG	SINAMICS SH150 (60 Hz CONVERTER) CUSTOMER INTERCONNECTIONS OVERVIEW POWER SYSTEM (V>300V)	Referenz =
			Ed	MARSDX				Stichwort +
			Appr		SO# 3008150777.1101 Date 6/2/2022	LDA PLM R&D-D-US 2		Page 7
Modification	Date	Name	Original		Replacement of / Replaced by	NKN	A5E51274298B REV AC	Page 8 / 22

Customer Input 3PH, 6.6kV, 25hz, 2187A

1)

-T11
/7.5
25.0 MVA
PRIMARY: 6.6 kV
SECONDARY: 12.4 kV

3PH, 6.6kV, 25Hz

See Note 4

+82
25Hz AVT
Input Feedback

D1XA-B61
D1XA-B62

B61 & B62 are resistors that will be mounted directly to the 6.6kV bus in the Switchgear. Point Eight will need to do interconnecting from B61&B62 to other Siemens supplied components going in the switchgear.

These two connections at the bottom are fiber optic cables supplied by Siemens.

D1XA-K12-U1 D1XA-K22-U1

See Note 5 See Note 5

=K1RX+43-A11-X170 =K1RX+43-A11-X171

+50
/7.3
Cells Cabinet
MOM

K1K-2U2
K1K-2V2
K1K-2W2

Input Terminals

460VAC, 125A, 3PH

Cell Cab. Fans
=K1M-X11
#1,2,3 &PE

DC LINK Terminal
=D1DA-T41-KM(-)
=D1DA-T11-AM(+)

DC LINK Terminal
=D1DA-T41-KM(-)

TO 60 Hz CONVERTER
=D1DA-T41-KM(-)
=D1DA-T11-AM(+)

See Note 2

To Braking Chopper
=D1DA-T41-KM(-)

See Note 3

+71
HEX Left Cabinet
HEX

460VAC, 30A, 3PH

HEX Fans
=K1SB-X14
#1,2,3 & 4(PE)

=K1SB-X15
#1,2,3 & 4(PE)

To Right HEX Cabinet
K1SB+62-X24

+72
HEX Right Cabinet
HEX

From Left HEX Cabinet
K1SB+61-X15

HEX Fans
=K1SB-X24
#1,2,3 & 4(PE)

1) Dashed Line ->Contractor Connections, means for connection not provided.

2) Interconnect bus supplied by Siemens

3) Contractor supplied 15kV Shielded Cable

4) Contractor connection inside of 6.6kV Switchgear

5) Fiber Optic Connection Supplied by Siemens

9

7

			Date	5/18/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150 (25 Hz CONVERTER) CUSTOMER INTERCONNECTIONS OVERVIEW POWER SYSTEM (V>300V)	Referenz =
			Ed	MARSDX	APPROVED FOR PRODUCTION	LDA PLM R&D-D-US 2		Stichwort +
			Appr		SO# 3008150777.1101 Date 6/2/2022	NKN	A5E51274298B REV AC	Page 8
Modification	Date	Name	Original		Replacement of / Replaced by			Page 9 / 22

To 60 Hz Converter
=D1DA-T11-AM(+)

To 25 Hz Converter
=D1DA-T41-KM(-)

See Note 1

See Note 1

+90
/12.3
Braking Chopper
Cell Cabinet

DC Link Terminals
=D1DA-T11-AM(+)
=D1DA-T41-KM(-)

460VAC, 25A, 3PH

Braking Chopper Cell
Cabinet Fans
= H1S-X11
#1,2,3 & PE

Braking Resistor Connections
=AM_Res(+)
=KM_Res(-)

See Note 2

See Note 2

To Braking Resistor
Input

To Braking Resistor
Output

1) Contractor supplied 15kV
Shielded Cable

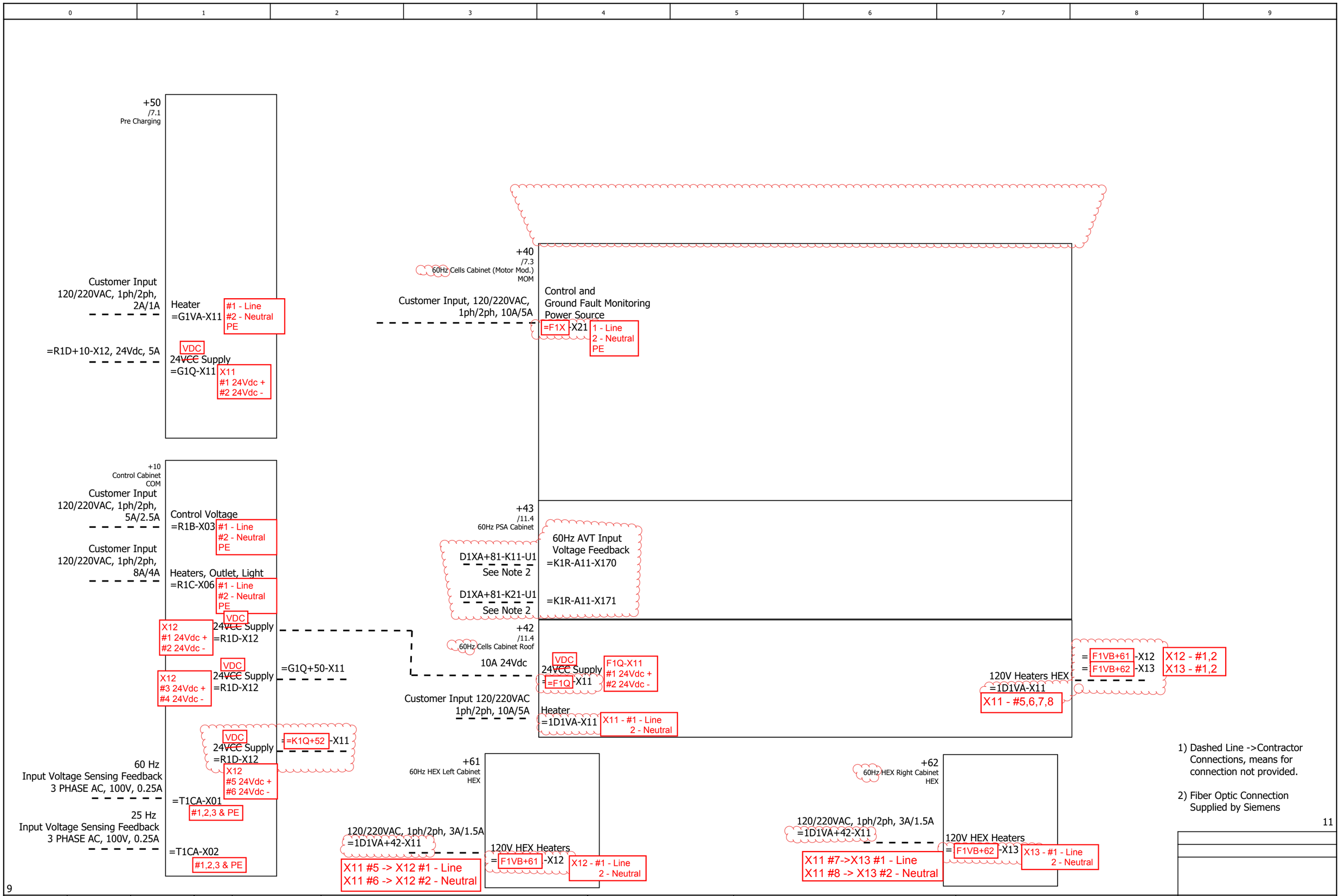
2) Customer supplied 15kV
Shielded Cable

3) Dashed line-> Contractor
Connections, means for
connection not provided.

10

8

			Date	5/11/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150 (Braking Chopper)	Referenz	=
			Ed	MARSDX	APPROVED FOR PRODUCTION	LDA PLM R&D-D-US 2	CUSTOMER INTERCONNECTIONS OVERVIEW	Stichwort	+
			Appr		SO# 3008150777.1101 Date 6/2/2022	NKN	POWER SYSTEM (V>300V)	A5E51274298B REV AC	Page 9
Modification	Date	Name	Original		Replacement of / Replaced by				Page 10 / 22



			Date	5/17/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150	Referenz	=
			Ed	MARSDX	APPROVED FOR PRODUCTION	LDA PLM R&D-D-US 2	CUSTOMER INTERCONNECTIONS OVERVIEW	Stichwort	+
			Appr		SO# 3008150777.1101 Date 6/2/2022	NKN	POWER SYSTEM (V<300V)	A5E51274298B REV AC	Page 10
Modification	Date	Name	Original		Replacement of / Replaced by				Page 11 / 22

+50
/7.3
25Hz Cells Cabinet (Motor Mod.)
MOM

Customer Input, 120/220VAC,
1ph/2ph, 10A/5A

Control and
Ground Fault Monitoring
Power Source

=K1X -X21
1 - Line
2 - Neutral
PE

+53
/10.4
25Hz PSA Cabinet

D1XA+82-K12-U1
See Note 2

D1XA+82-K22-U1
See Note 2

25Hz AVT Input
Voltage Feedback
=K1RX-A11-X170

=K1RX-A11-X171

+52
/10.4
25Hz Cells Cabinet Roof

VDC
24VCC Supply
=R1D+10-X12

10A 24Vdc

Customer Input 120/220VAC
1ph/2ph, 10A/5A

VDC
24VCC Supply
=K1Q -X11

K1Q-X11
#1 24Vdc +
#2 24Vdc -

Heater
=2D1VA-X11
X11 - #1 - Line
2 - Neutral

120V Heaters HEX
=2D1VA-X11
X11 - #5,6,7,8

=K1VB+71 -X12
=K1VB+72 -X13
X12 - #1,2
X13 - #1,2

+71
25Hz HEX Left Cabinet
HEX

120/220VAC, 1ph/2ph, 3A/1.5A
=2D1VA+42-X11

+52
X11 #5 -> X12 #1 - Line
X11 #6 -> X12 #2 - Neutral

120V HEX Heaters
=K1VB+71 -X12
X12 - #1 - Line
2 - Neutral

+72
25Hz HEX Right Cabinet
HEX

120/220VAC, 1ph/2ph, 3A/1.5A
=2D1VA+52-X11

X11 #7 -> X13 #1 - Line
X11 #8 -> X13 #2 - Neutral

120V HEX Heaters
=K1VB +72 -X13
X13 - #1 - Line
2 - Neutral

1) Dashed Line ->Contractor Connections, means for connection not provided.

2) Fiber Optic Connection Supplied by Siemens

12

10

			Date	5/17/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150	Referenz =
			Ed	MARSDX	APPROVED FOR PRODUCTION	LDA PLM R&D-D-US 2	CUSTOMER INTERCONNECTIONS OVERVIEW	Stichwort +
			Appr		SO# 3008150777.1101 Date 6/2/2022	NKN	POWER SYSTEM (V<300V)	A5E51274298B REV AC
Modification	Date	Name	Original		Replacement of / Replaced by			Page 11 / Page 12 / 22

+90
/9.3
Braking Chopper
Cell Cabinet

Customer Input
120VAC, 10A, 3PH

Control Voltage
= H1P-X11

#1 - Line
#2 - Nuetral

Customer Input
120VAC, 5A, 3PH

Space Heaters
= H1VA-X11

#1 - Line
#2 - Nuetral

1) Dashed line-> Contractor Connections, means for connection not provided.

13

11

			Date	5/17/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150 (Braking Chopper)	Referenz	=
			Ed	MARSDX	APPROVED FOR PRODUCTION		CUSTOMER INTERCONNECTIONS OVERVIEW	Stichwort	+
			Appr		SO# 3008150777.1101 Date 6/2/2022	LDA PLM R&D-D-US 2	POWER SYSTEM (V<300V)	A5E51274298B REV AC	Page 12
Modification	Date	Name	Original		Replacement of / Replaced by	NKN			Page 13 / 22

0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9

+10
Control Cabinet
COM

480V Aux Power
Circuit Breaker Closed
=T1BA-K11-X520-1
(COMMON)
=R1D-X22-3 R1D-X21:3C
480V Aux Power Circuit
Breaker - Ready to Close
T1BA-K11-X520:4

60Hz Inductor 150°C Temp Switch
=T1BA-K11-X520:2
=R1D-X22-2M24:8B
R1D-X21:8D

185
60Hz Inductor 180°C Temp Switch
=T1BA-K11-X520:3
=R1D-X22-2M24:8C
R1D-X21:8C

Customer Remote ESTOP Input
R1E-X11:2
R1E-X11:3

480V ATS Switch Closed Feedback
T1DA-K11-X530:4
(COMMON)
R1D-X21:3D

60Hz RC Filter Fuse Blown Indication
T1BA-K11-X530:1
R1D-X21:9C

25Hz RC Filter Fuse Blown Indication
T1BA-K11-X530:2
R1D-X21:9D

25 Hz Input Breaker
State Ready to close CB 1
=T1AX-K11-X122:1
State OFF CB 1
=T1AX-K11-X122:2
State ON CB 1
=T1AX-K11-X122:3
State OFF CB 1(Leading contact)
=T1AX-K11-X122:4
(COMMON)
=R1D-X22-6 R1D-X21:6C

60Hz Input Breaker
State Ready to close CB 1
=T1A-K11-X122:1
State OFF CB 1
=T1A-K11-X122:2
State ON CB 1
=T1A-K11-X122:3
State OFF CB 1(Leading contact)
=T1A-K11-X122:4
(COMMON)
=R1D-X22-6 R1D-X21:6A

480V Aux Power Circuit
Breaker Close Command
=T1BA-K11-X542-2
=T1BA-K11-X542-3

480V Aux Power Circuit
Breaker Trip Command
=T1BA-K11-X542-5
=T1BA-K11-X542-6

=R1FA-X21-1
=R1FA-X21-2
DO (CB On Command) Customer Input (25 Hz Breaker)

=R1FA-X21-3
=R1FA-X21-4
DO (CB Off Command High Active) Customer Input (25 Hz Breaker)

=R1FA-X21-7
=R1FA-X21-8
DO (CB Off Command Low Active) Customer Input (25 Hz Breaker)

=R1FA-X21-9
=R1FA-X21-10
DO (CB Undervoltage Coil) Customer Input (25 Hz Breaker)

DO Auxiliary ONOFF
=T1A-X132-13
=T1A-X132-14
G1M-+50-X11
13 - #1
14 - #2

T1DA-K11-X542:1
T1DA-K11-X542:2
T1DA-K11-X542:3
480V ATS Switch Closed - Position Control (NC)
480V ATS Switch Closed - Position Control (COMMON)
480V ATS Switch Closed - Position Control (NO)

=T1BA-K31-X521:8
DI/DO 14 - Drive Ready
=T1BA-K31-X521:9
DI/DO 15 - Drive Running
=T1BA-K31-X522:3
DI/DO 17 - Drive Alarm
=T1BA-K31-X522:2
DI/DO 16 - Drive Fault

=R1F-X21-1
=R1F-X21-2
DO (CB On Command) Customer Input (60 Hz Breaker)

=R1F-X21-3
=R1F-X21-4
DO (CB Off Command High Active) Customer Input (60 Hz Breaker)

=R1F-X21-7
=R1F-X21-8
DO (CB Off Command Low Active) Customer Input (60 Hz Breaker)

=R1F-X21-9
=R1F-X21-10
DO (CB Undervoltage Coil) Customer Input (60 Hz Breaker)

=T1AX-K51:X2
Ethernet IP (Customer Input)

Safety Relay Circuit
=R1F-X11
=H1R+90-X11
Safety Relay Circuit
=R1F-X11
=1K1M+42-X32

=T1AX-K12-X100
=H1R+90-A11-X200 (Drive Cliq)
Braking Chopper PSA4
=T1A-K11-X101
=F1R+42-A11-X200 (Drive Cliq)
60Hz MOM PSA5
=T1AX-K12-X101
=K1R+52-A11-X200 (Drive Cliq)
25Hz MOM PSA5

+61
60Hz HEX Left Cabinet
HEX
F1S-X51 #1,2,3,PE
Modbus RTU Input
=F1SB-X34 #1,2,3, PE
F1R+42-X14 - #1
Temp. Monitor
=F1SB-X21 - #3
F1R+42-X13 - #1
=F1SB-X21 - #1
HEX Fans
Temperature
Monitor
=F1SB-X21 - #2
F1SB-X21 - #4
Modbus RTU Output
=F1SB-X35
#1,2,3, PE
=F1SB+62-X44
#1,2,3, PE
F1R+42-X13 - #2
F1SB-+62-X24 - #5

+62
60Hz HEX Right Cabinet
HEX
#1,2,3, PE
=F1SB+61-X35
Modbus RTU Input
=F1SB-X44 #1,2,3, PE
F1SB-+61-X21 - #4
Temp. Monitor
=F1SB-X24 - #5
HEX Fans
Temperature
Monitor
=F1R-+43-X14 - #2
F1SB-X24 - #6

+42
/10,4
60Hz Cell Cabinet Roof
=T1A+10-K11-X101 (Drive Cliq)
#3,4 =.G1M+50-X51
=F1R-A11-X200
Undervoltage
Coil 480V Bus
F1M-X52, #1,2
=R1F+10-X11
=H1R+90-X11
Safety Relay Cicuit
=1K1M-X32
Safety Relay Cicuit
=1K1M-X32
=F1SB+61-X21 - #3
=F1SB+62-X21
HEX Fans
Temperature
Monitor
F1R-X14 - #1
=F1SB+62-X24 - #6
F1R-X14 - #2
Modbus RTU Output
=F1S-X51 #1,2,3,PE
Drive cliq
=F1R-A11-X201
=F1SB+61-X34 #1,2,3, PE
=G1Q+50-K21-X500
HEX Fans
Power Enable
F1R+42-X13 - #1
F1R+42-X13 - #2
F1SB+61-X21 - #1
F1SB+61-X21 - #2

Safety Relay Circuit #1
F1M-X32 #1 -> R1F-X11 #1
F1M-X32 #2 -> H1R-X11 #2
F1M-X32 #3 -> R1F-X11 #3
F1M-X32 #4 -> R1F-X11 #4

Safety Relay Circuit #1
R1F-X11 #1 -> F1M-X32 #1
R1F-X11 #2 -> H1R-X11 #1
R1F-X11 #3 -> F1M-X32 #3
R1F-X11 #4 -> F1M-X32 #4

Safety Relay Circuit #2
R1FA-X11 #1 -> K1M-X32 #1
R1FA-X11 #2 -> H1R-X11 #3
R1FA-X11 #3 -> K1M-X32 #3
R1FA-X11 #4 -> K1M-X32 #4

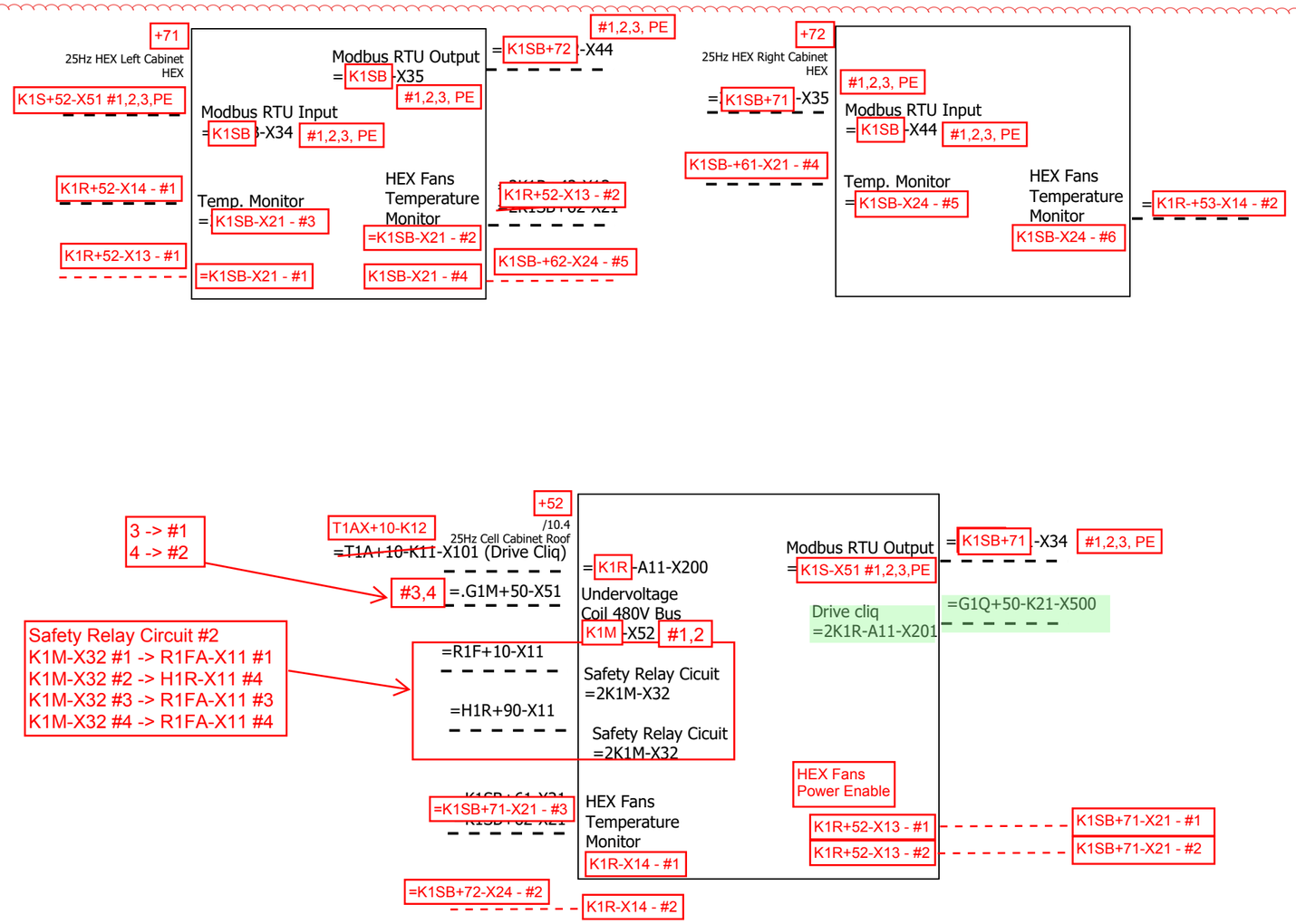
+50
Pre Charging
#13, 14
13 -> #1
14 -> #2
=T1A+10-X132
=F1R-A11-X201 (Drive Cliq)
DO Auxiliary ONOFF
=G1M-X11 #1, 2
=G1Q-K21-X500
Undervoltage
Coil 480V Bus
G1M-X51
=F1M+40-X52 #1, 2
#1, 2
1 -> #1
2 -> #2
G1M-X51, #3,4
K1M+50-X52, #1,2
3 -> #1
4 -> #2

1) Dashed Line ->Contractor
Connections, means for connection
not provided

12

14

			Date	5/17/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150 CUSTOMER INTERCONNECTIONS OVERVIEW CONTROL SYSTEM	Referenz =
			Ed	MARSDX	APPROVED FOR PRODUCTION			Stichwort +
			Appr		SQ# 3008150777.1101 Date 6/2/2022	LDA PLM R&D-D-US 2	A5E51274298B REV AC	Page 13
Modification	Date	Name	Original		Replacement of / Replaced by	NKN		Page 14 / 22



1) Dashed Line ->Contractor Connections, means for connection not provided

15

13

			Date	5/11/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150 CUSTOMER INTERCONNECTIONS OVERVIEW CONTROL SYSTEM	Referenz =
			Ed	MARSDX	APPROVED FOR PRODUCTION			Stichwort +
			Appr		SO# 3008150777.1101 Date 6/2/2022	LDA PLM R&D-D-US 2		A5E51274298B REV AC
Modification	Date	Name	Original		Replacement of / Replaced by	NKN		Page 14 / Page 15 / 22

+90
/9.3
Braking Chopper
Cell Cabinet

T1AX-K12-X100 (Drive Cliq) ---- =H1R-A11-X200

Braking Chopper Resistor
PT100 Temperature Sensors ---- =H1R-X12

H1R-X12
Terminal Numbers
1 - Not Used
2 -> Post Glover Terminal 201
3 -> Post Glover Terminal 202
4 -> Post Glover Terminal 203
5 - Not Used
6 -> Post Glover Terminal 101
7 -> Post Glover Terminal 102
8 -> Post Glover Terminal 103

=R1F+10-X11

=R1FA+10-X11

MV Circuit Breakers Off Commands
(Undervoltage Coil)

Safety Relay Circuit #1 & 2
H1R-X11 #1 -> R1F-X11 #2
H1R-X11 #2 -> F1M-X32 #2
H1R-X11 #3 -> R1FA-X11 #2
H1R-X11 #4 -> K1M-X32 #2

3-X32

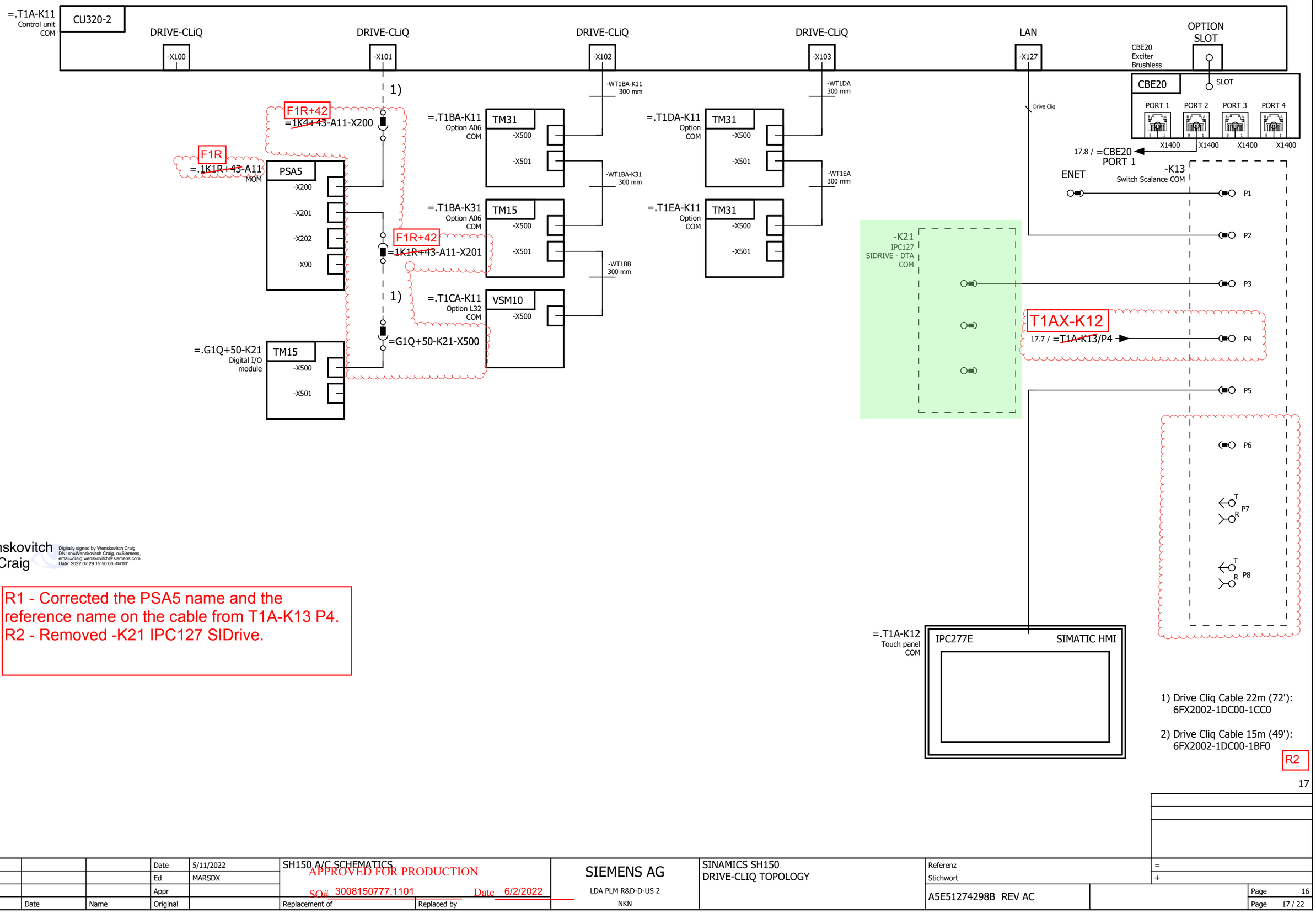
43-X32

1) Dashed line-> Contractor Connections, means for connection not provided.

16

14

			Date	5/17/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150 (Braking Chopper)	Referenz	=
			Ed	MARSDX	APPROVED FOR PRODUCTION		CUSTOMER INTERCONNECTIONS OVERVIEW	Stichwort	+
			Appr		SO# 3008150777.1101 Date 6/2/2022	LDA PLM R&D-D-US 2	Control System	A5E51274298B REV AC	Page 15
Modification	Date	Name	Original		Replacement of / Replaced by	NKN			Page 16 / 22



Wenskovitch Craig

Digitally signed by Wenskovitch Craig
DN: cn=Wenskovitch Craig, o=Siemens, email=craig.wenskovitch@siemens.com
Date: 2022.07.29 15:50:06 -04'00'

R1 - Corrected the PSA5 name and the reference name on the cable from T1A-K13 P4.
R2 - Removed -K21 IPC127 SIDrive.

1) Drive Cliq Cable 22m (72'): 6FX2002-1DC00-1CC0

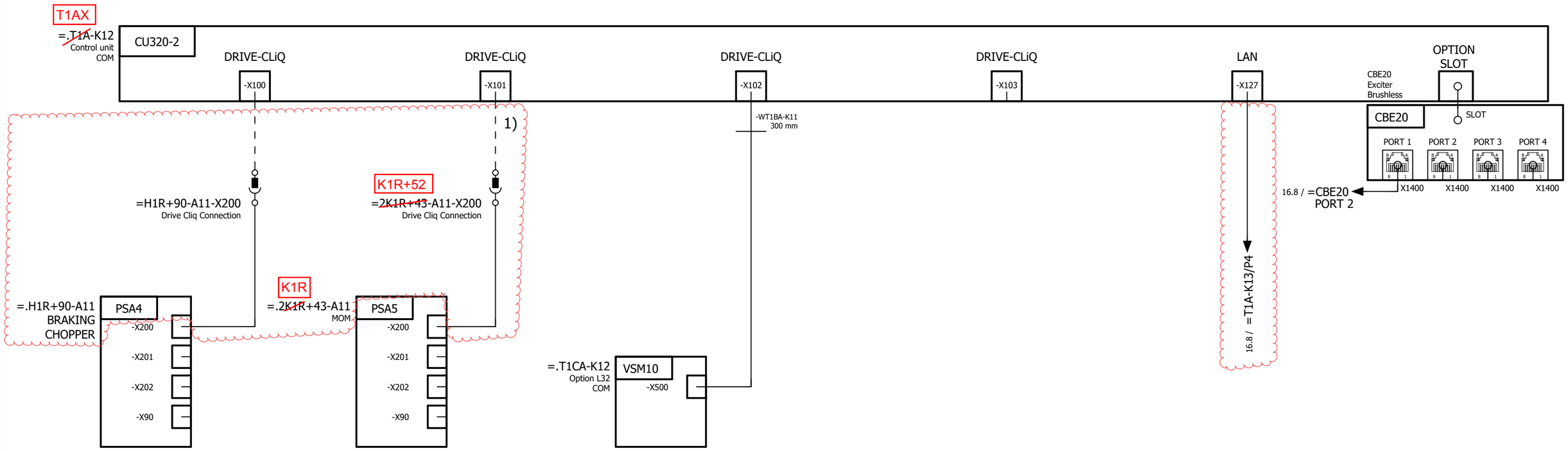
2) Drive Cliq Cable 15m (49'): 6FX2002-1DC00-1BF0

R2

17

15

			Date	5/11/2022	SH150 A/C SCHEMATICS		SIEMENS AG	SINAMICS SH150 DRIVE-CLIQ TOPOLOGY	Referenz =
			Ed	MARSDX	APPROVED FOR PRODUCTION				Stichwort +
			Appr		SO# 3008150777.1101	Date 6/2/2022	LDA PLM R&D-D-US 2		A5E51274298B REV AC
Modification	Date	Name	Original		Replacement of	Replaced by	NKN		Page 16 / Page 17 / 22



Wenskovitch Craig

Digitally signed by Wenskovitch Craig
DN: cn=Wenskovitch Craig, o=Siemens, email=craig.wenskovitch@siemens.com
Date: 2022.07.29 15:56:09 -04'00'

R1 - Corrected the PSA5 name.

1) Drive Cliq Cable 22m (72'): 6FX2002-1DC00-1CC0

2) Drive Cliq Cable 15m (49'): 6FX2002-1DC00-1BF0

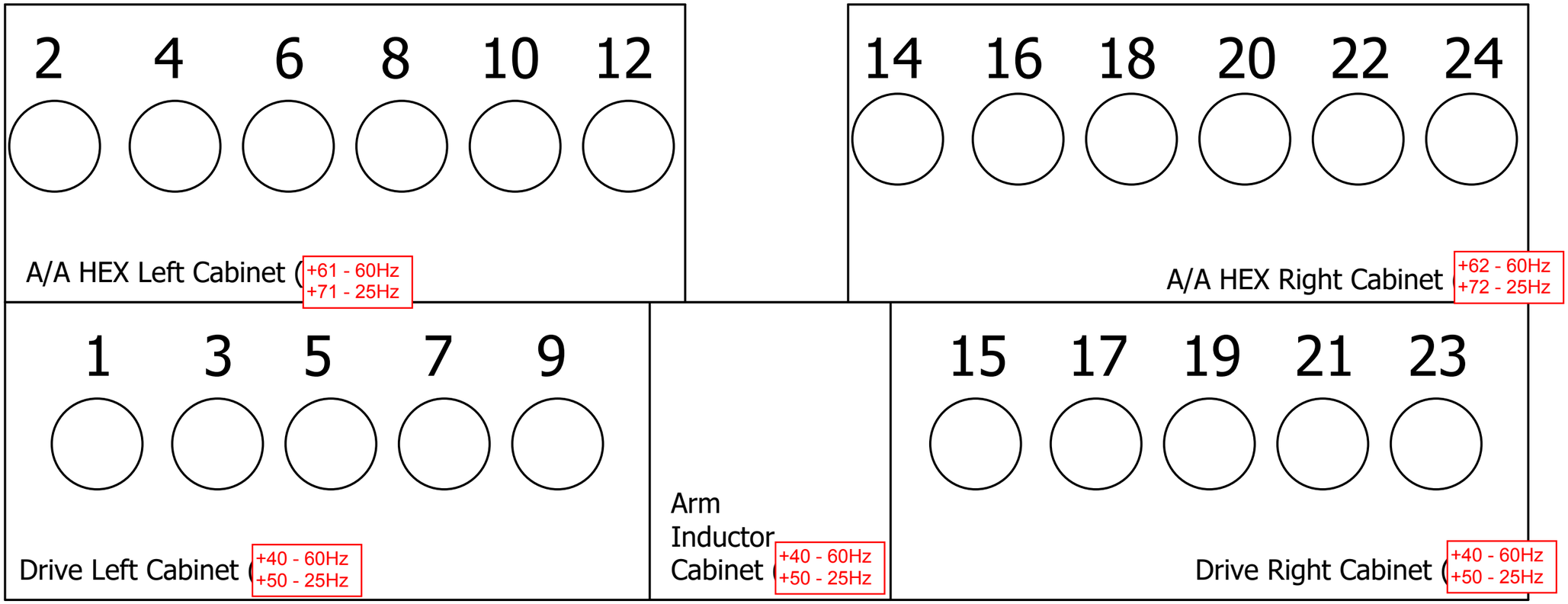
R1

18

16

			Date	5/12/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150	Referenz	=
			Ed	MARSDX	APPROVED FOR PRODUCTION		DRIVE-CLIQ TOPOLOGY	Stichwort	+
			Appr		SO# 3008150777.1101 Date 6/2/2022	LDA PLM R&D-D-US 2		A5E51274298B REV AC	Page 17
Modification	Date	Name	Original		Replacement of / Replaced by	NKN			Page 18 / 22

NOTE:
THIS DRAWING REPRESENTS THE TWO CONVERTERS (25 Hz AND 60 Hz)
ONLY ONE SET OF CABINETS WAS SHOWN FOR CLAIRITY.



19

17

			Date	5/10/2022	SH150 A/C SCHEMATICS		SIEMENS AG	SINAMICS SH150 FANS DISPOSITION TOP VIEW	Referenz =
			Ed	MARSDX	APPROVED FOR PRODUCTION				Stichwort +
			Appr		SO# 3008150777.1101 Date 6/2/2022		LDA PLM R&D-D-US 2		A5E51274298B REV AC Page 18
Modification	Date	Name	Original		Replacement of	Replaced by	NKN		Page 19 / 22

NOTE:
THIS DRAWING REPRESENTS THE TWO CONVERTERS (25 Hz AND 60 Hz)
ONLY ONE SET OF CABINETS WAS SHOWN FOR CLAIRITY.

CELL CABINET ROOF (+42 - 60Hz +52 - 25Hz

12 1212 X116	11 1211 X115	10 1210 X114	9 129 X113	8 128 X112	7 127 X111	6 126 X16	5 125 X15	4 124 X14	3 123 X13	2 122 X12	1 121 X11
36 2212 X136	35 2211 X135	34 2210 X134	33 229 X133	32 228 X132	31 227 X131	30 226 X36	29 225 X35	28 224 X34	27 223 X33	26 222 X32	25 221 X31
60 3212 X156	59 3211 X155	58 3210 X154	57 329 X153	56 328 X152	55 327 X151	54 326 X56	53 325 X55	52 324 X54	51 323 X53	50 322 X52	49 321 X51

KM(-) DC LINK

LEFT CELL CABINET (+40 - 60Hz +50 - 25Hz

PSA CABINET (+43)

Arm Inductor Cabinet

CELL CABINET ROOF (+42 - 60Hz +52 - 25Hz

13 111 X21	14 112 X22	15 113 X23	16 114 X24	17 115 X25	18 116 X26	19 117 X121	20 118 X122	21 119 X123	22 1110 X124	23 1111 X125	24 1112 X126
37 211 X41	38 212 X42	39 213 X43	40 214 X44	41 215 X45	42 216 X46	43 217 X141	44 218 X142	45 219 X143	46 2110 X144	47 2111 X145	48 2112 X146
61 311 X61	62 312 X62	63 313 X63	64 314 X64	65 315 X65	66 316 X66	67 317 X161	68 318 X162	69 319 X163	70 3110 X164	71 3111 X165	72 3112 X166

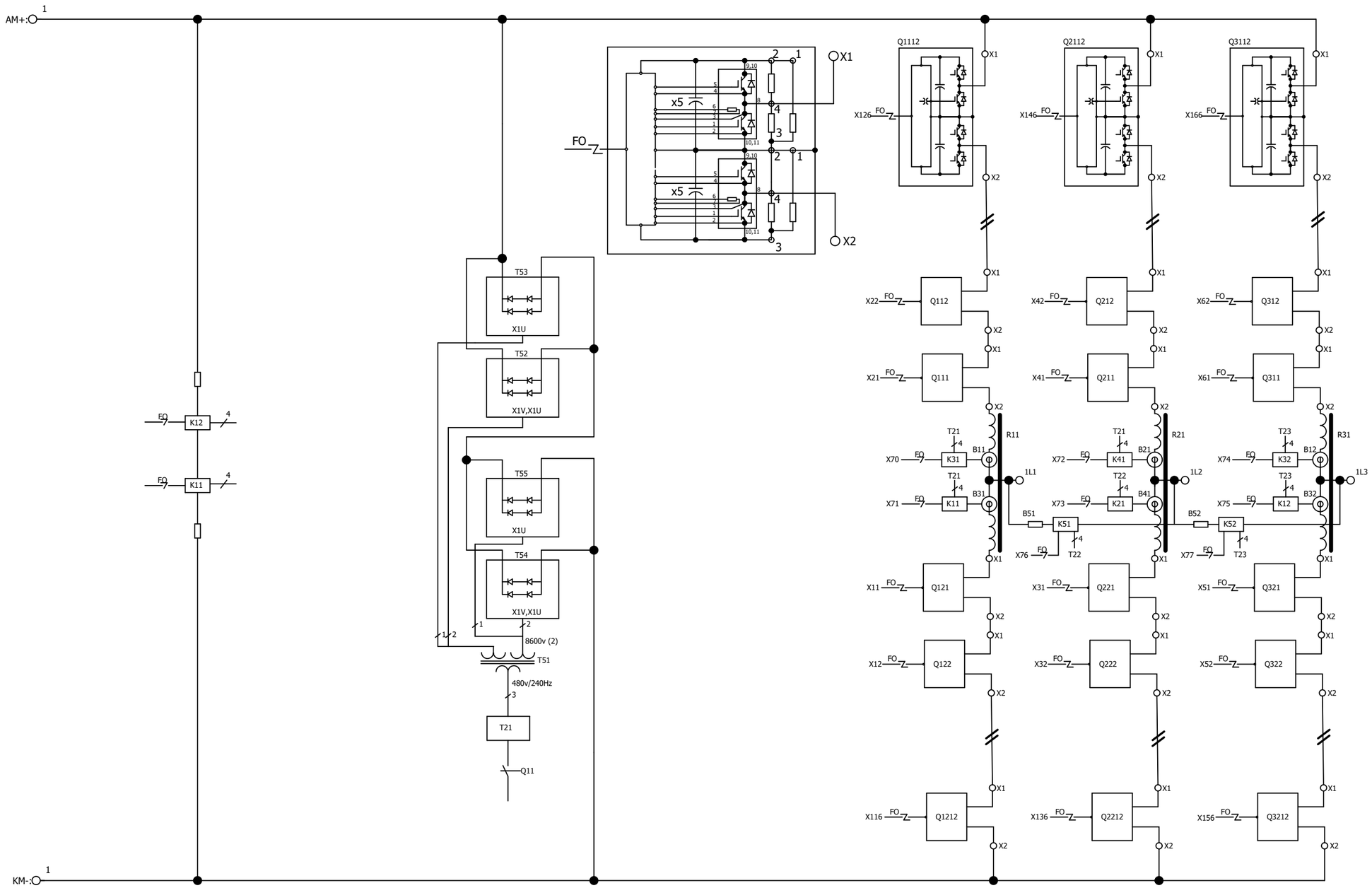
AM(+) DC LINK

RIGHT CELL CABINET (+40 - 60Hz +50 - 25Hz

20

18

			Date	5/10/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150 CELLS AND DIODE STACKS DISPOSITION FRONT VIEW	Referenz	=
			Ed	MARSDX	APPROVED FOR PRODUCTION			Stichwort	+
			Appr		SO# 3008150777.1101 Date 6/2/2022	LDA PLM R&D-D-US 2		A5E51274298B REV AC	Page 19
Modification	Date	Name	Original		Replacement of / Replaced by	NKN			Page 20 / 22



NOTE:
THIS DRAWING REPRESENTS THE TWO CONVERTERS (25 Hz AND 60 Hz)
THE COMMON/CONNECTION POINT BETWEEN THE TWO CONVERTERS IS THE AM+ AND KM - POINTS.

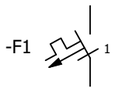
21

19

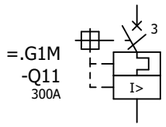
			Date	5/10/2022	SH150 A/C SCHEMATICS		SIEMENS AG	SINAMICS SH150	Referenz	=
			Ed	MARSDX	APPROVED FOR PRODUCTION			OVERVIEW DRIVE TOPOLOGY	Stichwort	+
			Appr		SO# 3008150777.1101 Date 6/2/2022		LDA PLM R&D-D-US 2		A5E51274298B REV AC	Page 20
Modification	Date	Name	Original		Replacement of	Replaced by	NKN			Page 21 / 22

0	1	2	3	4	5	6	7	8	9

= Customer Circuit Breaker

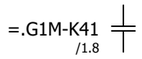


= Circuit Breaker

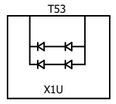


= Circuit Breaker with TOL

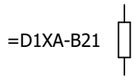
= Cooling Fan Motor



= Contactor



= Diode

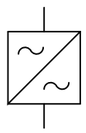


= Resistor

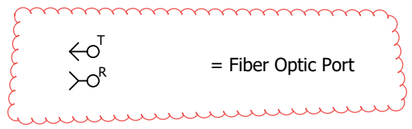
= Resistor

= Terminal Block / Connection

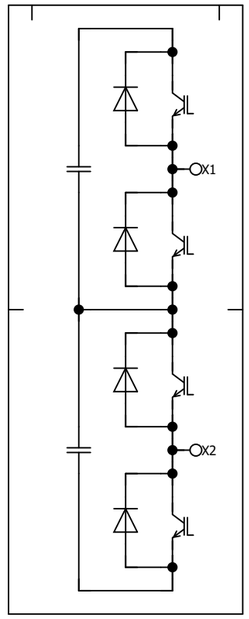
= Network Bus Cable Connection



= Variable Frequency Drive



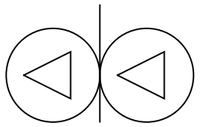
= Fiber Optic Port



=.K1F
-Q111...-Q1112
-Q121...-Q1212
-Q211...-Q2112
-Q221...-Q2212
-Q311...-Q3112
-Q321...-Q3212

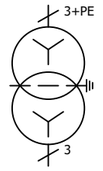
= SFC Power Cell

= SFC Power Cell



= Transformer

= Current Transformer



= Transformer

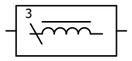
= Transformer

= Transformer

= Current Transformer

= Inductor

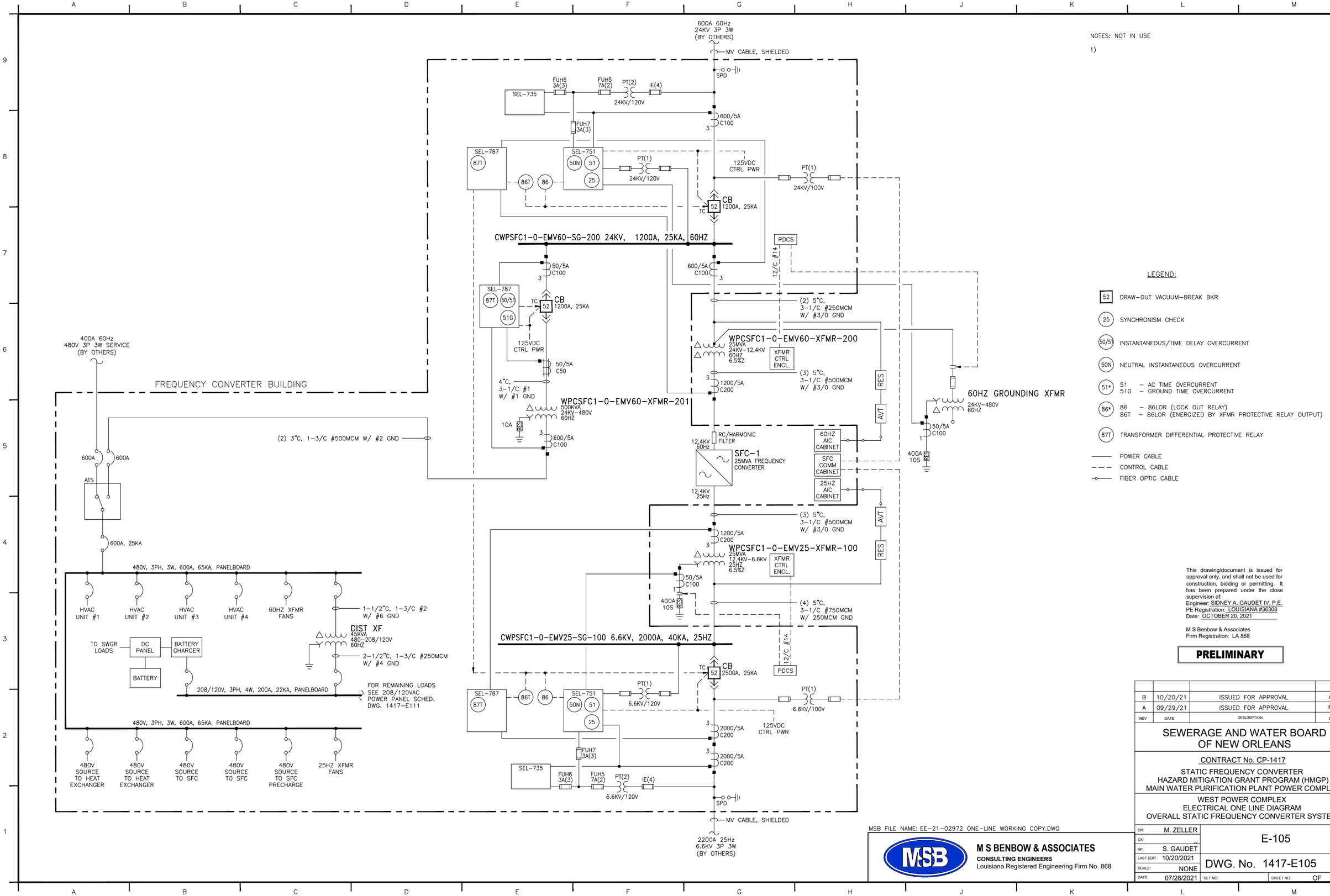
-L1



= Inductor

20

			Date	5/12/2022	SH150 A/C SCHEMATICS	SIEMENS AG	SINAMICS SH150 SYMBOL SHEET	Referenz	=
			Ed	MARSDX	APPROVED FOR PRODUCTION			Stichwort	+
			Appr		SO# 3008150777.1101 Date 6/2/2022	LDA PLM R&D-D-US 2		A5E51274298B REV AC	Page 21
Modification	Date	Name	Original		Replacement of / Replaced by	NKN			Page 22 / 22



NOTES: NOT IN USE

1)

LEGEND:

- 52 — DRAW-OUT VACUUM-BREAK BKR
- 25 — SYNCHRONISM CHECK
- 50/51 — INSTANTANEOUS/TIME DELAY OVERCURRENT
- 50N — NEUTRAL INSTANTANEOUS OVERCURRENT
- 51* — 51 – AC TIME OVERCURRENT; 51G – GROUND TIME OVERCURRENT
- 86* — 86 – 86LOR (LOCK OUT RELAY); 86T – 86LOR (ENERGIZED BY XFMR PROTECTIVE RELAY OUTPUT)
- 87T — TRANSFORMER DIFFERENTIAL PROTECTIVE RELAY
- POWER CABLE
- CONTROL CABLE
- FIBER OPTIC CABLE

This drawing/document is issued for approval only, and shall not be used for construction, bidding or permitting. It has been prepared under the close supervision of:
Engineer: SIDNEY A. GAUDET IV, P.E.
PE Registration: LOUISIANA #36308
Date: OCTOBER 20, 2021

M S Benbow & Associates
Firm Registration: LA 868

PRELIMINARY

REV	DATE	DESCRIPTION	BY
B	10/20/21	ISSUED FOR APPROVAL	ASL
A	09/29/21	ISSUED FOR APPROVAL	MJZ

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. CP-1417

STATIC FREQUENCY CONVERTER
HAZARD MITIGATION GRANT PROGRAM (HMGP)
MAIN WATER PURIFICATION PLANT POWER COMPLEX

WEST POWER COMPLEX
ELECTRICAL ONE LINE DIAGRAM
OVERALL STATIC FREQUENCY CONVERTER SYSTEM

MSB FILE NAME: EE-21-02972 ONE-LINE WORKING COPY.DWG

M S BENBOW & ASSOCIATES
CONSULTING ENGINEERS
Louisiana Registered Engineering Firm No. 868

DR:	M. ZELLER
CK:	
AP:	S. GAUDET
LAST EDIT:	10/20/2021
SCALE:	NONE
DATE:	07/28/2021

E-105

DWG. No. 1417-E105

SET NO: SHEET NO: OF

KEY NOTES

1. WORKSTATION, FIREWALLS AND SERVERS PROVIDED BY OWNER BUT INSTALLED AND PROGRAMMED BY CONTRACTOR. KEYBOARD, MOUSE AND MONITOR BY ARE PROVIDED BY CONTRACTOR.
2. IT AND SECURITY SERVER ARE EXISTING AND LOCATED IN OTHER BUILDINGS AT THE OWNER FACILITIES.
3. PROVIDED BY OWNER. INSTALLED BY 1420 CONTRACTOR.
4. EQUIPMENT BY OWNER, FIBER CONNECTIONS ONLY BY 1420 CONTRACTOR.
5. EQUIPMENT BY OWNER, FIBER CONNECTIONS ONLY BY 1420 VENDOR.
6. MONITORS ARE SHARING DESK SPACE IN THE AUX ELECTRICAL ROOM. KVM SWITCHES TO BE USED TO ALLOW SINGLE KEYBOARDS TO CONTROL MULTIPLE MONITORS.
7. FIREWALL CONNECTION USED TO INTEGRATE PI SYSTEM WITH WEST POWER COMPLEX.
8. SEE RISER PLAN SE.008 FOR DETAILS.
9. SEE RISER PLAN SE.009 FOR DETAILS.
10. SEE RISER PLAN SE.010 FOR DETAILS.
11. SEE RISER PLAN SE.011 FOR DETAILS.
12. SEE RISER PLAN SE.012 FOR DETAILS.
13. SEE RISER PLAN SE.013 FOR DETAILS.
14. FUTURE.
15. SEE RISER PLAN SE.018 FOR DETAILS.
16. SUPPLIED AND INSTALLED AS PART OF 1427 SCOPE.
17. SUPPLIED AND INSTALLED AS PART OF 1438 SCOPE.
18. SUPPLIED BY 1420 CONTRACTOR. MOUNT IN AUX ELECTRICAL NETWORK CABINET.
19. FUTURE.

MONITOR (6) (1)
PRINTER
PSS OPERATOR WORKSTATION
PSS SERVER (1)
FIREWALL (1) (7)
PDCS OPERATOR WORKSTATION (1)
PDCS SERVER (INCL GCS)
FIREWALL (1) (7)
IT/SECURITY OPERATOR WORKSTATION
IT LAN SERVER (2)
SECURITY SERVER (2)
FUEL GAS COMPRESSOR WORKSTATION (2)
T7 OPERATOR WORKSTATION
NEW VIDEO STORAGE (NVR) (18)
AUX ELECTRICAL MONITOR (1)
CEMS COMPUTER

CONNECTION TO G3 EL BLDG

IT LAN
PSS
SECURITY
PDCS

CONNECTION TO CENTRAL CONTROL

SFC 1 (4)
PDCS RTAC
HMI
TIME CLOCK
SECURITY (8)
HMI
SFC CNTL
FIRE PANEL (4)

SFC 2 (4)
PDCS RTAC
HMI
SECURITY (9)
HMI
SFC CNTL
FIRE PANEL

SFC 3 (14) (4)
RTAC
HMI
SECURITY (10)
HMI
SFC CNTL
FIRE PANEL

TURBINE 7 (3)
HMI
FIRE PANEL (17)
HMI CNTL BOX
SECURITY (13)
PDCS RTAC
TURBINE CNTL
HMI
COMPRESSOR CNTL
HMI

FUEL OIL FORWARDING PUMPS
FORWARDING PUMP PLC (19) (2)
PROCESS CNTL
ENTERGY RTU
ENTERGY SUBST.

ELECTRICAL PROTECTION RELAYS
ELECTRICAL PROTECTION RELAYS
ELECTRICAL PROTECTION RELAYS
ELECTRICAL PROTECTION RELAYS
PROCESS CNTL

AUX ELEC ROOM (16)
PDCS RTAC
HMI
BOP PLC
FIRE PANEL (16)
SECURITY (12)

INTERIM SWGR
FIRE PANEL
SECURITY (11)

BLACK START GENERATOR (14)

CEMS PLC

INSTRUMENT AIR COMPRESSOR

ELECTRICAL PROTECTION RELAYS
PROCESS CNTL
FUEL OIL TRANSFER PUMP PIPING LEAK DETECTION CONTROLLER
ELECTRICAL PROTECTION RELAYS
L4 ELEC SUB STN (15)

THE CONTENT OF THIS DRAWING IS BASED ON PRELIMINARY VENDOR FRAME INFORMATION AND IS TO BE USED BY CONTRACTOR AS DESIGN GUIDANCE. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF THE CONTENT AND MAKE REQUIRED CHANGES BASED ON CONTRACTOR FINAL DESIGN.

REV.	DATE	DESCRIPTION	BY
2	05/24/2024	ISSUED FOR CONSTRUCTION	JJ
1	04/12/2024	CONFORMED TO CONTRACT	JJ
0	10/27/2023	ISSUE FOR BID	JJ

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1420
WEST POWER COMPLEX
PHASE 1 INSTALLATION AND COMMISSIONING

I&C

NETWORK OVERVIEW FOR WPC PRIOR TO WPC OPERATIONS BEING ONLINE

Jacobs

JOB NO.	D3393001
DWG NO.	IC100_D3393001
DESIGNED BY:	J HANDWORK
FILE NAME:	IC100_D3393001.dgn

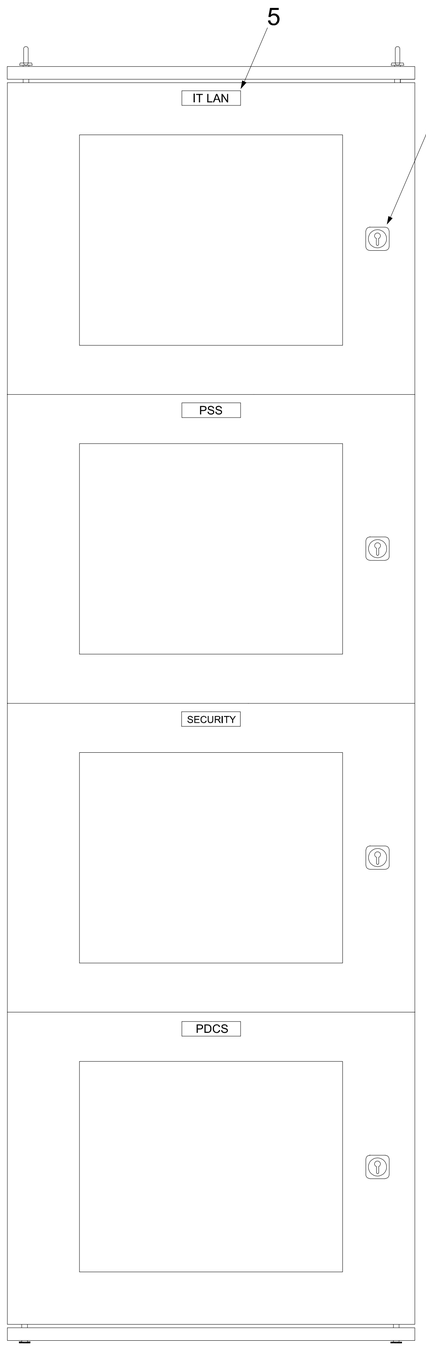
DR.	J JARVIS
CK:	J HANDWORK
AP:	S REISER
LAST EDIT:	
SCALE:	AS SHOWN
DATE:	MAY 2024

A/E DWG NO. IC100

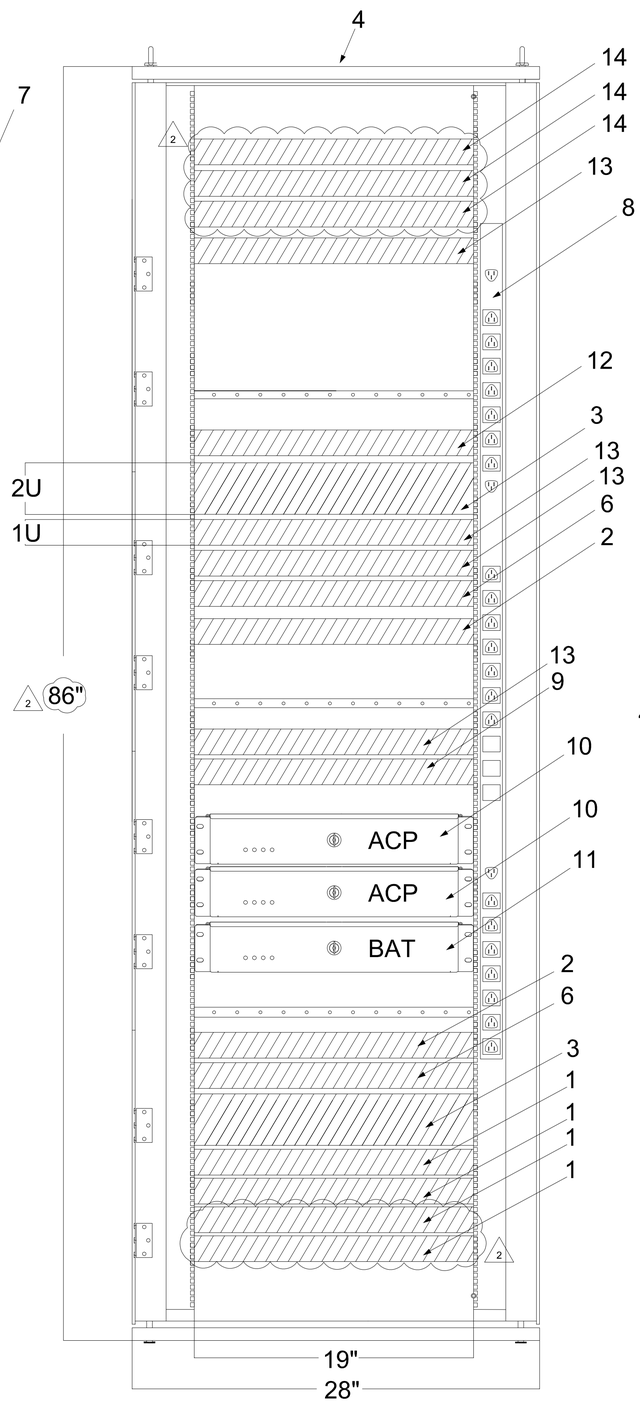
DWG. No. 12214-W-50

SET NO: SHEET NO: OF

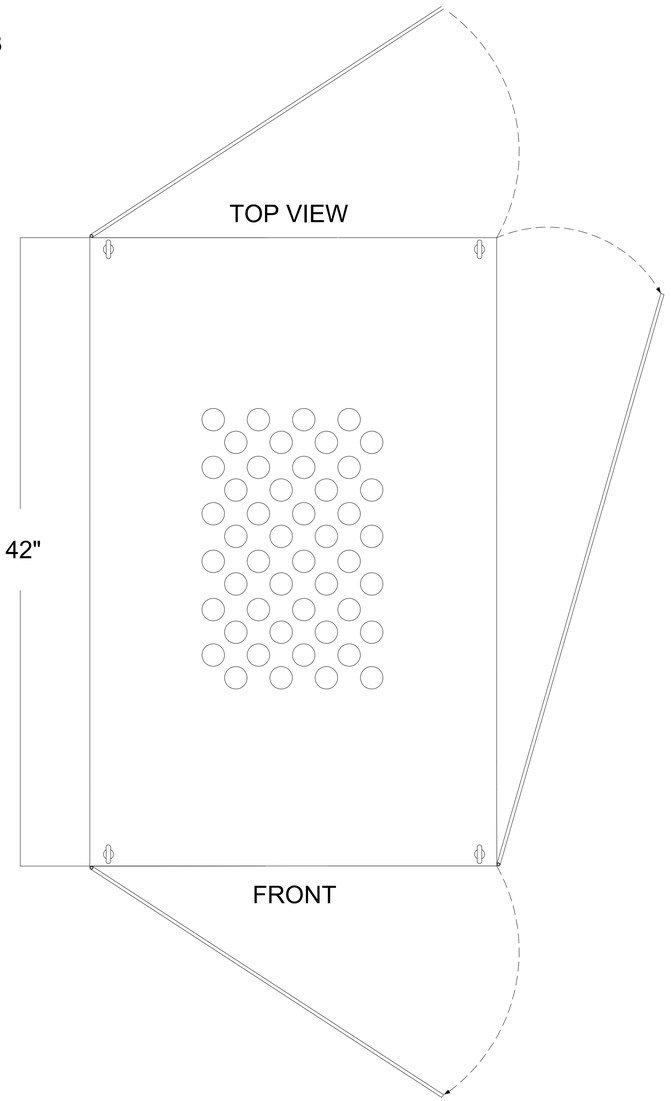
CONSTRUCTION PACKAGE - FOR CONSTRUCTION



FRONT VIEW



INSIDE VIEW



GENERAL NOTES

A. CABINET DETAIL TYPICAL FOR AUX ELECTRICAL (PDC1) NETWORK CABINET.
B. CONCEPTUAL DESIGN. DETAILED CABINET DESIGN TO BE PROVIDED BY CONTRACTOR.
C. FRONT AND REAR ACCESS.
D. THE OWNER WILL FREE ISSUE SERVER HARDWARE ONLY. THE 1420 CONTRACTOR IS RESPONSIBLE FOR ALL SOFTWARE AND CONFIGURATION NECESSARY FOR EQUIPMENT INTEGRATION AS SPECIFIED.

BILL OF MATERIAL

ID	QTY	DESCRIPTION	SUPPLIED BY
1 (2)	4	24 PORT SOFTWARE DEFINED NEWORK SWITCH	SEL SDN SWITCH BY CONTRACTOR
2	1	SATELLITE SYNCHRONIZED TIME CLOCK	SEL 2488 W/ GPS ANTENNA BY CONTRACTOR
3	2	RACK SERVER	DELL R440 BY OWNER
4	1	4 DOOR NETWORK CABINET	BY CONTRACTOR
5	4	1" X 4" NAMEPLATE	BY CONTRACTOR
6	2	FIREWALL	PALO ALTO 415 BY OWNER
7	4	UNIQUE LOCK AND KEY	BY CONTRACTOR
8	1	POWER DISTRIBUTION UNIT	BY CONTRACTOR
9	1	CAT6A PATCH PANEL	BY CONTRACTOR
10	2	ACCESS CONTROL PANEL	BY CONTRACTOR
11	1	BATTERY PACK	BY CONTRACTOR
12	1	NVR (NEW VIDEO STORAGE)	BY CONTRACTOR
13	4	24 PORT SOFTWARE DEFINED NEWORK SWITCH	CISCO C9200L-24-P-4X BY CONTRACTOR
14	1	KVM SWITCH	BY CONTRACTOR

(2)

THE CONTENT OF THIS DRAWING IS BASED ON PRELIMINARY VENDOR FRAME INFORMATION AND IS TO BE USED BY CONTRACTOR AS DESIGN GUIDANCE. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF THE CONTENT AND MAKE REQUIRED CHANGES BASED ON CONTRACTOR FINAL DESIGN.

REV.	DATE	DESCRIPTION	BY
2	05/24/2024	ISSUED FOR CONSTRUCTION	JJ
1	04/12/2024	CONFORMED TO CONTRACT	JJ
0	10/27/2023	ISSUE FOR BID	JJ

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1420

WEST POWER COMPLEX
PHASE 1 INSTALLATION AND COMMISSIONING

I&C

AUX ELECTRICAL NETWORK CABINET

Jacobs

JOB NO.	D3393001
DWG NO.	IC300_D3393001
DESIGNED BY:	J HANDWORK
FILE NAME:	IC300_D3393001.dgn

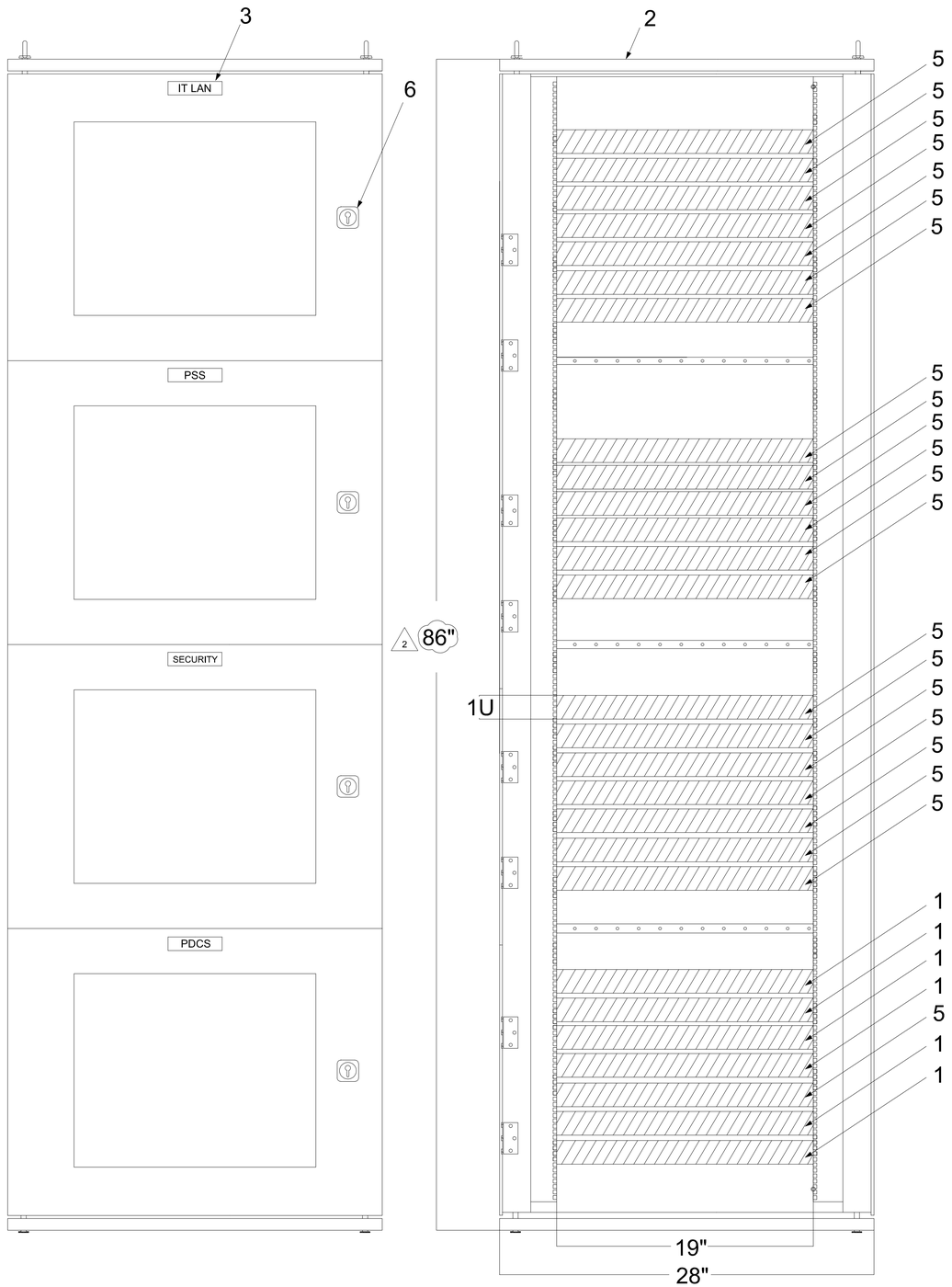
DR.	J JARVIS
CK:	J HANDWORK
AP:	S REISER
LAST EDIT:	
SCALE:	AS SHOWN
DATE:	MAY 2024

A/E DWG NO. IC300

DWG. No. 12214-W-50

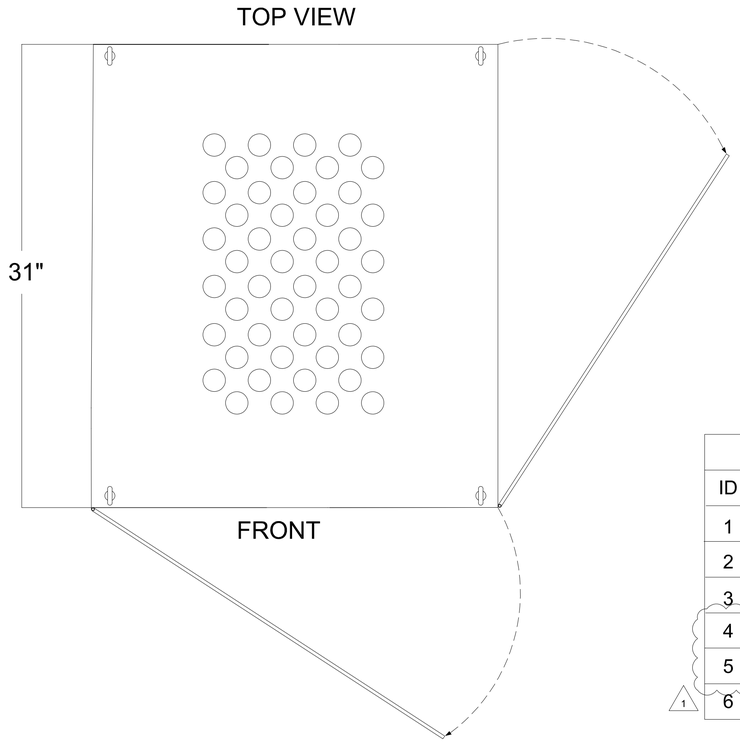
SET NO: SHEET NO: OF

CONSTRUCTION PACKAGE - FOR CONSTRUCTION



FRONT VIEW

INSIDE VIEW



GENERAL NOTES

A. CABINET DETAIL TYPICAL FOR AUX ELECTRICAL (PDC1) FIBER OPTIC PATCH PANEL.
B. CABINET DETAIL IS FRONT ACCESS ONLY.
C. CONCEPTUAL DESIGN. DETAILED CABINET DESIGN TO BE PROVIDED BY CONTRACTOR.
D. FUTURE/OUT OF SCOPE TERMINATIONS EXCLUDED FROM LAYOUT.

BILL OF MATERIAL

ID	QTY	DESCRIPTION	SUPPLIED BY
1	6	24 PORT FIBER OPTIC TERMINATION TRAY W/LC CONNECTORS	BY CONTRACTOR
2	1	4 DOOR FIBER OPTIC PATCH PANEL	BY CONTRACTOR
3	4	1" X 4" NAMEPLATE	BY CONTRACTOR
4	NOT USED	16 PORT FIBER OPTIC TERMINATION TRAY W/LC CONNECTORS	BY CONTRACTOR
5	21	12 PORT FIBER OPTIC TERMINATION TRAY W/LC CONNECTORS	BY CONTRACTOR
1 6	4	UNIQUE LOCK AND KEY	BY CONTRACTOR

THE CONTENT OF THIS DRAWING IS BASED ON PRELIMINARY VENDOR FRAME INFORMATION AND IS TO BE USED BY CONTRACTOR AS DESIGN GUIDANCE. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF THE CONTENT AND MAKE REQUIRED CHANGES BASED ON CONTRACTOR FINAL DESIGN.

REV.	DATE	DESCRIPTION	BY
1	05/24/2024	ISSUED FOR CONSTRUCTION	JJ
0	10/27/2023	ISSUE FOR BID	JJ

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1420

WEST POWER COMPLEX
PHASE 1 INSTALLATION AND COMMISSIONING

I&C

FULL SIZE FIBER OPTIC PATCH PANEL

Jacobs

JOB NO.	D3393001
DWG NO.	IC301_D3393001
DESIGNED BY:	J HANDWORK
FILE NAME:	IC301_D3393001.dgn

DR.	J JARVIS
CK:	J HANDWORK
AP:	S REISER
LAST EDIT:	
SCALE:	AS SHOWN
DATE:	MAY 2024

A/E DWG NO. IC301

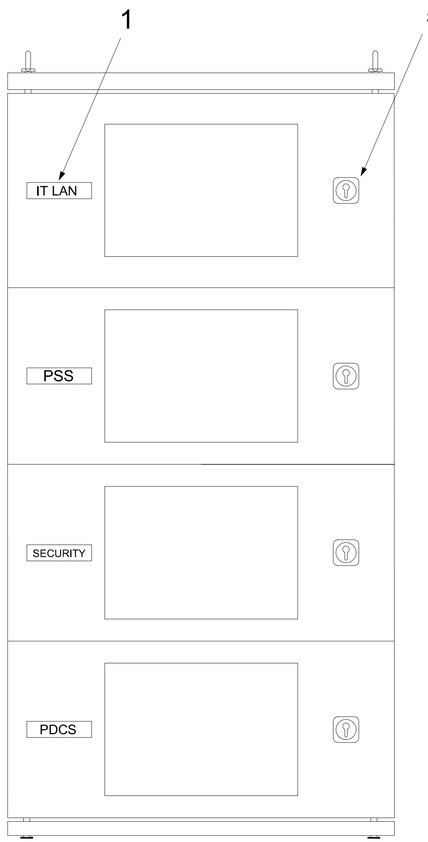
DWG. No. 12214-W-50

SET NO: SHEET NO: OF

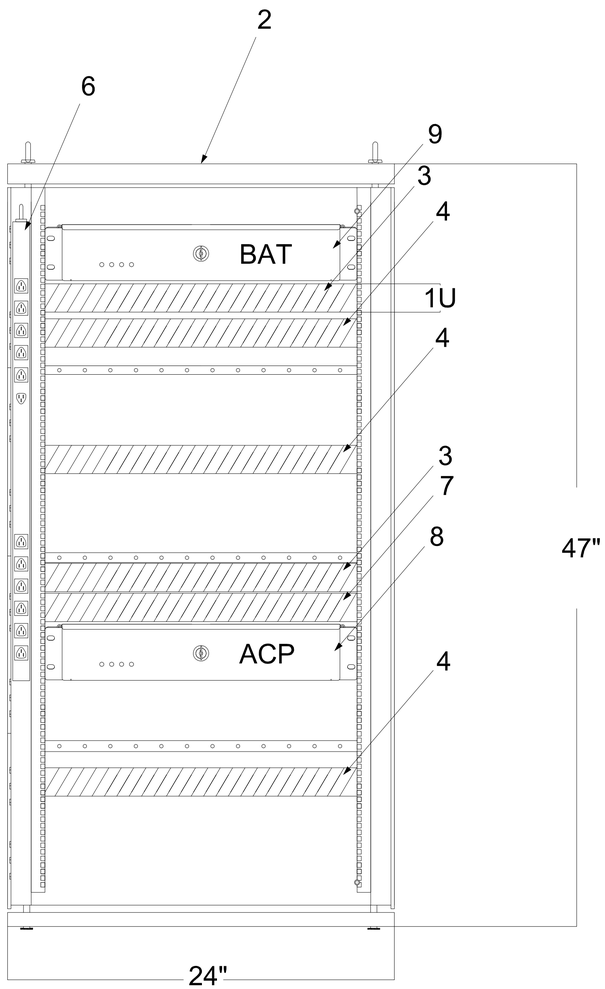
CONSTRUCTION PACKAGE - FOR CONSTRUCTION

KEY NOTES

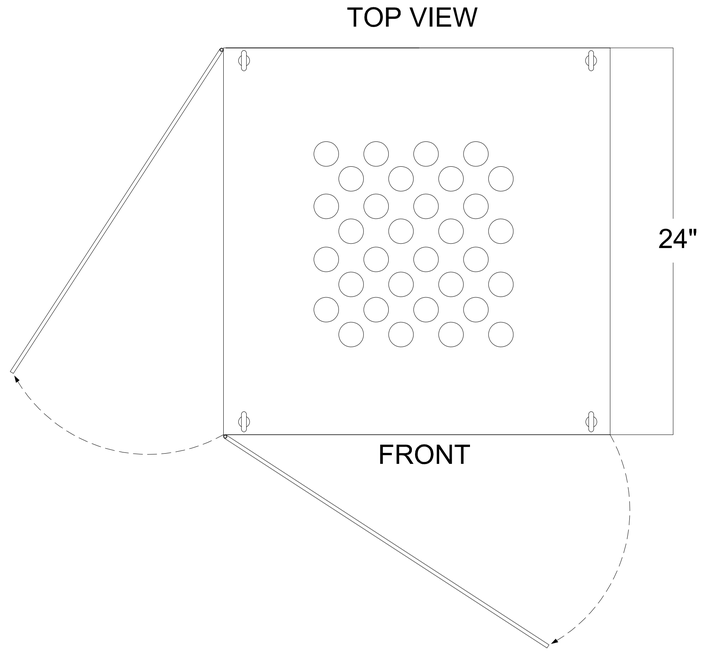
A. HALF SIZED CABINET DETAIL TYPICAL FOR SFC 1-3, TURBINE 7 AND THE INTERIM SWGR (PDC2).
B. CABINET IS FRONT ACCESS ONLY.
C. CONCEPTUAL DESIGN. DETAILED CABINET DESIGN TO BE PROVIDED BY CONTRACTOR.



FRONT VIEW



INSIDE VIEW



BILL OF MATERIAL

ID	QTY	DESCRIPTION	SUPPLIED BY
1	20	1"X4" NAMEPLATE	BY CONTRACTOR
2	5	4 DOOR HALF SIZED NETWORK CABINET	BY CONTRACTOR
3	10	24 PORT SOFTWARE DEFINED NETWORK SWITCH	CISCO C9200L-24P-4X BY OWNER
4	20	12 PORT FIBER OPTIC TERMINATION TRAY W/LC CONNECTORS (1)	BY CONTRACTOR
5	20	UNIQUE LOCK AND KEY	BY CONTRACTOR
6	5	POWER DISTRIBUTION UNIT	BY CONTRACTOR
7	1	CAT6A PATCH PANEL	BY CONTRACTOR
8	1	ACCESS CONTROL PANEL	BY CONTRACTOR
9	1	BATTERY PACK	BY CONTRACTOR

THE CONTENT OF THIS DRAWING IS BASED ON PRELIMINARY VENDOR FRAME INFORMATION AND IS TO BE USED BY CONTRACTOR AS DESIGN GUIDANCE. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF THE CONTENT AND MAKE REQUIRED CHANGES BASED ON CONTRACTOR FINAL DESIGN.

REV.	DATE	DESCRIPTION	BY
1	05/24/2024	ISSUED FOR CONSTRUCTION	JJ
0	10/27/2023	ISSUE FOR BID	JJ

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1420

WEST POWER COMPLEX
PHASE 1 INSTALLATION AND COMMISSIONING

I&C

HALF SIZED NETWORK CABINET

Jacobs

JOB NO.	D3393001
DWG NO.	IC302_D3393001
DESIGNED BY:	J HANDWORK
FILE NAME:	IC302_D3393001.dgn

DR.	J JARVIS
CK:	J HANDWORK
AP:	S REISER
LAST EDIT:	
SCALE:	AS SHOWN
DATE:	MAY 2024

A/E DWG NO. IC302

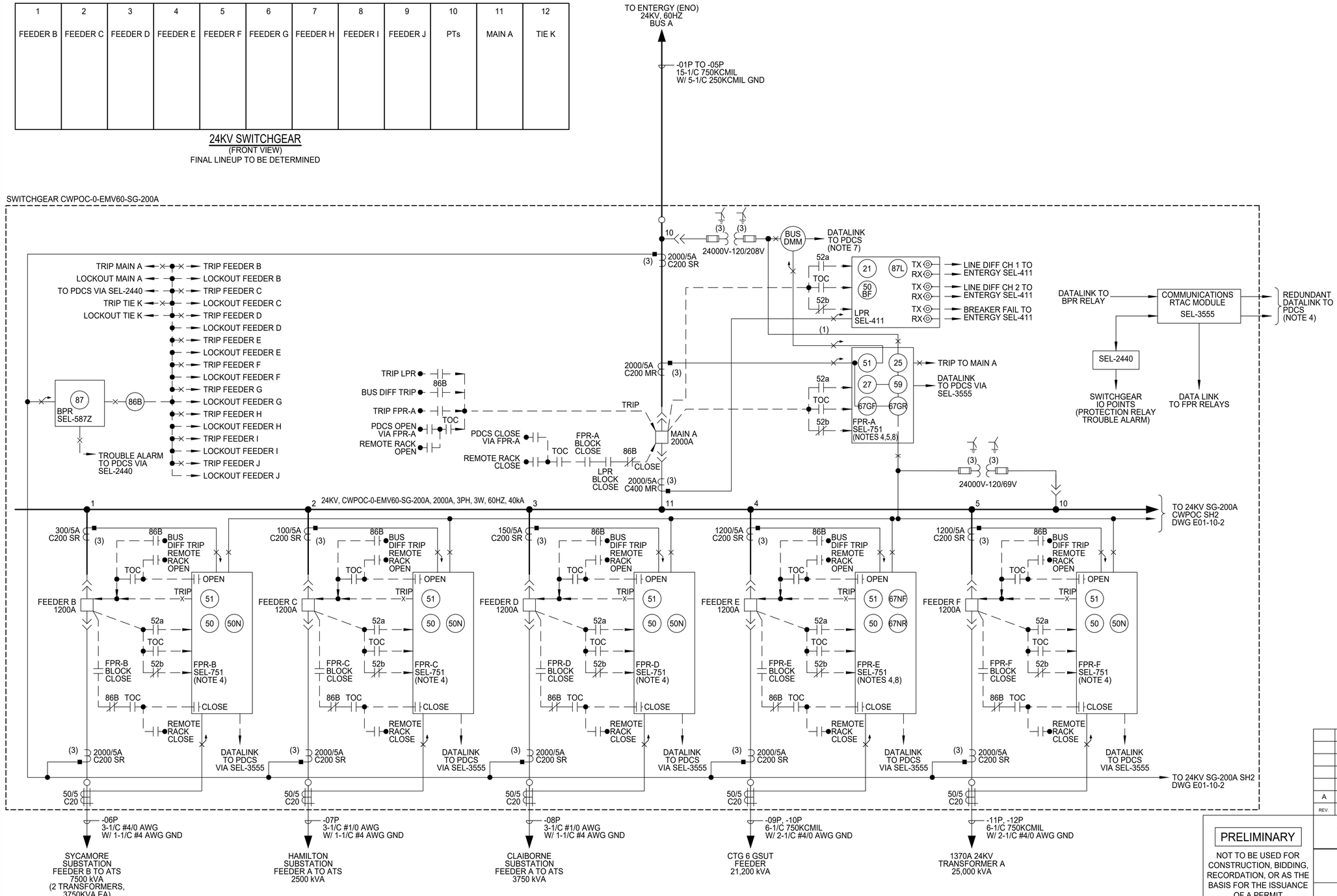
DWG. No. 12214-W-50

SET NO: SHEET NO: OF

CONSTRUCTION PACKAGE - FOR CONSTRUCTION

1	2	3	4	5	6	7	8	9	10	11	12
FEEDER B	FEEDER C	FEEDER D	FEEDER E	FEEDER F	FEEDER G	FEEDER H	FEEDER I	FEEDER J	PTs	MAIN A	TIE K

24KV SWITCHGEAR
(FRONT VIEW)
FINAL LINEUP TO BE DETERMINED



NOTES:

1. ALL DEVICES ARE LOCATED AT THE 24KV SWITCHGEAR, UNLESS OTHERWISE NOTED.
2. ALL CABLES ARE PREFIXED WITH CWPOC0EMV60SG200A UNLESS OTHERWISE NOTED.
3. THE FOLLOWING BREAKER SIGNALS SHALL BE HARDWIRED TO BREAKER PROTECTION RELAY AND COMMUNICATED TO PDCS VIA DATALINK:
   - BREAKER OPEN STATUS.
   - BREAKER CLOSE STATUS.
   - BREAKER RACKED IN STATUS.
4. MODBUS TCP/IP DATALINK WILL CARRY THE FOLLOWING SIGNALS TO PDCS FOR PROTECTIVE RELAYS AND OTHER DEVICES AS APPLICABLE: (SEL-751)
   - (O)NO RELAY TROUBLE
   - (O)RELAY TRIP
   - (O)OVERVOLTAGE ALARM
   - (O)UNDERVOLTAGE ALARM
   - (O)VOLTAGE
   - (O)AMP
   - (O)KW
   - (O)KVAR
   - (I)BREAKER OPEN COMMAND
   - (I)BREAKER CLOSE COMMAND
   - (I)BREAKER BLOCK CLOSE
   - (O)BREAKER OPEN STATUS
   - (O)BREAKER CLOSE STATUS
5. 27 UNDERVOLTAGE AND 59 OVERVOLTAGE RELAY ELEMENTS SHALL BE USED FOR ALARM ONLY.
6. ALL MEDIUM VOLTAGE CABLES OPERATING AT 24KV SHALL BE RATED 35KV.
7. SEL-735 OR EQUIVALENT BUS DMM (METER) LOCATED IN 24KV SWGR. METER WILL TRANSMIT THE FOLLOWING SIGNALS TO PDCS VIA DATALINK:
   - VOLTAGE
   - AMP
   - KW
   - KVAR
8. DIRECTIONAL GROUND PROTECTION ELEMENTS SHALL BE PROVIDED IN BOTH THE FORWARD AND REVESE DIRECTIONS. FORWARD AND REVERSE SETTINGS SHALL BE INDEPENDENT FROM EACH OTHER.

LEGEND:

LPR	LINE PROTECTION RELAY SEL-411 (0411L1X4X5C7HDXH6C47474)
FPR	FEEDER PROTECTION RELAY
MAIN A, FEEDER E	SEL-751 (751201ACA0X0X851C90)
FEEDER B, FEEDER C, FEEDER D, FEEDER F	SEL-751 (751001ACA0X0X851C90)
BPR	BUS PROTECTION RELAY SEL-587Z (0587Z0X325H12XX)
IO COLLECTOR	DISCRETE PROGRAMMABLE AUTOMATION CONTROLLER 24402311A1A12630
RTAC	REAL TIME AUTOMATION CONTROLLER SEL-3555#F9C7
NETWORK SWITCH	NETWORK SWITCH SEL-2730M
×	TEST SWITCH, POTENTIAL TYPE
×̸	TEST SWITCH, CURRENT SHORTING TYPE
SR	SINGLE RATIO
MR	MULTI RATIO

RELATED CONTRACT DRAWINGS:

E00-01	ELECTRICAL SYMBOLS SHEET 1
E00-02	ELECTRICAL SYMBOLS SHEET 2
E00-03	ELECTRICAL SYMBOLS SHEET 3
E01-05	OVERALL SCOPING KEY ONE LINE
E01-10-2	24KV SG-200A METERING AND PROTECTION SH 2 ONE LINE DIAGRAM

REV.	DATE	DESCRIPTION	BY
A	02/10/2023	ISSUED FOR REVIEW	RW

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION, BIDDING, RECORDATION, OR AS THE BASIS FOR THE ISSUANCE OF A PERMIT

POWER ENGINEERS
Power Engineers Inc. - Louisiana State Certificate of Registration # EF2455

DATE	FEBRUARY 2023	JOB NO.	174602

DESIGNED BY: R. WHIPPLE
FILE NAME: E01-10-1.dwg

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1430

WEST POWER COMPLEX AT CWP
OPERATIONS CENTER SWITCHGEAR SUPPLY

ELECTRICAL

ONE LINE DIAGRAM - 24KV SG-200A METERING AND PROTECTION SH1

DR.	A. COLON
CK:	J. RYAN
AP:	J. BONDANK
LAST EDIT:	
SCALE:	NTS
DATE:	FEBRUARY 2023

A/E DWG NO. E01-10-1

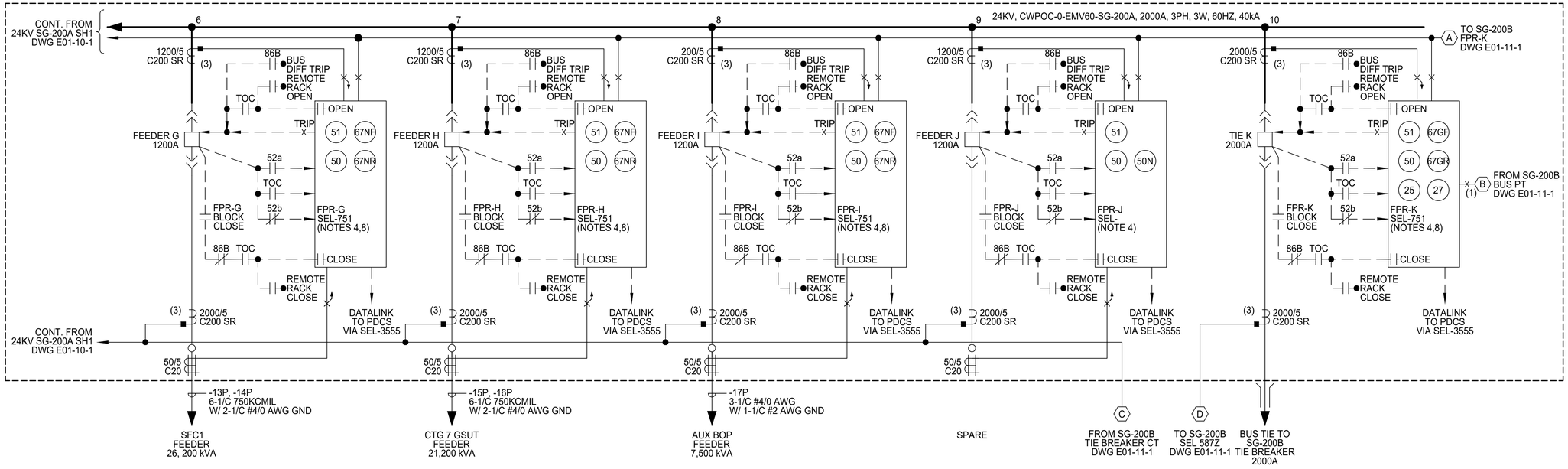
DWG. No. 12193-W-24

SET NO: SHEET NO: 1 OF 1

2/9/2023 11:39:29 AM

ISSUED FOR REVIEW - NOT FOR CONSTRUCTION

SWITCHGEAR CWPOC-0-EMV60-SG-200A



NOTES:

1. ALL DEVICES ARE LOCATED AT THE 24KV SWITCHGEAR, UNLESS OTHERWISE NOTED.
2. ALL CABLES ARE PREFIXED WITH CWPOC0EMV60SG200A UNLESS OTHERWISE NOTED.
3. THE FOLLOWING BREAKER SIGNALS SHALL BE HARDWIRED TO BREAKER PROTECTION RELAY AND COMMUNICATED TO PDCS VIA DATALINK:
   - BREAKER OPEN STATUS.
   - BREAKER CLOSE STATUS.
   - BREAKER RACKED IN STATUS.
4. MODBUS TCP/IP DATALINK WILL CARRY THE FOLLOWING SIGNALS TO PDCS FOR PROTECTIVE RELAYS AND OTHER DEVICES AS APPLICABLE: (SEL-751)
   - (O)NO RELAY TROUBLE
   - (O)RELAY TRIP
   - (O)OVERVOLTAGE ALARM
   - (O)UNDERVOLTAGE ALARM
   - (O)VOLTAGE
   - (O)AMP
   - (O)KW
   - (O)KVAR
   - (I)BREAKER OPEN COMMAND
   - (I)BREAKER CLOSE COMMAND
   - (I)BREAKER BLOCK CLOSE
   - (O)BREAKER OPEN STATUS
   - (O)BREAKER CLOSE STATUS
5. 27 UNDERVOLTAGE AND 59 OVERVOLTAGE RELAY ELEMENTS SHALL BE USED FOR ALARM ONLY.
6. ALL MEDIUM VOLTAGE CABLES OPERATING AT 24KV SHALL BE RATED 35KV.
7. NOT USED.
8. DIRECTIONAL GROUND PROTECTION ELEMENTS SHALL BE PROVIDED IN BOTH THE FORWARD AND REVESE DIRECTIONS. FORWARD AND REVERSE SETTINGS SHALL BE INDEPENDENT FROM EACH OTHER.

LEGEND:

LPR	LINE PROTECTION RELAY SEL-411 (0411L1X4X5C7HDXH6C47474)
FPR	FEEDER PROTECTION RELAY FEEDER G, FEEDER H, FEEDER I, TIE K: SEL-751 (751201ACA0X0X851C90) FEEDER J: SEL-751 (751001ACA0X0X851C90)
BPR	BUS PROTECTION RELAY SEL-587Z (0587Z0X325H12XX)
IO COLLECTOR	DISCRETE PROGRAMMABLE AUTOMATION CONTROLLER 24402311A1A12630
RTAC	REAL TIME AUTOMATION CONTROLLER SEL-3555#F9C7
NETWORK SWITCH	NETWORK SWITCH SEL-2730M
×	TEST SWITCH, POTENTIAL TYPE
×↗	TEST SWITCH, CURRENT SHORTING TYPE
SR	SINGLE RATIO
MR	MULTI RATIO

RELATED CONTRACT DRAWINGS:

E00-01	ELECTRICAL SYMBOLS SHEET 1
E00-02	ELECTRICAL SYMBOLS SHEET 2
E00-03	ELECTRICAL SYMBOLS SHEET 3
E01-05	OVERALL SCOPING KEY ONE LINE
E01-10-1	24KV SG-200A METERING AND PROTECTION SH 1 ONE LINE DIAGRAM
E01-11-1	24KV SG-200B METERING AND PROTECTION SH 1 ONE LINE DIAGRAM

REV.	DATE	DESCRIPTION	BY
A	02/10/2023	ISSUED FOR REVIEW	RW

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION, BIDDING, RECORDATION, OR AS THE BASIS FOR THE ISSUANCE OF A PERMIT

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1430

WEST POWER COMPLEX AT CWP
OPERATIONS CENTER SWITCHGEAR SUPPLY

ELECTRICAL

ONE LINE DIAGRAM - 24KV SG-200A METERING AND PROTECTION SH2

POWER ENGINEERS
Power Engineers Inc. - Louisiana State Certificate of Registration # EF2455

DATE	FEBRUARY 2023	JOB NO.	174602
DESIGNED BY: R. WHIPPLE			
FILE NAME: E01-10-2.dwg			

DR.	A. COLON
CK:	J. RYAN
AP:	J. BONDANK
LAST EDIT:	
SCALE:	NTS
DATE:	FEBRUARY 2023

A/E DWG NO. E01-10-2

DWG. No. 12193-W-24

SET NO: SHEET NO: 1 OF 1

2/9/2023 12:04:46 PM

ISSUED FOR REVIEW - NOT FOR CONSTRUCTION

1	2	3	4	5	6	7	8	9	10	11	12
TIE K	FEEDER B	FEEDER C	FEEDER D	FEEDER E	FEEDER F	FEEDER G	FEEDER H	FEEDER I	FEEDER J	PTs	MAIN A

24KV SWITCHGEAR
(FRONT VIEW)
FINAL LINEUP TO BE DETERMINED

TO ENTERGY (ENO)
24KV, 60HZ
BUS B

-01P TO -05P
15-1/C 750KCMIL
W/ 5-1/C 250KCMIL GND

SWITCHGEAR CWPOC-0-EMV60-SG-200B

TRIP MAIN A
LOCKOUT MAIN A
TO PDCS VIA SEL-2440
TRIP TIE K
LOCKOUT TIE K

TRIP FEEDER B
LOCKOUT FEEDER B
TRIP FEEDER C
LOCKOUT FEEDER C
TRIP FEEDER D
LOCKOUT FEEDER D
TRIP FEEDER E
LOCKOUT FEEDER E
TRIP FEEDER F
LOCKOUT FEEDER F
TRIP FEEDER G
LOCKOUT FEEDER G
TRIP FEEDER H
LOCKOUT FEEDER H
TRIP FEEDER I
LOCKOUT FEEDER I
TRIP FEEDER J
LOCKOUT FEEDER J

87 BPR SEL-587Z — 86B — TROUBLE ALARM TO PDCS VIA SEL-2440

TRIP LPR — 86B
BUS DIFF TRIP
TRIP FPR-A — TOC
PDCS OPEN VIA FPR-A
REMOTE RACK OPEN
PDCS CLOSE VIA FPR-A — TOC — FPR-A BLOCK CLOSE — 86B — CLOSE
REMOTE RACK CLOSE
LPR BLOCK CLOSE

TRIP

11 — (3) 2000/5A C200 SR — (3) 24000V-120/208V — BUS DMM — DATALINK TO PDCS (NOTE 7)

2000/5A C200 MR (3) — MAIN A 2000A — (3) 2000/5A C400 MR

52a — TOC — 52b
21 87L — LINE DIFF CH 1 TO ENTERGY SEL-411 (TX/RX)
50 BF — BREAKER FAIL TO ENTERGY SEL-411 (TX/RX)
LPR SEL-411

(1)
51 25 — TRIP TO MAIN A
27 59 — DATALINK TO PDCS VIA SEL-3555
67GF 67GR
FPR-A SEL-751 (NOTES 4,5,8)

(3) (3) 24000V-120/69V

DATALINK TO BPR RELAY
COMMUNICATIONS RTAC MODULE SEL-3555 — REDUNDANT DATALINK TO PDCS (NOTE 4)
SEL-2440
SWITCHGEAR IO POINTS (PROTECTION RELAY TROUBLE ALARM)
DATA LINK TO FPR RELAYS

1 — 2 — 3 — 12 — 4 — 5 — 11
24KV, CWPOC-0-EMV60-SG-200B, 2000A, 3PH, 3W, 60HZ, 40kA
TO 24KV SG-200B CWPOC SH2 DWG E01-11-2

	1	2	3	4	5
	2000/5 C200 SR	150/5A C200 SR	100/5A C200 SR	1200/5A C200 SR	300/5A C200 SR
	(3)	(3)	(3)	(3)	(3)
	86B BUS DIFF TRIP REMOTE RACK OPEN	86B BUS DIFF TRIP REMOTE RACK OPEN	86B BUS DIFF TRIP REMOTE RACK OPEN	86B BUS DIFF TRIP REMOTE RACK OPEN	86B BUS DIFF TRIP REMOTE RACK OPEN
	(1) A FROM SG-200A BUS PT DWG E01-10-2				
	TOC — OPEN	TOC — OPEN	TOC — OPEN	TOC — OPEN	TOC — OPEN
	TIE K 2000A	FEEDER B 1200A	FEEDER C 1200A	FEEDER D 1200A	FEEDER E 1200A
	TRIP	TRIP	TRIP	TRIP	TRIP
	51 67GF	51	51	51 67NF	51
	50 67GR	50 50N	50 50N	50 67NR	50 50N
	25 27				
	52a — TOC — 52b	52a — TOC — 52b	52a — TOC — 52b	52a — TOC — 52b	52a — TOC — 52b
	(1) B TO SG-200A FPR-K DWG E01-10-2				
	FPR-K BLOCK CLOSE	FPR-B BLOCK CLOSE	FPR-C BLOCK CLOSE	FPR-D BLOCK CLOSE	FPR-E BLOCK CLOSE
	FPR-K SEL-751 (NOTES 4,8)	FPR-B SEL-751 (NOTE 4)	FPR-C SEL-751 (NOTE 4)	FPR-D SEL-751 (NOTES 4,8)	FPR-E SEL-751 (NOTE 4)
	86B TOC — CLOSE	86B TOC — CLOSE	86B TOC — CLOSE	86B TOC — CLOSE	86B TOC — CLOSE
	REMOTE RACK CLOSE	REMOTE RACK CLOSE	REMOTE RACK CLOSE	REMOTE RACK CLOSE	REMOTE RACK CLOSE
	(3) 2000/5A C200 SR	(3) 2000/5A C200 SR	(3) 2000/5A C200 SR	(3) 2000/5A C200 SR	(3) 2000/5A C200 SR
	DATALINK TO PDCS VIA SEL-3555	DATALINK TO PDCS VIA SEL-3555	DATALINK TO PDCS VIA SEL-3555	DATALINK TO PDCS VIA SEL-3555	DATALINK TO PDCS VIA SEL-3555
		50/5 C20	50/5 C20	50/5 C20	50/5 C20
		-06P 3-1/C #1/0 AWG W/ 1-1/C #4 AWG GND	-07P 3-1/C #1/0 AWG W/ 1-1/C #4 AWG GND		-08P 3-1/C #4/0 AWG W/ 1-1/C #2 AWG GND

TO 24KV SG-200B SH2 DWG E01-11-2

C TO SG-200A SEL 587Z DWG E01-10-2
BUS TIE TO SG-200A TIE BREAKER 2000A
D FROM SG-200A TIE BREAKER CT DWG E01-10-2

CLAIBORNE SUBSTATION FEEDER B TO ATS 3750 kVA

HAMILTON SUBSTATION FEEDER B TO ATS 2500 kVA

CTG 8 GSUT FEEDER (FUTURE)

SYCAMORE SUBSTATION FEEDER A TO ATS 7500 kVA (2 TRANSFORMERS, 3750KVA EA)

NOTES:

1. ALL DEVICES ARE LOCATED AT THE 24KV SWITCHGEAR, UNLESS OTHERWISE NOTED.
2. ALL CABLES ARE PREFIXED WITH CWPOC0EMV60SG200B UNLESS OTHERWISE NOTED.
3. THE FOLLOWING BREAKER SIGNALS SHALL BE HARDWIRED TO BREAKER PROTECTION RELAY AND COMMUNICATED TO PDCS VIA DATALINK:
   - BREAKER OPEN STATUS.
   - BREAKER CLOSE STATUS.
   - BREAKER RACKED IN STATUS.
4. MODBUS TCP/IP DATALINK WILL CARRY THE FOLLOWING SIGNALS TO PDCS FOR PROTECTIVE RELAYS AND OTHER DEVICES AS APPLICABLE: (SEL-751 (751601ACA0X0X871C90))
   - (O)NO RELAY TROUBLE
   - (O)RELAY TRIP
   - (O)OVERVOLTAGE ALARM
   - (O)UNDERVOLTAGE ALARM
   - (O)VOLTAGE
   - (O)AMP
   - (O)KW
   - (O)KVAR
   - (I)BREAKER OPEN COMMAND
   - (I)BREAKER CLOSE COMMAND
   - (I)BREAKER BLOCK CLOSE
   - (O)BREAKER OPEN STATUS
   - (O)BREAKER CLOSE STATUS
5. 27 UNDERVOLTAGE AND 59 OVERVOLTAGE RELAY ELEMENTS SHALL BE USED FOR ALARM ONLY.
6. ALL MEDIUM VOLTAGE CABLES OPERATING AT 24KV SHALL BE RATED 35KV.
7. SEL-735 OR EQUIVALENT BUS DMM (METER) LOCATED IN 24KV SWGR. METER WILL TRANSMIT THE FOLLOWING SIGNALS TO PDCS VIA DATALINK:
   - VOLTAGE
   - AMP
   - KW
   - KVAR
8. DIRECTIONAL GROUND PROTECTION ELEMENTS SHALL BE PROVIDED IN BOTH THE FORWARD AND REVESE DIRECTIONS. FORWARD AND REVERSE SETTINGS SHALL BE INDEPENDENT FROM EACH OTHER.

LEGEND:

LPR	LINE PROTECTION RELAY SEL-411 (0411L1X4X5C7HDXH6C47474 FEEDER PROTECTION RELAY
FPR	MAIN A, FEEDER D, TIE K: SEL-751 (751201ACA0X0X851C90) FEEDER B, FEEDER C, FEEDER E: SEL-751 (751001ACA0X0X851C90)
BPR	BUS PROTECTION RELAY SEL-587Z (0587Z0X325H12XX)
IO COLLECTOR	DISCRETE PROGRAMMABLE AUTOMATION CONTROLLER 24402311A1A12630
RTAC	REAL TIME AUTOMATION CONTROLLER SEL-3555#F9C7
NETWORK SWITCH	NETWORK SWITCH SEL-2730M
×	TEST SWITCH, POTENTIAL TYPE
×↗	TEST SWITCH, CURRENT SHORTING TYPE
SR	SINGLE RATIO
MR	MULTI RATIO

RELATED CONTRACT DRAWINGS:

E00-01	ELECTRICAL SYMBOLS SHEET 1
E00-02	ELECTRICAL SYMBOLS SHEET 2
E00-03	ELECTRICAL SYMBOLS SHEET 3
E01-05	OVERALL SCOPING KEY ONE LINE
E01-10-2	24KV SG-200A METERING AND PROTECTION SH 2 ONE LINE DIAGRAM
E01-11-2	24KV SG-200B METERING AND PROTECTION SH 2 ONE LINE DIAGRAM

REV.	DATE	DESCRIPTION	BY
A	02/10/2023	ISSUED FOR REVIEW	RW

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION, BIDDING, RECORDATION, OR AS THE BASIS FOR THE ISSUANCE OF A PERMIT

POWER ENGINEERS
Power Engineers Inc. - Louisiana State Certificate of Registration # EF2455

DATE	FEBRUARY 2023	JOB NO.	174602
DESIGNED BY: R. WHIPPLE			
FILE NAME: E01-11-1.dwg			

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1430
WEST POWER COMPLEX AT CWP
OPERATIONS CENTER SWITCHGEAR SUPPLY

ELECTRICAL

ONE LINE DIAGRAM - 24KV SG-200B METERING AND PROTECTION SH1

DR.	A. COLON
CK:	J. RYAN
AP:	J. BONDANK
LAST EDIT:	
SCALE:	NTS
DATE:	FEBRUARY 2023

A/E DWG NO. E01-11-1

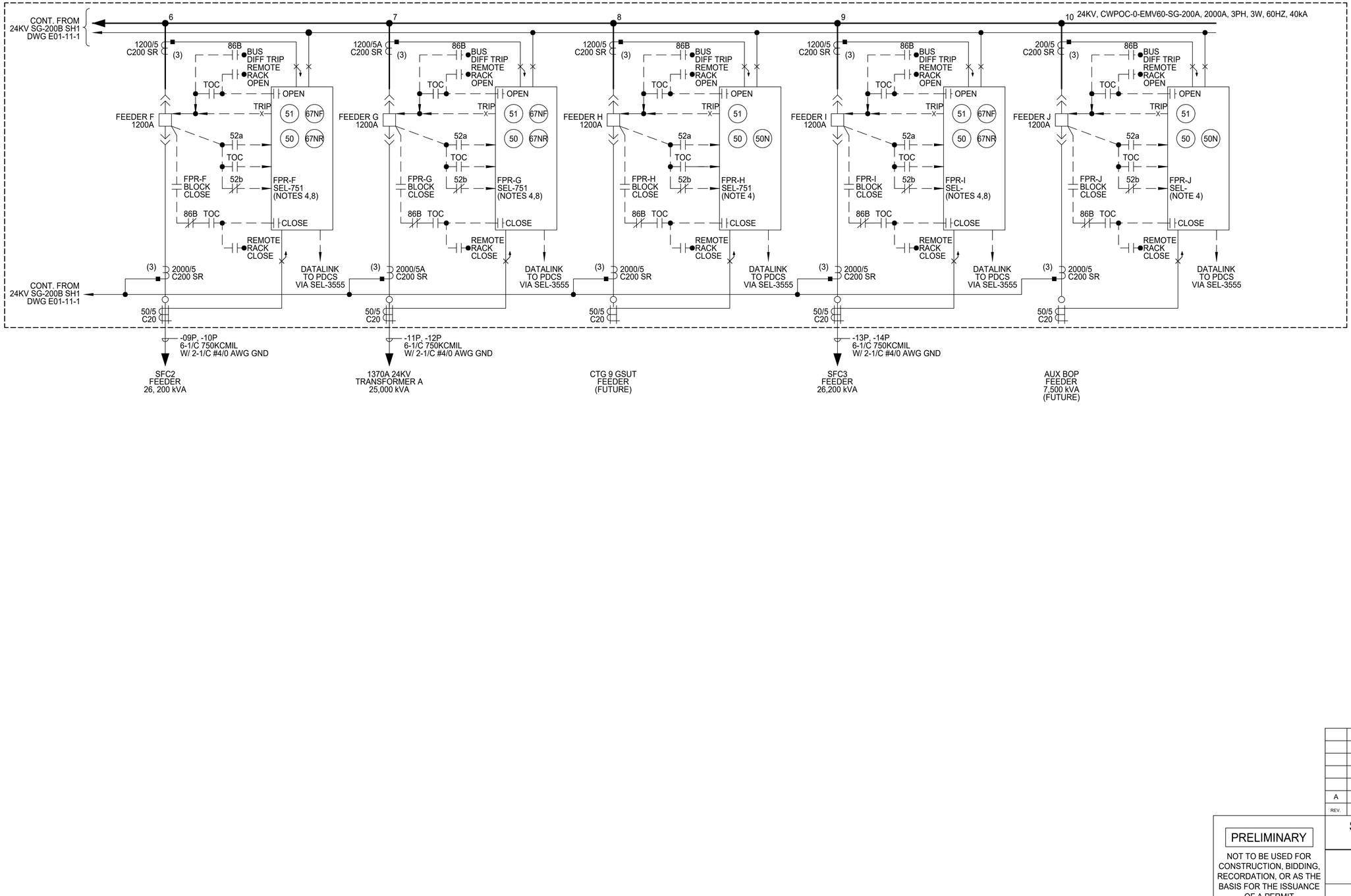
DWG. No. 12193-W-24

SET NO: SHEET NO: 1 OF 1

2/10/2023 1:30:38 PM

ISSUED FOR REVIEW - NOT FOR CONSTRUCTION

SWITCHGEAR CWPOC-0-EMV60-SG-200B



NOTES:

1. ALL DEVICES ARE LOCATED AT THE 24KV SWITCHGEAR, UNLESS OTHERWISE NOTED.
2. ALL CABLES ARE PREFIXED WITH CWPOC0EMV60SG200B UNLESS OTHERWISE NOTED.
3. THE FOLLOWING BREAKER SIGNALS SHALL BE HARDWIRED TO BREAKER PROTECTION RELAY AND COMMUNICATED TO PDCS VIA DATALINK:
   - BREAKER OPEN STATUS.
   - BREAKER CLOSE STATUS.
   - BREAKER RACKED IN STATUS.
4. MODBUS TCP/IP DATALINK WILL CARRY THE FOLLOWING SIGNALS TO PDCS FOR PROTECTIVE RELAYS AND OTHER DEVICES AS APPLICABLE: (SEL-751)
   - (O)NO RELAY TROUBLE
   - (O)RELAY TRIP
   - (O)OVERVOLTAGE ALARM
   - (O)UNDERVOLTAGE ALARM
   - (O)VOLTAGE
   - (O)AMP
   - (O)KW
   - (O)KVAR
   - (I)BREAKER OPEN COMMAND
   - (I)BREAKER CLOSE COMMAND
   - (I)BREAKER BLOCK CLOSE
   - (O)BREAKER OPEN STATUS
   - (O)BREAKER CLOSE STATUS
5. 27 UNDERVOLTAGE AND 59 OVERVOLTAGE RELAY ELEMENTS SHALL BE USED FOR ALARM ONLY.
6. ALL MEDIUM VOLTAGE CABLES OPERATING AT 24KV SHALL BE RATED 35KV.
7. NOT USED.
8. DIRECTIONAL GROUND PROTECTION ELEMENTS SHALL BE PROVIDED IN BOTH THE FORWARD AND REVESE DIRECTIONS. FORWARD AND REVERSE SETTINGS SHALL BE INDEPENDENT FROM EACH OTHER.

LEGEND:

LPR	LINE PROTECTION RELAY SEL-411 (0411L1X4X5C7HDXH6C47474
FPR	FEEDER PROTECTION RELAY FEEDER F, FEEDER G, FEEDER I: SEL-751 (751201ACA0X0X851C90) FEEDER H, FEEDER J: SEL-751 (751001ACA0X0X851C90)
BPR	BUS PROTECTION RELAY SEL-587Z (0587Z0X325H12XX)
IO COLLECTOR	DISCRETE PROGRAMMABLE AUTOMATION CONTROLLER 24402311A1A12630
RTAC	REAL TIME AUTOMATION CONTROLLER SEL-3555#F9C7
NETWORK SWITCH	NETWORK SWITCH SEL-2730M
×	TEST SWITCH, POTENTIAL TYPE
×→	TEST SWITCH, CURRENT SHORTING TYPE
SR	SINGLE RATIO
MR	MULTI RATIO

RELATED CONTRACT DRAWINGS:

E00-01	ELECTRICAL SYMBOLS SHEET 1
E00-02	ELECTRICAL SYMBOLS SHEET 2
E00-03	ELECTRICAL SYMBOLS SHEET 3
E01-05	OVERALL SCOPING KEY ONE LINE
E01-11-1	24KV SG-200B METERING AND PROTECTION SH 1 ONE LINE DIAGRAM

REV.	DATE	DESCRIPTION	BY
A	02/10/2023	ISSUED FOR REVIEW	RW

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION, BIDDING, RECORDATION, OR AS THE BASIS FOR THE ISSUANCE OF A PERMIT

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1430

WEST POWER COMPLEX AT CWP
OPERATIONS CENTER SWITCHGEAR SUPPLY

ELECTRICAL

ONE LINE DIAGRAM - 24KV SG-200B METERING AND PROTECTION SH2

POWER ENGINEERS
Power Engineers Inc. - Louisiana State Certificate of Registration # EF2455

DATE	FEBRUARY 2023	JOB NO.	174602

DESIGNED BY: R. WHIPPLE
FILE NAME: E01-11-2.dwg

DR.	A. COLON
CK:	J. RYAN
AP:	J. BONDANK
LAST EDIT:	
SCALE:	NTS
DATE:	FEBRUARY 2023

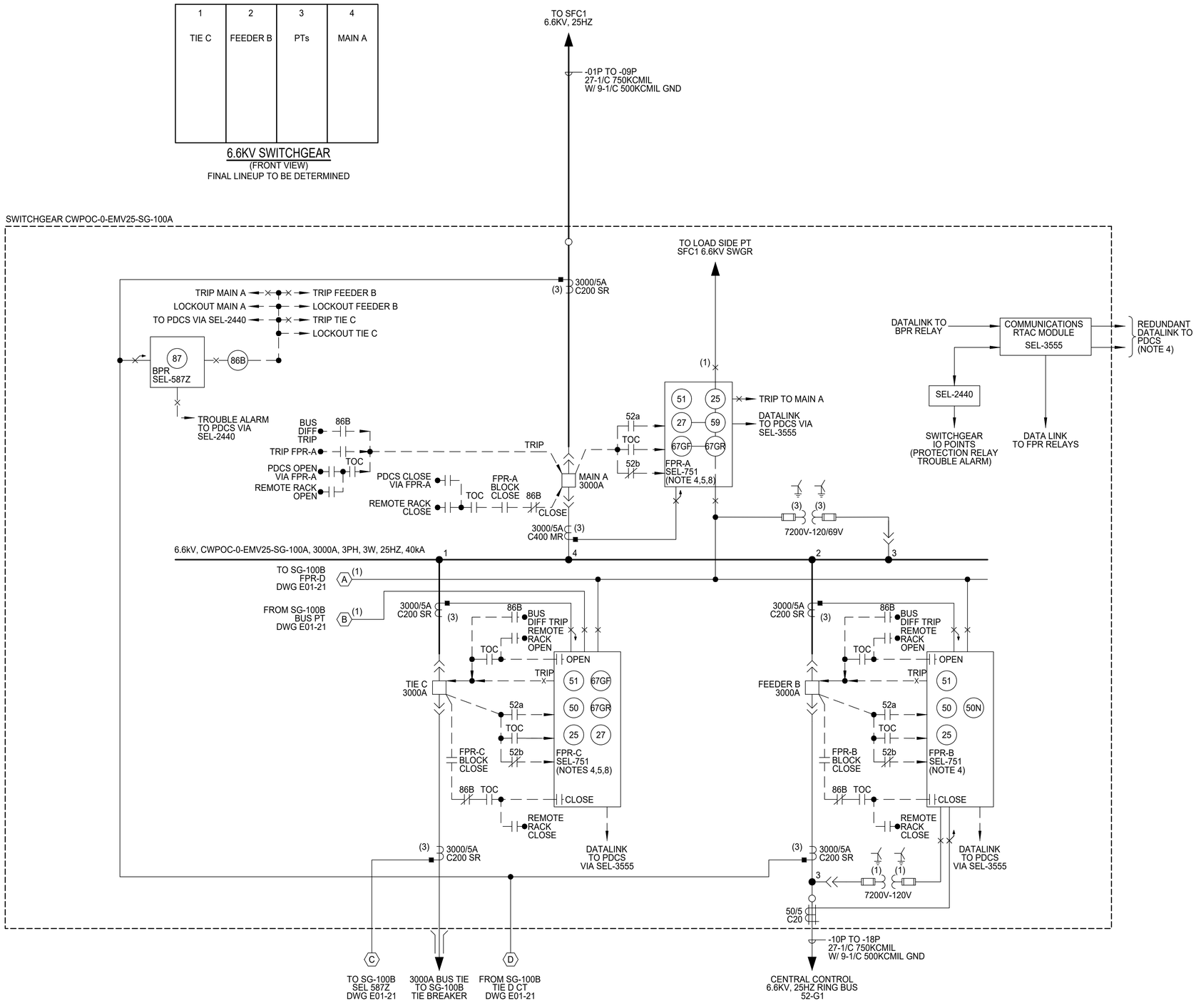
A/E DWG NO. E01-11-2

DWG. No. 12193-W-24

SET NO: SHEET NO: 1 OF 1

2/10/2023 1:32:44 PM

ISSUED FOR REVIEW - NOT FOR CONSTRUCTION



NOTES:

1. ALL DEVICES ARE LOCATED AT THE 6.6KV SWITCHGEAR, UNLESS OTHERWISE NOTED.
2. ALL CABLES ARE PREFIXED WITH CWPOC0EMV25SG100A UNLESS OTHERWISE NOTED.
3. THE FOLLOWING BREAKER SIGNALS SHALL BE HARDWIRED TO BREAKER PROTECTION RELAY AND COMMUNICATED TO PDCS VIA DATALINK:
   - BREAKER OPEN STATUS.
   - BREAKER CLOSE STATUS.
   - BREAKER RACKED IN STATUS.
4. MODBUS TCP/IP DATALINK WILL CARRY THE FOLLOWING SIGNALS TO PDCS FOR PROTECTIVE RELAYS AND OTHER DEVICES AS APPLICABLE: (SEL-751)
   - (O)NO RELAY TROUBLE
   - (O)RELAY TRIP
   - (O)OVERVOLTAGE ALARM
   - (O)UNDERVOLTAGE ALARM
   - (O)VOLTAGE
   - (O)AMP
   - (O)KW
   - (O)KVAR
   - (I)BREAKER OPEN COMMAND
   - (I)BREAKER CLOSE COMMAND
   - (O)BREAKER OPEN STATUS
   - (O)BREAKER CLOSE STATUS
5. 27 UNDERVOLTAGE AND 59 OVERVOLTAGE RELAY ELEMENTS SHALL BE USED FOR ALARM ONLY.
6. ALL MEDIUM VOLTAGE CABLES OPERATING AT 6.6KV SHALL BE RATED 15KV.
7. ALL INSTRUMENT TRANSFORMERS, RELAYS, AND OTHER AC COMPONENTS SHALL BE SUITABLE FOR OPERATION AT 25 HZ AC.
8. DIRECTIONAL GROUND PROTECTION ELEMENTS SHALL BE PROVIDED IN BOTH THE FORWARD AND REVESE DIRECTIONS. FORWARD AND REVERSE SETTINGS SHALL BE INDEPENDENT FROM EACH OTHER.

LEGEND:

FPR	FEEDER PROTECTION RELAY
	MAIN A, TIE C: SEL-751 (751201ACA0X0X851C90)
	FEEDER B: SEL-751 (751001ACA0X0X851C90)
BPR	BUS PROTECTION RELAY SEL-587Z (0587Z0X325H12XX)
IO COLLECTOR	DISCRETE PROGRAMMABLE AUTOMATION CONTROLLER 24402311A1A12630
RTAC	REAL TIME AUTOMATION CONTROLLER SEL-3555#F9C7
NETWORK SWITCH	NETWORK SWITCH SEL-2730M
×	TEST SWITCH, POTENTIAL TYPE
×↗	TEST SWITCH, CURRENT SHORTING TYPE
SR	SINGLE RATIO
MR	MULTI RATIO

RELATED CONTRACT DRAWINGS:

E00-01	ELECTRICAL SYMBOLS SHEET 1
E00-02	ELECTRICAL SYMBOLS SHEET 2
E00-03	ELECTRICAL SYMBOLS SHEET 3
E01-05	OVERALL SCOPING KEY ONE LINE
E01-21	6.6KV SG-100B METERING AND PROTECTION ONE LINE DIAGRAM
E01-22	6.6KV SG-100C METERING AND PROTECTION ONE LINE DIAGRAM

REV.	DATE	DESCRIPTION	BY
A	02/10/2023	ISSUED FOR REVIEW	RW

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION, BIDDING, RECORDATION, OR AS THE BASIS FOR THE ISSUANCE OF A PERMIT

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1430

WEST POWER COMPLEX AT CWP
OPERATIONS CENTER SWITCHGEAR SUPPLY

ELECTRICAL

ONE LINE DIAGRAM - 6.6KV SG-100A METERING AND PROTECTION

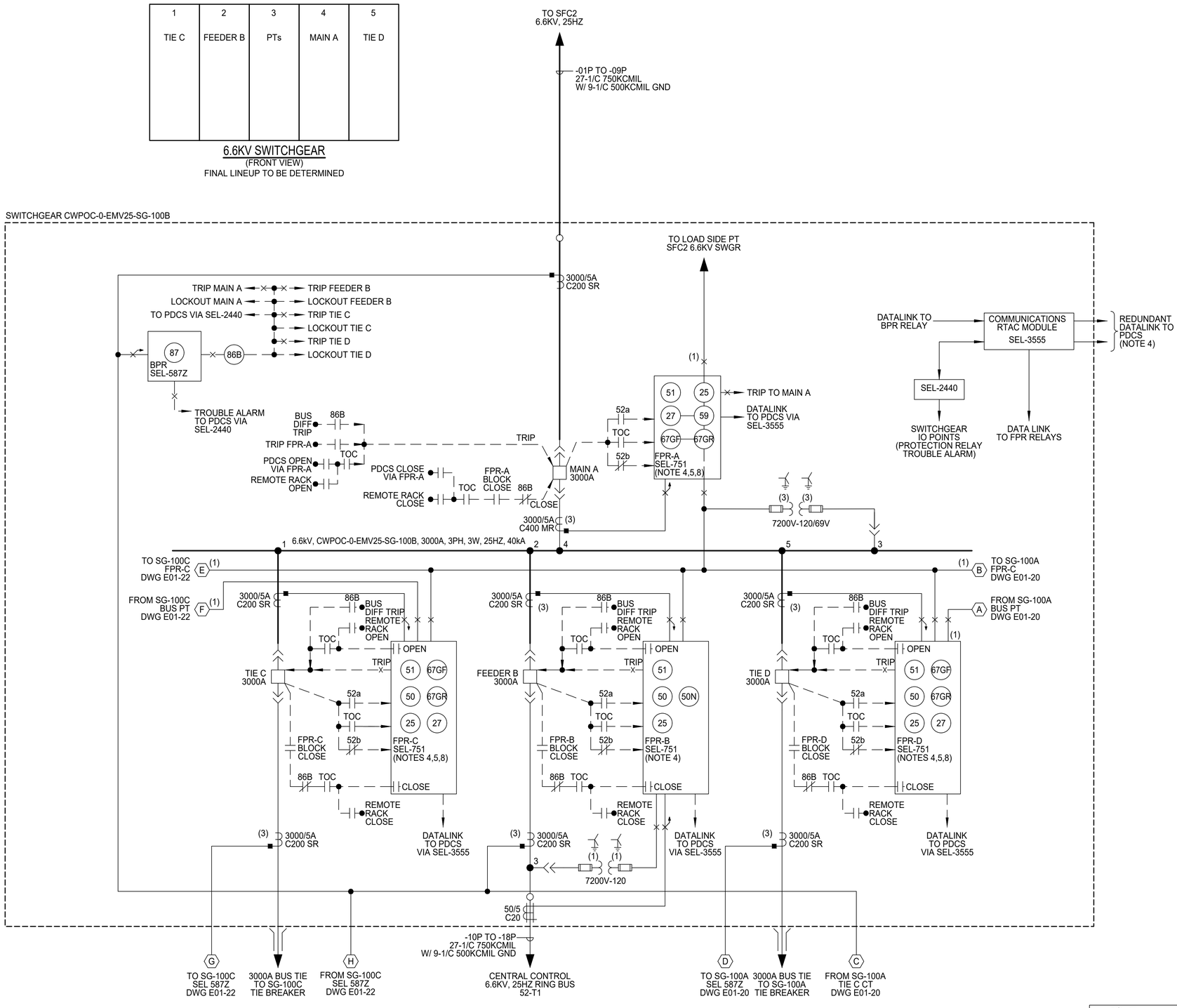
POWER ENGINEERS
Power Engineers Inc. - Louisiana State Certificate of Registration # EF2455

DATE	FEBRUARY 2023	JOB NO.	174602
DESIGNED BY: R. WHIPPLE			
FILE NAME: E01-20.dwg			

DR.	A. COLON
CK:	J. RYAN
AP:	J. BONDANK
LAST EDIT:	
SCALE:	NTS
DATE:	FEBRUARY 2023
A/E DWG NO.	E01-20
DWG. No.	12193-W-24
SET NO:	
SHEET NO:	1 OF 1

2/10/2023 1:39:53 PM

ISSUED FOR REVIEW - NOT FOR CONSTRUCTION



NOTES:

1. ALL DEVICES ARE LOCATED AT THE 6.6KV SWITCHGEAR, UNLESS OTHERWISE NOTED.
2. ALL CABLES ARE PREFIXED WITH CWPOC0EMV25SG100B UNLESS OTHERWISE NOTED.
3. THE FOLLOWING BREAKER SIGNALS SHALL BE HARDWIRED TO BREAKER PROTECTION RELAY AND COMMUNICATED TO PDCS VIA DATALINK:
   - BREAKER OPEN STATUS.
   - BREAKER CLOSE STATUS.
   - BREAKER RACKED IN STATUS.
4. MODBUS TCP/IP DATALINK WILL CARRY THE FOLLOWING SIGNALS TO PDCS FOR PROTECTIVE RELAYS AND OTHER DEVICES AS APPLICABLE: (SEL-751)
   - (O)NO RELAY TROUBLE
   - (O)RELAY TRIP
   - (O)OVERVOLTAGE ALARM
   - (O)UNDERVOLTAGE ALARM
   - (O)VOLTAGE
   - (O)AMP
   - (O)KW
   - (O)KVAR
   - (I)BREAKER OPEN COMMAND
   - (I)BREAKER CLOSE COMMAND
   - (O)BREAKER OPEN STATUS
   - (O)BREAKER CLOSE STATUS
5. 27 UNDERVOLTAGE AND 59 OVERVOLTAGE RELAY ELEMENTS SHALL BE USED FOR ALARM ONLY.
6. ALL MEDIUM VOLTAGE CABLES OPERATING AT 6.6KV SHALL BE RATED 15KV.
7. ALL INSTRUMENT TRANSFORMERS, RELAYS, AND OTHER AC COMPONENTS SHALL BE SUITABLE FOR OPERATION AT 25 HZ AC.
8. DIRECTIONAL GROUND PROTECTION ELEMENTS SHALL BE PROVIDED IN BOTH THE FORWARD AND REVESE DIRECTIONS. FORWARD AND REVERSE SETTINGS SHALL BE INDEPENDENT FROM EACH OTHER.

LEGEND:

FPR	FEEDER PROTECTION RELAY MAIN A, TIE C, TIE D: SEL-751 (751201ACA0X0X851C90) FEEDER B: SEL-751 (751001ACA0X0X851C90)
BPR	BUS PROTECTION RELAY SEL-587Z (0587Z0X325H12XX)
IO COLLECTOR	DISCRETE PROGRAMMABLE AUTOMATION CONTROLLER 24402311A1A12630
RTAC	REAL TIME AUTOMATION CONTROLLER SEL-3555#F9C7
NETWORK SWITCH	NETWORK SWITCH SEL-2730M
×	TEST SWITCH, POTENTIAL TYPE
×↗	TEST SWITCH, CURRENT SHORTING TYPE
SR	SINGLE RATIO
MR	MULTI RATIO

RELATED CONTRACT DRAWINGS:

E00-01	ELECTRICAL SYMBOLS SHEET 1
E00-02	ELECTRICAL SYMBOLS SHEET 2
E00-03	ELECTRICAL SYMBOLS SHEET 3
E01-05	OVERALL SCOPING KEY ONE LINE
E01-20	6.6KV SG-100A METERING AND PROTECTION ONE LINE DIAGRAM
E01-22	6.6KV SG-100C METERING AND PROTECTION ONE LINE DIAGRAM

REV.	DATE	DESCRIPTION	BY
A	02/10/2023	ISSUED FOR REVIEW	RW

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION, BIDDING, RECORDATION, OR AS THE BASIS FOR THE ISSUANCE OF A PERMIT

POWER ENGINEERS
Power Engineers Inc. - Louisiana State Certificate of Registration # EF2455

DATE	FEBRUARY 2023	JOB NO.	174602

DESIGNED BY: R. WHIPPLE
FILE NAME: E01-21.dwg

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1430

WEST POWER COMPLEX AT CWP
OPERATIONS CENTER SWITCHGEAR SUPPLY

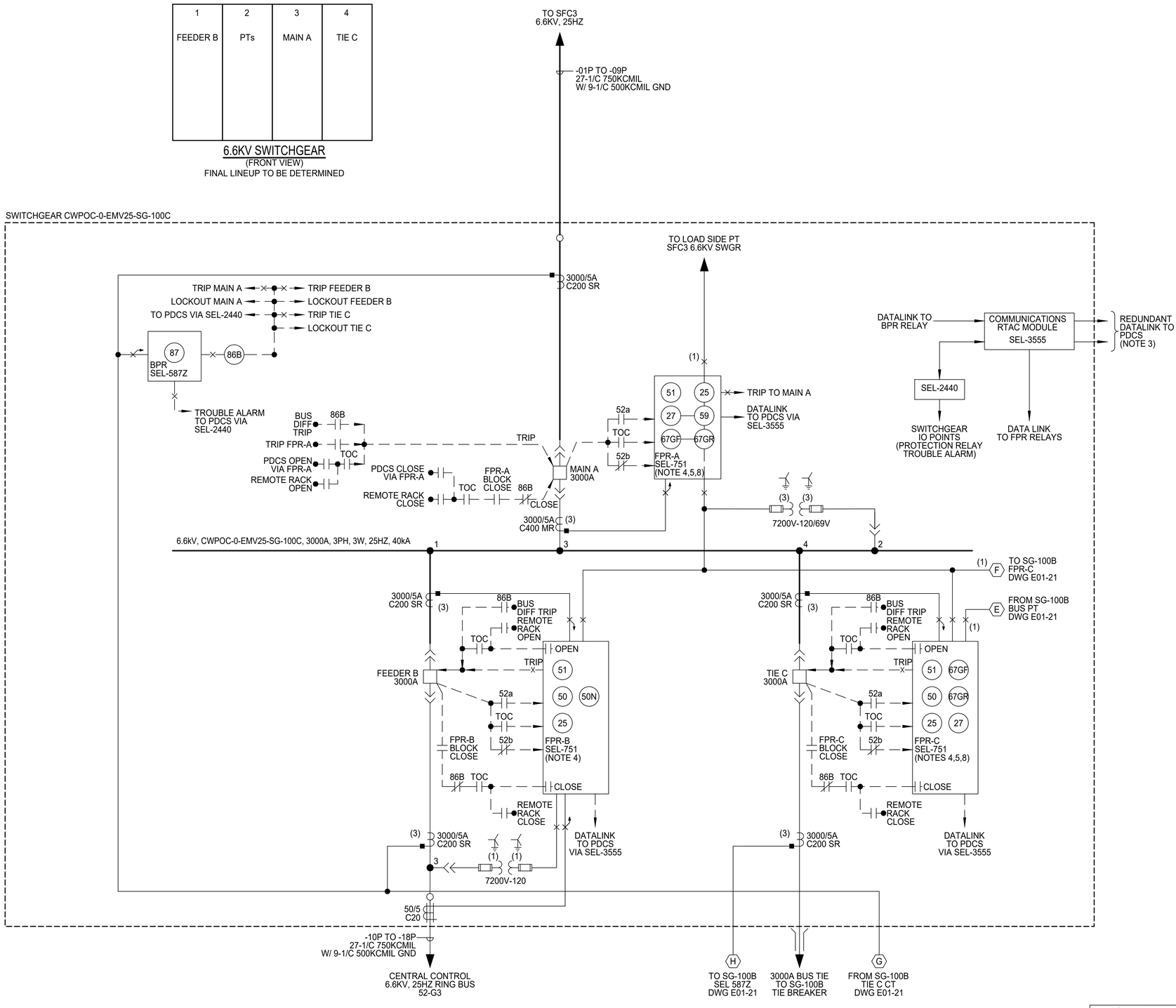
ELECTRICAL

ONE LINE DIAGRAM - 6.6KV SG-100B METERING AND PROTECTION

DR:	A. COLON
CK:	J. RYAN
AP:	J. BONDANK
LAST EDIT:	
SCALE:	NTS
DATE:	FEBRUARY 2023
A/E DWG NO.	E01-21
DWG. No.	12193-W-24
SHEET NO:	1 OF 1

ISSUED FOR REVIEW - NOT FOR CONSTRUCTION

2/10/2023 1:37:32 PM



NOTES:

1. ALL DEVICES ARE LOCATED AT THE 6.6KV SWITCHGEAR, UNLESS OTHERWISE NOTED.
2. ALL CABLES ARE PREFIXED WITH CWPOC0EMV25SG100C UNLESS OTHERWISE NOTED.
3. THE FOLLOWING BREAKER SIGNALS SHALL BE HARDWIRED TO BREAKER PROTECTION RELAY AND COMMUNICATED TO PDCS VIA DATALINK:
   - BREAKER OPEN STATUS.
   - BREAKER CLOSE STATUS.
   - BREAKER RACKED IN STATUS.
4. MODBUS TCP/IP DATALINK WILL CARRY THE FOLLOWING SIGNALS TO PDCS FOR PROTECTIVE RELAYS AND OTHER DEVICES AS APPLICABLE:
   - (O)NO RELAY TROUBLE
   - (O)RELAY TRIP
   - (O)OVERVOLTAGE ALARM
   - (O)UNDERVOLTAGE ALARM
   - (O)VOLTAGE
   - (O)AMP
   - (O)KW
   - (O)KVAR
   - (I)BREAKER OPEN COMMAND
   - (I)BREAKER CLOSE COMMAND
   - (O)BREAKER OPEN STATUS
   - (O)BREAKER CLOSE STATUS

   } SEL-751
5. 27 UNDERVOLTAGE AND 59 OVERVOLTAGE RELAY ELEMENTS SHALL BE USED FOR ALARM ONLY.
6. ALL MEDIUM VOLTAGE CABLES OPERATING AT 6.6KV SHALL BE RATED 15KV.
7. ALL INSTRUMENT TRANSFORMERS, RELAYS, AND OTHER AC COMPONENTS SHALL BE SUITABLE FOR OPERATION AT 25 HZ AC.
8. DIRECTIONAL GROUND PROTECTION ELEMENTS SHALL BE PROVIDED IN BOTH THE FORWARD AND REVESE DIRECTIONS. FORWARD AND REVERSE SETTINGS SHALL BE INDEPENDENT FROM EACH OTHER.

LEGEND:

FPR	FEEDER PROTECTION RELAY
	MAIN A, TIE C: SEL-751 (751201ACA0X0X851C90)
	FEEDER B: SEL-751 (751001ACA0X0X851C90)
BPR	BUS PROTECTION RELAY SEL-587Z (0587Z0X325H12XX)
IO COLLECTOR	DISCRETE PROGRAMMABLE AUTOMATION CONTROLLER 24402311A1A12630
RTAC	REAL TIME AUTOMATION CONTROLLER SEL-3555#F9C7
NETWORK SWITCH	NETWORK SWITCH SEL-2730M
×	TEST SWITCH, POTENTIAL TYPE
×↗	TEST SWITCH, CURRENT SHORTING TYPE
SR	SINGLE RATIO
MR	MULTI RATIO

RELATED CONTRACT DRAWINGS:

E00-01	ELECTRICAL SYMBOLS SHEET 1
E00-02	ELECTRICAL SYMBOLS SHEET 2
E00-03	ELECTRICAL SYMBOLS SHEET 3
E01-05	OVERALL SCOPING KEY ONE LINE
E01-21	6.6KV SG-100B METERING AND PROTECTION ONE LINE DIAGRAM

REV.	DATE	DESCRIPTION	BY
A	02/10/2023	ISSUED FOR REVIEW	RW

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION, BIDDING, RECORDATION, OR AS THE BASIS FOR THE ISSUANCE OF A PERMIT

POWER ENGINEERS
Power Engineers Inc. - Louisiana State Certificate of Registration # EF2455

DATE	FEBRUARY 2023	JOB NO.	174602

DESIGNED BY: R. WHIPPLE
FILE NAME: E01-22.dwg

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT No. 1430

WEST POWER COMPLEX AT CWP
OPERATIONS CENTER SWITCHGEAR SUPPLY

ELECTRICAL

ONE LINE DIAGRAM - 6.6KV SG-100C METERING AND PROTECTION

DR:	A. COLON
CK:	J. RYAN
AP:	J. BONDANK
LAST EDIT:	
SCALE:	NTS
DATE:	FEBRUARY 2023

A/E DWG NO.: E01-22

DWG. No. 12193-W-24

SHEET NO: 1 OF 1

ISSUED FOR REVIEW - NOT FOR CONSTRUCTION

2/10/2023 1:34:58 PM

PROCEEDING AS BUILT REVISIONS

COVER SHEET REV.	REVISION, AFFECTED SHEETS, AND DESCRIPTION OF CHANGE

NOTE:
THE ABOVE PROCEEDING AS BUILT REVISIONS AREA SHALL BE USED TO RECORD ALL DRAWING CHANGES AFTER THE REVISION LEVEL OF AS BUILT, ALL CHANGES MADE TO THE CUSTOMERS DRAWINGS INITIATED OUTSIDE THE POINT 8 FACILITY SHALL BE DOCUMENTED ON A FIELD CHANGE NOTICE "FCN", (FORM F-39)

THE REYNOLDS CO LLC

SOLAR TURBINE 7

PDCS ENCLOSURE

P.O.# 8934082

Sewerage and Water Board.

<Global Comment>
Wherever referencing 'The Reynolds Co LLC' replace or add "Sewerage and Water Board of New Orleans"

DRAWING LIST

SHEET	REV	DRAWING TITLE
C	0A	COVER SHEET WITH DRAWING LIST
D1	0A	DETAIL SHEET
D2	0A	SYMBOLS & DEVICE ID'S
D3	0A	DEVELOPMENTS
L	0A	ARRANGEMENT DETAILS
M	0A	BILL OF MATERILAS
N	0A	NAME PLATE DETAILS
1	0A	PDCS DC DISTRIBUTION & COMMUNICATION CIRCUIT
2	0A	DIGITAL INPUT SCHEMATIC (1 OF 3)
3	0A	DIGITAL INPUT SCHEMATIC (2 OF 3)
4	0A	DIGITAL INPUT SCHEMATIC (3 OF 3)
5	0A	DIGITAL OUTPUT SCHEMATIC (1 OF 2)
6	0A	DIGITAL OUTPUT SCHEMATIC (2 OF 2)
7	0A	ANALOG INTPUT SCHEMATIC
8	0A	ANALOG OUTPUT SCHEMATIC
9	0A	TERMINAL BLOCK LAYOUT (1 OF 2)
10	0A	TERMINAL BLOCK LAYOUT (2 OF 2)

POINT 8 POWER
pointeightpower.com
Partner in design

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/02/22	-	VR	CCS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

APPROVED	☐
APPROVED AS NOTED	☒
REVISE AND RESUBMIT	☐
REJECTED	☐
NOT SUBJECT TO REVIEW	☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

York Brogden 12/10/2022
JACOBS Date

POINT 8 POWER
POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

COVER SHEET WITH DRAWING LIST
THE REYNOLDS CO LLC
SOLAR TURBINE 7
PDCS ENCLOSURE

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-02	C

1.0 LOW VOLTAGE SWITCHGEAR CONSTRUCTION DETAILS

SECTION	1.1 GENERAL
1.101	STANDARD: *OTHER (SEE NOTES)*
1.102	ENCLOSURE TYPE:
1.103	MATERIAL: *MILD STEEL (STD)*
1.104	CABLE ACCESS: *FRONT ONLY*
1.105	CABLE ENTRY: *BOTH TOP/BOTTOM (STD)*
1.106	STRUCTURAL BASE: *NONE (STD)*
1.107	BOTTOM CABLE GLAND PLATE: *NONE (STD)*

SECTION	1.2 FRONT DOORS
1.201	PADLOCK PROVISIONS: *ALL DOORS*
	CONTROL DOORS: *VICE ACTION LATCHES (STD)*
	MOLDED CASE DISTRIBUTION BREAKER DOORS: *N/A*
	DOORS STOPS: *DOORS WITH ELECTRICAL DEVICES (STD)*
	INTERIOR LIGHT WITH SWITCH: *NONE (STD)*
	GASKET: *RUBBER BUMPERS (STD)*
1.202	MIMIC BUS: *NONE (STD)*

SECTION	1.3 REAR ACCESS
1.301	TYPE: *N/A*
	NAMEPLATES: *NONE (STD)*
	HANDLES: *NONE (STD)*
	GASKET: *NONE (STD)*
	IR WINDOWS: *NONE (STD)*

SECTION	1.4 INTERNAL BARRIERS
1.401	CABLE/BUS: *NONE (STD)*
	BUS SECT-SECT: *NONE (STD)*
	CABLE SECT-SECT: *NONE (STD)*
1.402	VENT OPENING PROTECTION: *NONE (STD)*
1.403	SEISMIC RATING: *NONE (STD)*
1.404	OVERHEAD BREAKER LIFTER: *NONE (STD)*
1.405	SERVICE ENTRANCE: *NONE (STD)*

SECTION	1.5 PAINT SYSTEM
1.501	METHOD: *INTERIOR PER ANSI C37.20.1 (STD)*
	COLOR: *ANSI 61 LIGHT GRAY (STD)*
	INTERNAL MNTG SURFACES: *GALVANIZED (STD)*
	FINISH: *TEXTURED (STD)*

SECTION	1.M MARINE CONSTRUCTION SUPPLEMENT
1.M01	ADD'L MARINE REQUIREMENTS: *N/A (THIS SECTION DOES NOT APPLY)*
	INSULATED REAR GUARD RAILS:
	NON-CONDUCTIVE HANDRAILS:
	UNFUSED WIRING DOUBLE: INSULATED & ORANGE IN COLOR
	ANTI-VIBRATION MATTING:
MARINE STANDARDS CONSTRUCTED TO (NOTE YEAR/RULE)	
1.M02	ABS:
	USCG:
	IEEE 45:
	OTHER:

SECTION	1.AR ARC RESISTANT CONSTRUCTION SUPPLEMENT
1.AR01	ARC RESISTANT: *NO*
	AR TYPE:
	AR TIME RATING:
	TOP PLENUM:

SECTION	OTHER NOTES (REFERENCE ABOVE APPLICABLE SECTION)
1.101	UL508A

3.0 WIRING DETAILS

SECTION				
3.1	TYPE:	*SIS, EXTRA FLEXIBLE EXCEPT WHERE NOTED*		
	(UNLESS OTHERWISE NOTED)	GAUGE	LUG TYPE	COLOR
3.2	PLC:	*#18 (STD)*	*LOCKING FORK/PIN*	*GRAY*
3.3	SHIELDED:	*#18 (STD)*	*LOCKING FORK/PIN*	*GRAY*
3.4	BREAKER TRIPPING:	*#14 (STD)*	*LOCKING FORK/PIN*	*GRAY*
3.5	CURRENT TRANSFORMER:	*#10*	*RING*	*GRAY*
3.6	INSTRUMENTS AND CONTROL:	*#14*	*LOCKING FORK/PIN*	*GRAY*
3.7	SAFETY GROUNDS:	*#14*	*RING*	*GREEN*
3.8	UNFUSED WIRING TO BUS:	*SIS, ORANGE IN COLOR*		
3.9	MARKING:	*HEAT SHRINK TYPE*		
3.10	NO. TERMINATIONS PER POINT:	*2- MAXIMUM*		
3.11	SPLICING:	*NOT PERMITTED*		
3.12	POWER CABLES (> #10 AWG):	*BLACK IN COLOR*		
3.13	ETHERNET CABLES:	*CAT 6 UNLESS OTHERWISE NOTED*		
SPECIAL WIRING DETAILS				
3.14	WIRING DIAGRAMS:	*N/A*		
3.15	SHIELDED WIRE DRAIN:	*UNCOVERED*		
3.16	REAR OF DOOR DEVICES COVERED:	*N/A*		
3.17	HIGH TEMP SPACE HEATER WIRING:	*N/A*		
3.18	SPECIAL WIRE COLORING:	*N/A*		
3.19	WIRING SEGREGATION:	*N/A*		

SECTION	OTHER NOTES (REFERENCE ABOVE APPLICABLE SECTION)

4.0 GENERAL NOTES

SECTION		
4.1	APPROXIMATE WEIGHT (LBS):	*200 lbs*
4.2	PEP PROPOSAL:	*Q2005083*
4.3		
4.4		
4.5		

yellow per specification
261116
261213
261300
261913
262300
262419
481123

not anticipated to be applicable in this enclosure

NO.	REVISION	DATE	DFT	DES	PM	APP
1	ISSUED FOR APPROVAL	11/02/22	-	VR	CCS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTIAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

APPROVED
APPROVED AS NOTED [X]
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

York Brogden 12/10/2022
JACOBS Date

POINT EIGHT POWER
POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

DETAIL SHEET
THE REYNOLDS CO LLC
SOLAR TURBINE 7
PDCS ENCLOSURE

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-02	D1

11/03/22
2022-11-03T00:00:24

DEVICE SYMBOLS

- NORMALLY CLOSED CONTACT
- NORMALLY OPEN CONTACT
- RELAY COIL
- STANDARD LIGHT (COLOR AS INDICATED)
  - A - AMBER
  - B - BLUE
  - C - CLEAR
  - G - GREEN
  - O - ORANGE
  - OP OPALESCENT
  - P - PURPLE
  - R - RED
  - W - WHITE
  - Y - YELLOW
- LED (COLOR AS INDICATED)
- EARTH GROUND
- CHASSIS GROUND
- NORMALLY CLOSED SWITCH
- NORMALLY OPEN SWITCH
- CAPACITOR
- VACUUM CIRCUIT BREAKER
- CIRCUIT BREAKER (AF \ AT)
- VOLTAGE COIL
- CURRENT TRANSFORMER
- CURRENT COIL
- NORMALLY CLOSED LEVEL SWITCH
- NORMALLY OPEN LEVEL SWITCH
- DIODE (WITH CONNECTORS)
- STANDARD DIODE
- DISCONNECT
- FUSE
- HORN
- NORMALLY CLOSED PUSHBUTTON
- NORMALLY OPEN PUSHBUTTON
- HEATER COIL
- THERMAL OVERLOAD
- RESISTOR
- THERMOSTAT
- THYRISTOR
- NORMALLY CLOSED PRESSURE SWITCH
- NORMALLY OPEN PRESSURE SWITCH
- NORMALLY CLOSED TEMPERATURE SWITCH
- NORMALLY OPEN TEMPERATURE SWITCH

- RHEOSTAT
- NORMALLY OPEN DISCONNECTING CONTACT
- NORMALLY CLOSED DISCONNECTING CONTACT
- SINGLE PHASE TRANSFORMER (V / V, VA)
- METER
- HAND OFF AUTO SWITCH (H, O, A)
- POWER CONDUCTOR
- CONTROL WIRING
- REMOTE WIRING
- BATTERY (+ −)
- NORMALLY CLOSED TIMED OPEN
- NORMALLY OPEN TIMED CLOSED
- NORMALLY CLOSED TIMED CLOSED
- NORMALLY OPEN TIMED OPEN
- X = STARTER SIZE (X / Y)
  Y = WIRING DIAGRAM
- WIRE CONTINUATION SYMBOL (ZONE)
- INSTALLATION (▪)
- LOCATION (+)
- DEVICE ID (+XXX)
- REMOTE DEVICES (ITALICIZED TEXT)
- COMMON DOOR INDICATOR (SIMILAR NUMBER = SIMILAR LAYOUTS) (#)
- COMMON PANEL INDICATOR (SIMILAR NUMBER = SIMILAR LAYOUTS) (#)
- TERMINAL BLOCK

DEVICE ID LIST

DEVICE ID	PAGE LINE NO	BOM MARK #	FUNCTION
+MAI1	D303H	9	ANALOG INPUT MODULE
+MAO1	D315H	10	ANALOG OUTPUT MODULE
+MCB1	114B	11	CIRCUIT BREAKER, MINIATURE
+MCB10	121G	12	CIRCUIT BREAKER, MINIATURE
+MCB11	123G	12	CIRCUIT BREAKER, MINIATURE
+MCB2	119B	12	CIRCUIT BREAKER, MINIATURE
+MCB3	121B	12	CIRCUIT BREAKER, MINIATURE
+MCB4	123B	12	CIRCUIT BREAKER, MINIATURE
+MCB5	125B	12	CIRCUIT BREAKER, MINIATURE
+MCB6	127B	12	CIRCUIT BREAKER, MINIATURE
+MCB7	129B	12	CIRCUIT BREAKER, MINIATURE
+MCB8	114G	11	CIRCUIT BREAKER, MINIATURE
+MCB9	119G	12	CIRCUIT BREAKER, MINIATURE
+MDI1	D310A	6	DIGITAL INPUT MODULE
+MDI2	D323A	6	DIGITAL INPUT MODULE
+MDI3	D303D	7	DIGITAL INPUT MODULE
+MDO1	D316D	8	DIGITAL OUTPUT MODULE
+MDO2	D324D	8	DIGITAL OUTPUT MODULE
+MHMI	D323K	3	HUMAN MACHINE INTERFACE
+MPC1	D306A	5	PROGRAMMABLE LOGIC CONTROLLER RACK
+MPC2	D308A	5	PROGRAMMABLE LOGIC CONTROLLER RACK
+MPDCS	L11E	1	WALLMOUNT CABINET ENCLOSURE
+MPLC	D301B	2	PROGRAMMABLE LOGIC CONTROLLER RACK
+MRTAC	D302A	4	AUTOMATION, COM MODULE
+PLCTB	111B	13	TERMINAL BLOCK, SECTIONAL
+PLCTB1	211B	13	TERMINAL BLOCK, SECTIONAL
+PLCTB2	311B	13	TERMINAL BLOCK, SECTIONAL
+PLCTB3	411B	13	TERMINAL BLOCK, SECTIONAL
+PLCTB4	505C	13	TERMINAL BLOCK, SECTIONAL
+PLCTB5	605C	13	TERMINAL BLOCK, SECTIONAL
+PLCTB6	701C	13	TERMINAL BLOCK, SECTIONAL
+PLCTB7	809C	13	TERMINAL BLOCK, SECTIONAL

NO.	REVISION	DATE	DFT	DES	PM	APP
DA	ISSUED FOR APPROVAL	11/02/22	-	VR	CCS	RG

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS. THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

APPROVED
APPROVED AS NOTED [X]
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

York Brogden 12/10/2022
JACOBS Date

POINT EIGHT POWER
POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

SYMBOLS & DEVICE ID'S
THE REYNOLDS CO LLC
SOLAR TURBINE 7
PDCS ENCLOSURE

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-02	D2

11/03/22
2022-11-03T00:10:27

+MPLC

PROGRAMMABLE LOGIC CONTROLLER RACK — AXION SEL-2240

	SLOT	TERMINAL POINT	FUNCTION	ZONE
+MRTAC	SLOT A	ETH 1	ETHERNET	135D
		ETH 2	ETHERNET	
		COM 1	EIA-232/EIA-485	
		COM 2	EIA-232/EIA-485	
		COM 3	EIA-232/EIA-485	
		COM 4	EIA-232/EIA-485	
		IN,OUT	IRIG-B	
		1,2,3	FORM C OUTPUT	
+MPC1	SLOT B	PORT 1	ETHERNET	
		PORT 2	ETHERNET	
		1(+/H), 2(-/N)	CONTROL POWER 119C	
		3	GND 129G	
+MPC2	SLOT C	PORT 1	ETHERNET	
		PORT 2	ETHERNET	
		1(+/H), 2(-/N)	CONTROL POWER 121C	
		3	GND 129G	
+MDI1	SLOT D	1	DI1 - 52-G BREAKER STATUS	211D
		2	DI2 - 52-G BREAKER READY STATUS	213D
		3	DI3 - 52-G ALARM STATUS	215D
		4	DI4 - 52-G LOCAL STATUS	217D
		5	DI5 - 52-G 86 TRIP STATUS	219D
		6	DI6 - 52-G BREAKER STATUS	221D
		7	DI7 - 52-U BREAKER STATUS	223D
		8	DI8 - 52-U BREAKER READY STATUS	225D
		9	DI9 - 52-U ALARM STATUS	227D
		10	COMMON	229D
		11,12	DI10 - 52-U LOCAL STATUS	231D
		13,14	DI11 - 52-U 86 TRIP STATUS	233D
		15,16	DI12 - 52-U BREAKER STATUS	235D
		17	DI13 - 52-F1 BREAKER STATUS	211H
		18	DI14 - 52-F1 BREAKER READY STATUS	213H
		19	DI15 - 52-F1 ALARM STATUS	215H
		20	DI16 - 52-F1 LOCAL STATUS	217H
		21	DI17 - 52-F1 86 TRIP STATUS	219H
		22	DI18 - 52-F1 BREAKER STATUS	221H
		23	DI19 - 52-F2 BREAKER STATUS	223H
		24	DI20 - 52-F2 BREAKER READY STATUS	225H
		25	DI21 - 52-F2 ALARM STATUS	227H
		26	COMMON	229H
		27,28	DI22 - 52-F2 LOCAL STATUS	231H
		29,30	DI23 - 52-F2 86 TRIP STATUS	233H
		31,32	DI24 - 52-F2 BREAKER STATUS	235H
+MDI2	SLOT E	1	DI1 - SPARE INPUT	311D
		2	DI2 - SPARE INPUT	313D
		3	DI3 - SPARE INPUT	315D
		4	DI4 - SPARE INPUT	317D
		5	DI5 - SPARE INPUT	319D
		6	DI6 - SPARE INPUT	321D
		7	DI7 - SPARE INPUT	323D
		8	DI8 - SPARE INPUT	325D
		9	DI9 - SPARE INPUT	327D
		10	COMMON	329D
		11,12	DI10 - SPARE INPUT	331D
		13,14	DI11 - SPARE INPUT	333D
		15,16	DI12 - SPARE INPUT	335D
		17	DI13 - SPARE INPUT	311H
		18	DI14 - SPARE INPUT	313H
		19	DI15 - SPARE INPUT	315H
		20	DI16 - SPARE INPUT	317H
		21	DI17 - SPARE INPUT	319H
		22	DI18 - SPARE INPUT	321H
		23	DI19 - SPARE INPUT	323H
		24	DI20 - SPARE INPUT	325H
		25	DI21 - SPARE INPUT	327H
		26	COMMON	329H
		27,28	DI22 - SPARE INPUT	331H
		29,30	DI23 - SPARE INPUT	333H
		31,32	DI24 - SPARE INPUT	335H

+MDI3

	SLOT			
+MDI3	SLOT F	1	DI1 - SPARE INPUT TO SOLAR TURBINES PLC	411D
		2	DI2 - SPARE INPUT TO SOLAR TURBINES PLC	413D
		3	DI3 - SPARE INPUT TO SOLAR TURBINES PLC	415D
		4	DI4 - SPARE INPUT TO SOLAR TURBINES PLC	417D
		5	DI5 - SPARE INPUT TO SOLAR TURBINES PLC	419D
		6	DI6 - SPARE INPUT TO SOLAR TURBINES PLC	421D
		7	DI7 - SPARE INPUT TO SOLAR TURBINES PLC	423D
		8	DI8 - SPARE INPUT TO SOLAR TURBINES PLC	425D
		9	DI9 - SPARE INPUT TO SOLAR TURBINES PLC	427D
		10	COMMON	429D
		11,12	DI10 - SPARE INPUT	431D
		13,14	DI11 - SPARE INPUT	433D
		15,16	DI12 - SPARE INPUT	435D
		17	DI13 - SPARE INPUT	411H
		18	DI14 - SPARE INPUT	413H
		19	DI15 - SPARE INPUT	415H
		20	DI16 - SPARE INPUT	417H
		21	DI17 - SPARE INPUT	419H
		22	DI18 - SPARE INPUT	421H
		23	DI19 - SPARE INPUT	423H
		24	DI20 - SPARE INPUT	425H
		25	DI21 - SPARE INPUT	427H
		26	COMMON	429H
		27,28	DI22 - SPARE INPUT	431H
		29,30	DI23 - SPARE INPUT	433H
		31,32	DI24 - SPARE INPUT	435H
+MDO1	SLOT G	1,2	DO1 - TO 52-G TRIP COMMAND	507C
		3,4	DO2 - TO 52-G CLOSE PERMISSIVE COMMAND	511C
		5,6	DO3 - TO 52-U TRIP COMMAND	515C
		7,8	DO4 - TO 52-U CLOSE PERMISSIVE COMMAND	519C
		9,10	DO5 - TO 52-U CLOSE COMMAND	523C
		11,12	DO6 - SPARE OUTPUT	527C
		13,14	DO7 - SPARE OUTPUT	531C
		15,16	DO8 - SPARE OUTPUT	535C
		17,18	DO9 - TO 52-F1 TRIP COMMAND	507G
		19,20	DO10 - TO 52-F1 CLOSE COMMAND	511G
		21,22	DO11 - TO 52-F2 TRIP COMMAND	515G
		23,24	DO12 - TO 52-F2 CLOSE COMMAND	519G
		25,26	DO13 - SPARE OUTPUT	523G
		27,28	DO14 - SPARE OUTPUT	527G
		29,30	DO15 - SPARE OUTPUT	531G
		31,32	DO16 - SPARE OUTPUT	535G
+MDO2	SLOT H	1,2	DO1 - GEN. FREQUENCY RAISE	607C
		3,4	DO2 - GEN. FREQUENCY LOWER	611C
		5,6	DO3 - GEN. VOLTAGE RAISE	615C
		7,8	DO4 - GEN. VOLTAGE LOWER	619C
		9,10	DO5 - GEN. REMOTE CTRL ENABLE	623C
		11,12	DO6 - GEN. CONNECTED TO UTILITY	627C
		13,14	DO7 - SPARE OUTPUT	631C
		15,16	DO8 - SPARE OUTPUT	635C
		17,18	DO9 - SPARE OUTPUT	607G
		19,20	DO10 - SPARE OUTPUT	611G
		21,22	DO11 - SPARE OUTPUT	615G
		23,24	DO12 - SPARE OUTPUT	619G
		25,26	DO13 - SPARE OUTPUT	623G
		27,28	DO14 - SPARE OUTPUT	627G
		29,30	DO15 - SPARE OUTPUT	631G
		31,32	DO16 - SPARE OUTPUT	635G

+MAI1

	SLOT			
+MAI1	SLOT I	1,2	AI01 - SPARE INPUT	703C
		3	GND	705C
		4,5	AI02 - SPARE INPUT	709C
		6,7	AI03 - SPARE INPUT	713C
		8	GND	715C
		9,10	AI04 SPARE INPUT	719C
		11,12	AI05 - SPARE INPUT	723C
		13	GND	725C
		14,15	AI06 - SPARE INPUT	729C
		21,22	AI07 - SPARE INPUT	733C
		23	GND	735C
		24,25	AI08 - SPARE INPUT	737C
		26,27	AI09 - SPARE INPUT	703G
		28	GND	705G
		29,30	AI10 - SPARE INPUT	709G
		31,32	AI11 - SPARE INPUT	713G
		33	GND	715G
		34,35	AI12 - SPARE INPUT	719G
		36,37	AI13 - SPARE INPUT	723G
		38	GND	725G
		39,40	AI14 - SPARE INPUT	729G
		36,37	AI15 - SPARE INPUT	733G
		38	GND	735G
		39,40	AI16 - SPARE INPUT	739G
+MAO1	SLOT J	1,2	AO01 - SPARE OUTPUT	811C
		3	GND	813C
		4,5	AO02 - SPARE OUTPUT	817C
		6,7	AO03 - SPARE OUTPUT	821C
		8	GND	823C
		9,10	AO04 - SPARE OUTPUT	827C
		11,12	AO05 - SPARE OUTPUT	811G
		13	GND	813G
		14,15	AO06 - SPARE OUTPUT	817G
		16,17	AO07 - SPARE OUTPUT	821G
		18	GND	823G
		19,20	AO08 - SPARE OUTPUT	827G

+MGND

GROUND PAD

TERMINAL GROUP	TERMINAL POINT	FUNCTION	ZONE
1	.1	GROUND TERMINAL	133G
	.2	GROUND TERMINAL	133G
2	.1	GROUND TERMINAL	133H
	.2	GROUND TERMINAL	
3	.1	GROUND TERMINAL	
	.2	GROUND TERMINAL	
4	.1	GROUND TERMINAL	
	.2	GROUND TERMINAL	
5	.1	GROUND TERMINAL	
	.2	GROUND TERMINAL	
6	.1	GROUND TERMINAL	
	.2	GROUND TERMINAL	

+MHMI

HUMAN MACHINE INTERFACE

TERMINAL POINTS	FUNCTION	ZONE
G	GND	129H
+,-	24VDC CTRL PWR	123H
RJ-45	ENET PORT 1	135E
RJ-45	ENET PORT 2	

reconcile with updated MV SWGR DC schematics

<TYPICAL COMMENT>
Evaluation of PDCS Input/Output (I/O) configuration is not possible by Jacobs due to the lack of an Approved PDCS I/O List from Solar.

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/02/22	-	VR	CCS	RG

NOTE: THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND.

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM — www.PointEightPower.com — 800.284.1522

DEVELOPMENTS
THE REYNOLDS CO LLC
SOLAR TURBINE ?
PDCS ENCLOSURE

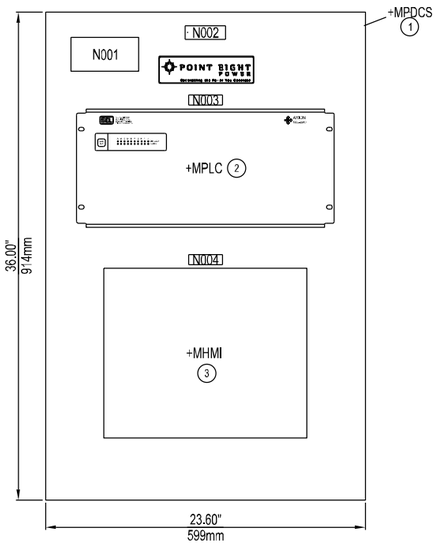
APPROVED	
APPROVED AS NOTED	
REVISE AND RESUBMIT	X
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

York Brogden 12/10/2022
JACOBS Date

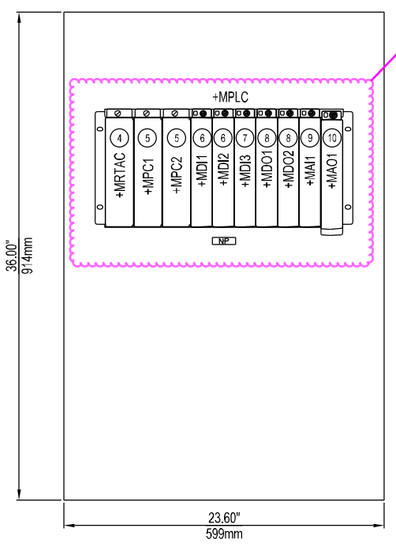
SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-02	D3

11/03/22
2022-11-03T00:10:30

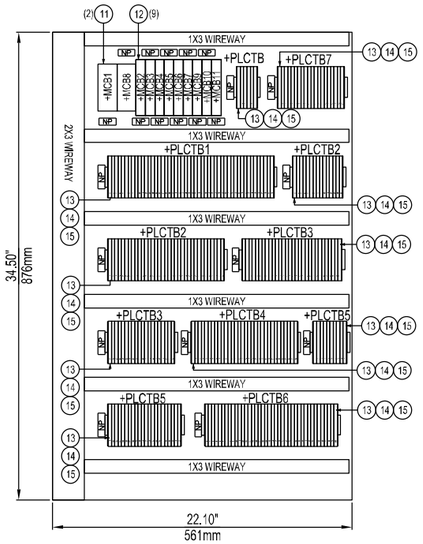


FRONT VIEW OF DOOR

uncertain as to I/O card configuration based on PDCS I/O evaluation



REAR VIEW OF DOOR



BACKPAN

<TYPICAL COMMENT>
Evaluation of PDCS Input/Output (I/O) configuration is not possible by Jacobs due to the lack of an Approved PDCS I/O List from Solar.

APPROVED
APPROVED AS NOTED
REVISE AND RESUBMIT [X]
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

York Brogden 12/10/2022
JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
A	ISSUED FOR APPROVAL	11/02/22	-	VR	CCS	RG

NOTE: THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTIAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND.

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS. THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER
POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

ARRANGEMENT DETAILS
THE REYNOLDS CO LLC
SOLAR TURBINE 7
PDCS ENCLOSURE

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
3/16"=1"	CS	VR	R64672-02	L

11/03/22
2022-11-03T00:10:40

BILL OF MATERIAL

MARK	DEVICE ID	QTY	FUNCTION	MFG	PART NO	DESCRIPTION
1	+MPDCS	1	ENCLOSURE	BLACKBOX	WMD19-2425-PQU	ENCLOSURE;WALL MOUNT; 19U; 36"X24'X25"; RACK MOUNT M6 RAILS; LOCKING PLEXIGLASS FRONT; DOUBLE-HINGED; 300LBS;
						NEMA TYPE 1; IP20; UL
2	+MPLC	1	AUTOMATION EQUIPMENT, RACK	SEL	2242R1X0	10 SLOT; 19IN RACK WIDTH; HORIZONTAL RACK MOUNT; 5U;
3	+MHMI	1	AUTOMATION EQUIPMENT, HMI	ALLEN BRADLEY	2711P-T15C22D9P	PANELVIEW PLUS 7 HMI; 15" TOUCHSCREEN; 24VDC; COLOR; 2 ETHERNET DLR PORTS;WINDOWS CE OS; UL E10314
4	+MRTAC	1	AUTOMATION, COM MODULE	SEL	2241#274B	RACK MOUNT; (2) ETHERNET PORTS; (2) EIA-232/EIA485; (2) EIA-232; (1) IRIG-B; (1) FORM C OUTPUT; IEC 61850
						GOOSE; ETHERNET/IP; UL-E220228
5	+MPC1 +MPC2	2	AUTOMATION EQUIPMENT, POWER SUPPLY	SEL	224311X0	SEL POWER SUPPLY; 125/250VDC; 120/240VAC; TWO 10/100BASE-T;
6	+MDI1 +MDI2	2	AUTOMATION EQUIPMENT, INPUT MODULE	SEL	22442424X0	125VDC/VAC INPUT MODULE; 24 DIGITAL INPUTS
7	+MDI3	1	AUTOMATION EQUIPMENT, INPUT MODULE	SEL	22442222X0	48VDC/VAC INPUT MODULE; 24 DIGITAL INPUTS
8	+MDO1 +MDO2	2	AUTOMATION EQUIPMENT, OUTPUT MODULE	SEL	22443131X0	125VDC/VAC OUTPUT MODULE; 16 STANDARD FORM A CURRENT DIGITAL OUTPUTS
9	+MAI1	1	AUTOMATION EQUIPMENT, INPUT MODULE	SEL	22452121XX0	12/24VDC; 10-30VDC; 16 ANALOG INPUTS; UL
10	+MAO1	1	AUTOMATION EQUIPMENT, OUTPUT MODULE	SEL	22453131XX0	12/24VDC; 10-30VDC; 12 ANALOG OUYPUTS; UL
11	+MCB1 +MCB8	2	MINIATURE CIRCUIT BREAKER	A-B	1492-D2C160	2POLE; DC; 16A; 10kA @500VDC, DIN RAIL MOUNTING; NOTES: UL1077, TYPE-C; UL-E65138
12	+MCB10 +MCB11 +MCB2 +MCB3 +MCB4	9	MINIATURE CIRCUIT BREAKER	A-B	1492-D1C030	1POLE; DC; 3A; 10kA @250VDC, DIN RAIL MOUNTING; NOTES: UL489, TYPE-C; UL-E197878
	+MCB5 +MCB6 +MCB7 +MCB9					
13	+PLCTB(6) +PLCTB1(50) +PLCTB2(50) +PLCTB3(50) +PLCTB4(32)	280	TERMINAL BLOCK, SECTIONAL	WAGO	2004-1401	CAGE CLAMP, 20-10AWG, DIN RAIL, 550V, 30A, GREY COLOR, 1 POLE
	+PLCTB5(32) +PLCTB6(40) +PLCTB7(20)					
14	+PLCTB:1 +PLCTB:6 +PLCTB1:1 +PLCTB1:50 +PLCTB2:1	22	TERMINAL BLOCK, ACCESSORY, END PLATE	WAGO	2004-1491	GREY COLOR, END PLATE FOR WAGO 2004-1401
	+PLCTB2:15 +PLCTB2:16 +PLCTB2:50 +PLCTB3:1 +PLCTB3:30					
	+PLCTB3:31 +PLCTB3:50 +PLCTB4:1 +PLCTB4:32 +PLCTB5:1					
	+PLCTB5:10 +PLCTB5:11 +PLCTB5:32 +PLCTB6:1 +PLCTB6:40					
	+PLCTB7:1 +PLCTB7:20					
15	+PLCTB:1 +PLCTB:6 +PLCTB1:1 +PLCTB1:50 +PLCTB2:1	22	TERMINAL BLOCK, ACCESSORY, END CLAMP	WAGO	249-116	GREY COLOR, END CLAMP FOR WAGO 2004-1401
	+PLCTB2:15 +PLCTB2:16 +PLCTB2:50 +PLCTB3:1 +PLCTB3:30					
	+PLCTB3:31 +PLCTB3:50 +PLCTB4:1 +PLCTB4:32 +PLCTB5:1					
	+PLCTB5:10 +PLCTB5:11 +PLCTB5:32 +PLCTB6:1 +PLCTB6:40					
	+PLCTB7:1 +PLCTB7:20					

uncertain as to I/O card configuration based on PDCS I/O evaluation

<TYPICAL COMMENT>
Evaluation of PDCS Input/Output (I/O) configuration is not possible by Jacobs due to the lack of an Approved PDCS I/O List from Solar.

APPROVED
APPROVED AS NOTED
REVISE AND RESUBMIT [X]
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

York Brogden 12/10/2022
JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
A	ISSUED FOR APPROVAL	11/02/22	-	VR	CCS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER
POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

BILL OF MATERILAS
THE REYNOLDS CO LLC
SOLAR TURBINE 7
PDCS ENCLOSURE

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-02	M

11/03/22
2022-11-03T00:10:46

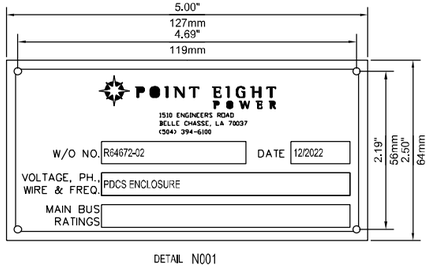
EXTERIOR NAMEPLATE SCHEDULE

MARK	QTY	TYPE	COLOR	1ST LINE	2ND LINE	3RD LINE
N001	1	S	SS	SEE DETAIL		
N002	1	A	WB	PDCS ENCLOSURE	CONTROL	
N003	1	B	WB	SEL-2242	CHASSIS	BACKPLANE
N004	1	B	WB	PANEL VIEW		

Uncertain where project compliant tag numbers will be incorporated into Name Plate details?

INTERIOR NAMEPLATE SCHEDULE

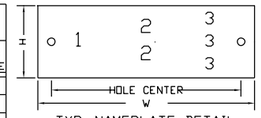
QTY	TYPE	COLOR	1st LINE	2nd LINE	3rd LINE
1	D	WB	+MCB1	16A, 125VDC	CONTROL CKT
1	D	WB	+MCB10	3A, 24VDC	DIGITAL INPUT 3
1	D	WB	+MCB11	3A, 24VDC	HMI PWR CKT
1	D	WB	+MCB2	3A, 125VDC	PWR COUPLER 1
1	D	WB	+MCB3	3A, 125VDC	PWR COUPLER 2
1	D	WB	+MCB4	3A, 125VDC	DIGITAL INPUT 1
1	D	WB	+MCB5	3A, 125VDC	DIGITAL INPUT 1
1	D	WB	+MCB6	3A, 125VDC	DIGITAL INPUT 2
1	D	WB	+MCB7	3A, 125VDC	DIGITAL INPUT 2
1	D	WB	+MCB8	16A, 24VDC	DIGITAL INPUT
1	D	WB	+MCB9	3A, 24VDC	DIGITAL INPUT 3
1	D	WB	+MPLC		
1	C	WB	+PLCTB		
1	C	WB	+PLCTB1		
1	C	WB	+PLCTB2		
1	C	WB	+PLCTB3		
1	C	WB	+PLCTB4		
1	C	WB	+PLCTB4		
1	C	WB	+PLCTB5		
1	C	WB	+PLCTB5		
1	C	WB	+PLCTB6		
1	C	WB	+PLCTB6		
1	C	WB	+PLCTB7		
1	C	WB	+PLCTB7		



DETAIL N001

STANDARD NAMEPLATE SIZES

TYPE	SIZE H	SIZE W	HOLE CNTR	LINES	LETTER HEIGHT	LETTER PER LINE
A	1	3	2.625	3	.187	17
B	.75	2.5	2.125	2	.156	16
				3	.156	16
C	.5	1.75	1.375	2	.125	12
D	.5	1.25	.875	3	.125	10
E	2	5	4.625	3	.25	22
S	SPECIAL SEE DETAIL					



TYP. NAMEPLATE DETAIL

NAMEPLATE STANDARDS

1. COLOR CODE FOR LAMINATED PLASTIC MATERIAL
   WB - WHITE FACE WITH BLACK LETTERS
   BW - BLACK FACE WITH WHITE LETTERS
   RW - RED FACE WITH WHITE LETTERS
   SS - STAINLESS STEEL
   ALUM - ALUMINUM
2. NAMEPLATES TO HAVE 5/32 DRILLED HOLES
3. NAMEPLATES TO BE AFFIX WITH 4/40 STAINLESS STEEL SELF TAPPING SCREWS
4. INTERIOR DEVICE NAMEPLATES TO BE TYPE "C" AND LOCATED AS PER ARRANGEMENT DRAWINGS AND IN ACCORDANCE WITH "INTERIOR DEVICE NAMEPLATE SCHEDULE"

APPROVED
APPROVED AS NOTED
REVISE AND RESUBMIT [X]
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

York Brogden 12/10/2022
JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
A	ISSUED FOR APPROVAL	11/02/22	-	VR	CCS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

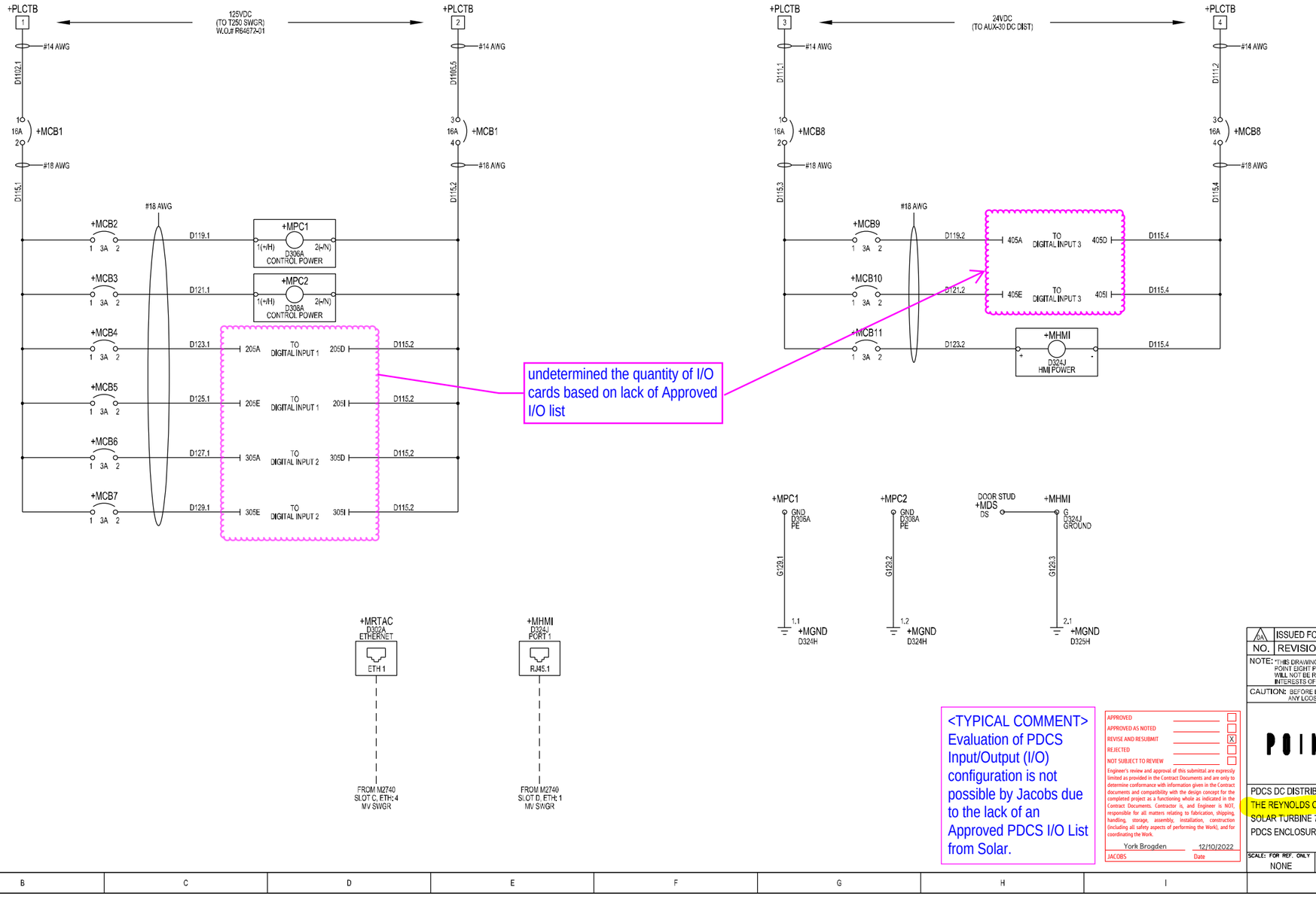
CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — www.PointEightPower.com — 800.284.1522

NAME PLATE DETAILS
THE REYNOLDS CO LLC
SOLAR TURBINE 7
PDCS ENCLOSURE

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-02	N

11/03/22
2022-11-03T00:10:48



<TYPICAL COMMENT> Evaluation of PDCS Input/Output (I/O) configuration is not possible by Jacobs due to the lack of an Approved PDCS I/O List from Solar.

APPROVED
APPROVED AS NOTED
REVISE AND RESUBMIT X
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

York Brogden 12/10/2022
JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/02/22	-	VR	CCS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

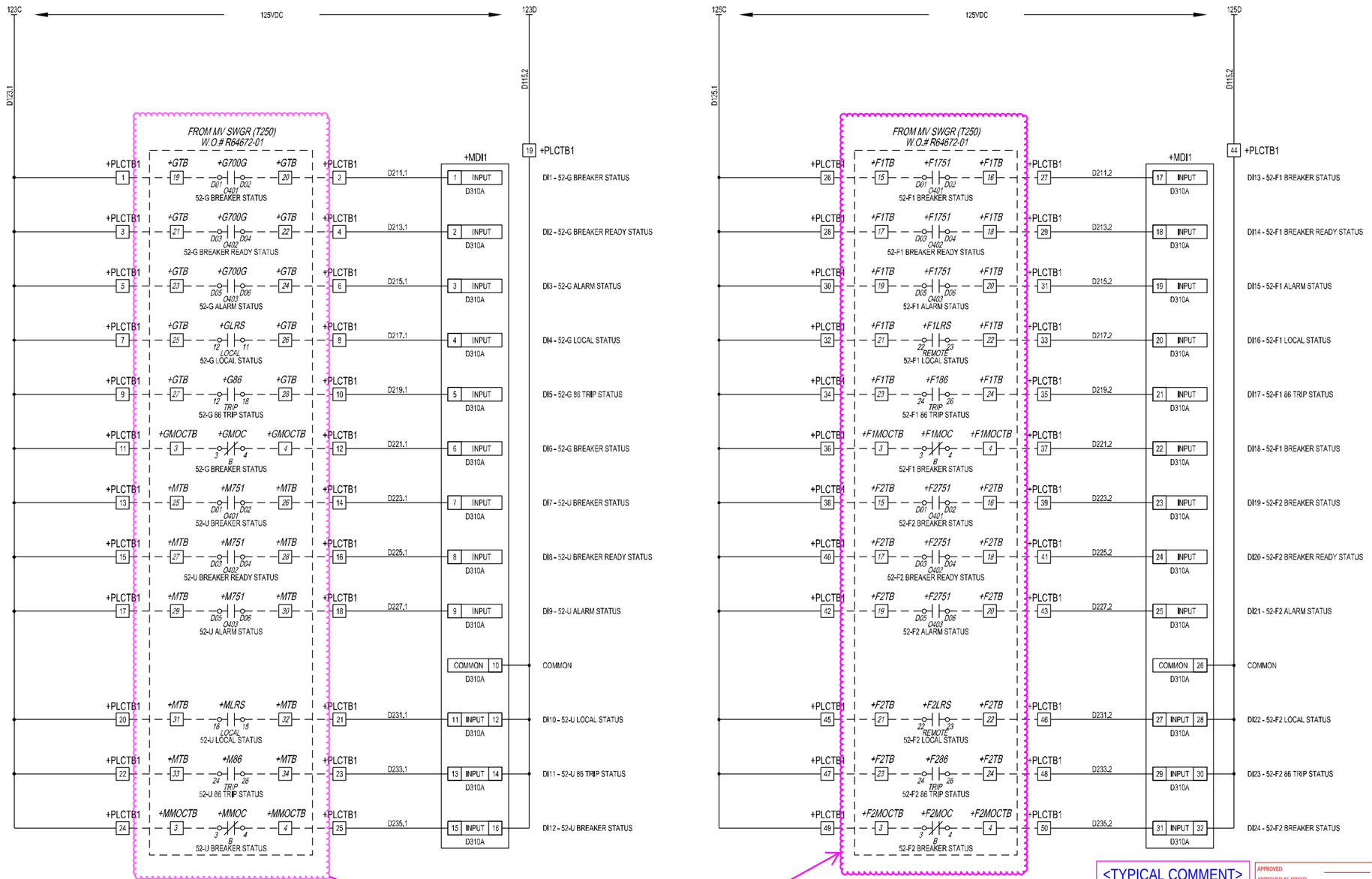
CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER
POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

PDCS DC DISTRIBUTION & COMMUNICATION CIRCUIT
THE REYNOLDS CO LLC
SOLAR TURBINE 7
PDCS ENCLOSURE

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-02	1

11/03/22
2022-11-03T00:10:52



reconcile with MV SWGR review comments

<TYPICAL COMMENT>
Evaluation of PDCS Input/Output (I/O) configuration is not possible by Jacobs due to the lack of an Approved PDCS I/O List from Solar.

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/02/22	-	VR	CCS	RG

NOTE: THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTIAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND.

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS. THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM — www.PointEightPower.com — 800.284.1522

DIGITAL INPUT SCHEMATIC (1 OF 3)

THE REYNOLDS CO LLC

SOLAR TURBINE 7

PDCS ENCLOSURE

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-02	2

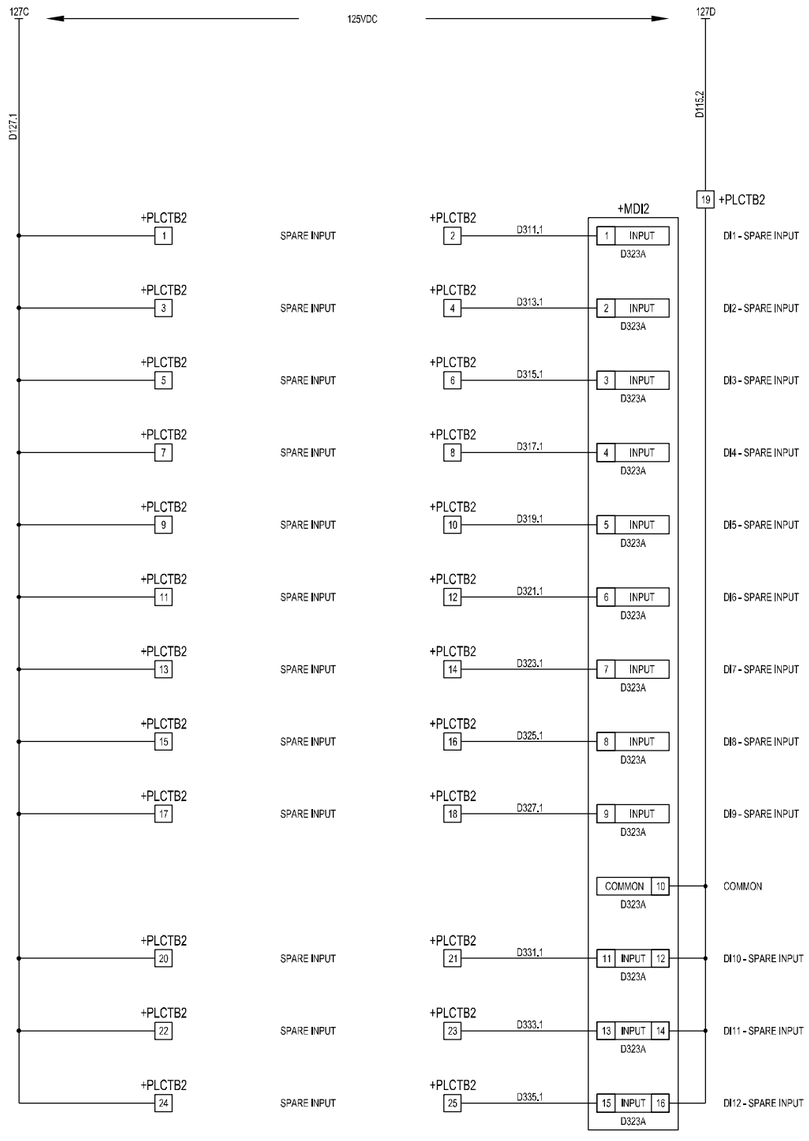
11/03/22
2022-11-03T00:10:56

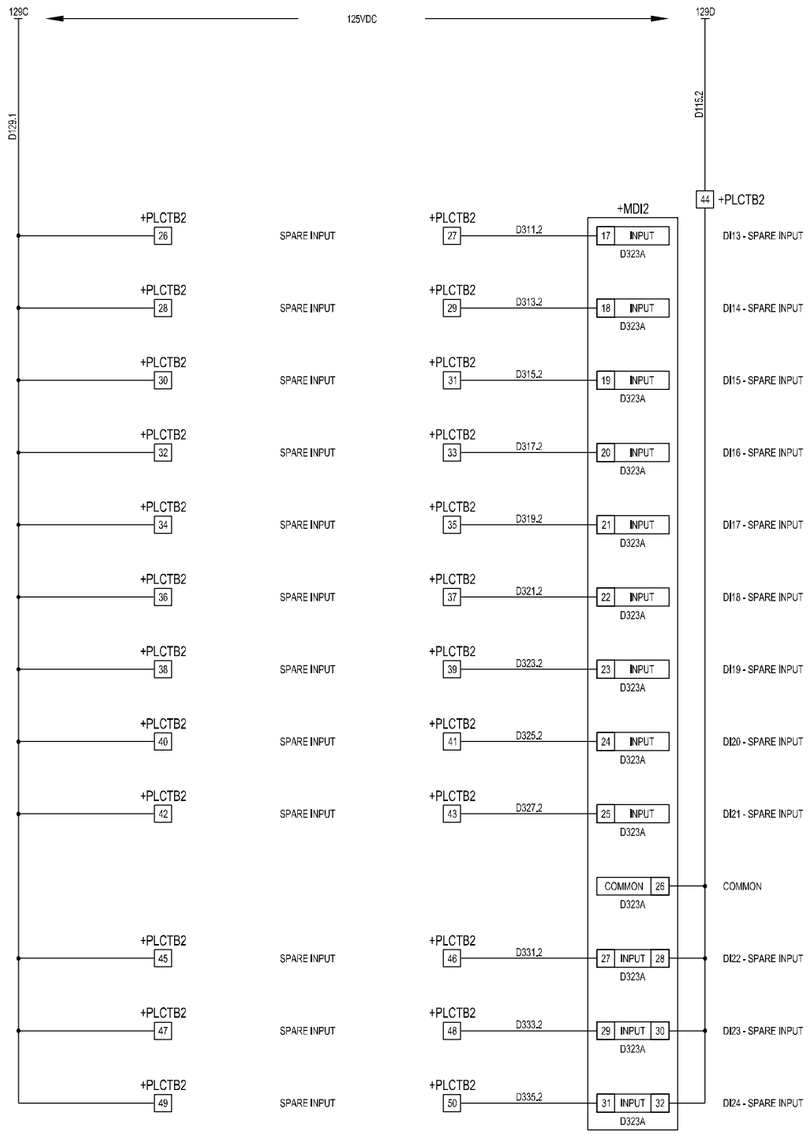
APPROVED	☐
APPROVED AS NOTED	☐
REVISE AND RESUBMIT	☒
REJECTED	☐
NOT SUBJECT TO REVIEW	☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

York Brogden 12/10/2022

JACOBS Date





<TYPICAL COMMENT>
Evaluation of PDCS Input/Output (I/O) configuration is not possible by Jacobs due to the lack of an Approved PDCS I/O List from Solar.

NO.	REVISION	DATE	DFT	DES	PM	APP
A	ISSUED FOR APPROVAL	11/02/22	-	VR	CCS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

DIGITAL INPUT SCHEMATIC (2 OF 3)
THE REYNOLDS CO LLC
SOLAR TURBINE 7
PDCS ENCLOSURE

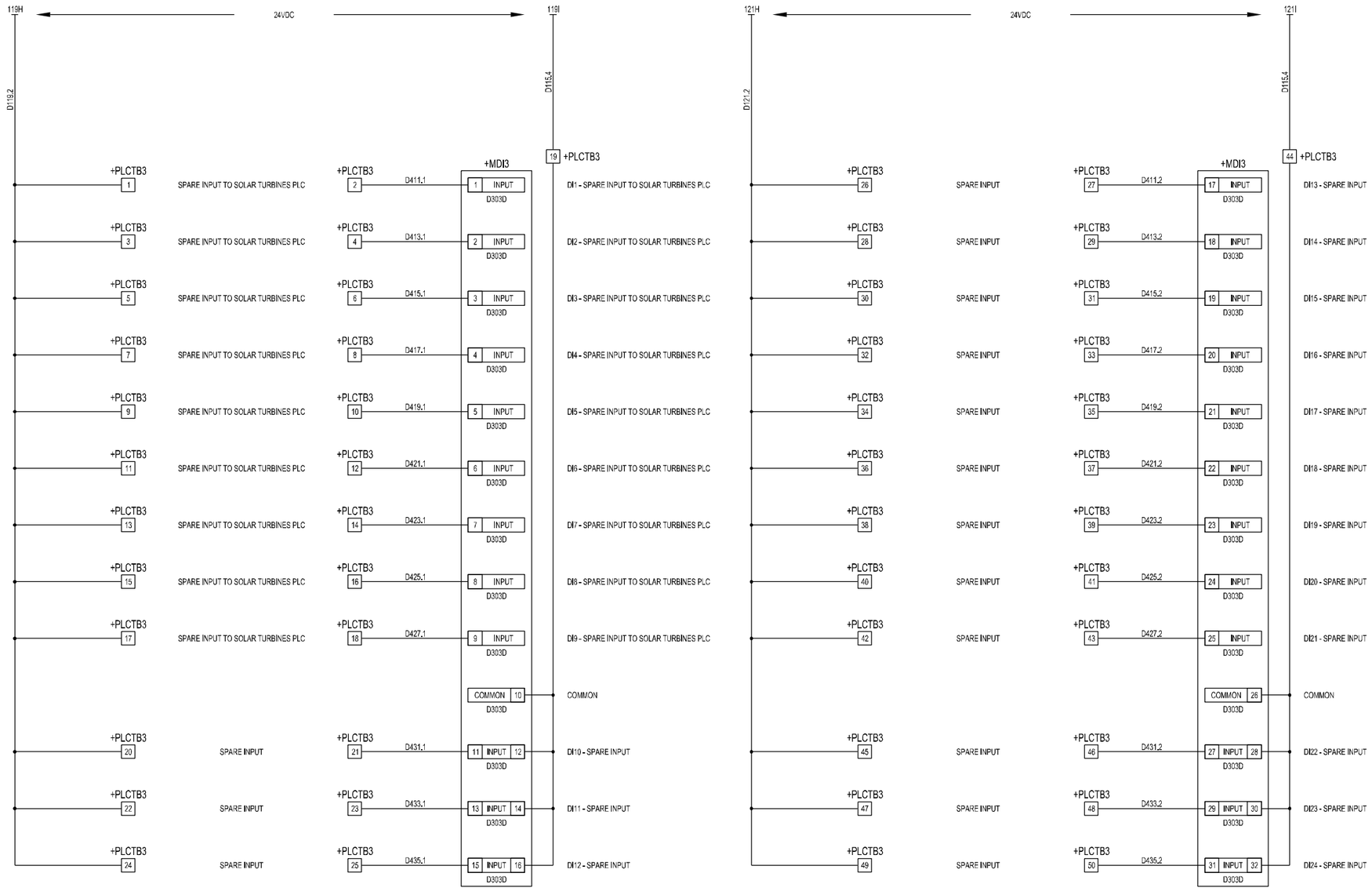
APPROVED	
APPROVED AS NOTED	
REVISE AND RESUBMIT	X
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

York Brogden 12/10/2022
JACOBS Date

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-02	3

11/03/22
2022-11-03T001100



NO.	REVISION	DATE	DFT	DES	PM	APP
A	ISSUED FOR APPROVAL	11/02/22	-	VR	CCS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

DIGITAL INPUT SCHEMATIC (3 OF 3)
THE REYNOLDS CO LLC
SOLAR TURBINE 7
PDCS ENCLOSURE

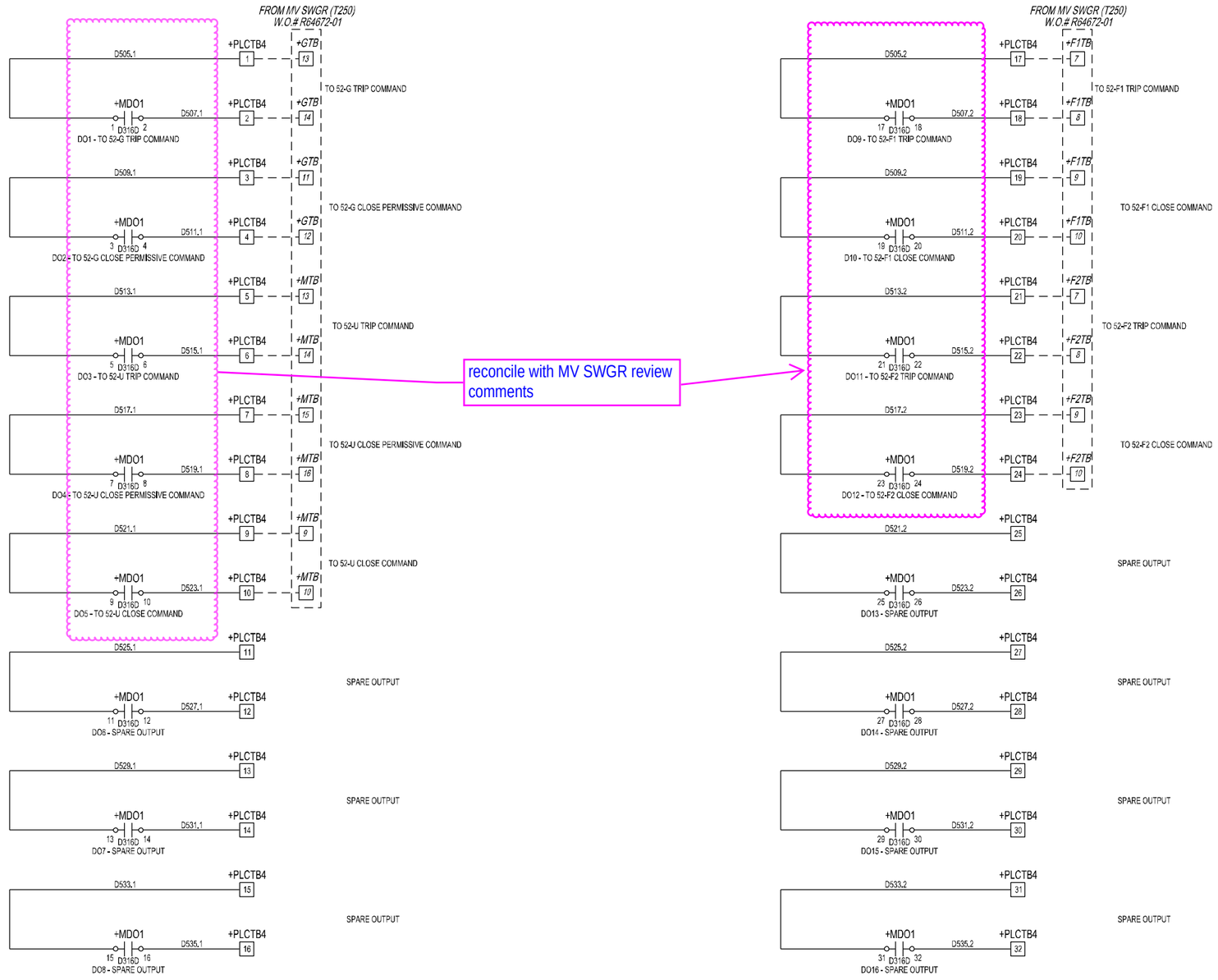
APPROVED		
APPROVED AS NOTED		
REVISE AND RESUBMIT		X
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

York Brogden — 12/10/2022
JACOBS — Date

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-02	4

11/03/22
2022-11-03T001104



<TYPICAL COMMENT> Evaluation of PDCS Input/Output (I/O) configuration is not possible by Jacobs due to the lack of an Approved PDCS I/O List from Solar.

APPROVED		
APPROVED AS NOTED		
REVISE AND RESUBMIT		X
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

York Brogden 12/10/2022

JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
A	ISSUED FOR APPROVAL	11/02/22	-	VR	CCS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM — www.PointEightPower.com — 800.284.1522

DIGITAL OUTPUT SCHEMATIC (1 OF 2)

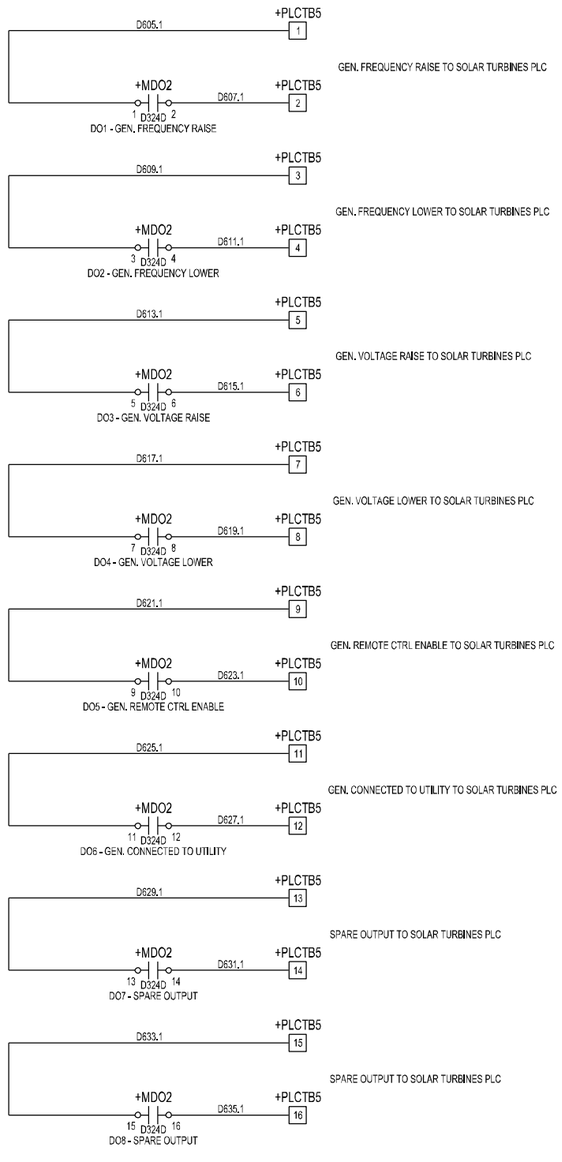
THE REYNOLDS CO LLC

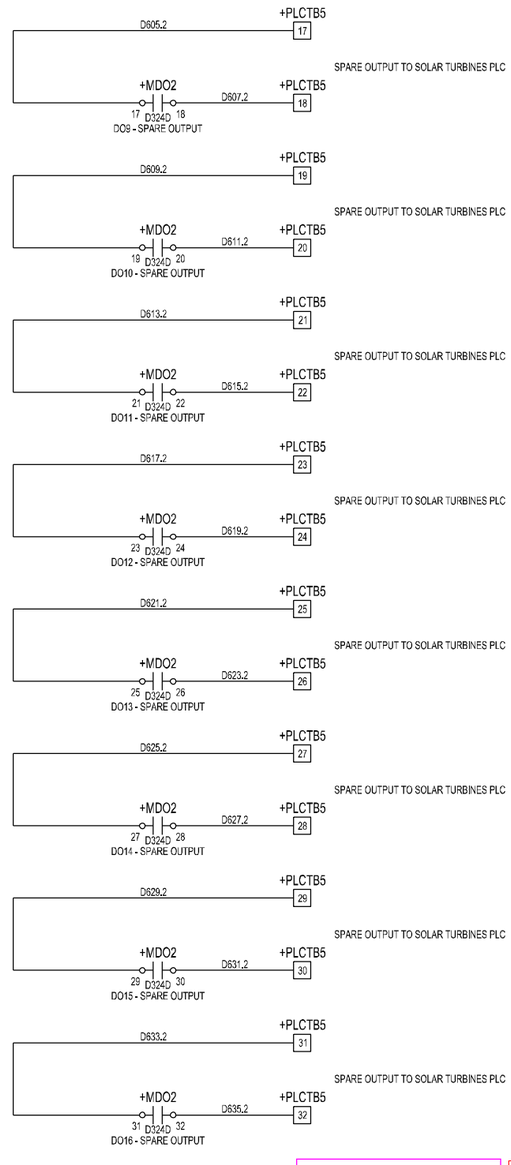
SOLAR TURBINE 7

PDCS ENCLOSURE

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-02	5

11/03/22
2022-11-03T001107





<TYPICAL COMMENT>
Evaluation of PDCS Input/Output (I/O) configuration is not possible by Jacobs due to the lack of an Approved PDCS I/O List from Solar.

APPROVED		
APPROVED AS NOTED		
REVISE AND RESUBMIT		X
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

York Brogden 12/10/2022
JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/02/22	-	VR	CCS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

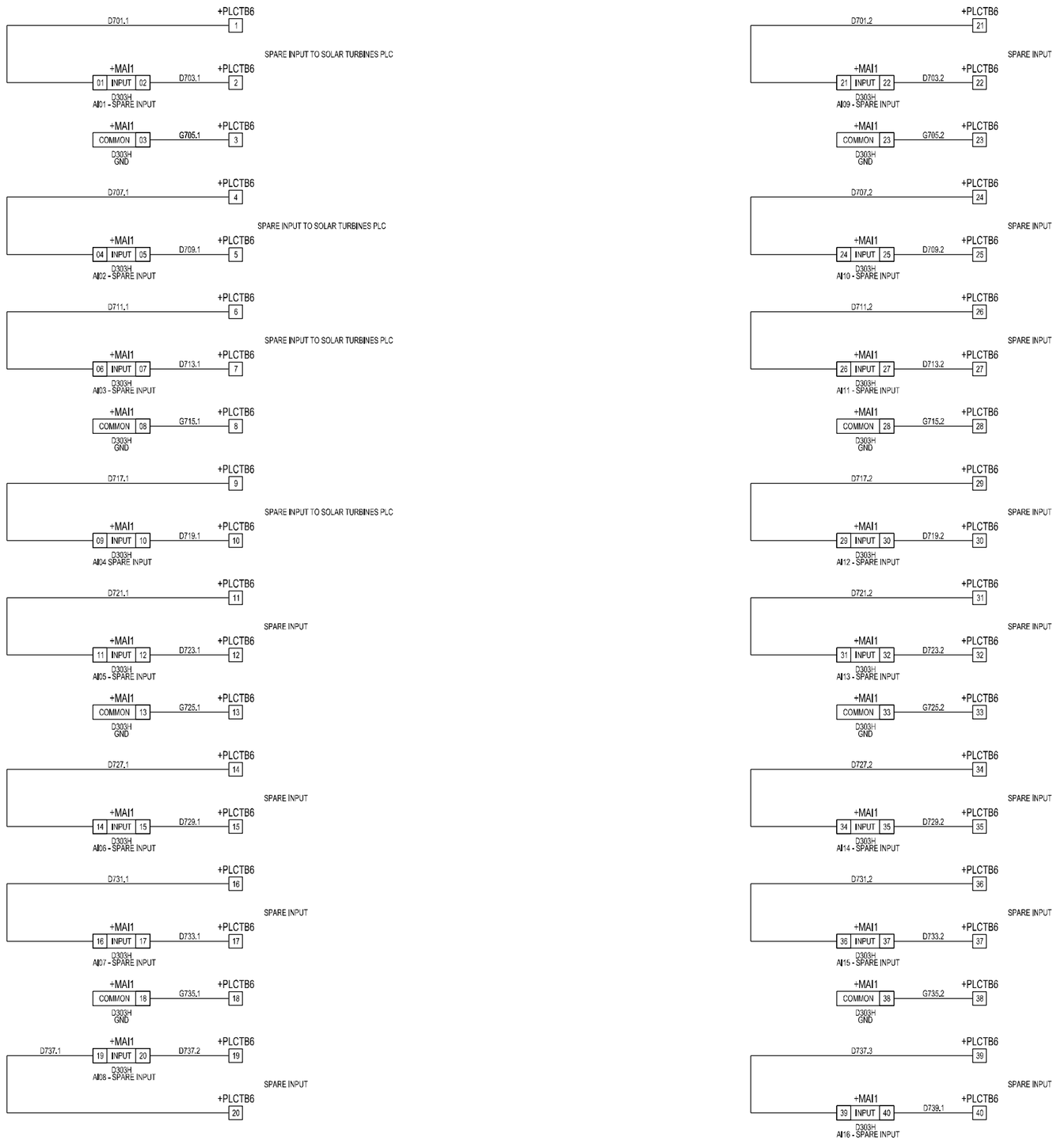
CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

DIGITAL OUTPUT SCHEMATIC (2 OF 2)
THE REYNOLDS CO LLC
SOLAR TURBINE 7
PDCS ENCLOSURE

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-02	6

11/03/22
2022-11-03T00:11:11



<TYPICAL COMMENT> Evaluation of PDCS Input/Output (I/O) configuration is not possible by Jacobs due to the lack of an Approved PDCS I/O List from Solar.

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/02/22	-	VR	CCS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM — www.PointEightPower.com — 800.284.1522

ANALOG INTPUT SCHEMATIC
THE REYNOLDS CO LLC
SOLAR TURBINE 7
PDCS ENCLOSURE

APPROVED		
APPROVED AS NOTED		
REVISE AND RESUBMIT		X
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

York Brogden — 12/10/2022
JACOBS — Date

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-02	7

11/03/22
2022-11-03T00:11:14

<TYPICAL COMMENT>
Evaluation of PDCS Input/Output (I/O) configuration is not possible by Jacobs due to the lack of an Approved PDCS I/O List from Solar.

APPROVED
APPROVED AS NOTED
REVISE AND RESUBMIT [X]
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

York Brogden 12/10/2022
JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
5	ISSUED FOR APPROVAL	11/02/22	-	VR	CCS	RG

NOTE: THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND.

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER
POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

ANALOG OUTPUT SCHEMATIC
THE REYNOLDS CO LLC
SOLAR TURBINE 7
PDCS ENCLOSURE

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-02	8

11/03/22
2022-11-03T08:11:18

+PLCTB

MCB1:1:D1102.1:14;GY	1	125VDC (TO T250 SWGR) W.O.# R64672-01
MCB1:3:D1105.5:14;GY	2	125VDC (TO T250 SWGR) W.O.# R64672-01
MCB6:1:D111.1:14;GY	3	24VDC (TO AUX-30 DC DIST)
MCB8:3:D111.2:14;GY	4	24VDC (TO AUX-30 DC DIST)
	5	SPARE
	6	SPARE

+PLCTB1

MCB4:2:D123.1:18;GY,PLCTB1:3:D123.1:18;GY	1	52-G BREAKER STATUS
MDI1:1:D211.1:18;GY	2	52-G BREAKER STATUS
PLCTB1:5:D123.1:18;GY,PLCTB1:1:D123.1:18;GY	3	52-G BREAKER READY STATUS
MDI1:2:D213.1:18;GY	4	52-G BREAKER READY STATUS
PLCTB1:7:D123.1:18;GY,PLCTB1:3:D123.1:18;GY	5	52-G ALARM STATUS
MDI1:3:D215.1:18;GY	6	52-G ALARM STATUS
PLCTB1:9:D123.1:18;GY,PLCTB1:5:D123.1:18;GY	7	52-G LOCAL STATUS
MDI1:4:D217.1:18;GY	8	52-G LOCAL STATUS
PLCTB1:11:D123.1:18;GY,PLCTB1:7:D123.1:18;GY	9	52-G 86 TRIP STATUS
MDI1:5:D219.1:18;GY	10	52-G 86 TRIP STATUS
PLCTB1:13:D123.1:18;GY,PLCTB1:9:D123.1:18;GY	11	52-G BREAKER STATUS
MDI1:6:D221.1:18;GY	12	52-G BREAKER STATUS
PLCTB1:15:D123.1:18;GY,PLCTB1:11:D123.1:18;GY	13	52-U BREAKER STATUS
MDI1:7:D223.1:18;GY	14	52-U BREAKER STATUS
PLCTB1:17:D123.1:18;GY,PLCTB1:13:D123.1:18;GY	15	52-U BREAKER READY STATUS
MDI1:8:D225.1:18;GY	16	52-U BREAKER READY STATUS
PLCTB1:20:D123.1:18;GY,PLCTB1:15:D123.1:18;GY	17	52-U ALARM STATUS
MDI1:9:D227.1:18;GY	18	52-U ALARM STATUS
MDI1:10:D115.2:18;GY	19	PLCTB1:44 :E :D115.2:18;GY,MPC2:2[-N] :D115.2:18;GY
PLCTB1:22:D123.1:18;GY,PLCTB1:17:D123.1:18;GY	20	52-U LOCAL STATUS
MDI1:11:D231.1:18;GY	21	52-U LOCAL STATUS
PLCTB1:24:D123.1:18;GY,PLCTB1:20:D123.1:18;GY	22	52-U 86 TRIP STATUS
MDI1:13:D233.1:18;GY	23	52-U 86 TRIP STATUS
PLCTB1:22:D123.1:18;GY	24	52-U BREAKER STATUS
MDI1:15:D235.1:18;GY	25	52-U BREAKER STATUS
MCB5:2:D125.1:18;GY,PLCTB1:28:D125.1:18;GY	26	52-F1 BREAKER STATUS
MDI1:17:D211.2:18;GY	27	52-F1 BREAKER STATUS
PLCTB1:26:D125.1:18;GY,PLCTB1:30:D125.1:18;GY	28	52-F1 BREAKER READY STATUS
MDI1:18:D213.2:18;GY	29	52-F1 BREAKER READY STATUS
PLCTB1:32:D125.1:18;GY,PLCTB1:28:D125.1:18;GY	30	52-F1 ALARM STATUS
MDI1:19:D215.2:18;GY	31	52-F1 ALARM STATUS
PLCTB1:34:D125.1:18;GY,PLCTB1:30:D125.1:18;GY	32	52-F1 LOCAL STATUS
MDI1:20:D217.2:18;GY	33	52-F1 LOCAL STATUS
PLCTB1:36:D125.1:18;GY,PLCTB1:32:D125.1:18;GY	34	52-F1 86 TRIP STATUS
MDI1:21:D219.2:18;GY	35	52-F1 86 TRIP STATUS
PLCTB1:38:D125.1:18;GY,PLCTB1:34:D125.1:18;GY	36	52-F1 BREAKER STATUS
MDI1:22:D221.2:18;GY	37	52-F1 BREAKER STATUS
PLCTB1:40:D125.1:18;GY,PLCTB1:36:D125.1:18;GY	38	52-F2 BREAKER STATUS
MDI1:23:D223.2:18;GY	39	52-F2 BREAKER STATUS
PLCTB1:42:D125.1:18;GY,PLCTB1:38:D125.1:18;GY	40	52-F2 BREAKER READY STATUS
MDI1:24:D225.2:18;GY	41	52-F2 BREAKER READY STATUS
PLCTB1:45:D125.1:18;GY,PLCTB1:40:D125.1:18;GY	42	52-F2 ALARM STATUS
MDI1:25:D227.2:18;GY	43	52-F2 ALARM STATUS
MDI1:26:D115.2:18;GY	44	PLCTB1:19 :E :D115.2:18;GY,PLCTB2:19 :E :D115.2:18;GY
PLCTB1:47:D125.1:18;GY,PLCTB1:42:D125.1:18;GY	45	52-F2 LOCAL STATUS
MDI1:27:D231.2:18;GY	46	52-F2 LOCAL STATUS
PLCTB1:49:D125.1:18;GY,PLCTB1:45:D125.1:18;GY	47	52-F2 86 TRIP STATUS
MDI1:29:D233.2:18;GY	48	52-F2 86 TRIP STATUS
PLCTB1:47:D125.1:18;GY	49	52-F2 BREAKER STATUS
MDI1:31:D235.2:18;GY	50	52-F2 BREAKER STATUS

reconcile with MV SWGR review comments

+PLCTB2

MCB6:2:D127.1:18;GY,PLCTB2:3:D127.1:18;GY	1	SPARE INPUT
MDI2:1:D311.1:18;GY	2	SPARE INPUT
PLCTB2:5:D127.1:18;GY,PLCTB2:1:D127.1:18;GY	3	SPARE INPUT
MDI2:2:D313.1:18;GY	4	SPARE INPUT
PLCTB2:7:D127.1:18;GY,PLCTB2:3:D127.1:18;GY	5	SPARE INPUT
MDI2:3:D315.1:18;GY	6	SPARE INPUT
PLCTB2:9:D127.1:18;GY,PLCTB2:5:D127.1:18;GY	7	SPARE INPUT
MDI2:4:D317.1:18;GY	8	SPARE INPUT
PLCTB2:11:D127.1:18;GY,PLCTB2:7:D127.1:18;GY	9	SPARE INPUT
MDI2:5:D319.1:18;GY	10	SPARE INPUT
PLCTB2:13:D127.1:18;GY,PLCTB2:9:D127.1:18;GY	11	SPARE INPUT
MDI2:6:D321.1:18;GY	12	SPARE INPUT
PLCTB2:15:D127.1:18;GY,PLCTB2:11:D127.1:18;GY	13	SPARE INPUT
MDI2:7:D323.1:18;GY	14	SPARE INPUT
PLCTB2:17:D127.1:18;GY,PLCTB2:13:D127.1:18;GY	15	SPARE INPUT
MDI2:8:D325.1:18;GY	16	SPARE INPUT
PLCTB2:20:D127.1:18;GY,PLCTB2:15:D127.1:18;GY	17	SPARE INPUT
MDI2:9:D327.1:18;GY	18	SPARE INPUT
MDI2:10:D115.2:18;GY	19	PLCTB1:44 :E :D115.2:18;GY,PLCTB2:44 :E :D115.2:18;GY
PLCTB2:22:D127.1:18;GY,PLCTB2:17:D127.1:18;GY	20	SPARE INPUT
MDI2:11:D331.1:18;GY	21	SPARE INPUT
PLCTB2:24:D127.1:18;GY,PLCTB2:20:D127.1:18;GY	22	SPARE INPUT
MDI2:13:D333.1:18;GY	23	SPARE INPUT
PLCTB2:22:D127.1:18;GY	24	SPARE INPUT
MDI2:15:D335.1:18;GY	25	SPARE INPUT
MCB7:2:D129.1:18;GY,PLCTB2:28:D129.1:18;GY	26	SPARE INPUT
MDI2:17:D311.2:18;GY	27	SPARE INPUT
PLCTB2:30:D129.1:18;GY,PLCTB2:26:D129.1:18;GY	28	SPARE INPUT
MDI2:18:D313.2:18;GY	29	SPARE INPUT
PLCTB2:32:D129.1:18;GY,PLCTB2:28:D129.1:18;GY	30	SPARE INPUT
MDI2:19:D315.2:18;GY	31	SPARE INPUT
PLCTB2:34:D129.1:18;GY,PLCTB2:30:D129.1:18;GY	32	SPARE INPUT
MDI2:20:D317.2:18;GY	33	SPARE INPUT
PLCTB2:36:D129.1:18;GY,PLCTB2:32:D129.1:18;GY	34	SPARE INPUT
MDI2:21:D319.2:18;GY	35	SPARE INPUT
PLCTB2:38:D129.1:18;GY,PLCTB2:34:D129.1:18;GY	36	SPARE INPUT
MDI2:22:D321.2:18;GY	37	SPARE INPUT
PLCTB2:40:D129.1:18;GY,PLCTB2:36:D129.1:18;GY	38	SPARE INPUT
MDI2:23:D323.2:18;GY	39	SPARE INPUT
PLCTB2:42:D129.1:18;GY,PLCTB2:38:D129.1:18;GY	40	SPARE INPUT
MDI2:24:D325.2:18;GY	41	SPARE INPUT
PLCTB2:45:D129.1:18;GY,PLCTB2:40:D129.1:18;GY	42	SPARE INPUT
MDI2:25:D327.2:18;GY	43	SPARE INPUT
MDI2:26:D115.2:18;GY	44	PLCTB2:19 :E :D115.2:18;GY
PLCTB2:47:D129.1:18;GY,PLCTB2:42:D129.1:18;GY	45	SPARE INPUT
MDI2:27:D331.2:18;GY	46	SPARE INPUT
PLCTB2:49:D129.1:18;GY,PLCTB2:45:D129.1:18;GY	47	SPARE INPUT
MDI2:29:D333.2:18;GY	48	SPARE INPUT
PLCTB2:47:D129.1:18;GY	49	SPARE INPUT
MDI2:31:D335.2:18;GY	50	SPARE INPUT

+PLCTB3

MCB9:2:D119.2:18;GY,PLCTB3:3:D119.2:18;GY	1	SPARE INPUT TO SOLAR TURBINES PLC
MDI3:1:D411.1:14;GY	2	SPARE INPUT TO SOLAR TURBINES PLC
PLCTB3:5:D119.2:18;GY,PLCTB3:1:D119.2:18;GY	3	SPARE INPUT TO SOLAR TURBINES PLC
MDI3:2:D413.1:14;GY	4	SPARE INPUT TO SOLAR TURBINES PLC
PLCTB3:7:D119.2:18;GY,PLCTB3:3:D119.2:18;GY	5	SPARE INPUT TO SOLAR TURBINES PLC
MDI3:3:D415.1:14;GY	6	SPARE INPUT TO SOLAR TURBINES PLC
PLCTB3:9:D119.2:18;GY,PLCTB3:5:D119.2:18;GY	7	SPARE INPUT TO SOLAR TURBINES PLC
MDI3:4:D417.1:14;GY	8	SPARE INPUT TO SOLAR TURBINES PLC
PLCTB3:11:D119.2:18;GY,PLCTB3:7:D119.2:18;GY	9	SPARE INPUT TO SOLAR TURBINES PLC
MDI3:5:D419.1:14;GY	10	SPARE INPUT TO SOLAR TURBINES PLC
PLCTB3:13:D119.2:18;GY,PLCTB3:9:D119.2:18;GY	11	SPARE INPUT TO SOLAR TURBINES PLC
MDI3:6:D421.1:14;GY	12	SPARE INPUT TO SOLAR TURBINES PLC
PLCTB3:15:D119.2:18;GY,PLCTB3:11:D119.2:18;GY	13	SPARE INPUT TO SOLAR TURBINES PLC
MDI3:7:D423.1:14;GY	14	SPARE INPUT TO SOLAR TURBINES PLC
PLCTB3:17:D119.2:18;GY,PLCTB3:13:D119.2:18;GY	15	SPARE INPUT TO SOLAR TURBINES PLC
MDI3:8:D425.1:14;GY	16	SPARE INPUT TO SOLAR TURBINES PLC
PLCTB3:20:D119.2:18;GY,PLCTB3:15:D119.2:18;GY	17	SPARE INPUT TO SOLAR TURBINES PLC
MDI3:9:D427.1:14;GY	18	SPARE INPUT TO SOLAR TURBINES PLC
MDI3:10:D115.4:18;GY	19	PLCTB3:44 :E :D115.4:18;GY,MHMI :- :D115.4:18;GY
PLCTB3:22:D119.2:18;GY,PLCTB3:17:D119.2:18;GY	20	SPARE INPUT
MDI3:11:D431.1:14;GY	21	SPARE INPUT
PLCTB3:24:D119.2:18;GY,PLCTB3:20:D119.2:18;GY	22	SPARE INPUT
MDI3:13:D433.1:14;GY	23	SPARE INPUT
PLCTB3:22:D119.2:18;GY	24	SPARE INPUT
MDI3:15:D435.1:14;GY	25	SPARE INPUT
MCB10:2:D121.2:18;GY,PLCTB3:28:D121.2:18;GY	26	SPARE INPUT
MDI3:17:D411.2:14;GY	27	SPARE INPUT
PLCTB3:30:D121.2:18;GY,PLCTB3:26:D121.2:18;GY	28	SPARE INPUT
MDI3:18:D413.2:14;GY	29	SPARE INPUT
PLCTB3:32:D121.2:18;GY,PLCTB3:28:D121.2:18;GY	30	SPARE INPUT
MDI3:19:D415.2:14;GY	31	SPARE INPUT
PLCTB3:34:D121.2:18;GY,PLCTB3:30:D121.2:18;GY	32	SPARE INPUT
MDI3:20:D417.2:14;GY	33	SPARE INPUT
PLCTB3:36:D121.2:18;GY,PLCTB3:32:D121.2:18;GY	34	SPARE INPUT
MDI3:21:D419.2:14;GY	35	SPARE INPUT
PLCTB3:38:D121.2:18;GY,PLCTB3:34:D121.2:18;GY	36	SPARE INPUT
MDI3:22:D421.2:14;GY	37	SPARE INPUT
PLCTB3:40:D121.2:18;GY,PLCTB3:36:D121.2:18;GY	38	SPARE INPUT
MDI3:23:D423.2:14;GY	39	SPARE INPUT
PLCTB3:42:D121.2:18;GY,PLCTB3:38:D121.2:18;GY	40	SPARE INPUT
MDI3:24:D425.2:14;GY	41	SPARE INPUT
PLCTB3:45:D121.2:18;GY,PLCTB3:40:D121.2:18;GY	42	SPARE INPUT
MDI3:25:D427.2:14;GY	43	SPARE INPUT
MDI3:26:D115.4:18;GY	44	PLCTB3:19 :E :D115.4:18;GY
PLCTB3:47:D121.2:18;GY,PLCTB3:42:D121.2:18;GY	45	SPARE INPUT
MDI3:27:D431.2:14;GY	46	SPARE INPUT
PLCTB3:49:D121.2:18;GY,PLCTB3:45:D121.2:18;GY	47	SPARE INPUT
MDI3:29:D433.2:14;GY	48	SPARE INPUT
PLCTB3:47:D121.2:18;GY	49	SPARE INPUT
MDI3:31:D435.2:14;GY	50	SPARE INPUT

<TYPICAL COMMENT>
Evaluation of PDCS Input/Output (I/O) configuration is not possible by Jacobs due to the lack of an Approved PDCS I/O List from Solar.

NO.	REVISION	DATE	DFT	DES	PM	APP
6A	ISSUED FOR APPROVAL	11/02/22	-	VR	CCS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

TERMINAL BLOCK LAYOUT (1 OF 2)
THE REYNOLDS CO LLC
SOLAR TURBINE ?
PDCS ENCLOSURE

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-02	9

11/03/22
2022-11-03T00:11:25

APPROVED
APPROVED AS NOTED
REVISE AND RESUBMIT [X]
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

York Brogden 12/10/2022
JACOBS Date

+PLCTB4

MDO1:1:D505.1:14:GY	1	TO 52-G TRIP COMMAND
MDO1:2:D507.1:14:GY	2	TO 52-G TRIP COMMAND
MDO1:3:D509.1:14:GY	3	TO 52-G CLOSE PERMISSIVE COMMAND
MDO1:4:D511.1:14:GY	4	TO 52-G CLOSE PERMISSIVE COMMAND
MDO1:5:D513.1:14:GY	5	TO 52-U TRIP COMMAND
MDO1:6:D515.1:14:GY	6	TO 52-U TRIP COMMAND
MDO1:7:D517.1:14:GY	7	TO 52-U CLOSE PERMISSIVE COMMAND
MDO1:8:D519.1:14:GY	8	TO 52-U CLOSE PERMISSIVE COMMAND
MDO1:9:D521.1:14:GY	9	TO 52-U CLOSE COMMAND
MDO1:10:D523.1:14:GY	10	TO 52-U CLOSE COMMAND
MDO1:11:D525.1:14:GY	11	SPARE OUTPUT
MDO1:12:D527.1:14:GY	12	SPARE OUTPUT
MDO1:13:D529.1:14:GY	13	SPARE OUTPUT
MDO1:14:D531.1:14:GY	14	SPARE OUTPUT
MDO1:15:D533.1:14:GY	15	SPARE OUTPUT
MDO1:16:D535.1:14:GY	16	SPARE OUTPUT
MDO1:17:D505.2:14:GY	17	TO 52-F1 TRIP COMMAND
MDO1:18:D507.2:14:GY	18	TO 52-F1 TRIP COMMAND
MDO1:19:D509.2:14:GY	19	TO 52-F1 CLOSE COMMAND
MDO1:20:D511.2:14:GY	20	TO 52-F1 CLOSE COMMAND
MDO1:21:D513.2:14:GY	21	TO 52-F2 TRIP COMMAND
MDO1:22:D515.2:14:GY	22	TO 52-F2 TRIP COMMAND
MDO1:23:D517.2:14:GY	23	TO 52-F2 CLOSE COMMAND
MDO1:24:D519.2:14:GY	24	TO 52-F2 CLOSE COMMAND
MDO1:25:D521.2:14:GY	25	SPARE OUTPUT
MDO1:26:D523.2:14:GY	26	SPARE OUTPUT
MDO1:27:D525.2:14:GY	27	SPARE OUTPUT
MDO1:28:D527.2:14:GY	28	SPARE OUTPUT
MDO1:29:D529.2:14:GY	29	SPARE OUTPUT
MDO1:30:D531.2:14:GY	30	SPARE OUTPUT
MDO1:31:D533.2:14:GY	31	SPARE OUTPUT
MDO1:32:D535.2:14:GY	32	SPARE OUTPUT

reconcile with MV SWGR review comments

+PLCTB5

MDO2:1:D605.1:14:GY	1	GEN. FREQUENCY RAISE TO SOLAR TURBINES PLC
MDO2:2:D607.1:14:GY	2	GEN. FREQUENCY RAISE TO SOLAR TURBINES PLC
MDO2:3:D609.1:14:GY	3	GEN. FREQUENCY LOWER TO SOLAR TURBINES PLC
MDO2:4:D611.1:14:GY	4	GEN. FREQUENCY LOWER TO SOLAR TURBINES PLC
MDO2:5:D613.1:14:GY	5	GEN. VOLTAGE RAISE TO SOLAR TURBINES PLC
MDO2:6:D615.1:14:GY	6	GEN. VOLTAGE RAISE TO SOLAR TURBINES PLC
MDO2:7:D617.1:14:GY	7	GEN. VOLTAGE LOWER TO SOLAR TURBINES PLC
MDO2:8:D619.1:14:GY	8	GEN. VOLTAGE LOWER TO SOLAR TURBINES PLC
MDO2:9:D621.1:14:GY	9	GEN. REMOTE CTRL ENABLE TO SOLAR TURBINES PLC
MDO2:10:D623.1:14:GY	10	GEN. REMOTE CTRL ENABLE TO SOLAR TURBINES PLC
MDO2:11:D625.1:14:GY	11	GEN. CONNECTED TO UTILITY TO SOLAR TURBINES PLC
MDO2:12:D627.1:14:GY	12	GEN. CONNECTED TO UTILITY TO SOLAR TURBINES PLC
MDO2:13:D629.1:14:GY	13	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:14:D631.1:14:GY	14	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:15:D633.1:14:GY	15	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:16:D635.1:14:GY	16	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:17:D605.2:14:GY	17	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:18:D607.2:14:GY	18	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:19:D609.2:14:GY	19	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:20:D611.2:14:GY	20	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:21:D613.2:14:GY	21	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:22:D615.2:14:GY	22	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:23:D617.2:14:GY	23	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:24:D619.2:14:GY	24	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:25:D621.2:14:GY	25	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:26:D623.2:14:GY	26	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:27:D625.2:14:GY	27	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:28:D627.2:14:GY	28	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:29:D629.2:14:GY	29	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:30:D631.2:14:GY	30	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:31:D633.2:14:GY	31	SPARE OUTPUT TO SOLAR TURBINES PLC
MDO2:32:D635.2:14:GY	32	SPARE OUTPUT TO SOLAR TURBINES PLC

+PLCTB6

MAI1:01:D701.1:14:GY	1	SPARE INPUT TO SOLAR TURBINES PLC
MAI1:02:D703.1:14:GY	2	SPARE INPUT TO SOLAR TURBINES PLC
MAI1:03:G705.1:14:GN	3	SPARE INPUT TO SOLAR TURBINES PLC
MAI1:04:D707.1:14:GY	4	SPARE INPUT TO SOLAR TURBINES PLC
MAI1:05:D709.1:14:GY	5	SPARE INPUT TO SOLAR TURBINES PLC
MAI1:06:D711.1:14:GY	6	SPARE INPUT TO SOLAR TURBINES PLC
MAI1:07:D713.1:14:GY	7	SPARE INPUT TO SOLAR TURBINES PLC
MAI1:08:G715.1:14:GN	8	SPARE INPUT TO SOLAR TURBINES PLC
MAI1:09:D717.1:14:GY	9	SPARE INPUT TO SOLAR TURBINES PLC
MAI1:10:D719.1:14:GY	10	SPARE INPUT TO SOLAR TURBINES PLC
MAI1:11:D721.1:14:GY	11	SPARE INPUT
MAI1:12:D723.1:14:GY	12	SPARE INPUT
MAI1:13:G725.1:14:GN	13	SPARE INPUT
MAI1:14:D727.1:14:GY	14	SPARE INPUT
MAI1:15:D729.1:14:GY	15	SPARE INPUT
MAI1:16:D731.1:14:GY	16	SPARE INPUT
MAI1:17:D733.1:14:GY	17	SPARE INPUT
MAI1:18:G735.1:14:GN	18	SPARE INPUT
MAI1:20:D737.2:14:GY	19	SPARE INPUT
MAI1:19:D737.1:14:GY	20	SPARE INPUT
MAI1:21:D701.2:14:GY	21	SPARE INPUT
MAI1:22:D703.2:14:GY	22	SPARE INPUT
MAI1:23:G705.2:14:GN	23	SPARE INPUT
MAI1:24:D707.2:14:GY	24	SPARE INPUT
MAI1:25:D709.2:14:GY	25	SPARE INPUT
MAI1:26:D711.2:14:GY	26	SPARE INPUT
MAI1:27:D713.2:14:GY	27	SPARE INPUT
MAI1:28:G715.2:14:GN	28	SPARE INPUT
MAI1:29:D717.2:14:GY	29	SPARE INPUT
MAI1:30:D719.2:14:GY	30	SPARE INPUT
MAI1:31:D721.2:14:GY	31	SPARE INPUT
MAI1:32:D723.2:14:GY	32	SPARE INPUT
MAI1:33:G725.2:14:GN	33	SPARE INPUT
MAI1:34:D727.2:14:GY	34	SPARE INPUT
MAI1:35:D729.2:14:GY	35	SPARE INPUT
MAI1:36:D731.2:14:GY	36	SPARE INPUT
MAI1:37:D733.2:14:GY	37	SPARE INPUT
MAI1:38:G735.2:14:GN	38	SPARE INPUT
MAI1:39:D737.3:14:GY	39	SPARE INPUT
MAI1:40:D739.1:14:GY	40	SPARE INPUT

+PLCTB7

MAO1:01:D609.1:14:GY	1	SPARE OUTPUT TO SOLAR TURBINES PLC
MAO1:02:D611.1:14:GY	2	SPARE OUTPUT TO SOLAR TURBINES PLC
MAO1:03:G613.1:14:GN	3	SPARE OUTPUT TO SOLAR TURBINES PLC
MAO1:04:D615.1:14:GY	4	SPARE OUTPUT TO SOLAR TURBINES PLC
MAO1:05:D617.1:14:GY	5	SPARE OUTPUT TO SOLAR TURBINES PLC
MAO1:06:D619.1:14:GY	6	SPARE OUTPUT TO SOLAR TURBINES PLC
MAO1:07:D621.1:14:GY	7	SPARE OUTPUT TO SOLAR TURBINES PLC
MAO1:08:G623.1:14:GN	8	SPARE OUTPUT TO SOLAR TURBINES PLC
MAO1:09:D625.1:14:GY	9	SPARE OUTPUT TO SOLAR TURBINES PLC
MAO1:10:D627.1:14:GY	10	SPARE OUTPUT TO SOLAR TURBINES PLC
MAO1:11:D609.2:14:GY	11	SPARE OUTPUT
MAO1:12:D611.2:14:GY	12	SPARE OUTPUT
MAO1:13:G613.2:14:GN	13	SPARE OUTPUT
MAO1:14:D615.2:14:GY	14	SPARE OUTPUT
MAO1:15:D617.2:14:GY	15	SPARE OUTPUT
MAO1:16:D619.2:14:GY	16	SPARE OUTPUT
MAO1:17:D621.2:14:GY	17	SPARE OUTPUT
MAO1:18:G623.2:14:GN	18	SPARE OUTPUT
MAO1:19:D625.2:14:GY	19	SPARE OUTPUT
MAO1:20:D627.2:14:GY	20	SPARE OUTPUT

<TYPICAL COMMENT>
Evaluation of PDCS Input/Output (I/O) configuration is not possible by Jacobs due to the lack of an Approved PDCS I/O List from Solar.

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/02/22	-	VR	CCS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM — www.PointEightPower.com — 800.284.1522

APPROVED	
APPROVED AS NOTED	
REVISE AND RESUBMIT	X
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

York Brogden — 12/10/2022
JACOBS — Date

TERMINAL BLOCK LAYOUT (2 OF 2)
THE REYNOLDS CO LLC
SOLAR TURBINE 7
PDCS ENCLOSURE

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-02	10

11/03/22
2022-11-03T00:12:59

REFERENCE DESIGNATOR SYMBOL LEGEND

CABLES

W COAX

W (CONSOLE) C WIRE ID

W (PACKAGE) P WIRE ID

W (COMMUNICATION) WIRE ID

XC (INTERCONNECT) WIRE ID

CAPACITOR

CX

CIRCUIT BREAKER

OS LI LD — LI = LINE, LD = LOAD

CONTACTS

NORMALLY CLOSED

NORMALLY OPEN

RELAY COILS

KA A1 A2 (TYPICAL)

KT A1 A2 B1 (TIMER)

DIODES

VD BLOCKING

VZ ZENER

XT T1 T2 B1 B2 (TERMINAL BLOCK)

FUSES

FU LI AMP LD

GROUNDS

IEG INSTRUMENT EARTH

PEG POWER EARTH

FG FRAME OR CHASSIS

GR DIN RAIL MOUNTED

HEATERS

H

SOLENOIDS

SV

SV VD SUPPRESSED

TEMPERATURE ELEMENTS

TE RESISTIVE

TE (+) (-) THERMOCOUPLE

RESISTORS

RR (TYPICAL)

RR CONTROL NET (END OF LINE)

INTRINSIC SAFETY ISOLATOR

UAI 5 6 4 7c 8c IE

POWER OUTLET

L N PE

SWITCHES

PS NO C NC HI PRESSURE

PDS LO NO C NC HI PRESSURE (DIFFERENTIAL)

ZS NO C NC LIMIT/PROXIMITY

LS NO C NC LEVEL

TS NO C NC TEMPERATURE

VS NO C NC VIBRATION

PUSHBUTTONS

SB C NO MAINTAINED (NORMAL OPEN)

SB C NO MOMENTARY (NORMAL OPEN)

SH C NO LIGHTED (NORMAL OPEN)

SB C NC MAINTAINED (NORMAL CLOSE)

SB C NC MOMENTARY (NORMAL CLOSE)

SH C NC LIGHTED (NORMAL CLOSE)

SELECTOR POSITION

SA C NO POSITION-LEFT (NORMAL OPEN)

SA C NO POSITION-CENTER (NORMAL OPEN)

SA C NO POSITION-RIGHT (NORMAL OPEN)

SA C NC POSITION-LEFT (NORMAL CLOSE)

SA C NC POSITION-CENTER (NORMAL CLOSE)

SA C NC POSITION-RIGHT (NORMAL CLOSE)

LIGHTS

HL 1 A 2 VISUAL ALARM (SIGNALING)

HAL R ACOUSTIC/VISUAL ALARM (SIGNALING)

EL W LIGHTING (OVERHEAD)

COLORS

A = AMBER C = CLEAR R = RED
B = BLUE G = GREEN W = WHITE

I/O CHANNEL

AF 4 CONNECTION: Ø0 I+ NODE: SLOT: CHANNEL: I/O TAG: | Ø2 SIG(L) | Ø3 SIG(-) | 16 GND

AF 3 CONNECTION: 41 V+ NODE: SLOT: CHANNEL: I/O TAG: | Ø6 SIG | 23 COM

AF 2 CONNECTION: 12 SIG NODE: SLOT: CHANNEL: I/O TAG: | 23 COM

MISCELLANEOUS

ZONE/LOC FROM DEVICE

ZONE/LOC TO DEVICE

CIRCUIT CONTINUED

WIRE JUMPER Jx CIRCUIT BREAK

FLOATING WIRE FLTG NOT USED

SOLAR WIRE

CUSTOMER/INTERCONNECT WIRE

XP PIN CONNECTOR

XT 1 TERMINAL BLOCK

GENERAL SYMBOLS (TYPICAL CONNECTIONS) DEVICE ID 1 2 DEVICE ID 1 2

NOTES:

1. AC AND DC ELECTRICAL COMPONENTS ARE SHOWN IN THE DE-ENERGIZED POSITIONS, ALL POWER OFF (SHELF STATUS).
2. SOLAR BRANDED WIRE NUMBERS ARE USING UNIT CONTROL PANEL DEVICE TERMINATION POINTS AS PRIMARY REFERENCE WHEN AND IF AVAILABLE. EXAMPLE: AF0080:21 DEVICE ID = AF0080, PIN/CONNECTION = 21; CIRCUIT NUMBER "008021".
3. NOTE NOT USED
4. WIRE SHIELDING GROUNDS ARE PER SOLAR ES-2648. SHIELD CONTINUITY MUST BE MAINTAINED FOR TOTAL LENGTH OF SHIELD AND GROUNDED AT ONE POINT ONLY.
5. INPUT VOLTAGES SHOWN REPRESENT NOMINAL VALUES. PLUS OR MINUS TEN PERCENT VARIATION FROM THE VALUES SHOWN IS ACCEPTABLE.
6. RELAY SUPPRESSION DIODES AND TERMINAL STRIPS ARE NOT LISTED IN THE REFERENCE DESIGNATOR INDEX.

△7 CUSTOMER FURNISHED.

△8 SOLAR FURNISHED, LOOSE SHIPPED, FOR SITE INSTALLATION BY OTHERS, UNLESS OTHERWISE NOTED.

△9 SOLAR CONSTRUCTION SERVICES FURNISHED.

△10 CUSTOMER FURNISHED SAFETY CRITICAL INTERCONNECT: THIS HARDWARE INTERCONNECT FORMS PART OF SAFETY CRITICAL FUNCTION TO MEET SAFETY DESIGN REQUIREMENT

△11 NOTE NOT USED.

△12 CUSTOMER SUPPLIED CONTACT MUST BE WIRED SUCH THAT THIS CONTACT OPENS IN THE EVENT OF FIRE.

△13 CONTACTS TRANSFER UPON APPLICATION OF POWER SIGNAL/LOCAL RESET BUTTON. SYMBOL DRAWN IN ALARM CONDITION.

△14 THIS CIRCUIT NOT USED FOR THIS CONFIGURATION.

△15 INTRINSICALLY SAFE CIRCUITS MUST BE ISOLATED FROM NON-IS CIRCUITS AND ARE TYPICALLY LIGHT BLUE WIRES, LIGHT BLUE SLEEVED WIRES, OR LOCATED INSIDE LIGHT BLUE WIRE DUCT.

△16 THE INTRINSIC SAFE EARTH (IS) GROUND MUST BE DEDICATED AND CONNECTED IN THE MOST DIRECT POSSIBLE PATH TO A COMMON SITE EARTH ELECTRODE. THE MEASURED IMPEDANCE SHALL BE ONE (1) OHM OR LESS BETWEEN THE BUS AND EARTH ELECTRODE. THE CONNECTING WIRE BETWEEN THE IS BUS AND EARTH ELECTRODE SHALL NOT BE SMALLER THAN 4 AWG (25MM2).

△17 REMOVE PURPLE WIRES WHEN INSTALLING DEVICE. PURPLE WIRES "JPx" ARE INSTALLED IN PLACE OF COMPONENTS WHICH ARE TO BE FIELD INSTALLED. INPUT CONTACTS TO THE MALFUNCTION ANNUNCIATOR ARE CLOSED FOR NORMAL OPERATION, AND OPEN ON FAULT.

△18 SPEED SENSOR INTERNAL SHIELD IS ISOLATED FROM CASE.

△19 RELAY CONTACTS RATED FOR 6 AMPS CONTINUOUS CURRENT AND MAXIMUM SWITCHING VOLTAGE OF 250 V AC/DC.

△20 SERIAL DATA INTERFACE: FOR RS485/RS232/RS422 USE DB9 PIN CONNECTOR WITH TWO OR THREE CONDUCTOR SHIELDED CABLE. RJ45 TO DB9 MALE ADAPTER CABLE REQUIRED. ADDITIONAL 1454-9F ADAPTER, DB9 FEMALE TO SCREW TERMINAL OPTIONAL. FOR ALLEN BRADLEY DATA HIGHWAY PLUS PROTOCOL USE BELDEN 9463 OR COMPARABLE TWIN AXIAL CABLE

△21 MUST BE SUPPLIED FOR EACH PRIMARY POWER SOURCE CONNECTED TO SOLAR EQUIPMENT.

22. MAXIMUM CURRENT OUTPUT FROM A DISCRETE 16 CHANNEL OUTPUT MODULE IS 8 AMPS AT 24V DC. EACH CHANNEL IS LIMITED TO A MAXIMUM 1.0 AMP AT 24V DC. TOTAL CURRENT NOT TO EXCEED 8 AMPS PER MODULE.

△23 THESE CONTACTS ARE SHOWN FOR REFERENCE ONLY. REFER TO ELECTRICAL DRAWINGS OF WASTE HEAT RECOVERY SYSTEM (WHRS), MOTOR CONTROL CENTER, AND WATER TREATMENT FOR CONTROL LOGIC AND WIRING CONFIGURATION.

△24 INSTALL 75 OHM, 1/4 WATT, 5% CARBON RESISTOR, AT BOTH ENDS OF EACH CHANNEL NETWORK.

△25 TYPICAL CONNECTIONS SHOWN. SEE MOTOR CONTROL CENTER (MCC) DRAWING FOR SPECIFIC STARTER CONNECTION INFORMATION.

△26 SPEED ANALOG INPUT MODULE TERMINALS 1-9, 13-21, 25-40, ARE NOT AVAILABLE FOR USE.

△27 SEE MOTOR NAMEPLATE FOR CONNECTION INFORMATION.

△28 CONTACTS PROVIDED FOR LOW OIL LEVEL INTERLOCK OF OIL TANK HEATER CONTACTOR. INTERLOCK MUST BE OPERATIVE TO MEET REQUIREMENTS FOR N.E.C. CLASS I, GROUP D, DIVISION ONE, HAZARDOUS ATMOSPHERES.

29. NOTE NOT USED.

△30 MOTOR STARTER SHOWN IS TYPICAL FOR SOLAR P/N 190377 AND SHALL BE HEAVY DUTY, REDUCED VOLTAGE, NON REVERSING, NON DYNAMIC BRAKING TYPE USED WITH A CONSTANT SPEED, DC MOTOR OF THE HP SIZE AND SUPPLY VOLTAGE SHOWN. MOTOR LOAD IS A PUMP REQUIRING FREQUENT START ATTEMPTS. STARTER SHALL INCORPORATE A TIME-LIMIT ACCELERATION CONTROL, PREFERABLY FIELD ADJUSTABLE, AND HAVE A MINIMUM OF TWO ACCELERATING CONTACTORS. APPROXIMATE PERCENT OF FULL LOAD CURRENT ON THE FIRST STARTING POINT SHALL BE 200% MAXIMUM. THE LIMIT SET POINT SHALL BE 3 SECONDS FOR EACH ACCELERATING CONTACTOR. STARTER SHALL BE LOCATED ADJACENT TO THE BATTERY CHARGER LOAD PANEL. IF NOT POSSIBLE A FUSED DISCONNECT MAY BE REQUIRED NEAR THE STARTER FOR SAFETY AND MAINTENANCE PURPOSES. FOR FURTHER INFORMATION REFER TO APPLICABLE NEMA STANDARDS. PLUG-IN JUMPER TO BE INSTALLED IN EITHER TB1 (6-7) SO THAT MOTOR FAILS ON FOR LUBE OIL APPLICATIONS, OR IN TB1 (7-8) SO THAT MOTOR FAILS OFF FOR TURNING GEAR APPLICATIONS.

△31 NOTE NOT USED.

△32 SECONDARY WINDINGS SHORTED TO PROTECT CURRENT TRANSFORMERS PRIOR TO FIELD WIRING. REMOVE JUMPER AFTER INSTALLING INTERCONNECT WIRING.

△33 NOTE NOT USED.

△34 MAY BE FIELD MOUNTED WITH BATTERY CHARGER.

△35 SOLAR FURNISHED BATTERY CHARGERS HAVE THEIR DC OUTPUTS FACTORY PREADJUSTED.

△36 NOTE NOT USED

△37 CONTACTS 4 AND 5 TRANSFER TO CLOSE ON POWER UP AND TRANSFER BACK TO OPEN ON TRIP. CONTACTS 5 AND 6 TRANSFER TO OPEN ON POWER UP AND TRANSFER BACK TO CLOSED ON TRIP. INSTALL JUMPER J13 ON MONITOR CIRCUIT BOARD.

△38 POWER EARTH (PE) IS CONNECTED TO A GROUNDING BUS IN THE CONSOLE INTERIOR NEAR THE BOTTOM OF THE BOX. POWER EARTH IS A CLEAN GROUND DESIGNED TO ISOLATE ANY POWER DEVICE FROM THE MORE SENSITIVE INSTRUMENT EARTH. THE POWER EARTH BUS SHALL CONNECT TO THE SITE GROUNDING ROD PROVIDE FOR THE PACKAGE. THE CONNECTING WIRE BETWEEN THE POWER EARTH BUS AND THE GROUND ROD SHALL NOT BE SMALLER THAN 4 AWG (25MM2) AND SHALL MEASURE 5 OHMS OR LESS.

△39 INSTRUMENT EARTH (IE) CONNECTS THE SHIELDING FROM INSTRUMENT WIRING TO A QUIET GROUND. THE IE GROUND BUS MUST BE ISOLATED FROM THE POWER EARTH GROUND BUS AND FRAME GROUND AND SHALL BE CONNECTED TO THE COMMON SITE GROUNDING ROD PROVIDED FOR THE PACKAGE. THE CONNECTING WIRE BETWEEN INSTRUMENT EARTH BUS AND THE GROUND ROD SHALL NOT BE SMALLER THAN 4 AWG (25MM2) AND SHALL MEASURE 5 OHMS OR LESS.

△40 FRAME GROUND (FG) DEFINED: INTERIOR PANELS, DOORS AND THE CONTROL CONSOLE ALL SHARE THE FRAME GROUND. THE DOOR IS ATTACHED BY STRAP TO A LUG ON THE FLOOR OF THE CONSOLE. THE PANELS ARE GROUNDED BY THEIR MECHANICAL CONNECTION. THE INTERNAL GROUND LUG HAS A COMPLIMENTARY GROUND LUG OUTSIDE AND IS ATTACHED DURING CONTROL BOX INSTALLATION TO THE SKID GROUND LUG. THIS IS THEN ATTACHED TO THE SITE GROUNDING ROD PROVIDED FOR THE PACKAGE. THE WIRE BETWEEN FRAME GROUND STUD AND THE GROUND ROD SHALL NOT BE SMALLER THAN 4 AWG (25MM2) AND SHALL MEASURE 5 OHMS OR LESS.

△41 THE HAZARDOUS AREA INSTRUMENT EARTH (HAIE) GROUND MUST BE DEDICATED AND CONNECTED IN THE MOST DIRECT POSSIBLE PATH TO A COMMON SITE EARTH ELECTRODE. THE MEASURED IMPEDANCE SHALL BE ONE (1) OHM OR LESS BETWEEN THE BUS AND EARTH ELECTRODE. THE CONNECTING WIRE BETWEEN THE HAIE BUS AND EARTH ELECTRODE SHALL NOT BE SMALLER THAN 4 AWG (25MM2).

42. NOTE NOT USED.
43. NOTE NOT USED.
44. SINGLE CONDUCTOR GREEN OR GREEN-YELLOW INSULATION OR BARE CONDUCTOR CABLE GROUND SHALL BE TERMINATED AT CABLE ENDS TO GROUNDING TERMINATION WITHIN DEVICE OR BOX TO FRAME GROUND.
45. CONNECT ANALOG INPUT SHIELDS TO SHIELD BUS BAR. ADD 14 AWG GRN/YEL WIRE TO CONNECT SHIELD BUS BAR TO INSTRUMENT EARTH BUS BAR.

△46 WHEN CONNECTING MULTIPLE UNITS SHIELD CONTINUITY MUST BE MAINTAINED AND GROUNDED AT ONE POINT ONLY. CROSS CURRENT COMPENSATION TRANSFORMERS MUST BE GROUNDED AT ONE POINT ONLY. THE BREAKER STATUS IS NEEDED TO DISALBE KW/CCCT LOAD SHARE LINE IF THE BREAKER IS OPEN.

△47 THE POWER TO THE ENCLOSURE VENT STANDBY FANS MUST BE FURNISHED FROM AN EXTERNAL INDEPENDENT RELIABLE SOURCE THAT IS NOT THE SAME SOURCE AS THAT FOR THE ENCLOSURE VENT PRIMARY FANS

△48 NOTE NOT USED

△49 TRANSFORMER TAP SETTING MUST BE VERIFIED PRIOR TO POWER UP.

△50 NOTE NOT USED.

△51 TYPICAL FOR STANDARD SOLAR DESIGN. VERIFY BURDEN IF ADDITIONAL DEVICES ARE CONNECTED.

△52 CONTACTS ARE DRAWN IN THE SYSTEM ALARM CONDITION. AN OPEN CONTACT COMMANDS A TURBINE SHUTDOWN.

△53 CONTACTS ARE DRAWN IN THE BREAKER OPEN CONDITION.

△54 NOTE NOT USED.

△55 INSIGHT CONNECT ESTABLISHES A SECURE, PURPOSE-BUILT MACHINE TO BUSINESS NETWORK CONNECTIVITY SOLUTION TO DELIVER SOLAR'S INSIGHT PLATFORM REMOTE TECHNOLOGY. THE TURBOTRONIC GATEWAY FACILITATES FUTURE CONNECTIVITY FOR INSIGHT BASED ON THE INSIGHT CONNECT OPTION SELECTED, SCOPE, AND CORRESPONDING HARDWARE.

△56 VFD POWER JUMPERS MUST BE CONFIGURED FOR THE SITE VFD POWER SUPPLY GROUNDING ARRANGEMENT. VFDS ARE FACTORY-CONFIGURED FOR A SUPPLY SYSTEM WITH A SOLID EARTH GROUND. IF AN UNGROUNDED OR HIGH-RESISTANCE GROUND SUPPLY SYSTEM IS USED, CONSULT ROCKWELL AUTOMATION, POWERFLEX 750-SERIES AC DRIVES INSTALLATION INSTRUCTIONS. FAILURE TO CORRECTLY CONFIGURE THE VFD FOR THE SITE GROUNDING SCHEME CAN RESULT IN CATASTROPHIC FAILURE.

△57 RELAY CONTACT SUPPLIED WITH EXTERNAL AC POWER CONTACTS MAY STILL BE ENERGIZED, EVEN WHEN BOX/CONSOLE POWER IS TURNED OFF

△58 FOR COMPLIANCE WITH THE FUNCTIONAL SAFETY REQUIREMENTS OF IEC61508 THIS SYSTEM/CIRCUIT IS DESIGNED TO PROVIDE TWO INDEPENDENT PATHS FOR INITIATION OF EMERGENCY SHUTDOWN TO MEET A MINIMUM SAFETY INTEGRITY LEVEL OF SIL 2

REVISION HISTORY		RELEASE - REV_691	
REV	DESCRIPTION	DATE	APPROVED
A	INITIAL SUBMITTAL	8/22/2022	G.PAWLO
B	CUSTOMER REQUEST	1/18/2023	G.PAWLO

APPROVED ☐

APPROVED AS NOTED J HANDWORK ☒

REVISE AND RESUBMIT ☐

REJECTED ☐

NOT SUBJECT TO REVIEW ☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

J. HANDWORK 12 MARCH 2023

JACOBS Date

JACOBS UNDERSTANDS THAT STRATA POWER (KYLE FALKENBERG) WILL BE CREATING A SEPRATE DRAWING SET THAT INDENTIFIES THE CABLING THAT IS CONTRACTOR RESPONSIBILITY FOR INSTALLATION IN LIEU OF SOLAR ADDING THAT INFORMATION TO THIS DRAWING SET.

APPROVED	
PROJECT MGR. G. PAWLOWSKI	DATE
PROJECT ENGR. G. PAWLOWSKI	DATE
DESIGN S. AWAD	DATE 6/29/2022
RELEASE STAMP PD-4F491 CDM B	CAGE CODE 66195

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LEGEND AND GENERAL NOTES

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447 | SIZE D | DWG REV B | SHEET 1 OF 141

SWBNO-1

BOP EER AC PWR

BOP EER

49 35 8

GD0525
BATTERY CHARGER
FLOOR MOUNTED UNIT

CCGD0525
CUSTOMER CONNECTION
THREE PHASE AC POWER

1 GD0525L1 — XCGD05P 1 — L1
2 GD0525L2 — XCGD05P 2 — L2
3 GD0525L3 — XCGD05P 3 — L3
4 GD0525G — XCGD05P 4 — GND

P3-1
P3-2 — XCGD05S 1 — GD05252 — 16A1 FROM AF0090:40
P3-3 — XCGD05S 2 — GD05253 — 16A1 TO AF0090:05

ALARM/DE-ENERGIZED
COMMAND
OPEN CONTACT=FAULT
CLOSED CONTACT=OKAY

INPUT VOLTAGE:
440,460,480 VAC
POWER: 16 kVA
OUTPUT VOLTAGE:120-145 VDC
FREQ: 47-63 HERTZ

CB522(+) — KM3170L1 — 104D4 TO KM3170:1L1
100A
CB522(-) — KM3170L2 — 104D4 FROM KM3170:5L3

CB524(+) — XCGD05DC2 1 — UV2610DC1 — 85A5 TO UV2610:X31:1
60A
CB524(-) — XCGD05DC2 2 — UV2610DC2 — 85A5 FROM UV2610:X31:2
FRAME — 3 — UV2610DCS — TO UV2610:P1 85A5

CB526(+)
20A
CB526(-)

CB521(+) — XCGD05DC 1 — 521POS — 16B1 TO FU0011:LI
20A
CB521(-) — XCGD05DC 2 — 521NEG — 16B1 FROM XT0011:1I

CB523(+) — XCGD05DC 3 — 523POS — 16B1 TO XT0014:1I
60A
CB523(-) — XCGD05DC 4 — 523NEG — 16B1 FROM XT0011:2I

CB525(+) — XCGD05DC3 1 — UF1300X311 — 40C4 TO UF1300:X31:1
60A
CB525(-) — XCGD05DC3 2 — UF1300X312 — 40C4 FROM UF1300:X31:2
FRAME — 3 — UF1300P1 — TO UF1300:P1 40C4

GROUNDING

CASE — XCGD05G GRN/YEL — GD0525FG FRAME

BOP EER BATTERY

8 34

GB0525
BATTERY SET
VRLA

(+) GB0525P — XCGB05DC0 1
(-) GB0525N — XCGB05DC0 2

XCGB05DC1 1 — TB521:1 — POS
XCGB05DC1 2 — TB521:3 — NEG
CHARGING

TB521:2
TB521:4

TB522:(+) — LOAD
TB522:(-)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
PACKAGE ELECTRICAL SYSTEM
BATTERIES AND CHARGER

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 2 OF 141

SWBNO-1

CUST GROUNDING

38 CCPEG0130 — CUSTOMER GROUNDING POWER EARTH IMPEDANCE LESS THAN 5 OHMS — 1 — XCPEG0130 — 1 — PEG0130G

39 CCIEG0230 — CUSTOMER GROUNDING INSTRUMENT EARTH IMPEDANCE LESS THAN 5 OHMS — 1 — XCIEG0230 — 1 — IEG0230G

38 CCPEG0140 — CUSTOMER GROUNDING POWER EARTH IMPEDANCE LESS THAN 5 OHMS — 1 — XCPEG0140 — 1 — PEG0140G

39 CCIEG0130 — CUSTOMER GROUNDING INSTRUMENT EARTH IMPEDANCE LESS THAN 5 OHMS — 1 — XCIEG0130 — 1 — IEG0130G

TURBINE BOX (JB70)

PEG0130 BUS BAR
36D6
PANEL A - POWER EARTH GROUNDING

GR0131,GRN/YEL — GR0131 — FRAME
GR0132,GRN/YEL — GR0132 — FRAME

IEG0230 BUS BAR
10B6 7D5 A3 10D6 8B5
6D6 6B5 24C6 10C6 7D7 7B4 20D6
PANEL B - INSTRUMENT EARTH GROUNDING

GR0234,GRN/YEL — GR0234 — FRAME
IEG02307,GRN — GR0232
A2 IEG0230 7
GR0113,GRN/YEL — GR0113 — FRAME

RIGHT WALL
GR1100,GRN/YEL — GR1100 — FRAME

GENERATOR BOX (JB72)

PEG0140 BUS BAR
11IB6 99C6 11C6 11285
GENERATOR - POWER EARTH GROUNDING

GR0140,GRN/YEL — GR0140 — FRAME
GR0141,GRN/YEL — GR0141 — FRAME
GR0142,GRN/YEL — GR0142 — FRAME

IEG0130 BUS BAR
26D4 26C6
GENERATOR - INSTRUMENT EARTH GROUNDING

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUST GROUNDING

40 CCFG0000 — CUSTOMER GROUNDING CONSOLE FRAME GROUND — 1 — XCFG0000 — 1 — FG0000G

38 CCPEG0356 — CUSTOMER GROUNDING POWER EARTH GROUND IMPEDANCE LESS THAN 5 OHMS — 1 — XCPEG0356 — 1 — PEG0356G

39 CCIEG0356 — CUSTOMER GROUNDING INSTRUMENT EARTH GROUND IMPEDANCE LESS THAN 5 OHMS — 1 — XCIEG0356 — 1 — IEG0356G

AUXILIARY CONSOLE

FG0000
CONSOLE GROUND LUG

PEG0356 BUS BAR
POWER EARTH GROUNDING

IEG0356 BUS BAR
12A3 12D7 12D7
INSTRUMENT EARTH GROUNDING

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
INSTRUMENTATION GROUNDING

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV A
SHEET 3 OF 141

SWBNO-1

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

BOP EER AC PWR

CCINSCON-PWR
CUSTOMER CONNECTION
SINGLE PHASE AC POWER
100-240V AC
10 AMPS

L — XCINSCON-PWR 1 — INSCON-PWRL
N — XCINSCON-PWR 2 — INSCON-PWRN
G — XCINSCON-PWR 3 — INSCON-PWRG

BOP EER

INSIGHT CONNECT

L
N
G
INSCON-PWR
POWER INPUT
INSIGHT POWER

INSCON-ENET-OUT
ETHERNET OUTPUT
INSIGHT CONNECT
ENET
INSCON-ENET-OUT

55

5C6
AT0680:LAN4 FROM
INSCON-ENET-IN
ENET
INSCON-ENET-IN
ETHERNET INPUT
INSIGHT CONNECT

REFER TO ENABLEMENT SCHEMATIC
AND NETWORK DIAGRAM

CUST TELECOM

XCINSCON-IC
CABLE
ENET
CCINSCON-IC
ETHERNET INPUT
INSIGHT CONNECT
7

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONNECTIVITY
INSIGHT CONNECT

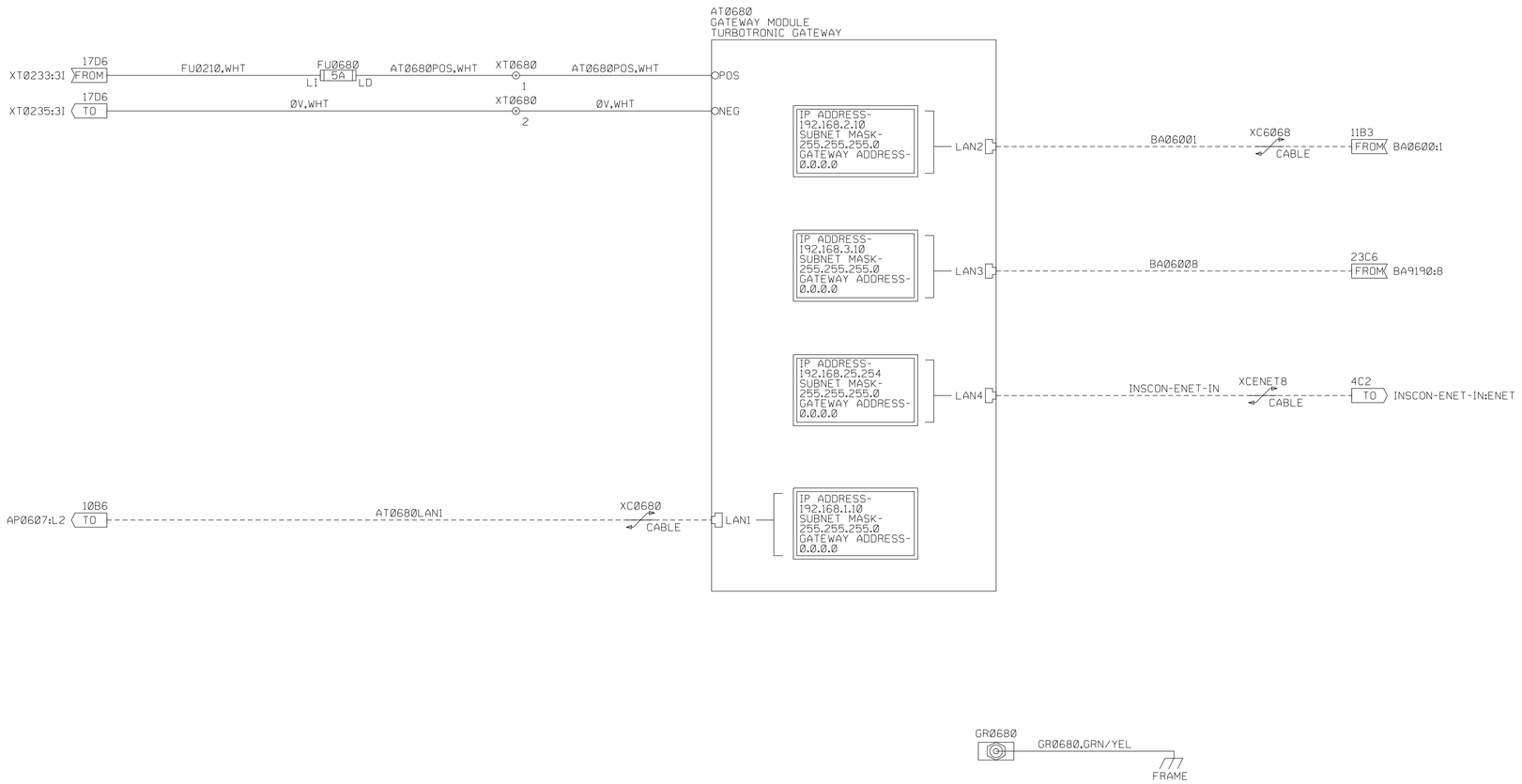
Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 4 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONNECTIVITY
TURBOTRONIC GATEWAY

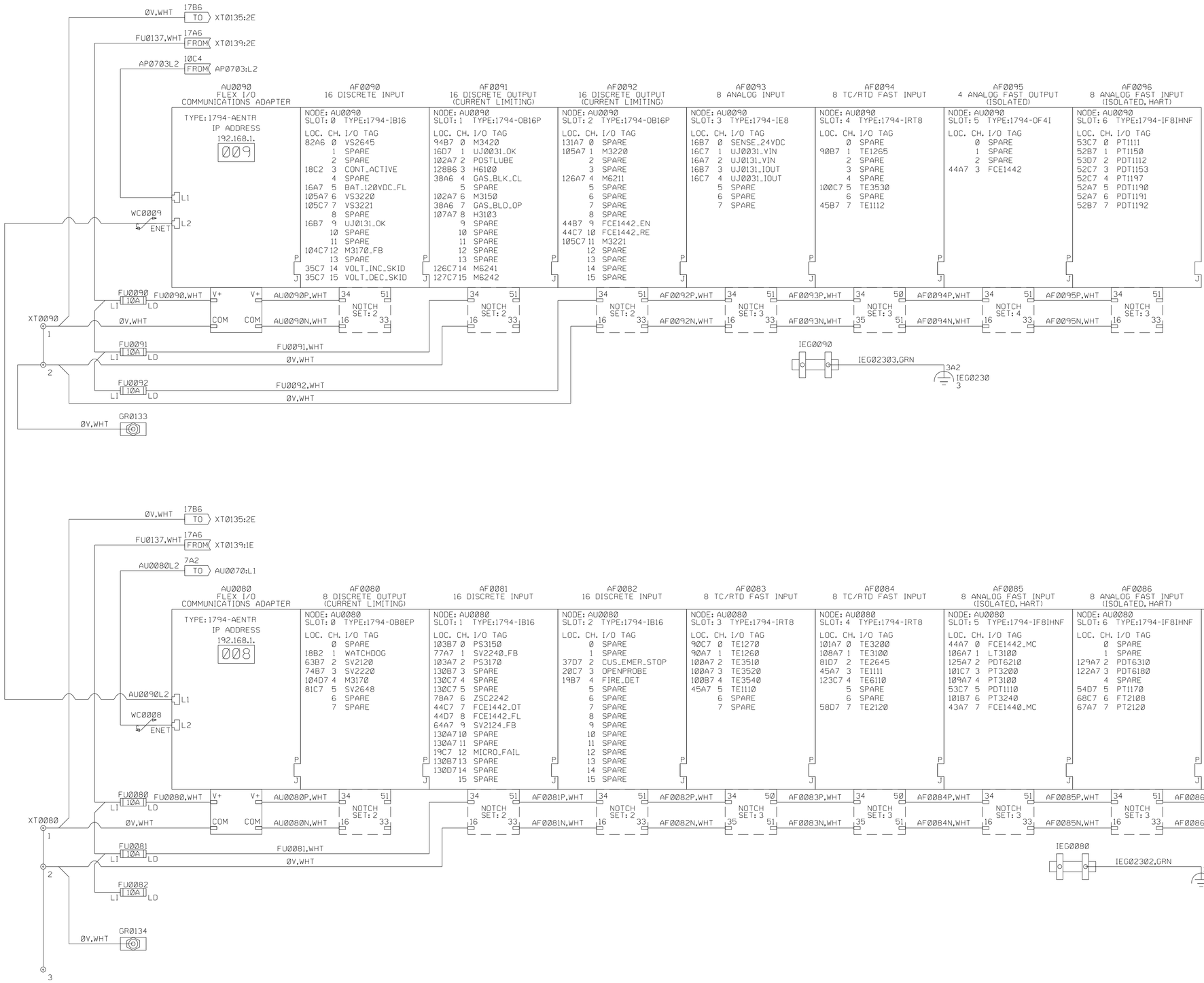
Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	A
	SHEET 5 OF 141	

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
NODE 008 & 009

Solar® Turbines

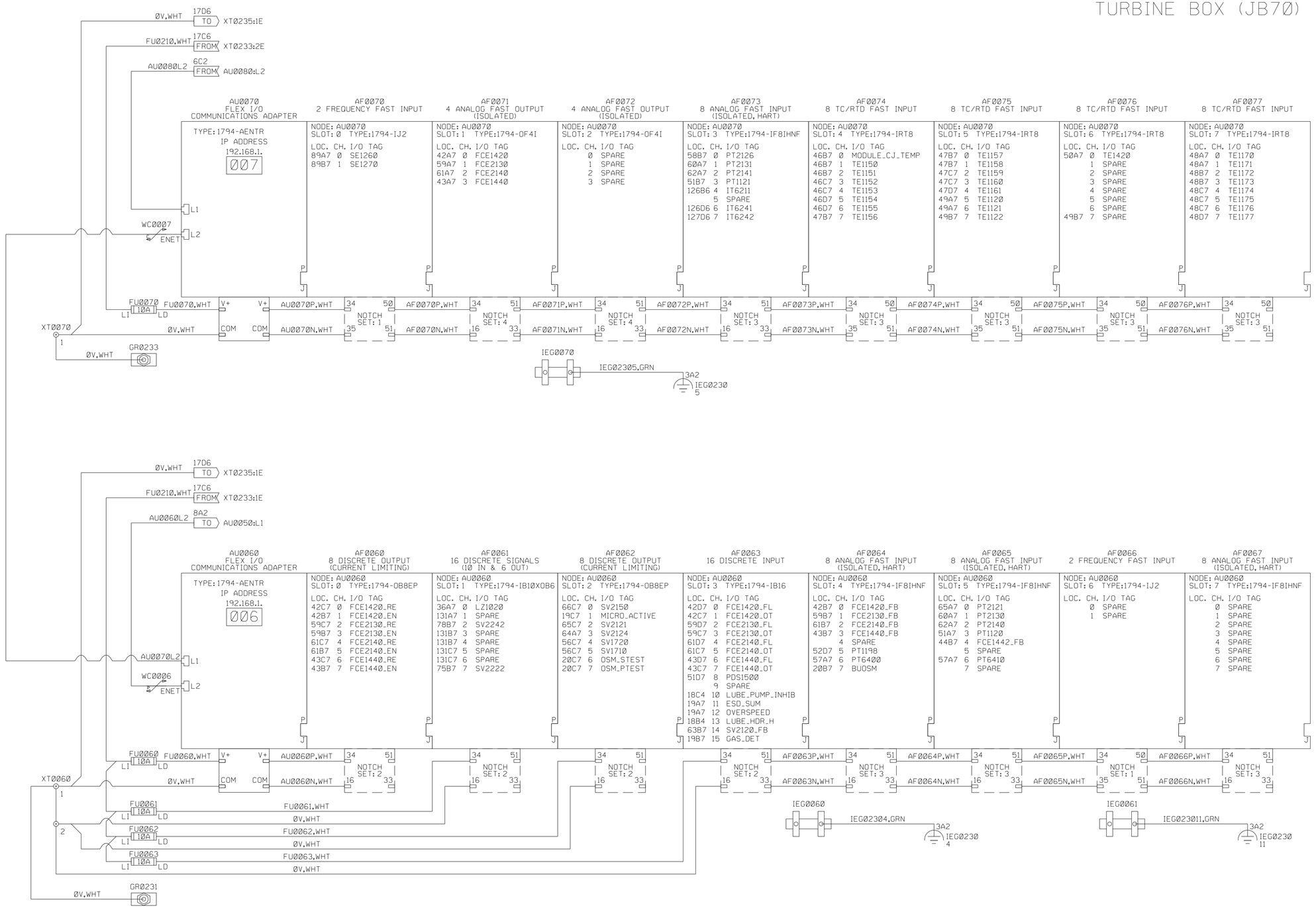
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 6 OF 141	

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
NODE 006 & 007

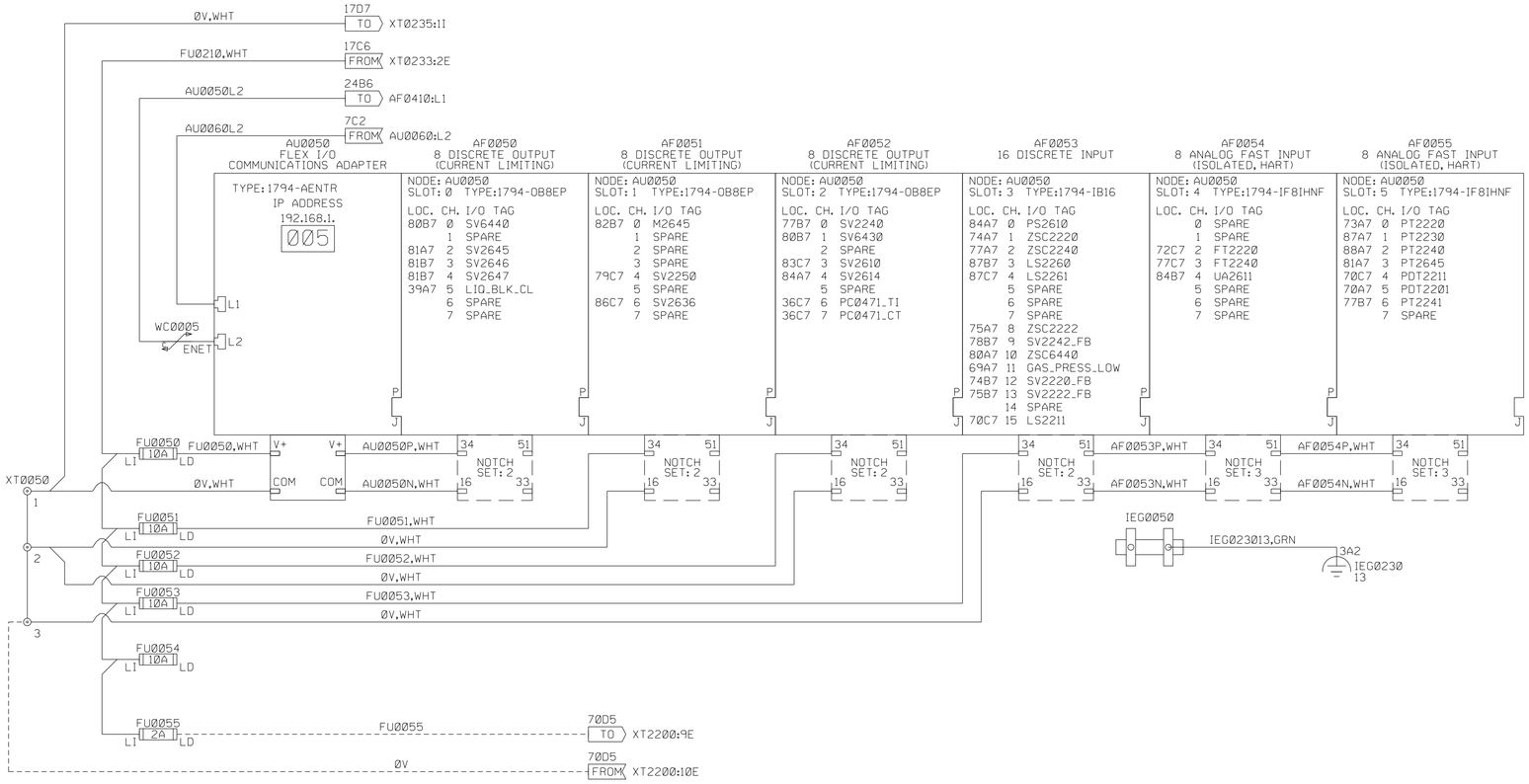
Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 7 OF 141	

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
NODE 005 (LIQUID FUEL)

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	A
	SHEET 8 OF 141	

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

GR0170 — GR0170,GRN/YEL — FRAME

AT0170 CONTROLLER EAGLE QUANTUM PREMIER
IP ADDRESS 192.168.1.Ø17
POWER: 1 2 3 4

8 DIGITAL INPUTS

CH.	ZONE	I/O TAG
I1		SPARE
I2		SPARE
I3		SPARE
I4	33A6	AUTO/INHIBIT
I5		SPARE
I6		SPARE
I7		SPARE
I8		SPARE

8 RELAY OUTPUTS

CH.	ZONE	I/O TAG
O1		SPARE
O2	B3	DETECTION
O3		SPARE
O4	C3	HIGH GAS
O5		SPARE
O6		SPARE
O7		SPARE
O8		SPARE

CH.	ZONE	I/O TAG
TR	114D6	TROUBLE ALARM
P7-1	A7	SLC/LON #1
P7-2	116D6	SCL/LON #2
P8		SPARE
P9		SPARE

L1 — BA1100L2 — 36D2 FROM BA1100:L2
L2 — AT0170L2 — XC9017 ENET — 12D3 TO AU0180:L1
GND — AT0170G,GRN/YEL — FRAME

AT0170 CONTROLLER EAGLE QUANTUM PREMIER
AT017048 48 — CHAN: P7-1 I/O TAG: SLC/LON #1
AT017049 49
AT017050 50
A5

AT0175 8 CHANNEL ED I/O EAGLE QUANTUM PREMIER
WC8069 WHT 4P2 — CHAN: P2-2 I/O TAG: COM #2
WC8069 BLK 5P2
WC8069 SH 6P2
B5

UV0170 POWER SUPPLY EAGLE QUANTUM PREMIER
INPUT: 1(+) 3(+) 2(-) 4(-)
CONTROLLER: 5(+) 6(-) 7(+) 8(-)
FIELD — 116B7
LOCAL: 9(+) 10(-) 11(+) 12(-)
GND — UV0170G,GRN/YEL — FRAME

KA0875:I1 33D6 TO — FU0170,WHT
XT0172:10E 124A7 TO — FU0170,WHT — XT0170 1
XT0138:2I 17A3 FROM — FU0136,WHT — FU0170 15A (L1 LD) — FU0170,WHT — 2
KA0232:2I 126A7 TO — FU0170,WHT
KA0176:A2 126B7 FROM — ØV,WHT
XT0134:2I 17B3 TO — ØV,WHT — XT0170 3
XT0172:11E 124A7 FROM — 4
XT0170:14E 33D6 FROM — ØV,WHT

UV01705,WHT
UV01706,WHT
UV01707,WHT
UV01708,WHT
UV01709,WHT
UV017010,WHT
UV017011,WHT
UV017012,WHT

ØV,WHT

11-14 21-24 / 114D6 / 11-12 21-22 — KA0172 A2 A1 — FIRE DETECTED (CUSTOMER)

AT0170 CONTROLLER EAGLE QUANTUM PREMIER
XT0240:12I 19C4 FROM — FU0139,WHT — 24
AT017025,WHT — 25 — CHAN: O2 I/O TAG: DETECTION
XT0240:7E 19C3 TO — KA0243A1,WHT — 26
A5

11-14 21-24 / 114D6 / 11-12 21-22 — KA0174 A2 A1 — GAS DETECTED (CUSTOMER)

AT0170 CONTROLLER EAGLE QUANTUM PREMIER
XT0240:12I 19D4 FROM — FU0139,WHT — 30
AT017031,WHT — 31 — CHAN: O4 I/O TAG: HIGH GAS
XT0240:8E 19D3 TO — KA0245A1,WHT — 32
A5

AT017754P1,WHT
KA6510A2,WHT

AT0175 8 CHANNEL ED I/O EAGLE QUANTUM PREMIER
POWER: 1P1 2P1 3P1 4P1 5P1 6P1
SWITCH SETTING CLOSED: 1,3 OPEN: 2,4,5,6,7,8

8 CHANNEL I/O

CH.	I/O TAG	ZONE
1	MANUAL RELEASE	33B6
2	THERMAL #1	115A6
3	CONFIRM	118C6
4	PRIMARY #1	117A6
5	SPARE	117A6
6	AUTO	33B6
7	INHIBIT	33C6
8	DISCHARGED	33C6

LON/SLC

CH.	I/O TAG	ZONE
P2-1	COM #1	C7
P2-2	COM #2	A7

GND — AT0175G,GRN/YEL — FRAME

AT0175 8 CHANNEL ED I/O EAGLE QUANTUM PREMIER
AT01753P2 3P2 — CHAN:P2-1 I/O TAG:COM #1
AT01752P2 2P2
AT01751P2 1P2
B5

AT0176 8 CHANNEL ED I/O EAGLE QUANTUM PREMIER
AT01764P1,WHT
AT01765P1,WHT

AT0176 8 CHANNEL ED I/O EAGLE QUANTUM PREMIER
POWER: 1P1 2P1 3P1 4P1 5P1 6P1
SWITCH SETTING CLOSED: 2,3 OPEN: 1,4,5,6,7,8

8 CHANNEL I/O

CH.	I/O TAG	ZONE
1	STROBE #1	114A6
2	STROBE #2	114B6
3	SPARE	
4	SPARE	117B6
5	SPARE	117D6
6	PRIMARY #2	117C6
7	SPARE	117C6
8	HORN	114A6

LON/SLC

CH.	I/O TAG	ZONE
P2-1	COM #1	D7
P2-2	COM #2	C7

GND — AT0176G,GRN/YEL — FRAME

AT0176 8 CHANNEL ED I/O EAGLE QUANTUM PREMIER
WC8066 WHT 4P2 — CHAN: P2-2 I/O TAG: COM #2
WC8066 BLK 5P2
WC8066 SH 6P2
C5

AT0178 8 CHANNEL ED I/O EAGLE QUANTUM PREMIER
33A6 SA0170:14 TO
33A6 KA6510:A2 FROM

AT0178 8 CHANNEL ED I/O EAGLE QUANTUM PREMIER
POWER: 1P1 2P1 3P1 4P1 5P1 6P1
SWITCH SETTING CLOSED: 4 OPEN: 1,2,3,5,6,7,8

8 CHANNEL I/O

CH.	I/O TAG	ZONE
1	PRIMARY ENCLOSURE	119A6
2	PRIMARY VENT	119B6
3	EXTENDED ENCLOSURE	119C6
4	EXTENDED VENT	119D6
5	PRIMARY CONFIRM	119A6
6	EXTENDED CONFIRM	119B6
7	ENCL_DOOR	121A6
8	LOCAL HORN	33D6

LON/SLC

CH.	I/O TAG	ZONE
P2-1	COM #1	124A6
P2-2	COM #2	D7

GND — AT0178G,GRN/YEL — FRAME

AT0178 8 CHANNEL ED I/O EAGLE QUANTUM PREMIER
WC8067 WHT 4P2 — CHAN: P2-2 I/O TAG: COM #2
WC8067 BLK 5P2
WC8067 SH 6P2
D5

11-14 21-24 / 33D6 / 11-12 21-22 — KA0875 A2 A1 — LOCAL HORN CONTROL (PLC)

AF0087 16 DISCRETE SIGNALS (10 IN & 6 OUT) 1794-IB10XOB6
50 V+ — 008715,WHT — 15 SIG — 008732,WHT — 32 COM
NODE: AU0080 SLOT: 7 CHAN: 05 I/O TAG: CTRL_HORN_SKID
6C6

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
NODE Ø17 (FIRE & GAS)

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B | SHT REV B
SHEET 9 OF 141

SWBNO-1

AUXILIARY CONSOLE

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

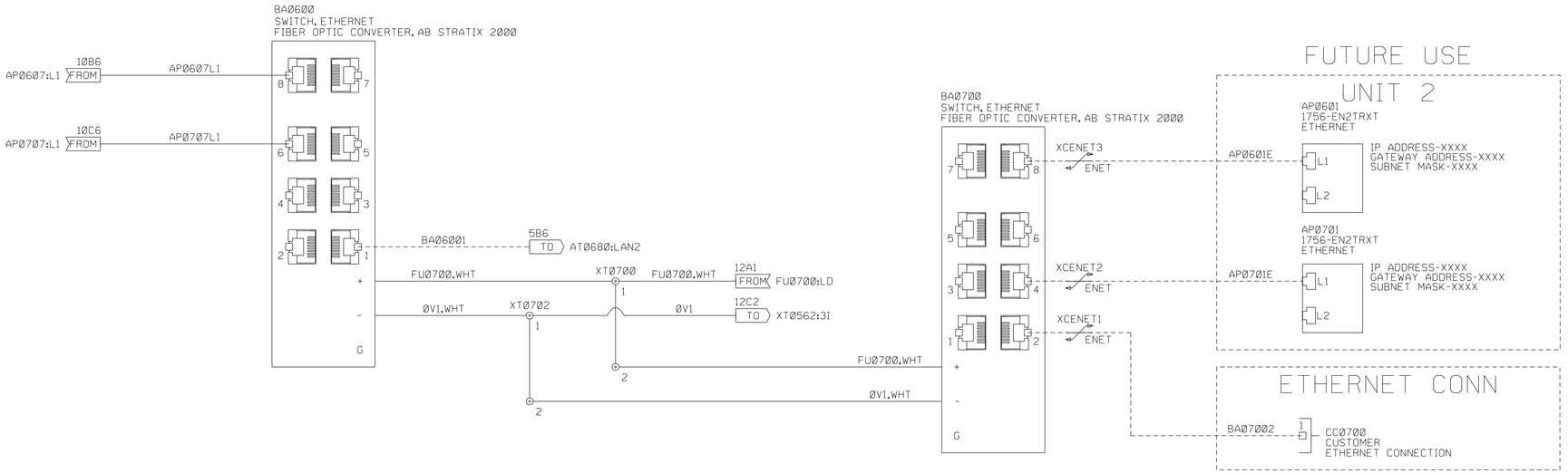
DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
PROGRAMMABLE LOGIC CONTROLLER

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 10 OF 141	

SWBNO-1

AUXILIARY CONSOLE



NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
DEVICE LEVEL RING MAPPING

Solar® Turbines

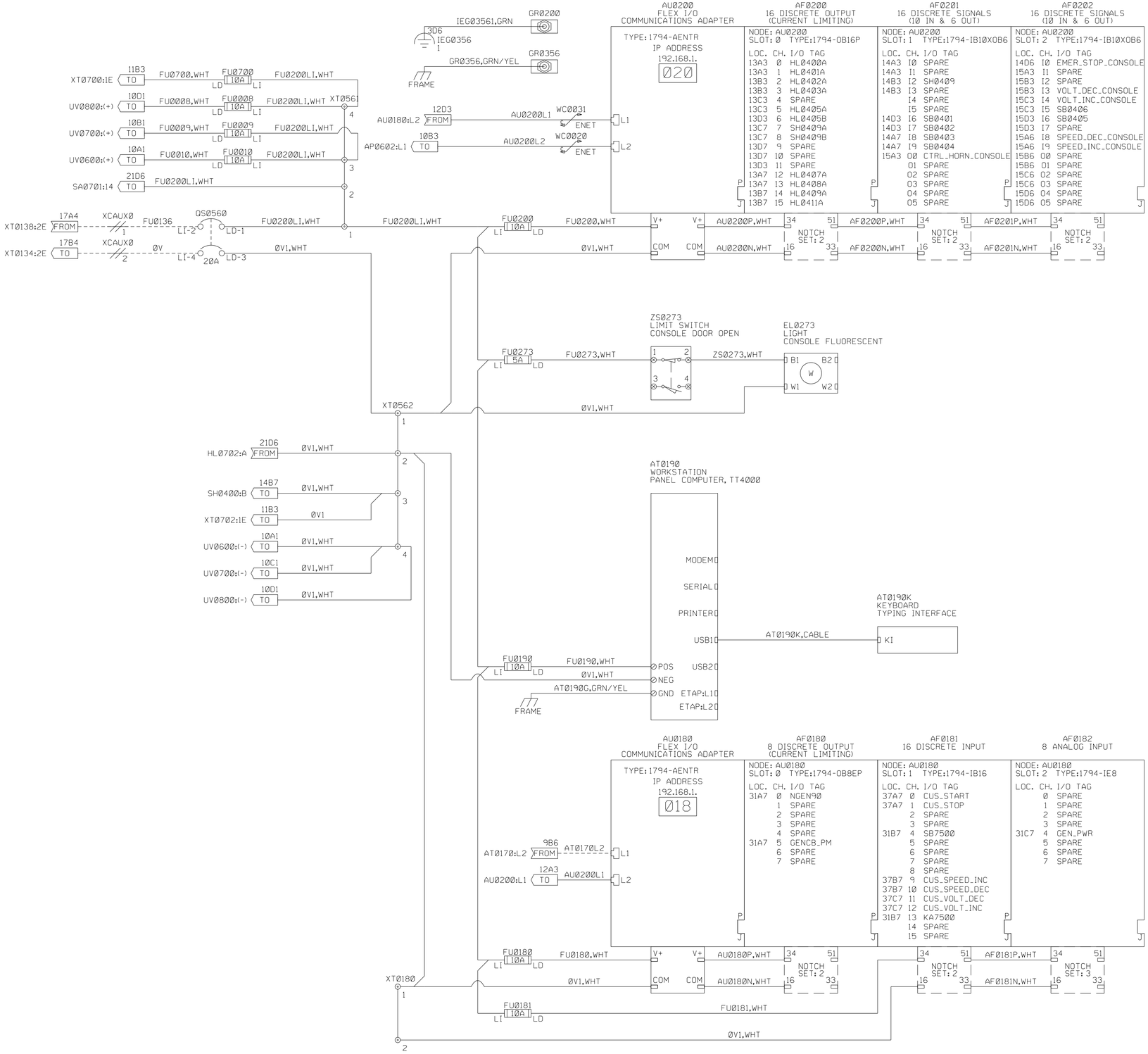
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 11 OF 141	

SWBNO-1

AUXILIARY CONSOLE

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
NODE 18, 19 & 20 (HMI TT4000)

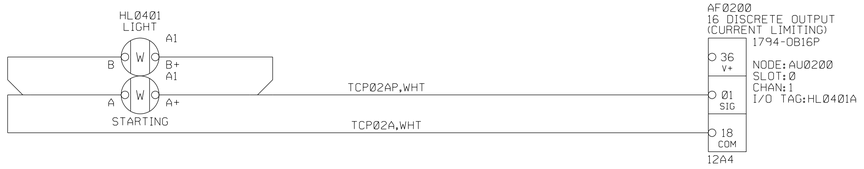
Solar® Turbines
A Caterpillar Company

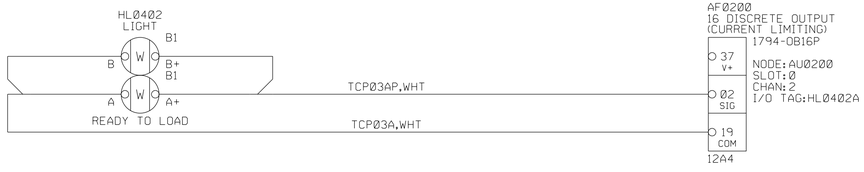
DRAWING NO. 4F491-149447
DWG REV B
SHT REV A
SHEET 12 OF 141

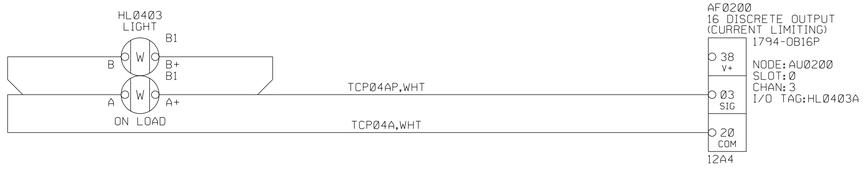
SWBNO-1

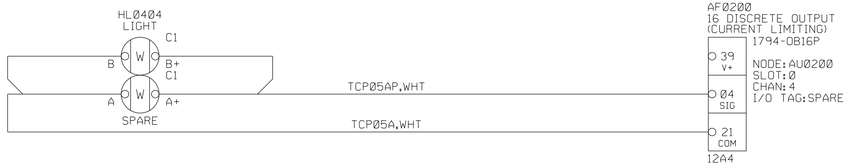
AUXILIARY CONSOLE

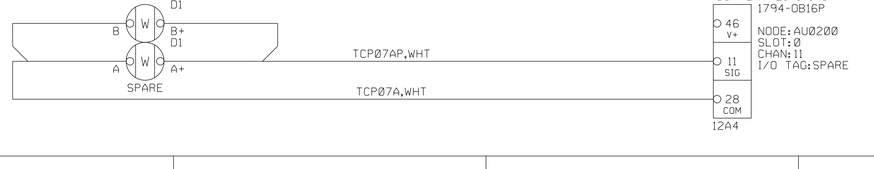
NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

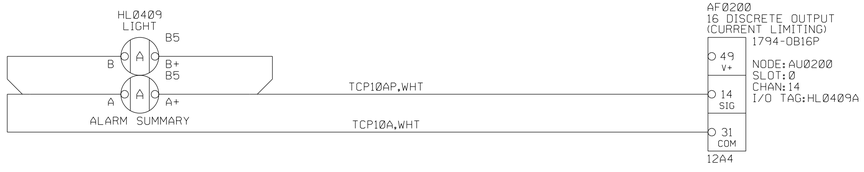


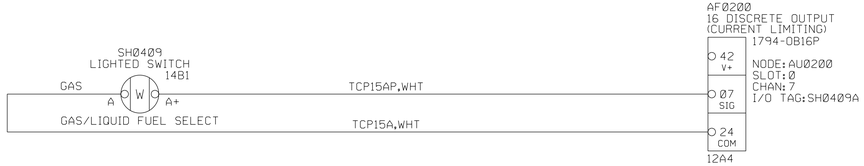


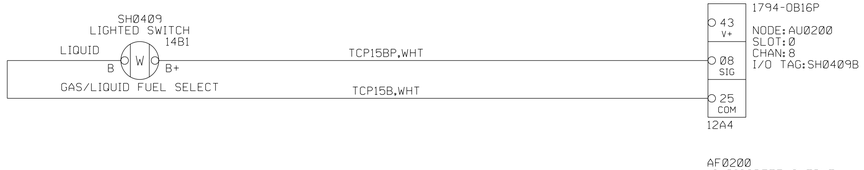












CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
NODE 020 (TURBINE CONTROL PANEL)

Solar® Turbines
A Caterpillar Company

DRAWING NO.
4F491-149447

DWG REV B | SHT REV A
SHEET 13 OF 141

SWBNO-1

AUXILIARY CONSOLE

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

SH0400
LIGHTED SWITCH
B5
B5
NO C
SPARE
TCP13C,WHT
TCP13NO,WHT
AF0201
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
35 V+
00 SIG
17 COM
NODE:AU0200
SLOT:1
CHAN:10
I/O TAG:SPARE
12A5

SH0401
LIGHTED SWITCH
C5
C5
NO C
SPARE
TCP14C,WHT
TCP14NO,WHT
AF0201
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
36 V+
01 SIG
18 COM
NODE:AU0200
SLOT:1
CHAN:11
I/O TAG:SPARE
12A5

SH0409
LIGHTED SWITCH
13C5
13C5
NO C
GAS/LIQUID FUEL SELECT
TCP15C,WHT
TCP15NO,WHT
AF0201
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
37 V+
02 SIG
19 COM
NODE:AU0200
SLOT:1
CHAN:12
I/O TAG:SH0409
12A5

SH0410
LIGHTED SWITCH
13D5
13D5
NO C
SPARE
TCP16C,WHT
TCP16NO,WHT
AF0201
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
38 V+
03 SIG
20 COM
NODE:AU0200
SLOT:1
CHAN:13
I/O TAG:SPARE
12A5

SB0403
PUSHBUTTON SWITCH
NO C
RESET
TCP25C,WHT
TCP25NO,WHT
AF0201
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
43 V+
08 SIG
25 COM
NODE:AU0200
SLOT:1
CHAN:18
I/O TAG:SB0403
12A5

SB0404
PUSHBUTTON SWITCH
NO C
LAMP TEST
TCP26C,WHT
TCP26NO,WHT
TCP26NO,WHT
AF0201
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
44 V+
09 SIG
26 COM
NODE:AU0200
SLOT:1
CHAN:19
I/O TAG:SB0404
12A5

HL0410
LIGHT
B5
A B
B+ B5
A A+
BACKUP ACTIVE
TCP12AP,WHT
0V,WHT
XT0564 1
T1 T2
B1 B2
XT0563 3
XT0345 3
XCAUX1 3
19D4 FROM XT0240:13I
XT0563 4
XT0345 4
XCAUX1 4
19D3 TO XT0240:9E

SH0400
LIGHTED SWITCH
A1
A W A+
SPARE
TCP13AP,WHT
XT0564 2
T1 T2
B1 B2

SH0400
LIGHTED SWITCH
A1
B W B+
SPARE
TCP13BP,WHT
XT0564 3
T1 T2
B1 B2
0V1,WHT
0V1,WHT
12B2 FROM XT0562:3I

SH0401
LIGHTED SWITCH
A1
B W B+
SPARE
TCP14BP,WHT
XT0564 4
T1 T2
B1 B2

SH0401
LIGHTED SWITCH
A1
A W A+
SPARE
TCP14AP,WHT
XT0564 5
T1 T2
B1 B2

SA0401
SELECTOR SWITCH
OFF ON
2 1
BACKUP SYSTEM RESET
KA0241A1,WHT
FU0139,WHT
XT0563 5
XT0345 5
XCAUX1 5
19C3 TO XT0240:6I
XT0563 6
XT0345 6
XCAUX1 6
19C4 FROM XT0240:11I

SB0401
PUSHBUTTON SWITCH
NC C
HORN SILENCE
TCP23C,WHT
TCP23NC,WHT
AF0201
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
41 V+
06 SIG
23 COM
NODE:AU0200
SLOT:1
CHAN:16
I/O TAG:SB0401
12A5

SB0402
PUSHBUTTON SWITCH
NO C
ACKNOWLEDGE
TCP24C,WHT
TCP24NO,WHT
AF0201
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
42 V+
07 SIG
24 COM
NODE:AU0200
SLOT:1
CHAN:17
I/O TAG:SB0402
12A5

58
SB0400
PUSHBUTTON SWITCH
D5
12 11
EMERGENCY STOP
ESTOPB,WHT
ESTOPA,WHT
XT0563 1
XT0345 1
XCAUX1 1
19A2 FROM XT0240:2I
XT0563 2
XT0345 2
XCAUX1 2
19A3 TO XT0240:3E

58
SB0400
PUSHBUTTON SWITCH
D5
22 21
EMERGENCY STOP
TCP18B1,WHT
TCP18B2,WHT
AF0202
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
35 V+
00 SIG
17 COM
NODE:AU0200
SLOT:2
CHAN:10
I/O TAG:EMER_STOP_CONSOLE
12A5

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
NODE 020 (TURBINE CONTROL PANEL)

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV A
SHEET 14 OF 141

SWBNO-1

AUXILIARY CONSOLE

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

HA0273
HORN
AUDIBLE ALARM
(+)
(-)
WC5540 BLK
WC5540 WHT
HA0273P,BLK
HA0273N,WHT

AF0201
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
45 V+
10 SIG
27 COM
NODE:AU0200
SLOT:1
CHAN:00
I/O TAG:CTRL_HORN_CONSOLE
12A5

SH0404
LIGHTED SWITCH
B5
B5
NO C
SPARE
TCP19C,WHT
TCP19NO,WHT

AF0202
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
36 V+
01 SIG
18 COM
NODE:AU0200
SLOT:2
CHAN:11
I/O TAG:SPARE
12A5

SH0405
LIGHTED SWITCH
B5
B5
NO C
SPARE
TCP20C,WHT
TCP20NO,WHT

AF0202
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
37 V+
02 SIG
19 COM
NODE:AU0200
SLOT:2
CHAN:12
I/O TAG:SPARE
12A5

SH0411
LIGHTED SWITCH
C5
C5
NO C
VOLTAGE DECREASE SELECT
TCP21C,WHT
TCP21NO,WHT

AF0202
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
38 V+
03 SIG
20 COM
NODE:AU0200
SLOT:2
CHAN:13
I/O TAG:VOLT_DEC_CONSOLE
12A5

SH0412
LIGHTED SWITCH
C5
C5
NO C
VOLTAGE INCREASE SELECT
TCP22C,WHT
TCP22NO,WHT

AF0202
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
39 V+
04 SIG
21 COM
NODE:AU0200
SLOT:2
CHAN:14
I/O TAG:VOLT_INC_CONSOLE
12A5

SB0406
PUSHBUTTON SWITCH
NC C
NORMAL STOP
TCP28C,WHT
TCP28NC,WHT

AF0202
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
40 V+
05 SIG
22 COM
NODE:AU0200
SLOT:2
CHAN:15
I/O TAG:SB0406
12A5

SB0405
PUSHBUTTON SWITCH
NO C
START
TCP29C,WHT
TCP29NO,WHT

AF0202
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
41 V+
06 SIG
23 COM
NODE:AU0200
SLOT:2
CHAN:16
I/O TAG:SB0405
12A5

SH0408
LIGHTED SWITCH
D5
D5
NO C
SPARE
TCP30C,WHT
TCP30NO,WHT

AF0202
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
42 V+
07 SIG
24 COM
NODE:AU0200
SLOT:2
CHAN:17
I/O TAG:SPARE
12A5

SB0407
PUSHBUTTON SWITCH
NO C
SPEED/LOAD DECREASE
TCP31C,WHT
TCP31NO,WHT

AF0202
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
43 V+
08 SIG
25 COM
NODE:AU0200
SLOT:2
CHAN:18
I/O TAG:SPEED_DEC_CONSOLE
12A5

SB0408
PUSHBUTTON SWITCH
NO C
SPEED/LOAD INCREASE
TCP32C,WHT
TCP32NO,WHT

AF0202
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
44 V+
09 SIG
26 COM
NODE:AU0200
SLOT:2
CHAN:19
I/O TAG:SPEED_INC_CONSOLE
12A5

SH0404
LIGHTED SWITCH
A1
B
W
B+
A1
A
W
A+
SPARE
TCP19AP,WHT
TCP19A,WHT

AF0202
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
45 V+
10 SIG
27 COM
NODE:AU0200
SLOT:2
CHAN:00
I/O TAG:SPARE
12A5

SH0405
LIGHTED SWITCH
B1
B
W
B+
B1
A
W
A+
SPARE
TCP20AP,WHT
TCP20A,WHT

AF0202
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
46 V+
11 SIG
28 COM
NODE:AU0200
SLOT:2
CHAN:01
I/O TAG:SPARE
12A5

SH0411
LIGHTED SWITCH
B1
B
W
B+
B1
A
W
A+
SPARE
TCP21AP,WHT
TCP21A,WHT

AF0202
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
47 V+
12 SIG
29 COM
NODE:AU0200
SLOT:2
CHAN:02
I/O TAG:SPARE
12A5

SH0412
LIGHTED SWITCH
C1
B
W
B+
C1
A
W
A+
SPARE
TCP22AP,WHT
TCP22A,WHT

AF0202
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
48 V+
13 SIG
30 COM
NODE:AU0200
SLOT:2
CHAN:03
I/O TAG:SPARE
12A5

SH0408
LIGHTED SWITCH
D1
A
W
A+
SPARE
TCP30AP,WHT
TCP30A,WHT

AF0202
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
49 V+
14 SIG
31 COM
NODE:AU0200
SLOT:2
CHAN:04
I/O TAG:SPARE
12A5

SH0408
LIGHTED SWITCH
D1
B
W
B+
SPARE
TCP30BP,WHT
TCP30B,WHT

AF0202
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
50 V+
15 SIG
32 COM
NODE:AU0200
SLOT:2
CHAN:05
I/O TAG:SPARE
12A5

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
NODE 020 (TURBINE CONTROL PANEL)

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV A
SHEET 15 OF 141

SWBNO-1

BOP EER
BATTERY CHARGER

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

2A4 TO — GD0525:P3-2 — GD05252
2A4 FROM — GD0525:P3-3 — GD05253

AF0090 16 DISCRETE INPUT 1794-IB16 — 6A2
40 V+ / 05 SIG / 22 COM
NODE: AU0090 SLOT: 0 CHAN: 5 I/O TAG: BAT_120VDC_FL

AF0093 8 ANALOG INPUT 1794-IE8 — 6A4
40 V+ / 05 SIG / 22 COM
NODE: AU0090 SLOT: 3 CHAN: 2 I/O TAG: UJ0131_VIN

AF0093 8 ANALOG INPUT 1794-IE8 — 6A4
42 V+ / 07 SIG / 24 COM
NODE: AU0090 SLOT: 3 CHAN: 3 I/O TAG: UJ0131_IOUT

AF0090 16 DISCRETE INPUT 1794-IB16 — 6A2
44 V+ / 09 SIG / 26 COM
NODE: AU0090 SLOT: 0 CHAN: 9 I/O TAG: UJ0131_OK

AF0093 8 ANALOG INPUT 1794-IE8 — 6A4
36 V+ / 01 SIG / 18 COM
NODE: AU0090 SLOT: 3 CHAN: 0 I/O TAG: SENSE_24VDC

AF0093 8 ANALOG INPUT 1794-IE8 — 6A4
38 V+ / 03 SIG / 20 COM
NODE: AU0090 SLOT: 3 CHAN: 1 I/O TAG: UJ0031_VIN

AF0093 8 ANALOG INPUT 1794-IE8 — 6A4
44 V+ / 09 SIG / 26 COM
NODE: AU0090 SLOT: 3 CHAN: 4 I/O TAG: UJ0031_IOUT

AF0091 16 DISCRETE OUTPUT (CURRENT LIMITING) 1794-OB16P — 6A3
36 V+ / 01 SIG / 18 COM
NODE: AU0090 SLOT: 1 CHAN: 1 I/O TAG: UJ0031_OK

UJ0131 POWER CONVERTER
AC/DC INPUT TO 28V DC OUTPUT
INPUT VOLTAGE: 100-240VAC; 90-340VDC
POWER: 1200W

INPUT MODULE J1: + AC/DC HIGH, - AC/DC LOW, G
VIN, GRD, IOUT, IS, OK1, OK2

UJ0131P,WHT — UJ0131N — UJ0131G,GRN/YEL — FRAME
UJ0131VIN,WHT — UJ0131IOUT,WHT — UJ0131IS,WHT — UJ0131OK1,WHT — UJ0131OK2,WHT

OUTPUT MODULE: OUT(+), OUT(-)

2B4 FROM — GD0525:CB521(+) — 521POS — FU0011 20A LI/LD — UJ0131P,WHT
2B4 TO — GD0525:CB521(-) — 521NEG — XT0011:1 — 521NEG,WHT

2B4 FROM — GD0525:CB523(+) — 523POS — XT0014:1 — 523POS — FU0012 10A — FU0012 — 59D7 TO — XT2809:1E
2B4 TO — GD0525:CB523(-) — 523NEG — 523POS — FU0013 10A — FU0013 — 61D7 TO — XT2809:3E
523POS — FU0014 10A — FU0014 — 42D7 TO — XT1851:1E
523POS — FU0015 10A — FU0015 — 43D7 TO — XT18108:1E
523POS — FU0016 10A — FU0016 — 44D7 TO — XT1853:1E
523POS — FU0017 10A

XT0011:2 — 523NEG — 59D7 FROM — XT2809:2E
44D7 FROM — XT1853:2E — XT0011:3 — 523NEG — 61D7 FROM — XT2809:4E
XT0011:4 — 523NEG — 42D7 FROM — XT1851:2E
XT0011:5 — 523NEG — 43D7 FROM — XT18108:2E

24V1,WHT — FU0131 30A LI/LD — XT0032:1 — XT0085:1 — RR0851 3.01K OHM — XT0085:2 — 009301,WHT
24V,WHT — XT0032:2 — XT0085:3 — RR0852 1.0K OHM
0V,WHT — XT0032:3 — XT0032:4

UJ0031 POWER CONVERTER
AC/DC INPUT TO 28V DC OUTPUT
INPUT VOLTAGE: 100-240VAC; 90-340VDC
POWER: 1200W

INPUT MODULE J1: + AC/DC HIGH, - AC/DC LOW, G
VIN, GRD, IOUT, IS, OK1, OK2

CCDCCB4 AC PANELBOARD 120VAC: 1 — FU0031 — XCUJ0031:1 — XT0015:1 — FU0031,WHT — FU0031 20A LI/LD — FU0031LD,WHT
2 — UJ0031N — XCUJ0031:2 — XT0015:2
UJ0031G,GRN/YEL — FRAME
UJ0031VIN,WHT — UJ0031IOUT,WHT — UJ0031OK1,WHT — UJ0031OK2,WHT

OUTPUT MODULE: OUT(+), OUT(-)

XT0033:2 — 24V,WHT — 17A1 TO — FU0136:LI
24V2,WHT — FU0032 30A LI/LD — XT0033:1
XT0033:4 — 0V,WHT — 17B1 FROM — XT0134:1I

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
MAIN POWER SUPPLY

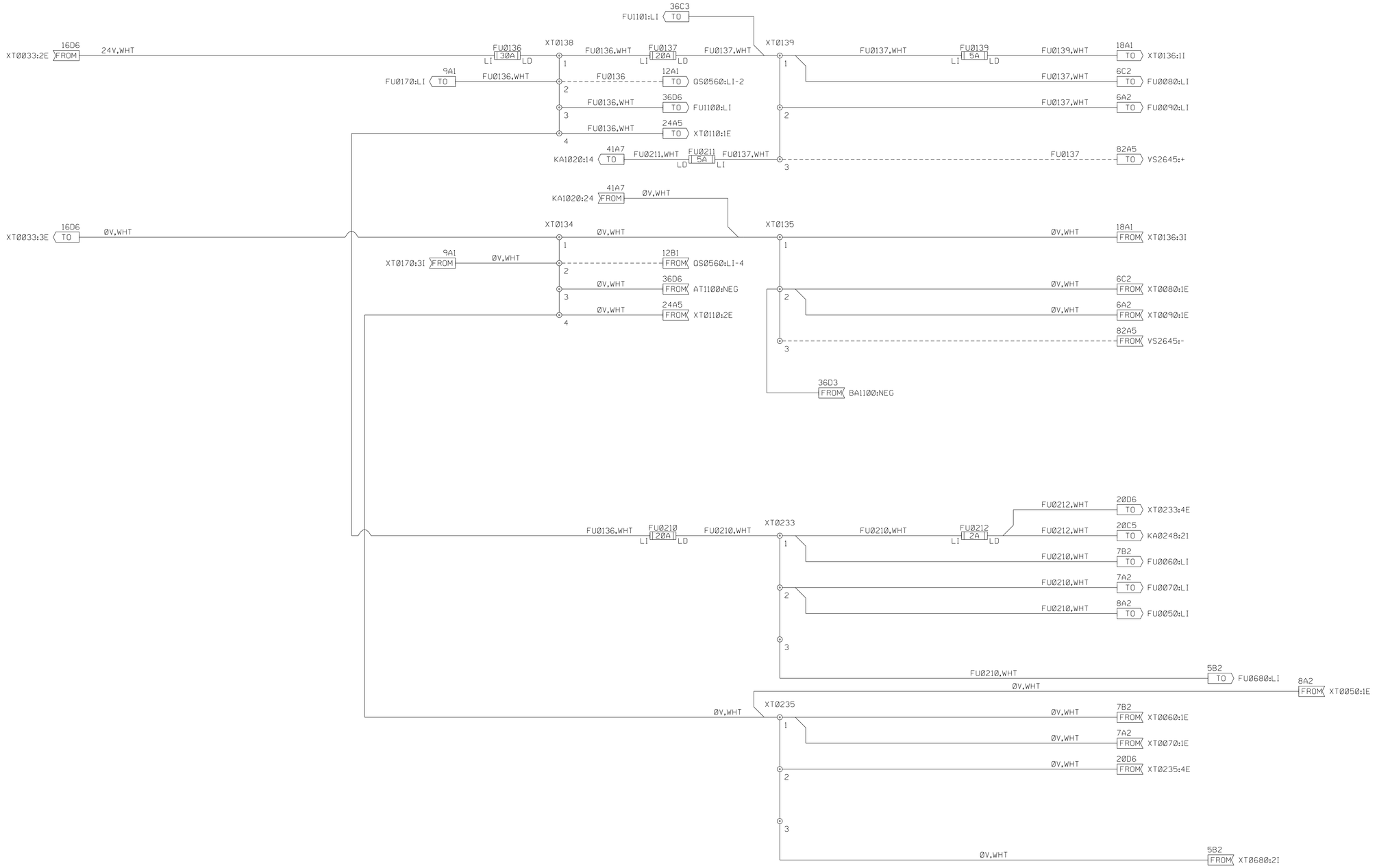
Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B | SHT REV B
SHEET 16 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
MAIN POWER DISTRIBUTION

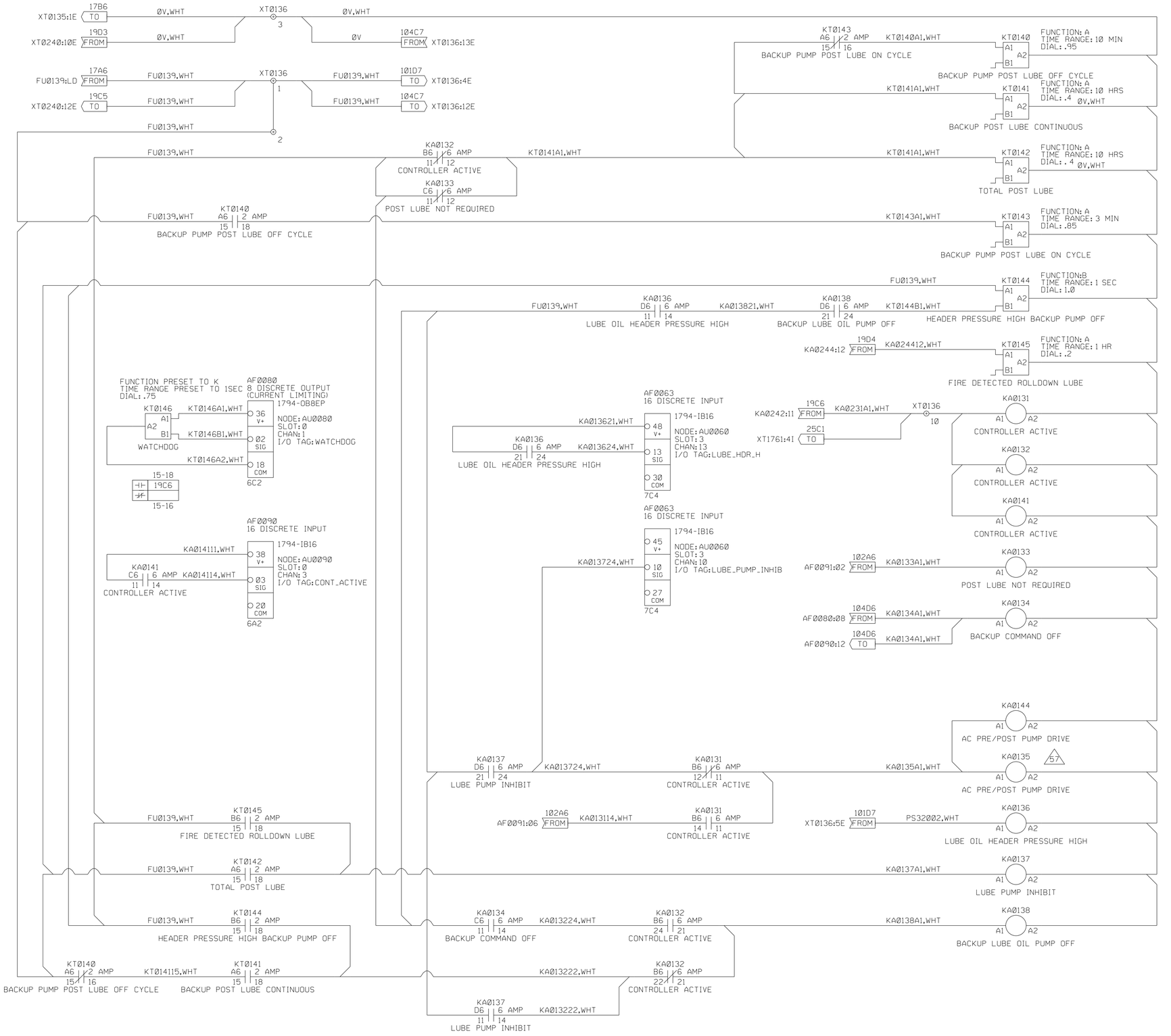
Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 17 OF 141	

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
BACKUP SYSTEM

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV B	SHT REV A
4F491-149447	SHEET 18 OF 141	

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

SB7512:NC1 — 37D6 TO — ESTOPC — XT0240 1 — ESTOPC,WHT — KA0243 C2 | 6 AMP 21 | 24 NO FIRE DETECTED — KA024511,WHT — KA0245 D2 | 6 AMP 11 | 14 NO GAS DETECTED — KA023121,WHT — KA0231 C6 | 6 AMP 21 | 24 CONTROLLER ACTIVE — KA024114,WHT — KA0241 C2 | 6 AMP 14 | 11 BACKUP SYSTEM RESET — UA1200J21,WHT — AF0063 16 DISCRETE INPUT 1794-IB16 47 V+ / 12 SIG / 29 COM 7C4 — NODE:AU0060 SLOT:3 CHAN:12 I/O TAG:OVERSPEED

JP0,V10 — 17 — XT0240 2

XT0345:1E — 14D7 TO — ESTOPB — XT0240 2 — ESTOPB — 37D6 FROM SB7512:C1

KA0235 A2 | 6 AMP 14 | 11 NO EMERGENCY SHUTDOWN SUMMARY — UA1200J21,WHT — 20D6 FROM XT0060:3E

XT0137:1E — 35B6 TO — ESTOPA,WHT — XT0240 3 — ESTOPA — 14D7 FROM XT0345:2E

XT0240 4 — ESTOP,WHT — 35B6 FROM XT0137:2E

XT0139 4 — ESTOP,WHT — 24B5 TO XT0110:5I

11-14	21-24
A5	63B5

11-12 21-22

KA0235 A2 | A1 NO EMERGENCY SHUTDOWN SUMMARY

11-14	21-24
	64A5
D4	

11-12 21-22

KA0236 A2 | A1 NO EMERGENCY SHUTDOWN SUMMARY

11-14	21-24
59B5	61B5

11-12 21-22

KA0237 A2 | A1 NO EMERGENCY SHUTDOWN SUMMARY

11-14	21-24
75B5	76A7

11-12 21-22

KA0238 A2 | A1 NO EMERGENCY SHUTDOWN SUMMARY

11-14	21-24
71A7	B6

11-12 21-22

KA0239 A2 | A1 NO EMERGENCY SHUTDOWN SUMMARY

11-14	21-24
101D6	74B5

11-12 21-22

KA0240 A2 | A1 NO EMERGENCY SHUTDOWN SUMMARY

11-14	21-24
	20C6

11-12 21-22

KA0248 A2 | A1 NO EMERGENCY SHUTDOWN SUMMARY

11-14	21-24
	77B6

11-12 21-22

KA0250 A2 | A1 NO EMERGENCY SHUTDOWN SUMMARY

11-14	21-24
A5	

11-12 21-22

KA0241 A2 | A1 BACKUP SYSTEM RESET — KA0241A1,WHT — XT0240 6 — 34B6 FROM XT0236:2E — KA0241A1 — 14C7 FROM XT0345:5E

11-14	21-24
C6	20C6

11-12 21-22

KA0242 A2 | A1 BACKUP SYSTEM RESET

11-14	21-24
B6	A3

11-12 21-22

KA0243 A2 | A1 NO FIRE DETECTED — KA0243A1,WHT — XT0240 7 — 9B3 FROM AT0170:26

11-14	21-24
	126C5
D4	

11-12 21-22

KA0244 A2 | A1 NO FIRE DETECTED

11-14	21-24
126A5	

11-12 21-22

KA0246 A2 | A1 NO FIRE DETECTED

11-14	21-24
	127C5

11-12 21-22

KA0247 A2 | A1 NO FIRE DETECTED

11-14	21-24
A4	B6

11-12 21-22

KA0245 A2 | A1 NO GAS DETECTED — KA0245A1,WHT — XT0240 8 — 9C3 FROM AT0170:32

11-14	21-24
126A6	

11-12 21-22

KA0249 A2 | A1 NO GAS DETECTED — XT0240 9 — 34C6 FROM XT0236:3E — 14B7 FROM XT0345:4E

0V,WHT — XT0240 10 — 0V,WHT — 18A1 TO XT0136:3I

XT0236:1E — 34B6 TO — XT0240 11

XT0345:6E — 14C7 TO

AT0170:24 — 9B3 TO — FU0139,WHT — XT0240 12 — 18A1 FROM XT0136:1I

AT0170:30 — 9C3 TO

XT0237:2B2 — 34C6 TO — XT0240 13 — KA023612,WHT — KA0236 B2 | 6 AMP 12 | 11 NO EMERGENCY SHUTDOWN SUMMARY

XT0345:3E — 14B7 TO

KT0145:A1 — 18B5 TO — KA024412,WHT — KA0244 D2 | 6 AMP 12 | 11 NO FIRE DETECTED

FU0139,WHT

11-14	21-24
C6	A4

11-12 21-22

11-14	21-24
99A5	
33D6	126A6

11-12 21-22

11-14	21-24
42B5	44B5

11-12 21-22

11-14	21-24
43B5	

11-12 21-22

KA023921,WHT — KA0239 B2 | 6 AMP 21 | 24 NO EMERGENCY SHUTDOWN SUMMARY — KA023924,WHT — AF0063 16 DISCRETE INPUT 1794-IB16 46 V+ / 11 SIG / 28 COM 7C4 — NODE:AU0060 SLOT:3 CHAN:11 I/O TAG:ESD_SUM

KA024311,WHT — KA0243 C2 | 6 AMP 11 | 14 NO FIRE DETECTED — KA024314,WHT — AF0082 16 DISCRETE INPUT 1794-IB16 39 V+ / 04 SIG / 21 COM 6C3 — NODE:AU0080 SLOT:2 CHAN:4 I/O TAG:FIRE_DET

KA024521,WHT — KA0245 D2 | 6 AMP 21 | 24 NO GAS DETECTED — KA024524,WHT — AF0063 16 DISCRETE INPUT 1794-IB16 50 V+ / 15 SIG / 32 COM 7C4 — NODE:AU0060 SLOT:3 CHAN:15 I/O TAG:GAS_DET

KA0231A1,WHT — 18B5 TO XT0136:10I — KA0242 C2 | 6 AMP 11 | 14 BACKUP SYSTEM RESET — KA024214,WHT — AF0081 16 DISCRETE INPUT 1794-IB16 47 V+ / 12 SIG / 29 COM 6C3 — NODE:AU0080 SLOT:1 CHAN:12 I/O TAG:MICRO_FAIL

KA0231 C6 | 6 AMP 11 | 14 CONTROLLER ACTIVE

KT0146 18B2 | 2 AMP 15 | 18 WATCHDOG — KT014615,WHT — AF0062 8 DISCRETE OUTPUT (CURRENT LIMITING) 1794-OB8EP 36 V+ / 02 SIG / 18 COM 7C3 — NODE:AU0060 SLOT:2 CHAN:1 I/O TAG:MICRO_ACTIVE

KA0231 A1 | A2 CONTROLLER ACTIVE — KA0231A2,WHT

KA0232 A1 | A2 CONTROLLER ACTIVE

KA0233 A1 | A2 CONTROLLER ACTIVE

KA0234 A1 | A2 CONTROLLER ACTIVE

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
EMERGENCY SHUTDOWN

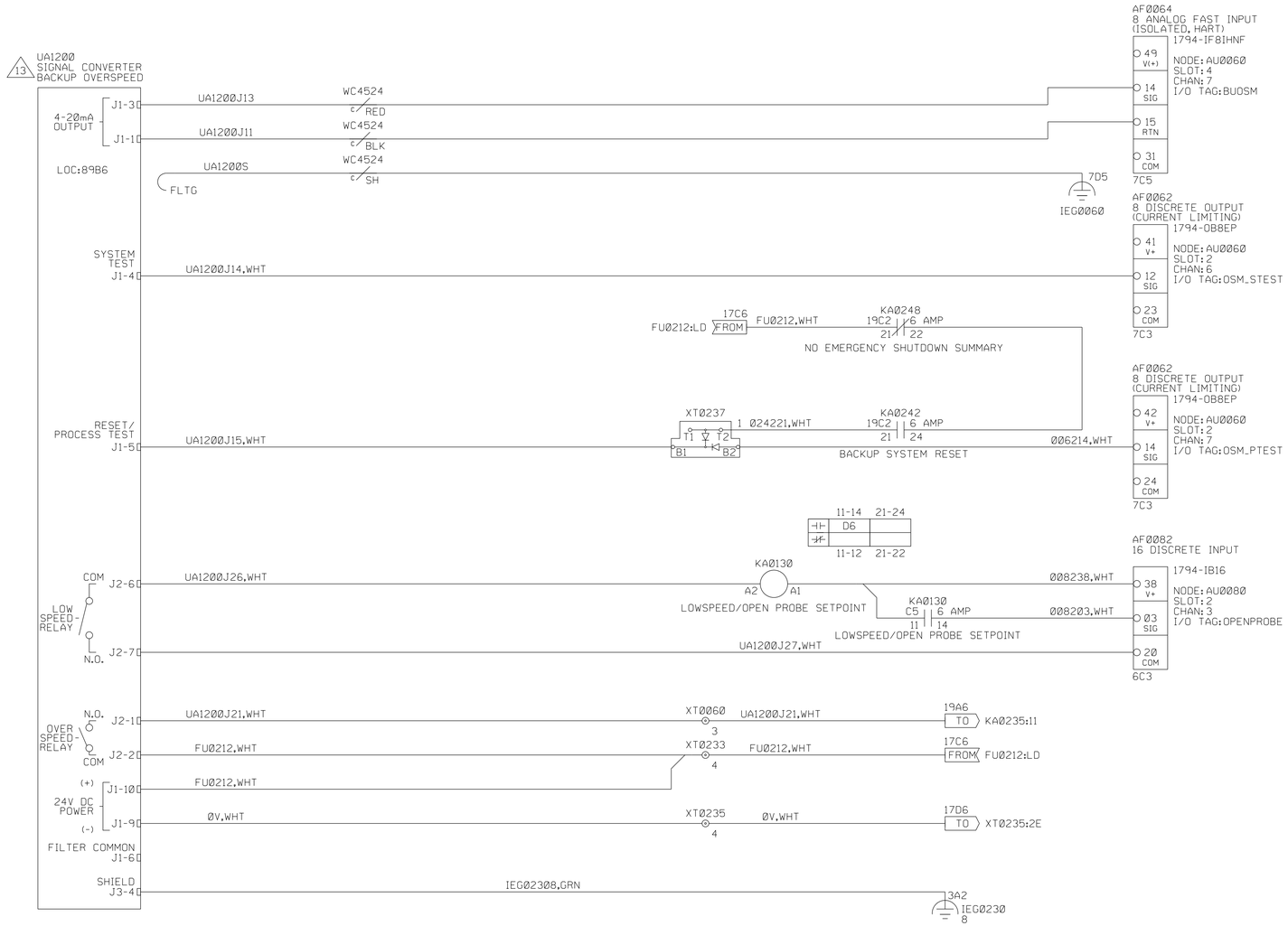
Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV B	SHT REV A
4F491-149447	SHEET 19 OF 141	

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
BACKUP OVERSPEED MODULE

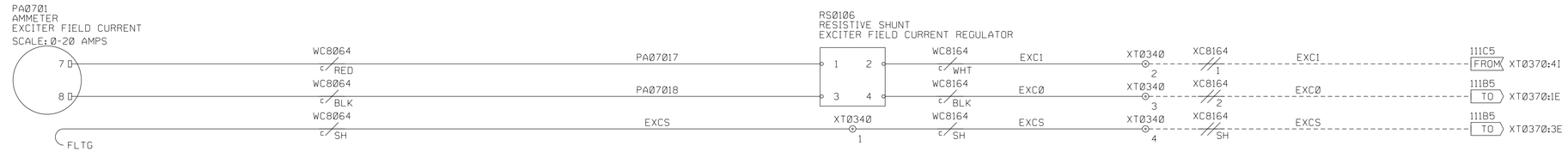
Solar® Turbines
A Caterpillar Company

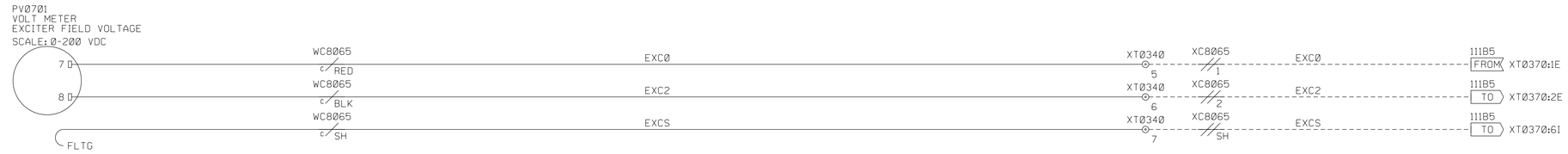
DRAWING NO. 4F491-149447
DWG REV B
SHT REV A
SHEET 20 OF 141

SWBNO-1

AUXILIARY CONSOLE

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.





CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
METERING PANEL

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	A
	SHEET 21 OF 141	

SWBNO-1

AUXILIARY CONSOLE

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

PF0700
GAGE
SYNCHROSCOPE
FREQ: 60HERTZ

HL0703
LIGHT

HL0704
LIGHT

SA0700
SELECTOR SWITCH
OFF ON
OFF ON 21C3
A5
MANUAL SYNCHRONIZATION

GENERATOR SYNCHRONIZING - PHASE A

GENERATOR SYNCHRONIZING - PHASE C

VBUSA,RED
PF07008,RED
PF07007,RED
VBUSC,RED

PA0703
METER
POWER
SCALE: WATTS/VARS

22C1
PA0771:4 FROM

112B6
XT0352:14I FROM
XCAUX7
PA07035,BLU
XT0342

PA07714,BLU
PA07035,BLU
PA07037,BLU
PA07033,BLU
PA07038,RED
PA07036,RED
PA07034,RED
PA07032,RED

VGENC,RED

PF0701
METER
FREQUENCY MEASUREMENT
FREQ: 60 HERTZ
VGENB,RED
PF07017,RED

KA0180
31A5 | 6 AMP
11 14
90% SPEED

SA0740
SELECTOR SWITCH

112B5
XT0352:9E FROM
XCAUX7
MCTN,BLU
XT0342

PA0700
AMMETER
CURRENT MEASUREMENT
SCALE: AMPS
MCTN,BLU
PA07007,BLU

CURRENT SELECT

XT0342
XCAUX7
SA074013,BLU
112B6
FROM XT0352:13I

TM0102
TRANSFORMER
PHASE SHIFTING

SA0770
SELECTOR SWITCH
OFF
W KVA

TM01026,RED
TM01027,RED
TM01024,RED
TM01025,RED
VGENB,RED
VGENA,RED
VGENB,RED
KW/KVAR SELECT
KW/KVAR SELECT

VGENC,RED
VGENA,RED
VGENB,RED
TM0102G,GRN/YEL
FRAME

PA0771
WATT METER
POWER FACTOR

22A1
PA0703:1 TO

112B6
XT0352:12I FROM
XCAUX7
PA07716,BLU
XT0342

PA07714,BLU
PA07716,BLU
VGENC,RED
VGENB,RED

KA0364
RELAY
SYNCHRONIZATION CHECK
11-14 21-24
31B6 32A6
11-12 21-22
5 AMP
VBUSB,RED
VBUSC,RED
VGENB,RED
VGENC,RED

PV0700
VOLTMETER
VOLTAGE MEASUREMEMT
SCALE: VOLTS
PV07008,RED
PV07007,RED

SA0710
SELECTOR SWITCH
OFF 1-2
OFF 2-3
OFF 3-1
VOLTAGE SELECT

SA0710
SELECTOR SWITCH
OFF 1-2
OFF 2-3
OFF 3-1
VOLTAGE SELECT

110B5
XT0351:6E FROM
XCAUX7
XT0341
VBUSB,RED

110B5
XT0351:4E FROM
XCAUX7
XT0341
VBUSA,RED

110B5
XT0351:8E FROM
XCAUX7
XT0341
VBUSC,RED

110D5
XT0351:12E FROM
XCAUX7
XT0341
VGENB,RED

110D5
XT0351:14E FROM
XCAUX7
XT0341
VGENC,RED
VGENC,RED

110D5
XT0351:10E FROM
XCAUX7
XT0341
VGENA,RED

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
METERING PANEL

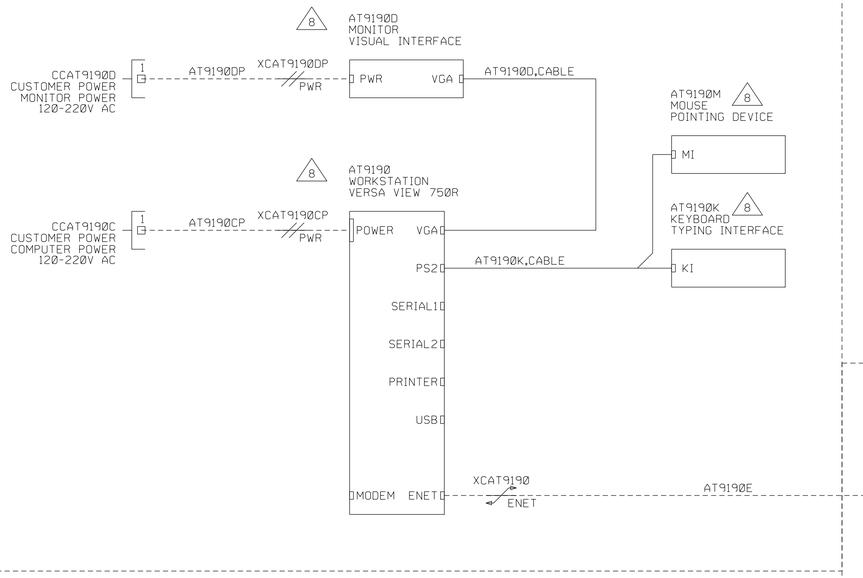
Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV A
SHEET 22 OF 141

SWBNO-1

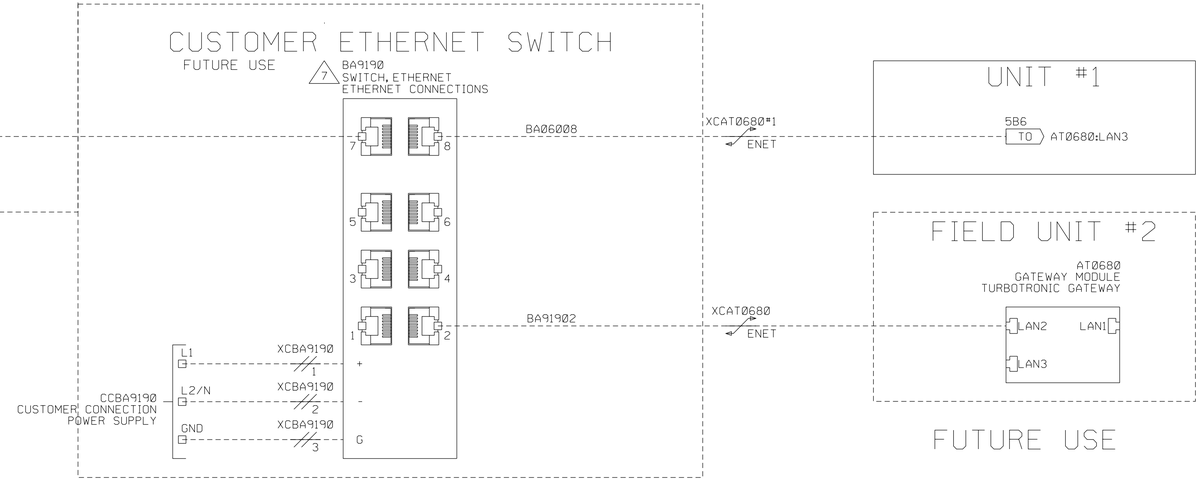
NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

AUXILLARY BUILDING REMOTE DESKTOP



CUSTOMER ETHERNET SWITCH

FUTURE USE



UNIT #1

5B6
TO AT0680:LAN3

FIELD UNIT #2

AT0680
GATEWAY MODULE
TURBOTRONIC GATEWAY

LAN2 LAN1
LAN3

FUTURE USE

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
(AUXILIARY DESKTOP)

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV B	SHT REV B
4F491-149447	SHEET 23 OF 141	

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

ØV,WHT

EF0112
FAN
AIR CIRCULATION

FU0112,RED — XT0112 1 — FU0112,WHT — FU0112 2A (LD/LI)

ØV,BLU — XT0112 2 — ØV,WHT

XT0110 3 — 2

FU0113,WHT — FU0113 5A (LD/LI) — FU0110,WHT — FU0110 20A (LD/LI) — XT0110 1

XT0110 5 — ESTOP — 19B3 FROM XT0139:4E

17B4 TO XT0134:4E

17B4 FROM XT0138:4E

PACK JB61

WC4005 P 3 — XT1761 3 — WC4105 P 3 — 25C1 FROM XT0334:11

WC4005 P 1 — XT1761 1 — WC4105 P 1 — 25B1 TO XT0332:11

WC4005 P 2 — XT1761 2 — WC4105 P 2 — 25C1 TO XT0336:11

AU0050L2 — 8A2 FROM AU0050:L2

AF0460L2

AF0460
4-CH VIBRATION INPUT
DYNAMIX 1444 VIBRATION

IP ADDRESS: 192.168.1.Ø46

L2 / L1 — WC0045 — ENET

LOC. CH. I/O TAG
93D6 0 VE4764_DX
93D6 1 VE4774_DX
2 SPARE
3 SPARE

LOC: LBUS RBUS — WC8045 — TYPE:1444-DYN04-ØIRA

56 V+ · 55 V- · 54 COM · 53 COM · 52 V+ · 51 V- · 50 COM · 49 COM · BUF.OUT DISABLE · GND 57 58 32

AF0450P,WHT
AF0460N,WHT

AF0450
4-CH VIBRATION INPUT
DYNAMIX 1444 VIBRATION

IP ADDRESS: 192.168.1.Ø45

L2 / L1 — WC0043 — ENET

LOC. CH. I/O TAG
93A6 0 VE1214_DX
93C6 1 VE4765_DX
91D6 2 VE1262_DX
92C6 3 VE1272_DX

LOC: LBUS RBUS — WC8043 — TYPE:1444-DYN04-ØIRA

56 V+ · 55 V- · 54 COM · 53 COM · 52 V+ · 51 V- · 50 COM · 49 COM · BUF.OUT DISABLE · GND 57 58 32

AF0430P,WHT
AF0430N,WHT

AF0430
4-CH VIBRATION INPUT
DYNAMIX 1444 VIBRATION

IP ADDRESS: 192.168.1.Ø43

L2 / L1 — WC0042 — ENET

LOC. CH. I/O TAG
92B6 0 VE1241_DX
92B6 1 VE1240_DX
92C6 2 VE1251_DX
92C6 3 VE1250_DX

LOC: LBUS RBUS — WC8042 — TYPE:1444-DYN04-ØIRA

56 V+ · 55 V- · 54 COM · 53 COM · 52 V+ · 51 V- · 50 COM · 49 COM · BUF.OUT DISABLE · GND 57 58 32

AF0420P,WHT
AF0420N,WHT

AF0420
4-CH VIBRATION INPUT
DYNAMIX 1444 VIBRATION

IP ADDRESS: 192.168.1.Ø42

L2 / L1 — WC0041 — ENET

LOC. CH. I/O TAG
91C6 0 VE1231_DX
91D6 1 VE1230_DX
92D6 2 VE1204_DX
55A7 3 PE1520_DX

LOC: LBUS RBUS — WC8041 — TYPE:1444-DYN04-ØIRA

56 V+ · 55 V- · 54 COM · 53 COM · 52 V+ · 51 V- · 50 COM · 49 COM · BUF.OUT DISABLE · GND 57 58 32

AF0410P,WHT
AF0410N,WHT

AF0410
4-CH VIBRATION INPUT
DYNAMIX 1444 VIBRATION

IP ADDRESS: 192.168.1.Ø41

L2 / L1

LOC. CH. I/O TAG
91B6 0 VE1211_DX
91B6 1 VE1210_DX
91C6 2 VE1221_DX
91C6 3 VE1220_DX

LOC: LBUS RBUS — WC8040 — TYPE:1444-DYN04-ØIRA

56 V+ · 55 V- · 54 COM · 53 COM · 52 V+ · 51 V- · 50 COM · 49 COM · BUF.OUT DISABLE · GND 57 58 32

AF0400
2-CH TACHOMETER INPUT
DYNAMIX 1444 VIBRATION

LOC. CH. I/O TAG
91A6 0 VE1263_DX
92A6 1 VE1273_DX

ON 1 2

LBUS RBUS — TYPE: 1444-TSCX02-02RB

12 GND

XT0400 IEG 2 — XT04002,GRN — XT0400 IEG 1

XT0400 IEG 3 — IEG02306,GRN — 3A2 IEG0230 6

WC0046 — ENET — 26B5 TO AF0510:L1

COIL AND SECURE ONE END OF ETHERNET CABLE AT SKID INTERCONNECT WHEN READY TO SHIP.
CABLE TO BE RE-CONNECTED AT SITE

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
TURBINE VIBRATION

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447

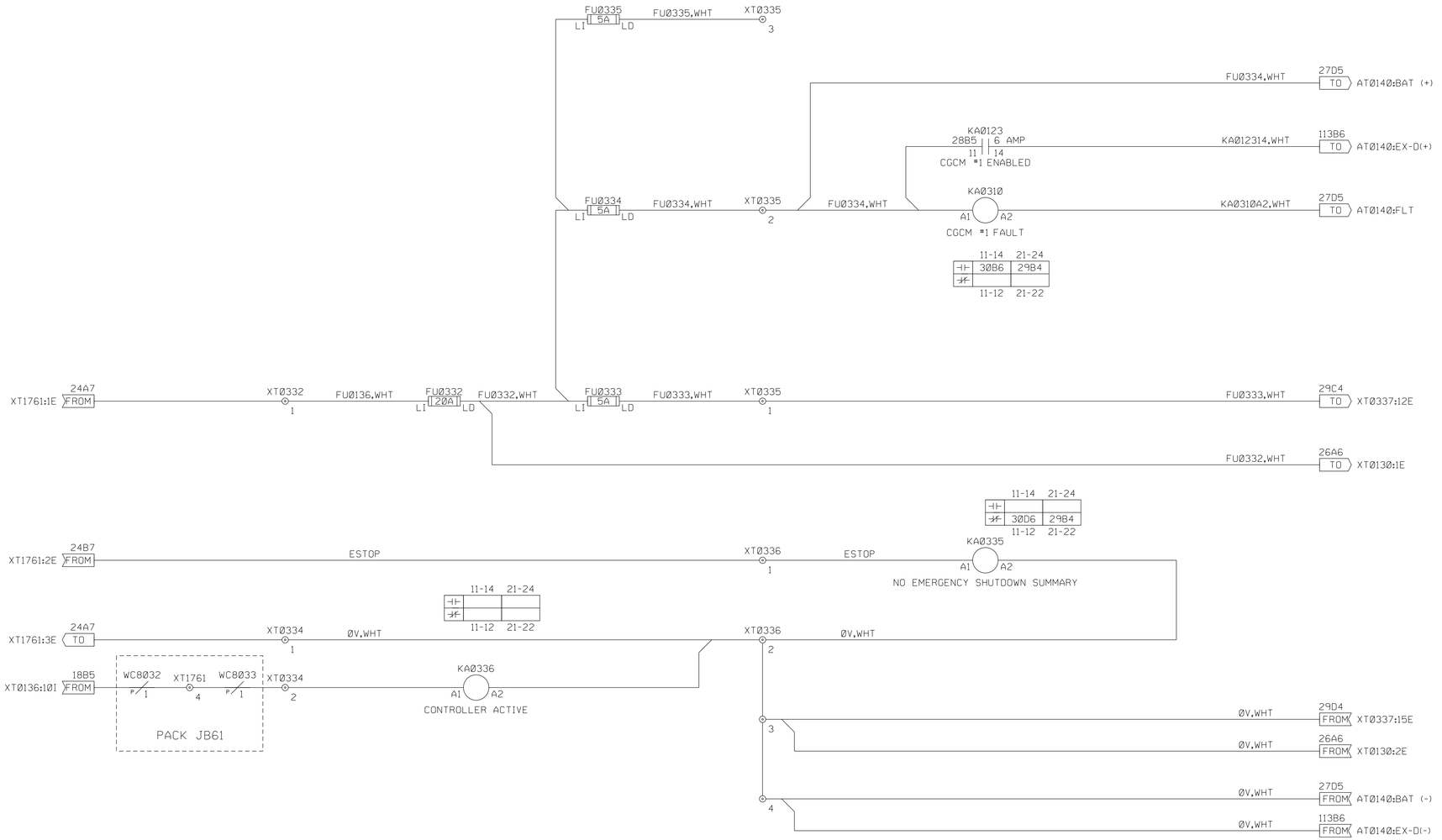
DWG REV B | SHT REV A

SHEET 24 OF 141

SWBNO-1

GENERATOR BOX (JB72)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
POWER DISTRIBUTION (GENERATOR)

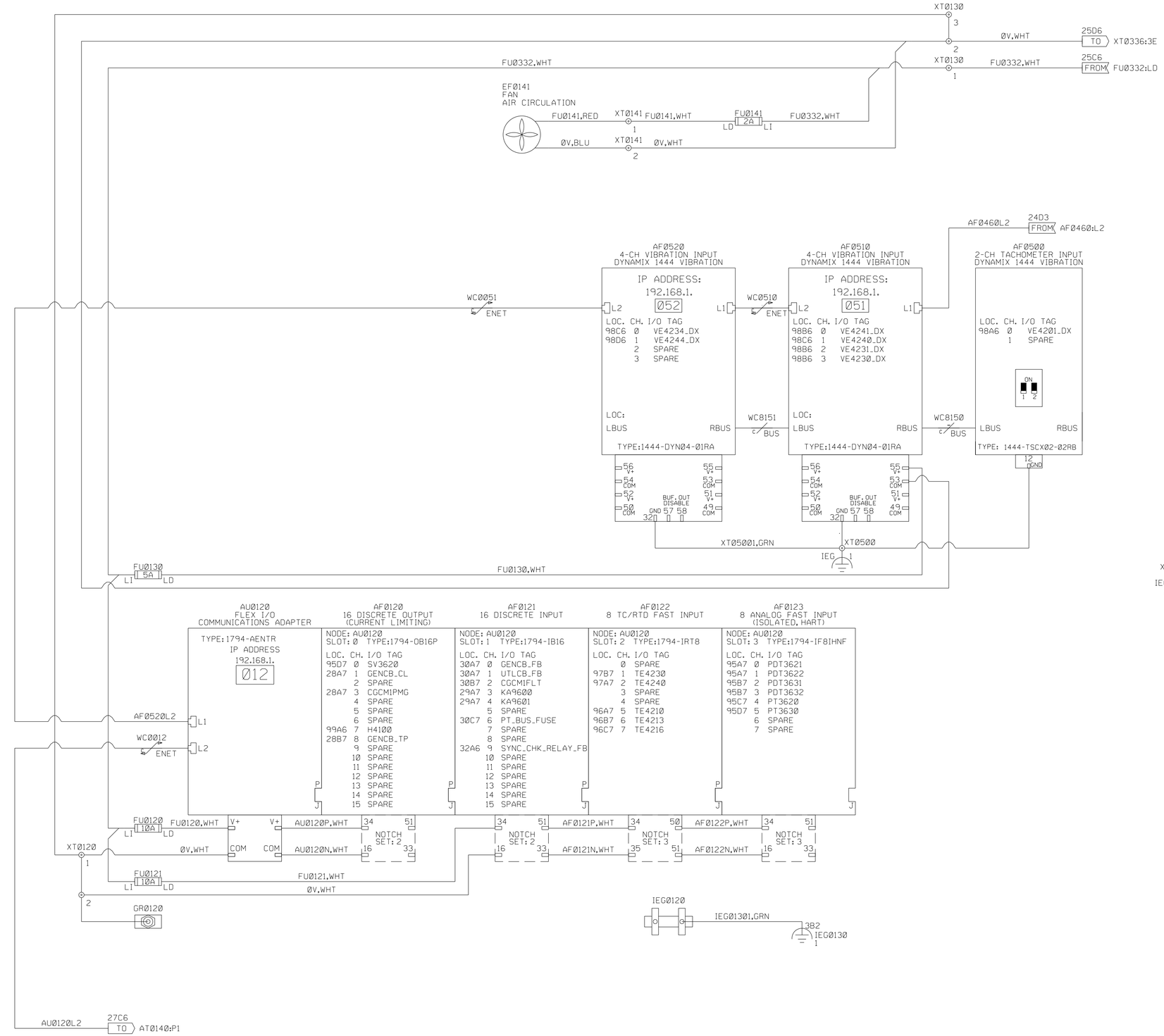
Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	A
	SHEET 25 OF 141	

SWBNO-1

GENERATOR BOX (JB72)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
GENERATOR CONTROLS & MONITORING

Solar® Turbines

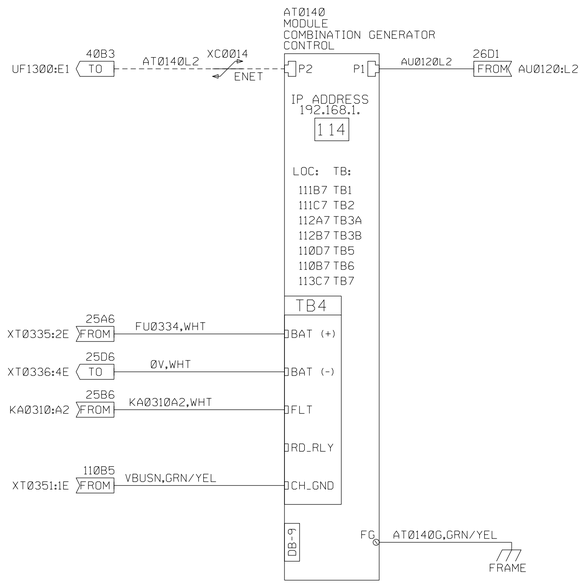
A Caterpillar Company

DRAWING NO.	DWG REV B	SHT REV A
4F491-149447	SHEET 26 OF 141	

SWBNO-1

GENERATOR BOX (JB72)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

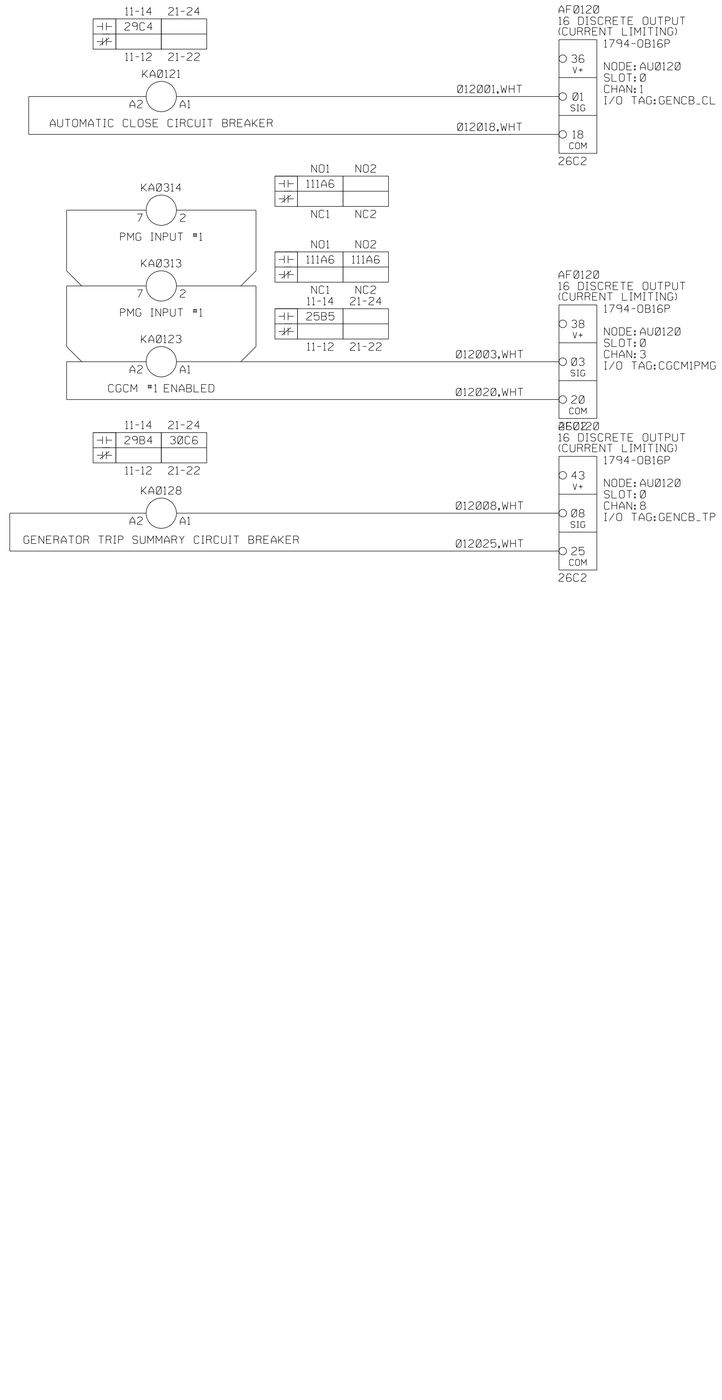
DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
GENERATOR CONTROLS & MONITORING

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 27 OF 141	

SWBNO-1

GENERATOR BOX (JB72)



NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
GENERATOR CONTROL RELAYS

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV B	SHT REV A
4F491-149447	SHEET 28 OF 141	

SWBNO-1

SWITCHGEAR

52 7 KA9600 C NO KA96001 — GENERATOR PROTECTION RELAY COOLDOWN SHUTDOWN — KA96002 — XCPRCS1 1 / XCPRCS1 2

52 7 KA9601 C NO KA96011 — GENERATOR PROTECTION RELAY FAST STOP SHUTDOWN — KA96012 — XCPRFS1 1 / XCPRFS1 2

53 7 KA9602 C2 C NO KA0330A1 — GENERATOR AUXILIARY CIRCUIT BREAKER — XCSWGR0 1

53 7 KA9602 B2 C NC KA9602NC — GENERATOR AUXILIARY CIRCUIT BREAKER — XCSWGR0 2

XCSWGR2 1

7 KA9603 C NO KA0331A1 — MAIN UTILITY AUXILIARY CIRCUIT BREAKER — XCSWGR0 3

FU0333 — XCSWGR0 4

BOP EER AUXILIARY CONSOLE

XCAUX2 1

KA0185 11 | 14 6 AMP — PERMISSIVE CLOSE CIRCUIT BREAKER — XCAUX2 2

GENERATOR BOX (JB72)

AF0121 16 DISCRETE INPUT — 1794-IB16
38 V+ — 03 SIG — 20 COM — 26C3
NODE:AU0120 SLOT:1 CHAN:3 I/O TAG:KA9600

AF0121 16 DISCRETE INPUT — 1794-IB16
39 V+ — 04 SIG — 21 COM — 26C3
NODE:AU0120 SLOT:1 CHAN:4 I/O TAG:KA9601

FU0333,WHT — XT0337 7

KA0128 28B5 11 | 14 6 AMP — GENERATOR TRIP SUMMARY CIRCUIT BREAKER — KA0333A1,WHT — FU0333,WHT

KA0335 25C5 21 / 22 6 AMP — NO EMERGENCY SHUTDOWN SUMMARY — KA0333A1,WHT — FU0333,WHT

KA0310 25B5 21 | 24 6 AMP — CGCM #1 FAULT — KA0333A1,WHT — FU0333,WHT

XT0337 8 — KA0333A1,WHT — KA0333A1 — 21C6 TO XT0343:2E

KA0333 A1 A2 — TRIP CONTROL CIRCUIT BREAKER — 0V,WHT
11-14 21-24 | 30D6 | 11-12 21-22

XT0337 9 — KA0330A1,WHT — KA0330A1 — 21C6 TO XT0343:4E

KA0330 A1 A2 — CLOSED CIRCUIT BREAKER — 0V,WHT
11-14 21-24 | 30A6 | 11-12 21-22

XT0337 10 — KA9602NC — 21C6 TO XT0343:3E

XT0337 11 — KA0331A1,WHT

KA0331 A1 A2 — MAIN UTILITY BREAKER AUXILIARY CONTACT CLOSED — 0V,WHT
11-14 21-24 | 30A6 | 11-12 21-22

FU0333,WHT — 25B6 FROM XT0335:1E

XT0337 12 — FU0333,WHT

KA018511 — 21C6 TO XT0343:1E

XT0337 13 — KA018511,WHT

KA0121 28A5 11 | 14 6 AMP — AUTOMATIC CLOSE CIRCUIT BREAKER

XT0337 14 — KA0332A1,WHT

KA0332 A1 A2 — CLOSE CONTROL CIRCUIT BREAKER — 0V,WHT
11-14 21-24 | 30D6 | 11-12 21-22

XT0337 15 — 0V,WHT — 0V,WHT — 25C6 TO XT0336:3E

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
SWITCHGEAR CONTROL INPUTS

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447 | DWG REV B | SHT REV B | SHEET 29 OF 141

SWBNO-1

SWITCHGEAR

1 — Ø12141 — CCPTBUSFUSE SWITCHGEAR CONNECTION BUS PT FUSE MONITOR

2 — Ø12106 — CCPTBUSFUSE SWITCHGEAR CONNECTION BUS PT FUSE MONITOR

PDCS

1 — KA012821 — CCKA0128 PDCS CONNECTION GENERATOR CIRCUIT BREAKER TRIP SUMMARY (LOAD SHED SYSTEM)

2 — KA012824 — CCKA0128 PDCS CONNECTION GENERATOR CIRCUIT BREAKER TRIP SUMMARY (LOAD SHED SYSTEM)

SWITCHGEAR

1 — KA033211 — CCKA0332 CUSTOMER CONNECTION GENERATOR CIRCUIT BREAKER CLOSE CONTROL

2 — KA033214 — CCKA0332 CUSTOMER CONNECTION GENERATOR CIRCUIT BREAKER CLOSE CONTROL

1 — KA033311 — CCKA0333 CUSTOMER CONNECTION GENERATOR CIRCUIT BREAKER TRIP CONTROL

2 — KA033314 — CCKA0333 CUSTOMER CONNECTION GENERATOR CIRCUIT BREAKER TRIP CONTROL

GENERATOR BOX (JB72)

KA0330 29B6 11 | 14 6 AMP — CLOSED CIRCUIT BREAKER

Ø12135.WHT → AF0121 16 DISCRETE INPUT, 1794-IB16, 35 V+
Ø12100.WHT → 00 SIG
17 COM
26C3

NODE:AU0120
SLOT:1
CHAN:0
I/O TAG:GENCB_FB

KA0331 29C6 11 | 14 6 AMP — MAIN UTILITY BREAKER AUXILIARY CONTACT CLOSED

Ø12136.WHT → AF0121 16 DISCRETE INPUT, 1794-IB16, 36 V+
Ø12101.WHT → 01 SIG
18 COM
26C3

NODE:AU0120
SLOT:1
CHAN:1
I/O TAG:UTLCB_FB

KA0310 25B5 11 | 14 6 AMP — CGCM #1 FAULT

Ø12137.WHT → AF0121 16 DISCRETE INPUT, 1794-IB16, 37 V+
Ø12102.WHT → 02 SIG
19 COM
26C3

NODE:AU0120
SLOT:1
CHAN:2
I/O TAG:CGCM1FLT

17 AF0121 16 DISCRETE INPUT, 1794-IB16

XCPTBUS 1 → JP1,VIO → 41 V+
XCPTBUS 2 → 06 SIG
23 COM
26C3

NODE:AU0120
SLOT:1
CHAN:6
I/O TAG:PT_BUS_FUSE

XCKA0128 1 / XCKA0128 2 — XT0337 1 / XT0337 2 — KA012821.WHT — KA0128 28B5 21 | 24 6 AMP — KA012824.WHT — GENERATOR TRIP SUMMARY CIRCUIT BREAKER

XCKA0332 1 / XCKA0332 2 — XT0337 3 / XT0337 4 — KA033211.WHT — KA0332 29C6 11 | 14 6 AMP — KA033214.WHT — CLOSE CONTROL CIRCUIT BREAKER

KA0335 25C5 11 | 12 6 AMP — NO EMERGENCY SHUTDOWN SUMMARY

XCKA0333 1 / XCKA0333 2 — XT0337 5 / XT0337 6 — KA0333 29B6 11 | 14 6 AMP — KA033314.WHT — TRIP CONTROL CIRCUIT BREAKER

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
GENERATOR CONTROL INPUTS

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 30 OF 141

SWBNO-1

AUXILIARY CONSOLE

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

7 CC7580 CUSTOMER INPUT 90% SPEED
1 CC75801
2 CC75802

XCKA0180 1 / 2

KA0180 A5 | 6 AMP 21 | 24 90% SPEED

KA0180 11-14 21-24 | 22B6 | A5 | 11-12 21-22
A2 A1
90% SPEED

018000,WHT
018017,WHT

AF0180
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
35 V+
00 SIG
17 COM
12C4

NODE:AU0180
SLOT:0
CHAN:0
I/O TAG:NGEN90

KA0185 11-14 21-24 | 11-12 21-22
KA0185A2,WHT
A2 A1
PERMISSIVE CLOSE CIRCUIT BREAKER

018010,WHT

KA0364 22C1 | 5 AMP 11 | 14 018022,WHT
SYNCHRONIZATION CHECK

AF0180
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
40 V+
10 SIG
22 COM
12C4

NODE:AU0180
SLOT:0
CHAN:5
I/O TAG:GENCB_PM

PDCS

7 KA7500 NO C
AUTOMATIC SYNCHRONIZE INITIATE (CUSTOMER)
KA75001
KA95002

XCKA7500 1 / 2

AF0181
16 DISCRETE INPUT
1794-IB16
48 V+
13 SIG
30 COM
12C5

NODE:AU0180
SLOT:1
CHAN:13
I/O TAG:KA7500

7 SB7500 PUSHBUTTON SWITCH NO C
START AND AUTO-SYNCHRONIZE (CUSTOMER)
SB75001
SB75002

XCSB7500 1 / 2

AF0181
16 DISCRETE INPUT
1794-IB16
39 V+
04 SIG
21 COM
12C5

NODE:AU0180
SLOT:1
CHAN:4
I/O TAG:SB7500

7 CC7581 EXTERNAL SETPOINT GENERATOR REAL POWER
1 CC75811
2 CC75812
3 CC7581S

XCGENP 1 / 2 / SH

AF0182
8 ANALOG INPUT
1794-IE8
43 V+
08 SIG
25 COM
12C5

NODE:AU0180
SLOT:2
CHAN:4
I/O TAG:GEN_PWR

12D6
IEG0180

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

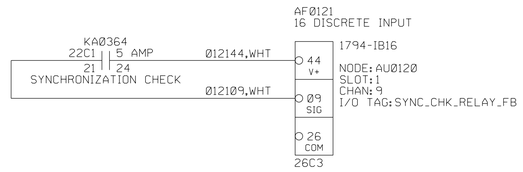
DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
GENERATOR CUSTOMER SIGNALS

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 31 OF 141

SWBNO-1

AUXILIARY CONSOLE



NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
GENERATOR CUSTOMER SIGNALS

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV B	SHT REV A
4F491-149447	SHEET 32 OF 141	

SWBNO-1

TURBINE BOX (JB70) DOOR

SA0170
SELECTOR SWITCH
AUTO INHIBIT
24 A1 23
FIRE SYSTEM AUTO/INHIBIT

SA017023,WHT
SA017024,WHT

SA0170
SELECTOR SWITCH
AUTO INHIBIT
13 A1 14
FIRE SYSTEM AUTO/INHIBIT

AT01754P1,WHT
SA017013,WHT

SB0170
PUSHBUTTON SWITCH
24 23
MANUAL RELEASE

SB017023,WHT
SB017024,WHT

HL0171
LIGHT
2 G 1
FIRE SYSTEM AUTO

HL01711,WHT
HL01712,WHT

HL0172
LIGHT
2 A 1
FIRE SYSTEM INHIBIT

HL01721,WHT
HL01722,WHT

HL0173
LIGHT
2 R 1
FIRE SYSTEM DISCHARGED

HL01731,WHT
HL01732,WHT

HA0472
HORN
AUDIBLE ALARM
BLK-2
BLK-1

WC5072 C 2
WC5072 C 1

HA04722
0V

TURBINE BOX (JB70)

AT0170
CONTROLLER
EAGLE QUANTUM PREMIER

XT0170 11 SA017023,WHT → 11
XT0170 12 SA017024,WHT → 12
CHAN: I4
I/O TAG: AUTO/INHIBIT
9A5

9D4 FROM AT0175:4P1
9D4 TO AT0175:5P1

KA6510
A1 A2
FIRE SYSTEM AUTO/INHIBIT
KA6510A2,WHT

KA6511
A1 A2
FIRE SYSTEM AUTO/INHIBIT

AT0175
8 CHANNEL ED I/O
EAGLE QUANTUM PREMIER

RR0175M
10K OHM
XT0171 9 SB017023,WHT → 1
XT0171 10 SB017024,WHT → 2, 3
CHAN: 1
I/O TAG: MANUAL RELEASE
9B5

AT0175
8 CHANNEL ED I/O
EAGLE QUANTUM PREMIER

RR0175A
10K OHM
XT0171 11 VD0175A
XT0171 12 VD0175A,WHT → 16
XT0171 13 HL01712,WHT → 18
CHAN: 6
I/O TAG: AUTO
9B5

AT0175
8 CHANNEL ED I/O
EAGLE QUANTUM PREMIER

RR0175I
10K OHM
XT0171 14 VD0175I
XT0171 15 VD0175I,WHT → 19
XT0171 16 HL01722,WHT → 21
CHAN: 7
I/O TAG: INHIBIT
9B5

AT0175
8 CHANNEL ED I/O
EAGLE QUANTUM PREMIER

RR0175D
10K OHM
XT0171 17 VD0175D
XT0171 18 VD0175D,WHT → 22
XT0171 19 HL0732,WHT → 24
CHAN: 8
I/O TAG: DISCHARGED
9B5

KA0178 D5 14 11 6 AMP
KA017814,WHT
KA0232 19D6 12 11 6 AMP
LOCAL HORN CONTROL (EQP)
CONTROLLER ACTIVE

KA0875 9D2 14 11 6 AMP
HA04722,WHT
FU0170,WHT → 9A1 FROM XT0170:1E
LOCAL HORN CONTROL (PLC)
0V,WHT → 9A1 TO XT0170:4I

XT0170 13
XT0170 14

11-14 D5 11-12
21-24 21-22

AT0178
8 CHANNEL ED I/O
EAGLE QUANTUM PREMIER

RR0178
10K OHM
XT0170 15 KA0178A1,WHT
VD0178
XT0170 16 VD0178,WHT → 23
XT0170 17 KA0178A2,WHT → 24
CHAN: 8
I/O TAG: LOCAL HORN
9D5

KA0178
A1 A2
LOCAL HORN CONTROL (EQP)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

11-14 21-24
117A6
11-12 21-22

11-14 21-24
117C6
11-12 21-22

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
FIRE SYSTEM OPERATOR

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 33 OF 141

SWBNO-1

TURBINE BOX (JB70) DOOR

SH0471
LIGHTED SWITCH
A1
A1
4 — 3
START/STARTING
SH04713 — WC5067 3
SH04714 — WC5067 4

A1
2 — 1
START/STARTING
SH04711 — WC5067 1
SH04712 — WC5067 2

A1
6 — G — 5
START/STARTING
SH04715 — WC5067 5
SH04716 — WC5067 6

SH0470
LIGHTED SWITCH
B1
B1
2 — 1
STOP/STOPPING
SH04701 — WC5068 1
SH04702 — WC5068 2

B1
4 — 3
STOP/STOPPING
SH04703 — WC5068 3
SH04704 — WC5068 4

B1
6 — R — 5
STOP/STOPPING
SH04705 — WC5068 5
SH04706 — WC5068 6

SH0472
LIGHTED SWITCH
C1
C1
4 — 3
BACKUP SYSTEM ACTIVE/RESET
FU0139 — WC5069 3
KA0241A1 — WC5069 4

B1
2 — 1
BACKUP SYSTEM ACTIVE/RESET
SH04721 — WC5069 1
SH04722 — WC5069 2

B1
6 — A — 5
BACKUP SYSTEM ACTIVE/RESET
SH04725 — WC5069 5
0V — WC5069 6

SB0471
PUSHBUTTON SWITCH
12 — 11
HORN SILENCE
SB047111.WHT
SB047112.WHT

SB0473
PUSHBUTTON SWITCH
24 — 23
ACKNOWLEDGE
SB047323.WHT
SB047324.WHT

TURBINE BOX (JB70)

XT0137 3 ← WC5067 3
XT0137 4 ← WC5067 4
XT0137 5 ← WC5068 3
XT0137 6 ← WC5068 4

XT0236 1 ← WC5069 3 — FU0139.WHT — 19C4 FROM XT0240:11I
XT0236 2 ← WC5069 4 — KA0241A1.WHT — 19C3 TO XT0240:6E
XT0236 4 ← WC5069 1
XT0236 5 ← WC5069 2
XT0236 3 ← WC5069 6 — 0V.WHT — 19D3 TO XT0240:9E

XT0237 2 — 008714.WHT
T1 T2 K1 B1 B2 — KA023612.WHT — 19D4 FROM XT0240:13I

AF0087
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
6C6

35 V+ — NODE:AU0080 SLOT:7 CHAN:10 I/O TAG:SH0471
00 SIG
17 COM
45 V+ — NODE:AU0080 SLOT:7 CHAN:00 I/O TAG:SH0471A
10 SIG
27 COM

AF0087
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
6C6

36 V+ — NODE:AU0080 SLOT:7 CHAN:11 I/O TAG:SH0470
01 SIG
18 COM
48 V+ — NODE:AU0080 SLOT:7 CHAN:03 I/O TAG:SH0470A
13 SIG
30 COM

AF0087
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
6C6

49 V+ — NODE:AU0080 SLOT:7 CHAN:04 I/O TAG:SH0472A
14 SIG
31 COM

AF0087
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
6C6

37 V+ — NODE:AU0080 SLOT:7 CHAN:12 I/O TAG:SB0471
02 SIG
19 COM

AF0087
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
6C6

38 V+ — NODE:AU0080 SLOT:7 CHAN:13 I/O TAG:SB0473
03 SIG
20 COM

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
TURBINE OPERATOR

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 34 OF 141

SWBNO-1

TURBINE BOX (JB70) DOOR

SB0474
PUSHBUTTON SWITCH
24 — 23
RESET

SB047423,WHT
SB047424,WHT

SA0471
SELECTOR SWITCH
OFF INC B1
14 — 13
SPEED/LOAD

SA047113,WHT
SA047114,WHT

SA0471
SELECTOR SWITCH
DEC OFF A1
24 — 23
SPEED/LOAD

SA047123,WHT
SA047124,WHT

SB0472
PUSHBUTTON SWITCH B1
58
12 — 11
EMERGENCY STOP

ESTOPA,WHT
ESTOP,WHT

SB0472 B1
58
22 — 21
EMERGENCY STOP

SB047221,WHT
SB047222,WHT

SA0472
SELECTOR SWITCH
OFF INC C1
14 — 13
VOLTAGE

SA047213,WHT
SA047214,WHT

SA0472
SELECTOR SWITCH
DEC OFF C1
24 — 23
VOLTAGE

SA047223,WHT
SA047224,WHT

SA0473
SELECTOR SWITCH
CLOSED
OPEN OPEN D1
22 — 21
OFF/LOCAL/AUXILIARY

SA047321,WHT
SA047322,WHT

SA0473
SELECTOR SWITCH
OPEN
OPEN CLOSED D1
14 — 13
OFF/LOCAL/AUXILIARY

SA047313,WHT
SA047314,WHT

TURBINE BOX (JB70)

XT0137 1 — ESTOPA,WHT — 19A2 FROM XT0240:3I
XT0137 2 — ESTOP,WHT — 19A3 TO XT0240:4E

AF0087
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
39 V+
04 SIG
21 COM
NODE:AU0080
SLOT:7
CHAN:I4
I/O TAG:SB0474
6C6

AF0087
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
42 V+
07 SIG
24 COM
NODE:AU0080
SLOT:7
CHAN:I7
I/O TAG:SPEED_INC_SKID
6C6

AF0087
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
43 V+
08 SIG
25 COM
NODE:AU0080
SLOT:7
CHAN:I8
I/O TAG:SPEED_DEC_SKID
6C6

AF0087
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
44 V+
09 SIG
26 COM
NODE:AU0080
SLOT:7
CHAN:I9
I/O TAG:EMER_STOP_SKID
6C6

AF0090
16 DISCRETE INPUT
1794-IB16
49 V+
14 SIG
31 COM
NODE:AU0090
SLOT:0
CHAN:14
I/O TAG:VOLT_INC_SKID
6A2

AF0090
16 DISCRETE INPUT
1794-IB16
50 V+
15 SIG
32 COM
NODE:AU0090
SLOT:0
CHAN:15
I/O TAG:VOLT_DEC_SKID
6A2

AF0087
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
40 V+
05 SIG
22 COM
NODE:AU0080
SLOT:7
CHAN:I5
I/O TAG:SYS_LOC
6C6

AF0087
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
41 V+
06 SIG
23 COM
NODE:AU0080
SLOT:7
CHAN:I6
I/O TAG:SYS_AUX
6C6

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
TURBINE OPERATOR

Solar® Turbines
A Caterpillar Company

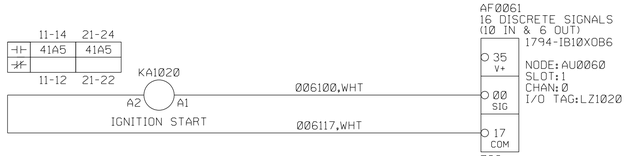
DRAWING NO. 4F491-149447
DWG REV B
SHT REV A
SHEET 35 OF 141

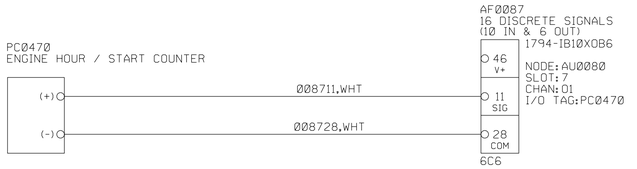
SWBNO-1

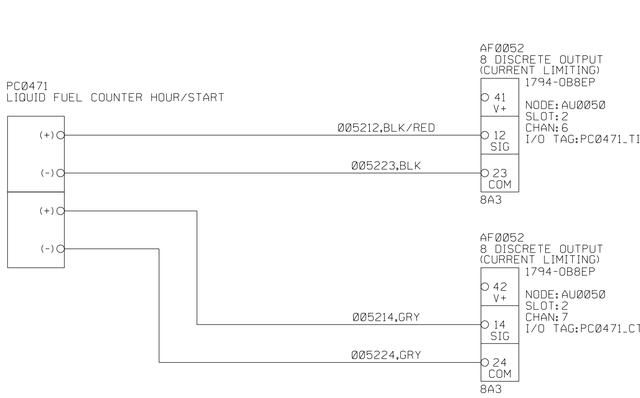
TURBINE BOX (JB70) DOOR

TURBINE BOX (JB70)

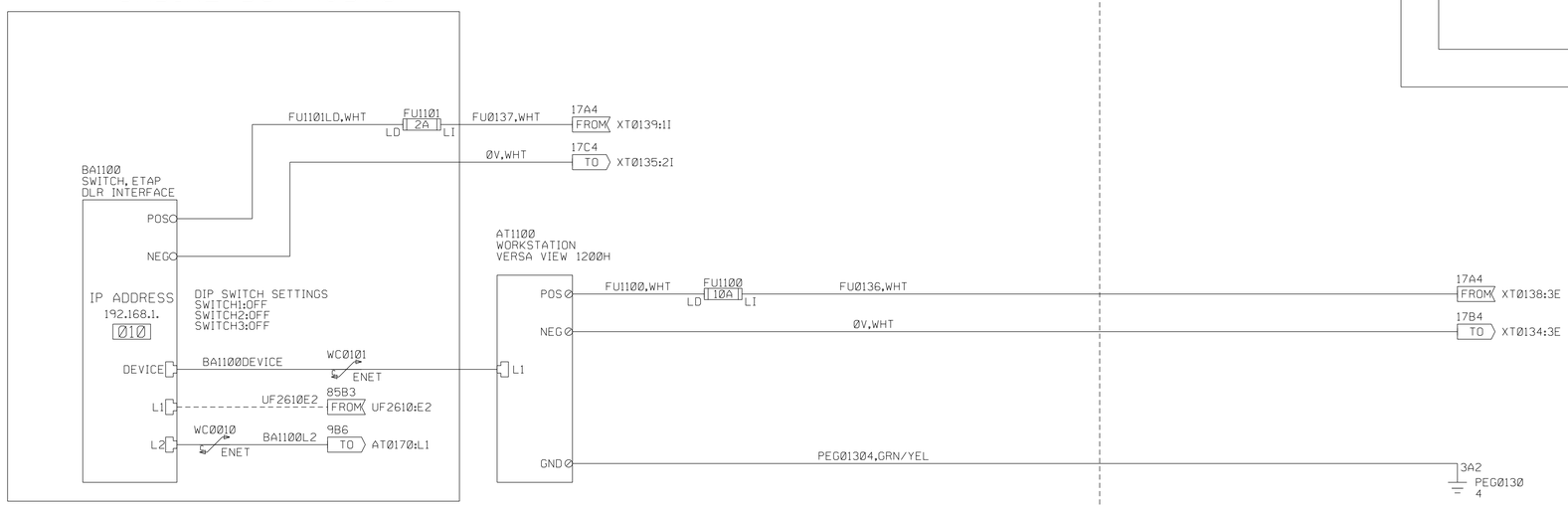
NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.







TURBINE BOX (JB70)



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
TURBINE OPERATOR

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV A
SHEET 36 OF 141

SWBNO-1

PDCS

SB7510
PUSHBUTTON SWITCH
7
NO C
START (CUSTOMER)

SB75101
SB75102

XCSB7510 1
XCSB7510 2

AF0181
16 DISCRETE INPUT
1794-IB16
35 V+
00 SIG
17 COM
12C5

NODE:AU0180
SLOT:1
CHAN:0
I/O TAG:CUS_START

SB7511
PUSHBUTTON SWITCH
7
NC C
NORMAL STOP (CUSTOMER)

SB75111
SB75112

XCSB7511 1
XCSB7511 2

AF0181
16 DISCRETE INPUT
1794-IB16
17
36 V+
01 SIG
18 COM
12C5
JP3,VIO

NODE:AU0180
SLOT:1
CHAN:1
I/O TAG:CUS_STOP

SB7555
PUSHBUTTON SWITCH
7
NO C
SPEED DECREASE (CUSTOMER)

SB75551
SB75552

XCSB7555 1
XCSB7555 2

AF0181
16 DISCRETE INPUT
1794-IB16
45 V+
10 SIG
27 COM
12C5

NODE:AU0180
SLOT:1
CHAN:10
I/O TAG:CUS_SPEED_DEC

SB7554
PUSHBUTTON SWITCH
7
NO C
SPEED INCREASE (CUSTOMER)

SB75541
SB75542

XCSB7554 1
XCSB7554 2

AF0181
16 DISCRETE INPUT
1794-IB16
44 V+
09 SIG
26 COM
12C5

NODE:AU0180
SLOT:1
CHAN:9
I/O TAG:CUS_SPEED_INC

SB7551
PUSHBUTTON SWITCH
7
NO C
VOLTAGE INCREASE (CUSTOMER)

SB75511
SB75512

XCSB7551 1
XCSB7551 2

AF0181
16 DISCRETE INPUT
1794-IB16
47 V+
12 SIG
29 COM
12C5

NODE:AU0180
SLOT:1
CHAN:12
I/O TAG:CUS_VOLT_INC

SB7552
PUSHBUTTON SWITCH
7
NO C
VOLTAGE DECREASE (CUSTOMER)

SB75521
SB75522

XCSB7552 1
XCSB7552 2

AF0181
16 DISCRETE INPUT
1794-IB16
46 V+
11 SIG
28 COM
12C5

NODE:AU0180
SLOT:1
CHAN:11
I/O TAG:CUS_VOLT_DEC

SB7512
PUSHBUTTON SWITCH
58 7
D2
NC2 C2
EMERGENCY STOP (CUSTOMER)

SB75121
SB75122

XCESTOP1 1
XCESTOP1 2

58
D2
NC1 C1
EMERGENCY STOP (CUSTOMER)

ESTOPB
ESTOPC

XCESTOP2 1
XCESTOP2 2

JB70

19A3
TO XT0240:2E
19A2
FROM XT0240:11
JB70

AF0082
16 DISCRETE INPUT
1794-IB16
17
37 V+
02 SIG
19 COM
6C3
JP2,VIO

NODE:AU0080
SLOT:2
CHAN:2
I/O TAG:CUS_EMER_STOP

AUXILIARY CONSOLE

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
CUSTOMER REMOTE INPUTS

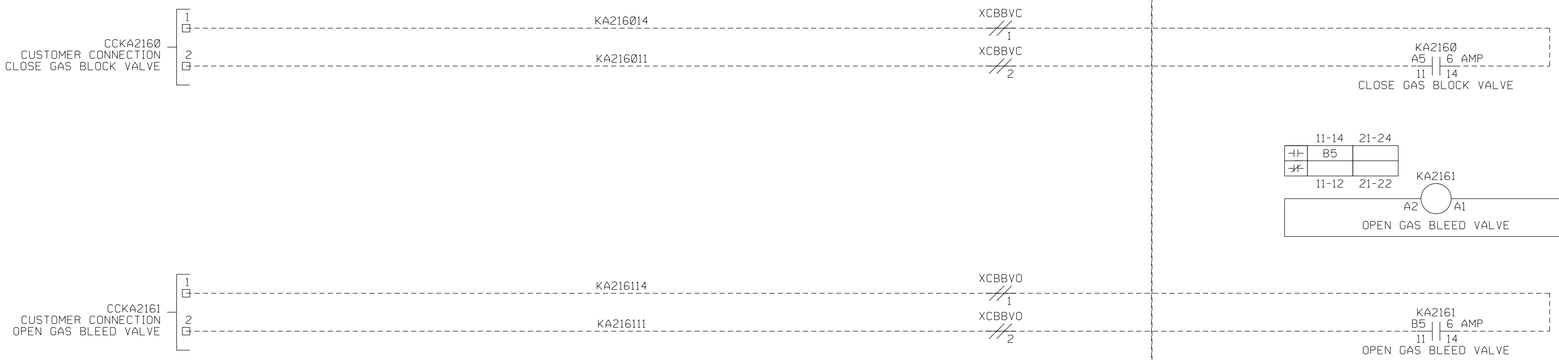
Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 37 OF 141

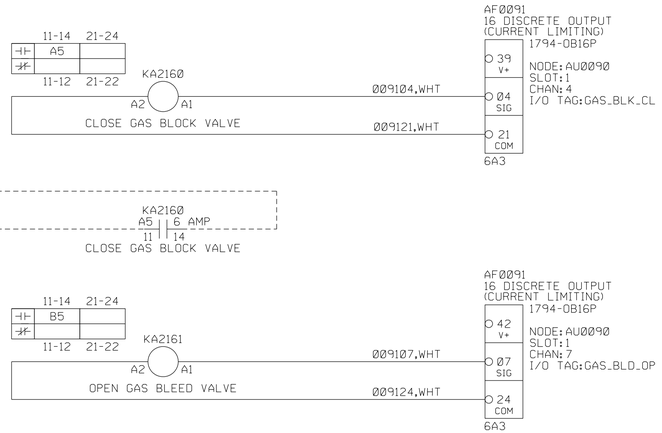
SWBNO-1

FIELD GAS FUEL BLOCK BLEED VALVE

Not part of FGC. Customer scope if required



TURBINE BOX (JB70)



NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
CUSTOMER OFFSKID GAS BLOCK VALVE RELAYS

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV B	SHT REV A
4F491-149447	SHEET 38 OF 141	

SWBNO-1

LIQUID FUEL BLOCK VALVE

Customer scope if required

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CONTROLS SYSTEM
CUSTOMER LIQUID BLOCK VALVE RELAY

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	A
	SHEET 39 OF 141	

SWBNO-1

PACKAGE

EER VFD

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

XCUF13T 1

UF1300 — 101D7 TO XT0136:7E

PS32005 2 — 101D7 FROM XT0136:8E

UF1300
FREQUENCY CONVERTER
START MOTOR SPEED CONTROL

IP ADDRESS
192.168.1.
016

56

RTU

D1:2 P
D1:2
ATX+
ATX-
E1
E2
R0NC
R1NC
POWER
PE1
U(T1)
V(T2)
W(T3)
BR1
BR2
PE4

X11:3
X11:2
X11:1
P2
R0CD
R1CD
PE2
R(L1)
S(L2)
T(L3)
X31:1
X31:2
P1

RTU 3-PHASE POWER CONNECTED INTERNALLY TO VFD BY SUPPLIER

8

M1300
MOTOR
TURBINE DIRECT MOUNT AC START

P1
P2
1H1
1H2
2H1
2H2
FRAME
GND
T1(U)
27 T2(V)
T3(W)
CASE
PID/2B5
FRAME

M1300P1 — XCM1300T 1 — ATX+
M1300P2 — XCM1300T 2 — ATX-
AT0140:P2 — 27C5 FROM — AT0140L2 — E1
UF2220:E1 — 71B4 TO — XC0016 ENET — E2
M1300H1 — XCM1300H 1 — R0NC — XCUF13H 1 — UF1300H1 — 1
M1300H2 — XCM1300H 2 — R1NC — UF1300H2 — 2
CCM1300H CUSTOMER CONNECTION SINGLE PHASE AC POWER
M1300G — XCM1300M SH — XCUF13P SH — UF1300G — SHLD
M1300G — XCM1300M 1 — PE1 — PE2 — UF1300G — PE
M13001 — XCM1300M 2 — U(T1) — R(L1) — UF1300R — 1
M13002 — XCM1300M 3 — V(T2) — S(L2) — UF1300S — 2
M13003 — XCM1300M 4 — W(T3) — T(L3) — UF1300T — 3
CCM1300M CUSTOMER CONNECTION THREE PHASE AC POWER
CASE — M1300FG,GRN/YEL — BR1 — X31:1 — UF1300X311 — 2C5 FROM GD0525:CB525(+)
BR2 — X31:2 — UF1300X312 — 2C5 TO GD0525:CB525(-)
PE4 — P1 — UF1300P1 — 2C5 FROM FG:1FRAME

BOP EER AC PWR

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

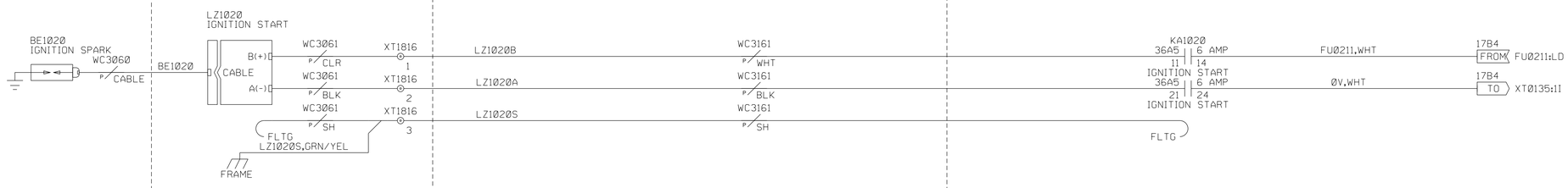
DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
START SYSTEM
DIRECT AC

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 40 OF 141

SWBNO-1

JB16



TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
COMBUSTION SYSTEM
IGNITOR

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	A
	SHEET 41 OF 141	

SWBNO-1

FCE1420
FLOW CONTROL, ELECTRIC
COMPRESSOR BLEED AIR, MOTOR DRIVEN (BV)

SIGNALS

DEMAND
- 1 mA SRC — FCE14201,BRN — XT1850 1 — FCE14201 — WC4090 P/ WHT
- 2 RTN — FCE14202,WHT/BRN — XT1850 2 — FCE14202 — WC4090 P/ BLK
- FCE1420S1 — WC4090 P/ SH — FLTG

MOTOR CURRENT
- 3 mA — FCE14203,BLU — XT1850 3
- 4 RTN — FCE14204,WHT/BLU — XT1850 4

POSITION
- 5 mA — FCE14205,YEL — XT1850 5 — FCE14205 — WC4091 P/ WHT
- 6 RTN — FCE14206,WHT/YEL — XT1850 6 — FCE14206 — WC4091 P/ BLK
- FCE1420S2 — WC4091 P/ SH — FLTG

RUN
- 7 SIG — FCE14207,VIO — XT1850 7 — FCE14207 — WC4092 P/ WHT-PR1
- 8 RTN — FCE14208,WHT/VIO — XT1850 8 — FCE14208 — WC4092 P/ BLK-PR1

RESET
- 9 SIG — FCE14209,GRY — XT1850 9 — FCE14209 — WC4092 P/ WHT-PR2
- 10 RTN — FCE142010,WHT/GRY — XT1850 10 — FCE142010 — WC4092 P/ BLK-PR2

SHUTDOWN
- 11 AL — FCE142011,BLK — XT1850 11 — FCE142011 — WC4092 P/ WHT-PR3
- 12 RTN — FCE142012,WHT/BLK — XT1850 12 — FCE142012 — WC4092 P/ BLK-PR3

FAULT
- 13 AL — FCE142013,ORN — XT1850 13 — FCE142013 — WC4092 P/ WHT-PR4
- 14 RTN — FCE142014,WHT/ORN — XT1850 14 — FCE142014 — WC4092 P/ BLK-PR4

SERIAL
- 15 TX OUT — FCE142015,WHT/ORN/BLU — XT1850 15
- 16 RX IN — FCE142016,WHT/ORN/YEL — XT1850 16
- 17 RTN — FCE142017,WHT/ORN/GRN — XT1850 17

ENET DLR1
- 18 TD+ — FCE142018,WHT/GRN — XT1850 18
- 19 TD- — FCE142019,GRN — XT1850 19
- 20 RD+ — FCE142020,WHT/ORN — XT1850 20
- 21 RD- — FCE142021,ORN — XT1850 21

ENET DLR2
- 22 TD+ — FCE142022,WHT/BRN — XT1850 22
- 23 TD- — FCE142023,BRN — XT1850 23
- 24 RD+ — FCE142024,WHT/BLU — XT1850 24
- 25 RD- — FCE142025,BLU — XT1850 25

JB50

JB51

SYSTEM POWER
- P1 V+ — FU0014,WHT/RED — XT1851 1 — FU0014 — WC6002 P/ 1
- P2 RTN — 523NEG,WHT/BLK — XT1851 2 — 523NEG — WC6002 P/ 2

PID/3A5

TURBINE BOX (JB70)

AF0071
4 ANALOG FAST OUTPUT
(ISOLATED)
1794-OF4I
00 SIG
01 RET
39 COM
NODE: AU0070
SLOT: 1
CHAN: 0
I/O TAG: FCE1420
7A3

AF0064
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
35 V(+)
00 SIG
01 RTN
17 COM
NODE: AU0060
SLOT: 4
CHAN: 0
I/O TAG: FCE1420_FB
7C5

KA0233
19D6 | | 6 AMP
11 | | 14
CONTROLLER ACTIVE

7D5
IEG0060

AF0060
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
36 V+
02 SIG
18 COM
NODE: AU0060
SLOT: 0
CHAN: 1
I/O TAG: FCE1420_EN
006002,WHT
7C2

AF0060
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
35 V+
00 SIG
17 COM
NODE: AU0060
SLOT: 0
CHAN: 0
I/O TAG: FCE1420_RE
7C2

AF0063
16 DISCRETE INPUT
1794-IB16
36 V+
01 SIG
18 COM
NODE: AU0060
SLOT: 3
CHAN: 1
I/O TAG: FCE1420_OT
7C4

AF0063
16 DISCRETE INPUT
1794-IB16
35 V+
00 SIG
17 COM
NODE: AU0060
SLOT: 3
CHAN: 0
I/O TAG: FCE1420_FL
7C4

16C3 FROM FU0014:LD

16C3 TO XT0011:4E

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
COMBUSTION SYSTEM
BLEED VALVE

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 42 OF 141

SWBNO-1

FCE1440
FLOW CONTROL, ELECTRIC
COMPRESSOR VARIABLE GUIDE VANE #2

JB12

SIGNALS

DEMAND	mA SRC	1	FCE14401,BRN	XT28122 1	FCE14401	WC4093 P WHT-PR1
	RTN	2	FCE14402,WHT/BRN	XT28122 2	FCE14402	WC4093 P BLK-PR1
				FLTG	FCE1440S1	WC4093 P SH-PR1
MOTOR CURRENT	mA	3	FCE14403,BLU	XT28122 3	FCE14403	WC4095 P WHT
	RTN	4	FCE14404,WHT/BLU	XT28122 4	FCE14404	WC4095 P BLK
				FLTG	FCE1440S2	WC4095 P SH
POSITION	mA	5	FCE14405,YEL	XT28122 5	FCE14405	WC4093 P WHT-PR2
	RTN	6	FCE14406,WHT/YEL	XT28122 6	FCE14406	WC4093 P BLK-PR2
				FLTG	FCE1440S3	WC4093 P SH-PR2
RUN	SIG	7	FCE14407,VIO	XT28122 7	FCE14407	WC4096 P WHT-PR1
	RTN	8	FCE14408,WHT/VIO	XT28122 8	FCE14408	WC4096 P BLK-PR1
RESET	SIG	9	FCE14409,GRY	XT28122 9	FCE14409	WC4096 P WHT-PR2
	RTN	10	FCE144010,WHT/GRY	XT28122 10	FCE144010	WC4096 P BLK-PR2
SHUTDOWN	AL	11	FCE144011,BLK	XT28122 11	FCE144011	WC4096 P WHT-PR3
	RTN	12	FCE144012,WHT/BLK	XT28122 12	FCE144012	WC4096 P BLK-PR3
FAULT	AL	13	FCE144013,ORN	XT28122 13	FCE144013	WC4096 P WHT-PR4
	RTN	14	FCE144014,WHT/ORN	XT28122 14	FCE144014	WC4096 P BLK-PR4
SERIAL	TX OUT	15	FCE144015,WHT/ORN/BLU	XT28122 15		
	RX IN	16	FCE144016,WHT/ORN/YEL	XT28122 16		
	RTN	17	FCE144017,WHT/ORN/GRN	XT28122 17		
ENET DLR1	TD+	18	FCE144018,WHT/GRN	XT28122 18		
	TD-	19	FCE144019,GRN	XT28122 19		
	RD+	20	FCE144020,WHT/ORN	XT28122 20		
	RD-	21	FCE144021,ORN	XT28122 21		
ENET DLR2	TD+	22	FCE144022,WHT/BRN	XT28122 22		
	TD-	23	FCE144023,BRN	XT28122 23		
	RD+	24	FCE144024,WHT/BLU	XT28122 24		
	RD-	25	FCE144025,BLU	XT28122 25		

JB108

SYSTEM POWER	V+	P1	FU0015,WHT/RED	XT18108 1	FU0015	WC6003 P 1
	RTN	P2	523NEG,WHT/BLK	XT18108 2	523NEG	WC6003 P 2

NOTE: SYSTEM POWER WIRE COLORS MAY VARY. SEE DEVICE NAMEPLATE FOR CONNECTION INFORMATION.

PID/3B3

TURBINE BOX (JB70)

AF0071
4 ANALOG FAST OUTPUT (ISOLATED)
1794-OF4I
12 SIG
13 RET
45 COM
NODE: AU0070
SLOT: 1
CHAN: 3
I/O TAG: FCE1440
7A3

AF0085
8 ANALOG FAST INPUT (ISOLATED, HART)
1794-IF8IHNF
49 V(+)
14 SIG
15 RTN
31 COM
NODE: AU0080
SLOT: 5
CHAN: 7
I/O TAG: FCE1440_MC
6C5

6D6
IEG0080

AF0064
8 ANALOG FAST INPUT (ISOLATED, HART)
1794-IF8IHNF
41 V(+)
06 SIG
07 RTN
23 COM
NODE: AU0060
SLOT: 4
CHAN: 3
I/O TAG: FCE1440_FB
7C5

KA0234
1D06 | | 6 AMP
11 | | 14
CONTROLLER ACTIVE

7D5
IEG0060

AF0060
8 DISCRETE OUTPUT (CURRENT LIMITING)
1794-OB8EP
42 V+
14 SIG
24 COM
NODE: AU0060
SLOT: 0
CHAN: 7
I/O TAG: FCE1440_EN
7C2

006014,WHT

AF0060
8 DISCRETE OUTPUT (CURRENT LIMITING)
1794-OB8EP
41 V+
12 SIG
23 COM
NODE: AU0060
SLOT: 0
CHAN: 6
I/O TAG: FCE1440_RE
7C2

AF0063
16 DISCRETE INPUT
1794-IB16
42 V+
07 SIG
24 COM
NODE: AU0060
SLOT: 3
CHAN: 7
I/O TAG: FCE1440_OT
7C4

AF0063
16 DISCRETE INPUT
1794-IB16
41 V+
06 SIG
23 COM
NODE: AU0060
SLOT: 3
CHAN: 6
I/O TAG: FCE1440_FL
7C4

16C3
FROM FU0015:LD

16C3
TO XT0011:5E

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
COMBUSTION SYSTEM
GUIDE VANE

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 43 OF 141

SWBNO-1

FCE1442
FLOW CONTROL, ELECTRIC
COMPRESSOR VARIABLE GUIDE VANE #1,#3,#4,#5

JB52

SIGNALS

DEMAND	mA SRC	1	FCE14421,BRN	XT1852 1	FCE14421	WC4097 P WHT-PR1
	RTN	2	FCE14422,WHT/BRN	XT1852 2	FCE14422	WC4097 P BLK-PR1
				FLTG	FCE1442S1	WC4097 P SH-PR1
MOTOR CURRENT	mA	3	FCE14423,BLU	XT1852 3	FCE14423	WC4098 P WHT
	RTN	4	FCE14424,WHT/BLU	XT1852 4	FCE14424	WC4098 P BLK
				FLTG	FCE1442S2	WC4098 P SH
POSITION	mA	5	FCE14425,YEL	XT1852 5	FCE14425	WC4097 P WHT-PR2
	RTN	6	FCE14426,WHT/YEL	XT1852 6	FCE14426	WC4097 P BLK-PR2
				FLTG	FCE1442S3	WC4097 P SH-PR2
RUN	SIG	7	FCE14427,VIO	XT1852 7	FCE14427	WC4099 P WHT-PR1
	RTN	8	FCE14428,WHT/VIO	XT1852 8	FCE14428	WC4099 P BLK-PR1
RESET	SIG	9	FCE14429,GRY	XT1852 9	FCE14429	WC4099 P WHT-PR2
	RTN	10	FCE144210,WHT/GRY	XT1852 10	FCE144210	WC4099 P BLK-PR2
SHUTDOWN	AL	11	FCE144211,BLK	XT1852 11	FCE144211	WC4099 P WHT-PR3
	RTN	12	FCE144212,WHT/BLK	XT1852 12	FCE144212	WC4099 P BLK-PR3
FAULT	AL	13	FCE144213,ORN	XT1852 13	FCE144213	WC4099 P WHT-PR4
	RTN	14	FCE144214,WHT/ORN	XT1852 14	FCE144214	WC4099 P BLK-PR4
SERIAL	TX OUT	15	FCE144215,WHT/ORN/BLU	XT1852 15		
	RX IN	16	FCE144216,WHT/ORN/YEL	XT1852 16		
	RTN	17	FCE144217,WHT/ORN/GRN	XT1852 17		
ENET DLR1	TD+	18	FCE144218,WHT/GRN	XT1852 18		
	TD-	19	FCE144219,GRN	XT1852 19		
	RD+	20	FCE144220,WHT/ORN	XT1852 20		
	RD-	21	FCE144221,ORN	XT1852 21		
ENET DLR2	TD+	22	FCE144222,WHT/BRN	XT1852 22		
	TD-	23	FCE144223,BRN	XT1852 23		
	RD+	24	FCE144224,WHT/BLU	XT1852 24		
	RD-	25	FCE144225,BLU	XT1852 25		

JB53

SYSTEM POWER	V+	P1	FU0016,WHT/RED	XT1853 1	FU0016	WC6004 P 1
	RTN	P2	523NEG,WHT/BLK	XT1853 2	523NEG	WC6004 P 2

NOTE: SYSTEM POWER WIRE COLORS MAY VARY. SEE DEVICE NAMEPLATE FOR CONNECTION INFORMATION.

PID/3B3

TURBINE BOX (JB70)

AF0095
4 ANALOG FAST OUTPUT (ISOLATED)
1794-OF4I
12 SIG
13 RET
45 COM
NODE: AU0090
SLOT: 5
CHAN: 3
I/O TAG: FCE1442
6A5

AF0085
8 ANALOG FAST INPUT (ISOLATED, HART)
1794-IF8IHNF
35 V(+)
00 SIG
01 RTN
17 COM
NODE: AU0080
SLOT: 5
CHAN: 0
I/O TAG: FCE1442_MC
6C5

6D6
IEG0080

AF0065
8 ANALOG FAST INPUT (ISOLATED, HART)
1794-IF8IHNF
43 V(+)
08 SIG
09 RTN
25 COM
NODE: AU0060
SLOT: 5
CHAN: 4
I/O TAG: FCE1442_FB
7C5

KA0233
19D6 | | 6 AMP
21 | | 24
CONTROLLER ACTIVE

7D5
IEG0060

AF0092
16 DISCRETE OUTPUT (CURRENT LIMITING)
1794-OB16P
44 V+
09 SIG
26 COM
NODE: AU0090
SLOT: 2
CHAN: 9
I/O TAG: FCE1442_EN
009209,WHT
6A3

AF0092
16 DISCRETE OUTPUT (CURRENT LIMITING)
1794-OB16P
45 V+
10 SIG
27 COM
NODE: AU0090
SLOT: 2
CHAN: 10
I/O TAG: FCE1442_RE
6A3

AF0081
16 DISCRETE INPUT
1794-IB16
42 V+
07 SIG
24 COM
NODE: AU0080
SLOT: 1
CHAN: 7
I/O TAG: FCE1442_OT
6C3

AF0081
16 DISCRETE INPUT
1794-IB16
43 V+
08 SIG
25 COM
NODE: AU0080
SLOT: 1
CHAN: 8
I/O TAG: FCE1442_FL
6C3

16C3
FROM FU0016:LD

16C2
TO XT0011:31

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
COMBUSTION SYSTEM
GUIDE VANE #1 & #3-#5

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 44 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

TE1110
TEMPERATURE ELEMENT
ENGINE AIR INLET TEMPERATURE

JB24
XT1824

TE11101,RED — 1 — TE11101 — WC2080 P/RED
TE11102,RED — 2 — TE11102 — WC2080 P/WHT
TE11103,WHT — 3 — TE11103 — WC2080 P/BLK
TE11104,WHT — 4 — TE1110S — WC2080 P/SH
PID/3C3 — FLTG

AF0083
8 TC/RTD FAST INPUT
1794-IRT8
21 I+
23 SIG(L)
24 SIG(-)
44 GND
NODE: AU0080
SLOT: 3
CHAN: 5
I/O TAG: TE1110
6C4

TE1111
TEMPERATURE ELEMENT
ENGINE AIR INLET TEMPERATURE

JB110
XT18110

TE11111,RED — 1 — TE11111 — WC2081 P/RED
TE11112,RED — 2 — TE11112 — WC2081 P/WHT
TE11113,WHT — 3 — TE11113 — WC2081 P/BLK
TE11114,WHT — 4 — TE1111S — WC2081 P/SH
PID/3C2 — FLTG

AF0084
8 TC/RTD FAST INPUT
1794-IRT8
12 I+
14 SIG(L)
15 SIG(-)
42 GND
NODE: AU0080
SLOT: 4
CHAN: 3
I/O TAG: TE1111
6C5

TE1112
TEMPERATURE ELEMENT
ENGINE AIR INLET TEMPERATURE

JB111
XT18111

TE11121,RED — 1 — TE11121 — WC2082 P/RED
TE11122,RED — 2 — TE11122 — WC2082 P/WHT
TE11123,WHT — 3 — TE11123 — WC2082 P/BLK
TE11124,WHT — 4 — TE1112S — WC2082 P/SH
PID/3C2 — FLTG

AF0094
8 TC/RTD FAST INPUT
1794-IRT8
29 I+
31 SIG(L)
32 SIG(-)
33 GND
NODE: AU0090
SLOT: 4
CHAN: 7
I/O TAG: TE1112
6A5

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

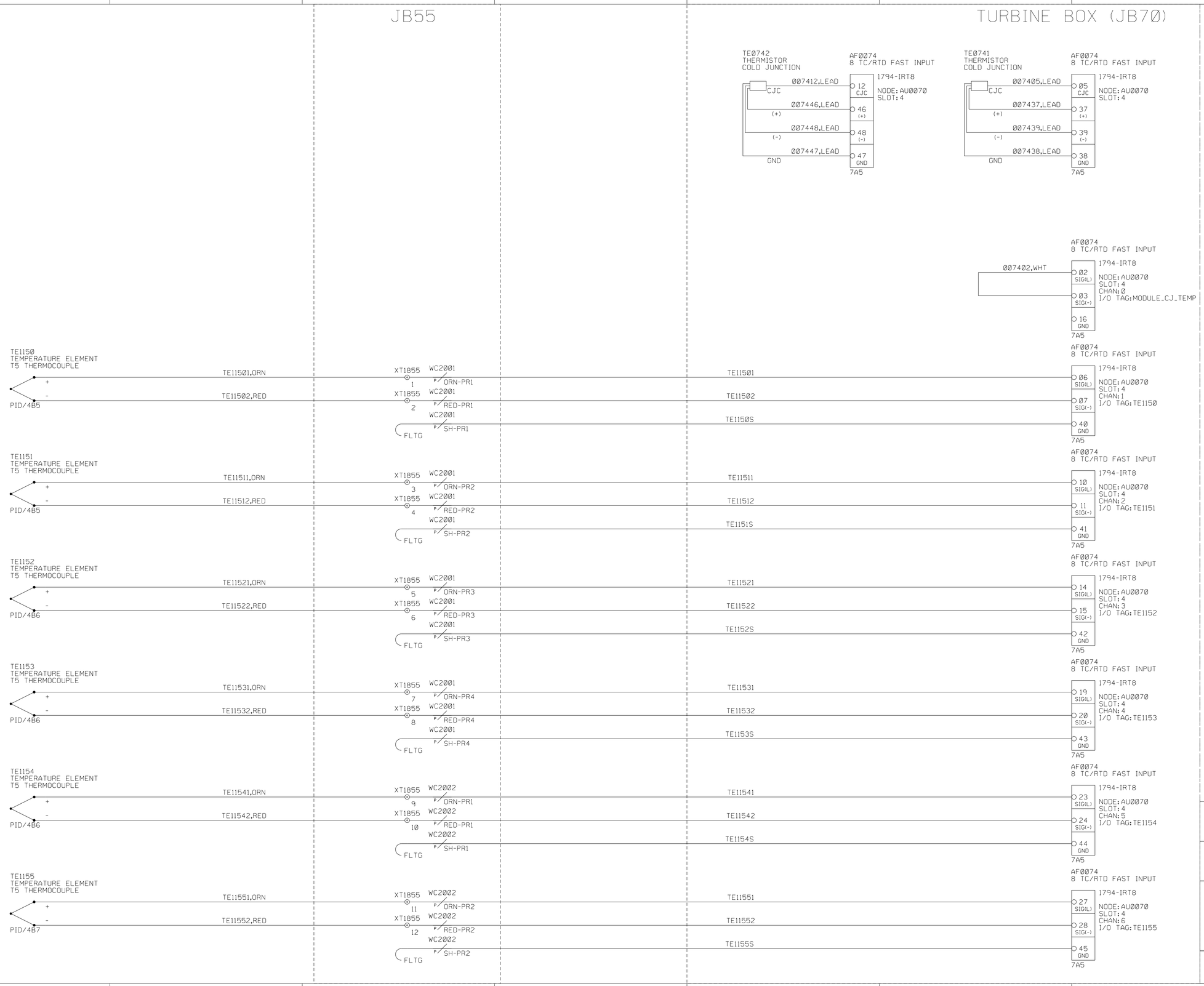
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
COMBUSTION SYSTEM
TURBINE AIR INLET

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV A
SHEET 45 OF 141

SWBNO-1



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
COMBUSTION SYSTEM
T5 MONITORING

Solar® Turbines

A Caterpillar Company

DRAWING NO. 4F491-149447

DWG REV B | SHT REV A

SHEET 46 OF 141

SWBNO-1

JB55

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

TE0752
THERMISTOR
COLD JUNCTION

AF0075
8 TC/RTD FAST INPUT
1794-IRT8
NODE: AU0070
SLOT: 5

007512,LEAD → 12 CJC
CJC
007546,LEAD → 46 (+)
(+)
007548,LEAD → 48 (-)
(-)
007547,LEAD → 47 GND
GND
7A5

TE0751
THERMISTOR
COLD JUNCTION

AF0075
8 TC/RTD FAST INPUT
1794-IRT8
NODE: AU0070
SLOT: 5

007505,LEAD → 05 CJC
CJC
007537,LEAD → 37 (+)
(+)
007539,LEAD → 39 (-)
(-)
007538,LEAD → 38 GND
GND
7A5

TE1156
TEMPERATURE ELEMENT
T5 THERMOCOUPLE
PID/4C5

TE11561,ORN → XT1855 13 → WC2002 P/ ORN-PR3 → TE11561 → AF0074 8 TC/RTD FAST INPUT, 1794-IRT8, 31 SIG(L)
TE11562,RED → XT1855 14 → WC2002 P/ RED-PR3 → TE11562 → 32 SIG(-)
WC2002 P/ SH-PR3 → FLTG → TE1156S → 33 GND
NODE: AU0070 SLOT: 4 CHAN: 7 I/O TAG: TE1156
7A5

TE1157
TEMPERATURE ELEMENT
T5 THERMOCOUPLE
PID/4C5

TE11571,ORN → XT1855 15 → WC2002 P/ ORN-PR4 → TE11571 → AF0075 8 TC/RTD FAST INPUT, 1794-IRT8, 02 SIG(L)
TE11572,RED → XT1855 16 → WC2002 P/ RED-PR4 → TE11572 → 03 SIG(-)
WC2002 P/ SH-PR4 → FLTG → TE1157S → 16 GND
NODE: AU0070 SLOT: 5 CHAN: 0 I/O TAG: TE1157
7A5

TE1158
TEMPERATURE ELEMENT
T5 THERMOCOUPLE
PID/4C6

TE11581,ORN → XT1855 17 → WC2003 P/ ORN-PR1 → TE11581 → AF0075 8 TC/RTD FAST INPUT, 1794-IRT8, 06 SIG(L)
TE11582,RED → XT1855 18 → WC2003 P/ RED-PR1 → TE11582 → 07 SIG(-)
WC2003 P/ SH-PR1 → FLTG → TE1158S → 40 GND
NODE: AU0070 SLOT: 5 CHAN: 1 I/O TAG: TE1158
7A5

TE1159
TEMPERATURE ELEMENT
T5 THERMOCOUPLE
PID/4C6

TE11591,ORN → XT1855 19 → WC2003 P/ ORN-PR2 → TE11591 → AF0075 8 TC/RTD FAST INPUT, 1794-IRT8, 10 SIG(L)
TE11592,RED → XT1855 20 → WC2003 P/ RED-PR2 → TE11592 → 11 SIG(-)
WC2003 P/ SH-PR2 → FLTG → TE1159S → 41 GND
NODE: AU0070 SLOT: 5 CHAN: 2 I/O TAG: TE1159
7A5

TE1160
TEMPERATURE ELEMENT
T5 THERMOCOUPLE
PID/4C6

TE11601,ORN → XT1855 21 → WC2003 P/ ORN-PR3 → TE11601 → AF0075 8 TC/RTD FAST INPUT, 1794-IRT8, 14 SIG(L)
TE11602,RED → XT1855 22 → WC2003 P/ RED-PR3 → TE11602 → 15 SIG(-)
WC2003 P/ SH-PR3 → FLTG → TE1160S → 42 GND
NODE: AU0070 SLOT: 5 CHAN: 3 I/O TAG: TE1160
7A5

TE1161
TEMPERATURE ELEMENT
T5 THERMOCOUPLE
PID/4C7

TE11611,ORN → XT1855 23 → WC2003 P/ ORN-PR4 → TE11611 → AF0075 8 TC/RTD FAST INPUT, 1794-IRT8, 19 SIG(L)
TE11612,RED → XT1855 24 → WC2003 P/ RED-PR4 → TE11612 → 20 SIG(-)
WC2003 P/ SH-PR4 → FLTG → TE1161S → 43 GND
NODE: AU0070 SLOT: 5 CHAN: 4 I/O TAG: TE1161
7A5

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
COMBUSTION SYSTEM
T5 MONITORING

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV A
SHEET 47 OF 141

SWBNO-1

JB92

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

TE1170
TEMPERATURE ELEMENT
EXHAUST GAS T7 THERMOCOUPLE
+ TE11701,ORN
- TE11702,RED
PID/3A6

XT1892 1 WC2004 P/ ORN-PR1
XT1892 2 WC2004 P/ RED-PR1
WC2004 P/ SH-PR1
FLTG

TE11701
TE11702
TE1170S

AF0077
8 TC/RTD FAST INPUT
1794-IRT8
02 SIG(L)
03 SIG(-)
16 GND
NODE: AU0070
SLOT: 7
CHAN: 0
I/O TAG: TE1170
7A6

TE1171
TEMPERATURE ELEMENT
EXHAUST GAS T7 THERMOCOUPLE
+ TE11711,ORN
- TE11712,RED
PID/3A6

XT1892 3 WC2004 P/ ORN-PR2
XT1892 4 WC2004 P/ RED-PR2
WC2004 P/ SH-PR2
FLTG

TE11711
TE11712
TE1171S

AF0077
8 TC/RTD FAST INPUT
1794-IRT8
06 SIG(L)
07 SIG(-)
40 GND
NODE: AU0070
SLOT: 7
CHAN: 1
I/O TAG: TE1171
7A6

TE1172
TEMPERATURE ELEMENT
EXHAUST GAS T7 THERMOCOUPLE
+ TE11721,ORN
- TE11722,RED
PID/3A6

XT1892 5 WC2004 P/ ORN-PR3
XT1892 6 WC2004 P/ RED-PR3
WC2004 P/ SH-PR3
FLTG

TE11721
TE11722
TE1172S

AF0077
8 TC/RTD FAST INPUT
1794-IRT8
10 SIG(L)
11 SIG(-)
41 GND
NODE: AU0070
SLOT: 7
CHAN: 2
I/O TAG: TE1172
7A6

TE1173
TEMPERATURE ELEMENT
EXHAUST GAS T7 THERMOCOUPLE
+ TE11731,ORN
- TE11732,RED
PID/3A6

XT1892 7 WC2004 P/ ORN-PR4
XT1892 8 WC2004 P/ RED-PR4
WC2004 P/ SH-PR4
FLTG

TE11731
TE11732
TE1173S

AF0077
8 TC/RTD FAST INPUT
1794-IRT8
14 SIG(L)
15 SIG(-)
42 GND
NODE: AU0070
SLOT: 7
CHAN: 3
I/O TAG: TE1173
7A6

TE1174
TEMPERATURE ELEMENT
EXHAUST GAS T7 THERMOCOUPLE
+ TE11741,ORN
- TE11742,RED
PID/3A6

XT1892 9 WC2005 P/ ORN-PR1
XT1892 10 WC2005 P/ RED-PR1
WC2005 P/ SH-PR1
FLTG

TE11741
TE11742
TE1174S

AF0077
8 TC/RTD FAST INPUT
1794-IRT8
19 SIG(L)
20 SIG(-)
43 GND
NODE: AU0070
SLOT: 7
CHAN: 4
I/O TAG: TE1174
7A6

TE1175
TEMPERATURE ELEMENT
EXHAUST GAS T7 THERMOCOUPLE
+ TE11751,ORN
- TE11752,RED
PID/3A6

XT1892 11 WC2005 P/ ORN-PR2
XT1892 12 WC2005 P/ RED-PR2
WC2005 P/ SH-PR2
FLTG

TE11751
TE11752
TE1175S

AF0077
8 TC/RTD FAST INPUT
1794-IRT8
23 SIG(L)
24 SIG(-)
44 GND
NODE: AU0070
SLOT: 7
CHAN: 5
I/O TAG: TE1175
7A6

TE1176
TEMPERATURE ELEMENT
EXHAUST GAS T7 THERMOCOUPLE
+ TE11761,ORN
- TE11762,RED
PID/3A7

XT1892 13 WC2005 P/ ORN-PR3
XT1892 14 WC2005 P/ RED-PR3
WC2005 P/ SH-PR3
FLTG

TE11761
TE11762
TE1176S

AF0077
8 TC/RTD FAST INPUT
1794-IRT8
27 SIG(L)
28 SIG(-)
45 GND
NODE: AU0070
SLOT: 7
CHAN: 6
I/O TAG: TE1176
7A6

TE1177
TEMPERATURE ELEMENT
EXHAUST GAS T7 THERMOCOUPLE
+ TE11771,ORN
- TE11772,RED
PID/3A7

XT1892 15 WC2005 P/ ORN-PR4
XT1892 16 WC2005 P/ RED-PR4
WC2005 P/ SH-PR4
FLTG

TE11771
TE11772
TE1177S

AF0077
8 TC/RTD FAST INPUT
1794-IRT8
31 SIG(L)
32 SIG(-)
33 GND
NODE: AU0070
SLOT: 7
CHAN: 7
I/O TAG: TE1177
7A6

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
COMBUSTION SYSTEM
T7 MONITORING

Solar® Turbines
A Caterpillar Company

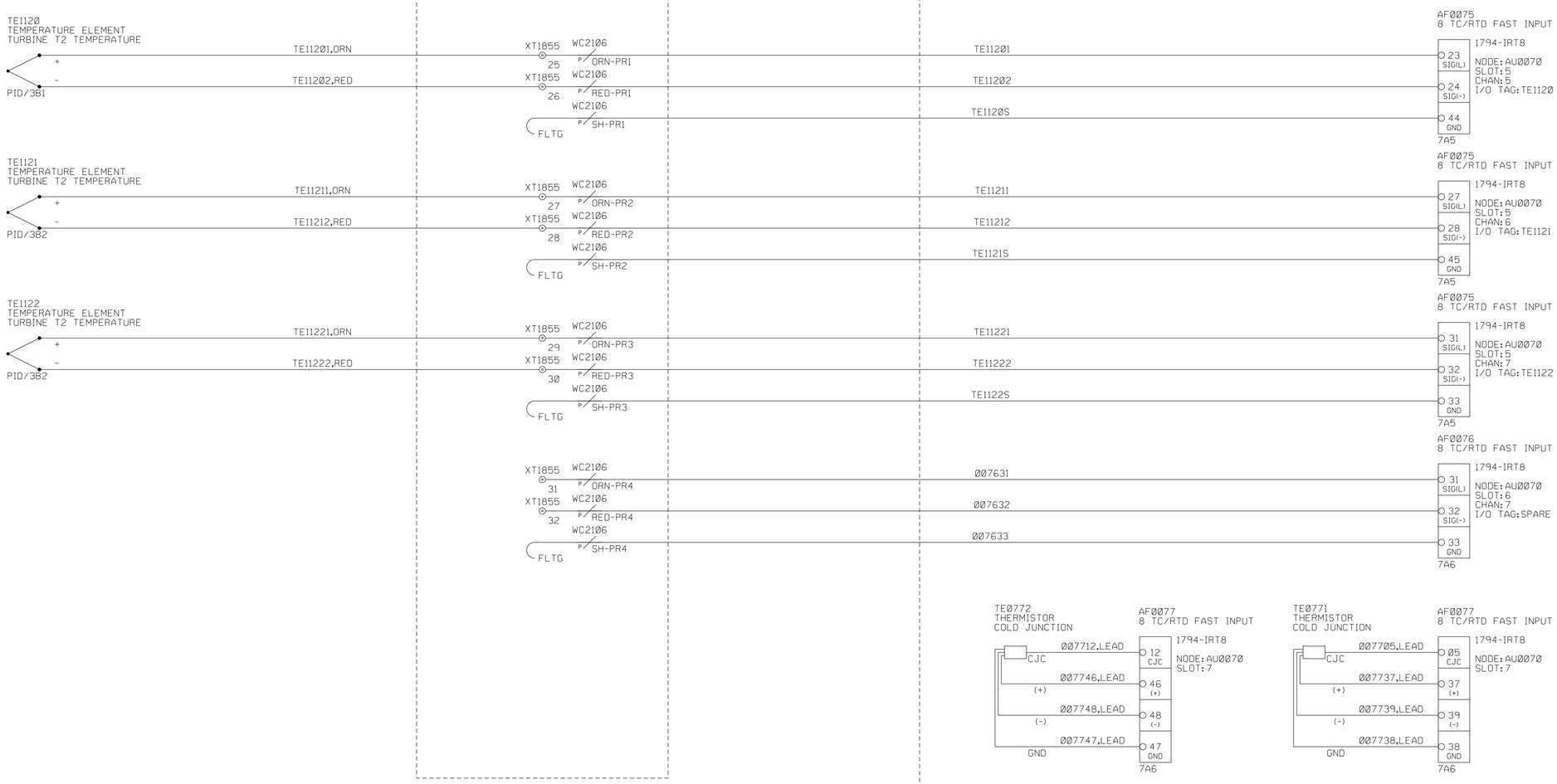
DRAWING NO. 4F491-149447
DWG REV B
SHT REV A
SHEET 48 OF 141

SWBNO-1

JB55

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
COMBUSTION SYSTEM
T2 MONITORING

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV A
SHEET 49 OF 141

SWBNO-1

JB50

TE1420
TEMPERATURE ELEMENT
MONITOR BLEED VALVE LEAK

+ TE14201,ORN
- TE14202,RED
PID/3A5

XT1420 1 — WC2107 P — ORN
XT1420 2 — WC2107 P — RED
WC2107 P — SH
FLTG

TURBINE BOX (JB70)

TE14201
TE14202
TE1420S

AF0076
8 TC/RTD FAST INPUT
1794-IRT8
Ø2 SIG(L)
Ø3 SIG(-)
16 GND
NODE:AU0070
SLOT:6
CHAN:Ø
I/O TAG:TE1420
7A6

TE0762
THERMISTOR
COLD JUNCTION
CJC
007612,LEAD
(+)
007646,LEAD
(-)
007648,LEAD
GND
007647,LEAD

AF0076
8 TC/RTD FAST INPUT
1794-IRT8
12 CJC
46 (+)
48 (-)
47 GND
NODE:AU0070
SLOT:6
7A6

TE0761
THERMISTOR
COLD JUNCTION
CJC
007605,LEAD
(+)
007637,LEAD
(-)
007639,LEAD
GND
007638,LEAD

AF0076
8 TC/RTD FAST INPUT
1794-IRT8
Ø5 CJC
37 (+)
39 (-)
38 GND
NODE:AU0070
SLOT:6
7A6

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 25Ø - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
COMBUSTION SYSTEM
BLEED-AIR MONITORING

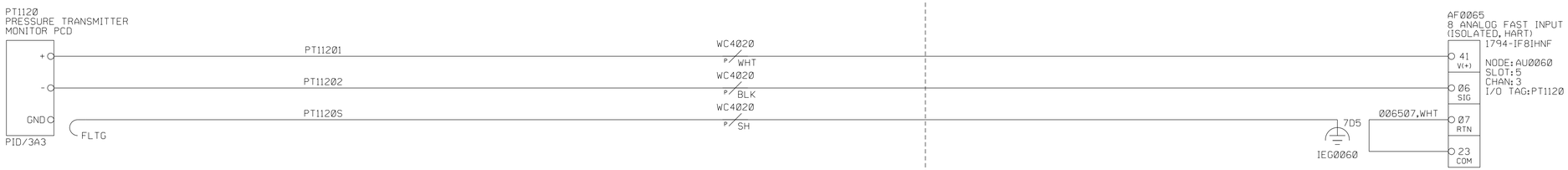
Solar® Turbines
A Caterpillar Company

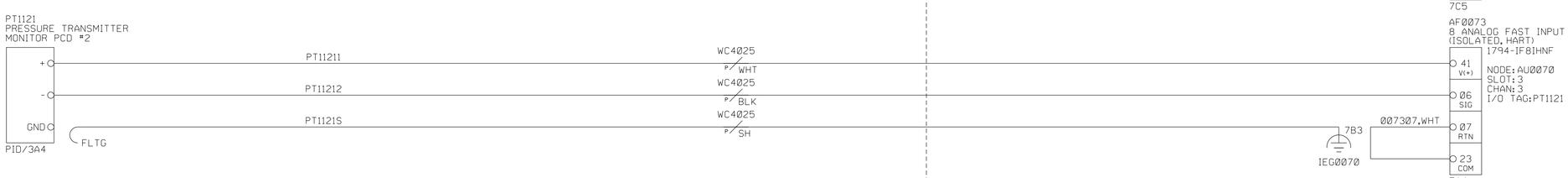
DRAWING NO. 4F491-149447
DWG REV B
SHT REV A
SHEET 5Ø OF 141

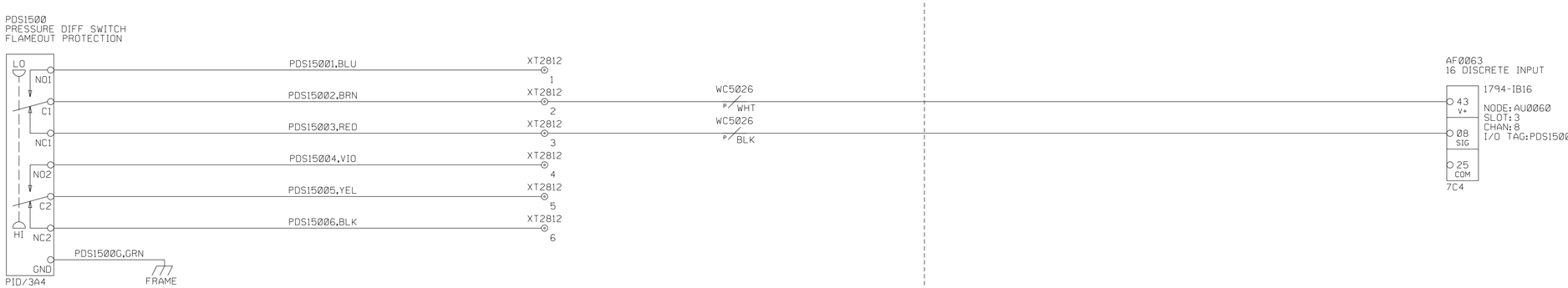
SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.







CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
COMBUSTION SYSTEM
PRESSURE PCD & FLAMEOUT PROTECTION

Solar® Turbines

A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 51 OF 141	

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

PDT1190
PRESSURE DIFF TRANSMITTER
ENGINE 8TH STAGE DELTA PRESSURE

PDT11901 WC4042 P WHT
PDT11902 WC4042 P BLK
PDT1190S WC4042 P SH
FLTG
PID/3B6

009611,WHT
6B5
IEG0090

AF0096
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
45 V(+)
10 SIG
11 RTN
27 COM
NODE: AU0090
SLOT: 6
CHAN: 5
I/O TAG: PDT1190
6A6

PDT1191
PRESSURE DIFF TRANSMITTER
ENGINE 11TH STAGE DELTA PRESSURE

PDT11911 WC4043 P WHT
PDT11912 WC4043 P BLK
PDT1191S WC4043 P SH
FLTG
PID/3B7

009613,WHT
6B5
IEG0090

AF0096
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
47 V(+)
12 SIG
13 RTN
29 COM
NODE: AU0090
SLOT: 6
CHAN: 6
I/O TAG: PDT1191
6A6

PDT1192
PRESSURE DIFF TRANSMITTER
ENGINE 12TH STAGE DELTA PRESSURE

PDT11921 WC4044 P WHT
PDT11922 WC4044 P BLK
PDT1192S WC4044 P SH
FLTG
PID/3C4

009615,WHT
6B5
IEG0090

AF0096
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
49 V(+)
14 SIG
15 RTN
31 COM
NODE: AU0090
SLOT: 6
CHAN: 7
I/O TAG: PDT1192
6A6

PT1150
PRESSURE TRANSMITTER
MONITOR POWER TURBINE INLET PRESSURE (P5.0)

PT11501 WC4047 P WHT
PT11502 WC4047 P BLK
PT1150S WC4047 P SH
FLTG
PID/3C6

009603,WHT
6B5
IEG0090

AF0096
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
37 V(+)
02 SIG
03 RTN
19 COM
NODE: AU0090
SLOT: 6
CHAN: 1
I/O TAG: PT1150
6A6

PDT1153
PRESSURE DIFF TRANSMITTER
COMBUSTOR DELTA PRESSURE

PDT11531 WC4548 P WHT
PDT11532 WC4548 P BLK
PDT1153S WC4548 P SH
FLTG
PID/3D4

009607,WHT
6B5
IEG0090

AF0096
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
41 V(+)
06 SIG
07 RTN
23 COM
NODE: AU0090
SLOT: 6
CHAN: 3
I/O TAG: PDT1153
6A6

PT1197
PRESSURE TRANSMITTER
PRE-SWIRLER CAVITY

PT11971 WC4049 P WHT
PT11972 WC4049 P BLK
PT1197S WC4049 P SH
FLTG
PID/3C8

009609,WHT
6B5
IEG0090

AF0096
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
43 V(+)
08 SIG
09 RTN
25 COM
NODE: AU0090
SLOT: 6
CHAN: 4
I/O TAG: PT1197
6A6

PT1198
PRESSURE TRANSMITTER
PRE-SWIRLER CAVITY

PT11981 WC4050 P WHT
PT11982 WC4050 P BLK
PT1198S WC4050 P SH
FLTG
PID/3C7

006411,WHT
7D5
IEG0060

AF0064
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
45 V(+)
10 SIG
11 RTN
27 COM
NODE: AU0060
SLOT: 4
CHAN: 5
I/O TAG: PT1198
7C5

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
COMBUSTION SYSTEM
PRESSURE MONITORING

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 52 OF 141

SWBNO-1

TURBINE BOX (JB7Ø)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

PDT1110
PRESSURE DIFF TRANSMITTER
TURBINE AIR INLET DUCT LOSSES

PID/3C2
+ PDT11101 → WC4520 P WHT
- PDT11102 → WC4520 P BLK
GND PDT1110S → WC4520 P SH
FLTG

WC4520 P WHT → AF0085 45 V(+)
WC4520 P BLK → AF0085 10 SIG
WC4520 P SH → 6D6 IEG0080 → 008511.WHT → AF0085 11 RTN
AF0085 27 COM

AF0085
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
NODE: AU0080
SLOT: 5
CHAN: 5
I/O TAG: PDT1110
6C5

PT1111
PRESSURE TRANSMITTER
MONITOR AIR INLET COLLECTOR

PID/3B2
+ PT11111 → WC4045 P WHT
- PT11112 → WC4045 P BLK
GND PT1111S → WC4045 P SH
FLTG

WC4045 P WHT → AF0096 35 V(+)
WC4045 P BLK → AF0096 00 SIG
WC4045 P SH → 6B5 IEG0090 → 009601.WHT → AF0096 01 RTN
AF0096 17 COM

AF0096
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
NODE: AU0090
SLOT: 6
CHAN: Ø
I/O TAG: PT1111
6A6

PDT1112
PRESSURE DIFF TRANSMITTER
MONITOR AIR INLET HOUSING DELTA PRESSURE (P1.1)

PID/3B3
+ PDT11121 → WC4546 P WHT
- PDT11122 → WC4546 P BLK
GND PDT1112S → WC4546 P SH
FLTG

WC4546 P WHT → AF0096 39 V(+)
WC4546 P BLK → AF0096 04 SIG
WC4546 P SH → 6B5 IEG0090 → 009621.WHT → AF0096 05 RTN
AF0096 21 COM

AF0096
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
NODE: AU0090
SLOT: 6
CHAN: 2
I/O TAG: PDT1112
6A6

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
COMBUSTION SYSTEM
PRESSURE MONITORING

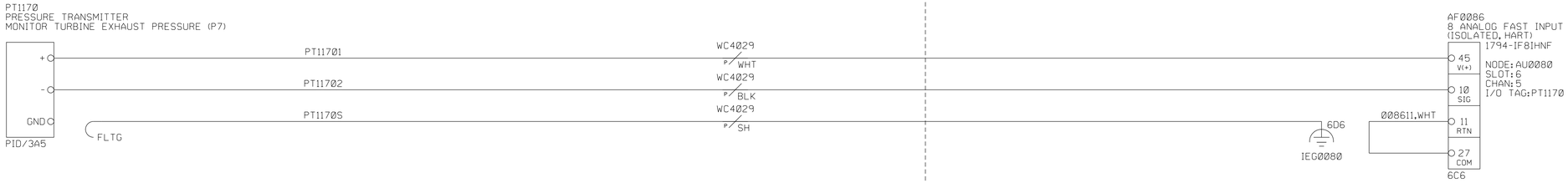
Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 53 OF 141

SWBNO-1

TURBINE BOX (JB7Ø)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 25Ø - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
COMBUSTION SYSTEM
PRESSURE MONITORING

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 54 OF 141

SWBNO-1

COMBUSTOR PRESSURE MONITOR

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
COMBUSTION SYSTEM
BAM MONITORING

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV B	SHT REV A
4F491-149447	SHEET 55 OF 141	

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

SV1720
SOLENOID VALVE
ON-CRANK CLEANING SHUTOFF

PID/3D1

SV17201 — WC3006 P WHT
SV17202 — WC3006 P BLK

AF0062
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
39 V+
08 SIG
21 COM
NODE: AU0060
SLOT: 2
CHAN: 4
I/O TAG: SV1720
7C3

SV1710
SOLENOID VALVE
ON-LINE CLEANING SHUTOFF

PID/3D2

SV17101 — WC3007 P WHT
SV17102 — WC3007 P BLK

AF0062
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
40 V+
10 SIG
22 COM
NODE: AU0060
SLOT: 2
CHAN: 5
I/O TAG: SV1710
7C3

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
COMBUSTION SYSTEM
ENGINE CLEANING

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 56 OF 141

SWBNO-1

TURBINE BOX (JB7Ø)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

PT6400
PRESSURE TRANSMITTER
MONITOR AIR SUPPLY

+ PT64001 WC4019 P WHT
- PT64002 WC4019 P BLK
GND PT6400S WC4019 P SH
FLTG
PID/5D2

AF0064
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF

47 V(+)
12 SIG
13 RTN
29 COM
7C5

NODE: AU0060
SLOT: 4
CHAN: 6
I/O TAG: PT6400

006413,WHT
7D5
IEG0060

PT6410
PRESSURE TRANSMITTER
SECONDARY MONITOR AIR SUPPLY

+ PT64101 WC4006 P WHT
- PT64102 WC4006 P BLK
GND PT6410S WC4006 P SH
FLTG
PID/5D2

AF0065
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF

47 V(+)
12 SIG
13 RTN
29 COM
7C5

NODE: AU0060
SLOT: 5
CHAN: 6
I/O TAG: PT6410

006513,WHT
7D5
IEG0060

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 25Ø - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
AIR SUPPLY SYSTEM
MONITOR

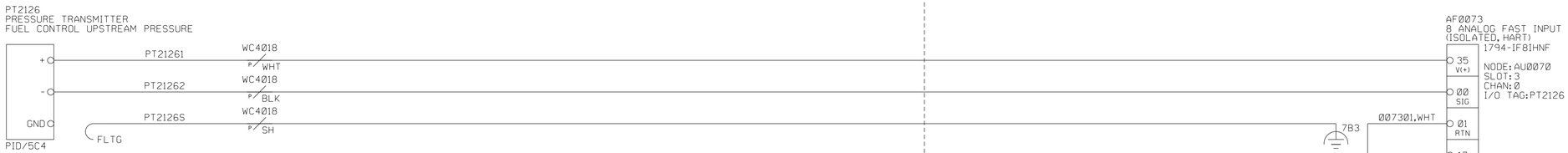
Solar® Turbines
A Caterpillar Company

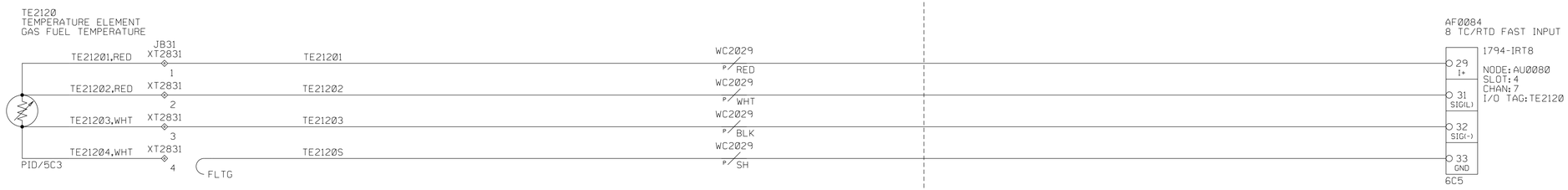
DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 57 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.





CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

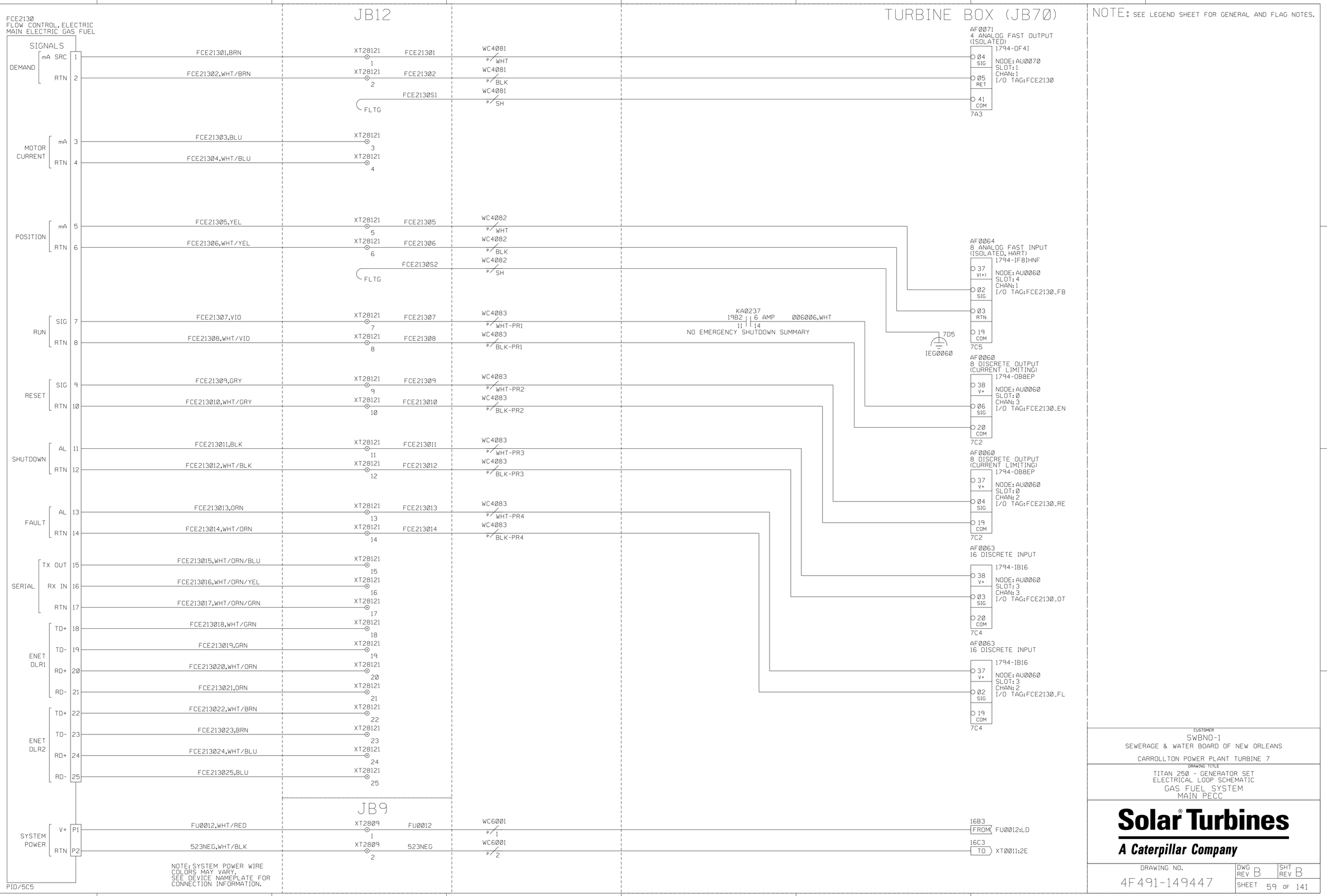
DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
GAS FUEL SYSTEM
PRESSURE & TEMPERATURE

Solar® Turbines

A Caterpillar Company

DRAWING NO.	DWG REV B	SHT REV B
4F491-149447	SHEET 58 OF 141	

SWBNO-1



NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
GAS FUEL SYSTEM
MAIN PECC

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 59 OF 141	

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

PT2130
PRESSURE TRANSMITTER
MAIN GAS MANIFOLD
FUEL VALVE DISCHARGE PRESSURE "1

+ PT21301 WC4022 P WHT
- PT21302 WC4022 P BLK
GND PT2130S WC4022 P SH
FLTG
PID/5C5

AF0065
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
37 V(+)
02 SIG
03 RTN
19 COM
NODE:AU0060
SLOT:5
CHAN:1
I/O TAG:PT2130
7C5

006503,WHT
7D5
IEG0060

PT2131
PRESSURE TRANSMITTER
MAIN GAS MANIFOLD
FUEL VALVE DISCHARGE PRESSURE "2

+ PT21311 WC4023 P WHT
- PT21312 WC4023 P BLK
GND PT2131S WC4023 P SH
FLTG
PID/5C5

AF0073
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
37 V(+)
02 SIG
03 RTN
19 COM
NODE:AU0070
SLOT:3
CHAN:1
I/O TAG:PT2131
7A4

007303,WHT
7B3
IEG0070

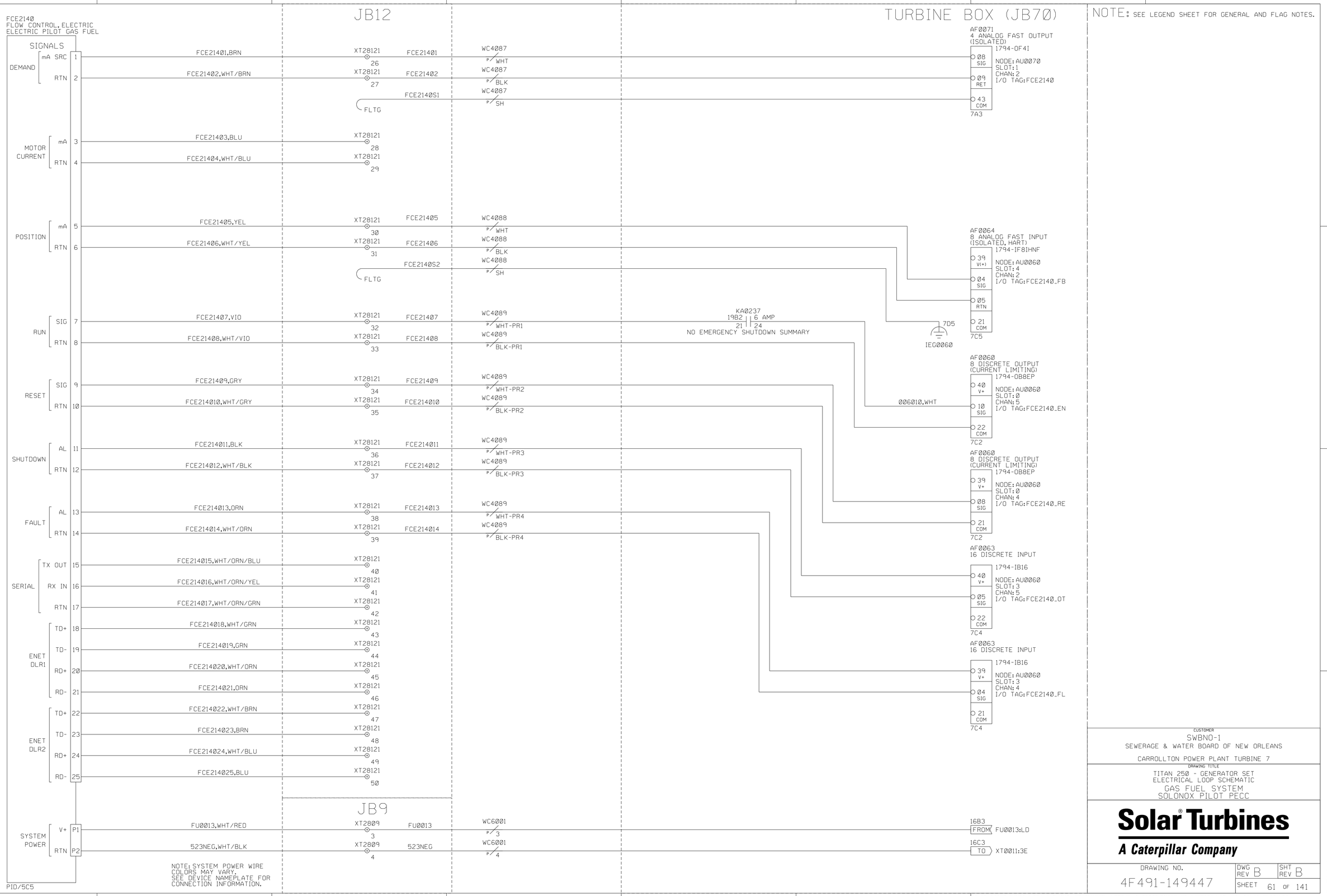
CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
GAS FUEL SYSTEM
MAIN "1 MANIFOLD PRESSURE

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 60 OF 141

SWBNO-1


FCE2140
FLOW CONTROL, ELECTRIC
ELECTRIC PILOT GAS FUEL
SIGNALS
DEMAND
mA SRC 1
RTN 2
MOTOR CURRENT
mA 3
RTN 4
POSITION
mA 5
RTN 6
RUN
SIG 7
RTN 8
RESET
SIG 9
RTN 10
SHUTDOWN
AL 11
RTN 12
FAULT
AL 13
RTN 14
SERIAL
TX OUT 15
RX IN 16
RTN 17
ENET DLR1
TD+ 18
TD- 19
RD+ 20
RD- 21
ENET DLR2
TD+ 22
TD- 23
RD+ 24
RD- 25
SYSTEM POWER
V+ P1
RTN P2
PID/5C5
JB12
FCE21401.BRN
FCE21402.WHT/BRN
FCE2140S1
FLTG
FCE21403.BLU
FCE21404.WHT/BLU
FCE21405.YEL
FCE21406.WHT/YEL
FCE2140S2
FLTG
FCE21407.VIO
FCE21408.WHT/VIO
FCE21409.GRY
FCE214010.WHT/GRY
FCE214011.BLK
FCE214012.WHT/BLK
FCE214013.ORN
FCE214014.WHT/ORN
FCE214015.WHT/ORN/BLU
FCE214016.WHT/ORN/YEL
FCE214017.WHT/ORN/GRN
FCE214018.WHT/GRN
FCE214019.GRN
FCE214020.WHT/ORN
FCE214021.ORN
FCE214022.WHT/BRN
FCE214023.BRN
FCE214024.WHT/BLU
FCE214025.BLU
XT28121
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
FCE21401
FCE21402
FCE2140S1
FCE21403
FCE21404
FCE21405
FCE21406
FCE2140S2
FCE21407
FCE21408
FCE21409
FCE214010
FCE214011
FCE214012
FCE214013
FCE214014
WC4087
P WHT
P BLK
P SH
WC4088
P WHT
P BLK
P SH
WC4089
P WHT-PR1
P BLK-PR1
P WHT-PR2
P BLK-PR2
P WHT-PR3
P BLK-PR3
P WHT-PR4
P BLK-PR4
JB9
FU0013.WHT/RED
523NEG.WHT/BLK
XT2809
3
4
FU0013
523NEG
WC6001
P 3
P 4
NOTE: SYSTEM POWER WIRE COLORS MAY VARY. SEE DEVICE NAMEPLATE FOR CONNECTION INFORMATION.
TURBINE BOX (JB70)
AF0071
4 ANALOG FAST OUTPUT (ISOLATED)
1794-OF4I
08 SIG
09 RET
43 COM
NODE: AU0070
SLOT: 1
CHAN: 2
I/O TAG: FCE2140
7A3
AF0064
8 ANALOG FAST INPUT (ISOLATED, HART)
1794-IF8IHNF
39 V(+)
04 SIG
05 RTN
21 COM
NODE: AU0060
SLOT: 4
CHAN: 2
I/O TAG: FCE2140_FB
7C5
KA0237
19B2 6 AMP
21 24
NO EMERGENCY SHUTDOWN SUMMARY
7D5
IEG0060
006010.WHT
AF0060
8 DISCRETE OUTPUT (CURRENT LIMITING)
1794-OB8EP
40 V+
10 SIG
22 COM
NODE: AU0060
SLOT: 0
CHAN: 5
I/O TAG: FCE2140_EN
7C2
AF0060
8 DISCRETE OUTPUT (CURRENT LIMITING)
1794-OB8EP
39 V+
08 SIG
21 COM
NODE: AU0060
SLOT: 0
CHAN: 4
I/O TAG: FCE2140_RE
7C2
AF0063
16 DISCRETE INPUT
1794-IB16
40 V+
05 SIG
22 COM
NODE: AU0060
SLOT: 3
CHAN: 5
I/O TAG: FCE2140_OT
7C4
AF0063
16 DISCRETE INPUT
1794-IB16
39 V+
04 SIG
21 COM
NODE: AU0060
SLOT: 3
CHAN: 4
I/O TAG: FCE2140_FL
7C4
16B3
FROM FU0013:LD
16C3
TO XT0011:3E
NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.
CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7
DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
GAS FUEL SYSTEM
SOLONOX PILOT PECC
Solar® Turbines
A Caterpillar Company
DRAWING NO.
4F491-149447
DWG REV B
SHT REV B
SHEET 61 OF 141
SWBNO-1
"THIS COPYRIGHTED WORK AND THE INFORMATION HEREIN IS PROPRIETARY TO CATERPILLAR INC., SOLAR TURBINES INCORPORATED AND/OR SUBSIDIARIES OF EITHER. WITHOUT EXPRESS WRITTEN PERMISSION FROM CATERPILLAR INC. OR SOLAR TURBINES INCORPORATED, ANY COPYING, DISCLOSURE, OR USE EXCEPT FOR THAT FOR WHICH IT IS LOANED, IS PROHIBITED."

TURBINE BOX (JB7Ø)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

PT2140
PRESSURE TRANSMITTER
PILOT GAS MANIFOLD
FUEL VALVE DISCHARGE PRESSURE #1

PID/5C5
+
-
GND
FLTG

PT21401 — WC4034 P WHT
PT21402 — WC4034 P BLK
PT2140S — WC4034 P SH

AF0065
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
NODE: AU0060
SLOT: 5
CHAN: 2
I/O TAG: PT2140
39 V(+)
Ø4 SIG
Ø5 RTN
21 COM
7C5

006505,WHT
7D5
IEG0060

PT2141
PRESSURE TRANSMITTER
PILOT GAS MANIFOLD
FUEL VALVE DISCHARGE PRESSURE #2

PID/5C5
+
-
GND
FLTG

PT21411 — WC4035 P WHT
PT21412 — WC4035 P BLK
PT2141S — WC4035 P SH

AF0073
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
NODE: AU0070
SLOT: 3
CHAN: 2
I/O TAG: PT2141
39 V(+)
Ø4 SIG
Ø5 RTN
21 COM
7A4

007305,WHT
7B3
IEG0070

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 25Ø - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
GAS FUEL SYSTEM
SOLONOX

Solar® Turbines
A Caterpillar Company

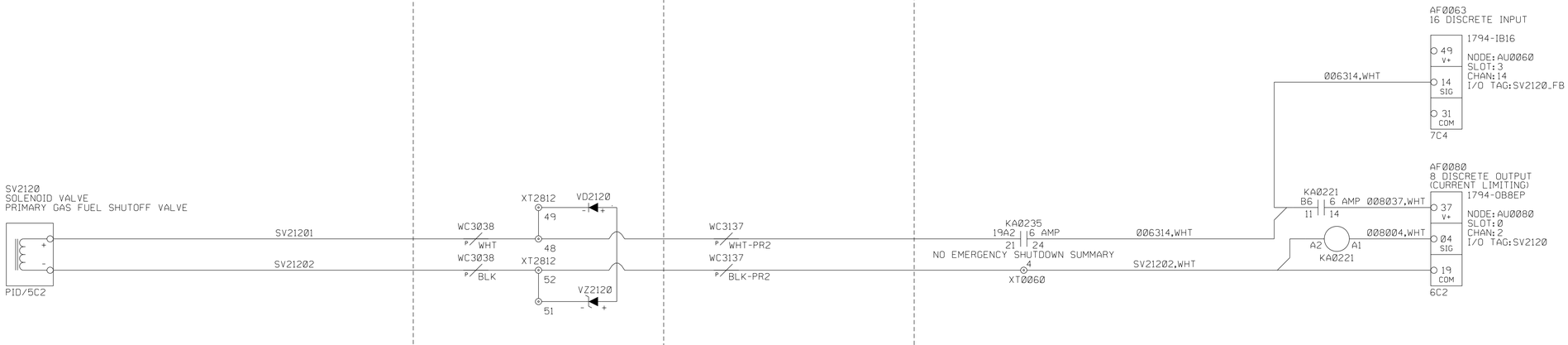
DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 62 OF 141

SWBNO-1

JB12

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



11-14	21-24
B6	

11-12 21-22

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
GAS FUEL SYSTEM
PRIMARY SHUTOFF

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447

DWG REV B | SHT REV B

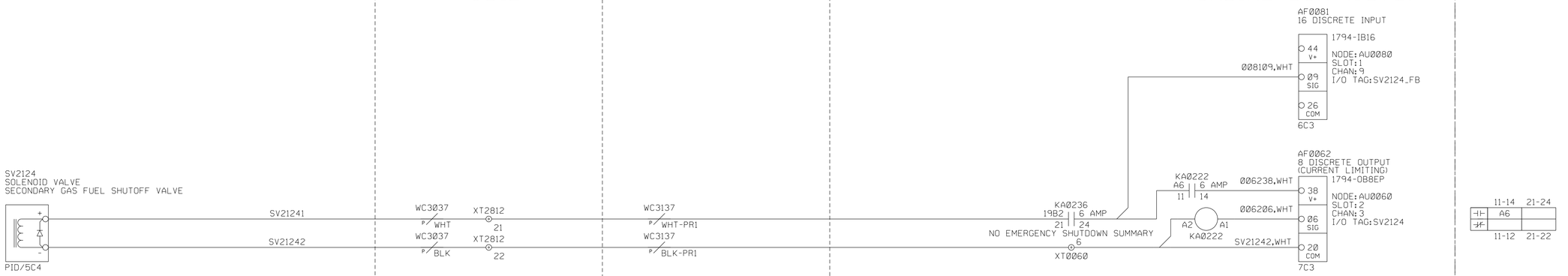
SHEET 63 OF 141

SWBNO-1

JB12

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



11-14	21-24
A6	
11-12	21-22

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
GAS FUEL SYSTEM
SECONDARY SHUTOFF

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447

DWG REV	SHT REV
B	B

SHEET 64 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

PT2121
PRESSURE TRANSMITTER
GAS VALVE CHECK

PT21211 — WC4021 P/WHT
PT21212 — WC4021 P/BLK
PT2121S — WC4021 P/SH
FLTG

PID/5C3

AF0065
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF

35 V(+)
00 SIG
01 RTN
17 COM

NODE: AU0060
SLOT: 5
CHAN: 0
I/O TAG: PT2121

006501.WHT
7D5
IEG0060

7C5

JB12

SV2121
SOLENOID VALVE
GAS FUEL VENT

SV21211 — WC3039 P/WHT — XT2812 7 — WC3137 P/WHT-PR3
SV21212 — WC3039 P/BLK — XT2812 10 — WC3137 P/BLK-PR3

PID/5C2

AF0062
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP

37 V+
04 SIG
19 COM

NODE: AU0060
SLOT: 2
CHAN: 2
I/O TAG: SV2121

7C3

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
GAS FUEL SYSTEM
VENT

Solar® Turbines
A Caterpillar Company

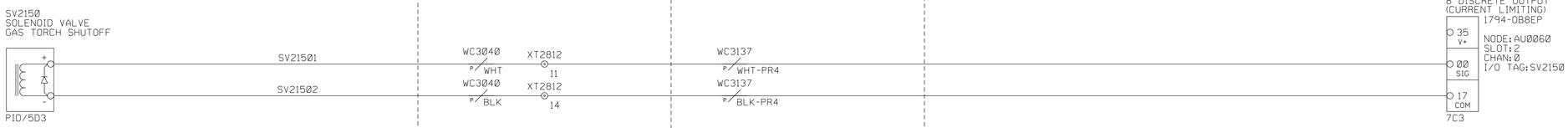
DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 65 OF 141

SWBNO-1

JB12

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
GAS FUEL SYSTEM
TORCH

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447

DWG REV B | SHT REV B

SHEET 66 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

PT2120
PRESSURE TRANSMITTER
GAS FUEL PRESSURE

PT21201 — WC4017 P/ WHT — +
PT21202 — WC4017 P/ BLK — -
PT2120S — WC4017 P/ SH — GND — FLTG

PID/5C2

AF0086
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF

NODE: AU0080
SLOT: 6
CHAN: 7
I/O TAG: PT2120

49 V(+)
14 SIG
15 RTN
31 COM

008631.WHT

6D6
IEG0080

6C6

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
GAS FUEL SYSTEM
SUPPLY PRESSURE MONITORING

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 67 OF 141

SWBNO-1

GAS FUEL FLOW METER

8 FT2108
FLOW TRANSMITTER
MONITOR GAS FUEL FLOW

PID/5A5
10 — FT21081
1 — FT21082
2 — FT21083
9 — FT21083.WHT — FLTG
GND — FT2108S

XC4561 1 — FT21081
XC4561 2 — FT21082
XC4561 3 — FT21083
XC4561 SH — FT2108S

TURBINE BOX (JB70)

AF0086
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
NODE: AU0080
SLOT: 6
CHAN: 6
I/O TAG: FT2108

6C6
47 V(+) — FT21081
12 SIG — FT21082
13 RTN — FT21083
29 COM — FT21083.WHT — 6D6
IEG0080

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
GAS FUEL SYSTEM
FLOW MONITORING

Solar® Turbines
A Caterpillar Company

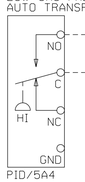
DRAWING NO. 4F491-149447
DWG REV B
SHT REV A
SHEET 68 OF 141

SWBNO-1

LOW GAS SWITCH

7

PS2106
PRESSURE SWITCH
LOW GAS PRESSURE,
AUTO TRANSFER TO LIQUID



PID/5A4

PS21061

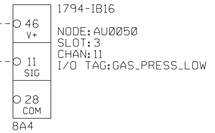
PS21062

XC5074
1

XC5074
2

TURBINE BOX (JB70)

AF0053
16 DISCRETE INPUT



1794-IB16

NODE:AU0050
SLOT:3
CHAN:11
I/O TAG:GAS_PRESS_LOW

8A4

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
GAS FUEL SYSTEM
TRANSFER SWITCH

Solar® Turbines
A Caterpillar Company

DRAWING NO.
4F491-149447

DWG REV B
SHT REV A
SHEET 69 OF 141

SWBNO-1

LIQUID FUEL COALESCER

LIQUID FUEL FILTER

8

PDT2201
PRESSURE DIFF TRANSMITTER
LIQUID FUEL FILTER

PID/7A2

+ WC4516 P WHT → JB140 XT2200 1 → PDT22011 → XC4516 1-PR1
- WC4516 P BLK → 2 → PDT22012 → XC4516 2-PR1
GND WC4516 P SH FLTG → 3 → PDT22015 → XC4516 SH-PR1

XC4516 → AF0055 8 ANALOG FAST INPUT (ISOLATED, HART) 1794-IF8IHNF
45 V(+)
10 SIG
11 RTN
27 COM
NODE:AU0050
SLOT:5
CHAN:5
I/O TAG:PDT2201
8A5

8B5 IEG0050 — 005511,WHT

8

PDT2211
PRESSURE DIFF TRANSMITTER
LIQUID FUEL COALESCER FILTER
DIFFERENTIAL PRESSURE

PID/7A4

+ WC4522 P WHT → JB140 XT2200 4 → PDT22111 → XC4516 1-PR2
- WC4522 P BLK → 5 → PDT22112 → XC4516 2-PR2
GND WC4522 P SH FLTG → 6 → PDT22115 → XC4516 SH-PR2

XC4516 → AF0055 8 ANALOG FAST INPUT (ISOLATED, HART) 1794-IF8IHNF
43 V(+)
08 SIG
09 RTN
25 COM
NODE:AU0050
SLOT:5
CHAN:4
I/O TAG:PDT2211
8A5

8B5 IEG0050 — 005509,WHT

8

LS2211
LEVEL SWITCH
COALESCER LEVEL SWITCH

TB1A NO C NC
TB1B NO C NC

WC5076 P WHT-PR1 → JB140 XT2200 7 → LS2211 → XC5076 1
WC5076 P BLK-PR1 → 8 → LS2212 → XC5076 2

XC5076 → AF0053 16 DISCRETE INPUT 1794-IB16
50 V+
15 SIG
32 COM
NODE:AU0050
SLOT:3
CHAN:15
I/O TAG:LS2211
8A4

TB4 24V DC
+ WC5076 P WHT-PR2 → JB140 XT2200 9 → FU0055 → XC5076 3 → 8B3 FROM FU0055:LD
- WC5076 P BLK-PR2 → 10 → 0V → XC5076 4 → 8C3 TO XT0050:3I

PID/7B4

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
COALESCER

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 70 OF 141

SWBNO-1

PACKAGE

EER VFD

BOP EER PWR

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

KA0239
19B2 | | 6 AMP
11 | | 14
NO EMERGENCY SHUTDOWN SUMMARY

UF2220
FREQUENCY CONVERTER
MAIN LIQUID FUEL MOTOR CONTROL

IP ADDRESS
192.168.1.
023
PID/6B3

56

KA023911 — XCUF22D12 1 — D1:2 P
KA023914 — XCUF22D12 2 — D1:2

M2220
MOTOR
MAIN FUEL PUMP DRIVE

P1
P2
1H1
1H2
2H1
2H2
GND
T1(U)
T2(V)
T3(W)
CASE
PID/6B3

M2220P1 — XCM2220T 1 — ATX+
M2220P2 — XCM2220T 2 — ATX-
M22201H1 — XCM2220H 1 — R0NC
M22201H2 — XCM2220H 2 — R1NC
XCM2220M SH — M2220G — FRAME
XCM2220M 1 — M2220G — PE1
XCM2220M 2 — M22201 — U(T1)
XCM2220M 3 — M22202 — V(T2)
XCM2220M 4 — M22203 — W(T3)
M2220.GRN/YEL — FRAME

D1:1 P
D1:1
D1:0 P
D1:0
E1 — UF1300E2 — 40B3 FROM UF1300:E2
E2 — UF2240E1 — XC0023 ENET — 76B4 TO UF2240:E1
R0C — XCUF22H 1 — UF2220H1 — 1
R1C — XCUF22H 2 — UF2220H2 — 2

CCM2220H
CUSTOMER CONNECTION
SINGLE PHASE AC POWER

8

POWER

PE1
PE2 — XCUF22P SH — UF2220G — SHLD
PE2 — XCUF22P 1 — UF2220G — PE
U(T1) — R(L1) — XCUF22P 2 — UF2220R — 1
V(T2) — S(L2) — XCUF22P 3 — UF2220S — 2
W(T3) — T(L3) — XCUF22P 4 — UF2220T — 3

CCM2220M
CUSTOMER CONNECTION
THREE PHASE AC POWER

XCUF22R 1 — RS2220R1 — BR1 — DC+
XCUF22R 2 — RS2220R2 — BR2 — DC-
PE4 — PE3

RS2220
SHUNT RESISTOR
EXTERNAL SNUBBER
PID/6B3

RESISTOR: R1, R2
THERMO DEVICE: T1, T2

XCRS2220 1 — RS2220T1 — 1
XCRS2220 2 — RS2220T2 — 2

CCM2220R
CUSTOMER CONNECTION
SHUNT TRIP BREAKER
LIQUID FUEL VFD 3 PHASE

8

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
MAIN PUMP MOTOR

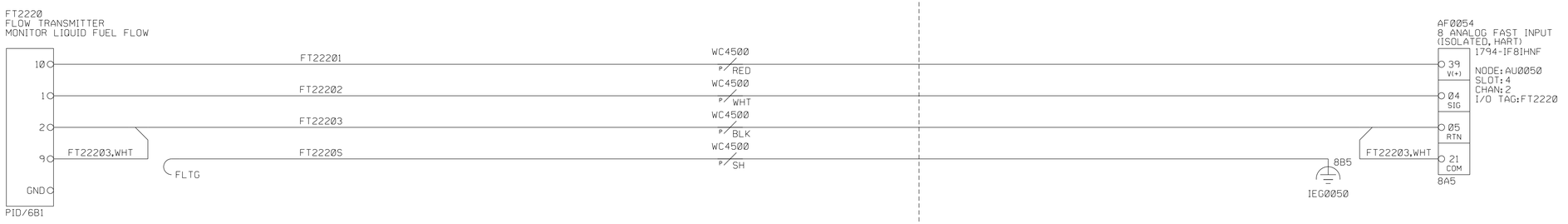
Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 71 OF 141	

SWBNO-1

TURBINE BOX (JB7Ø)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
FLOW MONITORING

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 72 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

PT2220
PRESSURE TRANSMITTER
LIQUID FUEL SUPPLY PRESSURE

PID/6B1
+
-
GND
FLTG

PT22201 — WC4009 P WHT
PT22202 — WC4009 P BLK
PT2220S — WC4009 P SH

AF0055
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF

35 V(+)
00 SIG
01 RTN
17 COM
8A5

NODE:AU0050
SLOT:5
CHAN:0
I/O TAG:PT2220

005501,WHT
8B5
IEG0050

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
PRESSURE MONITORING

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 73 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

ZS2220
POSITION SWITCH
DETECT VALVE OPERATION CLOSED
PRIMARY LIQUID FUEL SHUTOFF VALVE

NO1 — ZS222011,WHT — XT2220 1 — ZS222011 — WC5022 P/WHT
C1 — ZS222012,BLK — XT2220 2 — ZS222012 — WC5022 P/BLK
NC1 — ZS222013,RED — XT2220 3

UPPER SW1
LOWER SW2

NO2 — ZS222021,WHT — XT2220 4
C2 — ZS222022,BLK — XT2220 5
NC2 — ZS222023,RED — XT2220 6
GND — ZS2220G,GRN — FRAME

PID/6B2

AF0053
16 DISCRETE INPUT
1794-IB16
36 V+
01 SIG
18 COM
NODE:AU0050
SLOT:3
CHAN:1
I/O TAG:ZSC2220
8A4

AF0053
16 DISCRETE INPUT
1794-IB16
47 V+
12 SIG
29 COM
NODE:AU0050
SLOT:3
CHAN:12
I/O TAG:SV2220_FB
8A4

008006,WHT

SV2220
SOLENOID VALVE
PRIMARY LIQUID FUEL SHUTOFF VALVE, PILOT

\+ — VD2220 — SV22201 — WC3050 P/WHT
\- — SV22202 — WC3050 P/BLK

PID/6C2

KA0240
19B2 | | 6 AMP
21 | | 24
NO EMERGENCY SHUTDOWN SUMMARY

008006,WHT

AF0080
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
38 V+
06 SIG
20 COM
NODE:AU0080
SLOT:0
CHAN:3
I/O TAG:SV2220
6C2

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
PRIMARY SHUTOFF

Solar® Turbines
A Caterpillar Company

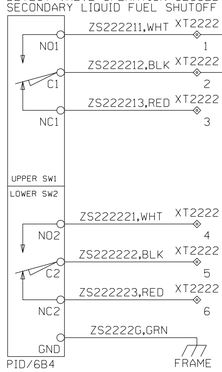
DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 74 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

ZS2222
POSITION SWITCH
DETECT VALVE OPERATION CLOSED
SECONDARY LIQUID FUEL SHUTOFF VALVE



ZS222211,WHT XT2222 1
ZS222212,BLK XT2222 2
ZS222213,RED XT2222 3
ZS222221,WHT XT2222 4
ZS222222,BLK XT2222 5
ZS222223,RED XT2222 6
ZS2222G,GRN

ZS222211 — WC5023 P WHT
ZS222212 — WC5023 P BLK

AF0053
16 DISCRETE INPUT
1794-IB16
43 V+
08 SIG
25 COM
8A4
NODE:AU0050
SLOT:3
CHAN:8
I/O TAG:ZSC2222

SV2222
SOLENOID VALVE
SECONDARY LIQUID FUEL SHUTOFF VALVE, PILOT

SV22221 — WC3054 P WHT
SV22222 — WC3054 P BLK

KA0238
19B2 | | 6 AMP
11 | | 14
NO EMERGENCY SHUTDOWN SUMMARY

006114,WHT

AF0053
16 DISCRETE INPUT
1794-IB16
48 V+
13 SIG
30 COM
8A4
NODE:AU0050
SLOT:3
CHAN:13
I/O TAG:SV2222_FB

AF0061
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6
42 V+
14 SIG
24 COM
7C3
NODE:AU0060
SLOT:1
CHAN:7
I/O TAG:SV2222

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
SECONDARY SHUTOFF

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 75 OF 141

SWBNO-1

PACKAGE | EER VFD | BOP EER AC PWR | TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

KA0238
19B2 | | 6 AMP
21 | | 24
NO EMERGENCY SHUTDOWN SUMMARY

UF2240
FREQUENCY CONVERTER
PILOT LIQUID FUEL MOTOR CONTROL

IP ADDRESS
192.168.1.
048
PID/7B7

56

KA023821 — XCUF24D12 1 — D↓2 P
KA023824 — 2 — D↓2
D↓1 P
D↓1
D↓Ø P
D↓Ø

M2240
MOTOR
PILOT FUEL PUMP DRIVE

P1
P2
M2240P1 — XCM2240T 1 — ATX+
M2240P2 — XCM2240T 2 — ATX-
E1 — UF2240E1 — 71B4 FROM UF2220:E2
E2 — XC0048 ENET — 85B3 TO UF2610:E1

1H1
1H2
M2240H1 — XCM2240H 1 — RØNC
M2240H2 — XCM2240H 2 — RINC
RØC — XCUF24H 1 — UF2240H1 — 1
RIC — XCUF24H 2 — UF2240H2 — 2
CCM2240H
CUSTOMER CONNECTION
SINGLE PHASE AC POWER

8

POWER

FRAME
M2240G — XCM2240M SH
GND — M2240G — XCM2240M 1 — PE1
PE2 — XCUF24P SH — UF2240G — SHLD
XCUF24P 1 — UF2240G — PE

T1(U)
27 T2(V)
T3(W)
M22401 — XCM2240M 2 — U(T1)
M22402 — XCM2240M 3 — V(T2)
M22403 — XCM2240M 4 — W(T3)
R(L1) — XCUF24P 2 — UF2240R — 1
S(L2) — XCUF24P 3 — UF2240S — 2
T(L3) — XCUF24P 4 — UF2240T — 3
CCM2240M
CUSTOMER CONNECTION
THREE PHASE AC POWER

CASE — M2240.GRN/YEL
PID/7C6
FRAME

BR1 — DC+
BR2 — DC-
PE4 — PE3

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
MAIN PUMP MOTOR

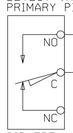
Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B | SHT REV B
SHEET 76 OF 141

SWBNO-1

LIQUID FUEL PILOT

ZS2240
POSITION SWITCH
DETECT VALVE OPERATION CLOSED
PRIMARY PILOT LIQUID FUEL SHUTOFF VALVE



PID/7B5

ZS22401 — WC5002 P/WHT — JB2240 XT2240 1
ZS22402 — WC5002 P/BLK — XT2240 2

ZS22401 — XC5002 1
ZS22402 — XC5002 2

AF0053
16 DISCRETE INPUT
1794-IB16
37 V+
02 SIG
19 COM
NODE: AU0050
SLOT: 3
CHAN: 2
I/O TAG: ZSC2240
8A4

SV2240
SOLENOID VALVE
PRIMARY PILOT LIQUID FUEL SHUTOFF VALVE, PILOT

PID/7C5

SV22401 — WC3026 P/WHT — JB2240 XT2240 3
SV22402 — WC3026 P/BLK — XT2240 4

SV22401 — XC3026 1
SV22402 — XC3026 2

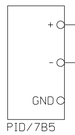
KA0250
19C2 | 6 AMP
21 | 24
NO EMERGENCY SHUTDOWN SUMMARY

005200,WHT

AF0081
16 DISCRETE INPUT
1794-IB16
36 V+
01 SIG
18 COM
NODE: AU0080
SLOT: 1
CHAN: 1
I/O TAG: SV2240_FB
6C3

AF0052
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
35 V+
00 SIG
17 COM
NODE: AU0050
SLOT: 2
CHAN: 0
I/O TAG: SV2240
8A3

PT2241
PRESSURE TRANSMITTER
LIQUID FUEL PILOT SUPPLY PRESSURE



PID/7B5

PT22411 — WC4534 P/WHT — JB2240 XT2240 5
PT22412 — WC4534 P/BLK — XT2240 6
PT2241S — WC4534 P/SH — XT2240 7
FLTG

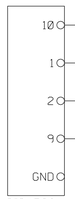
PT22411 — XC4534 1
PT22412 — XC4534 2
PT2241S — XC4534 SH

8B5
IEG0050

005513,WHT

AF0055
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
47 V(+)
12 SIG
13 RTN
29 COM
NODE: AU0050
SLOT: 5
CHAN: 6
I/O TAG: PT2241
8A5

FT2240
FLOW TRANSMITTER
MONITOR LIQUID FUEL PILOT FLOW



PID/7C6

FT22401 — WC4501 P/RED — JB2240 XT2240 8
FT22402 — WC4501 P/WHT — XT2240 9
FT22403 — WC4501 P/BLK — XT2240 10
FT22403,WHT
FT2240S — WC4501 P/SH — XT2240 11
FLTG

FT22401 — XC4501 1
FT22402 — XC4501 2
FT22403 — XC4501 3
FT2240S — XC4501 SH

8B5
IEG0050

FT22403,WHT

AF0054
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
41 V(+)
06 SIG
07 RTN
23 COM
NODE: AU0050
SLOT: 4
CHAN: 3
I/O TAG: FT2240
8A5

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
SOLONOX PILOT SKID

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B | SHT REV B
SHEET 77 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

ZS2242
POSITION SWITCH
DETECT VALVE OPERATION CLOSED
SECONDARY PILOT LIQUID FUEL SHUTOFF VALVE

NO
C
NC

PID/6C2

ZS22421 — WC5003 P/ WHT
ZS22422 — WC5003 P/ BLK

AF0081
16 DISCRETE INPUT
1794-IB16

41 V+
06 SIG
23 COM

NODE:AU0080
SLOT:1
CHAN:6
I/O TAG:ZSC2242

6C3

SV2242
SOLENOID VALVE
SECONDARY PILOT LIQUID FUEL SHUTOFF VALVE,PILOT

\+
-

PID/6D2

SV22421 — WC3023 P/ WHT
SV22422 — WC3023 P/ BLK

KA0238
19B2 | | 6 AMP
24 | 21
NO EMERGENCY SHUTDOWN SUMMARY

006104,WHT

AF0053
16 DISCRETE INPUT
1794-IB16

44 V+
09 SIG
26 COM

NODE:AU0050
SLOT:3
CHAN:9
I/O TAG:SV2242_FB

8A4

006104,WHT

AF0061
16 DISCRETE SIGNALS
(10 IN & 6 OUT)
1794-IB10XOB6

37 V+
04 SIG
19 COM

NODE:AU0060
SLOT:1
CHAN:2
I/O TAG:SV2242

7C3

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
SOLONOX PILOT

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B | SHT REV B
SHEET 78 OF 141

SWBNO-1

TURBINE BOX (JB7Ø)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 25Ø - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
TORCH

Solar® Turbines
A Caterpillar Company

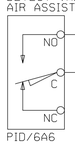
DRAWING NO.	DWG REV B	SHT REV B
4F491-149447	SHEET 79 OF 141	

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

ZS6440
POSITION SWITCH
DETECT VALVE OPERATION CLOSED
AIR ASSIST SHUTOFF VALVE



PID/6A6

ZS64401 — WC5001 P WHT
ZS64402 — WC5001 P BLK

AF0053
16 DISCRETE INPUT
1794-IB16
45 V+
10 SIG
27 COM
NODE:AU0050
SLOT:3
CHAN:10
I/O TAG:ZSC6440
8A4

SV6440
SOLENOID VALVE
AIR ASSIST SHUTOFF, PILOT

PID/6A5

SV64401 — WC3025 P WHT
SV64402 — WC3025 P BLK

AF0050
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
35 V+
00 SIG
17 COM
NODE:AU0050
SLOT:0
CHAN:0
I/O TAG:SV6440
8A2

SV6430
SOLENOID VALVE
MAIN AIR ASSIST SHUTOFF

PID/6A5

SV64301 — WC3004 P WHT
SV64302 — WC3004 P BLK

AF0052
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
36 V+
02 SIG
18 COM
NODE:AU0050
SLOT:2
CHAN:1
I/O TAG:SV6430
8A3

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
ATOMIZING AIR

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B | SHT REV B
SHEET 80 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

PT2645
PRESSURE TRANSMITTER
PCD PRESSURE FOR FORWARD PURGE

PID/6D4
+
-
GND
FLTG

PT26451 — WC4007 P WHT
PT26452 — WC4007 P BLK
PT2645S — WC4007 P SH

005507.WHT
8B5
IEG0050

AF0055
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
8A5
41 V(+)
06 SIG
07 RTN
23 COM

NODE: AU0050
SLOT: 5
CHAN: 3
I/O TAG: PT2645

SV2645
SOLENOID VALVE
COOLED FORWARD PURGE SHUTOFF #1

PID/6D3

SV26451 — WC3064 P WHT
SV26452 — WC3064 P BLK

AF0050
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
8A2
37 V+
04 SIG
19 COM

NODE: AU0050
SLOT: 0
CHAN: 2
I/O TAG: SV2645

SV2646
SOLENOID VALVE
COOLED FORWARD PURGE MAIN SHUTOFF

PID/6C5

SV26461 — WC3062 P WHT
SV26462 — WC3062 P BLK

AF0050
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
8A2
38 V+
06 SIG
20 COM

NODE: AU0050
SLOT: 0
CHAN: 3
I/O TAG: SV2646

SV2647
SOLENOID VALVE
COOLED PCD FORWARD PURGE DRAIN VALVE

PID/6D5

SV26471 — WC3063 P WHT
SV26472 — WC3063 P BLK

AF0050
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
8A2
39 V+
08 SIG
21 COM

NODE: AU0050
SLOT: 0
CHAN: 4
I/O TAG: SV2647

SV2648
SOLENOID VALVE
COOLED FORWARD PURGE SECONDARY SHUTOFF

PID/6D7

SV26481 — WC3065 P WHT
SV26482 — WC3065 P BLK

AF0080
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
6C2
40 V+
10 SIG
22 COM

NODE: AU0080
SLOT: 0
CHAN: 5
I/O TAG: SV2648

TE2645
TEMPERATURE ELEMENT
LIQUID MANIFOLD PURGE TEMPERATURE

PID/6D2

TE26451,RED — JB46 XT2846 1 — TE26451 — WC2037 P RED
TE26452,RED — XT2846 2 — TE26452 — WC2037 P WHT
TE26453,WHT — XT2846 3 — TE26453 — WC2037 P BLK
TE26454,WHT — XT2846 4 — TE2645S — WC2037 P SH
FLTG

AF0084
8 TC/RTD FAST INPUT
1794-IRT8
6C5
08 I+
10 SIG(L)
11 SIG(-)
41 GND

NODE: AU0080
SLOT: 4
CHAN: 2
I/O TAG: TE2645

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
COOLED FWD PCD PURGE

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 81 OF 141

SWBNO-1

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

VS2645
VIBRATION SWITCH
PURGE PCD COOLER FAN VIBRATION

C
NC
NO
GND
PID/6D1

XCVS2645 1 — VS26451 — AF0090 16 DISCRETE INPUT 1794-IB16 35 V+
XCVS2645 2 — VS26452 — Ø0 SIG
17 COM
NODE: AU0090
SLOT: Ø
CHAN: Ø
I/O TAG: VS2645
6A2

XCVSP2645 1 — FU0137 — 17B6 FROM XTØ139:3E
2 — ØV — 17B6 TO XTØ135:3E

KM2645
CONTACTOR RELAY
LIQUID FUEL MANIFOLD PURGE PCD
COOLER MOTOR

SA+ EN+
FULL VOLTAGE
SA- EN-
7
25

XCKM2645E 1 — KM2645EP
XCKM2645E 2 — KM2645EN

11-14 21-24
C5
11-12 21-22
KA2645 57
A2 A1
LF MANIFOLD PURGE PCD COOLER

AF0051
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
35 V+
Ø0 SIG
17 COM
NODE: AU0050
SLOT: 1
CHAN: Ø
I/O TAG: M2645
8A3

005100,WHT
005117,WHT

KA2645
B5 6 AMP
11 14
57 LF MANIFOLD PURGE PCD COOLER

M2645
MOTOR
LIQUID FUEL MANIFOLD PURGE PCD
COOLER MOTOR

GND
H1
H2
GND
T1(U)
27
T2(V)
T3(W)
CASE
PID/6D1

M2645HG — XCM2645H 1 — GND
M2645H1 — XCM2645H 2 — H1 — AUX — 1P-L1 — XCKM2645H 1 — KM2645H1 — 1
M2645H2 — XCM2645H 3 — H2 — 1P-L2 — XCKM2645H 2 — KM2645H2 — 2
CCM2645H
CUSTOMER CONNECTION
SINGLE PHASE AC BUS

M2645G — XCM2645M 1 — GND
M26451 — XCM2645M 2 — T1(U) — 3P-L1 — XCKM2645M 1 — KM2645M1 — 1
M26452 — XCM2645M 3 — T2(V) — 3P-L2 — XCKM2645M 2 — KM2645M2 — 2
M26453 — XCM2645M 4 — T3(W) — 3P-L3 — XCKM2645M 3 — KM2645M3 — 3
CCM2645M
CUSTOMER CONNECTION
THREE PHASE AC BUS

M2645,GRN/YEL
FRAME

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 25Ø - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
LIQUID FUEL MANIFOLD PCD COOLER MOTOR

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 82 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
WATER PURGE SHUTOFF

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 83 OF 141

SWBNO-1

WATER PURGE MODULE

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

8 SV2614
SOLENOID VALVE
CONDUCTIVITY SENSOR REFRESH, WATER PURGE

SV26141,YEL → JB2614 XT2614 1 → VD2614 → SV26141 → XCWQS1 1
SV26142,YEL → XT2614 2 → SV26142 → XCWQS1 2

PID/7D2

AF0052
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP

39 V+
08 SIG
21 COM

NODE: AU0050
SLOT: 2
CHAN: 4
I/O TAG: SV2614

8A3

8 PS2610
PRESSURE SWITCH
MONITOR WATER SUPPLY PRESSURE

PS26101,BLU → JB145 XT2610 1 → PS26101 → XCWQP1 1
PS26102,BRN → XT2610 2 → PS26102 → XCWQP1 2
PS26103,RED → XT2610 3
PS26104,VIO → XT2610 4
PS26105,YEL → XT2610 5
PS26106,BLK → XT2610 6
PS2610G,GRN → FRAME

NO1, C1, NC1, NO2, C2, NC2, HI, GND

PID/7D2

AF0053
16 DISCRETE INPUT
1794-IB16

35 V+
00 SIG
17 COM

NODE: AU0050
SLOT: 3
CHAN: 0
I/O TAG: PS2610

8A4

8 DT2611
SENSOR DETECTOR

8 UA2611
SIGNAL CONVERTER
DE-IONIZED WATER QUALITY, WATER PURGE

GRN DT26111,GRN → TB2 01 → TB1 +1 PWR → UA26111 → XCWQT1 1
RED DT26112,RED → 02 → -2 → UA26112 → XCWQT1 2
WHT DT26113,WHT → 03 → +3 TST → UA26113 → XCWQT1 SH
BLK DT26114,BLK → 04 → -4 → FLTG
BLU DT26115,BLU → 05
YEL DT26116,YEL → 06
HVY GRN DT26117,HVY/GRN → 07
08 JGND

PID/7D1
PID/7D1

8B5
IEG0050

005409,WHT

AF0054
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF

43 V(+)
08 SIG
09 RTN
25 COM

NODE: AU0050
SLOT: 4
CHAN: 4
I/O TAG: UA2611

8A5

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
OFFSKID WATER PURGE

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 84 OF 141

SWBNO-1

WATER PURGE

EER VFD

UF2610
FREQUENCY CONVERTER
WATER PURGE MOTOR CONTROL

IP ADDRESS
192.168.1.
030
PID7C3

56

UF2610J.WHT
UF2610ATX.WHT
UF2240:E2 76B4 FROM
UF2240E2
BA1100:L1 36D2 TO
XC0030 ENET

D↓2 P
D↓2
ATX+
ATX-
E1
E2
R0NC
R1NC

XCUF26DI
D↓1 P
D↓1
D↓0 P
D↓0
FLTG
R0C
R1C

8

POWER

XCUF26P SH
PE1
PE2

XCUF26DC
BR1
DC+
BR2
DC-
PE4
PE3

M2610
MOTOR
WATER PURGE MOTOR
FRAME
GND
T1(U)
27 T2(V)
T3(W)
CASE
M2610.GRN/YEL
PID/7D2
FRAME

M2610G
M2610G
M26101
M22612
M26103

XCM2610M SH
XCM2610M 1
XCM2610M 2
XCM2610M 3
XCM2610M 4

UF2610DI1
UF2610DI2
UF2610DI3
UF2610DI4
UF2610DIS
UF2610G
UF2610G
UF2610R
UF2610S
UF2610T
UF2610DC1
UF2610DC2
UF2610DCS

EER RTU

UV2610
DC/DC CONVERTER
RIDE THRU UNIT

X41:1
X41:2
P3
X82:1
X82:2
X82:3
X82:4
P4
PID/7C3

8

X31:1C
X31:2C
P1C
X11:1C
X11:2C
X11:3C
P2C

UV2610DC1 2B5 FROM GD0525:CB524(+)
UV2610DC2 2B5 TO GD0525:CB524(-)
UV2610DCS 2B5 FROM FG:1FRAME
UV2610AC1 XCUV22AC 1
UV2610AC2 XCUV22AC 2
UV2610AC3 XCUV22AC 3
UV2610ACS XCUV22AC 4

BOP EER AC PWR

1
2
3
4
CCUV2220AC
CUSTOMER CONNECTION
THREE PHASE AC POWER LOSS DETECTION
10A FUSE REQUIRED

SHLD
PE
1
2
3
CCM2610M
CUSTOMER CONNECTION
THREE PHASE AC POWER

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
WATER PURGE VFD

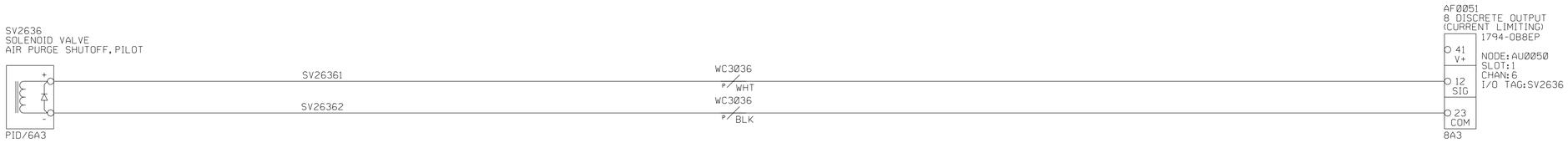
Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 85 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
AIR PURGE

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447

DWG REV B | SHT REV B

SHEET 86 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

PT2230
PRESSURE TRANSMITTER
LIQUID FUEL DISTRIBUTION MANIFOLD #1 PRESSURE

PID/6C5
+
-
GND
FLTG

PT22301 — WC4010 P/WHT
PT22302 — WC4010 P/BLK
PT2230S — WC4010 P/SH

8B5
IEG0050
005503,WHT

AF0055
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
37 V(+)
02 SIG
03 RTN
19 COM
NODE: AU0050
SLOT: 5
CHAN: 1
I/O TAG: PT2230
8A5

LS2260
LEVEL SWITCH
LIQUID FUEL PURGE TANK HIGH LEVEL

PID/7D5
NO
C
NC
HI
GND

LS22601 — WC3066 P/WHT
LS22602 — WC3066 P/BLK

AF0053
16 DISCRETE INPUT
1794-IB16
38 V+
03 SIG
20 COM
NODE: AU0050
SLOT: 3
CHAN: 3
I/O TAG: LS2260
8A4

LS2261
LEVEL SWITCH
LIQUID FUEL PURGE TANK LOW LEVEL

PID/7D4
NO
C
NC
HI
GND

LS22611 — WC3067 P/WHT
LS22612 — WC3067 P/BLK

AF0053
16 DISCRETE INPUT
1794-IB16
39 V+
04 SIG
21 COM
NODE: AU0050
SLOT: 3
CHAN: 4
I/O TAG: LS2261
8A4

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
BACK PURGE

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 87 OF 141

SWBNO-1

TURBINE BOX (JB7Ø)

PT2240
PRESSURE TRANSMITTER
LIQUID FUEL DISTRIBUTION MANIFOLD #2 PRESSURE

PID/6C6
+
-
GND
FLTG

PT22401 — WC4011 P WHT
PT22402 — WC4011 P BLK
PT2240S — WC4011 P SH

AF0055
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
39 V(+)
Ø4 SIG
Ø5 RTN
21 COM
8A5

NODE:AU0050
SLOT:5
CHAN:2
I/O TAG:PT2240

005505.WHT

8B5
IEG0050

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

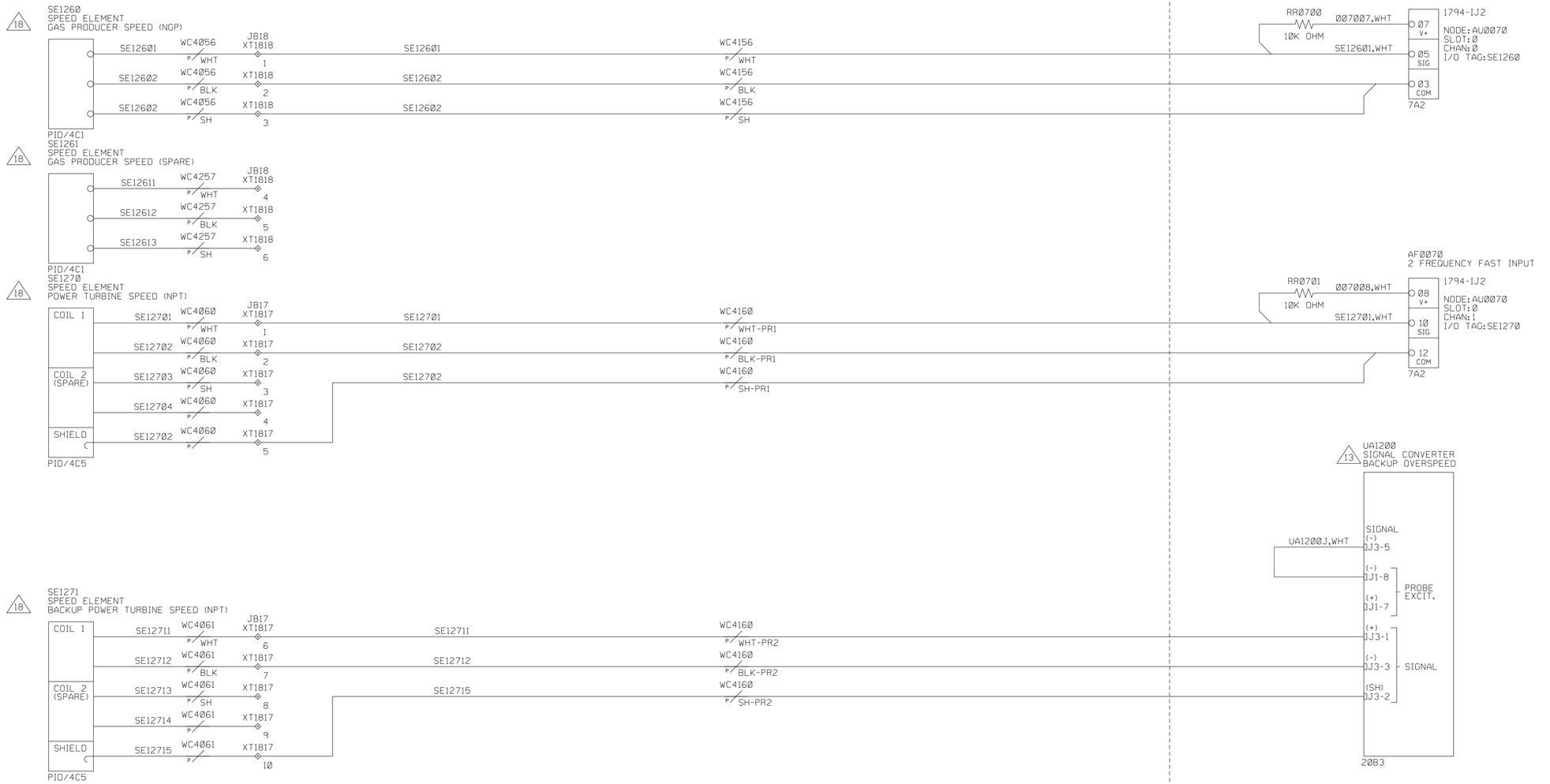
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 25Ø - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LIQUID FUEL SYSTEM
SOLONOX DRAIN

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 88 OF 141

SWBNO-1



NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
DRIVETRAIN AND BEARING SYSTEM
SPEED MONITORING

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV A
SHEET 89 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

TE1260
TEMPERATURE ELEMENT
GAS PRODUCER THRUST BEARING TEMPERATURE

JB32
TE12601,WHT XT1832 1 — TE12601 — WC2054 P RED
TE12602,WHT XT1832 2 — TE12602 — WC2054 P WHT
TE12603,RED XT1832 3 — TE12603 — WC2054 P BLK
PID/4B2
TE1260S — WC2054 P SH
FLTG

AF0083
8 TC/RTD FAST INPUT
1794-IRT8
04 I+ — TE12601
06 SIG(L) — TE12602
07 SIG(-) — TE12603
40 GND — TE1260S
NODE: AU0080
SLOT: 3
CHAN: 1
I/O TAG: TE1260
6C4

TE1260-SP
TEMPERATURE ELEMENT
GAS PRODUCER THRUST BEARING TEMPERATURE
(SPARE)

JB32
TE1260-SP1,WHT XT1832 4
TE1260-SP2,WHT XT1832 5
TE1260-SP3,RED XT1832 6
PID/4B2

TE1265
TEMPERATURE ELEMENT
GAS PRODUCER THRUST BEARING TEMPERATURE

JB32
TE12651,WHT XT1832 7 — TE12651 — WC2053 P RED
TE12652,WHT XT1832 8 — TE12652 — WC2053 P WHT
TE12653,RED XT1832 9 — TE12653 — WC2053 P BLK
PID/4C2
TE1265S — WC2053 P SH
FLTG

AF0094
8 TC/RTD FAST INPUT
1794-IRT8
04 I+ — TE12651
06 SIG(L) — TE12652
07 SIG(-) — TE12653
40 GND — TE1265S
NODE: AU0090
SLOT: 4
CHAN: 1
I/O TAG: TE1265
6A5

TE1265-SP
TEMPERATURE ELEMENT
GAS PRODUCER THRUST BEARING TEMPERATURE
(SPARE)

JB32
TE1265-SP1,WHT XT1832 10
TE1265-SP2,WHT XT1832 11
TE1265-SP3,RED XT1832 12
PID/4C2

TE1270
TEMPERATURE ELEMENT
POWER TURBINE THRUST BEARING TEMPERATURE

JB171
TE12701,WHT XT18171 1 — TE12701 — WC2055 P RED
TE12702,WHT XT18171 2 — TE12702 — WC2055 P WHT
TE12703,RED XT18171 3 — TE12703 — WC2055 P BLK
PID/4B3
TE1270S — WC2055 P SH
FLTG

AF0083
8 TC/RTD FAST INPUT
1794-IRT8
00 I+ — TE12701
02 SIG(L) — TE12702
03 SIG(-) — TE12703
16 GND — TE1270S
NODE: AU0080
SLOT: 3
CHAN: 0
I/O TAG: TE1270
6C4

TE1270-SP
TEMPERATURE ELEMENT
POWER TURBINE THRUST BEARING TEMPERATURE
(SPARE)

JB171
TE1270-SP1,WHT XT18171 4
TE1270-SP2,WHT XT18171 5
TE1270-SP3,RED XT18171 6
PID/4B4

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

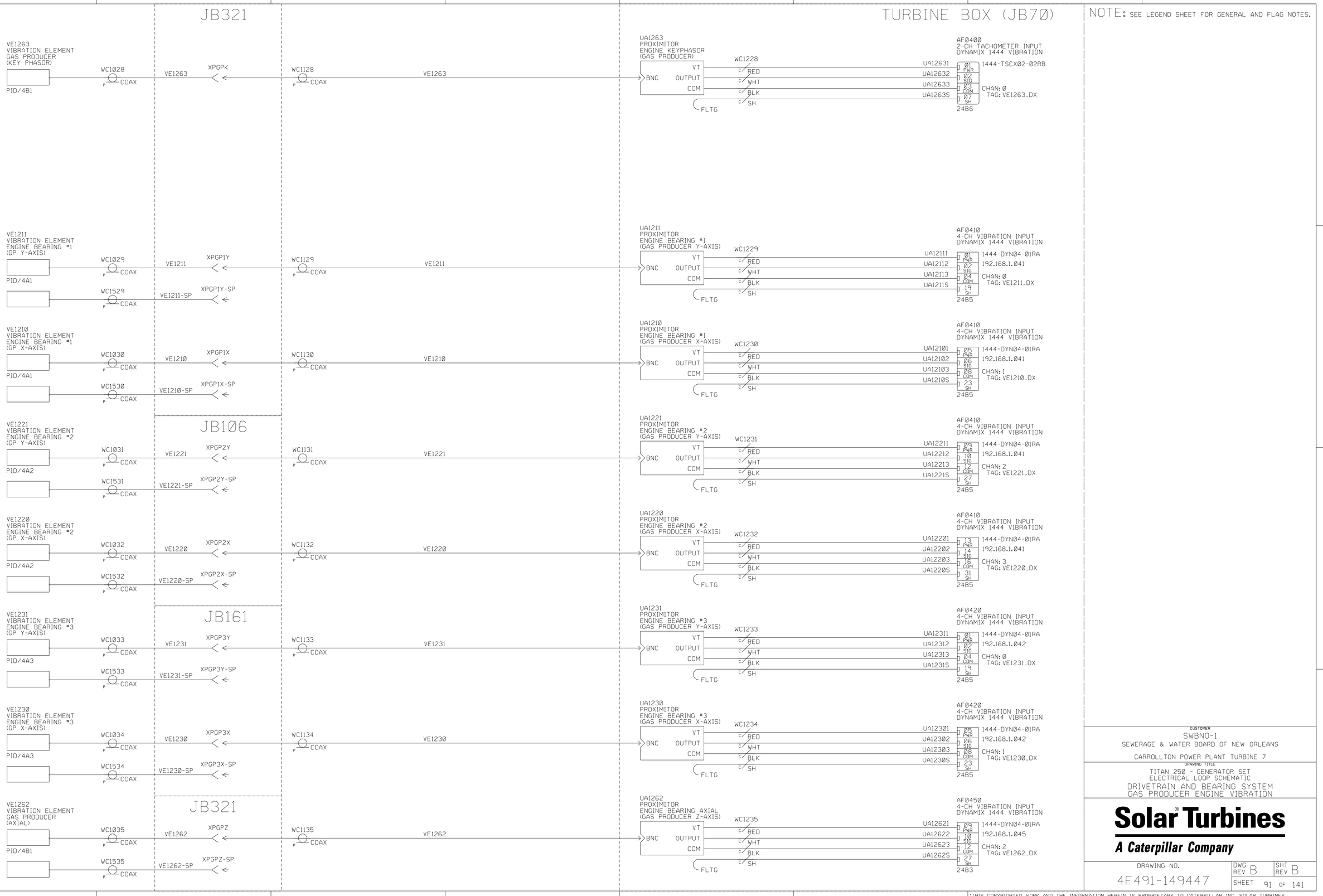
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
DRIVETRAIN AND BEARING SYSTEM
TURBINE BEARING TEMPERATURE

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 90 OF 141

SWBNO-1



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

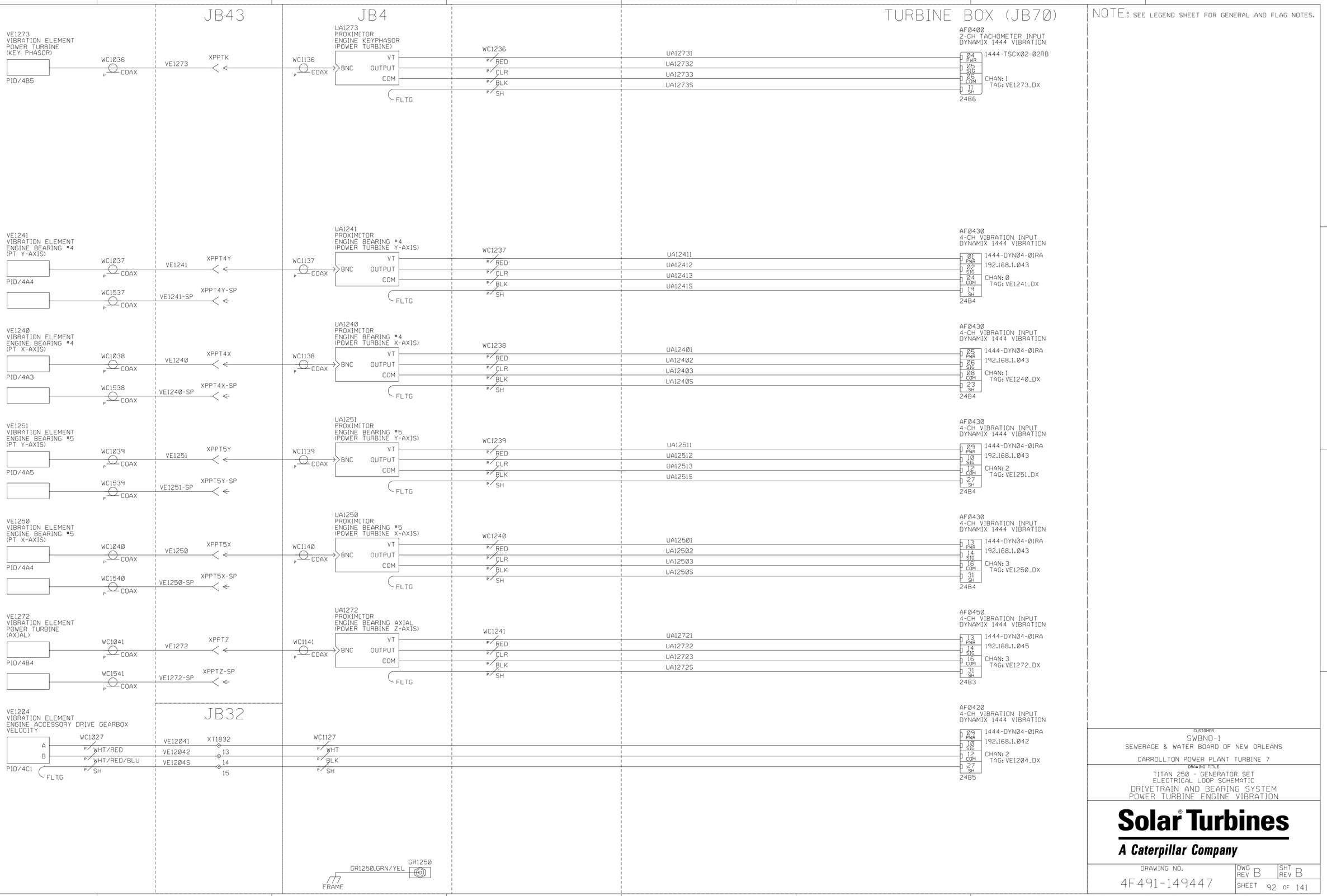
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
DRIVETRAIN AND BEARING SYSTEM
GAS PRODUCER ENGINE VIBRATION

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 91 OF 141

SWBNO-1



NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
DRIVETRAIN AND BEARING SYSTEM
POWER TURBINE ENGINE VIBRATION

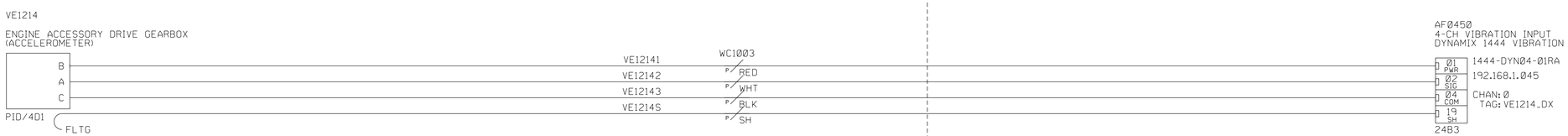
Solar® Turbines
A Caterpillar Company

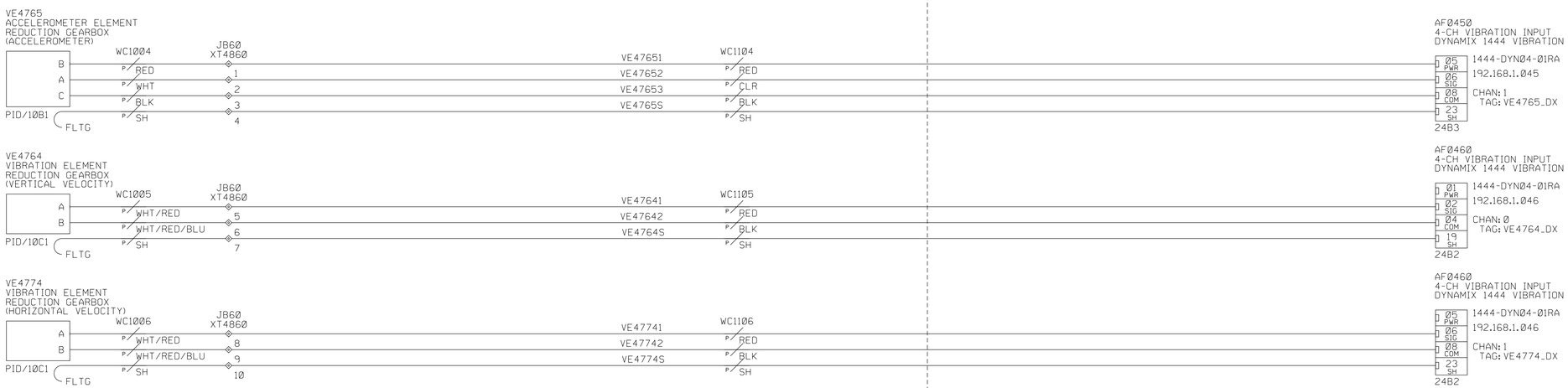
DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 92 OF 141	

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.





CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
DRIVETRAIN AND BEARING SYSTEM
ACCESSORY GEAR BOX VIBRATION

Solar® Turbines

A Caterpillar Company

DRAWING NO.	DWG REV B	SHT REV B
4F491-149447	SHEET 93 OF 141	

SWBNO-1

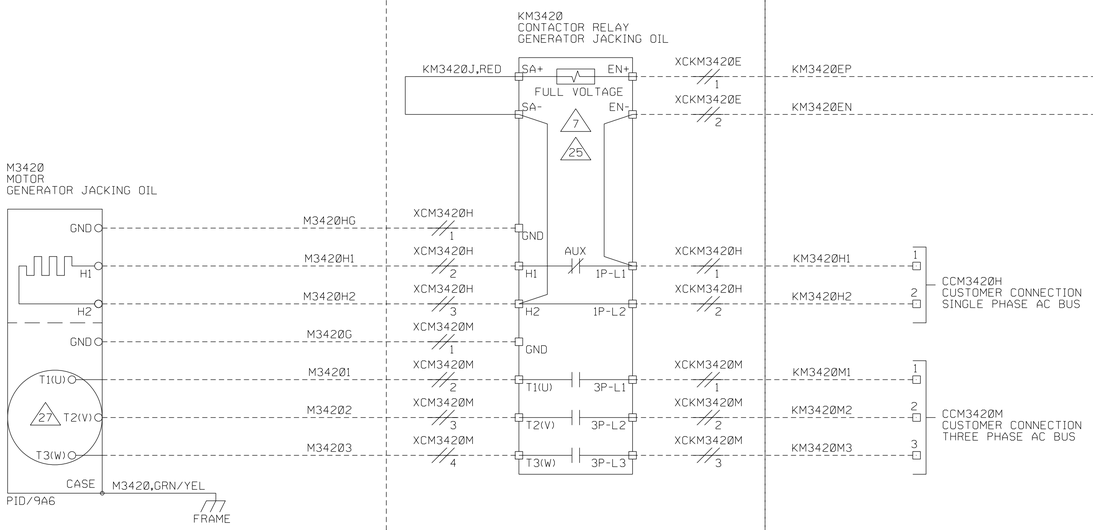
PACKAGE

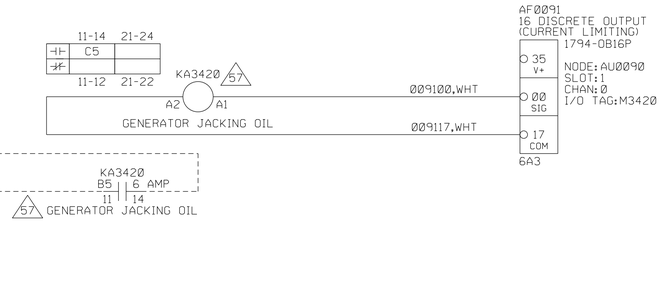
EER MCC AC CONTACTOR

BOP EER AC PWR

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.





CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
DRIVETRAIN AND BEARING SYSTEM
GENERATOR JACKING OIL

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 94 OF 141	

SWBNO-1

GENERATOR BOX (JB72)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

PDT3621
PRESSURE DIFF TRANSMITTER
DRIVE END BEARING HOUSING SEAL AIR
DELTA-P TRANSMITTER (INNER SEAL)

+ PDT36211 WC4070 P/ WHT
- PDT36212 WC4070 P/ BLK
GND PDT3621S WC4070 P/ SH
FLTG

IEG0120 26D4 AF012301,WHT

AF0123
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
35 V(+)
00 SIG
01 RTN
17 COM
NODE: AU0120
SLOT: 3
CHAN: 0
I/O TAG: PDT3621
26C4

PDT3622
PRESSURE DIFF TRANSMITTER
DRIVE END BEARING HOUSING SEAL AIR
DELTA-P TRANSMITTER (OUTER SEAL)

+ PDT36221 WC4071 P/ WHT
- PDT36222 WC4071 P/ BLK
GND PDT3622S WC4071 P/ SH
FLTG

IEG0120 26D4 AF012303,WHT

AF0123
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
37 V(+)
02 SIG
03 RTN
19 COM
NODE: AU0120
SLOT: 3
CHAN: 1
I/O TAG: PDT3622
26C4

PDT3631
PRESSURE DIFF TRANSMITTER
EXCITER END BEARING HOUSING SEAL AIR
DELTA-P TRANSMITTER (INNER SEAL)

+ PDT36311 WC4072 P/ WHT
- PDT36312 WC4072 P/ BLK
GND PDT3631S WC4072 P/ SH
FLTG

IEG0120 26D4 AF012305,WHT

AF0123
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
39 V(+)
04 SIG
05 RTN
21 COM
NODE: AU0120
SLOT: 3
CHAN: 2
I/O TAG: PDT3631
26C4

PDT3632
PRESSURE DIFF TRANSMITTER
EXCITER END BEARING HOUSING SEAL AIR
DELTA-P TRANSMITTER (OUTER SEAL)

+ PDT36321 WC4073 P/ WHT
- PDT36322 WC4073 P/ BLK
GND PDT3632S WC4073 P/ SH
FLTG

IEG0120 26D4 AF012307,WHT

AF0123
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
41 V(+)
06 SIG
07 RTN
23 COM
NODE: AU0120
SLOT: 3
CHAN: 3
I/O TAG: PDT3632
26C4

PT3620
PRESSURE TRANSMITTER
DRIVE END SEAL AIR SUPPLY
PRESSURE TRANSMITTER

+ PT36201 WC4074 P/ WHT
- PT36202 WC4074 P/ BLK
GND PT3620S WC4074 P/ SH
FLTG

IEG0120 26D4 AF012309,WHT

AF0123
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
43 V(+)
08 SIG
09 RTN
25 COM
NODE: AU0120
SLOT: 3
CHAN: 4
I/O TAG: PT3620
26C4

PT3630
PRESSURE TRANSMITTER
EXCITER END SEAL AIR SUPPLY
PRESSURE TRANSMITTER

+ PT36301 WC4075 P/ WHT
- PT36302 WC4075 P/ BLK
GND PT3630S WC4075 P/ SH
FLTG

IEG0120 26D4 AF012311,WHT

AF0123
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
45 V(+)
10 SIG
11 RTN
27 COM
NODE: AU0120
SLOT: 3
CHAN: 5
I/O TAG: PT3630
26C4

SV3620
SOLENOID VALVE
GENERATOR SEAL AIR SHUTOFF

+ SV36201 WC3070 P/ WHT
- SV36202 WC3070 P/ BLK

AF0120
16 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB16P
35 V+
00 SIG
17 COM
NODE: AU0120
SLOT: 0
CHAN: 0
I/O TAG: SV3620
26C2

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

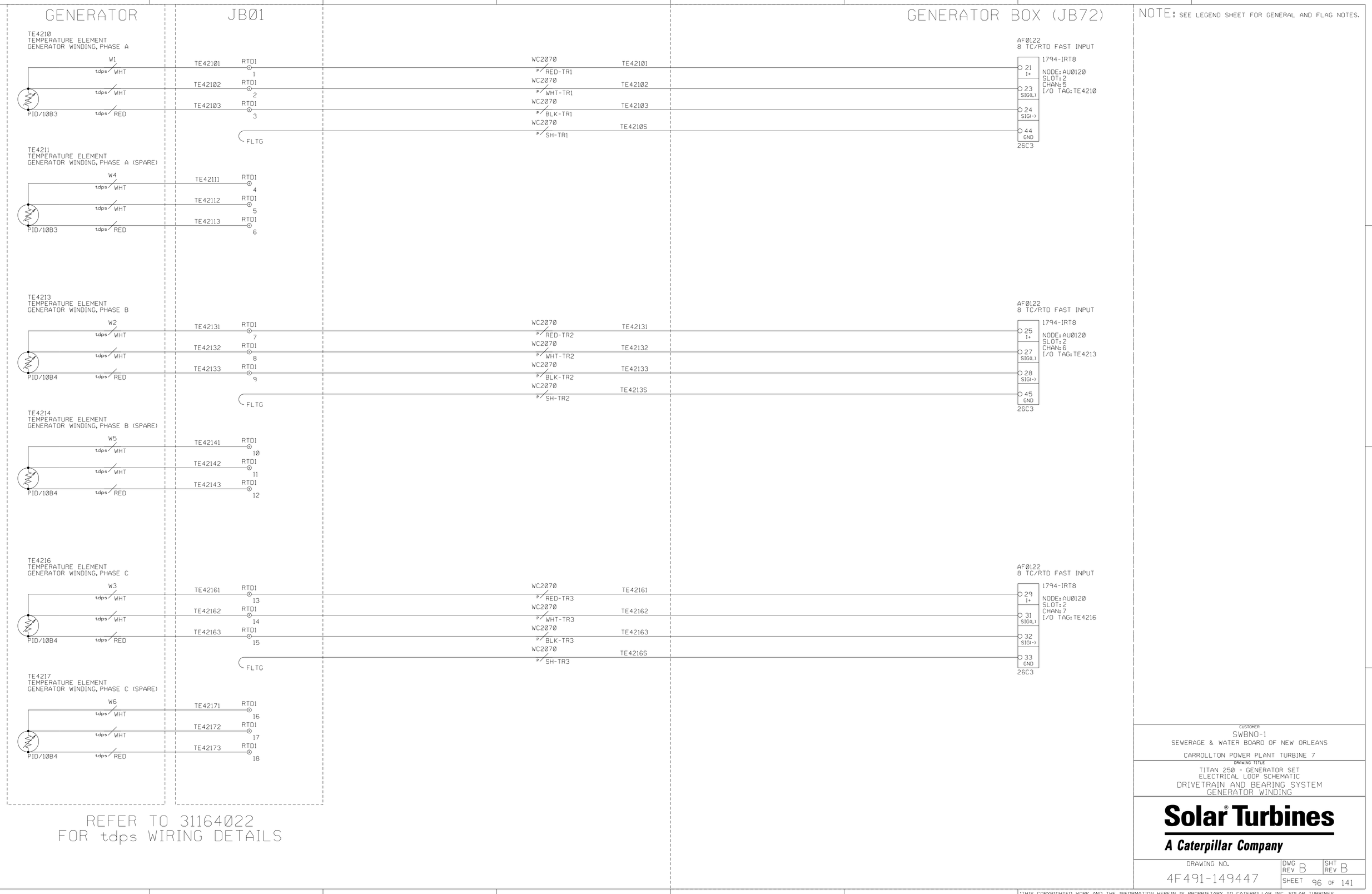
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
DRIVETRAIN AND BEARING SYSTEM
GENERATOR BEARING HOUSING SEAL AIR

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 95 OF 141

SWBNO-1



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
DRIVETRAIN AND BEARING SYSTEM
GENERATOR WINDING

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV B	SHT REV B
4F491-149447	SHEET 96 OF 141	

SWBNO-1

GENERATOR

TE4240
TEMPERATURE ELEMENT
GENERATOR BEARING (EXCITER END)

W11 tdps WHT
W11 tdps WHT
W11 tdps RED
PID/10B5

JB01

TE42401 RTD2 1
TE42402 RTD2 2
TE42403 RTD2 3
FLTG

WC2070 P RED-TR4 TE42401
WC2070 P WHT-TR4 TE42402
WC2070 P BLK-TR4 TE42403
WC2070 P SH-TR4 TE4240S

GENERATOR BOX (JB72)

AF0122
8 TC/RTD FAST INPUT
1794-IRT8

08 I+	NODE: AU0120
10 SIG(L)	SLOT: 2
11 SIG(-)	CHAN: 2
41 GND	I/O TAG: TE4240

26C3

TE4230
TEMPERATURE ELEMENT
GENERATOR BEARING (DRIVE END)

W10 tdps WHT
W10 tdps WHT
W10 tdps RED
PID/10B3

TE42301 RTD2 4
TE42302 RTD2 5
TE42303 RTD2 6
FLTG

WC2070 P RED-TR5 TE42301
WC2070 P WHT-TR5 TE42302
WC2070 P BLK-TR5 TE42303
WC2070 P SH-TR5 TE4230S

AF0122
8 TC/RTD FAST INPUT
1794-IRT8

04 I+	NODE: AU0120
06 SIG(L)	SLOT: 2
07 SIG(-)	CHAN: 1
40 GND	I/O TAG: TE4230

26C3

REFER TO 31164022
FOR tdps WIRING DETAILS

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

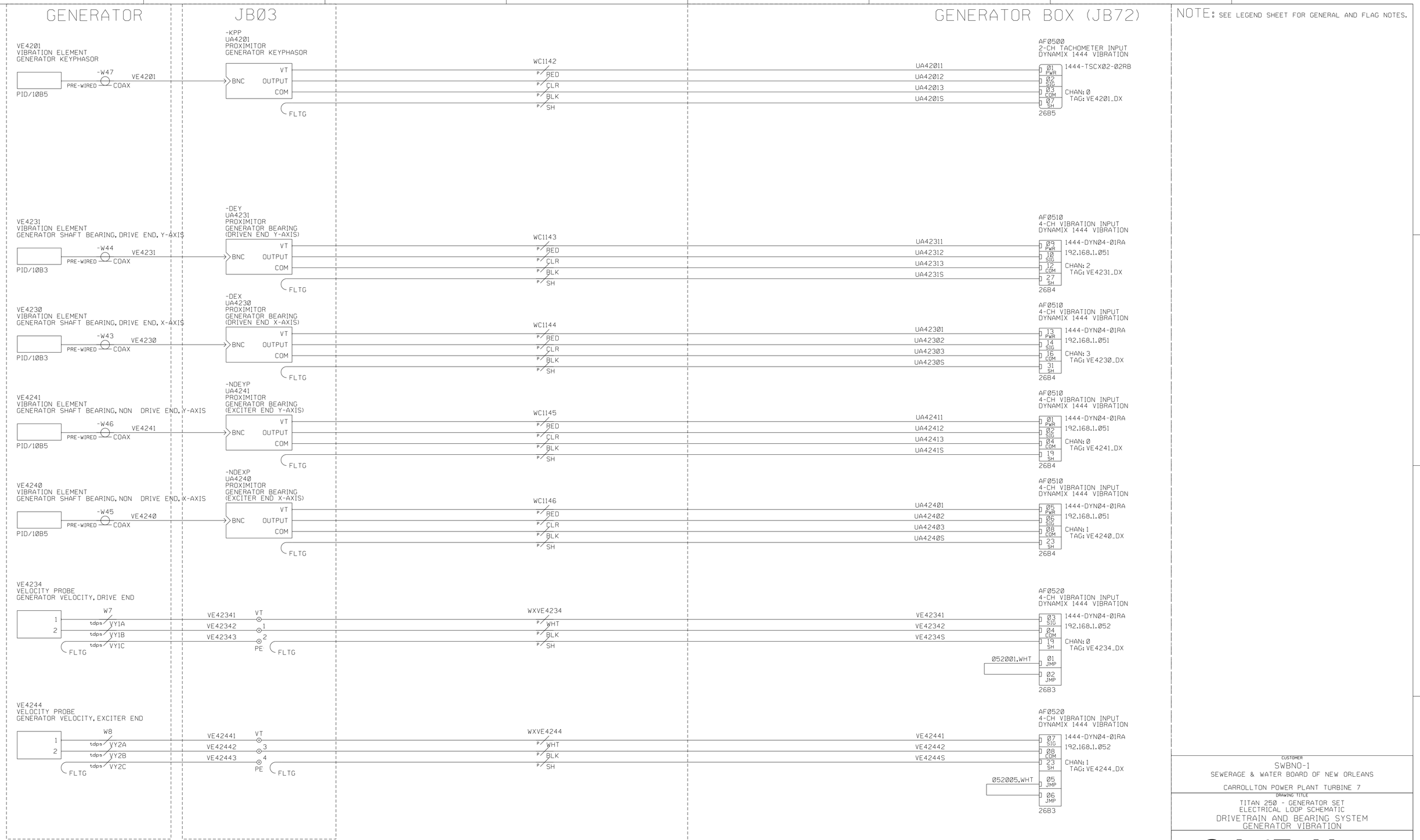
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
DRIVETRAIN AND BEARING SYSTEM
GENERATOR BEARING

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 97 OF 141

SWBNO-1



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
DRIVETRAIN AND BEARING SYSTEM
GENERATOR VIBRATION

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 98 OF 141	

SWBNO-1

PACKAGE

EER MCC AC CONTACTOR

BOP EER AC PWR

GENERATOR BOX (JB72)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

KM4100
CONTACTOR RELAY
MOTOR CONTACTOR RELAY

KM4100J,RED
SA+ EN+
FULL VOLTAGE
SA- EN-
7
25
GND
HI(L1) 1P-2L1
H2(L2) 1P-2L2

XC7104 1 — KM4100EP
XC7104 2 — KM4100EN

57 KA4100 A6 | 6 AMP 12 | 11
GENERATOR HEATER DISABLED

AF0120
16 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB16P
42 V+
07 SIG
24 COM
NODE:AU0120
SLOT:0
CHAN:7
I/O TAG:H4100
26C2

KA0232 19D6 | 6 AMP 14 | 11
CONTROLLER ACTIVE
Ø12007,WHT
57 KA4100
KA4100A1,WHT
A1 A2 Ø12024,WHT
GENERATOR HEATER DISABLED

⊣⊢		
⊣⊢	A5	

XC7304 1 — KM4100H1 — 1
XC7304 2 — KM4100H2 — 2
CCH4100H
CUSTOMER CONNECTION
SINGLE PHASE AC BUS

XC7004 2 — H41002
XC7004 1 — H41001

DE

H4100
HEATER, SPACE
GENERATOR, DRIVE END
PID/10B3

H4101
HEATER, SPACE
GENERATOR DRIVE END
PID/10C3

NDE

H4104
HEATER, SPACE
GENERATOR NON DRIVE END
PID/10B4

H4105
HEATER, SPACE
GENERATOR NON DRIVE END
PID/10C4

EXCITER

H4108
HEATER, SPACE
GENERATOR EXCITER
PID/10B5

JB04

WIRED BY
tdps

EF 3
EF 4

JB02

SH 1
2
3
4
5
SH 6
7
8
9
PEG 10
1

WC7004 P 1 — H41001 — XT0355 1
WC7004 P 2 — H41002 — XT0355 2
WC7004 P GY — PEG01403 — XT0355 3
PEG01403,GRN/YEL
3B2
PEG0140
3

REFER TO 31164022
FOR tdps WIRING DETAILS

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
DRIVETRAIN AND BEARING SYSTEM
GENERATOR SPACE HEATER

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 99 OF 141	

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

TE3510
TEMPERATURE ELEMENT
#1 BEARING DRAIN

JB20
TE35101,RED XT3820 1 — TE35101 — WC2056 P RED
TE35102,RED XT3820 2 — TE35102 — WC2056 P WHT
TE35103,WHT XT3820 3 — TE35103 — WC2056 P BLK
TE35104,WHT XT3820 4 — TE3510S — WC2056 P SH
PID/9C2
FLTG

AF0083
8 TC/RTD FAST INPUT
1794-IRT8
08 I+ — TE35101
10 SIG(L) — TE35102
11 SIG(-) — TE35103
41 GND — TE3510S
NODE: AU0080
SLOT: 3
CHAN: 2
I/O TAG: TE3510
6C4

TE3520
TEMPERATURE ELEMENT
#2 AND #3 BEARING COMMON DRAIN

JB21
TE35201,RED XT3821 1 — TE35201 — WC2028 P RED
TE35202,RED XT3821 2 — TE35202 — WC2028 P WHT
TE35203,WHT XT3821 3 — TE35203 — WC2028 P BLK
TE35204,WHT XT3821 4 — TE3520S — WC2028 P SH
PID/9C2
FLTG

AF0083
8 TC/RTD FAST INPUT
1794-IRT8
12 I+ — TE35201
14 SIG(L) — TE35202
15 SIG(-) — TE35203
42 GND — TE3520S
NODE: AU0080
SLOT: 3
CHAN: 3
I/O TAG: TE3520
6C4

TE3540
TEMPERATURE ELEMENT
#4 AND #5 ENGINE BEARING COMMON DRAIN

JB22
TE35401,RED XT3822 1 — TE35401 — WC2057 P RED
TE35402,RED XT3822 2 — TE35402 — WC2057 P WHT
TE35403,WHT XT3822 3 — TE35403 — WC2057 P BLK
TE35404,WHT XT3822 4 — TE3540S — WC2057 P SH
PID/9C3
FLTG

AF0083
8 TC/RTD FAST INPUT
1794-IRT8
17 I+ — TE35401
19 SIG(L) — TE35402
20 SIG(-) — TE35403
43 GND — TE3540S
NODE: AU0080
SLOT: 3
CHAN: 4
I/O TAG: TE3540
6C4

TE3530
TEMPERATURE ELEMENT
#2 AND #3 BEARING COMMON DRAIN

JB119
TE35301,RED XT38119 1 — TE35301 — WC2061 P RED
TE35302,RED XT38119 2 — TE35302 — WC2061 P WHT
TE35303,WHT XT38119 3 — TE35303 — WC2061 P BLK
TE35304,WHT XT38119 4 — TE3530S — WC2061 P SH
PID/9C3
FLTG

AF0094
8 TC/RTD FAST INPUT
1794-IRT8
21 I+ — TE35301
23 SIG(L) — TE35302
24 SIG(-) — TE35303
44 GND — TE3530S
NODE: AU0090
SLOT: 4
CHAN: 5
I/O TAG: TE3530
6A5

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
DRIVETRAIN AND BEARING SYSTEM
LUBE OIL ENGINE BEARING DRAIN

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 100 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

TE3200
TEMPERATURE ELEMENT
LUBE OIL HEADER TEMPERATURE

JB25
TE32001,BLK XT3825 1 — TE32001 — WC2026 P RED
TE32002,BLK XT3825 2 — TE32002 — WC2026 P WHT
TE32003,YEL XT3825 3 — TE32003 — WC2026 P BLK
TE3200-SP1,RED XT3825 4 — TE3200S — WC2026 P SH — FLTG
TE3200-SP2,RED XT3825 5
TE3200-SP3,WHT XT3825 6
PID/9A1

AF0084
8 TC/RTD FAST INPUT
1794-IRT8
00 I+
02 SIG(L)
03 SIG(-)
16 GND
NODE:AU0080
SLOT:4
CHAN:0
I/O TAG:TE3200
6C5

PT3240
PRESSURE TRANSMITTER
LUBE OIL FILTER INLET PRESSURE TRANSMITTER

\+ — PT32401 — WC4014 P WHT
\- — PT32402 — WC4014 P BLK
GND — PT3240S — WC4014 P SH — FLTG
PID/8B4

AF0085
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
47 V(+)
12 SIG
13 RTN
29 COM
NODE:AU0080
SLOT:5
CHAN:6
I/O TAG:PT3240
008513,WHT
6D6
IEG0080
6C5

PT3200
PRESSURE TRANSMITTER
LUBE OIL HEADER PRESSURE

\+ — PT32001 — WC4012 P WHT
\- — PT32002 — WC4012 P BLK
GND — PT3200S — WC4012 P SH — FLTG
PID/9A3

AF0085
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF
41 V(+)
06 SIG
07 RTN
23 COM
NODE:AU0080
SLOT:5
CHAN:3
I/O TAG:PT3200
008507,WHT
6D6
IEG0080
6C5

PS3200
PRESSURE SWITCH
BACKUP LUBE PUMP ACTIVATION, PLC FAILURE

JB30
FU0139,BLU XT3830 1 — FU0139 — WC5080 P WHT-PR3 — XT0136 4 — FU0139,WHT — 18A3 FROM XT0136:1E
NO1
PS32002,BRN XT3830 2 — PS32002 — WC5080 P BLK-PR3 — XT0136 5 — PS32002,WHT — 18D5 TO KA0136:A1
C1
PS32003,RED XT3830 3
NC1
PS32004,VIO XT3830 4 — PS32004 — WC5080 P WHT-PR4 — XT0136 6 — PS32004,WHT — KA0240 19B2 11 | 14 6 AMP — XT0136 7 — UF1300 — 40A6 FROM UF1300:D12
NO2
PS32005,YEL XT3830 5 — PS32005 — WC5080 P BLK-PR4 — XT0136 8 — NO EMERGENCY SHUTDOWN SUMMARY — PS32005 — 40A6 TO UF1300:D12 P
C2
PS32006,BLK XT3830 6
HI
NC2
PS3200G,GRN — FG — FRAME
GND
PID/9A3

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LUBE OIL SUPPLY SYSTEM
FILTRATION MODULE

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 101 OF 141

SWBNO-1

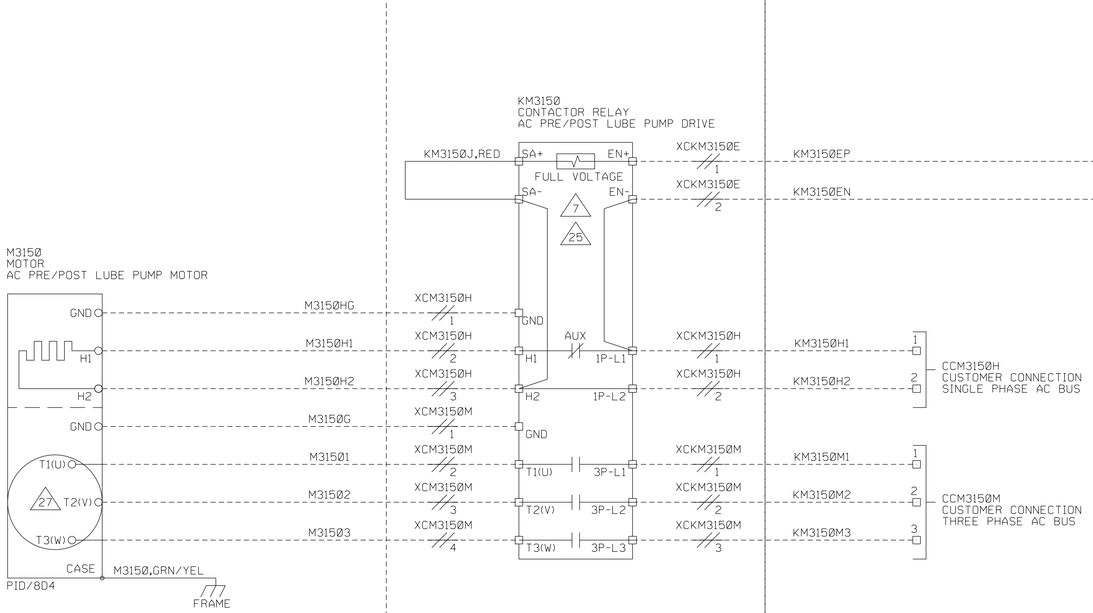
PACKAGE

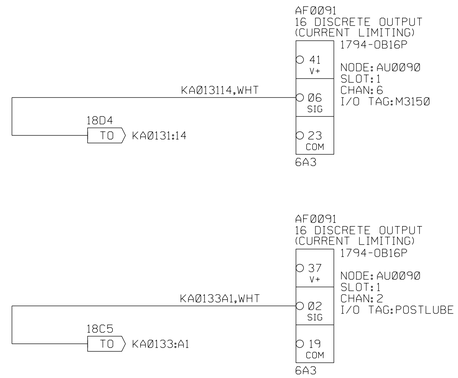
EER MCC AC CONTACTOR

BOP EER AC PWR

TURBINE BOX (JB7Ø)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.





CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 25Ø - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LUBE OIL SUPPLY SYSTEM
PRE/POST PUMP MOTOR

Solar® Turbines
A Caterpillar Company

DRAWING NO.
4F491-149447

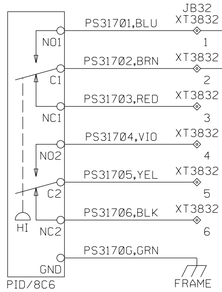
DWG REV B
SHT REV B
SHEET 1Ø2 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

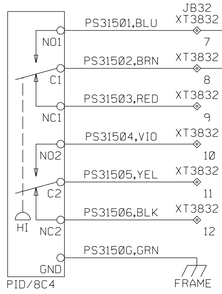
PS3170
PRESSURE SWITCH
BACKUP PUMP LOW PRESSURE TEST



PS31701 → WC5080 P WHT-PR1
PS31702 → WC5080 P BLK-PR1

AF0081
16 DISCRETE INPUT
1794-IB16
37 V+
02 SIG
19 COM
NODE:AU0080
SLOT:1
CHAN:2
I/O TAG:PS3170
6C3

PS3150
PRESSURE SWITCH
AC PRE/POST PUMP CHECK



PS31501 → WC5080 P WHT-PR2
PS31502 → WC5080 P BLK-PR2

AF0081
16 DISCRETE INPUT
1794-IB16
35 V+
00 SIG
17 COM
NODE:AU0080
SLOT:1
CHAN:0
I/O TAG:PS3150
6C3

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LUBE OIL SUPPLY SYSTEM
BACKUP AND PRE/POST PUMP SWITCHES

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 103 OF 141

SWBNO-1

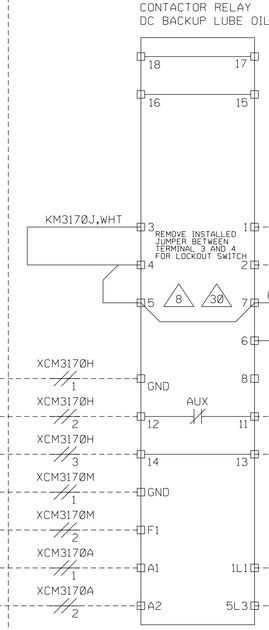
PACKAGE

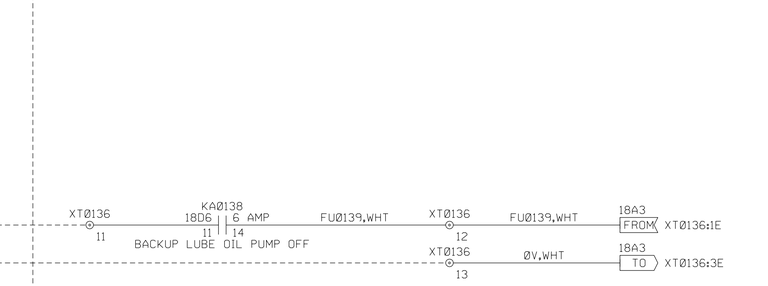
EER DC CONTACTOR

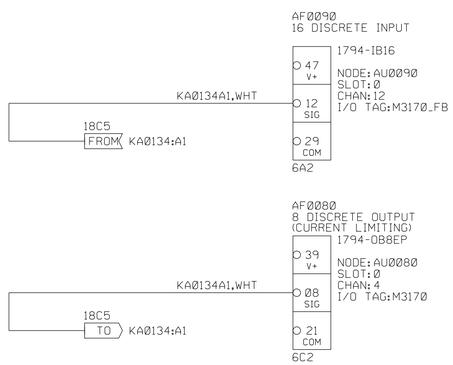
TURBINE BOX (JB7Ø)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

KM3170
CONTACTOR RELAY
DC BACKUP LUBE OIL PUMP DRIVE







CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 25Ø - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LUBE OIL SUPPLY SYSTEM
BACKUP PUMP MOTOR

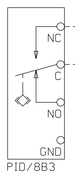
Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 1Ø4 OF 141

SWBNO-1

LUBE OIL COOLER

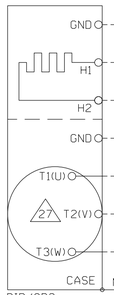
13 8 VS3220
VIBRATION SWITCH
LUBE OIL COOLER FAN VIBRATION



PID/8B3

XCVS3220 1 — VS32201
XCVS3220 2 — VS32202

8 M3220
MOTOR
LUBE OIL COOLER FAN "1



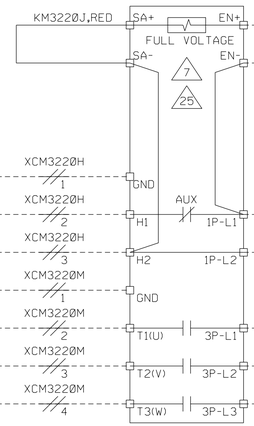
PID/8B3

M3220,GRN/YEL
FRAME

M3220HG — XCM3220H 1 — GND
M3220H1 — XCM3220H 2 — H1 — AUX — 1P-L1 — XCKM3220H L1 — KM3220H1 — 1
M3220H2 — XCM3220H 3 — H2 — 1P-L2 — XCKM3220H L2 — KM3220H2 — 2
CCM3220H
CUSTOMER CONNECTION
SINGLE PHASE AC BUS
M3220G — XCM3220M 1 — GND
M32201 — XCM3220M 2 — T1(U) — 3P-L1 — XCKM3220M L1 — KM3220M1 — 1
M32202 — XCM3220M 3 — T2(V) — 3P-L2 — XCKM3220M L2 — KM3220M2 — 2
M32203 — XCM3220M 4 — T3(W) — 3P-L3 — XCKM3220M L3 — KM3220M3 — 3
CCM3220M
CUSTOMER CONNECTION
THREE PHASE AC BUS

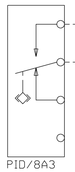
EER MCC AC CONTACTOR

KM3220
CONTACTOR RELAY
LUBE OIL COOLER FAN



XCKM3220E 1 — KM3220EP
XCKM3220E 2 — KM3220EN

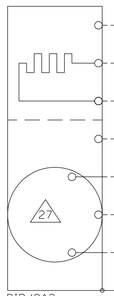
13 8 VS3221
VIBRATION SWITCH
LUBE OIL COOLER FAN #2 VIBRATION



PID/8A3

XCVS3221 1 — VS32211
XCVS3221 2 — VS32212

8 M3221
MOTOR
LUBE OIL COOLER FAN #2

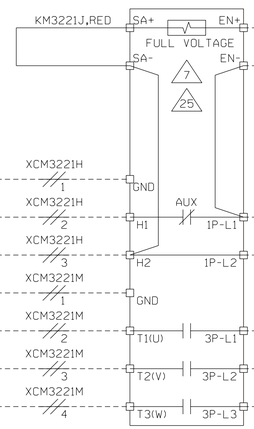


PID/8A3

M3221,GRN/YEL
FRAME

M3221HG — XCM3221H 1 — GND
M3221H1 — XCM3221H 2 — H1 — AUX — 1P-L1 — XC3221H L1 — KM3221HL1 — 1
M3221H2 — XCM3221H 3 — H2 — 1P-L2 — XC3221H L2 — KM3221HL2 — 2
CCM3221H
CUSTOMER CONNECTION
SINGLE PHASE AC POWER
M3221G — XCM3221M 1 — GND
M32211 — XCM3221M 2 — T1(U) — 3P-L1 — XC3221M L1 — KM3221ML1 — 1
M32212 — XCM3221M 3 — T2(V) — 3P-L2 — XC3221M L2 — KM3221ML2 — 2
M32213 — XCM3221M 4 — T3(W) — 3P-L3 — XC3221M L3 — KM3221ML3 — 3
CCM3221M
CUSTOMER CONNECTION
THREE PHASE AC POWER

KM3221
CONTACTOR RELAY
LUBE OIL COOLER FAN #2



XCKM3221E 1 — KM3221EP
XCKM3221E 2 — KM3221EN

BOP EER AC PWR

57
KA3220
B5 | 6 AMP
11 | 14
LUBE OIL COOLER FAN

11-14 21-24
A5
11-12 21-22
KA3220
57
A2 A1
LUBE OIL COOLER FAN

57
KA3221
C5 | 6 AMP
11 | 14
LUBE OIL COOLER FAN #2

11-14 21-24
C5
11-12 21-22
KA3221
A2 A1
LUBE OIL COOLER FAN #2

TURBINE BOX (JB70)

AF0090
16 DISCRETE INPUT
1794-IB16
41 V+
06 SIG
23 COM
NODE:AU0090
SLOT:0
CHAN:6
I/O TAG:VS3220
6A2

AF0092
16 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB16P
36 V+
01 SIG
18 COM
NODE:AU0090
SLOT:2
CHAN:1
I/O TAG:M3220
009201,WHT
009218,WHT
6A3

AF0090
16 DISCRETE INPUT
1794-IB16
42 V+
07 SIG
24 COM
NODE:AU0090
SLOT:0
CHAN:7
I/O TAG:VS3221
6A2

AF0092
16 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB16P
46 V+
11 SIG
28 COM
NODE:AU0090
SLOT:2
CHAN:11
I/O TAG:M3221
009211,WHT
009228,WHT
6A3

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

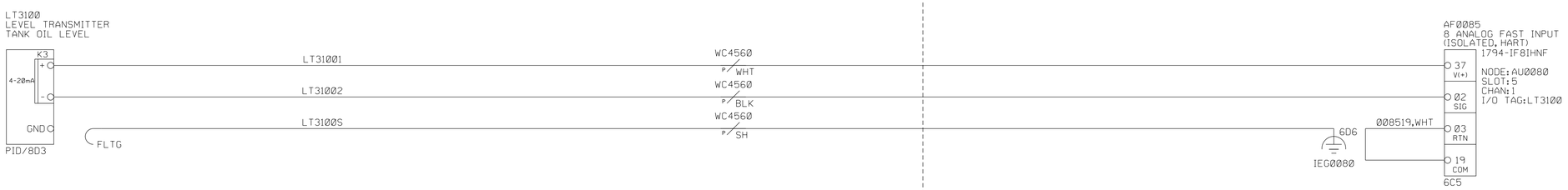
DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LUBE OIL SUPPLY SYSTEM
COOLER

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B | SHT REV B
SHEET 105 OF 141

SWBNO-1

TURBINE BOX (JB70)



NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LUBE OIL SUPPLY SYSTEM
TANK LEVEL

Solar® Turbines

A Caterpillar Company

DRAWING NO.	DWG REV B	SHT REV B
4F491-149447	SHEET 106 OF 141	

SWBNO-1

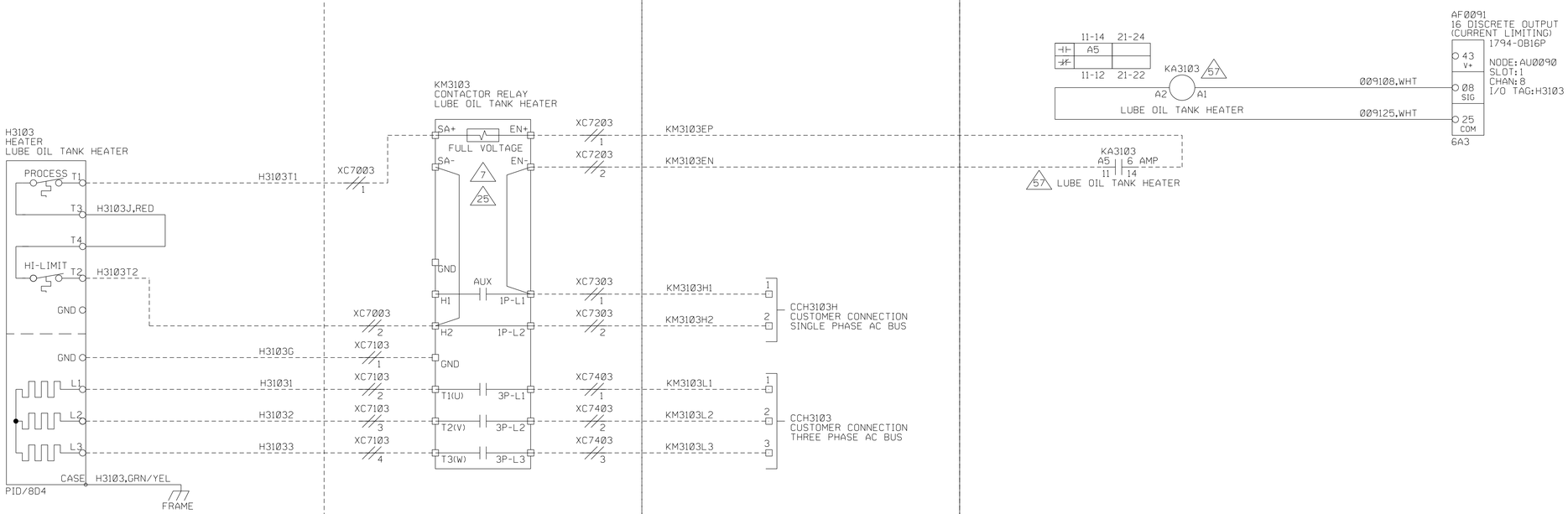
PACKAGE

EER MCC AC CONTACTOR

BOP EER AC PWR

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LUBE OIL SUPPLY SYSTEM
HEATER

Solar® Turbines
A Caterpillar Company

DRAWING NO.
4F491-149447

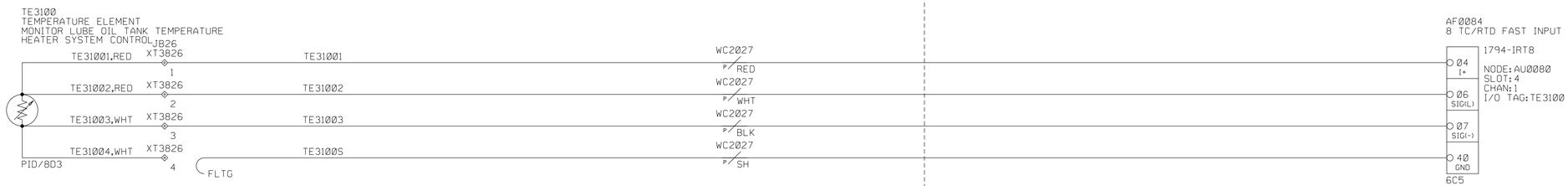
DWG REV B | SHT REV B

SHEET 107 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LUBE OIL SUPPLY SYSTEM
TANK TEMP

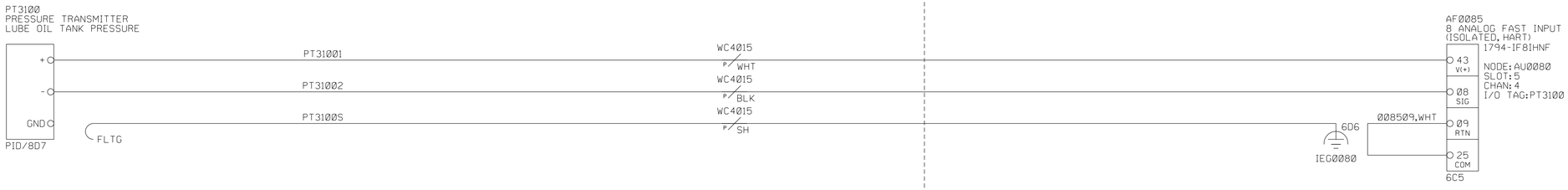
Solar® Turbines

A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 108 OF 141	

SWBNO-1

TURBINE BOX (JB70)



NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

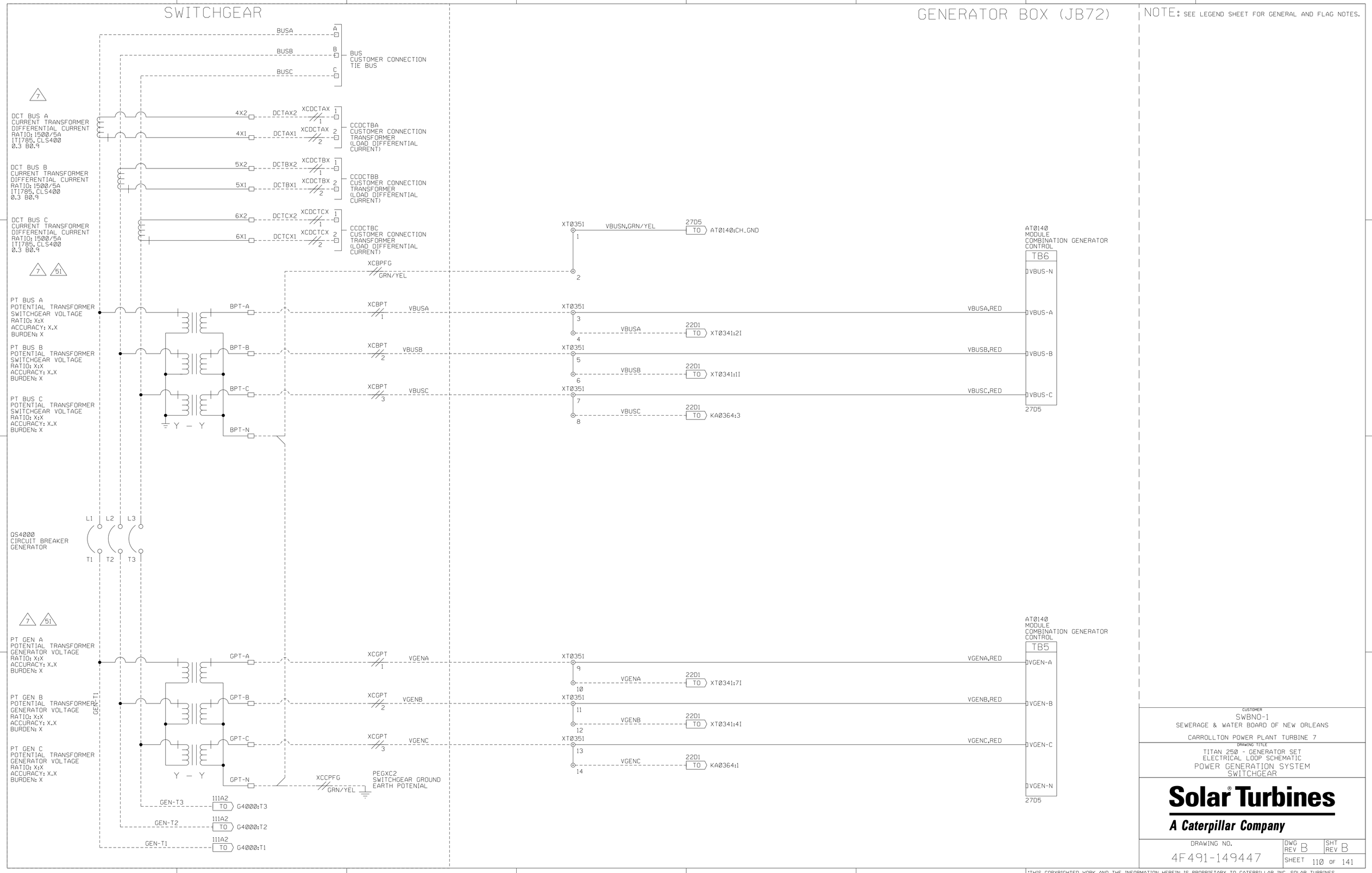
CARROLLTON POWER PLANT TURBINE 7

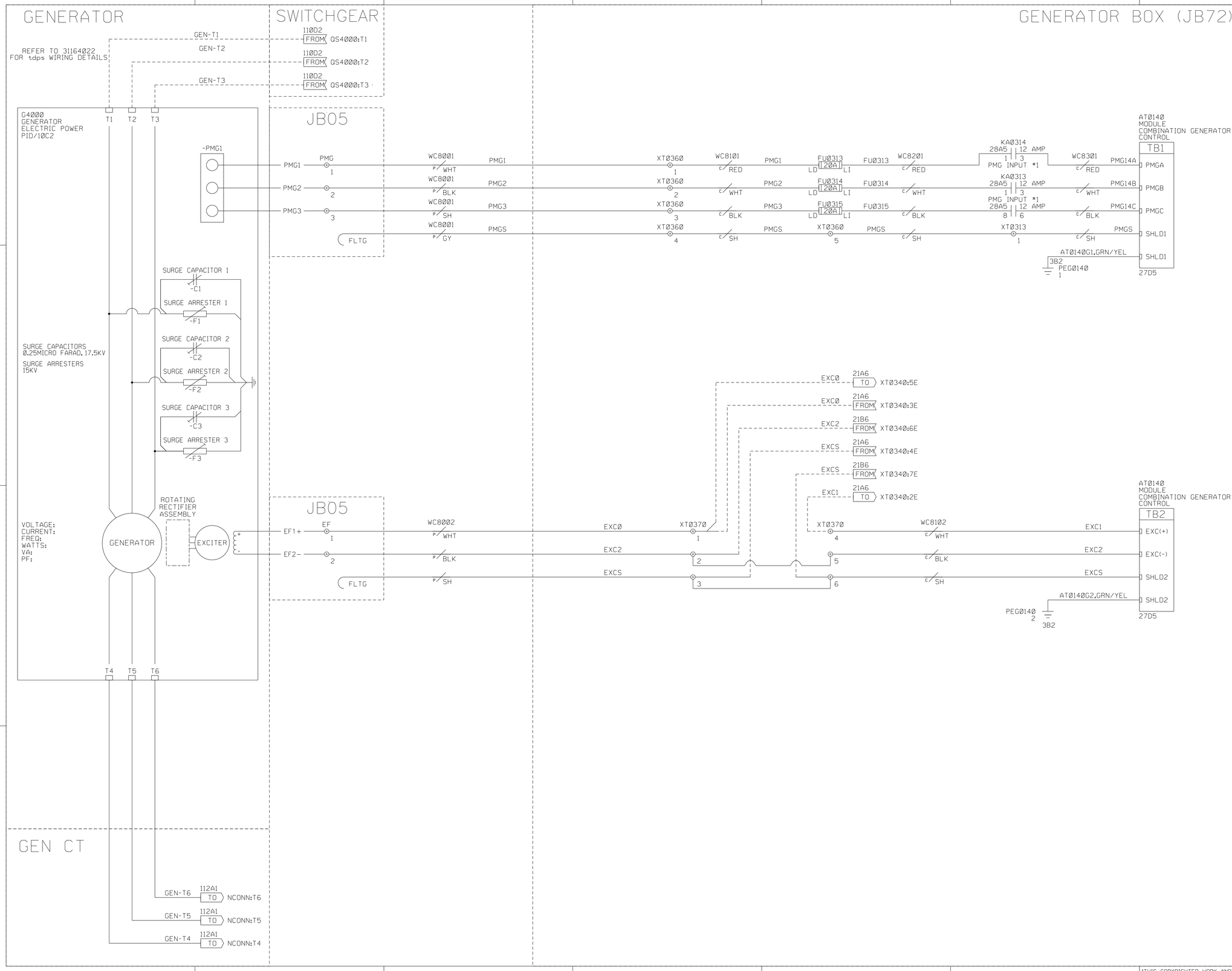
DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
LUBE OIL SUPPLY SYSTEM
TANK VENT

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 109 OF 141	

SWBNO-1





CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

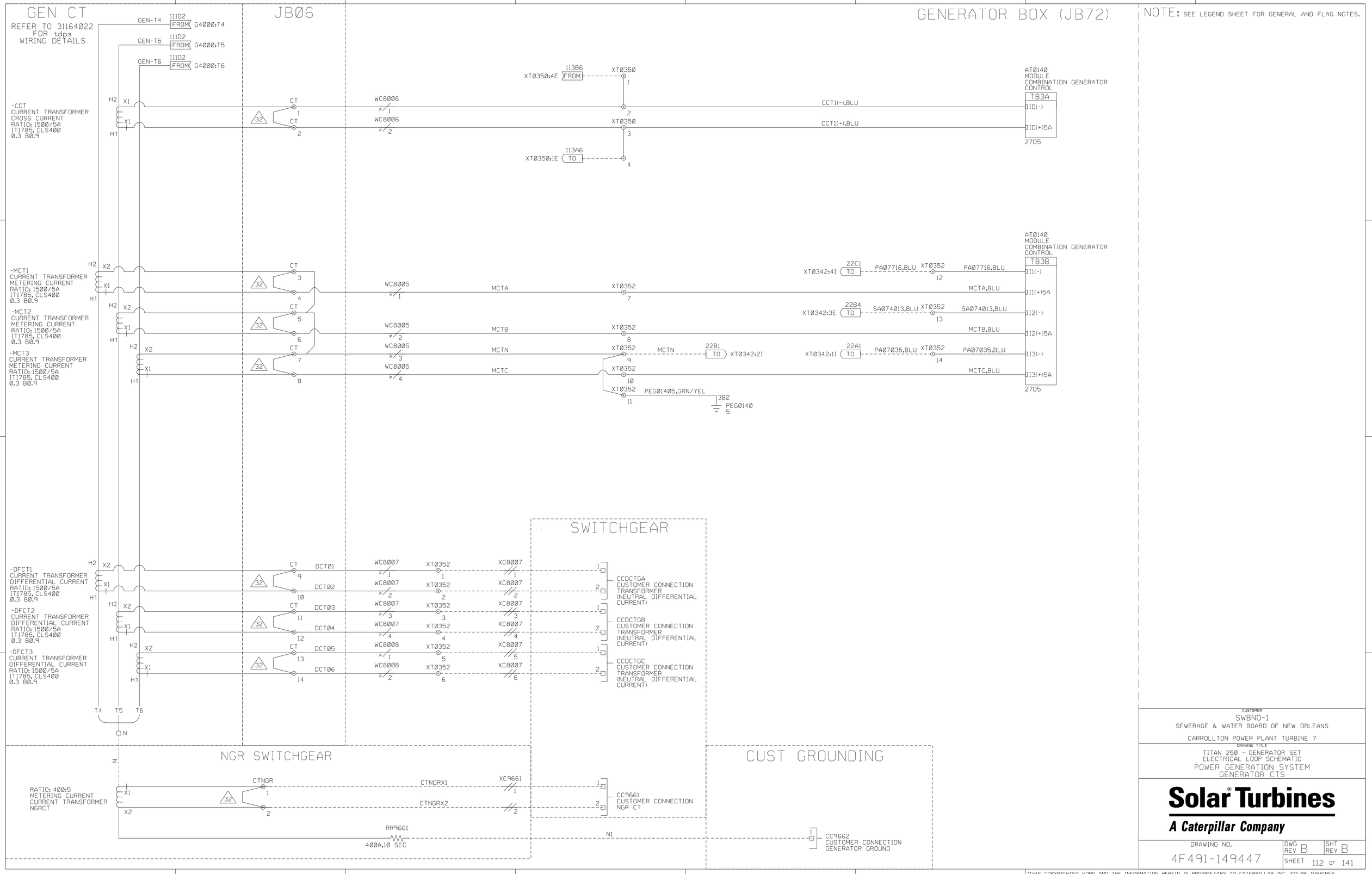
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
POWER GENERATION SYSTEM
GENERATOR

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 111 OF 141

SWBNO-1



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
POWER GENERATION SYSTEM
GENERATOR CTS

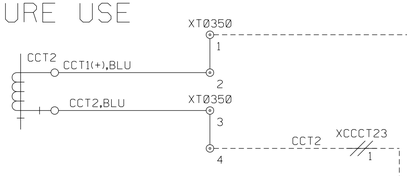
Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 112 OF 141	

SWBNO-1

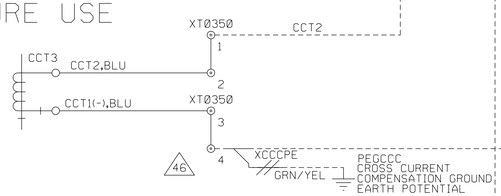
CROSS CURRENT COMPENSATION UNIT 2

FUTURE USE



CROSS CURRENT COMPENSATION UNIT 3

FUTURE USE



PDCS

XCCCT2 1 — CCT1(+) — 112A4 FROM XT0350:4I

XCCCT3 1 — CCT1(-) — 112A4 TO XT0350:1I

GENERATOR BOX (JB72)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
POWER GENERATION SYSTEM
LOAD SHARING

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 113 OF 141	

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

HAL6730
ACOUSTIC/VISUAL ALARM
FIRE SYSTEM DISCHARGE

TB2-2 — HAL67301 — WC5035 P/ BLU-PR1
TB2-1 — HAL67302 — WC5035 P/ BLK-PR1
TB3-2 — RR6730A2,WHT — RR6730A 10K OHM — RR6730A1,WHT — TB3-1

SWITCH #1: ON - 3, OFF - 1,2,4,5
SWITCH #2: OFF - 1,2,3,4,5

REMOVE JUMPERS LK1 AND LK2

TB1-2 — HAL67303 — WC5035 P/ BLU-PR2
TB1-1 — HAL67304 — WC5035 P/ BLK-PR2
TB1-4 — RR6730L4,WHT — RR6730L 10K OHM — RR6730L3,WHT — TB1-3

PID/13A6

AT0176
8 CHANNEL ED I/O
EAGLE QUANTUM PREMIER
9C5

- 22
- 23 — CHAN: 8, I/O TAG: HORN
- 24

AT0176
8 CHANNEL ED I/O
EAGLE QUANTUM PREMIER
9C5

- 1
- 2 — CHAN: 1, I/O TAG: STROBE #1
- 3

HL6710
VISUAL ALARM
FIRE SYSTEM DISCHARGE

TB1-2 — HL67101 — WC5036 P/ BLU
TB1-1 — HL67102 — WC5036 P/ BLK
TB1-4 — RR67104,WHT — RR6710 10K OHM — RR67103,WHT — TB1-3

PID/13A6

AT0176
8 CHANNEL ED I/O
EAGLE QUANTUM PREMIER
9C5

- 4
- 5 — CHAN: 2, I/O TAG: STROBE #2
- 6

CUSTOMER FIRE AND GAS SIGNALS

CCAT0170 CUSTOMER CONNECTION TROUBLE ALARM SIGNAL (DRY CONTACT: OPEN FOR TROUBLE AND CLOSED FOR NORMAL OPERATION)
CCKA0982 CUSTOMER CONNECTION FIRE DETECTED SIGNAL (CLOSED FOR NORMAL OPERATION)
CCKA0984 CUSTOMER CONNECTION GAS DETECTED SIGNAL (CLOSED FOR NORMAL OPERATION)

XC5038 1 — XT0170 18 — AT017045,WHT
XC5038 2 — XT0170 19 — AT017046,WHT

AT0170
CONTROLLER
EAGLE QUANTUM PREMIER
9A5

- 45
- 46 — CHAN: TR, I/O TAG: TROUBLE ALARM
- 47

XC5038 3 — XT0170 20 — KA017211,WHT
XC5038 4 — XT0170 21 — KA017212,WHT
KA0172 9B2 / 6 AMP / 11 / 12 — FIRE DETECTED (CUSTOMER)

XC5038 5 — XT0170 5 — KA017411,WHT
XC5038 6 — XT0170 6 — KA017412,WHT
KA0174 9C2 / 6 AMP / 11 / 12 — GAS DETECTED (CUSTOMER)

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
TURB PROTECTION & ACCESSIBILITY SYSTEM
FIRE SYSTEM ANNUNCIATION

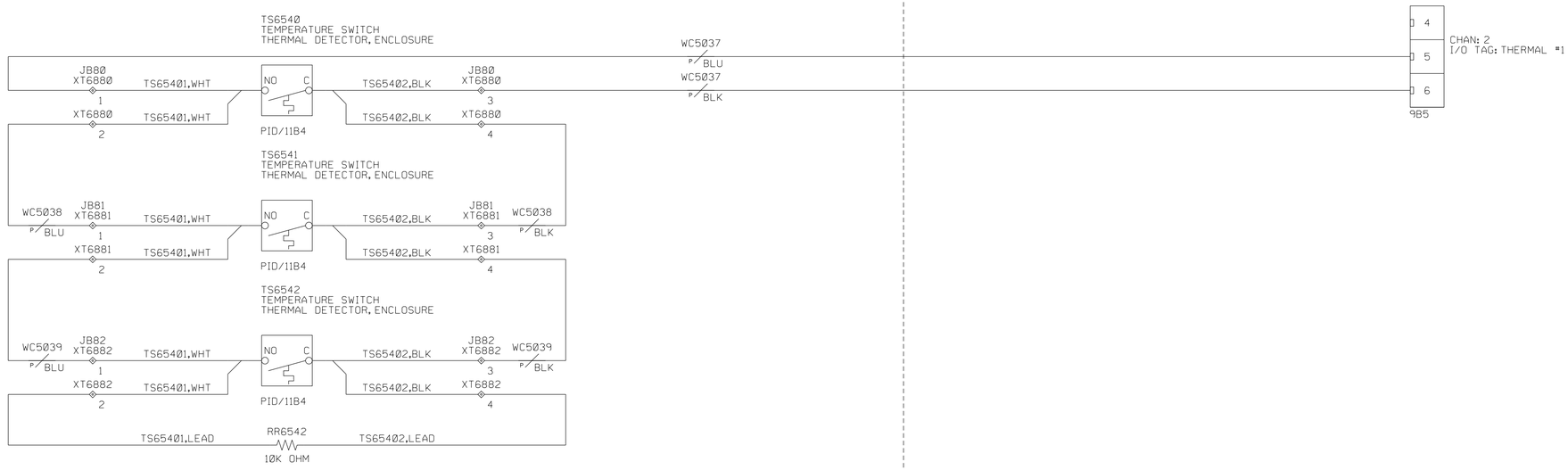
Solar® Turbines
A Caterpillar Company

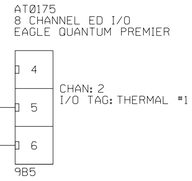
DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 114 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.





CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
TURB PROTECTION & ACCESSIBILITY SYSTEM
FIRE THERMAL DETECTORS

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 115 OF 141	

SWBNO-1

TURBINE BOX (JB7Ø)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

DTF6511
FIRE DETECTOR
MULTI-SPECTRUM (FIRE)

DTF6510
FIRE DETECTOR
MULTI-SPECTRUM (FIRE)

116B5 TO DTF6512:15 — WC5013 P/BLU-PR1 — DTF1A — COM*1 5 — COM*2 15 — WC5011 P/BLU-PR1 — DTF0A — COM*1 5 — COM*2 15 — WC5010 P/BLU-PR1 — LON0A — 124D7 FROM XT0172:4E
116B5 TO DTF6512:14 — WC5013 P/BLK-PR1 — DFT1B — 4 — 14 — WC5011 P/BLK-PR1 — DTF0B — 4 — 14 — WC5010 P/BLK-PR1 — LON0B — 124D7 FROM XT0172:5E
116B5 TO DTF6512:16 — WC5013 P/SH-PR1 — DTF1S1 — 6 — 16 — WC5011 P/SH-PR1 — DTF0S1 — 6 — 16 — WC5010 P/SH-PR1 — LON0S1 — 124D7 FROM XT0172:6E

SETTING: 81
OPEN: 2,3,4,6,8
CLOSED: 1,5,7

SETTING: 80
OPEN: 1,2,3,4,6,8
CLOSED: 5,7

116B5 TO DTF6512:12 — WC5013 P/BLU-PR2 — DTF1P — 2 — 12 — WC5011 P/BLU-PR2 — DTF0P — 2 — 12 — WC5010 P/BLU-PR2 — LON0P — XT0170 22 — LON0P,WHT
116B5 TO DTF6512:11 — WC5013 P/BLK-PR2 — DTF1N — 1 — 11 — WC5011 P/BLK-PR2 — DTF0N — 1 — 11 — WC5010 P/BLK-PR2 — LON0N — XT0170 23 — LON0N,WHT
116B5 TO DTF6512:13 — WC5013 P/SH-PR2 — DTF1S2 — 3 — 13 — WC5011 P/SH-PR2 — DTF0S2 — 3 — 13 — WC5010 P/SH-PR2 — LON0S0 — XT0170 24

PWR*1 PWR*2 PID/11B4 PID/11B3

DTF6513
FIRE DETECTOR
MULTI-SPECTRUM (FIRE)

DTF6512
FIRE DETECTOR
MULTI-SPECTRUM (FIRE)

116C5 TO DTF6514:15 — WC5016 P/BLU-PR1 — DTF5A — COM*1 5 — COM*2 15 — WC5015 P/BLU-PR1 — DTF4A — COM*1 5 — COM*2 15 — DTF1A — 116A1 FROM DTF6511:5
116C5 TO DTF6514:14 — WC5016 P/BLK-PR1 — DTF5B — 4 — 14 — WC5015 P/BLK-PR1 — DTF4B — 4 — 14 — DFT1B — 116A1 FROM DTF6511:4
116C5 TO DTF6514:16 — WC5016 P/SH-PR1 — DTF5S1 — 6 — 16 — WC5015 P/SH-PR1 — DTF4S1 — 6 — 16 — DTF1S1 — 116A1 FROM DTF6511:6

SETTING: 83
OPEN: 3,4,6,8
CLOSED: 1,2,5,7

SETTING: 82
OPEN: 1,3,4,6,8
CLOSED: 2,5,7

116C5 TO DTF6514:12 — WC5016 P/BLU-PR2 — DTF5P — 2 — 12 — WC5015 P/BLU-PR2 — DTF4P — 2 — 12 — DTF1P — 116A1 FROM DTF6511:2
116C5 TO DTF6514:11 — WC5016 P/BLK-PR2 — DTF5N — 1 — 11 — WC5015 P/BLK-PR2 — DTF4N — 1 — 11 — DTF1N — 116A1 FROM DTF6511:1
116C5 TO DTF6514:13 — WC5016 P/SH-PR2 — DTF5S2 — 3 — 13 — WC5015 P/SH-PR2 — DTF4S2 — 3 — 13 — DTF1S2 — 116A1 FROM DTF6511:3

PWR*1 PWR*2 PID/11B4 PID/11B4

UV0170
POWER SUPPLY
EAGLE QUANTUM PREMIER

FIELD
13(+)
14(-)
15(+)
16(-)
9A3

DTF6514
FIRE DETECTOR
MULTI-SPECTRUM (FIRE)

116D1 TO XT0172:22I — WC5017 P/BLU-PR1 — LON2A — COM*1 5 — COM*2 15 — DTF5A — 116B1 FROM DTF6513:5
116D1 TO XT0172:23I — WC5017 P/BLK-PR1 — LON2B — 4 — 14 — DTF5B — 116B1 FROM DTF6513:4
116D1 TO XT0172:24I — WC5017 P/SH-PR1 — LON2S1 — 6 — 16 — DTF5S1 — 116B1 FROM DTF6513:6

SETTING: 84
OPEN: 1,2,4,6,8
CLOSED: 3,5,7

116D1 TO XT0170:25I — WC5017 P/BLU-PR2 — LON2P — 2 — 12 — DTF5P — 116B1 FROM DTF6513:2
116D1 TO XT0170:26I — WC5017 P/BLK-PR2 — LON2N — 1 — 11 — DTF5N — 116B1 FROM DTF6513:1
116D1 TO XT0170:27I — WC5017 P/SH-PR2 — LON2S2 — 3 — 13 — DTF5S2 — 116B1 FROM DTF6513:3

PWR*1 PWR*2 PID/11B4

116C1 FROM DTF6514:2 — LON2P — XT0170 25 — LON2P.WHT
116C1 FROM DTF6514:1 — LON2N — XT0170 26 — LON2N.WHT
116C1 FROM DTF6514:3 — LON2S2 — XT0170 27

AT0170
CONTROLLER
EAGLE QUANTUM PREMIER

116C1 FROM DTF6514:5 — LON2A — XT0172 22 — LON2A — WC5018 C/WHT — 53
116C1 FROM DTF6514:4 — LON2B — XT0172 23 — LON2B — WC5018 C/BLK — 52
116C1 FROM DTF6514:6 — LON2S1 — XT0172 24 — LON2S1 — WC5018 C/SH — 51

CHAN: P7-2
I/O TAG: SCL/LON *2
9A5

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 25Ø - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
TURB PROTECTION & ACCESSIBILITY SYSTEM
ENCLOSURE FLAME DETECTION

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 116 OF 141

SWBNO-1

FIRE SUPPRESSION CABINET

SV6611
SOLENOID VALVE
PRIMARY RELEASE #1
CO2

SV66111,YEL — TB3 XT6610 1 — WC5760 P/ WHT-PR1 — TB1 XT6611 1
SV66112,YEL — XT6610 2 — WC5760 P/ BLK-PR1 — XT6611 2

PID/12B3

XCSVPR1 1
XCSVPR1 2

KA6510
33A5 | | 6 AMP
11 | | 12
FIRE SYSTEM AUTO/INHIBIT

KA651012,WHT

TURBINE BOX (JB70)

AT0175
8 CHANNEL ED I/O
EAGLE QUANTUM PREMIER

10
11 — CHAN: 4 I/O TAG: PRIMARY #1
12

9B5

AT0175
8 CHANNEL ED I/O
EAGLE QUANTUM PREMIER

RR0175S5
10K OHM

AT017514,WHT
AT017515,WHT

13
14 — CHAN: 5 I/O TAG: SPARE
15

9B5

AT0176
8 CHANNEL ED I/O
EAGLE QUANTUM PREMIER

RR0176S4
10K OHM

AT017611,WHT
AT017612,WHT

10
11 — CHAN: 4 I/O TAG: SPARE
12

9C5

SV6612
SOLENOID VALVE
PRIMARY RELEASE #2
CO2

SV66121,YEL — TB3 XT6610 3 — WC5760 P/ WHT-PR2 — TB1 XT6611 3
SV66122,YEL — XT6610 4 — WC5760 P/ BLK-PR2 — XT6611 4

PID/12B4

XCSVPR2 1
XCSVPR2 2

KA6511
33A5 | | 6 AMP
21 | | 22
FIRE SYSTEM AUTO/INHIBIT

KA651122,WHT

AT0176
8 CHANNEL ED I/O
EAGLE QUANTUM PREMIER

16
17 — CHAN: 6 I/O TAG: PRIMARY #2
18

9C5

AT0176
8 CHANNEL ED I/O
EAGLE QUANTUM PREMIER

RR0176S7
10K OHM

AT017620,WHT
AT017621,WHT

19
20 — CHAN: 7 I/O TAG: SPARE
21

9C5

AT0176
8 CHANNEL ED I/O
EAGLE QUANTUM PREMIER

RR0176S5
10K OHM

AT017614,WHT
AT017615,WHT

13
14 — CHAN: 5 I/O TAG: SPARE
15

9C5

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
TURB PROTECTION & ACCESSIBILITY SYSTEM
FIRE SUPPRESSION STORAGE AND RELEASE

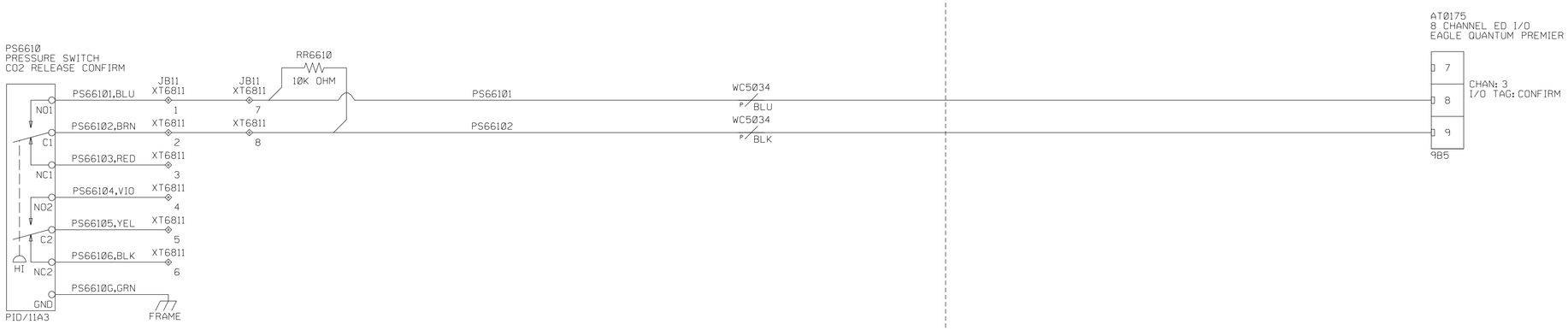
Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 117 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
TURB PROTECTION & ACCESSIBILITY SYSTEM
CO2 RELEASE CONFIRMATION

Solar® Turbines
A Caterpillar Company

DRAWING NO.
4F491-149447

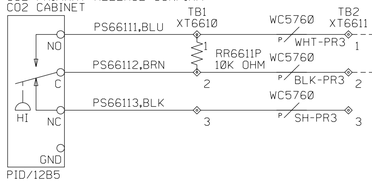
DWG REV B | SHT REV B

SHEET 118 OF 141

SWBNO-1

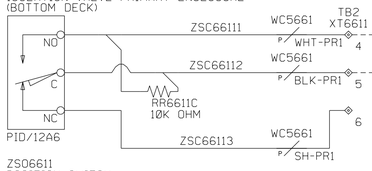
⚠8 FIRE SUPPRESSION CABINET

PS6611
PRESSURE SWITCH
CO2 PRIMARY RELEASE CONFIRM
CO2 CABINET



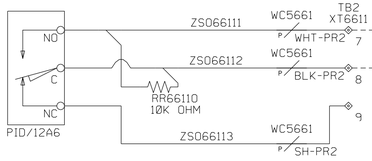
PID/12B5

ZSC6611
POSITION SWITCH
ISOLATION VALVE PRIMARY ENCLOSURE
(BOTTOM DECK)



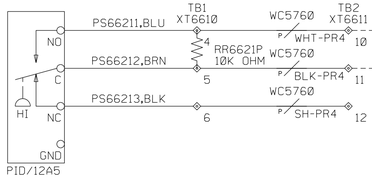
PID/12A6

ZSO6611
POSITION SWITCH
ISOLATION VALVE PRIMARY VENT (TOP DECK)



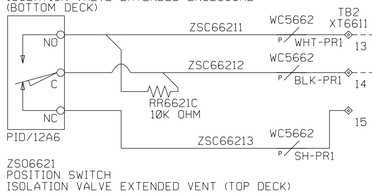
PID/12A6

PS6621
PRESSURE SWITCH
CO2 EXTENDED RELEASE CONFIRM



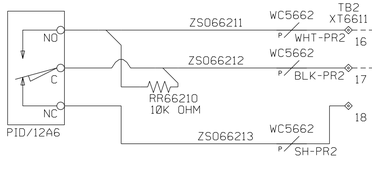
PID/12A5

ZSC6621
POSITION SWITCH
ISOLATION VALVE EXTENDED ENCLOSURE
(BOTTOM DECK)



PID/12A6

ZSO6621
POSITION SWITCH
ISOLATION VALVE EXTENDED VENT (TOP DECK)



PID/12A6

TURBINE BOX (JB70)

PS66111	XCPSPC1 1	AT0178 8 CHANNEL ED I/O EAGLE QUANTUM PREMIER 9D5	13 / 14 / 15 — CHAN: 5 I/O TAG: PRIMARY CONFIRM
PS66112	XCPSPC1 2		
ZSC66111	XCZSPE1 1	AT0178 8 CHANNEL ED I/O EAGLE QUANTUM PREMIER 9D5	1 / 2 / 3 — CHAN: 1 I/O TAG: PRIMARY ENCLOSURE
ZSC66112	XCZSPE1 2		
ZSO66111	XCZSPV1 1	AT0178 8 CHANNEL ED I/O EAGLE QUANTUM PREMIER 9D5	4 / 5 / 6 — CHAN: 2 I/O TAG: PRIMARY VENT
ZSO66112	XCZSPV1 2		
PS66211	XCPSEC1 1	AT0178 8 CHANNEL ED I/O EAGLE QUANTUM PREMIER 9D5	16 / 17 / 18 — CHAN: 6 I/O TAG: EXTENDED CONFIRM
PS66212	XCPSEC1 2		
ZSC66211	XCZSEE1 1	AT0178 8 CHANNEL ED I/O EAGLE QUANTUM PREMIER 9D5	7 / 8 / 9 — CHAN: 3 I/O TAG: EXTENDED ENCLOSURE
ZSC66212	XCZSEE1 2		
ZSO66211	XCZSEV1 1	AT0178 8 CHANNEL ED I/O EAGLE QUANTUM PREMIER 9D5	10 / 11 / 12 — CHAN: 4 I/O TAG: EXTENDED VENT
ZSO66212	XCZSEV1 2		

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
TURB PROTECTION & ACCESSIBILITY SYSTEM
CO2 ISOLATION VALVES

Solar® Turbines
A Caterpillar Company

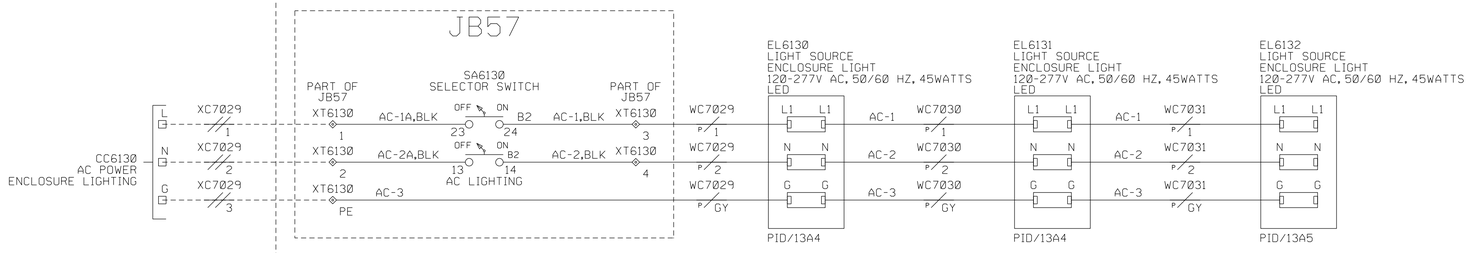
DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 119 OF 141	

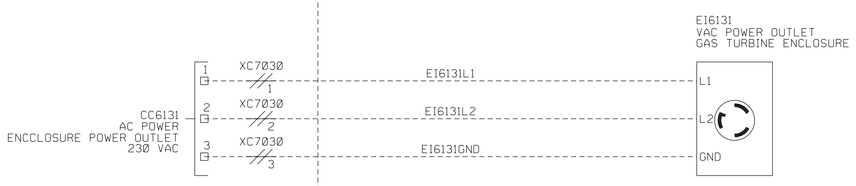
SWBNO-1

BOP EER AC PWR

ENCLOSURE INTERIOR

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.





CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

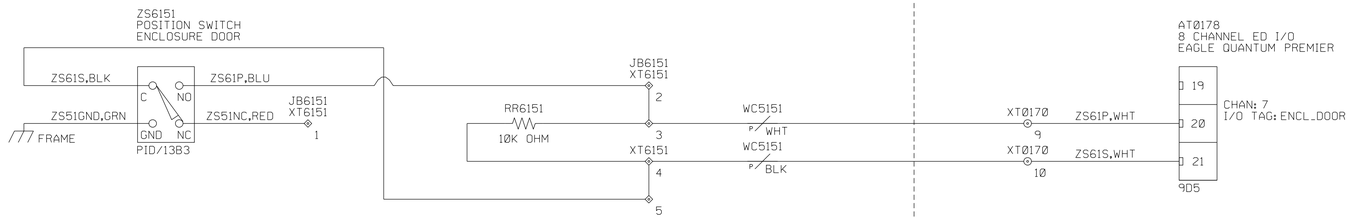
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
TURB PROTECTION & ACCESSIBILITY SYSTEM
ENCLOSURE INTERIOR LIGHTS

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV B	SHT REV B
4F491-149447	SHEET 120 OF 141	

SWBNO-1



TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

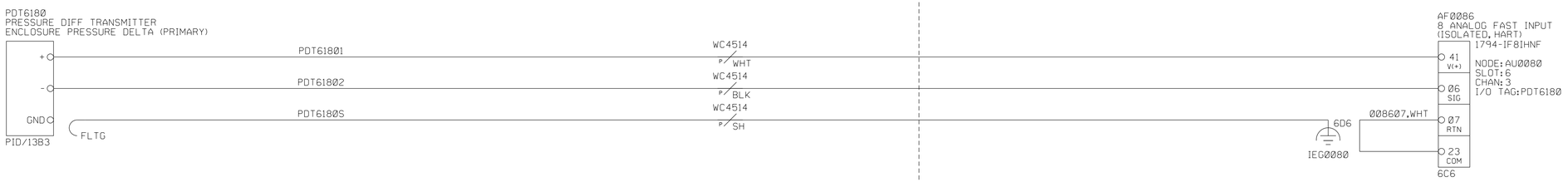
DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
TURB PROTECTION & ACCESSIBILITY SYSTEM
ENCLOSURE INTERIOR DOOR SWITCHES

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 121 OF 141

SWBNO-1

TURBINE BOX (JB70)



NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
TURB PROTECTION & ACCESSIBILITY SYSTEM
ENCLOSURE INTERIOR PRESSURE

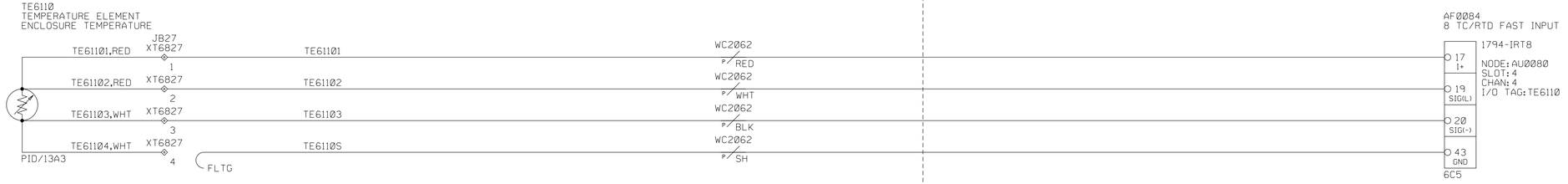
Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 122 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

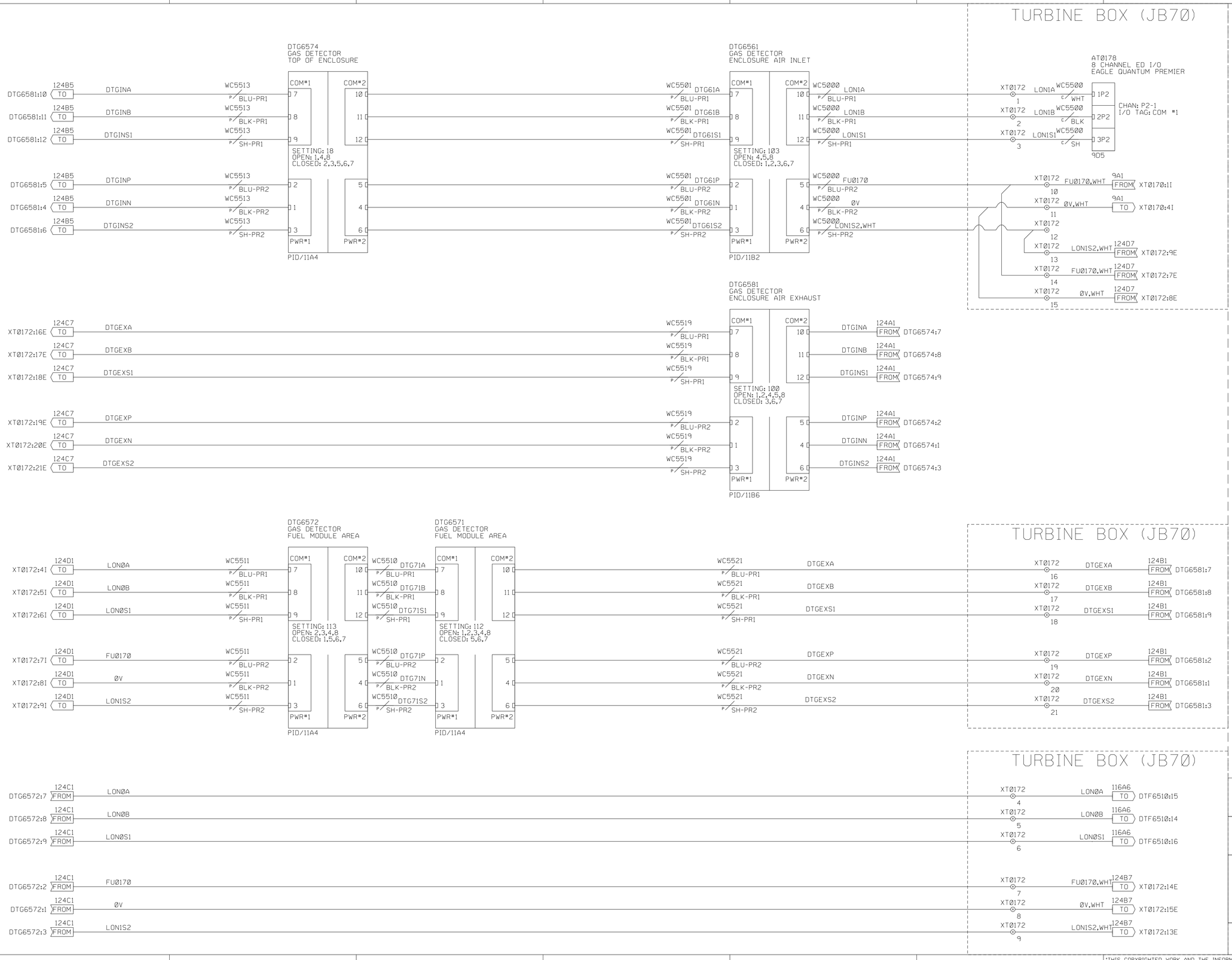
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
TURB PROTECTION & ACCESSIBILITY SYSTEM
ENCLOSURE INTERIOR TEMPERATURE

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV B	SHT REV B
4F491-149447	SHEET 123 OF 141	

SWBNO-1



NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
TURB PROTECTION & ACCESSIBILITY SYSTEM
ENCLOSURE & FUEL MODULE GAS DETECTION

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 124 OF 141

SWBNO-1

ANCILLARY

PDT6210
PRESSURE DIFF TRANSMITTER
ENCLOSURE VENT FILTER

PDT62101 → XCVFDP1 / 1 → AF0085 pin 39 V(+)
PDT62102 → XCVFDP1 / 2 → AF0085 pin 04 SIG
PDT62103 → XCVFDP1 / SH → AF0085 pin 05 RTN

+ PDT62101
- PDT62102
GND PDT62103
FLTG

PID/13A1

TURBINE BOX (JB70)

AF0085
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF

39 V(+)
04 SIG
05 RTN
21 COM

NODE: AU0080
SLOT: 5
CHAN: 2
I/O TAG: PDT6210

008505.WHT

6D6
IEG0080

6C5

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
TURB PROTECTION & ACCESSIBILITY SYSTEM
ENCLOSURE VENTILATION FILTER

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 125 OF 141

SWBNO-1

ENCLOSURE VENT FANS

EER MCC AC CONTACTOR

BOP EER AC PWR

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

M6211
MOTOR
VENTILATION FAN, DRIVER #1, INLET

GND
H1
H2
T1(U)
T2(V)
T3(W)
CASE
PID/13A2
M6211,GRN/YEL
FRAME

M6211HG
M6211H1
M6211H2
M6211G
M62111
M62112
M62113

XCM6211H 1 GND
XCM6211H 2 H1
XCM6211H 3 H2
XCM6211M 1 GND
XCM6211M 2 T1(U)
XCM6211M 3 T2(V)
XCM6211M 4 T3(W)

KM6211
CONTACTOR RELAY
DRIVER VENTILATION FAN #1

KM6211J,RED
SA+ EN+
FULL VOLTAGE
SA- EN-
AUX
1P-L1
1P-L2
3P-L1
3P-L2
3P-L3

XCKM6211E 1
XCKM6211E 2
XCKM6211H 1
XCKM6211H 2
XCKM6211M 1
XCKM6211M 2
XCKM6211M 3

KM6211EP
KM6211EN
KM6211H1
KM6211H2
KM6211M1
KM6211M2
KM6211M3

CCM6211H
CUSTOMER CONNECTION
SINGLE PHASE AC BUS

CCM6211M
CUSTOMER CONNECTION
THREE PHASE AC BUS

XCIT6211 1
XCIT6211 2
XCIT6211 SH

IT6211P
IT6211N
IT6211S

PID/13A2
NOTE: REMOVE JUMPER TO READ 0-100AMPS MOTOR

IT6211
CURRENT TRANSMITTER
MONITOR VENTILATION
FAN, DRIVER #1

FLTG

KA6211
A6 | 6 AMP
11 | 14
DRIVER ENCLOSURE
VENT FAN #1

AF0092
16 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB16P

KA017611,WHT
KA0176
B5 | 6 AMP
11 | 14
VENTILATION REQUIRED
009239,WHT
39 V+
009204,WHT
04 SIG
009221,WHT
21 COM
6A3

NODE: AU0090
SLOT: 2
CHAN: 4
I/O TAG: M6211

XT0171 2
VD6211
XT0171 4

KA0246
19D2 | 6 AMP
11 | 14
NO FIRE DETECTED
KA6211A1,WHT
KA6211
A1 A2
DRIVER ENCLOSURE
VENT FAN #1

KA014422,WHT
KA0144
18C6 | 6 AMP
22 | 21
AC PRE/POST PUMP DRIVE
KA0232
19D6 | 6 AMP
22 | 21
CONTROLLER ACTIVE
FU0170,WHT
9A1
FROM
XT0170:21

KA0249
19D2 | 6 AMP
12 | 11
NO GAS DETECTED

KA0176
A1 A2
VENTILATION REQUIRED
0V,WHT
9A1
TO
XT0170:31

KA0177
A1 A2
VENTILATION REQUIRED
0V,WHT

AF0073
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF

43 V(+)
08 SIG
09 RTN
25 COM
7A4

NODE: AU0070
SLOT: 3
CHAN: 4
I/O TAG: IT6211

007309,WHT
7B3
IEG0070

11-14 21-24
A5
11-12 21-22

11-14 21-24
A6 C6
11-12 21-22

11-14 21-24
127C6
11-12 21-22

KM6241
CONTACTOR RELAY
EXHAUST VENTILATION FAN #1

KM6241J,RED
SA+ EN+
FULL VOLTAGE
SA- EN-
AUX
1P-L1
1P-L2
3P-L1
3P-L2
3P-L3

XCKM6241E 1
XCKM6241E 2
XCKM6241H 1
XCKM6241H 2
XCKM6241M 1
XCKM6241M 2
XCKM6241M 3

KM6241EP
KM6241EN
KM6241H1
KM6241H2
KM6241M1
KM6241M2
KM6241M3

CCM6241H
CUSTOMER CONNECTION
SINGLE PHASE AC BUS

CCM6241M
CUSTOMER CONNECTION
THREE PHASE AC BUS

XCIT6241 1
XCIT6241 2
XCIT6241 SH

IT6241P
IT6241N
IT6241S

PID/13A6
NOTE: REMOVE JUMPER TO READ 0-100AMPS MOTOR

IT6241
CURRENT TRANSMITTER
MONITOR VENTILATION
FAN, DRIVER #1

FLTG

M6241
MOTOR
VENTILATION FAN, DRIVER #1
EXHAUST

M6241HG
M6241H1
M6241H2
M6241G
M62411
M62412
M62413

XCM6241H 1 GND
XCM6241H 2 H1
XCM6241H 3 H2
XCM6241M 1 GND
XCM6241M 2 T1(U)
XCM6241M 3 T2(V)
XCM6241M 4 T3(W)

KA6241
C6 | 6 AMP
11 | 14
EXHAUST ENCLOSURE
VENT FAN #1

AF0091
16 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB16P

KA024421,WHT
KA0176
B5 | 6 AMP
21 | 24
VENTILATION REQUIRED
009149,WHT
49 V+
009114,WHT
14 SIG
009131,WHT
31 COM
6A3

NODE: AU0090
SLOT: 1
CHAN: 14
I/O TAG: M6241

XT0171 1
VD6241
XT0171 3

KA0244
19D2 | 6 AMP
21 | 24
NO FIRE DETECTED
KA6241A1,WHT
KA6241
A1 A2
EXHAUST ENCLOSURE
VENT FAN #1

11-14 21-24
C5
11-12 21-22

AF0073
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF

47 V(+)
12 SIG
13 RTN
29 COM
7A4

NODE: AU0070
SLOT: 3
CHAN: 6
I/O TAG: IT6241

007313,WHT
7B3
IEG0070

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
TURB PROTECTION & ACCESSIBILITY SYSTEM
ENCLOSURE PRIMARY VENTILATION FANS

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 126 OF 141

SWBNO-1

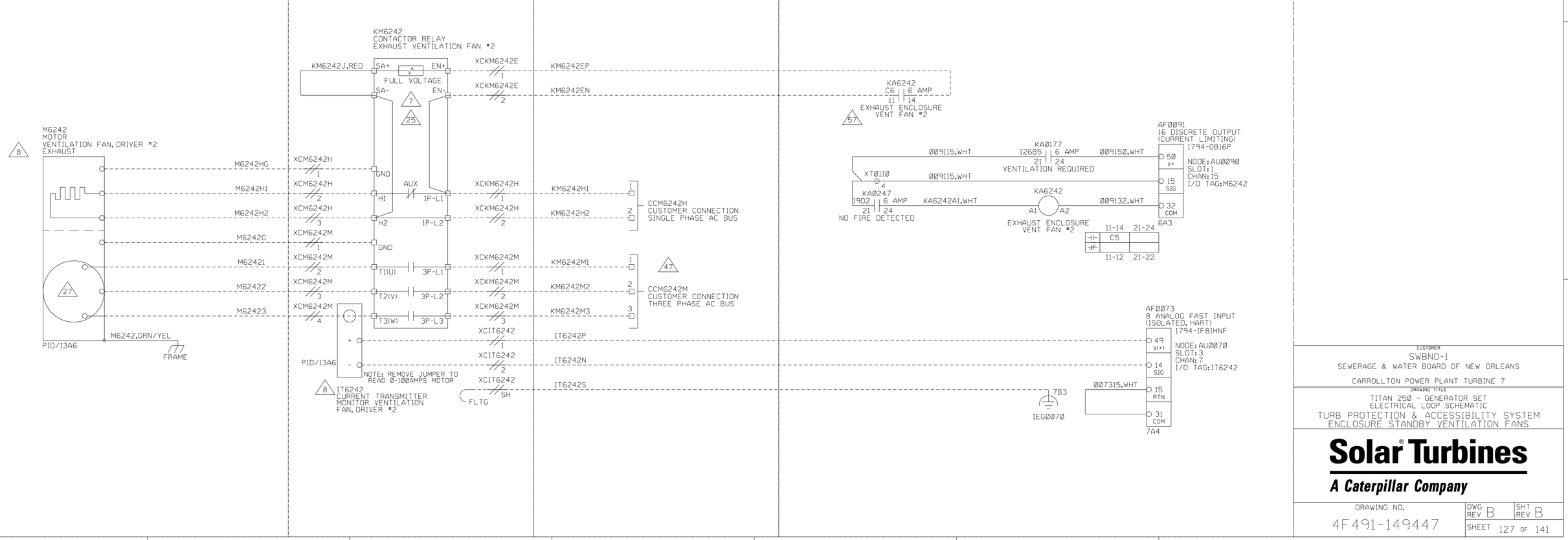
ENCLOSURE VENT FANS

EER MCC AC CONTACTOR

BOP EER AC PWR

TURBINE BOX (JB7Ø)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
TURB PROTECTION & ACCESSIBILITY SYSTEM
ENCLOSURE STANDBY VENTILATION FANS

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 127 OF 141

SWBNO-1

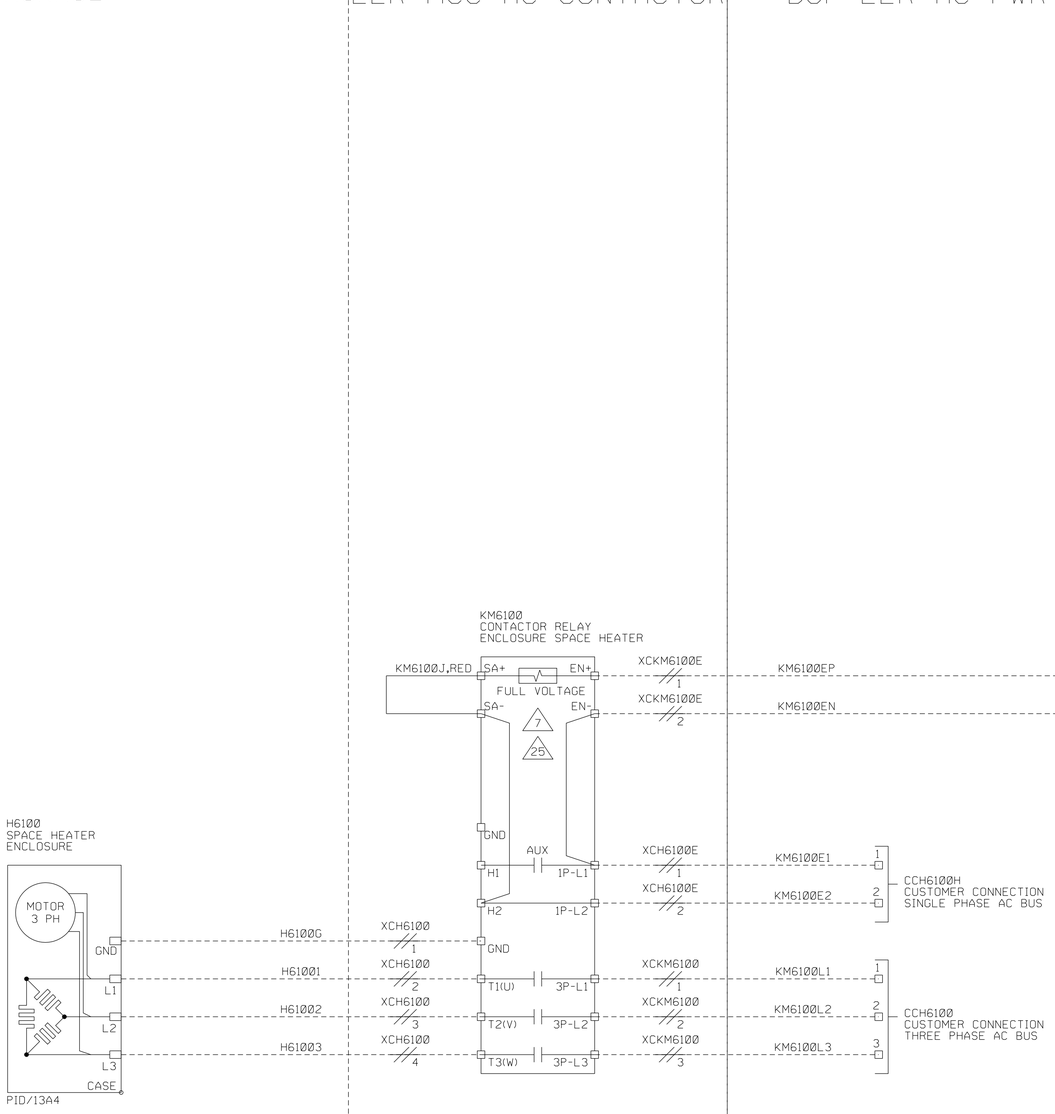
PACKAGE

EER MCC AC CONTACTOR

BOP EER AC PWR

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
TURB PROTECTION & ACCESSIBILITY SYSTEM
ENCLOSURE INTERIOR TEMPERATURE

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 128 OF 141	

SWBNO-1

ANCILLARY

PDT6310
PRESSURE DIFF TRANSMITTER
TURBINE AIR INLET FILTER

△8

\+
\-
GND

PDT63101
PDT63102
PDT6310S

FLTG

PID/13C1

XCAIF0 1
XCAIF0 2
XCAIF0 SH

TURBINE BOX (JB70)

AF0086
8 ANALOG FAST INPUT
(ISOLATED, HART)
1794-IF8IHNF

39 V(+)
04 SIG
05 RTN
21 COM

NODE: AU0080
SLOT: 6
CHAN: 2
I/O TAG: PDT6310

6C6

008605.WHT

6D6

IEG0080

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
TURBINE AIR INLET & EXHAUST SYSTEM
ANCILLARY

Solar® Turbines
A Caterpillar Company

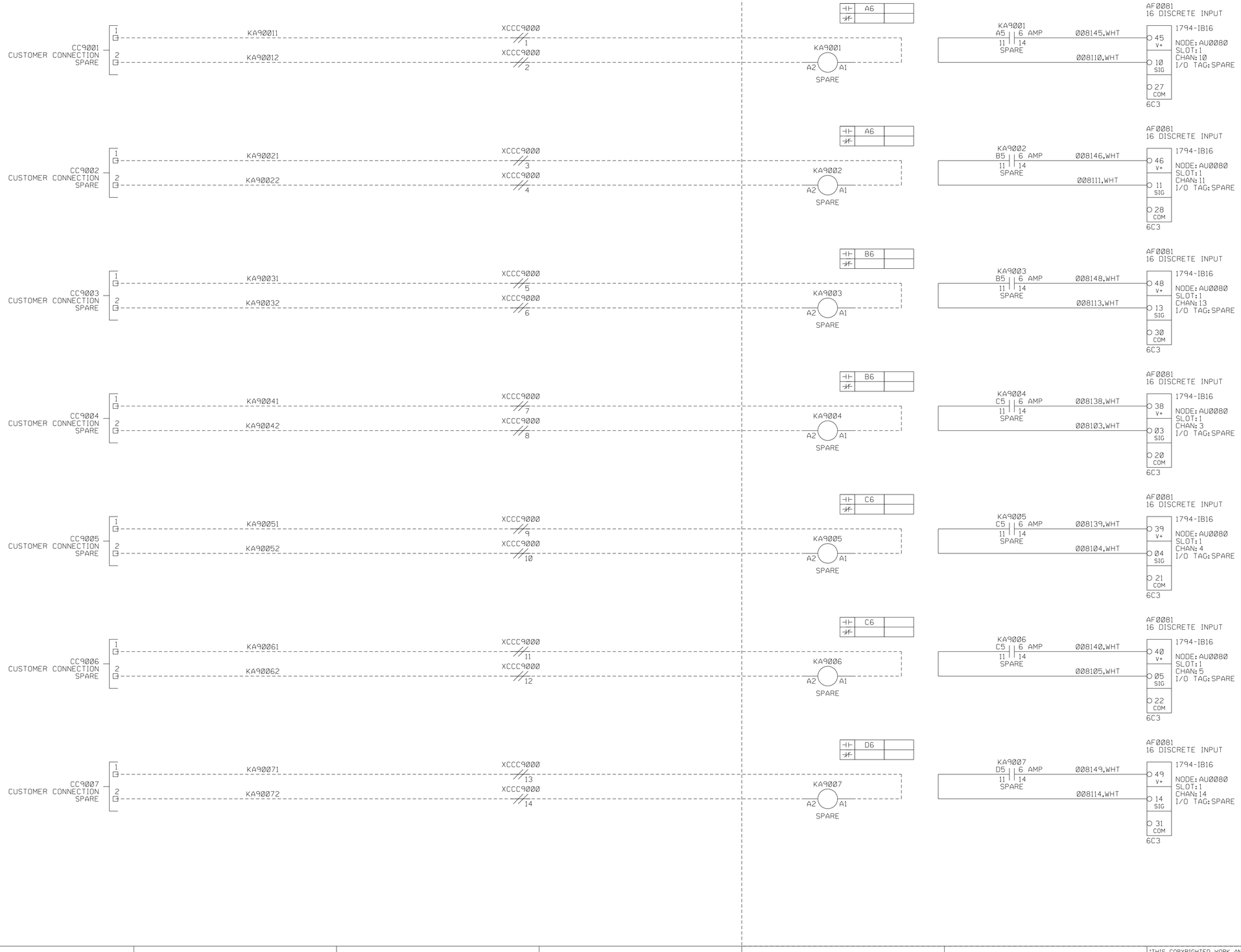
DRAWING NO.
4F491-149447

DWG REV B
SHT REV B
SHEET 129 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.



CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS
CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CUSTOMER DRY CONTACTS

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV A
SHEET 130 OF 141

SWBNO-1

TURBINE BOX (JB70)

NOTE: SEE LEGEND SHEET FOR GENERAL AND FLAG NOTES.

CC9011
CUSTOMER CONNECTION
SPARE
1 KA90111 → XCCC9000 15
2 KA90112 → XCCC9000 16

KA9011
A6 | 6 AMP
11 | 14
SPARE

A5

AF0092
16 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB16P
35 V+
00 SIG
17 COM
NODE: AU0090
SLOT: 2
CHAN: 0
I/O TAG: SPARE
6A3

KA9011
A2 A1
SPARE
009200,WHT
009217,WHT

CC9012
CUSTOMER CONNECTION
SPARE
1 KA90121 → XCCC9000 17
2 KA90122 → XCCC9000 18

KA9012
A6 | 6 AMP
11 | 14
SPARE

B5

AF0061
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
36 V+
02 SIG
18 COM
NODE: AU0060
SLOT: 1
CHAN: 1
I/O TAG: SPARE
7C3

KA9012
A2 A1
SPARE
006102,WHT
006118,WHT

CC9013
CUSTOMER CONNECTION
SPARE
1 KA90131 → XCCC9000 19
2 KA90132 → XCCC9000 20

KA9013
B6 | 6 AMP
11 | 14
SPARE

B5

AF0061
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
38 V+
06 SIG
20 COM
NODE: AU0060
SLOT: 1
CHAN: 3
I/O TAG: SPARE
7C3

KA9013
A2 A1
SPARE
006106,WHT
006120,WHT

CC9014
CUSTOMER CONNECTION
SPARE
1 KA90141 → XCCC9001 1
2 KA90142 → XCCC9001 2

KA9014
C6 | 6 AMP
11 | 14
SPARE

C5

AF0061
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
39 V+
08 SIG
21 COM
NODE: AU0060
SLOT: 1
CHAN: 4
I/O TAG: SPARE
7C3

KA9014
A2 A1
SPARE
006108,WHT
006121,WHT

CC9015
CUSTOMER CONNECTION
SPARE
1 KA90151 → XCCC9001 3
2 KA90152 → XCCC9001 4

KA9015
C6 | 6 AMP
11 | 14
SPARE

C5

AF0061
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
40 V+
10 SIG
22 COM
NODE: AU0060
SLOT: 1
CHAN: 5
I/O TAG: SPARE
7C3

KA9015
A2 A1
SPARE
006110,WHT
006122,WHT

CC9016
CUSTOMER CONNECTION
SPARE
1 KA90161 → XCCC9001 5
2 KA90162 → XCCC9001 6

KA9016
D6 | 6 AMP
11 | 14
SPARE

D5

AF0061
8 DISCRETE OUTPUT
(CURRENT LIMITING)
1794-OB8EP
41 V+
12 SIG
23 COM
NODE: AU0060
SLOT: 1
CHAN: 6
I/O TAG: SPARE
7C3

KA9016
A2 A1
SPARE
006112,WHT
006123,WHT

CUSTOMER
SWBNO-1
SEWERAGE & WATER BOARD OF NEW ORLEANS

CARROLLTON POWER PLANT TURBINE 7

DRAWING TITLE
TITAN 250 - GENERATOR SET
ELECTRICAL LOOP SCHEMATIC
CUSTOMER DRY CONTACTS

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV B	SHT REV A
4F491-149447	SHEET 131 OF 141	

SWBNO-1

Table of Contents (ELS)

Solar® Turbines
A Caterpillar Company

DRAWING NO.	DWG REV	SHT REV
4F491-149447	B	B
	SHEET 132 OF 141	

SWBNO-1

Table of Contents (ELS)

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 133 OF 141

SWBNO-1

DEVICE ID	# USED	ON SHEET(S)	CATEGORY
CT	14	112	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
CTNGR	2	112	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
EF	2	111	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
PE	2	98	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),RAIL GROUND
PMG	3	111	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
RTD1	18	96	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
RTD2	6	97	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
SH	10	99	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
VT	4	98	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0011	5	16	TERMINAL BLOCK,SPRING,2 CONDUCTOR,14-4 AWG (2.08-21.15 MM2),NON-IS
XT0014	1	16	TERMINAL BUS,POWER FEED,SCREW,10-1/0 AWG (5.26-53.48 MM2)
XT0015	2	16	TERMINAL BLOCK,SPRING,2 CONDUCTOR,14-4 AWG (2.08-21.15 MM2),NON-IS
XT0032	4	16	TERMINAL BLOCK,SPRING,2 CONDUCTOR,14-4 AWG (2.08-21.15 MM2),NON-IS
XT0033	4	16	TERMINAL BLOCK,SPRING,2 CONDUCTOR,14-4 AWG (2.08-21.15 MM2),NON-IS
XT0050	3	8	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0060	5	7,20,63-64	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0070	1	7	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0080	3	6	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0085	3	16	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0090	2	6	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0110	5	24,127	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0112	2	24	TERMINAL BLOCK,SCREW,2 CONDUCTOR,26-12 AWG (0.13-3.31 MM2),NON-IS
XT0120	2	26	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0130	3	26	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0134	4	17	TERMINAL BLOCK,SPRING,2 CONDUCTOR,14-4 AWG (2.08-21.15 MM2),NON-IS
XT0135	3	17	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0136	12	18,101,104	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0137	6	34-35	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0138	4	17	TERMINAL BLOCK,SPRING,2 CONDUCTOR,14-4 AWG (2.08-21.15 MM2),NON-IS
XT0139	4	17,19	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0141	2	26	TERMINAL BLOCK,SCREW,2 CONDUCTOR,26-12 AWG (0.13-3.31 MM2),NON-IS
XT0170	25	9,33,114,116,121	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0171	15	33,126	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0172	24	116,124	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0180	2	12	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0233	4	17,20	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0235	4	17,20	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0236	5	34	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0237	2	20,34	TERMINAL BLOCK,DIODE,SPRING,2 CONDUCTOR,26-10 AWG (0.13-5.26 MM2),NON-IS
XT0240	12	19	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0313	1	111	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0332	1	25	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0334	2	25	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0335	3	25	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0336	4	25	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0337	18	29-30,113	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0340	7	21	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0341	7	22	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0342	4	22	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0343	4	21	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0345	6	14	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0350	4	112	TERMINAL BLOCK,SPRING,2 CONDUCTOR,14-4 AWG (2.08-21.15 MM2),NON-IS
XT0350	4	113	TERMINAL BLOCK,SPRING,2 CONDUCTOR,14-4 AWG (2.08-21.15 MM2),NON-IS
XT0351	14	110	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0352	14	112	TERMINAL BLOCK,SPRING,2 CONDUCTOR,14-4 AWG (2.08-21.15 MM2),NON-IS
XT0355	3	99	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0360	5	111	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0370	6	111	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0400	3	24	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),RAIL GROUND
XT0500	2	26	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),RAIL GROUND
XT0561	4	12	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0562	4	12	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0563	6	14	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0564	5	14	TCP ASSEMBLY
XT0680	2	5	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0700	2	11	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT0702	2	11	TERMINAL BLOCK,SPRING,4 CONDUCTOR,30-12 AWG (0.05-3.31 MM2),NON-IS
XT1420	2	50	COMMON PART TO DRIVER
XT1761	4	24-25	COMMON PART TO DRIVER
XT18108	2	43	COMMON PART TO DRIVER
XT18110	4	45	COMMON PART TO DRIVER
XT18111	4	45	COMMON PART TO DRIVER
XT1816	3	41	COMMON PART TO DRIVER
XT1817	10	89	COMMON PART TO DRIVER
XT18171	6	90	COMMON PART TO DRIVER
XT1818	6	89	COMMON PART TO DRIVER
XT1824	4	45	COMMON PART TO DRIVER
XT1832	15	90,92	COMMON PART TO DRIVER
XT1850	25	42	COMMON PART TO DRIVER
XT1851	2	42	COMMON PART TO DRIVER
XT1852	25	44	COMMON PART TO DRIVER
XT1853	2	44	COMMON PART TO DRIVER
XT1855	32	46-47,49	COMMON PART TO DRIVER
XT1892	16	48	COMMON PART TO DRIVER
XT2200	10	70	

DEVICE ID	# USED	ON SHEET(S)	CATEGORY
XT2220	6	74	COMMON PART TO DRIVER
XT2222	6	75	COMMON PART TO DRIVER
XT2240	11	77	COMMON PART TO DRIVER
XT2610	6	84	COMMON PART TO DRIVER
XT2614	2	84	COMMON PART TO DRIVER
XT2809	4	59,61	COMMON PART TO DRIVER
XT2812	16	51,63-66	COMMON PART TO DRIVER
XT28121	50	59,61	COMMON PART TO DRIVER
XT28122	25	43	COMMON PART TO DRIVER
XT2831	4	58	COMMON PART TO DRIVER
XT2846	4	81	COMMON PART TO DRIVER
XT38119	4	100	COMMON PART TO DRIVER
XT3820	4	100	COMMON PART TO DRIVER
XT3821	4	100	COMMON PART TO DRIVER
XT3822	4	100	COMMON PART TO DRIVER
XT3825	6	101	COMMON PART TO DRIVER
XT3826	4	108	COMMON PART TO DRIVER
XT3830	6	101	COMMON PART TO DRIVER
XT3832	12	103	COMMON PART TO DRIVER
XT4860	10	93	COMMON PART TO DRIVER
XT6130	5	120	COMMON PART TO ENCLOSURE
XT6151	5	121	BOX,DEVICE,SPECIAL,ATEX
XT6610	10	117,119	
XT6611	22	117,119	
XT6811	8	118	COMMON PART TO ENCLOSURE
XT6827	4	123	COMMON PART TO ENCLOSURE
XT6880	4	115	COMMON PART TO ENCLOSURE
XT6881	4	115	COMMON PART TO ENCLOSURE
XT6882	4	115	COMMON PART TO ENCLOSURE

Terminal Strip Index

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B | SHT REV B
SHEET 134 OF 141

SWBNO-1

DEVICE ID	PAGE ZONE	CUSTOMER TAG	COMPONENT DESCRIPTION	SYSTEM FUNCTION	J-BOX or PANEL LOCATION
AF0050	8.A2		1794-OB8EP	8 DISCRETE OUTPUT (CURRENT LIMITING)	TURBINE BOX PANEL B (JB70)
AF0051	8.A3		1794-OB8EP	8 DISCRETE OUTPUT (CURRENT LIMITING)	TURBINE BOX PANEL B (JB70)
AF0052	8.A3		1794-OB8EP	8 DISCRETE OUTPUT (CURRENT LIMITING)	TURBINE BOX PANEL B (JB70)
AF0053	8.A4		1794-IB16	16 DISCRETE INPUT	TURBINE BOX PANEL B (JB70)
AF0054	8.A5		1794-IF8IHNF	8 ANALOG FAST INPUT (ISOLATED, HART)	TURBINE BOX PANEL B (JB70)
AF0055	8.A5		1794-IF8IHNF	8 ANALOG FAST INPUT (ISOLATED, HART)	TURBINE BOX PANEL B (JB70)
AF0060	7.C2		1794-OB8EP	8 DISCRETE OUTPUT (CURRENT LIMITING)	TURBINE BOX PANEL B (JB70)
AF0061	7.C3		1794-IB10XOB6	16 DISCRETE SIGNALS (10 IN & 6 OUT)	TURBINE BOX PANEL B (JB70)
AF0062	7.C3		1794-OB8EP	8 DISCRETE OUTPUT (CURRENT LIMITING)	TURBINE BOX PANEL B (JB70)
AF0063	7.C4		1794-IB16	16 DISCRETE INPUT	TURBINE BOX PANEL B (JB70)
AF0064	7.C5		1794-IF8IHNF	8 ANALOG FAST INPUT (ISOLATED, HART)	TURBINE BOX PANEL B (JB70)
AF0065	7.C5		1794-IF8IHNF	8 ANALOG FAST INPUT (ISOLATED, HART)	TURBINE BOX PANEL B (JB70)
AF0066	7.C6		1794-IJ2	2 FREQUENCY FAST INPUT	TURBINE BOX PANEL B (JB70)
AF0067	7.C6		1794-IF8IHNF	8 ANALOG FAST INPUT (ISOLATED, HART)	TURBINE BOX PANEL B (JB70)
AF0070	7.A2		1794-IJ2	2 FREQUENCY FAST INPUT	TURBINE BOX PANEL B (JB70)
AF0071	7.A3		1794-OF4I	4 ANALOG FAST OUTPUT (ISOLATED)	TURBINE BOX PANEL B (JB70)
AF0072	7.A3		1794-OF4I	4 ANALOG FAST OUTPUT (ISOLATED)	TURBINE BOX PANEL B (JB70)
AF0073	7.A4		1794-IF8IHNF	8 ANALOG FAST INPUT (ISOLATED, HART)	TURBINE BOX PANEL B (JB70)
AF0074	7.A5		1794-IRT8	8 TC/RTD FAST INPUT	TURBINE BOX PANEL B (JB70)
AF0075	7.A5		1794-IRT8	8 TC/RTD FAST INPUT	TURBINE BOX PANEL B (JB70)
AF0076	7.A6		1794-IRT8	8 TC/RTD FAST INPUT	TURBINE BOX PANEL B (JB70)
AF0077	7.A6		1794-IRT8	8 TC/RTD FAST INPUT	TURBINE BOX PANEL B (JB70)
AF0080	6.C2		1794-OB8EP	8 DISCRETE OUTPUT (CURRENT LIMITING)	TURBINE BOX PANEL A (JB70)
AF0081	6.C3		1794-IB16	16 DISCRETE INPUT	TURBINE BOX PANEL A (JB70)
AF0082	6.C3		1794-IB16	16 DISCRETE INPUT	TURBINE BOX PANEL A (JB70)
AF0083	6.C4		1794-IRT8	8 TC/RTD FAST INPUT	TURBINE BOX PANEL A (JB70)
AF0084	6.C5		1794-IRT8	8 TC/RTD FAST INPUT	TURBINE BOX PANEL A (JB70)
AF0085	6.C5		1794-IF8IHNF	8 ANALOG FAST INPUT (ISOLATED, HART)	TURBINE BOX PANEL A (JB70)
AF0086	6.C6		1794-IF8IHNF	8 ANALOG FAST INPUT (ISOLATED, HART)	TURBINE BOX PANEL A (JB70)
AF0087	6.C6		1794-IB10XOB6	16 DISCRETE SIGNALS (10 IN & 6 OUT)	TURBINE BOX PANEL A (JB70)
AF0090	6.A2		1794-IB16	16 DISCRETE INPUT	TURBINE BOX PANEL A (JB70)
AF0091	6.A3		1794-OB16P	16 DISCRETE OUTPUT (CURRENT LIMITING)	TURBINE BOX PANEL A (JB70)
AF0092	6.A3		1794-OB16P	16 DISCRETE OUTPUT (CURRENT LIMITING)	TURBINE BOX PANEL A (JB70)
AF0093	6.A4		1794-IE8	8 ANALOG INPUT	TURBINE BOX PANEL A (JB70)
AF0094	6.A5		1794-IRT8	8 TC/RTD FAST INPUT	TURBINE BOX PANEL A (JB70)
AF0095	6.A5		1794-OF4I	4 ANALOG FAST OUTPUT (ISOLATED)	TURBINE BOX PANEL A (JB70)
AF0096	6.A6		1794-IF8IHNF	8 ANALOG FAST INPUT (ISOLATED, HART)	TURBINE BOX PANEL A (JB70)
AF0120	26.C2		1794-OB16P	16 DISCRETE OUTPUT (CURRENT LIMITING)	GENERATOR BOX (JB72)
AF0121	26.C3		1794-IB16	16 DISCRETE INPUT	GENERATOR BOX (JB72)
AF0122	26.C3		1794-IRT8	8 TC/RTD FAST INPUT	GENERATOR BOX (JB72)
AF0123	26.C4		1794-IF8IHNF	8 ANALOG FAST INPUT (ISOLATED, HART)	GENERATOR BOX (JB72)
AF0180	12.C4		1794-OB8EP	8 DISCRETE OUTPUT (CURRENT LIMITING)	AUXILIARY CONSOLE PANEL
AF0181	12.C5		1794-IB16	16 DISCRETE INPUT	AUXILIARY CONSOLE PANEL
AF0182	12.C5		1794-IE8	8 ANALOG INPUT	AUXILIARY CONSOLE PANEL
AF0200	12.A4		1794-OB16P	16 DISCRETE OUTPUT (CURRENT LIMITING)	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
AF0201	12.A5		1794-IB10XOB6	16 DISCRETE SIGNALS (10 IN & 6 OUT)	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
AF0202	12.A5		1794-IB10XOB6	16 DISCRETE SIGNALS (10 IN & 6 OUT)	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
AF0400	24.B6		1444-TSCX02-02RB	2-CH TACHOMETER INPUT DYNAMIX 1444 VIBRATION	TURBINE BOX PANEL C (JB70)
AF0410	24.B5		1444-DYN04-01RA	4-CH VIBRATION INPUT DYNAMIX 1444 VIBRATION	TURBINE BOX PANEL C (JB70)
AF0420	24.B5		1444-DYN04-01RA	4-CH VIBRATION INPUT DYNAMIX 1444 VIBRATION	TURBINE BOX PANEL C (JB70)
AF0430	24.B4		1444-DYN04-01RA	4-CH VIBRATION INPUT DYNAMIX 1444 VIBRATION	TURBINE BOX PANEL C (JB70)
AF0450	24.B3		1444-DYN04-01RA	4-CH VIBRATION INPUT DYNAMIX 1444 VIBRATION	TURBINE BOX PANEL C (JB70)
AF0460	24.B2		1444-DYN04-01RA	4-CH VIBRATION INPUT DYNAMIX 1444 VIBRATION	TURBINE BOX PANEL C (JB70)
AF0500	26.B5		1444-TSCX02-02RB	2-CH TACHOMETER INPUT DYNAMIX 1444 VIBRATION	GENERATOR PANEL (JB72)
AF0510	26.B4		1444-DYN04-01RA	4-CH VIBRATION INPUT DYNAMIX 1444 VIBRATION	GENERATOR PANEL (JB72)
AF0520	26.B3		1444-DYN04-01RA	4-CH VIBRATION INPUT DYNAMIX 1444 VIBRATION	GENERATOR PANEL (JB72)

DEVICE ID	PAGE ZONE	CUSTOMER TAG	COMPONENT DESCRIPTION	SYSTEM FUNCTION	J-BOX or PANEL LOCATION
AP0601	10.A2		1756-EN2TRXT	ETHERNET	AUXILIARY CONSOLE (PLC PANEL)
AP0601	11.A5		1756-EN2TRXT	ETHERNET	FIELD/UNIT 2
AP0602	10.A3		1756-EN2TRXT	ETHERNET	AUXILIARY CONSOLE (PLC PANEL)
AP0603	10.A3		1756-EN2TRXT	ETHERNET	AUXILIARY CONSOLE (PLC PANEL)
AP0604	10.A4		MODULE	BLANK FILLER	UCP/PANEL
AP0605	10.A4		MODULE	BLANK FILLER	AUXILIARY CONSOLE (PLC PANEL)
AP0606	10.A5		1756-EN2TRXT	ETHERNET	AUXILIARY CONSOLE (PLC PANEL)
AP0607	10.A5		1756-EN2TRXT	ETHERNET	UCP/PANEL
AP0608	10.A6		1756-EN2TXT	ETHERNET	UCP/PANEL
AP0609	10.A6		REDUNDANCY MODULE	1756-RM2XT	AUXILIARY CONSOLE (PLC PANEL)
AP0701	10.B2		1756-EN2TRXT	ETHERNET	AUXILIARY CONSOLE (PLC PANEL)
AP0701	11.B5		1756-EN2TRXT	ETHERNET	FIELD/UNIT 2
AP0702	10.B3		1756-EN2TRXT	ETHERNET	AUXILIARY CONSOLE (PLC PANEL)
AP0703	10.B3		1756-EN2TRXT	ETHERNET	AUXILIARY CONSOLE (PLC PANEL)
AP0704	10.B4		MODULE	BLANK FILLER	AUXILIARY CONSOLE (PLC PANEL)
AP0705	10.B4		MODULE	BLANK FILLER	AUXILIARY CONSOLE (PLC PANEL)
AP0706	10.B5		1756-EN2TRXT	ETHERNET	AUXILIARY CONSOLE (PLC PANEL)
AP0707	10.B5		1756-EN2TRXT	ETHERNET	AUXILIARY CONSOLE (PLC PANEL)
AP0708	10.B6		1756-EN2TXT	ETHERNET	AUXILIARY CONSOLE (PLC PANEL)
AP0709	10.B6		REDUNDANCY MODULE	1756-RM2XT	AUXILIARY CONSOLE (PLC PANEL)
AP0800	10.C2		1756-EN2TRXT	ETHERNET	UCP/PANEL
AP0801	10.C2		MVI 56-MNEXT	ETHERNET/MODBUS	UCP/PANEL
AP0802	10.C3		1756-EN2TXT	ETHERNET	JB70
AP0803	10.C3		MODULE	BLANK FILLER	JB70
AP0804	10.C4		MODULE	BLANK FILLER	JB70
AP0805	10.C4		MODULE	BLANK FILLER	JB70
AP0806	10.C5		MODULE	BLANK FILLER	JB70
AP0807	10.C5		MODULE	BLANK FILLER	JB70
AP0808	10.C6		MODULE	BLANK FILLER	JB70
AP0809	10.C6		MODULE	BLANK FILLER	JB70
AR0600	10.A1		RACK CHASSIS	1756-A10XT (10 SLOT)	AUXILIARY CONSOLE (PLC PANEL)
AR0700	10.B1		RACK CHASSIS	1756-A10XT (10 SLOT)	AUXILIARY CONSOLE (PLC PANEL)
AR0800	10.C1		RACK CHASSIS	1756-A10XT (10 SLOT)	JB70
AT0140	27.D5		MODULE	COMBINATION GENERATOR CONTROL	GENERATOR PANEL (JB72)
AT0170	9.A5		CONTROLLER	EAGLE QUANTUM PREMIER	TURBINE BOX (JB70)
AT0175	9.B5		8 CHANNEL ED I/O	EAGLE QUANTUM PREMIER	TURBINE BOX (JB70)
AT0176	9.C5		8 CHANNEL ED I/O	EAGLE QUANTUM PREMIER	TURBINE BOX (JB70)
AT0178	9.D5		8 CHANNEL ED I/O	EAGLE QUANTUM PREMIER	TURBINE BOX (JB70)
AT0190	12.B4		WORKSTATION	PANEL COMPUTER, TT4000	AUXILIARY CONSOLE (DOOR PANELS)
AT0190K	12.C5		KEYBOARD	TYPING INTERFACE	AUXILIARY CONSOLE (DOOR PANELS)
AT0600	10.A2		1756-L73XT	MICROPROCESSOR	AUXILIARY CONSOLE (PLC PANEL)
AT0680	5.B4		GATEWAY MODULE	TURBOTRONIC GATEWAY	TURBINE BOX PANEL C (JB70)
AT0680	23.C7		GATEWAY MODULE	TURBOTRONIC GATEWAY	FIELD/UNIT #2
AT0700	10.B2		1756-L73XT	MICROPROCESSOR	AUXILIARY CONSOLE (PLC PANEL)
AT1100	36.D3		WORKSTATION	VERSA VIEW 1200H	TURBINE BOX (JB70)
AT9190	23.B2		WORKSTATION	VERSA VIEW 750R	AUXILLARY BUILDING/REMOTE DESKTOP
AT9190D	23.A2		MONITOR	VISUAL INTERFACE	AUXILLARY BUILDING/REMOTE DESKTOP
AT9190K	23.B3		KEYBOARD	TYPING INTERFACE	AUXILLARY BUILDING/REMOTE DESKTOP
AT9190M	23.B3		MOUSE	POINTING DEVICE	AUXILLARY BUILDING/REMOTE DESKTOP
AU0050	8.A2		1794-AENTR	FLEX I/O COMMUNICATIONS ADAPTER	TURBINE BOX PANEL B (JB70)
AU0060	7.C2		1794-AENTR	FLEX I/O COMMUNICATIONS ADAPTER	TURBINE BOX PANEL B (JB70)
AU0070	7.A2		1794-AENTR	FLEX I/O COMMUNICATIONS ADAPTER	TURBINE BOX PANEL B (JB70)
AU0080	6.C2		1794-AENTR	FLEX I/O COMMUNICATIONS ADAPTER	TURBINE BOX PANEL A (JB70)
AU0090	6.A2		1794-AENTR	FLEX I/O COMMUNICATIONS ADAPTER	TURBINE BOX PANEL A (JB70)
AU0120	26.C1		1794-AENTR	FLEX I/O COMMUNICATIONS ADAPTER	GENERATOR BOX (JB72)
AU0180	12.C3		1794-AENTR	FLEX I/O COMMUNICATIONS ADAPTER	AUXILIARY CONSOLE PANEL
AU0200	12.A3		1794-AENTR	FLEX I/O COMMUNICATIONS ADAPTER	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
BA0600	11.A2		SWITCH, ETHERNET	FIBER OPTIC CONVERTER, AB STRATIX 2000	AUXILIARY CONSOLE (PLC PANEL)
BA0700	11.A4		SWITCH, ETHERNET	FIBER OPTIC CONVERTER, AB STRATIX 2000	AUXILIARY CONSOLE (PLC PANEL)
BA1100	36.D1		SWITCH, ETAP	DLR INTERFACE	TURBINE BOX (JB70)
BA9190	23.B4		SWITCH, ETHERNET	ETHERNET CONNECTIONS	FIELD/CUSTOMER MUD ENET SWITCH
BE1020	41.A1		IGNITOR PLUG	IGNITION SPARK	PACK/GENERAL
BUS	110.A2		CUSTOMER CONNECTION	TIE BUS	PACK/SWITCHGEAR
CC0700	11.B5		CUSTOMER	ETHERNET CONNECTION	FIELD/CUST ETHERNET CONN
CC6130	120.B1		AC POWER	ENCLOSURE LIGHTING	BOP EER/AC PWR
CC6131	120.C1		AC POWER	ENCCLOSURE POWER OUTLET 230 VAC	BOP EER/AC PWR
CC7580	31.A2		CUSTOMER INPUT	90% SPEED	CUST/BOP
CC7581	31.C2		EXTERNAL SETPOINT	GENERATOR REAL POWER	UCP/PDCS
CC9001	130.A1		CUSTOMER CONNECTION	SPARE	CUST/BOP
CC9002	130.A1		CUSTOMER CONNECTION	SPARE	CUST/BOP
CC9003	130.B1		CUSTOMER CONNECTION	SPARE	CUST/BOP
CC9004	130.B1		CUSTOMER CONNECTION	SPARE	CUST/BOP
CC9005	130.C1		CUSTOMER CONNECTION	SPARE	CUST/BOP
CC9006	130.C1		CUSTOMER CONNECTION	SPARE	CUST/BOP
CC9007	130.D1		CUSTOMER CONNECTION	SPARE	CUST/BOP
CC9011	131.A1		CUSTOMER CONNECTION	SPARE	CUST/BOP

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B | SHT REV B
SHEET 135 OF 141

Reference Designator Index (Electrical)

SWBNO-1

DEVICE ID	PAGE ZONE	CUSTOMER TAG	COMPONENT DESCRIPTION	SYSTEM FUNCTION	J-BOX or PANEL LOCATION
CC9012	131.A1		CUSTOMER CONNECTION	SPARE	CUST/BOP
CC9013	131.B1		CUSTOMER CONNECTION	SPARE	CUST/BOP
CC9014	131.C1		CUSTOMER CONNECTION	SPARE	CUST/BOP
CC9015	131.C1		CUSTOMER CONNECTION	SPARE	CUST/BOP
CC9016	131.D1		CUSTOMER CONNECTION	SPARE	CUST/BOP
CC9361	113.C1		OTHER UNITS	KW LOAD SHARE	PACK/PDCS
CC9661	112.D4		CUSTOMER CONNECTION	NGR CT	PACK/SWITCHGEAR
CC9662	112.D5		CUSTOMER CONNECTION	GENERATOR GROUND	CUST/GROUNDING
CCAP0801	10.D3		CUSTOMER	MODBUS TCP/IP CONNECTION	UCP/NETWORK INTERFACE CABINET
CCAT0170	114.D2		CUSTOMER CONNECTION	TROUBLE ALARM SIGNAL	PACK/CUSTOMER FIRE AND GAS SIGNALS
CCAT9190C	23.B1		CUSTOMER POWER	COMPUTER POWER 120-220V AC	AUXILLARY BUILDING/REMOTE DESKTOP
CCAT9190D	23.A1		CUSTOMER POWER	MONITOR POWER 120-220V AC	AUXILLARY BUILDING/REMOTE DESKTOP
CCBA9190	23.C4		CUSTOMER CONNECTION	POWER SUPPLY	FIELD/CUSTOMER MUD ENET SWITCH
CCDCCB4	16.D1		AC PANELBOARD	120VAC	CUST/AC PANELBOARD
CCDCTBA	110.A2		CUSTOMER CONNECTION	TRANSFORMER (LOAD DIFFERENTIAL CURRENT)	PACK/SWITCHGEAR
CCDCTBB	110.A2		CUSTOMER CONNECTION	TRANSFORMER (LOAD DIFFERENTIAL CURRENT)	PACK/SWITCHGEAR
CCDCTBC	110.A2		CUSTOMER CONNECTION	TRANSFORMER (LOAD DIFFERENTIAL CURRENT)	PACK/SWITCHGEAR
CCDCTGA	112.C4		CUSTOMER CONNECTION	TRANSFORMER (NEUTRAL DIFFERENTIAL CURRENT)	PACK/SWITCHGEAR
CCDCTGB	112.C4		CUSTOMER CONNECTION	TRANSFORMER (NEUTRAL DIFFERENTIAL CURRENT)	PACK/SWITCHGEAR
CCDCTGC	112.D4		CUSTOMER CONNECTION	TRANSFORMER (NEUTRAL DIFFERENTIAL CURRENT)	PACK/SWITCHGEAR
CCFG0000	3.D5		CUSTOMER GROUNDING	CONSOLE FRAME GROUND	CUST/GROUNDING
CCGD0525	2.A1		CUSTOMER CONNECTION	THREE PHASE AC POWER	BOP EER/AC PWR
CCH3103	107.B4		CUSTOMER CONNECTION	THREE PHASE AC BUS	BOP EER/AC PWR
CCH3103H	107.A4		CUSTOMER CONNECTION	SINGLE PHASE AC BUS	BOP EER/AC PWR
CCH4100H	99.B4		CUSTOMER CONNECTION	SINGLE PHASE AC BUS	BOP EER/AC PWR
CCH6100	128.C4		CUSTOMER CONNECTION	THREE PHASE AC BUS	BOP EER/AC PWR
CCH6100H	128.C4		CUSTOMER CONNECTION	SINGLE PHASE AC BUS	BOP EER/AC PWR
CCIEG0130	3.B1		CUSTOMER GROUNDING	INSTRUMENT EARTH IMPEDANCE LESS THAN 5 OHMS	CUST/GROUNDING
CCIEG0230	3.A1		CUSTOMER GROUNDING	INSTRUMENT EARTH IMPEDANCE LESS THAN 5 OHMS	CUST/GROUNDING
CCIEG0356	3.D5		CUSTOMER GROUNDING	INSTRUMENT EARTH GROUND IMPEDANCE LESS THAN 5 OHMS	CUST/GROUNDING
CCINSCON-IC	4.B6		ETHERNET INPUT	INSIGHT CONNECT	CUST/TELECOM
CCINSCON-PWR	4.B2		CUSTOMER CONNECTION	SINGLE PHASE AC POWER 100-240V AC 10 AMPS	BOP EER/AC PWR
CCKA0128	30.C2		PDCS CONNECTION	GENERATOR CIRCUIT BREAKER TRIP SUMMARY (LOAD SHED SYSTEM)	UCP/PDCS
CCKA0332	30.D2		CUSTOMER CONNECTION	GENERATOR CIRCUIT BREAKER CLOSE CONTROL	UCP/SWITCHGEAR
CCKA0333	30.D2		CUSTOMER CONNECTION	GENERATOR CIRCUIT BREAKER TRIP CONTROL	UCP/SWITCHGEAR
CCKA0505	39.B2		CUSTOMER CONNECTION	CLOSE LIQUID FUEL BLOCK VALVE	FIELD/LIQUID FUEL BLOCK VALVE
CCKA0982	114.D2		CUSTOMER CONNECTION	FIRE DETECTED SIGNAL	PACK/CUSTOMER FIRE AND GAS SIGNALS
CCKA0984	114.D2		CUSTOMER CONNECTION	GAS DETECTED SIGNAL	PACK/CUSTOMER FIRE AND GAS SIGNALS
CCKA2160	38.A1		CUSTOMER CONNECTION	CLOSE GAS BLOCK VALVE	FIELD/GAS FUEL BLOCK BLEED VALVE
CCKA2161	38.B1		CUSTOMER CONNECTION	OPEN GAS BLEED VALVE	FIELD/GAS FUEL BLOCK BLEED VALVE
CCM1300H	40.B6		CUSTOMER CONNECTION	SINGLE PHASE AC POWER	BOP EER/AC PWR
CCM1300M	40.B6		CUSTOMER CONNECTION	THREE PHASE AC POWER	BOP EER/AC PWR
CCM2220H	71.B5		CUSTOMER CONNECTION	SINGLE PHASE AC POWER	BOP EER/PWR
CCM2220M	71.B5		CUSTOMER CONNECTION	THREE PHASE AC POWER	BOP EER/PWR
CCM2220R	71.C5		CUSTOMER CONNECTION	SHUNT TRIP BREAKER LIQUID FUEL VFD 3 PHASE	BOP EER/PWR
CCM2240H	76.B5		CUSTOMER CONNECTION	SINGLE PHASE AC POWER	BOP EER/AC PWR
CCM2240M	76.B5		CUSTOMER CONNECTION	THREE PHASE AC POWER	BOP EER/AC PWR
CCM2610M	85.B6		CUSTOMER CONNECTION	THREE PHASE AC POWER	BOP EER/AC PWR
CCM2645H	82.C4		CUSTOMER CONNECTION	SINGLE PHASE AC BUS	BOP EER/AC PWR
CCM2645M	82.C4		CUSTOMER CONNECTION	THREE PHASE AC BUS	BOP EER/AC PWR
CCM3150H	102.A4		CUSTOMER CONNECTION	SINGLE PHASE AC BUS	BOP EER/AC PWR
CCM3150M	102.B4		CUSTOMER CONNECTION	THREE PHASE AC BUS	BOP EER/AC PWR
CCM3170H	104.C4		CUSTOMER CONNECTION	SINGLE PHASE AC POWER	BOP EER/AC PWR
CCM3220H	105.B4		CUSTOMER CONNECTION	SINGLE PHASE AC BUS	BOP EER/AC PWR
CCM3220M	105.B4		CUSTOMER CONNECTION	THREE PHASE AC BUS	BOP EER/AC PWR
CCM3221H	105.D4		CUSTOMER CONNECTION	SINGLE PHASE AC POWER	BOP EER/AC PWR
CCM3221M	105.D4		CUSTOMER CONNECTION	THREE PHASE AC POWER	BOP EER/AC PWR
CCM3420H	94.C4		CUSTOMER CONNECTION	SINGLE PHASE AC BUS	BOP EER/AC PWR
CCM3420M	94.C4		CUSTOMER CONNECTION	THREE PHASE AC BUS	BOP EER/AC PWR
CCM6211H	126.A4		CUSTOMER CONNECTION	SINGLE PHASE AC BUS	BOP EER/AC PWR
CCM6211M	126.B4		CUSTOMER CONNECTION	THREE PHASE AC BUS	BOP EER/AC PWR
CCM6241H	126.C4		CUSTOMER CONNECTION	SINGLE PHASE AC BUS	BOP EER/AC PWR
CCM6241M	126.C4		CUSTOMER CONNECTION	THREE PHASE AC BUS	BOP EER/AC PWR
CCM6242H	127.C4		CUSTOMER CONNECTION	SINGLE PHASE AC BUS	BOP EER/AC PWR
CCM6242M	127.C4		CUSTOMER CONNECTION	THREE PHASE AC BUS	BOP EER/AC PWR

DEVICE ID	PAGE ZONE	CUSTOMER TAG	COMPONENT DESCRIPTION	SYSTEM FUNCTION	J-BOX or PANEL LOCATION
CCPEG0130	3.A1		CUSTOMER GROUNDING	POWER EARTH IMPEDANCE LESS THAN 5 OHMS	CUST/GROUNDING
CCPEG0140	3.B1		CUSTOMER GROUNDING	POWER EARTH IMPEDANCE LESS THAN 5 OHMS	CUST/GROUNDING
CCPEG0356	3.D5		CUSTOMER GROUNDING	POWER EARTH GROUND IMPEDANCE LESS THAN 5 OHMS	CUST/GROUNDING
CCPTBUSFUSE	30.C2		SWITCHGEAR CONNECTION	BUS PT FUSE MONITOR	UCP/SWITCHGEAR
-CCT	112.A1		CURRENT TRANSFORMER	CROSS CURRENT	GEN/CT
CCT2	113.A1		UNIT2	CROSS CURRENT TRANSFOMER	FIELD/CCC UNIT 2
CCT3	113.A1		UNIT3	CROSS CURRENT TRANSFORMER	FIELD/CCC UNIT 3
CCUV2220AC	85.A6		CUSTOMER CONNECTION	THREE PHASE AC POWER LOSS DETECTION 10A FUSE REQUIRED	BOP EER/AC PWR
DCT BUS A	110.A2		CURRENT TRANSFORMER	DIFFERENTIAL CURRENT	PACK/SWITCHGEAR
DCT BUS B	110.A2		CURRENT TRANSFORMER	DIFFERENTIAL CURRENT	PACK/SWITCHGEAR
DCT BUS C	110.B2		CURRENT TRANSFORMER	DIFFERENTIAL CURRENT	PACK/SWITCHGEAR
-DFCT1	112.C1		CURRENT TRANSFORMER	DIFFERENTIAL CURRENT	GEN/CT
-DFCT2	112.C1		CURRENT TRANSFORMER	DIFFERENTIAL CURRENT	GEN/CT
-DFCT3	112.D1		CURRENT TRANSFORMER	DIFFERENTIAL CURRENT	GEN/CT
DT2611	84.B1		SENSOR DETECTOR	DE-IONIZED WATER QUALITY, WATER PURGE	FIELD/WATER PURGE
DTF6510	116.A3		FIRE DETECTOR	MULTI-SPECTRUM (FIRE)	PACK/GENERAL
DTF6511	116.A3		FIRE DETECTOR	MULTI-SPECTRUM (FIRE)	PACK/GENERAL
DTF6512	116.B3		FIRE DETECTOR	MULTI-SPECTRUM (FIRE)	PACK/GENERAL
DTF6513	116.B2		FIRE DETECTOR	MULTI-SPECTRUM (FIRE)	PACK/GENERAL
DTF6514	116.C3		FIRE DETECTOR	MULTI-SPECTRUM (FIRE)	PACK/GENERAL
DTG6561	124.A5		GAS DETECTOR	ENCLOSURE AIR INLET	PACK/GENERAL
DTG6571	124.C3		GAS DETECTOR	FUEL MODULE AREA	PACK/GENERAL
DTG6572	124.C2		GAS DETECTOR	FUEL MODULE AREA	PACK/GENERAL
DTG6574	124.A2		GAS DETECTOR	TOP OF ENCLOSURE	PACK/GENERAL
DTG6581	124.B5		GAS DETECTOR	ENCLOSURE AIR EXHAUST	PACK/GENERAL
EF0112	24.A3		FAN	AIR CIRCULATION	TURBINE BOX PANEL C (JB70)
EF0141	26.A3		FAN	AIR CIRCULATION	GENERATOR PANEL (JB72)
EI6131	120.C3		VAC POWER OUTLET	GAS TURBINE ENCLOSURE	PACK/GAS TURBINE ENCLOSURE
EL0273	12.B4		LIGHT	CONSOLE FLUORESCENT	AUXILIARY CONSOLE
EL6130	120.B3		LIGHT SOURCE	ENCLOSURE LIGHT	PACK/ENCLOSURE (INTERIOR)
EL6131	120.B4		LIGHT SOURCE	ENCLOSURE LIGHT	PACK/ENCLOSURE (INTERIOR)
EL6132	120.B5		LIGHT SOURCE	ENCLOSURE LIGHT	PACK/ENCLOSURE (INTERIOR)
FCE1420	42.A1		FLOW CONTROL, ELECTRIC	COMPRESSOR BLEED AIR, MOTOR DRIVEN (BV)	PACK/TURB
FCE1440	43.A1		FLOW CONTROL, ELECTRIC	COMPRESSOR VARIABLE GUIDE VANE #2	PACK/TURB
FCE1442	44.A1		FLOW CONTROL, ELECTRIC	COMPRESSOR VARIABLE GUIDE VANE #1,#3,#4,#5	PACK/TURB
FCE2130	59.A1		FLOW CONTROL, ELECTRIC	MAIN ELECTRIC GAS FUEL	PACK/FUEL
FCE2140	61.A1		FLOW CONTROL, ELECTRIC	ELECTRIC PILOT GAS FUEL	PACK/FUEL
FG0000	3.D6		CONSOLE GROUND LUG	FRAME GROUNDING	AUXILIARY CONSOLE
FGGR0680	5.D5		GROUND	FRAME/CHASSIS GROUNDING	UCP/PANEL
FT2108	68.C1		FLOW TRANSMITTER	MONITOR GAS FUEL FLOW	PACK/GAS FUEL FLOW METER
FT2220	72.C1		FLOW TRANSMITTER	MONITOR LIQUID FUEL FLOW	PACK/FUEL
FT2240	77.C1		FLOW TRANSMITTER	MONITOR LIQUID FUEL PILOT FLOW	FUEL/LIQUID FUEL PILOT
FU0008	12.A2		FUSE	10A	AUXILIARY CONSOLE (PLC PANEL)
FU0009	12.A2		FUSE	10A	AUXILIARY CONSOLE (PLC PANEL)
FU0010	12.A2		FUSE	10A	TURBINE BOX PANEL A (JB70)
FU0011	16.B3		FUSE	20A	TURBINE BOX PANEL A (JB70)
FU0012	16.B3		FUSE	10A	TURBINE BOX PANEL A (JB70)
FU0013	16.B3		FUSE	10A	TURBINE BOX PANEL A (JB70)
FU0014	16.C3		FUSE	10A	TURBINE BOX PANEL A (JB70)
FU0015	16.C3		FUSE	10A	TURBINE BOX PANEL A (JB70)
FU0016	16.C3		FUSE	10A	TURBINE BOX PANEL A (JB70)
FU0017	16.C3		FUSE	10A	TURBINE BOX PANEL A (JB70)
FU0031	16.D4		FUSE	20A	TURBINE BOX PANEL A (JB70)
FU0032	16.D5		FUSE	30A	TURBINE BOX PANEL A (JB70)
FU0050	8.B1		FUSE	10A	TURBINE BOX PANEL B (JB70)
FU0051	8.B1		FUSE	10A	TURBINE BOX PANEL B (JB70)
FU0052	8.B1		FUSE	10A	TURBINE BOX PANEL B (JB70)
FU0053	8.B1		FUSE	10A	TURBINE BOX PANEL B (JB70)
FU0054	8.B1		FUSE	10A	TURBINE BOX PANEL B (JB70)
FU0055	8.B1		FUSE	2A	TURBINE BOX PANEL B (JB70)
FU0060	7.C1		FUSE	10A	TURBINE BOX PANEL B (JB70)
FU0061	7.D1		FUSE	10A	TURBINE BOX PANEL B (JB70)
FU0062	7.D1		FUSE	10A	TURBINE BOX PANEL B (JB70)
FU0063	7.D1		FUSE	10A	TURBINE BOX PANEL B (JB70)
FU0070	7.B1		FUSE	10A	TURBINE BOX PANEL B (JB70)
FU0080	6.D1		FUSE	10A	TURBINE BOX PANEL A (JB70)
FU0081	6.D1		FUSE	10A	TURBINE BOX PANEL A (JB70)
FU0082	6.D1		FUSE	10A	TURBINE BOX PANEL A (JB70)
FU0090	6.B1		FUSE	10A	TURBINE BOX PANEL A (JB70)
FU0091	6.B1		FUSE	10A	TURBINE BOX PANEL A (JB70)
FU0092	6.B1		FUSE	10A	TURBINE BOX PANEL A (JB70)
FU0110	24.A5		FUSE	20A	TURBINE BOX PANEL C (JB70)
FU0112	24.A4		FUSE	2A	TURBINE BOX PANEL C (JB70)
FU0113	24.A4		FUSE	5A	TURBINE BOX PANEL C (JB70)
FU0120	26.D1		FUSE	10A	GENERATOR BOX (JB72)
FU0121	26.D1		FUSE	10A	GENERATOR BOX (JB72)
FU0130	26.C1		FUSE	5A	GENERATOR PANEL (JB72)
FU0131	16.C5		FUSE	30A	TURBINE BOX PANEL A (JB70)
FU0136	17.A3		FUSE	30A	TURBINE BOX PANEL A (JB70)
FU0137	17.A4		FUSE	20A	TURBINE BOX PANEL A (JB70)

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B | SHT REV B
SHEET 136 OF 141

Reference Designator Index (Electrical)

SWBNO-1

DEVICE ID	PAGE ZONE	CUSTOMER TAG	COMPONENT DESCRIPTION	SYSTEM FUNCTION	J-BOX or PANEL LOCATION
FU0139	17.A5		FUSE	5A	TURBINE BOX PANEL A (JB70)
FU0141	26.A4		FUSE	2A	GENERATOR BOX (JB72)
FU0170	9.A2		FUSE	15A	TURBINE BOX (JB70)
FU0180	12.D3		FUSE	10A	AUXILIARY CONSOLE PANEL
FU0181	12.D3		FUSE	10A	AUXILIARY CONSOLE PANEL
FU0190	12.C3		FUSE	10A	AUXILIARY CONSOLE DOOR (PWR DIST RAIL)
FU0200	12.A3		FUSE	10A	AUXILIARY CONSOLE DOOR (PWR DIST RAIL)
FU0210	17.C4		FUSE	20A	TURBINE BOX PANEL B (JB70)
FU0211	17.B4		FUSE	5A	TURBINE BOX PANEL B (JB70)
FU0212	17.C5		FUSE	2A	TURBINE BOX PANEL B (JB70)
FU0273	12.B3		FUSE	5A	AUXILIARY CONSOLE DOOR (PWR DIST RAIL)
FU0313	111.A5		FUSE	20A	GENERATOR PANEL (JB72)
FU0314	111.A5		FUSE	20A	GENERATOR PANEL (JB72)
FU0315	111.A5		FUSE	20A	GENERATOR PANEL (JB72)
FU0332	25.B3		FUSE	20A	GENERATOR BOX (JB72)
FU0333	25.B3		FUSE	5A	GENERATOR BOX (JB72)
FU0334	25.B3		FUSE	5A	GENERATOR BOX (JB72)
FU0335	25.A3		FUSE	5A	GENERATOR BOX (JB72)
FU0680	5.B2		FUSE	5A	TURBINE BOX PANEL C (JB70)
FU0700	12.A2		FUSE	10A	AUXILIARY CONSOLE (PLC PANEL)
FU1100	36.D3		FUSE	10A	TURBINE BOX (JB70)
FU1101	36.C2		FUSE	2A	TURBINE BOX (JB70)
G4000	111.C2		GENERATOR	ELECTRIC POWER	PACK/GENERATOR
GB0525	2.C1		BATTERY SET	VRLA	CUST/CHARGER
GD0525	2.A2		BATTERY CHARGER	FLOOR MOUNTED UNIT	BOP EER/CHARGER
GR0113	3.B4		RAIL GROUND	DIN RAIL GROUNDING	TURBINE BOX PANEL C (JB70)
GR0120	26.D1		RAIL GROUND	DIN RAIL GROUNDING	GENERATOR BOX (JB72)
GR0131	3.A3		RAIL GROUND	DIN RAIL GROUNDING	TURBINE BOX PANEL A (JB70)
GR0132	3.A3		RAIL GROUND	DIN RAIL GROUNDING	TURBINE BOX PANEL A (JB70)
GR0133	6.B1		RAIL GROUND	DIN RAIL GROUNDING	TURBINE BOX PANEL A (JB70)
GR0134	6.D1		RAIL GROUND	DIN RAIL GROUNDING	TURBINE BOX PANEL A (JB70)
GR0140	3.B3		RAIL GROUND	DIN RAIL GROUNDING	GENERATOR PANEL (JB72)
GR0141	3.B3		RAIL GROUND	DIN RAIL GROUNDING	GENERATOR PANEL (JB72)
GR0142	3.B3		RAIL GROUND	DIN RAIL GROUNDING	GENERATOR PANEL (JB72)
GR0170	9.A5		RAIL GROUND	DIN RAIL GROUNDING	TURBINE BOX (JB70)
GR0180	12.D6		RAIL GROUND	DIN RAIL GROUNDING	AUXILIARY CONSOLE PANEL
GR0200	12.A3		RAIL LUG	DIN RAIL GROUNDING	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
GR0231	7.D1		RAIL GROUND	DIN RAIL GROUNDING	TURBINE BOX PANEL B (JB70)
GR0232	3.A3		RAIL GROUND	DIN RAIL GROUNDING	TURBINE BOX PANEL B (JB70)
GR0233	7.B1		RAIL GROUND	DIN RAIL GROUNDING	TURBINE BOX PANEL B (JB70)
GR0234	3.A4		RAIL GROUND	DIN RAIL GROUNDING	AUXILIARY CONSOLE (PLC PANEL)
GR0356	12.A3		RAIL GROUND	DIN RAIL GROUNDING	AUXILIARY CONSOLE PANEL
GR0680	5.D5		RAIL GROUND	DIN RAIL GROUNDING	TURBINE BOX PANEL C (JB70)
GR1100	3.A5		RAIL GROUND	DIN RAIL GROUNDING	TURBINE BOX (JB70)
GR1250	92.D3		RAIL GROUND	DIN RAIL GROUNDING	PACK/JB4
H3103	107.B1		HEATER	LUBE OIL TANK HEATER	PACK/LUBE
H4100	99.C1		HEATER, SPACE	GENERATOR, DRIVE END	PACK/GENERATOR DE
H4101	99.C2		HEATER, SPACE	GENERATOR DRIVE END	PACK/GENERATOR DE
H4104	99.C1		HEATER, SPACE	GENERATOR NON DRIVE END	PACK/GENERATOR NDE
H4105	99.C2		HEATER, SPACE	GENERATOR NON DRIVE END	PACK/GENERATOR NDE
H4108	99.D1		HEATER, SPACE	GENERATOR EXCITER	PACK/GENERATOR NDE
H6100	128.C1		SPACE HEATER	ENCLOSURE	PACK/ENCL
HA0273	15.A1		HORN	AUDIBLE ALARM	AUXILIARY CONSOLE
HA0472	33.D1		HORN	AUDIBLE ALARM	TURBINE BOX (JB70)
HAL6730	114.A1		ACOUSTIC/VISUAL ALARM	FIRE SYSTEM DISCHARGE	PACK/GENERAL
HL0171	33.B1		LIGHT	FIRE SYSTEM AUTO	TURBINE BOX (JB70)
HL0172	33.C1		LIGHT	FIRE SYSTEM INHIBIT	TURBINE BOX (JB70)
HL0173	33.C1		LIGHT	FIRE SYSTEM DISCHARGED	TURBINE BOX (JB70)
HL0400	13.A1		LIGHT	READY	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
HL0401	13.A1		LIGHT	STARTING	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
HL0402	13.B1		LIGHT	READY TO LOAD	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
HL0403	13.B1		LIGHT	ON LOAD	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
HL0404	13.C1		LIGHT	SPARE	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
HL0405	13.C1		LIGHT	LOCAL/AUXILIARY SELECT	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
HL0406	13.D1		LIGHT	SPARE	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
HL0407	13.A5		LIGHT	COOLDOWN	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
HL0408	13.A5		LIGHT	STOPPING	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
HL0409	13.B5		LIGHT	ALARM SUMMARY	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
HL0410	14.B5		LIGHT	BACKUP ACTIVE	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
HL0411	13.B5		LIGHT	SHUTDOWN SUMMARY	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
HL0701	21.C2		LIGHT	GENERATOR CIRCUIT BREAKER OPEN	AUXILIARY CONSOLE DOOR (METER AND SWITCH PANELS)
HL0702	21.C2		LIGHT	GENERATOR CIRCUIT BREAKER CLOSED	AUXILIARY CONSOLE DOOR (METER AND SWITCH PANELS)

DEVICE ID	PAGE ZONE	CUSTOMER TAG	COMPONENT DESCRIPTION	SYSTEM FUNCTION	J-BOX or PANEL LOCATION
HL0703	22.A5		LIGHT	GENERATOR SYNCHRONIZING - PHASE A	AUXILIARY CONSOLE DOOR (METER AND SWITCH PANELS)
HL0704	22.A5		LIGHT	GENERATOR SYNCHRONIZING - PHASE C	AUXILIARY CONSOLE DOOR (METER AND SWITCH PANELS)
HL6710	114.B1		VISUAL ALARM	FIRE SYSTEM DISCHARGE	PACK/GENERAL
IEG0050	8.B5		BUS BAR	INSTRUMENT EARTH (SHIELDING)	TURBINE BOX PANEL B (JB70)
IEG0060	7.D5		BUS BAR	INSTRUMENT EARTH (SHIELDING)	TURBINE BOX PANEL B (JB70)
IEG0061	7.D6		BUS BAR	INSTRUMENT EARTH (SHIELDING)	TURBINE BOX PANEL B (JB70)
IEG0070	7.B3		BUS BAR	INSTRUMENT EARTH (SHIELDING)	TURBINE BOX PANEL B (JB70)
IEG0080	6.D6		BUS BAR	INSTRUMENT EARTH (SHIELDING)	TURBINE BOX PANEL A (JB70)
IEG0090	6.B5		BUS BAR	INSTRUMENT EARTH (SHIELDING)	TURBINE BOX PANEL A (JB70)
IEG0120	26.D4		BUS BAR	INSTRUMENT EARTH (SHIELDING)	GENERATOR BOX (JB72)
IEG0130	3.B2		BUS BAR	GENERATOR - INSTRUMENT EARTH GROUNDING	GENERATOR PANEL (JB72)
IEG0180	12.D6		BUS BAR	INSTRUMENT EARTH (SHIELDING)	AUXILIARY CONSOLE PANEL
IEG0230	3.A2		BUS BAR	PANEL B - INSTRUMENT EARTH GROUNDING	TURBINE BOX PANEL B (JB70)
IEG0356	3.D6		BUS BAR	INSTRUMENT EARTH GROUNDING	AUXILIARY CONSOLE PANEL
INSCON-ENET-IN	4.C4		ETHERNET INPUT	INSIGHT CONNECT	CUST CONTROL ROOM/INSIGHT CONNECT
INSCON-ENET-OUT	4.B5		ETHERNET OUTPUT	INSIGHT CONNECT	CUST CONTROL ROOM/INSIGHT CONNECT
INSCON-PWR	4.B4		POWER INPUT	INSIGHT POWER	CUST CONTROL ROOM/INSIGHT CONNECT
IT6211	126.B2		CURRENT TRANSMITTER	MONITOR VENTILATION FAN, DRIVER #1	EER MCC/AC CONTACTOR
IT6241	126.D2		CURRENT TRANSMITTER	MONITOR VENTILATION FAN, DRIVER #1	EER MCC/AC CONTACTOR
IT6242	127.D2		CURRENT TRANSMITTER	MONITOR VENTILATION FAN, DRIVER #2	MCC/AC CONTACTOR
KA00910	128.B5		CONTACT, NORMALLY OPEN	ENCLOSURE SPACE HEATER	TURBINE BOX PANEL A (JB70)
KA00910	128.B5		RELAY	ENCLOSURE SPACE HEATER	TURBINE BOX PANEL A (JB70)
KA0121	28.A5		RELAY	AUTOMATIC CLOSE CIRCUIT BREAKER	GENERATOR PANEL (JB72)
KA0121	29.C4		CONTACT, NORMALLY OPEN	AUTOMATIC CLOSE CIRCUIT BREAKER	GENERATOR PANEL (JB72)
KA0123	25.B5		CONTACT, NORMALLY OPEN	CGCM #1 ENABLED	GENERATOR PANEL (JB72)
KA0123	28.B5		RELAY	CGCM #1 ENABLED	GENERATOR PANEL (JB72)
KA0128	28.B5		RELAY	GENERATOR TRIP SUMMARY CIRCUIT BREAKER	GENERATOR PANEL (JB72)
KA0128	29.B4		CONTACT, NORMALLY OPEN	GENERATOR TRIP SUMMARY CIRCUIT BREAKER	GENERATOR PANEL (JB72)
KA0128	30.C6		CONTACT, NORMALLY OPEN	GENERATOR TRIP SUMMARY CIRCUIT BREAKER	GENERATOR PANEL (JB72)
KA0130	20.C5		RELAY	LOWSPEED/OPEN PROBE SETPOINT	TURBINE BOX PANEL A (JB70)
KA0130	20.D6		CONTACT, NORMALLY OPEN	LOWSPEED/OPEN PROBE SETPOINT	TURBINE BOX PANEL A (JB70)
KA0131	18.B6		RELAY	CONTROLLER ACTIVE	TURBINE BOX PANEL A (JB70)
KA0131	18.D4		CONTACT, NORMALLY CLOSED	CONTROLLER ACTIVE	TURBINE BOX PANEL A (JB70)
KA0131	18.D4		CONTACT, NORMALLY OPEN	CONTROLLER ACTIVE	TURBINE BOX PANEL A (JB70)
KA0132	18.A3		CONTACT, NORMALLY CLOSED	CONTROLLER ACTIVE	TURBINE BOX PANEL A (JB70)
KA0132	18.B6		RELAY	CONTROLLER ACTIVE	TURBINE BOX PANEL A (JB70)
KA0132	18.D4		CONTACT, NORMALLY CLOSED	CONTROLLER ACTIVE	TURBINE BOX PANEL A (JB70)
KA0132	18.D4		CONTACT, NORMALLY OPEN	CONTROLLER ACTIVE	TURBINE BOX PANEL A (JB70)
KA0133	18.A3		CONTACT, NORMALLY CLOSED	POST LUBE NOT REQUIRED	TURBINE BOX PANEL A (JB70)
KA0133	18.C6		RELAY	POST LUBE NOT REQUIRED	TURBINE BOX PANEL A (JB70)
KA0134	18.C6		RELAY	BACKUP COMMAND OFF	TURBINE BOX PANEL A (JB70)
KA0134	18.D3		CONTACT, NORMALLY OPEN	BACKUP COMMAND OFF	TURBINE BOX PANEL A (JB70)
KA0135	18.D6		RELAY	AC PRE/POST PUMP DRIVE	TURBINE BOX PANEL A (JB70)
KA0135	102.A5		CONTACT, NORMALLY CLOSED	AC PRE/POST PUMP DRIVE	TURBINE BOX PANEL A (JB70)
KA0136	18.B3		CONTACT, NORMALLY OPEN	LUBE OIL HEADER PRESSURE HIGH	TURBINE BOX PANEL A (JB70)
KA0136	18.B4		CONTACT, NORMALLY OPEN	LUBE OIL HEADER PRESSURE HIGH	TURBINE BOX PANEL A (JB70)
KA0136	18.D6		RELAY	LUBE OIL HEADER PRESSURE HIGH	TURBINE BOX PANEL A (JB70)
KA0137	18.D3		CONTACT, NORMALLY OPEN	LUBE PUMP INHIBIT	TURBINE BOX PANEL A (JB70)
KA0137	18.D3		CONTACT, NORMALLY OPEN	LUBE PUMP INHIBIT	TURBINE BOX PANEL A (JB70)
KA0137	18.D6		RELAY	LUBE PUMP INHIBIT	TURBINE BOX PANEL A (JB70)
KA0138	18.B5		CONTACT, NORMALLY OPEN	BACKUP LUBE OIL PUMP OFF	TURBINE BOX PANEL A (JB70)
KA0138	18.D6		RELAY	BACKUP LUBE OIL PUMP OFF	TURBINE BOX PANEL A (JB70)
KA0138	104.C5		CONTACT, NORMALLY OPEN	BACKUP LUBE OIL PUMP OFF	TURBINE BOX PANEL A (JB70)
KA0141	18.C2		CONTACT, NORMALLY OPEN	CONTROLLER ACTIVE	TURBINE BOX PANEL A (JB70)
KA0141	18.C6		RELAY	CONTROLLER ACTIVE	TURBINE BOX PANEL A (JB70)
KA0144	18.C6		RELAY	AC PRE/POST PUMP DRIVE	TURBINE BOX PANEL A (JB70)
KA0144	126.A6		CONTACT, NORMALLY CLOSED	AC PRE/POST PUMP DRIVE	TURBINE BOX PANEL A (JB70)
KA0172	9.B2		RELAY	FIRE DETECTED (CUSTOMER)	TURBINE BOX (JB70)
KA0172	114.D6		CONTACT, NORMALLY CLOSED	FIRE DETECTED (CUSTOMER)	TURBINE BOX (JB70)
KA0174	9.C2		RELAY	GAS DETECTED (CUSTOMER)	TURBINE BOX (JB70)
KA0174	114.D6		CONTACT, NORMALLY CLOSED	GAS DETECTED (CUSTOMER)	TURBINE BOX (JB70)
KA0176	126.A6		CONTACT, NORMALLY OPEN	VENTILATION REQUIRED	TURBINE BOX (JB70)
KA0176	126.B5		RELAY	VENTILATION REQUIRED	TURBINE BOX (JB70)
KA0176	126.C6		CONTACT, NORMALLY OPEN	VENTILATION REQUIRED	TURBINE BOX (JB70)
KA0177	126.B5		RELAY	VENTILATION REQUIRED	TURBINE BOX (JB70)
KA0177	127.C6		CONTACT, NORMALLY OPEN	VENTILATION REQUIRED	TURBINE BOX (JB70)
KA0178	33.D5		CONTACT, NORMALLY OPEN	LOCAL HORN CONTROL (EQP)	TURBINE BOX (JB70)
KA0178	33.D5		RELAY	LOCAL HORN CONTROL (EQP)	TURBINE BOX (JB70)
KA0180	22.B6		CONTACT, NORMALLY OPEN	90% SPEED	AUXILIARY CONSOLE PANEL
KA0180	31.A5		CONTACT, NORMALLY OPEN	90% SPEED	AUXILIARY CONSOLE PANEL
KA0180	31.A5		RELAY	90% SPEED	AUXILIARY CONSOLE PANEL
KA0185	29.C2		CONTACT, NORMALLY OPEN	PERMISSIVE CLOSE CIRCUIT BREAKER	BOP EER/AUXILIARY CONSOLE
KA0185	29.C2		RELAY	PERMISSIVE CLOSE CIRCUIT BREAKER	BOP EER/AUXILIARY CONSOLE
KA0185	31.A5		RELAY	PERMISSIVE CLOSE CIRCUIT BREAKER	AUXILIARY CONSOLE PANEL
KA0221	63.B6		CONTACT, NORMALLY OPEN	PRIMARY GAS FUEL SHUTOFF VALVE	TURBINE BOX PANEL A (JB70)
KA0221	63.B6		RELAY	PRIMARY GAS FUEL SHUTOFF VALVE	TURBINE BOX PANEL A (JB70)
KA0222	64.A6		CONTACT, NORMALLY OPEN	SECONDARY GAS FUEL SHUTOFF VALVE	TURBINE BOX PANEL B (JB70)
KA0222	64.A6		RELAY	SECONDARY GAS FUEL SHUTOFF VALVE	TURBINE BOX PANEL B (JB70)
KA0231	19.A4		CONTACT, NORMALLY OPEN	CONTROLLER ACTIVE	TURBINE BOX PANEL B (JB70)
KA0231	19.C6		CONTACT, NORMALLY OPEN	CONTROLLER ACTIVE	TURBINE BOX PANEL B (JB70)

Reference Designator Index (Electrical)

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B | SHT REV B
SHEET 137 OF 141

SWBNO-1

DEVICE ID	PAGE ZONE	CUSTOMER TAG	COMPONENT DESCRIPTION	SYSTEM FUNCTION	J-BOX or PANEL LOCATION
KA0231	19.C6		RELAY	CONTROLLER ACTIVE	TURBINE BOX PANEL B (JB70)
KA0232	19.D6		RELAY	CONTROLLER ACTIVE	TURBINE BOX PANEL B (JB70)
KA0232	33.D6		CONTACT, NORMALLY CLOSED	CONTROLLER ACTIVE	TURBINE BOX PANEL B (JB70)
KA0232	99.A5		CONTACT, NORMALLY OPEN	CONTROLLER ACTIVE	TURBINE BOX PANEL B (JB70)
KA0232	126.A6		CONTACT, NORMALLY CLOSED	CONTROLLER ACTIVE	TURBINE BOX PANEL B (JB70)
KA0233	19.D6		RELAY	CONTROLLER ACTIVE	TURBINE BOX PANEL B (JB70)
KA0233	42.B5		CONTACT, NORMALLY OPEN	CONTROLLER ACTIVE	TURBINE BOX PANEL B (JB70)
KA0233	44.B5		CONTACT, NORMALLY OPEN	CONTROLLER ACTIVE	TURBINE BOX PANEL B (JB70)
KA0234	19.D6		RELAY	CONTROLLER ACTIVE	TURBINE BOX PANEL B (JB70)
KA0234	43.B5		CONTACT, NORMALLY OPEN	CONTROLLER ACTIVE	TURBINE BOX PANEL B (JB70)
KA0235	19.A2		RELAY	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0235	19.A5		CONTACT, NORMALLY OPEN	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0235	63.B5		CONTACT, NORMALLY OPEN	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0236	19.B2		RELAY	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0236	19.D4		CONTACT, NORMALLY CLOSED	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0236	64.A5		CONTACT, NORMALLY OPEN	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0237	19.B2		RELAY	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0237	59.B5		CONTACT, NORMALLY OPEN	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0237	61.B5		CONTACT, NORMALLY OPEN	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0238	19.B2		RELAY	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0238	75.B5		CONTACT, NORMALLY OPEN	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0238	76.A7		CONTACT, NORMALLY OPEN	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0238	78.B5		CONTACT, NORMALLY OPEN	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0239	19.B2		RELAY	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0239	19.B6		CONTACT, NORMALLY OPEN	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0239	71.A7		CONTACT, NORMALLY OPEN	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0240	19.B2		RELAY	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0240	74.B5		CONTACT, NORMALLY OPEN	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0240	101.D6		CONTACT, NORMALLY OPEN	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0241	19.A5		CONTACT, NORMALLY OPEN	BACKUP SYSTEM RESET	TURBINE BOX PANEL B (JB70)
KA0241	19.C2		RELAY	BACKUP SYSTEM RESET	TURBINE BOX PANEL B (JB70)
KA0242	19.C2		RELAY	BACKUP SYSTEM RESET	TURBINE BOX PANEL B (JB70)
KA0242	19.C6		CONTACT, NORMALLY OPEN	BACKUP SYSTEM RESET	TURBINE BOX PANEL B (JB70)
KA0242	20.C6		CONTACT, NORMALLY OPEN	BACKUP SYSTEM RESET	TURBINE BOX PANEL B (JB70)
KA0243	19.A3		CONTACT, NORMALLY OPEN	NO FIRE DETECTED	TURBINE BOX PANEL B (JB70)
KA0243	19.B6		CONTACT, NORMALLY OPEN	NO FIRE DETECTED	TURBINE BOX PANEL B (JB70)
KA0243	19.C2		RELAY	NO FIRE DETECTED	TURBINE BOX PANEL B (JB70)
KA0244	19.D2		RELAY	NO FIRE DETECTED	TURBINE BOX PANEL B (JB70)
KA0244	19.D4		CONTACT, NORMALLY CLOSED	NO FIRE DETECTED	TURBINE BOX PANEL B (JB70)
KA0244	126.C5		CONTACT, NORMALLY OPEN	NO FIRE DETECTED	TURBINE BOX PANEL B (JB70)
KA0245	19.A4		CONTACT, NORMALLY OPEN	NO GAS DETECTED	TURBINE BOX PANEL B (JB70)
KA0245	19.B6		CONTACT, NORMALLY OPEN	NO GAS DETECTED	TURBINE BOX PANEL B (JB70)
KA0245	19.D2		RELAY	NO GAS DETECTED	TURBINE BOX PANEL B (JB70)
KA0246	19.D2		RELAY	NO FIRE DETECTED	TURBINE BOX PANEL B (JB70)
KA0246	126.A5		CONTACT, NORMALLY OPEN	NO FIRE DETECTED	TURBINE BOX PANEL B (JB70)
KA0247	19.D2		RELAY	NO FIRE DETECTED	TURBINE BOX PANEL B (JB70)
KA0247	127.C5		CONTACT, NORMALLY OPEN	NO FIRE DETECTED	TURBINE BOX PANEL B (JB70)
KA0248	19.C2		RELAY	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0248	20.C6		CONTACT, NORMALLY CLOSED	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0249	19.D2		RELAY	NO GAS DETECTED	TURBINE BOX PANEL B (JB70)
KA0249	126.A6		CONTACT, NORMALLY CLOSED	NO GAS DETECTED	TURBINE BOX PANEL B (JB70)
KA0250	19.C2		RELAY	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0250	77.B6		CONTACT, NORMALLY OPEN	NO EMERGENCY SHUTDOWN SUMMARY	TURBINE BOX PANEL B (JB70)
KA0310	25.B5		RELAY	CGCM *1 FAULT	GENERATOR PANEL (JB72)
KA0310	29.B4		CONTACT, NORMALLY OPEN	CGCM *1 FAULT	GENERATOR PANEL (JB72)
KA0310	30.B6		CONTACT, NORMALLY OPEN	CGCM *1 FAULT	GENERATOR PANEL (JB72)
KA0313	28.A5		RELAY	PMG INPUT *1	GENERATOR PANEL (JB72)
KA0313	111.A6		CONTACT, NORMALLY OPEN	PMG INPUT *1	GENERATOR PANEL (JB72)
KA0313	111.A6		CONTACT, NORMALLY OPEN	PMG INPUT *1	GENERATOR PANEL (JB72)
KA0314	28.A5		RELAY	PMG INPUT *1	GENERATOR PANEL (JB72)
KA0314	111.A6		CONTACT, NORMALLY OPEN	PMG INPUT *1	GENERATOR PANEL (JB72)
KA0330	29.B6		RELAY	CLOSED CIRCUIT BREAKER	GENERATOR PANEL (JB72)
KA0330	30.A6		CONTACT, NORMALLY OPEN	CLOSED CIRCUIT BREAKER	GENERATOR PANEL (JB72)
KA0331	29.C6		RELAY	MAIN UTILITY BREAKER AUXILIARY CONTACT CLOSED	GENERATOR PANEL (JB72)
KA0331	30.A6		CONTACT, NORMALLY OPEN	MAIN UTILITY BREAKER AUXILIARY CONTACT CLOSED	GENERATOR PANEL (JB72)
KA0332	29.C6		RELAY	CLOSE CONTROL CIRCUIT BREAKER	GENERATOR PANEL (JB72)
KA0332	30.D6		CONTACT, NORMALLY OPEN	CLOSE CONTROL CIRCUIT BREAKER	GENERATOR PANEL (JB72)
KA0333	29.B6		RELAY	TRIP CONTROL CIRCUIT BREAKER	GENERATOR PANEL (JB72)
KA0333	30.D6		CONTACT, NORMALLY OPEN	TRIP CONTROL CIRCUIT BREAKER	GENERATOR PANEL (JB72)
KA0335	25.C5		RELAY	NO EMERGENCY SHUTDOWN SUMMARY	GENERATOR PANEL (JB72)
KA0335	29.B4		CONTACT, NORMALLY CLOSED	NO EMERGENCY SHUTDOWN SUMMARY	GENERATOR PANEL (JB72)
KA0335	30.D6		CONTACT, NORMALLY CLOSED	NO EMERGENCY SHUTDOWN SUMMARY	GENERATOR PANEL (JB72)
KA0336	25.C3		RELAY	CONTROLLER ACTIVE	GENERATOR PANEL (JB72)
KA0364	22.C1		RELAY	SYNCHRONIZATION CHECK	AUXILIARY CONSOLE PANEL
KA0364	31.B6		CONTACT, NORMALLY OPEN	SYNCHRONIZATION CHECK	AUXILIARY CONSOLE PANEL
KA0364	32.A6		CONTACT, NORMALLY OPEN	SYNCHRONIZATION CHECK	AUXILIARY CONSOLE PANEL
KA0505	39.A5		RELAY	CLOSE LIQUID FUEL BLOCK VALVE	TURBINE BOX PANEL B (JB70)
KA0505	39.B5		CONTACT, NORMALLY OPEN	CLOSE LIQUID FUEL BLOCK VALVE	TURBINE BOX PANEL B (JB70)
KA0875	9.D2		RELAY	LOCAL HORN CONTROL (PLC)	TURBINE BOX (JB70)
KA0875	33.D6		CONTACT, NORMALLY OPEN	LOCAL HORN CONTROL (PLC)	TURBINE BOX (JB70)
KA1020	36.A5		RELAY	IGNITION START	TURBINE BOX PANEL B (JB70)
KA1020	41.A5		CONTACT, NORMALLY OPEN	IGNITION START	TURBINE BOX PANEL B (JB70)
KA1020	41.A5		CONTACT, NORMALLY OPEN	IGNITION START	TURBINE BOX PANEL B (JB70)
KA2160	38.A5		CONTACT, NORMALLY OPEN	CLOSE GAS BLOCK VALVE	TURBINE BOX PANEL A (JB70)

DEVICE ID	PAGE ZONE	CUSTOMER TAG	COMPONENT DESCRIPTION	SYSTEM FUNCTION	J-BOX or PANEL LOCATION
KA2160	38.A5		RELAY	CLOSE GAS BLOCK VALVE	TURBINE BOX PANEL A (JB70)
KA2161	38.B5		CONTACT, NORMALLY OPEN	OPEN GAS BLEED VALVE	TURBINE BOX PANEL A (JB70)
KA2161	38.B5		RELAY	OPEN GAS BLEED VALVE	TURBINE BOX PANEL A (JB70)
KA2645	82.B5		RELAY	LF MANIFOLD PURGE PCD COOLER	TURBINE BOX PANEL B (JB70)
KA2645	82.C5		CONTACT, NORMALLY OPEN	LF MANIFOLD PURGE PCD COOLER	TURBINE BOX PANEL B (JB70)
KA3103	107.A5		CONTACT, NORMALLY OPEN	LUBE OIL TANK HEATER	TURBINE BOX PANEL A (JB70)
KA3103	107.A5		RELAY	LUBE OIL TANK HEATER	TURBINE BOX PANEL A (JB70)
KA3220	105.A5		CONTACT, NORMALLY OPEN	LUBE OIL COOLER FAN	TURBINE BOX PANEL A (JB70)
KA3220	105.B5		RELAY	LUBE OIL COOLER FAN	TURBINE BOX PANEL A (JB70)
KA3221	105.C5		CONTACT, NORMALLY OPEN	LUBE OIL COOLER FAN *2	TURBINE BOX PANEL A (JB70)
KA3221	105.C5		RELAY	LUBE OIL COOLER FAN *2	TURBINE BOX PANEL A (JB70)
KA3420	94.B5		RELAY	GENERATOR JACKING OIL	TURBINE BOX PANEL A (JB70)
KA3420	94.C5		CONTACT, NORMALLY OPEN	GENERATOR JACKING OIL	TURBINE BOX PANEL A (JB70)
KA4100	99.A5		CONTACT, NORMALLY CLOSED	GENERATOR HEATER DISABLED	TURBINE BOX PANEL B (JB70)
KA4100	99.A6		RELAY	GENERATOR HEATER DISABLED	TURBINE BOX PANEL B (JB70)
KA6211	126.A5		CONTACT, NORMALLY OPEN	DRIVER ENCLOSURE VENT FAN *1	TURBINE BOX PANEL A (JB70)
KA6211	126.A6		RELAY	DRIVER ENCLOSURE VENT FAN *1	TURBINE BOX PANEL A (JB70)
KA6241	126.C5		CONTACT, NORMALLY OPEN	EXHAUST ENCLOSURE VENT FAN *1	TURBINE BOX PANEL A (JB70)
KA6241	126.C6		RELAY	EXHAUST ENCLOSURE VENT FAN *1	TURBINE BOX PANEL A (JB70)
KA6242	127.C5		CONTACT, NORMALLY OPEN	EXHAUST ENCLOSURE VENT FAN *2	TURBINE BOX PANEL A (JB70)
KA6242	127.C6		RELAY	EXHAUST ENCLOSURE VENT FAN *2	TURBINE BOX PANEL A (JB70)
KA6510	33.A5		RELAY	FIRE SYSTEM AUTO/INHIBIT	TURBINE BOX (JB70)
KA6510	117.A6		CONTACT, NORMALLY CLOSED	FIRE SYSTEM AUTO/INHIBIT	TURBINE BOX (JB70)
KA6511	33.A5		RELAY	FIRE SYSTEM AUTO/INHIBIT	TURBINE BOX (JB70)
KA6511	117.C6		CONTACT, NORMALLY CLOSED	FIRE SYSTEM AUTO/INHIBIT	TURBINE BOX (JB70)
KA7500	31.B2		CONTACT	AUTOMATIC SYNCHRONIZE INITIATE (CUSTOMER)	UCP/PDCS
KA9001	130.A5		RELAY	SPARE	UCP/PANEL
KA9001	130.A6		CONTACT, NORMALLY OPEN	SPARE	UCP/PANEL
KA9002	130.A6		CONTACT, NORMALLY OPEN	SPARE	UCP/PANEL
KA9002	130.B5		RELAY	SPARE	UCP/PANEL
KA9003	130.B5		RELAY	SPARE	UCP/PANEL
KA9003	130.B6		CONTACT, NORMALLY OPEN	SPARE	UCP/PANEL
KA9004	130.B6		CONTACT, NORMALLY OPEN	SPARE	UCP/PANEL
KA9004	130.C5		RELAY	SPARE	UCP/PANEL
KA9005	130.C5		RELAY	SPARE	UCP/PANEL
KA9005	130.C6		CONTACT, NORMALLY OPEN	SPARE	UCP/PANEL
KA9006	130.C5		RELAY	SPARE	UCP/PANEL
KA9006	130.C6		CONTACT, NORMALLY OPEN	SPARE	UCP/PANEL
KA9007	130.D5		RELAY	SPARE	UCP/PANEL
KA9007	130.D6		CONTACT, NORMALLY OPEN	SPARE	UCP/PANEL
KA9011	131.A5		CONTACT, NORMALLY OPEN	SPARE	UCP/PANEL
KA9011	131.A6		RELAY	SPARE	UCP/PANEL
KA9012	131.A6		RELAY	SPARE	UCP/PANEL
KA9012	131.B5		CONTACT, NORMALLY OPEN	SPARE	UCP/PANEL
KA9013	131.B5		CONTACT, NORMALLY OPEN	SPARE	UCP/PANEL
KA9013	131.B6		RELAY	SPARE	UCP/PANEL
KA9014	131.C5		CONTACT, NORMALLY OPEN	SPARE	UCP/PANEL
KA9014	131.C6		RELAY	SPARE	UCP/PANEL
KA9015	131.C5		CONTACT, NORMALLY OPEN	SPARE	UCP/PANEL
KA9015	131.C6		RELAY	SPARE	UCP/PANEL
KA9016	131.D5		CONTACT, NORMALLY OPEN	SPARE	UCP/PANEL
KA9016	131.D6		RELAY	SPARE	UCP/PANEL
KA9600	29.A2		RELAY	GENERATOR PROTECTION RELAY COOLDOWN SHUTDOWN	PACK/SWITCHGEAR
KA9601	29.A2		RELAY	GENERATOR PROTECTION RELAY FAST STOP SHUTDOWN	PACK/SWITCHGEAR
KA9602	29.B2		RELAY	GENERATOR AUXILIARY CIRCUIT BREAKER	PACK/SWITCHGEAR
KA9603	29.C2		RELAY	MAIN UTILITY AUXILIARY CIRCUIT BREAKER	PACK/SWITCHGEAR
KM2645	82.B3		CONTACTOR RELAY	LIQUID FUEL MANIFOLD PURGE PCD COOLER MOTOR	EER MCC/AC CONTACTOR
KM3103	107.A3		CONTACTOR RELAY	LUBE OIL TANK HEATER	EER MCC/AC CONTACTOR
KM3150	102.A3		CONTACTOR RELAY	AC PRE/POST LUBE PUMP DRIVE	EER MCC/AC CONTACTOR
KM3170	104.B3		CONTACTOR RELAY	DC BACKUP LUBE OIL PUMP DRIVE	EER/DC CONTACTOR
KM3220	105.A3		CONTACTOR RELAY	LUBE OIL COOLER FAN	EER MCC/AC CONTACTOR
KM3221	105.C3		CONTACTOR RELAY	LUBE OIL COOLER FAN *2	EER MCC/AC CONTACTOR
KM3420	94.B3		CONTACTOR RELAY	GENERATOR JACKING OIL	EER MCC/AC CONTACTOR
KM4100	99.A3		CONTACTOR RELAY	MOTOR CONTACTOR RELAY	EER MCC/AC CONTACTOR
KM6100	128.B3		CONTACTOR RELAY	ENCLOSURE SPACE HEATER	EER MCC/AC CONTACTOR
KM6211	126.A3		CONTACTOR RELAY	DRIVER VENTILATION FAN *1	EER MCC/AC CONTACTOR
KM6241	126.C3		CONTACTOR RELAY	EXHAUST VENTILATION FAN *1	EER MCC/AC CONTACTOR
KM6242	127.C3		CONTACTOR RELAY	EXHAUST VENTILATION FAN *2	MCC/AC CONTACTOR
KT0140	18.A2		CONTACT, NORMALLY OPEN	BACKUP PUMP POST LUBE OFF CYCLE	TURBINE BOX PANEL A (JB70)
KT0140	18.A6		TIMER RELAY	BACKUP PUMP POST LUBE OFF CYCLE	TURBINE BOX PANEL A (JB70)
KT0140	18.D1		CONTACT, NORMALLY CLOSED	BACKUP PUMP POST LUBE OFF CYCLE	TURBINE BOX PANEL A (JB70)
KT0141	18.A6		TIMER RELAY	BACKUP POST LUBE CONTINUOUS	TURBINE BOX PANEL A (JB70)
KT0141	18.D2		CONTACT, NORMALLY OPEN	BACKUP POST LUBE CONTINUOUS	TURBINE BOX PANEL A (JB70)
KT0142	18.A6		TIMER RELAY	TOTAL POST LUBE	TURBINE BOX PANEL A (JB70)
KT0142	18.D2		CONTACT, NORMALLY OPEN	TOTAL POST LUBE	TURBINE BOX PANEL A (JB70)
KT0143	18.A5		CONTACT, NORMALLY CLOSED	BACKUP PUMP POST LUBE ON CYCLE	TURBINE BOX PANEL A (JB70)
KT0143	18.A6		TIMER RELAY	BACKUP PUMP POST LUBE ON CYCLE	TURBINE BOX PANEL A (JB70)
KT0144	18.B6		TIMER RELAY	HEADER PRESSURE HIGH BACKUP PUMP OFF	TURBINE BOX PANEL A (JB70)
KT0144	18.D2		CONTACT, NORMALLY OPEN	HEADER PRESSURE HIGH BACKUP PUMP OFF	TURBINE BOX PANEL A (JB70)

Solar® Turbines
A Caterpillar Company

Reference Designator Index (Electrical)

DRAWING NO. 4F491-149447
DWG REV B | SHT REV B
SHEET 138 OF 141

SWBNO-1

DEVICE ID	PAGE ZONE	CUSTOMER TAG	COMPONENT DESCRIPTION	SYSTEM FUNCTION	J-BOX or PANEL LOCATION
KT0145	18.B6		TIMER RELAY	FIRE DETECTED ROLLDOWN LUBE	TURBINE BOX PANEL A (JB70)
KT0145	18.D2		CONTACT, NORMALLY OPEN	FIRE DETECTED ROLLDOWN LUBE	TURBINE BOX PANEL A (JB70)
KT0146	18.B2		TIMER RELAY	WATCHDOG	TURBINE BOX PANEL A (JB70)
KT0146	19.C6		CONTACT, NORMALLY OPEN	WATCHDOG	TURBINE BOX PANEL A (JB70)
LS2211	70.C1		LEVEL SWITCH	COALESCER LEVEL SWITCH	FUEL/LIQUID FUEL COALESCER
LS2260	87.B1		LEVEL SWITCH	LIQUID FUEL PURGE TANK HIGH LEVEL	PACK/FUEL
LS2261	87.C1		LEVEL SWITCH	LIQUID FUEL PURGE TANK LOW LEVEL	PACK/FUEL
LT3100	106.A1		LEVEL TRANSMITTER	TANK OIL LEVEL	PACK/LUBE
LZ1020	41.A2		EXCITER	IGNITION START	PACK/JB16
M1300	40.B1		MOTOR	TURBINE DIRECT MOUNT AC START	PACK/START
M2220	71.B1		MOTOR	MAIN FUEL PUMP DRIVE	PACK/FUEL
M2240	76.B1		MOTOR	PILOT FUEL PUMP DRIVE	FUEL/LIQUID FUEL PILOT
M2610	85.B1		MOTOR	WATER PURGE MOTOR	FIELD/WATER PURGE
M2645	82.C1		MOTOR	LIQUID FUEL MANIFOLD PURGE PCD COOLER MOTOR	PACK/FUEL
M3150	102.B1		MOTOR	AC PRE/POST LUBE PUMP MOTOR	PACK/LUBE
M3170	104.D1		MOTOR	DC BACKUP LUBE PUMP MOTOR	PACK/LUBE
M3220	105.B1		MOTOR	LUBE OIL COOLER FAN #1	FIELD/LUBE OIL COOLER
M3221	105.D1		MOTOR	LUBE OIL COOLER FAN #2	FIELD/LUBE OIL COOLER
M3420	94.C1		MOTOR	GENERATOR JACKING OIL	PACK/LUBE
M6211	126.B1		MOTOR	VENTILATION FAN, DRIVER #1, INLET	PACK/ENCLOSURE VENT FANS
M6241	126.C1		MOTOR	VENTILATION FAN, DRIVER #1 EXHAUST	PACK/ENCLOSURE VENT FANS
M6242	127.C1		MOTOR	VENTILATION FAN, DRIVER #2 EXHAUST	PACK/ENCLOSURE VENT FANS
-MCT1	112.B1		CURRENT TRANSFORMER	METERING CURRENT	GEN/CT
-MCT2	112.B1		CURRENT TRANSFORMER	METERING CURRENT	GEN/CT
-MCT3	112.B1		CURRENT TRANSFORMER	METERING CURRENT	GEN/CT
NCONN	112.D1		BUS BAR	NEUTRAL 3 PHASE TIE, PART OF GENERATOR	GEN/CT
NGRCT	112.D1		CURRENT TRANSFORMER	METERING CURRENT	NGR/SWITCHGEAR
PA0700	22.B2		AMMETER	CURRENT MEASUREMENT	AUXILIARY CONSOLE DOOR (METER AND SWITCH PANELS)
PA0701	21.A1		AMMETER	EXCITER FIELD CURRENT	AUXILIARY CONSOLE DOOR (METER AND SWITCH PANELS)
PA0703	22.A4		METER	POWER	AUXILIARY CONSOLE DOOR (METER AND SWITCH PANELS)
PA0771	22.C3		WATT METER	POWER FACTOR	AUXILIARY CONSOLE DOOR (METER AND SWITCH PANELS)
PC0470	36.B5		TIMER/COUNTER	ENGINE HOUR / START COUNTER	TURBINE BOX PANEL A (JB70)
PC0471	36.C5		METER/COUNTER	LIQUID FUEL COUNTER HOUR/START	TURBINE BOX PANEL B (JB70)
PC0472	36.B5		TIMER/COUNTER	OVERFIRING HOUR/COUNTER	UCP/PANEL
PDS1500	51.D1		PRESSURE DIFF SWITCH	FLAMEOUT PROTECTION	PACK/TURB
PDT1110	53.C1		PRESSURE DIFF TRANSMITTER	TURBINE AIR INLET DUCT LOSSES	PACK/TURB
PDT1112	53.D1		PRESSURE DIFF TRANSMITTER	MONITOR AIR INLET HOUSING DELTA PRESSURE (P1.1)	PACK/TURB
PDT1153	52.C1		PRESSURE DIFF TRANSMITTER	COMBUSTOR DELTA PRESSURE	PACK/TURB
PDT1190	52.A1		PRESSURE DIFF TRANSMITTER	ENGINE 8TH STAGE DELTA PRESSURE	PACK/TURB
PDT1191	52.A1		PRESSURE DIFF TRANSMITTER	ENGINE 11TH STAGE DELTA PRESSURE	PACK/TURB
PDT1192	52.B1		PRESSURE DIFF TRANSMITTER	ENGINE 12TH STAGE DELTA PRESSURE	PACK/TURB
PDT2201	70.A1		PRESSURE DIFF TRANSMITTER	LIQUID FUEL FILTER	FUEL/LIQUID FUEL FILTER
PDT2211	70.C1		PRESSURE DIFF TRANSMITTER	LIQUID FUEL COALESCER FILTER DIFFERENTIAL PRESSURE	FUEL/LIQUID FUEL COALESCER
PDT3621	95.A1		PRESSURE DIFF TRANSMITTER	DRIVE END BEARING HOUSING SEAL AIR DELTA-P TRANSMITTER (INNER SEAL)	PACK/LUBE
PDT3622	95.A1		PRESSURE DIFF TRANSMITTER	DRIVE END BEARING HOUSING SEAL AIR DELTA-P TRANSMITTER (OUTER SEAL)	PACK/LUBE
PDT3631	95.B1		PRESSURE DIFF TRANSMITTER	EXCITER END BEARING HOUSING SEAL AIR DELTA-P TRANSMITTER (INNER SEAL)	PACK/LUBE
PDT3632	95.B1		PRESSURE DIFF TRANSMITTER	EXCITER END BEARING HOUSING SEAL AIR DELTA-P TRANSMITTER (OUTER SEAL)	PACK/LUBE
PDT6180	122.A1		PRESSURE DIFF TRANSMITTER	ENCLOSURE PRESSURE DELTA (PRIMARY)	PACK/GENERAL
PDT6210	125.A1		PRESSURE DIFF TRANSMITTER	ENCLOSURE VENT FILTER	PACK/ENCLOSURE (INTERIOR)
PDT6310	129.A1		PRESSURE DIFF TRANSMITTER	TURBINE AIR INLET FILTER	PACK/ANCILLARY
PE1520	55.A1		PRESSURE ELEMENT	COMBUSTOR PRESSURE MONITOR	PACK/COMBUSTOR PRESSURE MONITOR
PEG	99.D3		PHYSICAL EARTH GROUND BAR	GENERATOR +GB	PACK/GENERATOR JB02
PEG0130	3.A2		BUS BAR	PANEL A - POWER EARTH GROUNDING	TURBINE BOX PANEL A (JB70)
PEG0140	3.B2		BUS BAR	GENERATOR - POWER EARTH GROUNDING	GENERATOR PANEL (JB72)
PEG0356	3.D6		BUS BAR	POWER EARTH GROUNDING	AUXILIARY CONSOLE PANEL
PEGCCC	113.B2		EARTH POTENTIAL	CROSS CURRENT COMPENSATION GROUND	FIELD/CCC UNIT 3
PEGXC2	110.D3		EARTH POTENIAL	SWITCHGEAR GROUND	PACK/SWITCHGEAR
PF0700	22.A4		GAGE	SYNCHROSCOPE	AUXILIARY CONSOLE DOOR (METER AND SWITCH PANELS)
PF0701	22.B6		METER	FREQUENCY MEASUREMENT	AUXILIARY CONSOLE DOOR (METER AND SWITCH PANELS)
PS2106	69.A1		PRESSURE SWITCH	LOW GAS PRESSURE, AUTO TRANSFER TO LIQUID	FUEL/LOW GAS SWITCH
PS2610	84.A1		PRESSURE SWITCH	MONITOR WATER SUPPLY PRESSURE	FIELD/WATER PURGE
PS3150	103.B1		PRESSURE SWITCH	AC PRE/POST PUMP CHECK	PACK/LUBE
PS3170	103.A1		PRESSURE SWITCH	BACKUP PUMP LOW PRESSURE TEST	PACK/LUBE
PS3200	101.D1		PRESSURE SWITCH	BACKUP LUBE PUMP ACTIVATION, PLC FAILURE	PACK/LUBE
PS6610	118.C1		PRESSURE SWITCH	CO2 RELEASE CONFIRM	PACK/GENERAL
PS6611	119.A1		PRESSURE SWITCH	CO2 PRIMARY RELEASE CONFIRM CO2 CABINET	FIELD/FIRE SUPPRESSION CABINET
PS6621	119.C1		PRESSURE SWITCH	CO2 EXTENDED RELEASE CONFIRM	FIELD/FIRE SUPPRESSION CABINET
PT BUS A	110.B2		POTENTIAL TRANSFORMER	SWITCHGEAR VOLTAGE	PACK/SWITCHGEAR
PT BUS B	110.B2		POTENTIAL TRANSFORMER	SWITCHGEAR VOLTAGE	PACK/SWITCHGEAR
PT BUS C	110.C2		POTENTIAL TRANSFORMER	SWITCHGEAR VOLTAGE	PACK/SWITCHGEAR
PT GEN A	110.D2		POTENTIAL TRANSFORMER	GENERATOR VOLTAGE	PACK/SWITCHGEAR
PT GEN B	110.D2		POTENTIAL TRANSFORMER	GENERATOR VOLTAGE	PACK/SWITCHGEAR
PT GEN C	110.D2		POTENTIAL TRANSFORMER	GENERATOR VOLTAGE	PACK/SWITCHGEAR
PT1111	53.C1		PRESSURE TRANSMITTER	MONITOR AIR INLET COLLECTOR	PACK/TURB
PT1120	51.A1		PRESSURE TRANSMITTER	MONITOR PCD	PACK/TURB
PT1121	51.B1		PRESSURE TRANSMITTER	MONITOR PCD #2	PACK/TURB
PT1150	52.B1		PRESSURE TRANSMITTER	MONITOR POWER TURBINE INLET PRESSURE (P5.0)	PACK/TURB
PT1170	54.D1		PRESSURE TRANSMITTER	MONITOR TURBINE EXHAUST PRESSURE (P7)	PACK/TURB
PT1197	52.C1		PRESSURE TRANSMITTER	PRE-SWIRLER CAVITY	PACK/TURB
PT1198	52.D1		PRESSURE TRANSMITTER	PRE-SWIRLER CAVITY	PACK/TURB
PT2120	67.A1		PRESSURE TRANSMITTER	GAS FUEL PRESSURE	PACK/FUEL
PT2121	65.A1		PRESSURE TRANSMITTER	GAS VALVE CHECK	PACK/FUEL
PT2126	58.B1		PRESSURE TRANSMITTER	FUEL CONTROL UPSTREAM PRESSURE	PACK/FUEL
PT2130	60.A1		PRESSURE TRANSMITTER	MAIN GAS MANIFOLD FUEL VALVE DISCHARGE PRESSURE #1	PACK/FUEL
PT2131	60.A1		PRESSURE TRANSMITTER	MAIN GAS MANIFOLD FUEL VALVE DISCHARGE PRESSURE #2	PACK/FUEL
PT2140	62.A1		PRESSURE TRANSMITTER	PILOT GAS MANIFOLD FUEL VALVE DISCHARGE PRESSURE #1	PACK/FUEL
PT2141	62.A1		PRESSURE TRANSMITTER	PILOT GAS MANIFOLD FUEL VALVE DISCHARGE PRESSURE #2	PACK/FUEL
PT2220	73.A1		PRESSURE TRANSMITTER	LIQUID FUEL SUPPLY PRESSURE	PACK/FUEL
PT2230	87.A1		PRESSURE TRANSMITTER	LIQUID FUEL DISTRIBUTION MANIFOLD #1 PRESSURE	PACK/FUEL
PT2240	88.A1		PRESSURE TRANSMITTER	LIQUID FUEL DISTRIBUTION MANIFOLD #2 PRESSURE	PACK/FUEL
PT2241	77.B1		PRESSURE TRANSMITTER	LIQUID FUEL PILOT SUPPLY PRESSURE	FUEL/LIQUID FUEL PILOT
PT2645	81.A1		PRESSURE TRANSMITTER	PCD PRESSURE FOR FORWARD PURGE	PACK/FUEL
PT3100	109.A1		PRESSURE TRANSMITTER	LUBE OIL TANK PRESSURE	PACK/LUBE
PT3200	101.C1		PRESSURE TRANSMITTER	LUBE OIL HEADER PRESSURE	PACK/LUBE
PT3240	101.B1		PRESSURE TRANSMITTER	LUBE OIL FILTER INLET PRESSURE TRANSMITTER	PACK/LUBE
PT3620	95.C1		PRESSURE TRANSMITTER	DRIVE END SEAL AIR SUPPLY PRESSURE TRANSMITTER	PACK/LUBE
PT3630	95.D1		PRESSURE TRANSMITTER	EXCITER END SEAL AIR SUPPLY PRESSURE TRANSMITTER	PACK/LUBE
PT6400	57.A1		PRESSURE TRANSMITTER	MONITOR AIR SUPPLY	PACK/GENERAL
PT6410	57.A1		PRESSURE TRANSMITTER	SECONDARY MONITOR AIR SUPPLY	PACK/GENERAL
PV0700	22.C5		VOLTMETER	VOLTAGE MEASUREMEMT	AUXILIARY CONSOLE DOOR (METER AND SWITCH PANELS)
PV0701	21.A1		VOLT METER	EXCITER FIELD VOLTAGE	AUXILIARY CONSOLE DOOR (METER AND SWITCH PANELS)
QS0560	12.A2		CIRCUIT BREAKER	DOUBLE POLE - RAIL MOUNTABLE	AUXILIARY CONSOLE PANEL
QS4000	110.C2		CIRCUIT BREAKER		PACK/SWITCHGEAR
RR0175A	33.B6		RESISTOR	10K OHM	TURBINE BOX (JB70)
RR0175D	33.C6		RESISTOR	10K OHM	TURBINE BOX (JB70)
RR0175I	33.C6		RESISTOR	10K OHM	TURBINE BOX (JB70)
RR0175M	33.B6		RESISTOR	10K OHM	TURBINE BOX (JB70)
RR0175S5	117.A6		RESISTOR	10K OHM	TURBINE BOX (JB70)
RR0176S4	117.B6		RESISTOR	10K OHM	TURBINE BOX (JB70)
RR0176S5	117.D6		RESISTOR	10K OHM	TURBINE BOX (JB70)
RR0176S7	117.C6		RESISTOR	10K OHM	TURBINE BOX (JB70)
RR0178	33.D6		RESISTOR	10K OHM	TURBINE BOX (JB70)
RR0700	89.A6		RESISTOR	10K OHM	TURBINE BOX PANEL B (JB70)
RR0701	89.B6		RESISTOR	10K OHM	TURBINE BOX PANEL B (JB70)
RR0851	16.C6		RESISTOR	3.01K OHM	TURBINE BOX PANEL A (JB70)
RR0852	16.C6		RESISTOR	1.0K OHM	TURBINE BOX PANEL A (JB70)
RR6151	121.A4		RESISTOR	10K OHM	PACK/GENERAL
RR6542	115.B2		RESISTOR	10K OHM	PACK/JB82
RR6610	118.C2		RESISTOR	10K OHM	PACK/JB11
RR6611C	119.B2		RESISTOR	10K OHM	FIELD/FIRE SUPPRESSION CABINET
RR6611O	119.B2		RESISTOR	10K OHM	FIELD/FIRE SUPPRESSION CABINET
RR6611P	119.A2		RESISTOR	10K OHM	FIELD/FIRE SUPPRESSION CABINET
RR6621C	119.C2		RESISTOR	10K OHM	FIELD/FIRE SUPPRESSION CABINET
RR6621O	119.D2		RESISTOR	10K OHM	FIELD/FIRE SUPPRESSION CABINET
RR6621P	119.C2		RESISTOR	10K OHM	FIELD/FIRE SUPPRESSION CABINET
RR6710	114.B2		RESISTOR	10K OHM	PACK/GENERAL
RR6730A	114.A2		RESISTOR	10K OHM	PACK/GENERAL
RR6730L	114.B2		RESISTOR	10K OHM	PACK/GENERAL
RR9661	112.D3		RESISTOR	400A,10 SEC	NGR/SWITCHGEAR
RS0106	21.A4		RESISTIVE SHUNT	EXCITER FIELD CURRENT REGULATOR	AUXILIARY CONSOLE PANEL
RS2220	71.C2		SHUNT RESISTOR	EXTERNAL SNUBBER	EER/VFD
SA0170	33.A1		SELECTOR SWITCH	FIRE SYSTEM AUTO/INHIBIT	TURBINE BOX (JB70)
SA0401	14.C5		SELECTOR SWITCH	BACKUP SYSTEM RESET	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
SA0471	35.B1		SELECTOR SWITCH	SPEED/LOAD	TURBINE BOX (JB70)
SA0472	35.C1		SELECTOR SWITCH	VOLTAGE	TURBINE BOX (JB70)
SA0473	35.D1		SELECTOR SWITCH	OFF/LOCAL/AUXILIARY	TURBINE BOX (JB70)
SA0700	22.A5		SELECTOR SWITCH	MANUAL SYNCHRONIZATION	AUXILIARY CONSOLE DOOR (METER AND SWITCH PANELS)
SA0701	21.C2		SELECTOR SWITCH	CIRCUIT BREAKER CONTROL	AUXILIARY CONSOLE DOOR (METER AND SWITCH PANELS)
SA0710	22.D5		SELECTOR SWITCH	VOLTAGE SELECT	AUXILIARY CONSOLE DOOR (METER AND SWITCH PANELS)
SA0740	22.C3		SELECTOR SWITCH	CURRENT SELECT	AUXILIARY CONSOLE DOOR (METER AND SWITCH PANELS)
SA0770	22.B6		SELECTOR SWITCH	KW/KVAR SELECT	AUXILIARY CONSOLE DOOR (METER AND SWITCH PANELS)
SA6130	120.B2		SELECTOR SWITCH	AC LIGHTING	PACK/JB57
SB0170	33.B1		PUSHBUTTON SWITCH	MANUAL RELEASE	TURBINE BOX (JB70)
SB0400	14.D5		PUSHBUTTON SWITCH	EMERGENCY STOP	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)

Reference Designator Index (Electrical)

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 139 OF 141

SWBNO-1

DEVICE ID	PAGE ZONE	CUSTOMER TAG	COMPONENT DESCRIPTION	SYSTEM FUNCTION	J-BOX or PANEL LOCATION
SB0401	14.D1		PUSHBUTTON SWITCH	HORN SILENCE	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
SB0402	14.D1		PUSHBUTTON SWITCH	ACKNOWLEDGE	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
SB0403	14.A5		PUSHBUTTON SWITCH	RESET	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
SB0404	14.A5		PUSHBUTTON SWITCH	LAMP TEST	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
SB0405	15.D1		PUSHBUTTON SWITCH	START	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
SB0406	15.C1		PUSHBUTTON SWITCH	NORMAL STOP	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
SB0407	15.A5		PUSHBUTTON SWITCH	SPEED/LOAD DECREASE	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
SB0408	15.A5		PUSHBUTTON SWITCH	SPEED/LOAD INCREASE	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
SB0471	34.D1		PUSHBUTTON SWITCH	HORN SILENCE	TURBINE BOX (JB70)
SB0472	35.B1		PUSHBUTTON SWITCH	EMERGENCY STOP	TURBINE BOX (JB70)
SB0473	34.D1		PUSHBUTTON SWITCH	ACKNOWLEDGE	TURBINE BOX (JB70)
SB0474	35.A1		PUSHBUTTON SWITCH	RESET	TURBINE BOX (JB70)
SB7500	31.B2		PUSHBUTTON SWITCH	START AND AUTO-SYNCHRONIZE (CUSTOMER)	UCP/PDCS
SB7510	37.A2		PUSHBUTTON SWITCH	START (CUSTOMER)	UCP/PDCS
SB7511	37.A2		PUSHBUTTON SWITCH	NORMAL STOP (CUSTOMER)	UCP/PDCS
SB7512	37.D2		PUSHBUTTON SWITCH	EMERGENCY STOP (CUSTOMER)	UCP/PDCS
SB7551	37.C2		PUSHBUTTON SWITCH	VOLTAGE INCREASE (CUSTOMER)	UCP/PDCS
SB7552	37.C2		PUSHBUTTON SWITCH	VOLTAGE DECREASE (CUSTOMER)	UCP/PDCS
SB7554	37.B2		PUSHBUTTON SWITCH	SPEED INCREASE (CUSTOMER)	UCP/PDCS
SB7555	37.B2		PUSHBUTTON SWITCH	SPEED DECREASE (CUSTOMER)	UCP/PDCS
SE1260	89.A1		SPEED ELEMENT	GAS PRODUCER SPEED (NGP)	PACK/TURB
SE1261	89.A1		SPEED ELEMENT	GAS PRODUCER SPEED (SPARE)	PACK/TURB
SE1270	89.B1		SPEED ELEMENT	POWER TURBINE SPEED (NPT)	PACK/TURB
SE1271	89.C1		SPEED ELEMENT	BACKUP POWER TURBINE SPEED (NPT)	PACK/TURB
SH0400	14.A1		LIGHTED SWITCH	SPARE	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
SH0401	14.A1		LIGHTED SWITCH	SPARE	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
SH0404	15.A1		LIGHTED SWITCH	SPARE	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
SH0405	15.B1		LIGHTED SWITCH	SPARE	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
SH0408	15.D1		LIGHTED SWITCH	SPARE	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
SH0409	14.B1		LIGHTED SWITCH	GAS/LIQUID FUEL SELECT	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
SH0410	14.B1		LIGHTED SWITCH	SPARE	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
SH0411	15.B1		LIGHTED SWITCH	VOLTAGE DECREASE SELECT	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
SH0412	15.C1		LIGHTED SWITCH	VOLTAGE INCREASE SELECT	AUXILIARY CONSOLE DOOR (TURBINE CONTROL PANEL)
SH0470	34.B1		LIGHTED SWITCH	STOP/STOPPING	TURBINE BOX (JB70)
SH0471	34.A1		LIGHTED SWITCH	START/STARTING	TURBINE BOX (JB70)
SH0472	34.B1		LIGHTED SWITCH	BACKUP SYSTEM ACTIVE/RESET	TURBINE BOX (JB70)
SV1710	56.C1		SOLENOID VALVE	ON-LINE CLEANING SHUTOFF	PACK/TURB
SV1720	56.C1		SOLENOID VALVE	ON-CRANK CLEANING SHUTOFF	PACK/TURB
SV2120	63.B1		SOLENOID VALVE	PRIMARY GAS FUEL SHUTOFF VALVE	PACK/FUEL
SV2121	65.C1		SOLENOID VALVE	GAS FUEL VENT	PACK/FUEL
SV2124	64.A1		SOLENOID VALVE	SECONDARY GAS FUEL SHUTOFF VALVE	PACK/FUEL
SV2150	66.C1		SOLENOID VALVE	GAS TORCH SHUTOFF	PACK/FUEL
SV2220	74.B1		SOLENOID VALVE	PRIMARY LIQUID FUEL SHUTOFF VALVE, PILOT	PACK/FUEL
SV2222	75.B1		SOLENOID VALVE	SECONDARY LIQUID FUEL SHUTOFF VALVE, PILOT	PACK/FUEL
SV2240	77.B1		SOLENOID VALVE	PRIMARY PILOT LIQUID FUEL SHUTOFF VALVE, PILOT	FUEL/LIQUID FUEL PILOT
SV2242	78.B1		SOLENOID VALVE	SECONDARY PILOT LIQUID FUEL SHUTOFF VALVE, PILOT	PACK/FUEL
SV2250	79.C1		SOLENOID VALVE	LIQUID FUEL TORCH SHUTOFF	PACK/FUEL
SV2610	83.C1		SOLENOID VALVE	WATER PURGE SHUTOFF	PACK/FUEL
SV2614	84.A1		SOLENOID VALVE	CONDUCTIVITY SENSOR REFRESH, WATER PURGE	FIELD/WATER PURGE
SV2636	86.C1		SOLENOID VALVE	AIR PURGE SHUTOFF, PILOT	PACK/FUEL
SV2645	81.A1		SOLENOID VALVE	COOLED FORWARD PURGE SHUTOFF #1	PACK/FUEL
SV2646	81.B1		SOLENOID VALVE	COOLED FORWARD PURGE MAIN SHUTOFF	PACK/FUEL
SV2647	81.B1		SOLENOID VALVE	COOLED PCD FORWARD PURGE DRAIN VALVE	PACK/FUEL
SV2648	81.C1		SOLENOID VALVE	COOLED FORWARD PURGE SECONDARY SHUTOFF	PACK/FUEL
SV3620	95.D1		SOLENOID VALVE	GENERATOR SEAL AIR SHUTOFF	PACK/LUBE
SV6430	80.B1		SOLENOID VALVE	MAIN AIR ASSIST SHUTOFF	PACK/GENERAL
SV6440	80.B1		SOLENOID VALVE	AIR ASSIST SHUTOFF, PILOT	PACK/GENERAL
SV6611	117.A1		SOLENOID VALVE	PRIMARY RELEASE #1 CO2	FIELD/FIRE SUPPRESSION CABINET
SV6612	117.C1		SOLENOID VALVE	PRIMARY RELEASE #2 CO2	FIELD/FIRE SUPPRESSION CABINET
TE0741	46.A6		THERMISTOR	COLD JUNCTION	TURBINE BOX PANEL B (JB70)
TE0742	46.A5		THERMISTOR	COLD JUNCTION	TURBINE BOX PANEL B (JB70)
TE0751	47.A6		THERMISTOR	COLD JUNCTION	TURBINE BOX PANEL B (JB70)
TE0752	47.A5		THERMISTOR	COLD JUNCTION	TURBINE BOX PANEL B (JB70)
TE0761	50.B6		THERMISTOR	COLD JUNCTION	TURBINE BOX PANEL B (JB70)
TE0762	50.B5		THERMISTOR	COLD JUNCTION	TURBINE BOX PANEL B (JB70)
TE0771	49.C6		THERMISTOR	COLD JUNCTION	TURBINE BOX PANEL B (JB70)
TE0772	49.C5		THERMISTOR	COLD JUNCTION	TURBINE BOX PANEL B (JB70)
TE1110	45.A1		TEMPERATURE ELEMENT	ENGINE AIR INLET TEMPERATURE	PACK/TURB
TE1111	45.A1		TEMPERATURE ELEMENT	ENGINE AIR INLET TEMPERATURE	PACK/TURB
TE1112	45.B1		TEMPERATURE ELEMENT	ENGINE AIR INLET TEMPERATURE	PACK/TURB

DEVICE ID	PAGE ZONE	CUSTOMER TAG	COMPONENT DESCRIPTION	SYSTEM FUNCTION	J-BOX or PANEL LOCATION
TE1120	49.A1		TEMPERATURE ELEMENT	TURBINE T2 TEMPERATURE	PACK/TURB
TE1121	49.A1		TEMPERATURE ELEMENT	TURBINE T2 TEMPERATURE	PACK/TURB
TE1122	49.B1		TEMPERATURE ELEMENT	TURBINE T2 TEMPERATURE	PACK/TURB
TE1150	46.B1		TEMPERATURE ELEMENT	T5 THERMOCOUPLE	PACK/TURB
TE1151	46.B1		TEMPERATURE ELEMENT	T5 THERMOCOUPLE	PACK/TURB
TE1152	46.C1		TEMPERATURE ELEMENT	T5 THERMOCOUPLE	PACK/TURB
TE1153	46.C1		TEMPERATURE ELEMENT	T5 THERMOCOUPLE	PACK/TURB
TE1154	46.D1		TEMPERATURE ELEMENT	T5 THERMOCOUPLE	PACK/TURB
TE1155	46.D1		TEMPERATURE ELEMENT	T5 THERMOCOUPLE	PACK/TURB
TE1156	47.B1		TEMPERATURE ELEMENT	T5 THERMOCOUPLE	PACK/TURB
TE1157	47.B1		TEMPERATURE ELEMENT	T5 THERMOCOUPLE	PACK/TURB
TE1158	47.B1		TEMPERATURE ELEMENT	T5 THERMOCOUPLE	PACK/TURB
TE1159	47.C1		TEMPERATURE ELEMENT	T5 THERMOCOUPLE	PACK/TURB
TE1160	47.C1		TEMPERATURE ELEMENT	T5 THERMOCOUPLE	PACK/TURB
TE1161	47.D1		TEMPERATURE ELEMENT	T5 THERMOCOUPLE	PACK/TURB
TE1170	48.A1		TEMPERATURE ELEMENT	EXHAUST GAS T7 THERMOCOUPLE	PACK/TURB
TE1171	48.A1		TEMPERATURE ELEMENT	EXHAUST GAS T7 THERMOCOUPLE	PACK/TURB
TE1172	48.B1		TEMPERATURE ELEMENT	EXHAUST GAS T7 THERMOCOUPLE	PACK/TURB
TE1173	48.B1		TEMPERATURE ELEMENT	EXHAUST GAS T7 THERMOCOUPLE	PACK/TURB
TE1174	48.C1		TEMPERATURE ELEMENT	EXHAUST GAS T7 THERMOCOUPLE	PACK/TURB
TE1175	48.C1		TEMPERATURE ELEMENT	EXHAUST GAS T7 THERMOCOUPLE	PACK/TURB
TE1176	48.C1		TEMPERATURE ELEMENT	EXHAUST GAS T7 THERMOCOUPLE	PACK/TURB
TE1177	48.D1		TEMPERATURE ELEMENT	EXHAUST GAS T7 THERMOCOUPLE	PACK/TURB
TE1260	90.A1		TEMPERATURE ELEMENT	GAS PRODUCER THRUST BEARING TEMPERATURE	PACK/TURB
TE1260-SP	90.A1		TEMPERATURE ELEMENT	GAS PRODUCER THRUST BEARING TEMPERATURE (SPARE)	PACK/TURB
TE1265	90.B1		TEMPERATURE ELEMENT	GAS PRODUCER THRUST BEARING TEMPERATURE	PACK/TURB
TE1265-SP	90.B1		TEMPERATURE ELEMENT	GAS PRODUCER THRUST BEARING TEMPERATURE (SPARE)	PACK/TURB
TE1270	90.C1		TEMPERATURE ELEMENT	POWER TURBINE THRUST BEARING TEMPERATURE	PACK/TURB
TE1270-SP	90.C1		TEMPERATURE ELEMENT	POWER TURBINE THRUST BEARING TEMPERATURE (SPARE)	PACK/TURB
TE1420	50.A1		TEMPERATURE ELEMENT	MONITOR BLEED VALVE LEAK	PACK/TURB
TE2120	58.D1		TEMPERATURE ELEMENT	GAS FUEL TEMPERATURE	PACK/FUEL
TE2645	81.D1		TEMPERATURE ELEMENT	LIQUID MANIFOLD PURGE TEMPERATURE	PACK/FUEL
TE3100	108.A1		TEMPERATURE ELEMENT	MONITOR LUBE OIL TANK TEMPERATURE HEATER SYSTEM CONTROL	PACK/LUBE
TE3200	101.A1		TEMPERATURE ELEMENT	LUBE OIL HEADER TEMPERATURE	PACK/LUBE
TE3510	100.A1		TEMPERATURE ELEMENT	#1 BEARING DRAIN	PACK/LUBE
TE3520	100.A1		TEMPERATURE ELEMENT	#2 AND #3 BEARING COMMON DRAIN	PACK/LUBE
TE3530	100.C1		TEMPERATURE ELEMENT	#2 AND #3 BEARING COMMON DRAIN	PACK/LUBE
TE3540	100.B1		TEMPERATURE ELEMENT	#4 AND #5 ENGINE BEARING COMMON DRAIN	PACK/LUBE
TE4210	96.A1		TEMPERATURE ELEMENT	GENERATOR WINDING, PHASE A	PACK/GENERATOR
TE4211	96.A1		TEMPERATURE ELEMENT	GENERATOR WINDING, PHASE A (SPARE)	PACK/GENERATOR
TE4213	96.B1		TEMPERATURE ELEMENT	GENERATOR WINDING, PHASE B	PACK/GENERATOR
TE4214	96.C1		TEMPERATURE ELEMENT	GENERATOR WINDING, PHASE B (SPARE)	PACK/GENERATOR
TE4216	96.C1		TEMPERATURE ELEMENT	GENERATOR WINDING, PHASE C	PACK/GENERATOR
TE4217	96.D1		TEMPERATURE ELEMENT	GENERATOR WINDING, PHASE C (SPARE)	PACK/GENERATOR
TE4230	97.B1		TEMPERATURE ELEMENT	GENERATOR BEARING (DRIVE END)	PACK/GENERATOR
TE4240	97.A1		TEMPERATURE ELEMENT	GENERATOR BEARING (EXCITER END)	PACK/GENERATOR
TE6110	123.C1		TEMPERATURE ELEMENT	ENCLOSURE TEMPERATURE	PACK/GENERAL
TM0102	22.B5		TRANSFORMER	PHASE SHIFTING	AUXILIARY CONSOLE PANEL
TS6540	115.A2		TEMPERATURE SWITCH	THERMAL DETECTOR, ENCLOSURE	PACK/GENERAL
TS6541	115.A2		TEMPERATURE SWITCH	THERMAL DETECTOR, ENCLOSURE	PACK/GENERAL
TS6542	115.B2		TEMPERATURE SWITCH	THERMAL DETECTOR, ENCLOSURE	PACK/GENERAL
UA1200	20.B3		SIGNAL CONVERTER	BACKUP OVERSPEED	TURBINE BOX PANEL B (JB70)
UA1210	91.B5		PROXIMITOR	ENGINE BEARING #1 (GAS PRODUCER X-AXIS)	TURBINE BOX PANEL C (JB70)
UA1211	91.B5		PROXIMITOR	ENGINE BEARING #1 (GAS PRODUCER Y-AXIS)	TURBINE BOX PANEL C (JB70)
UA1220	91.C5		PROXIMITOR	ENGINE BEARING #2 (GAS PRODUCER X-AXIS)	TURBINE BOX PANEL C (JB70)
UA1221	91.C5		PROXIMITOR	ENGINE BEARING #2 (GAS PRODUCER Y-AXIS)	TURBINE BOX PANEL C (JB70)
UA1230	91.D5		PROXIMITOR	ENGINE BEARING #3 (GAS PRODUCER X-AXIS)	TURBINE BOX PANEL C (JB70)
UA1231	91.C5		PROXIMITOR	ENGINE BEARING #3 (GAS PRODUCER Y-AXIS)	TURBINE BOX PANEL C (JB70)
UA1240	92.B3		PROXIMITOR	ENGINE BEARING #4 (POWER TURBINE X-AXIS)	PACK/JB4
UA1241	92.B3		PROXIMITOR	ENGINE BEARING #4 (POWER TURBINE Y-AXIS)	PACK/JB4
UA1250	92.C3		PROXIMITOR	ENGINE BEARING #5 (POWER TURBINE X-AXIS)	PACK/JB4
UA1251	92.C3		PROXIMITOR	ENGINE BEARING #5 (POWER TURBINE Y-AXIS)	PACK/JB4
UA1262	91.D5		PROXIMITOR	ENGINE BEARING AXIAL (GAS PRODUCER Z-AXIS)	TURBINE BOX PANEL C (JB70)
UA1263	91.A5		PROXIMITOR	ENGINE KEYPHASOR (GAS PRODUCER)	TURBINE BOX PANEL C (JB70)
UA1272	92.C3		PROXIMITOR	ENGINE BEARING AXIAL (POWER TURBINE Z-AXIS)	PACK/JB4
UA1273	92.A3		PROXIMITOR	ENGINE KEYPHASOR (POWER TURBINE)	PACK/JB4
UA1520	55.A5		SIGNAL CONVERTER	BAM 2 SIGNAL CONDITIONER	TURBINE BOX PANEL C (JB70)
UA2611	84.B2		SIGNAL CONVERTER	DE-IONIZED WATER QUALITY, WATER PURGE	FIELD/WATER PURGE
UA4201	98.A2	-KPP	PROXIMITOR	GENERATOR KEYPHASOR	PACK/GENERATOR JB03
UA4230	98.B2	-DEX	PROXIMITOR	GENERATOR BEARING (DRIVEN END X-AXIS)	PACK/GENERATOR JB03

Reference Designator Index (Electrical)

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 140 OF 141

SWBNO-1

DEVICE ID	PAGE ZONE	CUSTOMER TAG	COMPONENT DESCRIPTION	SYSTEM FUNCTION	J-BOX or PANEL LOCATION
UA4231	98.B2	-DEY	PROXIMITOR	GENERATOR BEARING (DRIVEN END Y-AXIS)	PACK/GENERATOR JB03
UA4240	98.C2	-NDEXP	PROXIMITOR	GENERATOR BEARING (EXCITER END X-AXIS)	PACK/GENERATOR JB03
UA4241	98.B2	-NDEYP	PROXIMITOR	GENERATOR BEARING (EXCITER END Y-AXIS)	PACK/GENERATOR JB03
UF1300	40.A3		FREQUENCY CONVERTER	START MOTOR SPEED CONTROL	PACK/VFD
UF2220	71.A3		FREQUENCY CONVERTER	MAIN LIQUID FUEL MOTOR CONTROL	EER/VFD
UF2240	76.A3		FREQUENCY CONVERTER	PILOT LIQUID FUEL MOTOR CONTROL	MCC/VFD
UF2610	85.A3		FREQUENCY CONVERTER	WATER PURGE MOTOR CONTROL	EER/VFD
UJ0031	16.D4		POWER CONVERTER	AC/DC INPUT TO 28V DC OUTPUT	TURBINE BOX PANEL A (JB70)
UJ0131	16.B4		POWER CONVERTER	AC/DC INPUT TO 28V DC OUTPUT	TURBINE BOX PANEL A (JB70)
UV0170	9.A3		POWER SUPPLY	EAGLE QUANTUM PREMIER	TURBINE BOX (JB70)
UV0600	10.A2		POWER SUPPLY	RSLOGIX CHASSIS	AUXILIARY CONSOLE (PLC PANEL)
UV0700	10.B2		POWER SUPPLY	RSLOGIX CHASSIS	AUXILIARY CONSOLE (PLC PANEL)
UV0800	10.D2		POWER SUPPLY	RSLOGIX CHASSIS	JB70
UV2610	85.A5		DC/DC CONVERTER	RIDE THRU UNIT	EER/RTU
VD0175A	33.B5		DIODE	15 pF	TURBINE BOX (JB70)
VD0175D	33.C5		DIODE	15 pF	TURBINE BOX (JB70)
VD0175I	33.C5		DIODE	15 pF	TURBINE BOX (JB70)
VD0178	33.D6		DIODE	15 pF	TURBINE BOX (JB70)
VD2120	63.B3		DIODE	15 pF	PACK/JB12
VD2220	74.B1		DIODE	15 pF	PACK/FUEL
VD2240	77.B1		DIODE	15 pF	FUEL/LIQUID FUEL PILOT
VD2614	84.A2		DIODE	15 pF	FIELD/WATER PURGE
VD6211	126.A5		DIODE	15 pF	TURBINE BOX (JB70)
VD6241	126.C5		DIODE	15 pF	TURBINE BOX (JB70)
VE1204	92.D1		VIBRATION ELEMENT	ENGINE ACCESSORY DRIVE GEARBOX VELOCITY	PACK/TURB
VE1210	91.B1		VIBRATION ELEMENT	ENGINE BEARING #1 (GP X-AXIS)	PACK/TURB
VE1210-SP	91.B1		VIBRATION ELEMENT	ENGINE BEARING #1 (GAS PRODUCER X-AXIS) - SPARE	PACK/TURB
VE1211	91.B1		VIBRATION ELEMENT	ENGINE BEARING #1 (GP Y-AXIS)	PACK/TURB
VE1211-SP	91.B1		VIBRATION ELEMENT	ENGINE BEARING #1 (GAS PRODUCER Y-AXIS) - SPARE	PACK/TURB
VE1214	93.A1		ACCELEROMETER ELEMENT	ENGINE ACCESSORY DRIVE GEARBOX (ACCELEROMETER)	PACK/TURB
VE1220	91.C1		VIBRATION ELEMENT	ENGINE BEARING #2 (GP X-AXIS)	PACK/TURB
VE1220-SP	91.C1		VIBRATION ELEMENT	ENGINE BEARING #2 (GAS PRODUCER X-AXIS) - SPARE	PACK/TURB
VE1221	91.C1		VIBRATION ELEMENT	ENGINE BEARING #2 (GP Y-AXIS)	PACK/TURB
VE1221-SP	91.C1		VIBRATION ELEMENT	ENGINE BEARING #2 (GAS PRODUCER Y-AXIS) - SPARE	PACK/TURB
VE1230	91.D1		VIBRATION ELEMENT	ENGINE BEARING #3 (GP X-AXIS)	PACK/TURB
VE1230-SP	91.D1		VIBRATION ELEMENT	ENGINE BEARING #3 (GAS PRODUCER X-AXIS) - SPARE	PACK/TURB
VE1231	91.C1		VIBRATION ELEMENT	ENGINE BEARING #3 (GP Y-AXIS)	PACK/TURB
VE1231-SP	91.D1		VIBRATION ELEMENT	ENGINE BEARING #3 (GAS PRODUCER Y-AXIS) - SPARE	PACK/TURB
VE1240	92.B1		VIBRATION ELEMENT	ENGINE BEARING #4 (PT X-AXIS)	PACK/TURB
VE1240-SP	92.B1		VIBRATION ELEMENT	ENGINE BEARING #4 (POWER TURBINE X-AXIS) - SPARE	PACK/TURB
VE1241	92.B1		VIBRATION ELEMENT	ENGINE BEARING #4 (PT Y-AXIS)	PACK/TURB
VE1241-SP	92.B1		VIBRATION ELEMENT	ENGINE BEARING #4 (POWER TURBINE Y-AXIS) - SPARE	PACK/TURB
VE1250	92.C1		VIBRATION ELEMENT	ENGINE BEARING #5 (PT X-AXIS)	PACK/TURB
VE1250-SP	92.C1		VIBRATION ELEMENT	ENGINE BEARING #5 (POWER TURBINE X-AXIS) - SPARE	PACK/TURB
VE1251	92.C1		VIBRATION ELEMENT	ENGINE BEARING #5 (PT Y-AXIS)	PACK/TURB
VE1251-SP	92.C1		VIBRATION ELEMENT	ENGINE BEARING #5 (POWER TURBINE Y-AXIS) - SPARE	PACK/TURB
VE1262	91.D1		VIBRATION ELEMENT	GAS PRODUCER (AXIAL)	PACK/TURB
VE1262-SP	91.D1		VIBRATION ELEMENT	ENGINE BEARING AXIAL (GAS PRODUCER Z-AXIS) - SPARE	PACK/TURB
VE1263	91.A1		VIBRATION ELEMENT	GAS PRODUCER (KEY PHASOR)	PACK/TURB
VE1272	92.C1		VIBRATION ELEMENT	POWER TURBINE (AXIAL)	PACK/TURB
VE1272-SP	92.D1		VIBRATION ELEMENT	ENGINE BEARING AXIAL (POWER TURBINE Z-AXIS) - SPARE	PACK/TURB
VE1273	92.A1		VIBRATION ELEMENT	POWER TURBINE (KEY PHASOR)	PACK/TURB
VE4201	98.A1		VIBRATION ELEMENT	GENERATOR KEYPHASOR	PACK/GENERATOR
VE4230	98.B1		VIBRATION ELEMENT	GENERATOR SHAFT BEARING, DRIVE END, X-AXIS	PACK/GENERATOR
VE4231	98.B1		VIBRATION ELEMENT	GENERATOR SHAFT BEARING, DRIVE END, Y-AXIS	PACK/GENERATOR
VE4234	98.C1		VELOCITY PROBE	GENERATOR VELOCITY, DRIVE END	PACK/GENERATOR
VE4240	98.C1		VIBRATION ELEMENT	GENERATOR SHAFT BEARING, NON DRIVE END, X-AXIS	PACK/GENERATOR
VE4241	98.B1		VIBRATION ELEMENT	GENERATOR SHAFT BEARING, NON DRIVE END, Y-AXIS	PACK/GENERATOR
VE4244	98.D1		VELOCITY PROBE	GENERATOR VELOCITY, EXCITER END	PACK/GENERATOR
VE4764	93.D1		VIBRATION ELEMENT	REDUCTION GEARBOX (VERTICAL VELOCITY)	PACK/GEARBOX
VE4765	93.C1		ACCELEROMETER ELEMENT	REDUCTION GEARBOX (ACCELEROMETER)	PACK/GEARBOX
VE4774	93.D1		VIBRATION ELEMENT	REDUCTION GEARBOX (HORIZONTAL VELOCITY)	PACK/GEARBOX
VS2645	82.A1		VIBRATION SWITCH	PURGE PCD COOLER FAN VIBRATION	PACK/FUEL
VS3220	105.A1		VIBRATION SWITCH	LUBE OIL COOLER FAN VIBRATION	FIELD/LUBE OIL COOLER
VS3221	105.C1		VIBRATION SWITCH	LUBE OIL COOLER FAN #2 VIBRATION	FIELD/LUBE OIL COOLER
VZ2120	63.C3		ZENER	SYSTEM FUNCTION (USE)	PACK/JB12
-W43	98.B1		COAX	SUPPLIER COAX CABLE	PACK/GENERATOR
-W44	98.B1		COAX	SUPPLIER COAX CABLE	PACK/GENERATOR
-W45	98.C1		COAX	SUPPLIER COAX CABLE	PACK/GENERATOR
-W46	98.B1		COAX	SUPPLIER COAX CABLE	PACK/GENERATOR
-W47	98.A1		COAX	SUPPLIER COAX CABLE	PACK/GENERATOR
XP1520	55.A2		CONNECTOR	CIRCUIT CONTINUITY	PACK/COMBUSTOR PRESSURE MONITOR
XPGP1X	91.B2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB321
XPGP1X-SP	91.B2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB321
XPGP1Y	91.B2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB321
XPGP1Y-SP	91.B2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB321
XPGP2X	91.C2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB106
XPGP2X-SP	91.C2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB106
XPGP2Y	91.C2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB106
XPGP2Y-SP	91.C2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB106
XPGP3X	91.D2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB161
XPGP3X-SP	91.D2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB161
XPGP3Y	91.C2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB161
XPGP3Y-SP	91.D2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB161
XPGPK	91.A2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB321
XPGPZ	91.D2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB321
XPGPZ-SP	91.D2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB321
XPPT4X	92.B2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB43
XPPT4X-SP	92.B2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB43
XPPT4Y	92.B2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB43
XPPT4Y-SP	92.B2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB43
XPPT5X	92.C2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB43
XPPT5X-SP	92.C2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB43
XPPT5Y	92.C2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB43
XPPT5Y-SP	92.C2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB43
XPPTK	92.A2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB43
XPPTZ	92.C2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB43
XPPTZ-SP	92.D2		CONNECTOR	CIRCUIT CONTINUITY	PACK/JB43
ZS0273	12.B4		LIMIT SWITCH	CONSOLE DOOR OPEN	AUXILIARY CONSOLE
ZS2220	74.A1		POSITION SWITCH	DETECT VALVE OPERATION CLOSED PRIMARY LIQUID FUEL SHUTOFF VALVE	PACK/FUEL
ZS2222	75.A1		POSITION SWITCH	DETECT VALVE OPERATION CLOSED SECONDARY LIQUID FUEL SHUTOFF VALVE	PACK/FUEL
ZS2240	77.A1		POSITION SWITCH	DETECT VALVE OPERATION CLOSED PRIMARY PILOT LIQUID FUEL SHUTOFF VALVE	FUEL/LIQUID FUEL PILOT
ZS2242	78.A1		POSITION SWITCH	DETECT VALVE OPERATION CLOSED SECONDARY PILOT LIQUID FUEL SHUTOFF VALVE	PACK/FUEL
ZS6151	121.A3		POSITION SWITCH	ENCLOSURE DOOR	PACK/GENERAL
ZS6440	80.A1		POSITION SWITCH	DETECT VALVE OPERATION CLOSED AIR ASSIST SHUTOFF VALVE	PACK/GENERAL
ZSC6611	119.A1		POSITION SWITCH	ISOLATION VALVE PRIMARY ENCLOSURE (BOTTOM DECK)	FIELD/FIRE SUPPRESSION CABINET
ZSC6621	119.C1		POSITION SWITCH	ISOLATION VALVE EXTENDED ENCLOSURE (BOTTOM DECK)	FIELD/FIRE SUPPRESSION CABINET
ZSO6611	119.B1		POSITION SWITCH	ISOLATION VALVE PRIMARY VENT (TOP DECK)	FIELD/FIRE SUPPRESSION CABINET
ZSO6621	119.D1		POSITION SWITCH	ISOLATION VALVE EXTENDED VENT (TOP DECK)	FIELD/FIRE SUPPRESSION CABINET

Reference Designator Index (Electrical)

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149447
DWG REV B
SHT REV B
SHEET 141 OF 141

SWBNO-1

REVISION HISTORY			
REV	DESCRIPTION	DATE	M.I. DESIGNER
A	INITIAL RELEASE	08-09-22	L. ACOSTA
B	REVISED PER CUSTOMER REQUEST	11-29-22	R. CHANG

TABLE OF CONTENTS

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

SYMBOL EXAMPLES

- (20) DENOTES EXTERNAL CONNECTION POINT
- (A) DENOTES REVISION
- (CF) CUSTOM FEATURE DESIGN REQUIREMENT. DEFINITION OR DIMENSION MAY CHANGE.
- (1/3B) INDICATES LOCATION AS SHEET AND VERTICAL/HORIZONTAL ZONE.

APPROVED	
PROJECT MGR G. PAWLOWSKI	DATE 11-29-22
PROJECT ENGR N/A	DATE N/A
ANCILLARY ENGR. J. ZADA	DATE 11-29-22
ENCLOSURE ENGR A. BADAWI	DATE 11-29-22
PACKAGE ENGR L. FINK	DATE 11-29-22
HYDRO-MECH ENGR H. PANG	DATE 11-29-22
FRAME ENGR T. VU	DATE 11-29-22

RELEASE STAMP 12/05/22 CDM

CAGE CODE 66195

CAD IDENT Released B5

CUSTOMER/END USER/PROJECT

SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE

TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
COVER SHEET

Solar® Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 1 OF 52	

SWBNO-1

TABLE 1 - PACKAGE CONNECTION SUMMARY

ITEM	DESCRIPTION	SIZE & TYPE	REFERENCE NOTE	SERVICE RATINGS	FLUID TYPE	OPERATION MODE	MAXIMUM BACK PRESSURE	VELOCITY FT/SEC [M/SEC]	SHEET	REV
	MECHANICAL									
3	LUBE OIL TANK VENT	10" CLASS 150 RF FLANGE	5.5	14" (356 MM) H2O	AIR, OIL (MIST)	CONTINUOUS	2" (51 MM) H2O	15.58 FT/SEC (4.75 M/S)	11	
7	LUBE OIL COOLER VENT	1/2" NPT FEMALE	5.2, 13.11	150 PSIG (1034 KPAG)	AIR, OIL	CONTINUOUS	10" (254 MM) H2O	20 FT/SEC (6.1 M/S)	9	
19	ENGINE EXHAUST COLLECTOR AND COMBUSTOR DRAIN	1" CLASS 150 RF FLANGE	13.3	N/A	AIR, OIL, WATER, FUEL	STARTUP, SHUTDOWN	0 PSIG (0 KPAG)	N/A	15	
20	NATURAL GAS FUEL INLET	3" CLASS 300 RF FLANGE	4.0	605 PSIG (4171 KPAG) MAX AT 200 DEG F (93 DEG C)	GAS	CONTINUOUS	N/A	100.0 FT/SEC (33.5 M/S)	15	
22	ENGINE AIR INLET DUCT DRAIN	1" CLASS 150 RF FLANGE	9.3, 13.7	N/A	AIR, WATER	MAINT, STARTUP, SHUTDOWN	0 PSIG (0 KPAG)	N/A	15	
25	LUBE OIL FILTER DRAIN - FILTERED	1" CLASS 150 RF FLANGE	5.0, 13.12	150 PSIG (1034 KPAG)	OIL	MAINTENANCE	0 PSIG (0 KPAG)	7.0 FT/SEC (2.1 M/S)	14	
26	LUBE OIL TANK DRAIN (2 PLACES)	2" NPT FEMALE	5.0, 13.9	14" (356 MM) H2O	OIL	MAINTENANCE	0 PSIG (0 KPAG)	7.0 FT/SEC (2.1 M/S)	15	
30	GAS VENT	1" CLASS 150 RF FLANGE	10.2, 13.2	100 - 195 PSIG (689-1344 KPAG)	GAS	STARTUP, SHUTDOWN	5 PSIG (34 KPAG)	194.0 FT/SEC (59.1 M/S)	15	
33	LUBE OIL TO COOLER	6" CLASS 150 RF FLANGE	5.2	150 PSIG (1034 KPAG)	OIL	CONTINUOUS	150 PSIG (1034 KPAG)	13.0 FT/SEC (4.0 M/S)	14	
34	LUBE OIL FROM COOLER	6" CLASS 150 RF FLANGE	5.2	150 PSIG (1034 KPAG)	OIL	CONTINUOUS	150 PSIG (1034 KPAG)	13.0 FT/SEC (4.0 M/S)	14	
35	LIQUID FUEL INLET	1" CLASS 150 RF FLANGE	4.1, 4.3, 4.4	10 - 100 PSIG (68.9-689.5 KPAG)	LIQUID FUEL	CONTINUOUS	N/A	2.0 FT/SEC (0.6 M/S)	14	
36	PACKAGE AIR SUPPLY	1" CLASS 300 RF FLANGE	4.2, 4.4	100 - 200 PSIG (689-1379 KPAG)	AIR	CONTINUOUS	N/A	46.0 FT/SEC (14.0 M/S)	15	
38	LIQUID FUEL DRAIN	1" CLASS 150 RF FLANGE	13.8	UNRESTRICTED	AIR, H2O, FUEL	XFER TO LIQUID FUEL, S/D	0 PSIG (0 KPAG)	N/A	14	
54	LUBE OIL FILTER DRAIN - UNFILTERED	1" CLASS 150 RF FLANGE	5.0, 13.12	150 PSIG (1034 KPAG)	OIL	MAINTENANCE	0 PSIG (0 KPAG)	7.0 FT/SEC (2.1 M/S)	14	
64	LOW POINT DRAIN FROM LUBE OIL HEADER (2 PLACES)	1" CLASS 150 RF FLANGE		150 PSIG (1034 KPAG)	OIL	MAINTENANCE	0 PSIG (0 KPAG)	7.0 FT/SEC (2.1 M/S)	14,15	
97	ENCLOSURE FIRE EXT. MEDIUM INLET - MAIN	1" NPT FEMALE	8.2	750 PSIG (5171 KPAG)	CO2	EMERGENCY	N/A	N/A	11	
98	ENCLOSURE FIRE EXT. MEDIUM INLET - EXTENDED	1/2" NPT FEMALE	8.2	750 PSIG (5171 KPAG)	CO2	EMERGENCY	N/A	N/A	11	
121	ON LINE CLEANING FLUID INLET	1" CLASS 150 RF FLANGE	9.0 - 9.4	85 - 100 PSIG (586-689 KPAG)	AIR, WATER, CLNG FLUID	MAINTENANCE	N/A	110.0 FT/SEC (33.5 M/S)	15	
122	ON CRANK CLEANING FLUID INLET	1" CLASS 150 RF FLANGE	9.0, 9.1, 9.3, 9.4	85 - 100 PSIG (586-689 KPAG)	AIR, WATER, CLNG FLUID	MAINTENANCE	N/A	110.0 FT/SEC (33.5 M/S)	15	
126	OIL DRAIN FROM DRIP PAN (6 PLACES)	2" NPT FEMALE	2.25, 13.10	1.0 PSIG (6.89 KPAG)	OIL, WATER	MAINTENANCE	0 PSIG (0 KPAG)	1.0 FT/SEC (0.3 M/S)	14,15,16	
288	LUBE OIL MIST SEPARATOR OIL RETURN	1" NPT FEMALE	5.5	1.0 PSIG (6.89 KPAG)	OIL	MAINTENANCE	SEE NOTE 13.1	3.0 FT/SEC (0.9 M/S)	11	
454	COOLER PCD INLET	2" CLASS 300 RF FLANGE	10	320 PSIG (2206 KPAG) MAX AT 400 DEG F (204 C)	AIR	CONTINUOUS		N/A	14	
455	PCD TO COOLER OUTLET	2" CLASS 300 RF FLANGE	10	320 PSIG (2206 KPAG) MAX AT 900 DEG F (482 C)	AIR	CONTINUOUS		N/A	14	
674	LUBE OIL TANK FILL	2" SPRING RETURN CAP	5.0	N/A	OIL	MAINTENANCE	N/A	N/A	15	
859	PILOT AIR TO LIQUID FUEL MODULE	3/8" TUBE FITTING	4.2, 4.4	100 PSIG (689 KPAG)	AIR	CONTINUOUS	N/A	46.0 FT/SEC (14.0 M/S)	28	
1011	PILOT LIQUID FUEL INLET	1" CLASS 1500 RF FLANGE	4.1, 4.3, 4.4	10-3000 PSIG (68.9-20684 KPAG)	LIQUID FUEL	CONTINUOUS	N/A	2.0 FT/SEC (0.6 M/S)	14	
1034	OUTLET- PILOT AIR TO LIQUID FUEL MODULE	3/8" TUBE FITTING	4.2, 4.4	100 PSIG (689 KPAG)	AIR	CONTINUOUS	N/A	46.0 FT/SEC (14.0 M/S)	14	
	ELECTRICAL - NEC									
313	AC VOLTS, LUBE OIL TANK HEATER	(ENCL) RGSM-4X2-H I MCT 4.75" X 6.28" (121 X 160) - (DEVICE) 3" NPT FEMALE	6.0, 6.1, 6.5	SEE P&ID (H3103)	N/A	INTERMITTENT	N/A	N/A	16	
315	AC VOLTS, PRE/POST LUBE OIL PUMP MOTOR	(SKID) RGS-4 MCT 4.75" X 6.28" (121 X 160) - (DEVICE) 1.5" NPT FEMALE	6.0, 6.1, 6.5	SEE P&ID (M3150)	N/A	INTERMITTENT	N/A	N/A	16	
316	AC VOLTS, LIQUID FUEL PRIMARY PUMP MOTOR	(SKID) RGS-4 MCT 4.75" X 6.28" (121 X 160) - (DEVICE) 3" NPT FEMALE	6.0, 6.1, 6.5, 6.7	SEE P&ID (M2220)	N/A	CONTINUOUS	N/A	N/A	16	
319	DC VOLTS, BACKUP PUMP OIL MOTOR STARTER (2 PLACES)	7" X 2' 4-11/16" (178 X 729) OPENING WITH UNDRILLED GLAND PLATE	6.0, 6.1, 6.5	N/A (JB 28)	N/A	CONTINUOUS	N/A	N/A	49	
329	DC VOLTS, PACKAGE TO CONSOLE (2 PLACES)	4" X 20" (102 X 508) OPENING WITH UNDRILLED GLAND PLATE (SEE DETAIL)	6.0, 6.4	N/A (JB 70)	N/A	CONTINUOUS	N/A	N/A	16	
331	GROUND, PACKAGE FRAME (4 PLACES)	1/2"-13 UNC	6.2, 6.3	N/A	N/A	CONTINUOUS	N/A	N/A	14,15,16	
334	GROUND, FRAME TO FRAME (4 PLACES)	1/2"-13 UNC	6.2, 6.3	N/A	N/A	CONTINUOUS	N/A	N/A	14,15	
335	DC VOLTS, CONTROL CONSOLE (6 PLACES)	UNDRILLED GLAND PLATE	6.0, 6.4	SEE ELS	N/A	CONTINUOUS	N/A	N/A	48	
336	DC VOLTS, BACKUP LUBE OIL PUMP MOTOR	(SKID) RGSM-4X3-H I MCT 4.75" X 6.28" (121 X 160) - (DEVICE) 2XM50XI.5 AND 2XM20XI.5	6.0, 6.1, 6.5	SEE P&ID (M3170)	N/A	INTERMITTENT	N/A	N/A	16	
350	AC VOLTS, LUBE OIL COOLER MOTOR (2 PLACES)	1-1/2" NPT FEMALE	6.0, 6.1, 6.5	SEE P&ID (M3220)	N/A	CONTINUOUS	N/A	N/A	38	B
354	DC VOLTS, FIRE SYSTEM	11.75" X 4.56" (292 X 116) UNDRILLED GLAND PLATE	6.0, 6.1, 6.5	SEE ELS (ASY6600)	N/A	CONTINUOUS	N/A	N/A	44	
357	AC VOLTS, ENCLOSURE VENT FAN (3 PLACES)	1 1/4" NPT FEMALE	6.0, 6.1, 6.5	SEE P&ID (M6211/M6212)	N/A	CONTINUOUS	N/A	N/A	9,13	
358	AC VOLTS, ENCLOSURE LIGHTING	25 MM	6.0, 6.1, 6.5	SEE ELS (EL6130X)	N/A	CONTINUOUS	N/A	N/A	9	
363	DC VOLTS, FUEL GAS FLOW ANALOG I-O (2 PLACES)	1/2" NPT FEMALE OR M20 X 1.5	6.0, 6.1, 6.5	SEE ELS (FE2108)	N/A	CONTINUOUS	N/A	N/A	39	
370	AC VOLTS, POWER CABLE	M25 CABLE GLAND	6	SEE ELS (E16131)	N/A	INTERMITTENT	N/A	N/A	9	
374	DC VOLTS, TURBINE AIR INLET FILTER ANALOG I-O	1/2" NPT FEMALE	6.0, 6.1, 6.5	SEE P&ID (PDT6310)	N/A	CONTINUOUS	N/A	N/A	9	
397	DC VOLTS, ELECTRONIC ACTUATOR POWER	2" (50.8) CIRCULAR CUT OUT	6.0, 6.1, 6.5	SEE ELS (JB70)	N/A	CONTINUOUS	N/A	N/A	16	
399	DC VOLTS, OIL COOLER VIB SWITCH (2 PLACES)	1/2" NPT FEMALE	6.0, 6.1, 6.5	SEE P&ID (VS3220)	N/A	CONTINUOUS	N/A	N/A	38	B
404	AC VOLTS, STARTER MOTOR	(SKID) RGSM-4X3-H I MCT 4.75" X 6.28" (121 X 160) - (DEVICE) UNDRILLED GLAND PLATE	6.0, 6.1, 6.5	SEE P&ID (M1300)	N/A	INTERMITTENT	N/A	N/A	16	
418	AC VOLTS, GENERATOR JACKING LUBE OIL PUMP MOTOR	(SKID) RGS-4 MCT 4.75" X 6.28" (121 X 160) - (DEVICE) 3/4" NPT FEMALE	6.0, 6.1, 6.5, 6.8	SEE P&ID (M3420)	N/A	INTERMITTENT	N/A	N/A	9	
419	AC VOLTS, LIQUID FUEL PILOT PUMP MOTOR	2X M50 X 1.5 AND 1X M20 X 1.5 - (DEVICE) 2" NPT	6.0, 6.1, 6.5, 6.7	SEE P&ID	N/A	CONTINUOUS	N/A	N/A	28	
420	GENERATOR CONTROL BOX	4" X 20" (102 X 508) OPENING WITH UNDRILLED GLAND PLATE (SEE DETAIL)	6.0, 6.4	N/A (JB 72)	N/A	CONTINUOUS	N/A	N/A	15	
426	AC VOLTS, SPACE HEATER	(ENCL) RGS-4 MCT 4.75" X 6.28" (121 X 160) - (DEVICE) 1" NPT FEMALE	6.0, 6.1, 6.5	SEE P&ID (H6100)	N/A	INTERMITTENT	N/A	N/A	16	
458	AC VOLTS, ENCLOSURE VENT FAN SPACE HEATER (3 PLACES)	1 1/4" NPT FEMALE	6.0, 6.5	SEE P&ID (M6211/M6212/M6241)	N/A	CONTINUOUS	N/A	N/A	9,13	
470	DC VOLTS, OFF-SKID LIQ. FUEL MODULE J-BOX	1/2" NPT FEMALE, PLUGGED	6.0, 6.1, 6.5	N/A	N/A	N/A	N/A	N/A	29	
471	WATER CONDUCTIVITY ANALYZER	M20 X 1.5	4.5	N/A	N/A	N/A	N/A	N/A	30	
475	AC VOLTS, BACKUP PUMP OIL MOTOR STARTER (2 PLACES)	7" X 2' 4-11/16" (178 X 729) OPENING WITH UNDRILLED GLAND PLATE	6.0, 6.1, 6.5	N/A (JB 28)	N/A	CONTINUOUS	N/A	N/A	49	
487	AC VOLTS, AIR COOLER MOTOR	1" NPT FEMALE	6.0, 6.1, 6.5	SEE P&ID (M2645)	N/A	INTERMITTENT	N/A	N/A	41	
747	AC VOLTS, CUSTOMER INTERFACE	1X M32 X 1.5 AND 2X M20 X 1.5	4.5	N/A	N/A	CONTINUOUS	N/A	N/A	30	
790	SOLENOID, ELECTRICAL INTERFACE	M20 X 1.5	4.5	N/A	N/A	N/A	N/A	N/A	30	
791	PRESSURE SWITCH, ELECTRICAL CONNECTION	M20 X 1.5	4.5	N/A	N/A	N/A	N/A	N/A	30	
807	DC VOLTS, ENCLOSURE VENT FILTER DELTA PRESSURE TRANSMITTER	1/2" NPT FEMALE	6.0, 6.5	SEE ELS (PDT6210)	N/A	CONTINUOUS	N/A	N/A	10	
935	GROUND STUD, DEMISTER	1/4-20 NC STUD	5.5	N/A	N/A	N/A	N/A	N/A	37	
2140	DC VOLTS, AIR COOLER FAN VIB SWITCH	1/2" NPT FEMALE	6.0, 6.1, 6.5	SEE P&ID (VS2645)	N/A	INTERMITTENT	N/A	N/A	41	
3000	LIQUID FUEL PILOT PUMP SKID J-BOX	4X 0.86" KNOCKOUTS	6.0, 6.1, 6.5	N/A (JB 2240)	N/A	N/A	N/A	N/A	28	
3008	RTU DC/DC CONVERTER	3-1/2" X 13" (89 X 330) OPENING WITH UNDRILLED GLAND PLATE	6.0, 6.5	N/A	N/A	INTERMITTENT	N/A	N/A	32	
	REMOTE MECHANICAL									
40	PURGE TANK DRAIN	1" NPT FEMALE	13.8	UNRESTRICTED	AIR, H2O, FUEL	INTERMITTENT	N/A	N/A	42	
155	FUEL FILTER DRAIN	3/4" NPT FEMALE, PLUGGED	4.7, 13.10	5 PSIG (34 KPAG)	FUEL	MAINTENANCE	0 PSIG (0 KPAG)	N/A	29	
203	FLAME ARRESTOR, LUBE OIL TANK VENT	8" CLASS 150 RF FLANGE	5.5, 5.6	10 PSIG (69 KPAG)	OIL, AIR	CONTINUOUS	0.5" (12.7 MM) H2O	15.58 FT/SEC (4.75 M/S)	40	
210	FLAME ARRESTOR, LIQUID FUEL PURGE TANK VENT	2" CLASS 150 RF FLANGE	10.2, 13.0, 13.8	10 PSIG (69 KPAG)	AIR, H2O, FUEL	INTERMITTENT	0 PSIG (0 KPAG)	N/A	43	
233	LUBE OIL COOLER OIL INLET (2 PLACES)	4" CLASS 150 RF FLANGE	5.2	200 PSIG (1379 KPAG)	OIL	CONTINUOUS	150 PSIG (1034 KPAG)	9.6 FT/SEC (2.9 M/S)	38	B
234	LUBE OIL COOLER OIL OUTLET (2 PLACES)	4" CLASS 150 RF FLANGE	5.2	200 PSIG (1379 KPAG)	OIL	CONTINUOUS	150 PSIG (1034 KPAG)	9.6 FT/SEC (2.9 M/S)	38	B
235	OIL COOLER VENT RETURN TO TANK	3/4" UNION	5.2	150 PSIG (1034 KPAG)	AIR, OIL	CONTINUOUS	10" (254 MM) H2O	10.0 FT/SEC (3.0 M/S)	38	B
239	LIQUID FUEL PURGE TANK VENT	2" NPT FEMALE	13.8	UNRESTRICTED	AIR, H2O, FUEL	INTERMITTENT	N/A	N/A	42	
241	LIQUID FUEL PURGE TANK INLET	1" NPT FEMALE	13.8	UNRESTRICTED	AIR, H2O, FUEL	INTERMITTENT	N/A	N/A	42	
262	LIQUID FUEL FILTER INLET	2" NPT FEMALE	4.1	10 - 100 PSIG (68.9-689.5 KPAG)	LIQUID FUEL	CONTINUOUS	N/A	3.0 FT/SEC (0.9 M/S)	29	
263	LIQUID FUEL FILTER OUTLET	2" NPT FEMALE	4.1	10 - 100 PSIG (68.9-689.5 KPAG)	LIQUID FUEL	CONTINUOUS	N/A	3.0 FT/SEC (0.9 M/S)	29	
271	GAS FUEL FLOW METER INLET	2" CLASS 300 RF FLANGE	2.17	605 PSIG (4171 KPAG) MAX AT 200 DEG F (93 DEG C)	FUEL	CONTINUOUS	N/A	100.0 FT/SEC (30.5 M/S)	39	
272	GAS FUEL FLOW METER OUTLET	2" CLASS 300 RF FLANGE	2.17	605 PSIG (4171 KPAG) MAX AT 200 DEG F (93 DEG C)	FUEL	CONTINUOUS	N/A	100.0 FT/SEC (30.5 M/S)	39	
280	GAS FUEL FILTER INLET	3" CLASS 300 RF FLANGE	4.0	605 PSIG (4171 KPAG) MAX AT 200 DEG F (93 DEG C)	FUEL	CONTINUOUS	N/A	100.0 FT/SEC (30.5 M/S)	45	
281	GAS FUEL FILTER OUTLET	3" CLASS 300 RF FLANGE	4.0	605 PSIG (4171 KPAG) MAX AT 200 DEG F (93 DEG C)	FUEL	CONTINUOUS	N/A	100.0 FT/SEC (30.5 M/S)	45	
282	AIR COOLER INLET	2" CLASS 600 RFWN FLANGE	10	300 PSIG (2068 KPAG) AT 800 DEG F (427 DEG C)	AIR	CONTINUOUS	N/A	92 FT/SEC (28 M/S)	41	
283	AIR COOLER OUTLET	2" CLASS 600 RFWN FLANGE	10	300 PSIG (2068 KPAG) AT 800 DEG F (427 DEG C)	AIR	CONTINUOUS	N/A	92 FT/SEC (28 M/S)	41	
287	LUBE OIL MIST SEPARATOR INLET	10" CLASS 150 RF FLANGE	5.5	1.0 PSIG (6.89 KPAG)	OIL, AIR	CONTINUOUS	SEE NOTE 5.5	15.58 FT/SEC (4.75 M/S)	37	
289	LUBE OIL MIST SEPARATOR OUTLET	8" CLASS 150 RF FLANGE	5.5	1.0 PSIG (6.89 KPAG)	OIL, AIR	CONTINUOUS	SEE NOTE 5.5	15.58 FT/SEC (4.75 M/S)	37	
290	LUBE OIL MIST SEPARATOR FILL PORT	1" NPT (PLUGGED)	5.5	1.0 P	OIL	CONTINUOUS	SEE NOTE 13.1	15.58 FT/SEC (4.75 M/S)	37	
291	LUBE OIL MIST SEPARATOR RETURN	1" NPT	5.5	1.0 P	OIL	CONTINUOUS	SEE NOTE 13.1	15.58 FT/SEC (4.75 M/S)	37	
297	FIRE SYSTEM DISCHARGE - MAIN	1" FEMALE TUBE	8.2	732 P	CO2	EMERGENCY	N/A	N/A	44	
298	FIRE SYSTEM DISCHARGE - EXTENDED	1/2" FEMALE TUBE	8.2	748 P	CO2	EMERGENCY	N/A	N/A	44	
522	AIR INLET FILTER DRAIN (2 PLACES)	1" TUBE	N/A	N/A	WATER	MAINTENANCE	0 PSIG (0 BAR)	N/A	12	
527	ENCLOSURE VENT FILTER DRAIN	1" TUBE	11.2	N/A	WATER	MAINTENANCE	0 PSIG (0 BARG)	N/A	9	
536	ON-LINE/CRANK CLEANING TANK FLUID INLET	1/2" QUICK DISCONNECT MALE	9.0, 9.1, 9.2, 9.4	85 -	AIR, WATER, CLNG FLUID	MAINTENANCE	N/A	N/A	46	
538	ON-LINE/CRANK CLEANING TANK FLUID INLET (AUXILARY)	2" NPT FEMALE	9.0, 9.1, 9.2, 9.4	130 P	DI WATER, CLNG SOLU	MAINTENANCE	N/A	N/A	46	
539	ON-LINE/CRANK CLEANING TANK FLUID OUTLET	3/4" QUICK DISCONNECT MALE	9.0, 9.1, 9.2, 9.4	130 P	DI WATER, CLNG SOLU	MAINTENANCE	N/A	290 FT/SEC (88.4 M/S)	46	
540	ON-LINE/CRANK CLEANING TANK DRAIN	1/2" NPT FEMALE	9.0, 9.1, 9.2, 9.4	130 P	DI WATER, CLNG SOLU	MAINTENANCE	0 PSIG (0 KPAG)	6.0 FT/SEC (1.8 M/S)	46	
548	VENT, FIRE EXTINGUISHANT, MAIN	3/4" NPT FEMALE	8.2	732 P	CO2	EMERGENCY	N/A	N/A	44	
549	VENT, FIRE EXTINGUISHANT, EXTENDED	1/2" NPT FEMALE	8.2	748 P	CO2	EMERGENCY	N/A	N/A	44	
629	LIQUID FUEL FILTER SKID DRIP PAN DRAIN	1" NPT FEMALE	13.1	N/A	N/A	N/A	0 PSIG (0 KPAG)	N/A	29	
750	WATER INLET TO PACKAGE	3/4" NPT FEMALE	4.5	500 P	DE-IONIZED WATER	XFER TO LIQUID FUEL	N/A	N/A	15	
751	WATER PURGE SKID OUTLET	3/4" TUBE FITTING	4.5	500 P	DE-IONIZED WATER	XFER TO LIQUID FUEL	N/A	N/A	30	
752	WATER PURGE SKID INLET	3/4" TUBE FITTING	4.5	10-40	DE-IONIZED WATER	XFER TO LIQUID FUEL	N/A	N/A	30	
753	WATER PURGE SKID DRAIN	3/4" TUBE FITTING	4.5	N/A	DE-IONIZED WATER	MAINTENANCE	0 PSIG (0 KPAG)	N/A	30	
763	DRAIN DIRTY LIQUID FUEL	3/4" TUBE FITTING	4.1	N/A	FUEL	MAINTENANCE	0 PSIG (0 KPAG)	N/A	28	
1009	PILOT LIQUID FUEL PUMP SKID INLET	1" TUBE FITTING	4.1, 4.3, 4.4	10-10	LIQUID FUEL	CONTINUOUS	N/A	2.0 FT/SEC (0.6 M/S)	28	B
1010	PILOT LIQUID FUEL PUMP SKID OUTLET	1" TUBE FITTING	4.1	10-30	LIQUID FUEL	CONTINUOUS	N/A	2.0 FT/SEC (0.6 M/S)	28	B
1059	LIQUID FUEL PUMP MODULE DRAIN	3/8" TUBE FITTING	13.6	N/A	FUEL	MAINTENANCE	0 PSIG (0 KPAG)	N/A	28	B
2008	ON-LINE QUICK DISCONNECT ADAPTOR INLET	3/4" QUICK DISCONNECT MALE	9.0 - 9.4	85 -	AIR, WATER, CLNG FLUID	MAINTENANCE	N/A	110.0 FT/SEC (33.5 M/S)	46	
2009	ON-LINE QUICK DISCONNECT ADAPTOR OUTLET	1" CLASS 150 RF FLANGE	9.0 - 9.4	85 -	AIR, WATER, CLNG FLUID	MAINTENANCE	N/A	110.0 FT/SEC (33.5 M/S)	46	
2010	ON-CRANK QUICK DISCONNECT ADAPTOR INLET	3/4" QUICK DISCONNECT MALE	9.0, 9.1, 9.3, 9.4	85 - 100 PSIG (586-689 KPAG)	AIR, WATER, CLNG FLUID	MAINTENANCE	N/A	110.0 FT/SEC (33.5 M/S)	46	
2011	ON-CRANK QUICK DISCONNECT ADAPTOR OUTLET	1" CLASS 150 RF FLANGE	9.0, 9.1, 9.3, 9.4	85 - 100 PSIG (586-689 KPAG)	AIR, WATER, CLNG FLUID	MAINTENANCE	N/A	110.0 FT/SEC (33.5 M/S)	46	

APPROVED	X
APPROVED AS NOTED	
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
PACKAGE CONNECTION SUMMARY TABLE

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149956 | SIZE E | REV B | SH 2 OF 52

CAD IDENT Released B5

SWBNO-1

GENERAL NOTES

1.0 SYMBOLS AND ABBREVIATIONS:

" INCHES	KPA KILOPASCAL
' FEET	KPAD KILOPASCAL DIFF
AC ALTERNATING CURRENT	KPAG KILOPASCAL GAGE
ACFM ACTUAL CUBIC FEET PER MINUTE	KW KILOWATT
AH AMPERE HOURS	L LITER
BAR BAR	LBF POUND-FORCE
BARG BAR GAGE	LBF-FT POUND-FORCE FOOT
BARD BAR DIFF	LBS POUNDS
BTU BRITISH THERMAL UNIT	LPM LITERS PER MINUTE
°C DEGREE CELSIUS	M METER
CFM CUBIC FEET PER MINUTE	M3 CUBIC METER
CS CENTISTOKES MM SQUARED PER SECOND	M/S METERS PER SECOND
DBA DECIBELS	MM MILLIMETER
DC DIRECT CURRENT	MPH MILES PER HOUR
DIFF DIFFERENTIAL	MIN MINUTE
°F DEGREE FAHRENHEIT	N NEWTONS
FT FEET	N-M NEWTON METER
GAL GALLONS	NM3 NORMAL CUBIC METER
GPM GALLONS PER MINUTE	PSI POUNDS PER SQUARE INCH
HR HOUR	PSID POUNDS PER SQUARE INCH DIFF
HRS HOT ROLLED STEEL	PSIG POUNDS PER SQUARE INCH GAGE
IN INCHES	SCF STANDARD CUBIC FOOT
KG KILOGRAM	SCFM STANDARD CUBIC FEET PER MINUTE
KG/CM2 KILOGRAMS PER CENTIMETER SQUARED	SST STAINLESS STEEL
KJ KILOJOULE	SSU SAYBOLTS SECONDS UNIVERSAL
KM/H KILOMETERS PER HOUR	VAC VOLTS ALTERNATING CURRENT
KN KILONEWTON	VDC VOLTS DIRECT CURRENT

1.1 SPECIFICATIONS: THE FOLLOWING SOLAR DOCUMENTS MAY APPLY TO THIS DRAWING.

AUXILIARY SERVICE AIR	ES 2201
CLEANING AND FLUSHING OF HYDRAULIC SYSTEMS AND COMPONENTS	ES 2184
CUSTOMER DRAWINGS - POWER GENERATION	PIL 012
CUSTOMER STATION GROUNDING REQUIREMENTS	ES 2648
DIRECT-DRIVE AC START SYSTEM	PIL 149
VARIABLE FREQUENCY DRIVES	PIL 231
FASTENER INSTALLATION AND TORQUE VALUES	ES 9-54
FUEL, AIR, AND WATER (OR STEAM) FOR SOLAR GAS TURBINE ENGINE	ES 9-98
INGESTIVE CLEANING SOLAR GAS TURBINE ENGINES	ES 9-62
LUBE OIL TANK VENT WITH SEPARATOR WITH OR WITHOUT A FLAME ARRESTOR	ES 1745
LUBRICATING OIL FOR SOLAR GAS TURBINES	ES 9-224
PACKAGE ELEVATION, BASE LEVELING, PRELIMINARY AND FINAL ALIGNMENT INSTALLATION INSTRUCTIONS	ES 9-414
PACKAGE LIFTING GUIDELINES	PIL 183
PACKAGE TIE-DOWN OPTIONS	PIL 181
PURGE REQUIREMENTS FOR SOLAR GAS TURBINES	PIL 210
TURBOMACHINERY PACKAGE INSTALLATION GUIDELINE	TPIM 1000
EXHAUST SUPPORT RECOMMENDATIONS	PIL 273
METHANE EMISSIONS REDUCTION SOLUTIONS	PIL 279
PROCESS VENT RECOMPRESSION SYSTEM	PIL 280

1.2 FOLLOWING IS A LIST OF CORRESPONDING DRAWINGS AND SCHEMATICS:

PROCESS AND INSTRUMENTATION DIAGRAM	4F491-149446
ELECTRICAL LOOP SCHEMATIC	4F491-149447

PACKAGE INSTALLATION

2.0 PACKAGE WEIGHTS (ESTIMATES):

DRIVER PACKAGE LIFT WEIGHT	149,700 LBS [67903 KG]
DRIVEN BASE PACKAGE LIFT WEIGHT	129,800 LBS [58876 KG]
TOTAL PACKAGE LIFT WEIGHT	279,500 LBS [126779 KG]
INSTALLED PACKAGE LIFT WEIGHT (APPROXIMATE)	299,300 LBS [135760 KG]
ESTIMATED COMPONENT LIFT WEIGHTS	
TURBINE ASSEMBLY (INCLUDES SOLONOX, AIR INLET AND EXHAUST)	39,770 LBS [18039 KG]
AC START MOTOR ASSEMBLY	3,550 LBS [1610 KG]
GEARBOX	13,510 LBS [6128 KG]
GENERATOR (EXCLUDING TERMINAL BOX(ES)	105,821 LBS [48000 KG]
GENERATOR (INCLUDING TERMINAL BOX(ES)	108,356 LBS [49149 KG]

2.1 **CAUTION:**
THE LIFTING OF TURBOMACHINERY PACKAGES REQUIRES EXTREME CAUTION AND THE USE OF SUITABLE LIFTING EQUIPMENT.

THE PACKAGE FRAME CAN BE SAFELY LIFTED IN AMBIENT TEMPERATURES DOWN TO 32°F (0°C). FOR MORE INFORMATION ON LOW TEMPERATURE LIFTING LIMITATIONS PLEASE CONSULT SOLAR ENGINEERING. THE DRIVER FRAME AND DRIVEN FRAME ARE SHIPPED SEPARATELY. THEY MUST BE LIFTED SEPARATELY. FOR ALL LIFTS, FOUR LIFTING POINTS MUST BE USED WITH SPREADER BARS TO PREVENT DAMAGE TO THE PACKAGE.
THE CENTER OF GRAVITY FOR THE PACKAGE LIFT IS LABELED ON EACH SIDE OF THE PACKAGE FRAME AND ON THE MID PACKAGE CENTER OF GRAVITY AND LIFT POINTS SHEET.

LIFTING OF THE CONTROL CONSOLE (WHEN PROVIDED SEPARATELY) MAY BE ACCOMPLISHED BY ATTACHING A LIFTING SLING TO LIFTING EYES ON TOP OF CONSOLE.

FOR MORE INFORMATION ON PACKAGE LIFTING REFER TO PIL 183 - PACKAGE LIFTING GUIDELINES

FOR MORE INFORMATION ON SOLAR LIFTING EQUIPMENT REFER TO ES 2335.

APPROVED		☐
APPROVED AS NOTED		X
REVISE AND RESUBMIT		☐
REJECTED		☐
NOT SUBJECT TO REVIEW		☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL 7/17/23

JACOBS Date

2.2 ACCEPTABLE PACKAGE MOUNTING METHODS ARE DESCRIBED IN PIL 181. WHEN A CONVENTIONAL REINFORCED CONCRETE SLAB IS USED, IT IS EXPECTED THAT THE CONTACT AREA OF THE CONCRETE WILL BE FLAT AND LEVEL WITHIN 1/8"-INCH [3MM]. THE CUSTOMER, BASED ON LOCAL SOIL CONDITIONS, WILL DETERMINE THE THICKNESS. AN EMBEDDED PLATE AT EACH MOUNTING PAD IS REQUIRED TO SUPPORT THE JACKING SCREW.

THE PACKAGE FRAME IS DESIGNED SUCH THAT IT WILL UNDERGO THERMAL GROWTH WITH OPERATION OF THE PACKAGE. FLEXIBLE SEALANT MAY BE USED AROUND THE PERIMETER OF THE FRAME BUT SHALL NOT RESTRAIN THE UNIT FROM THERMAL GROWTH. THE SOLAR FRAME IS PAINTED IN ACCORDANCE WITH SOLAR ES 9-58 AND THE CUSTOMER SHOULD SELECT A SEALANT THAT IS COMPATIBLE WITH THE SOLAR PAINT. DO NOT REMOVE PAINT FROM THE FRAME.

WHEN ENCLOSED PACKAGES ARE INSTALLED SUCH THAT A GAP EXISTS BETWEEN THE FRAME AND FOUNDATION, THAT GAP MUST BE SEALED TO ACHIEVE THE TARGET AVERAGE SOUND LEVEL. THIS GAP CAN BE FILLED WITH A FLEXIBLE HOUSEKEEPING GROUT. IF THE GAP IS TOO LARGE TO BE FILLED WITH CAULK, SKIRTS MUST BE USED. THIS WILL REDUCE SOUND EMISSIONS FROM THE SKID BOTTOM.

THE SLAB OR DECK SHALL PROVIDE ADEQUATE AND CLEAN WALKWAYS THAT PERMIT SAFE ACCESS FOR MAINTENANCE AND ALLOW PROPER CLEARANCE FOR HINGED ENCLOSURE DOORS AND FOR THE REMOVAL OF DUCTING. FOR PACKAGE MAINTENANCE ACCESSIBILITY, REVIEW CLEARANCE ZONES ON THE MECHANICAL INTERFACE DRAWING. MAINTENANCE STRUCTURES (IF USED) SHALL ALLOW SAFE ACCESS FOR MAINTENANCE OF COMPONENTS LOCATED EXTERNAL TO THE PACKAGE (VALVES, STRAINERS, ETC.). THESE STRUCTURES ARE NOT SUPPLIED BY SOLAR.
ASSUME ENTIRE SHORT CIRCUIT TORQUE IS TRANSMITTED DOWN THE DRIVE TRAIN AND THE TORQUE IS REACTED BY TIE-DOWN BOLTS NEAREST TO THE COMPONENT PRODUCING THE TORQUE. REFER TO ES 9-414 FOR MORE DETAIL.

2.3 IF GENERATOR ROTOR IS TO BE REMOVED FROM THE PACKAGE, SEE VALUE BELOW FOR THE CLEARANCE REQUIRED AT THE GENERATOR END OF THE PACKAGE.
GENERATOR ROTOR REMOVAL CLEARANCE 20' [6096 MM]

2.4 NOTE NOT USED

2.5 NOTE NOT USED

2.6 FOR PACKAGE ELEVATION, BASE LEVELING, PRELIMINARY AND FINAL ALIGNMENT; ANCHOR BOLTING AND GROUTING PLEASE REFERENCE ES-9-414 AND PIL 181.

2.7 NOTE NOT USED

2.8 A. ENGLISH UNITS ARE PRIMARY AND METRIC CONVERSIONS SHOWN IN BRACKETS ARE DERIVED FROM THE ENGLISH UNITS. OVERALL DIMENSIONS SHOWN ON THIS DRAWING ARE NOMINAL AND SMALL VARIATIONS CAN BE EXPECTED. TOLERANCES ON ALL HOLD DOWN FOUNDATION POINTS ARE ±1/4" [± 6.4MM] FORWARD/AFT AND ± 1/8" [± 3.2 MM] LEFT/RIGHT. FOR ALL OTHER CUSTOMER CONNECTIONS, THE TOLERANCES ARE ± 1/2" [± 12.7 MM]. IT IS RECOMMENDED THAT SUFFICIENT ALLOWANCE BE LEFT ON MATING PIPES AND FLANGES FOR FINAL FIELD ALIGNMENT. DO NOT SCALE THIS DRAWING, WORK TO DIMENSIONS GIVEN. DIMENSIONS IN PARENTHESIS ARE REFERENCE ONLY.

B. CUSTOMER CONNECTION PIPE FLANGES CONFORM TO AMERICAN SOCIETY OF MECHANICAL (ASME) B.16.5. ALL FLANGE HOLES STRADDLE THE VERTICAL CENTERLINE SYMMETRICALLY.

C. ALL EXTERNAL PIPES, DUCTS AND VENTS CONNECTED TO THE PACKAGE MUST BE FULLY SELF-SUPPORTING. EXTERNAL INTERCONNECT PIPING MUST BE CLEANED OF DIRT, LOOSE DEBRIS, MILL SCALE AND RUST BY CONTRACTOR PRIOR TO INSTALLATION. MINIMUM PIPE SIZES ALLOWABLE ARE DETERMINED BY PACKAGE CONNECTION POINT. NO REDUCTIONS ARE ALLOWED UNLESS OTHERWISE SPECIFIED.

D. ALL SOLAR SUPPLIED PIPING INTERFACE CONNECTIONS ARE STAINLESS STEEL UNLESS OTHERWISE SPECIFIED.

2.9 FLOW, PRESSURE AND TEMPERATURE VALUES SHOWN ON THIS DRAWING ARE INTENDED FOR USE IN THE DESIGN OF EXTERNAL SYSTEMS AND EQUIPMENT ONLY, AND CANNOT BE USED IN ANY TURBINE PERFORMANCE CALCULATIONS.

2.10 **NOTICE:**
THE FLANGE FACES OF EXTERNAL DUCTING TO THE TURBINE AIR INLET AND EXHAUST EXPANSION JOINTS MUST BE ALIGNED TO MATING FLANGE FACES TO WITHIN +/- 1/4" [6 MM] IN ANY PLANE. UNDER NO CIRCUMSTANCES SHOULD EXTERNALLY IMPOSED LOADING WHICH EXCEEDS THE FOLLOWING VALUE, BE APPLIED IN ANY DIRECTION ON THE AIR INLET CONNECTION. THIS DUCTING MUST ALSO BE SUPPORTED TO LIMIT THE MOVEMENT OF THE DUCTING DURING TURBINE OPERATION AS FOLLOWS:

A. ALL AIR INLET DUCT FLANGES MUST BE SEALED. SEALANT MUST BE APPLIED CAREFULLY TO ENSURE AN AIRTIGHT SEAL. EXCESS SEALANT THAT MIGHT BE INGESTED BY THE ENGINE MUST BE REMOVED BEFORE ENGINE START-UP. SEALANT AND ATTACHING HARDWARE ARE FURNISHED BY SOLAR.

B. EXHAUST DUCT ALIGNMENT MUST BE MAINTAINED WITHIN +/- 1/4" [6 MM] OF EXHAUST DUCT CENTERLINE IN BOTH HOT AND COLD CONDITIONS. FOR MAXIMUM ALLOWABLE EXTERNAL LOADS AND MAXIMUM ALLOWABLE LATERAL DEFLECTIONS ON EXHAUST DUCT FLANGES, SEE NOTE 11.0.

NOTE: THE SHIPPING BRACES ARE TO BE REMOVED AND STORED FOR USE WHEN COMPRESSING THE BELLOWS DURING ENGINE REMOVAL.
AIR INLET DUCT FLANGE MAX ALLOWABLE EXTERNAL FORCE500 LBF [2224 N]
AIR INLET DUCT FLANGE MAX ALLOWABLE LATERAL DEFLECTION 0.38" [9.65 MM]

2.11 THERMAL GROWTH FROM EXTERNAL DUCTING TO ENCLOSURE PANEL OR ROOF MUST NOT EXCEED 1/2" [13 MM]. THE LOOSE SHIP BELLOWS IS SHIPPED AT ITS INSTALLED LENGTH, AND CAN NOT BE EXTENDED MORE THAN 0.5" [12MM] PAST THIS LENGTH. GASKETS AND ATTACHING HARDWARE ARE FURNISHED BY SOLAR. BELLOWS ARE INTENDED FOR SYSTEM THERMAL GROWTH ONLY; BELLOWS ARE NOT INTENDED FOR MECHANICAL VARIATION AND SHOULD BE FLANGED-UP AT THEIR APPLICABLE INSTALLED LENGTH.

2.12 NOTE NOT USED

2.13 NOTE NOT USED

2.14 NOTE NOT USED

2.15 TOTAL TURBINE PACKAGE CONVECTIVE AND RADIANT HEAT REJECTION (APPROXIMATE) VALUES WITH ASSOCIATED VENT FLOW ARE AS STATED BELOW. THIS ESTIMATE IS AT ISO CONDITIONS AND EXCLUDES THE LUBE OIL COOLER AND DRIVEN EQUIPMENT.
TURBINE PACKAGE HEAT REJECTION (EXCLUDES DRIVEN EQUIPMENT) 945,000 BTU/HR [276.9 kW]
REQUIRED TURBINE VENTILATION AIRFLOW +/- 10% 30,000 SCFM [850 NM3/MIN]

2.16 DIRECTIONAL REFERENCES TO THE PACKAGE - LEFT SIDE, RIGHT SIDE, FORWARD, AND AFT ARE ESTABLISHED BY VIEWING THE PACKAGE FROM THE EXHAUST END (AFT), AND LOOKING FORWARD TO THE TURBINE AIR INLET (FWD).

2.17 **WARNING:**
CUSTOMER SHOULD INSTALL LOCKABLE ISOLATION VALVES FOR ALL EXTERNALLY SUPPLIED, PRESSURIZED NATURAL GAS SOURCES. VALVES NEED TO BE LOCATED IN A READILY ACCESSIBLE AND SAFE AREA (AWAY FROM POSSIBLE FIRE OR GAS RELEASE ZONES). GAS FUEL AND GAS START SYSTEM OFF SKID SUPPLY LINES SHOULD SELECT VALVES THAT ARE LOCKABLE ONLY IN THE CLOSED POSITION.

2.18 GENERATOR COOLING AIRFLOW IS PER TABLE BELOW; GENERATOR COOLING AIR MUST BE CLEAN AND DRY. MAXIMUM ALLOWABLE BACK PRESSURE AT GENERATOR FRAME EXHAUST IS 0.5" [13 MM] H2O.
TOTAL GENERATOR CONVECTIVE HEAT REJECTION (APPROXIMATE) VALUES ARE AS STATED BELOW.
THIS ESTIMATE IS AT ISO CONDITIONS AND EXCLUDES THE LUBE OIL COOLER AND DRIVER EQUIPMENT.
GENERATOR COOLING AIRFLOW 16,600 CFM [470 M^3/MIN]
GENERATOR HEAT REJECTION 594,766 BTU/HR [172 KW/HR]

2.18 NOTE NOT USED

2.19 EXTERNAL ENGINE LIFTING CRANE, (PROVIDED BY OTHERS) TO BE SIZED FOR THE ENGINE PLUS THE WEIGHT OF LIFTING TOOL AS STATED BELOW. LIFTING TOOL IS AVAILABLE FROM SOLAR CUSTOMER SERVICES.
ENGINE LIFTING TOOL WEIGHT (SoLoNoX) 3220 LBS [1460.5 KG]

2.20 THE QUALITY OF AIR, FUEL AND WATER TO BE USED IN THIS GAS TURBINE IS ESTABLISHED IN ES 9-98. PROVIDING AIR, FUEL OR WATER THAT DOES NOT MEET THE MINIMUM REQUIREMENTS OF ES 9-98 WILL RESULT IN INCREASED MAINTENANCE, PERFORMANCE LOSS, AND REDUCED LIFE EXPECTANCIES AND MAY AFFECT WARRANTIES AND GUARANTEES. INCLUDES WATER USED IN EVAPORATIVE COOLERS

2.21 **NOTICE:**
THE AIR ENTERING THE ENCLOSURE/GENERATOR COMPARTMENT MUST BE FREE OF DUST, OIL MIST AND MOISTURE. GENERATORS OPERATING IN CHEMICALLY LADEN AIR MAY REQUIRE ADDITIONAL PROTECTION. INCREASED MAINTENANCE, PERFORMANCE LOSS, AND REDUCED LIFE EXPECTANCIES WILL RESULT IF SUITABLE AIR IS NOT USED FOR ENCLOSURE/GENERATOR COOLING.

2.22 NOTE NOT USED

2.23 NOTE NOT USED

2.24 **CAUTION:**
HIGH ELECTRICAL CURRENTS FLOW BETWEEN WELDING GROUND AND AN ARC DURING ARC WELD OPERATION. PRECAUTION MUST BE TAKEN TO ENSURE THAT THESE CURRENTS DO NOT PASS THROUGH CLOSE-TOLERANCE MOVING SURFACES, BEARING SURFACES, OR ELECTRONIC SYSTEMS. PLACE WELD GROUND AS CLOSE TO THE WELD LOCATION AS POSSIBLE OR ON THE COMPONENT TO BE WELDED. FAILURE TO OBSERVE THIS MAY RESULT IN PROPERTY DAMAGE AND COULD VOID WARRANTY CLAIMS. PRIOR TO WELDING ON, OR IN THE VICINITY OF, A TURBINE PACKAGE, ENSURE THE TURBINE PACKAGE IS NOT IN OPERATION AND IT IS PROPERLY GROUNDED.
NEVER USE THE TURBINE SKID AS A GROUND CONNECTION FOR WELDING OR OTHER FACILITY PURPOSES.

DO NOT WELD ON FILTERS, EVAPORATIVE COOLERS, CHILLERS, SILENCERS, LINED DUCTS, ENCLOSURE ROOF, ENCLOSURE PANELS, OR ANY OTHER POTENTIALLY FLAMMABLE COMPONENTS. WELDING ON THESE DEVICES MAY RESULT IN FIRE OR EQUIPMENT DAMAGE.

2.25 **NOTICE:**
THE PACKAGE FRAME DRIP PAN DRAINS MUST BE FITTED WITH A MANUAL SHUTOFF VALVE, WHICH MUST BE CLOSED DURING TURBINE OPERATION. THIS IS TO PREVENT THE ESCAPE OF THE FIRE SYSTEM AGENT IN CASE OF FIRE SYSTEM DISCHARGE OCCURS. TERMINATION POINT(S) ARE TO BE ROUTED TO AN OPEN DRAIN SYSTEM SUITABLE TO ACCEPT HYDROCARBON LIQUIDS. AVOID CONNECTING TO ANY CLOSED DRAIN SYSTEM.

START SYSTEM

3.0 NOTE NOT USED

Confirm gas fuel temp. any additional heating of gas fuel shall be in Solar's Scope.

FUEL SYSTEM

4.0 GAS FUEL IS TO BE IN ACCORDANCE WITH SOLAR SPECIFICATION ES 9-98. SOLAR REQUIRES THE FUEL TEMPERATURE BE AT LEAST 50° F [28° C] ABOVE THE DEW-POINT TEMPERATURE OF ANY INLET GAS CONSTITUENT AND AT LEAST 20° F [11° C] ABOVE THE DEW-POINT TEMPERATURE OF WATER AT SKID EDGE IN ORDER TO PREVENT LIQUID DROPOUT.
THE MINIMUM GAS FUEL TEMPERATURE FOR TITAN 250 SOLONOX IS 130° F (54.4° C).
THE MINIMUM ACCEPTABLE FUEL PRESSURE AND MAXIMUM FUEL FLOW RATE VARY INVERSELY WITH THE AMBIENT TEMPERATURE. PLEASE CONSULT SOLAR ENGINEERING FOR THE FUEL PRESSURE VS. AMBIENT TEMPERATURE CURVE AND FUEL FLOW RATE VS. AMBIENT TEMPERATURE CURVE FOR YOUR SPECIFIC APPLICATION

THE GAS FUEL SYSTEM SUPPLY TEMPERATURE RANGE IS BETWEEN -18° F (-27.8° C) AND 200° F (93° C). MAXIMUM FUEL SYSTEM PRESSURE RATING IS SHOWN BELOW. THE FUEL SYSTEM ALARM AND SHUTDOWN SET POINTS CAN BE FOUND ON THE GAS FUEL SYSTEM PROCESS AND INSTRUMENTATION DIAGRAM.

IT IS RECOMMENDED THAT A QUICK CLOSING AND EASILY ACCESSIBLE HAND OPERATED VALVE BE INSTALLED IN THE EXTERNAL SUPPLY LINE TO PROVIDE IMMEDIATE SHUTOFF CAPABILITY.
NOTE: THE SOLAR SUPPLIED LOOSE-SHIPPED GAS FUEL IN-LINE FILTER IS TO BE INSTALLED IN THE GAS PIPE EXTERNAL TO THE PACKAGE CONNECTION AND AS CLOSE TO THE PACKAGE CONNECTION AS POSSIBLE. ANY PIPING BETWEEN THE FILTER AND THE SKID EDGE CONNECTION MUST BE CLEANED PRIOR TO INSTALLATION. REFER TO LOOSE SHIPPED DETAIL FOR MAINTENANCE CLEARANCES.
FUEL SYSTEM PRESSURE RATING 605 PSIG [4,171 KPAG]

4.1 LIQUID FUEL IS TO BE IN ACCORDANCE WITH SOLAR SPECIFICATION ES 9-98. (REFER TO SOLAR PRODUCT INFORMATION LETTER 162 (PIL 162)FOR RECOMMENDED LIQUID FUEL CLEANUP) SEE VALUES BELOW.

LIQUID FUEL TEMPERATURE MIN	ES 9-98 SECT. 8.2.1
LIQUID FUEL TEMPERATURE MAX	ES 9-98 SECT. 8.2.1
LIQUID FLOW DEMAND MAX (@ -40°F [-40°C] AMBIENT TEMP)	4.25 SCFM [0.12 NM3/MIN]
LIQUID FUEL PRESSURE AT SKID EDGE MIN	10 PSIG [68.94 KPAG]
LIQUID FUEL PRESSURE AT SKID EDGE MAX	100 PSIG [689.4 KPAG]

4.2 AN EXTERNAL AIR SUPPLY IS REQUIRED TO OPERATE SEVERAL PNEUMATIC PILOT VALVE/ACTUATORS. THE AIR SUPPLY MUST BE CLEAN AND DRY IN ACCORDANCE WITH SOLAR SPECIFICATION ES 2201. AIR SUPPLY MUST BE MAINTAINED DURING ALL PHASES OF OPERATION. SEE VALUES BELOW.

AIR PRESSURE AT PACKAGE CONNECTION MIN	100 PSIG [689.5 KPAG]
AIR PRESSURE AT PACKAGE CONNECTION MAX	195 PSIG [1,345 KPAG]
INTERMITTENT FLOW RATE	25 SCFM [0.70 NM3/MIN]
PILOT AIR CONSUMPTION PER START, MAX	2 SCF [0.05 NM3]

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
DRAWING NOTES

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149956
SIZE E
REV B
SH 3 OF 52
CAD IDENT Released B5

SWBNO-1

4.3 **NOTICE:**
ON DUAL FUEL UNITS, ONCE THE COMMAND IS GIVEN TO TRANSFER, THE GAS FUEL PRESSURE AT THE PACKAGE CONNECTION MUST BE MAINTAINED AT OR ABOVE THE MINIMUM RECOMMENDED PRESSURE FOR THE TIME SPECIFIED (SEE VALUES BELOW). IN ORDER TO MAINTAIN FULL LOAD DURING TRANSFER. IT IS RECOMMENDED THAT A FUEL TRANSFER SIGNAL BE TAKEN IMMEDIATELY DOWNSTREAM OF GAS FUEL PRESSURE SOURCE.

TRANSFER TIME FROM GAS TO LIQUID - SoLoNoX	MIN 55, NOMINAL 70, MAX 85 (SECONDS)
TRANSFER TIME FROM LIQUID TO GAS - SoLoNoX	MIN 86, NOMINAL 99, MAX 201 (SECONDS)

4.4 ⚠1 AIR ASSIST IS REQUIRED FOR LIQUID FUEL ATOMIZATION DURING THE START CYCLE. AIR SUPPLY MUST BE MAINTAINED DURING ALL PHASES OF OPERATION ON LIQUID AND GAS (IF DUAL FUEL) FUELS FOR VALVE/ACTUATOR PILOT MEDIA (NOT REQUIRED DURING POST LUBE) THE AIR SUPPLY IS TO BE IN ACCORDANCE WITH SOLAR SPECIFICATION ES 2201. SEE VALUES BELOW.

AIR ASSIST FLOW RATE	150 SCFM [4.25 NM3/MIN]
CONSUMPTION	1050 SCF [29.8 NM3]
TOTAL TIME REQUIRED	435 SEC
SHUTDOWN:	
AIR ASSIST FLOW RATE	20 SCFM [0.57 NM3/MIN]
CONSUMPTION:	300 SCF [8.50 NM3]
TOTAL TIME REQUIRED	900 SEC

4.5 **NOTICE:**
WATER SUPPLY IS TO BE IN ACCORDANCE WITH ES 9-98 SPECIFICATION, AND REGULATED BETWEEN 10 TO 40 PSIG (69 TO 276 KPAG) FOR PURGING LIQUID FUEL LINES TO THE OFF-SKID WATER PURGE MODULE PUMP INLET. INLET SUPPLY TEMPERATURE TO BE BETWEEN 35 TO 140 DEG F (1.7 TO 71.1 DEG C).

SUPPLY PRESSURE FROM THE OFF-SKID PURGE MODULE TO THE PACKAGE IS 200 TO 600 PSIG (1380 TO 4140 KPAG), SYSTEM FLOW IS 10 GPM (37.8 LPM) MAXIMUM.

THE SOLAR SUPPLIED WATER PURGE PUMP ASSEMBLY IS A SELF-CONTAINED OFF-SKID MODULE THAT SHALL BE LOCATED AS CLOSE TO THE PACKAGE AS POSSIBLE. WATER PURGE MODULE MUST BE LOCATED WITHIN 50' [15 METERS] EQUIVALENT TUBE DISTANCE. INTERCONNECT TUBING SHALL BE 3/4" (19MM) SIZE O.D., 0.065" (1.65 MM) WALL THICKNESS. INTERCONNECT TUBING AND FITTINGS SHALL BE 316/316L STAINLESS STEEL. THE WATER SYSTEM PURGE/DRAIN CONNECTION SHOULD BE ROUTED TO A SUITABLE, VENTED CONTAINER. APPROXIMATELY 0.5 GAL [2.0 L] OF WATER WILL BE PURGED OVER A 5-SECOND PERIOD WHENEVER THE WATER SYSTEM IS DEACTIVATED.

CAUTION: PURGE FLUID MAY CONTAIN COMBUSTIBLE MATERIAL UNDER PRESSURE AND MUST BE ROUTED TO A SAFE LOCATION.

REFERENCE PIL 210 FOR PURGE SYSTEM REQUIREMENTS.

4.6 NOTE NOT USED

4.7 **NOTICE:**
PRIOR TO SERVICING THE GAS FUEL FILTER, ISOLATE, LOCK-OUT AND TAG-OUT THE HIGH PRESSURE FUEL GAS SUPPLY TO THE SKID. VENT THE FILTER CANISTER TO AMBIENT PRESSURE USING THE VENT LINE. THEN OPEN THE FILTER DRAIN VALVE AND ALLOW ANY COLLECTED LIQUIDS TO DRAIN IN AN ENVIRONMENTALLY APPROPRIATE MANNER, AND IN ACCORDANCE WITH LOCAL SAFETY PRACTICES AND PROCEDURES.

LUBE SYSTEM

IN SOLAR'S SCOPE

5.0 A. LUBE OIL USED IN THIS PACKAGE MUST BE IN ACCORDANCE WITH SOLAR SPECIFICATION ES 9-224. INITIAL FILL OF THE PACKAGE OIL TANK SHALL FULLY COMPLY WITH OIL CLEANLINESS GUIDELINES SPECIFIED IN ES 2184.
B. ALL SUBSEQUENT FILLS FROM THE DISPENSING OIL STORAGE TANK SHOULD BE PRE-FILTERED TO THIS SAME CLEANLINESS LEVEL.
C. SOLAR RECOMMENDS STAINLESS STEEL PIPING. EXTERNAL LINES ARE TO BE CLEANED BY CONTRACTOR PRIOR TO CONNECTION TO THE TURBINE SKID OR EXTERNALLY MOUNTED OIL COOLERS. (CARBON STEEL PIPING MUST BE PICKLED AND PASSIVATED PRIOR TO FLUSHING). UNDER NO CIRCUMSTANCES ARE THE EXTERNAL PIPES TO BE CLEANED WHILE THEY ARE CONNECTED TO THE TURBINE OR EXTERNALLY MOUNTED OIL COOLERS.
D. SOLAR RECOMMENDS THAT ALL LUBE OIL PIPING BE FLUSHED IN ACCORDANCE WITH THE RECOMMENDATIONS AND PROCEDURES SPECIFIED IN ES 2184.
SEE VALUES BELOW:

LUBE TANK CAPACITY AT NORMAL OPERATING LEVEL [6208 L]	1640 GAL
ADDITIONAL OIL REQD TO FILL PKG FILTERS & PIPING	150 GAL [567.8L]
DRAINBACK CAPACITY ABOVE OPERATING LEVEL (MAX RUNDOWN CAPACITY IS 2" BELOW TOP OF TANK)	525 GAL [1987 L]

5.1 THE LUBE OIL SHALL HAVE A POUR POINT, WHICH IS AT LEAST 11° F [6° C] BELOW THE MINIMUM AMBIENT TEMPERATURE, TO ENSURE FLOW IN EXPOSED LINES AND VESSELS.

CF ⚠1 5.2 OIL COOLING REQUIREMENTS. THE PACKAGE OIL COOLER IS NOT INTEGRAL WITH THE PACKAGE AND MUST BE LOCATED AND INSTALLED SEPARATELY. NO CHECK VALVES ARE ALLOWED IN THE OIL COOLER LOOP. IF THE COOLER IS MOUNTED ABOVE THE PACKAGE, THE OIL SUPPLY, RETURN, AND OPTIONAL VENT LINE SHOULD SLOPE FROM THE COOLER TO THE PACKAGE, WITH NO LIQUID TRAPS, TO FACILITATE DRAINING. WHEN AN AIR/OIL COOLER IS USED, CARE SHOULD BE TAKEN TO LOCATE THE COOLER SO THAT THE COOLER INLET AIR FLOW IS NOT SIGNIFICANTLY HIGHER THAN AMBIENT AIR TEMPERATURE. SIMILARLY, THE COOLER FAN EXHAUST FLOW SHOULD BE A SUFFICIENT DISTANCE AWAY FROM THE ENGINE AIR INLET. PREVAILING WINDS SHOULD BE CONSIDERED TO MAKE THIS ASSESSMENT. NO AIRFLOW BACK PRESSURE IS ALLOWED AT THE LUBE OIL COOLER FAN EXHAUST. MINIMUM DESIGN CRITERIA ARE SUPPLIED (SEE VALUES BELOW).

MAXIMUM HEIGHT OF TOP OF COOLER FROM BOTTOM OF PACKAGE	50' [15240 MM]
COOLER OIL VOLUME	189 GAL [715 L]
DESIGN HEAT LOAD	3,401,404 BTU/HR [997 KW]
DESIGN OIL FLOW RATE	488 GPM [1847 LPM]
DESIGN AIR FLOW RATE	212,743 SCFM [6024.2 NM3/MIN]
DESIGN AMBIENT TEMPERATURE	100 °F [38 °C]
DESIGN LUBE OIL OUTLET TEMPERATURE MAX	150 °F [65.5 °C]
COOLER DESIGN PRESSURE DROP MAX	20 PSID [137.8 KPAD]
COOLER DESIGN PRESSURE MIN	150 PSIG [1034 KPAG]
ALLOWABLE PRESSURE DROP OF COOLER & PIPING	40 PSID [275.7 KPAD]
OIL VISCOSITY	16.5 CENTISTOKES
OIL VISCOSITY GRADE	VG46

5.3 NOTE NOT USED

5.4 NOTE NOT USED

APPROVED		
APPROVED AS NOTED		X
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL 7/17/23

JACOBS Date

5.5 THE PIPING, OIL MIST SEPARATOR, AND FLAME ARRESTOR MAKE UP THE LUBE OIL TANK VENT SYSTEM. THE EXTERNAL OIL TANK VENT PIPE IS A CONTINUATION OF THE OIL TANK. THE PIPE MUST BE CLEAN, SELF-SUPPORTING AND HAVE A MINIMUM UPWARD SLOPE OF 1-INCH PER FOOT [76.4 MM/M] WITHOUT LIQUID TRAPS OR RESTRICTIONS. THE VENT LINE MUST BE ROUTED SUCH THAT OIL TANK VAPORS WILL NOT MIX WITH THE TURBINE INLET AIR. THE VENT LINE MUST BE ROUTED AWAY FROM THE TURBINE EXHAUST AND OTHER SOURCES OF IGNITION. IF A FLAME ARRESTOR IS USED, IT IS LOCATED AT THE ULTIMATE TERMINATION OF THE VENT LINE. IN THE ABSENCE OF A FLAME ARRESTOR, VENT PIPE TERMINATION SHALL AFFORD PROTECTION FROM RAIN AND SNOW BY MEANS OF A SHIELD OR BY PIPE GEOMETRY AND MAY REQUIRE SCREENING TO PREVENT THE ENTRY OF LARGE FOREIGN OBJECTS. FOR FURTHER GUIDANCE INSTALLING THE LUBE OIL TANK VENT PIPING SYSTEM, PLEASE REFER TO SOLAR ES 1745.

THE OIL MIST SEPARATOR IS NOT INTEGRAL WITH THE PACKAGE AND MUST BE LOCATED AND INSTALLED SEPARATELY. THE OIL MIST SEPARATOR SYSTEM (INLET AND OUTLET) HAS A MAXIMUM PRESSURE DROP OF 4" H2O [101.6 MM]. THE FOLLOWING INSTALLATION REQUIREMENTS APPLY: FILL THE SEPARATOR SUMP THROUGH FILL PORT TO OVERFLOWING BEFORE OPERATING. THE OIL MIST SEPARATOR MUST BE INSTALLED VERTICALLY. SUFFICIENT VERTICAL CLEARANCE FOR REMOVAL OF THE COVER MUST BE PROVIDED FOR PROPER MAINTENANCE OF THE SEPARATOR.

TANK VENTS SHOULD NOT BE TIED TOGETHER IN A MULTIPLE UNIT INSTALLATION. THIS VENT IS NOT DESIGNED FOR HIGH BACK PRESSURE OPERATION AND THE PACKAGE WILL ALARM AND SHUT DOWN IF SYSTEM OVER PRESSURE IS DETECTED. ALARM AND SHUTDOWN VALUES CAN BE FOUND ON THE PROJECT P&ID'S.

5.6 THE FLAME ARRESTOR PREVENTS FIRE FLASHBACK INTO THE OIL TANK. THE FLAME ARRESTOR IS NOT INTEGRAL WITH THE PACKAGE AND MUST BE LOCATED AND INSTALLED SEPARATELY.

ELECTRICAL SYSTEMS

6.0 PACKAGE ELECTRICAL INSTALLATION REQUIREMENTS AND RECOMMENDED WIRE GAUGES ARE AS SHOWN ON FIELD WIRE LIST. FOR DETAILED INFORMATION ON ALL PACKAGE VFD'S (OTHER THAN THE START MOTOR), SEE PIL 231.

6.1 IT IS WITHIN THE CUSTOMER'S SCOPE TO PENETRATE THE SKID EDGE CONNECTIONS AND CONTINUE ROUTING CABLES OR CONDUITS TO THE FINAL EQUIPMENT AND/OR TERMINAL BOXES WITHIN THE SKID. WHEN ROUTING AND SUPPORTING CABLE/CONDUIT CUSTOMER SHALL ENSURE THEY DO NOT BLOCK ANY EQUIPMENT REMOVAL. BE ESPECIALLY COGNIZANT OF COMPONENTS MOUNTED TO THE LUBE OIL TANK THAT MAY NEED TO BE REMOVED FOR SERVICING. THE CUSTOMER'S SCOPE OF SUPPLY ALSO INCLUDES ALL ASSOCIATED CABLE AND/OR CONDUIT MATERIAL.
REFERENCE TPIM 1000 TURBOMACHINERY PACKAGE INSTALLATION GUIDELINES FOR RECOMMENDED CABLE LENGTH ALLOWANCES TO REACH FROM SKID EDGE TRANSIT POINT TO END DEVICE.

6.2 **NOTICE:**
TO ENSURE SAFETY AND TO AVOID SENSITIVITY DUE TO POWER DISTURBANCES, ELECTROMAGNETIC INTERFERENCE (EMI), RADIO FREQUENCY INTERFERENCE (RFI) AND ELECTRICAL NOISE, USE OF A PROPER, CLEAN GROUND SYSTEM IS REQUIRED. REFER TO SOLAR ES-2648 FOR PROPER ELECTRICAL GROUND REQUIREMENTS.

6.3 GROUNDING LUGS/BUS BARS ARE PROVIDED FOR SEPARATELY GROUNDING THE PACKAGE FRAME, CONTROL CONSOLE/BOX, AND BATTERY CHARGER TO THE CUSTOMER'S GROUNDING CONDUCTOR. GROUNDING CONDUCTOR TO BE SIZED IN ACCORDANCE WITH REQUIREMENTS OF APPLICABLE ELECTRICAL CODES. LUG/BUS BAR SURFACE TO BE FREE OF DIRT, GRIME, PAINT AND OIL TO ALLOW METAL-TO-METAL CONTACT. LUG/BUS BAR ALSO SUITABLE FOR CONNECTION OF MAIN BONDING JUMPER FOR GROUNDING SYSTEMS. MAIN BONDING JUMPER TO BE SIZED IN ACCORDANCE WITH THE APPLICABLE ELECTRICAL CODE.

THE CONTROL SYSTEM MAY HAVE UP TO 4 DIFFERENT GROUND CLASSIFICATIONS TO ADDRESS PERFORMANCE AND PROTECTION. EVERY CONTROL CONSOLE/BOX WILL REQUIRE AT LEAST ONE (1) OF THESE GROUND CONNECTION POINTS. REFERENCE THE ELECTRICAL SCHEMATIC FOR SPECIFIC DETAILS AND CONNECTION LOCATIONS.

6.4 THE TURBOTRONIC CONTROL IS CONTAINED IN A DUST TIGHT, STEEL CONSOLE/BOX DESIGNED TO LIMIT THE EFFECTS OF ELECTROMAGNETIC INTERFERENCE. THE CONTROL CONSOLE/BOX IS DESIGNED WITH INTERNAL FANS TO PROVIDE AIR CIRCULATION WITHIN THE CONSOLE/BOX TO THE HEAT GENERATING COMPONENTS.

THE CONTROL CONSOLE (IF USED) MUST BE LOCATED IN A CLEAN, DRY ENVIRONMENT CONSISTENT WITH GOOD OPERATING PRACTICES FOR PLC AND COMPUTER SYSTEMS. ENVIRONMENTAL CONDITIONS WITHIN -4° F [-20° C] AND 131° F [55° C] WITH 95 PERCENT NON-CONDENSING HUMIDITY ARE REQUIRED.

TO ENSURE GOOD PERFORMANCE OF THE VIDEO DISPLAY UNIT, THE AIR FILTER AT THE REAR OF THE DISPLAY SHOULD BE CHECKED AT REGULAR INTERVALS FOR CLEANLINESS AND CLEANED AS APPROPRIATE.

THE EXACT LOCATION FOR EXTERNAL CONNECTIONS INTO THE CONTROL CONSOLE/BOXES IS TO BE DETERMINED ON THE SITE DURING INSTALLATION. THE AREA AVAILABLE IN THE CONSOLE/BOX FOR THESE CONNECTIONS IS SHOWN. THE CONSOLE/BOXES ARE SUPPLIED WITH FACTORY CUTOUTS AND REMOVABLE GLAND PLATES ON THE BOTTOM.

6.5 **NOTICE:**
INSTALL AC AND DC CIRCUITS IN SEPARATE LINES TO AVOID ELECTRICAL INTERFERENCE PROBLEMS. INTRINSICALLY SAFE CIRCUITS MUST BE SEPARATE FROM NON-INTRINSICALLY SAFE CIRCUITS. INCENDIVE CIRCUITS MUST BE SEPARATE FROM NON-INCENDIVE CIRCUITS.

6.6 **NOTICE:**
BATTERIES AND BATTERY CHARGER ARE DEDICATED TO THE SOLAR ELECTRICAL SYSTEM AND MUST NOT BE SHARED WITH OTHER SITE/CUSTOMER SYSTEMS WITHOUT WRITTEN APPROVAL FROM SOLAR ENGINEERING. IF THE BATTERY AND CHARGER ARE CUSTOMER SUPPLIED, THE SUPPLIED BATTERY SYSTEM MUST CONFORM TO SOLAR SPECIFICATION ES 2416.

6.7 UPON INSTALLATION OF THE LIQUID FUEL PUMP MOTOR VARIABLE FREQUENCY DRIVE, ALLOW A MINIMUM OF 3" [76.2MM] CLEARANCE ON THE TOP. THE VFD MUST BE INSTALLED SUCH THAT THE VISUAL AND PHYSICAL ACCESS TO THE VFD CONTROL PANEL IS MAINTAINED DURING NORMAL OPERATION. AIRFLOW THROUGH THE VFD MUST NOT BE IMPEDED. THE VFD MUST BE LOCATED IN AN AREA WITH A TEMPERATURE RANGE OF 32° F TO 122° F [0° C TO 50° C] AND WITH A 5-95% NON-CONDENSING RELATIVE HUMIDITY. CABLE ENTRY IS FROM THE BOTTOM ONLY. DEPENDING ON THE CABLE SELECTED AND THE MINIMUM BEND RADIUS, ALLOW FOR SUFFICIENT SPACE TO INSTALL CABLES. FOR COOLING REQUIREMENTS, A MINIMUM OF 3" [76.2MM] IS REQUIRED AT THE BOTTOM. FOR DETAILED INFORMATION ON LIQUID FUEL PUMP VARIABLE FREQUENCY DRIVE INSTALLATION REFER TO PIL 231.

6.8 THE JACKING OIL SYSTEM IS USED DURING START TO REDUCE THE ENERGY NEEDED TO BREAKAWAY AND ESTABLISH ROTATION OF THE GENERATOR, GEARBOX AND TURBINE. THE SYSTEM IS COMPOSED OF A MOTOR, PUMPS WITH A COMMUNICATING BODY AND RELIEF VALVES FOR SYSTEM PROTECTION. THE SYSTEM IS ENERGIZED PRIOR TO ROTATION OF THE MACHINE AND REMAINS ON UNTIL NGP REACHES APPROXIMATELY 250 RPM. IT IS NOT USED DURING SHUTDOWN OR SLOW ROLL AFTER SHUTDOWN. TWO HAND OPERATED HYDRAULIC PUMPS, HOSES AND CONNECTION POINTS ARE PROVIDED TO ASSIST WITH GENERATOR ALIGNMENT WHEN ELECTRICAL POWER TO THE JACKING OIL PUMP IS NOT AVAILABLE.

6.9 THE EXCITER END GENERATOR BEARING HOUSING IS ELECTRICALLY INSULATED FROM THE GENERATOR FRAME TO PREVENT SHAFT CURRENTS.

6.10 NOTE NOT USED

6.11 NOTE NOT USED

6.12 UPON INSTALLATION OF THE START MOTOR VARIABLE FREQUENCY DRIVE, ALLOW A MINIMUM OF 8" [203MM] CLEARANCE ON THE TOP. THE VFD MUST BE INSTALLED SUCH THAT THE VISUAL AND PHYSICAL ACCESS TO THE VFD CONTROL PANEL IS MAINTAINED DURING NORMAL OPERATION. AIRFLOW THROUGH THE VFD MUST NOT BE IMPEDED. THE VFD MUST BE LOCATED IN AN AREA WITH A TEMPERATURE RANGE OF 32° F TO 104° F [0° C TO 40° C] AND WITH A 5-95% NON-CONDENSING RELATIVE HUMIDITY. THE STANDARD VFD DESIGN IS FLOOR STANDING AND ALLOWS FOR CABLE ENTRY THROUGH THE TOP, WITH CABLE EXIT THROUGH THE BOTTOM. ANY OTHER CABLE ENTRY/EXIT CONFIGURATION REQUIRES PROJECT SPECIFIC EVALUATION TO DETERMINE IF THE CABLING WILL FIT. ALLOW FOR SUFFICIENT SPACE TO INSTALL CABLES. FOR DETAILED INFORMATION ON AC START SYSTEM VARIABLE FREQUENCY DRIVE INSTALLATION REFER TO PIL 149.

COMPRESSOR AND SEAL SYSTEM

7.0 SEAL SYSTEM (SECTION NOT REQUIRED)

ENCLOSURE

8.0 THE ENCLOSURE VENTILATION SYSTEM IS SIZED APPROPRIATELY BASED ON THE COMPONENTS SHOWN. IF ADDITIONAL DUCTING OR RESTRICTIONS ARE ADDED TO EITHER THE VENTILATION INLET OR EXHAUST RESULTING IN A TOTAL PRESSURE DROP INCREASES BY OF MORE THAN 1/2" [12.7 MM] H2O (INLET AND EXHAUST COMBINED), THE VENT FAN CAPACITY MUST BE RE-EVALUATED AND POSSIBLY INCREASED. PLEASE CONSULT SOLAR ENGINEERING.

DURING OPERATION, A MINIMUM DELTA PRESSURE OF 1/4" [6.35 MM] H2O WILL BE MAINTAINED. FOR APPROXIMATE HEAT REJECTION VALUE AND ASSOCIATED FLOW SEE NOTE 2.15. AND 2.18.

8.1 NOTE NOT USED

8.2 **NOTICE:**
ENCLOSURE IS EQUIPPED WITH A FIRE DETECTION AND EXTINGUISHING SYSTEM. THE EXTINGUISHANT DISCHARGE PRESSURE ACTIVATES PNEUMATICALLY RELEASED ISOLATION DAMPERS ON ALL VENT OPENINGS.

FIRE SYSTEM MANUAL RELEASE STATIONS MUST BE EASILY ACCESSIBLE IN AN EMERGENCY. FIRE EXTINGUISHANT SUPPLY SHIPS LOOSE FOR FIELD INSTALLATION BY OTHERS.

INTERCONNECT PIPING BETWEEN EXTINGUISHANT SUPPLY AND ENCLOSURE CONNECTION TO BE SUPPLIED BY OTHERS.
EXTINGUISHANT SUPPLY MUST BE LOCATED WITHIN 50 EQUIVALENT PIPE/TUBE FEET OF THE PACKAGE ENCLOSURE CONNECTION. INTERCONNECT TUBING FOR PRIMARY SYSTEM TO BE SEAMLESS 1" [25.4 MM] SIZE O.D., MINIMUM 0.095" [2.4 MM] WALL THICKNESS, ASTM A213/A269, GRADE 316/316L. INTERCONNECT TUBING FOR EXTENDED SYSTEM TO BE SEAMLESS 1/2" [12.7 MM] SIZE O.D., 0.049" [1.25 MM] WALL THICKNESS, ASTM A213/A269, GRADE 316/316L, 3/4" AND 1/2" SCHEDULE 40 PIPE, ASTM A53 OR ASTM A106, IS AN ACCEPTABLE ALTERNATIVE FOR THE MAIN AND EXTENDED SYSTEMS, RESPECTIVELY. ALL RUNS SHOULD BE ROUTED TO MINIMIZE PRESSURE LOSSES. AFTER THE INTERCONNECT IS COMPLETE REMOVE DISCHARGE NOZZLES AND BLOW OUT ALL LINES. CUSTOMER SUPPLIED INTERCONNECT PIPING/TUBING AND FITTINGS SHALL MEET NFPA 12 REQUIREMENTS.
THE FIRE SYSTEM DESIGN REQUIRES MINIMAL EXTINGUISHANT LEAKAGE THROUGH PACKAGE OPENINGS. TO PREVENT LEAKAGE, ENSURE THAT ALL ENCLOSURE AND FRAME OPENINGS ARE SEALED. PACKAGE DRIP PAN DRAINS NEED TO BE PLUGGED.

EXTINGUISHANT CYLINDERS MUST BE INSTALLED IN A WEATHER AND DIRECT SUNLIGHT PROTECTED ENVIRONMENT. MAXIMUM AMBIENT TEMPERATURE NOT TO EXCEED +130° F [54° C] OR FALL BELOW 0° F [-18° C].
WARNING:
CARBON DIOXIDE GAS CAN CAUSE INJURY OR DEATH. PRIOR TO ISOLATING THE FIRE CABINET FROM THE ENCLOSURE, THE FIRE SYSTEM INHIBIT FUNCTION MUST BE ACTIVATED. IF SUPPLIED, 3-WAY MANUAL ISOLATION VALVES FOR MAIN AND EXTENDED CO2 CYLINDERS ARE SHIPPED INSTALLED AND PLUGGED. THE ISOLATION VALVES ARE OPEN TO VENT WHEN THE FIRE CABINET IS ISOLATED FROM THE ENCLOSURE. IN THE EVENT CO2 IS DISCHARGED WHILE THE FIRE CABINET IS ISOLATED FROM THE ENCLOSURE, THE ENTIRE CONTENT OF CO2 IN THE FIRE CABINET IS VENTED. VENT PIPING/TUBING BY OTHERS MUST BE INSTALLED FROM THE ISOLATION VALVES AND ROUTED TO ATMOSPHERE IN AN UNOCCUPIED AREA. REFER TO MANUFACTURER'S INSTALLATION MANUAL FOR PROPER SYSTEM AND PIPING /TUBING INSTALLATION.

8.3 NOTE NOT USED

8.4 NOTE NOT USED

8.5 NOTE NOT USED

8.6 ALL MATING SURFACES OF LADDER RESTRAINTS MUST BE SEALED. SEALANT MUST BE APPLIED TO PREVENT LIQUIDS FROM ENTERING INTO THE PACKAGE. SEALANT IS FURNISHED BY SOLAR.

8.7 VENTILATION INLET AND EXHAUST SYSTEM EQUIPMENT SHIP SEPARATELY FROM ENCLOSED PACKAGE. THESE INTERCONNECTIONS ARE TO BE MADE DURING FIELD ERECTION. SOLAR SUPPLIED SEALANT IS TO BE APPLIED TO ALL MATING VENTILATION COMPONENT FLANGES DURING FIELD ERECTION. INTERCONNECTING HARDWARE IS PROVIDED FOR ALL SOLAR SUPPLIED VENTILATION COMPONENTS.

8.8 PACKAGE IS EQUIPPED WITH BUILT-IN COMPONENT REMOVAL CAPABILITY CONSISTING OF INTERNAL TROLLEYS, LOOSE-SHIPPED TROLLEY BEAM EXTENSION(S) AND HOIST(S). AN ADDITIONAL HOIST AND TROLLEY IS PROVIDED FOR ACCESSORY HANDLING AND REMOVAL.

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
DRAWING NOTES

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149956
SIZE E
REV B
SH 4 OF 52

CAD IDENT Released B5

SWBNO-1

ENGINE CLEANING

9.0 TURBINE CLEANING SUPPLY CONNECTIONS I2I AND I22 MUST BE CAPPED, OR PLUGGED WHEN NOT IN USE TO AVOID THE ENTRANCE OF DIRT, AND DEBRIS. USE CONNECTION I22 FOR ON-CRANK CLEANING ONLY, AND I2I FOR ON-LINE CLEANING ONLY. FOR ON-CRANK AND ON-LINE CLEANING THE WATER/SOLVENT SOLUTIONS SUPPLY IS TO BE REGULATED BETWEEN 85 PSIG AND I00 PSIG [586.1 KPAG AND 689.5 KPAG] AT THE PACKAGE SKID CONNECTION. THE FLUID TEMPERATURE SHOULD BE AT AMBIENT CONDITIONS EXCEPT IN EXTREME COLD AMBIENT. PLEASE REFER TO ES 9-62 OR THE OPERATIONS AND MAINTENANCE MANUAL FOR ADDITIONAL TURBINE CLEANING REQUIREMENTS AND PROCEDURES. WASH FLOW RATES AND TREATMENT QUANTITIES PER WASH CYCLE ARE SHOWN IN THE TABLE BELOW.

ON-LINE FLOW (CONNECTION I2I)	3.5 - 4.1 GPM [13.2 to 15.5 LPM]
ON-CRANK FLOW (CONNECTION I22)	5.0 - 5.8 GPM [18.9 to 22.0 LPM]
ON-LINE/ON-CRANK CLEANING PRODUCT VOLUME	20 - 25 GAL [75.7 - 94.6 L]
ON-LINE/ON-CRANK RINSE WATER VOLUME	25 - 50 GAL [94.6 - 189.3 L]

9.1 WHEN AMBIENT TEMPERATURES FALL BELOW 50° F [10° C], CONSULT SOLAR SPECIFICATION ES 9-62 AND THE OPERATION AND MAINTENANCE MANUAL FOR PROPER COLD WEATHER OPERATING PROCEDURES.

9.2 SOLAR TURBINES RECOMMENDED CLEANING SOLUTIONS SHOULD NEVER BE USED FOR ON-LINE CLEANING CONNECTION I2I UNLESS A PROPERLY DESIGNED INJECTION SYSTEM IS INSTALLED.

9.3 **CAUTION:**
ENSURE THE TURBINE AIR INLET DUCT/PLENUM IS FREE OF ACCUMULATED WATER AND SOLVENTS PRIOR TO STARTING THE TURBINE. ALSO, ENSURE THE TURBINE DRAINS ARE COMPLETELY DRAINED AFTER CLEANING AND NOT TERMINATED IN A COMBUSTIBLE ENVIRONMENT.

9.4 THE SOLAR SUPPLIED WASH CART REQUIRES A CLEAN DRY SUPPLY OF SHOP AIR AT 85 PSIG [586.1 KPAG] TO I00 PSIG [689.5 KPAG] SEE TABLE BELOW FOR FLOW RATE. COMPANION FLANGE INCORPORATING AN INTEGRAL QUICK DISCONNECT COUPLING IS PROVIDED WITH THE WASH CART FOR INSTALLATION AT SKID CONNECTIONS.

ON-LINE AIR FLOW (CONNECTION I2I)	2.5 SCFM [0.067 NM3/MIN]
ON-CRANK AIR FLOW (CONNECTION I22)	4.6 SCFM [0.13 NM3/MIN]

SAFETY AND MISCELLANEOUS NOTES

I0.0 **WARNING:**
ENGINE BLEED AIR TEMPERATURE RANGES FROM 660 DEG F [349 DEG C] TO 920 DEG F [493 DEG C]. TO PREVENT PERSONNEL BURNS INSTALLATION OF THERMAL PROTECTIVE MATERIAL ON ALL EXTERNAL PIPES, TUBES AND FITTINGS IS RECOMMENDED.

I0.1 TURBINE BLEED AIR FOR USE IN THE SELF CLEANING AIR CLEANER UNIT IS TO BE PLUMBED BY THE CUSTOMER/INSTALLER.

I0.2 **WARNING:**
FAILURE TO LIMIT BACK PRESSURE TO SPECIFIED VALUE CAN RESULT IN SYSTEM OR COMPONENT MALFUNCTION AND CAN CAUSE PERSONAL INJURY OR DEATH AND/OR PROPERTY DAMAGE. INSTALLATION OF BLOCK VALVES IN THE VENT LINES IS STRONGLY NOT RECOMMENDED.

WARNING:
IF THE EQUIPMENT WILL BE USING COMBUSTIBLE GAS FOR SERVICE, SPECIAL CARE MUST BE TAKEN TO PROPERLY VENT THE EXHAUST TO A SAFE LOCATION.

TURBINE EXHAUST SYSTEM

II.0 **NOTICE:**
GENERAL EXHAUST SYSTEM DESIGN GUIDELINES:
THE EXHAUST DUCTING MUST BE SUPPORTED TO LIMIT MOVEMENT OF THE DUCTING DURING TURBINE OPERATION AS FOLLOWS:

A. SUPPORT THE EXHAUST SYSTEM TO PREVENT DAMAGE TO SOLAR SUPPLIED COMPONENTS DUE TO THERMAL EXPANSION. REFERENCE PIL 273 FOR SUPPORT RECOMMENDATIONS.

B. MOUNTING BRACKETS MAY BE WELDED TO THE SHELL OF THE DUCTS (REPAINT MAY BE NEEDED). SEE NOTE 2.24 FOR ADDITIONAL INFORMATION.

C. THE EXPANSION JOINT AND EXHAUST DUCTING MATING FACES MUST BE ALIGNED WITHIN +/- 1/4" [6MM] IN ANY PLANE AND THE OVERALL EXHAUST ALIGNMENT BE MAINTAINED WITHIN +/- 1/4" [6MM] OF THE EXHAUST DUCT CENTERLINE IN BOTH HOT AND COLD CONDITIONS.

D. A GASKET IS REQUIRED ON THE ENGINE EXHAUST JOINT.

NOTE: SHIPPING BRACES ON BELLOWS ARE TO BE LEFT INSTALLED UNTIL COMMISSIONING IS COMPLETE AND STORED FOR USE DURING BELLOWS OR ENGINE REMOVAL.
EXHAUST DUCT FLANGE MAX ALLOWABLE EXTERNAL FORCE 400 LBF [1780 N]

II.1 **CAUTION:**
WHEN ASSEMBLING OR DISASSEMBLING THIS SYSTEM, USE THE LIFTING LUGS PROVIDED. USE THE LUGS TO LIFT COMPONENTS INDIVIDUALLY. IF LIFT LUGS ARE NOT AVAILABLE, EMPLOY INDUSTRY ACCEPTED LIFTING TECHNIQUES; USE COMPONENT WEIGHTS AND GEOMETRIC CENTER OF GRAVITY FOR REFERENCE. DO NOT USE THE LIFTING LUGS FOR PERMANENT MOUNTING.

II.2 THE DRAIN CONNECTIONS SHOWN ON THE ANCILLARY COMPONENTS ARE DESIGNED TO REMOVE EXCESSIVE AMOUNTS OF RAIN OR MOISTURE FROM THE SYSTEM DURING EXTENDED SHUT DOWN PERIODS. CONNECTION TO THESE DRAINS IS OPTIONAL FOR THE CUSTOMER.

II.3 ATTACHING HARDWARE KITS ARE INCLUDED FOR ALL FLANGES IN SOLAR SCOPE OR THE TURBINE EXHAUST INTERFACE FLANGE, (AS APPLICABLE). HARDWARE IS NOT SUPPLIED FOR ANY OTHER DOWNSTREAM CONNECTIONS. HARDWARE IS NOT SUPPLIED FOR FOUNDATION OR SUPPORT STEEL INTERFACES, UNLESS INCLUDED IN SOLAR SCOPE.

II.4 THE PRESSURE DROP ACROSS ALL ITEMS SHOWN IS REFERENCED IN THE PROJECT SPECIFIC ENGINE PREDICTED PERFORMANCE. ANY CHANGES TO THE ANCILLARY CONFIGURATION WILL NEED TO BE REVIEWED, AND THE PERFORMANCE PREDICTIONS MODIFIED ACCORDINGLY.

⚠ II.5 INDIVIDUAL COMPONENTS OF THE TURBINE EXHAUST SYSTEM ARE DESIGNED TO WITHSTAND THE FOLLOWING ENVIRONMENTAL LOADS: WIND LOAD OF I20 MPH [193 KM/H] (FASTEST MILE) PER UBC 1997 OR I60 MPH [257 KM/H] (3-SEC GUST) PER ASCE 7-16; SEISMIC LOADS OF 0.5G APPLIED AS HORIZONTAL ACCELERATION. WIND AND SEISMIC LOADS ARE APPLIED INDEPENDENTLY. APPLICATIONS WITH LOADS BEYOND THESE WILL NEED ADDITIONAL ENGINEERING EVALUATION.

II.6 **WARNING:**
TURBINE EXHAUST SURFACES OPERATE AROUND 900 DEG F [482 DEG C]. PERSONAL PROTECTIVE EQUIPMENT AND SPECIAL CARE MUST BE USED WHEN WORKING NEAR EXHAUST SURFACE AREA. TO AVOID FIRES DO NOT INSTALL EXHAUST COMPONENTS ON OR NEAR FLAMMABLE SURFACES OR OBJECTS.

II.7 NOTE NOT USED

⚠ II.8 FOR MORE INFORMATION ABOUT ACOUSTICAL INSULATION, REFER TO SOLAR'S PIL 058 - PACKAGE SOUND LEVELS AND REQUIREMENTS.

TURBINE AIR INLET SYSTEM

I2.0 A MINIMUM CLEARANCE OR CLEAR AREA IS REQUIRED TO SERVICE THE FILTER ELEMENTS AND TO ENSURE PROPER AIRFLOW TO THE TURBINE. DO NOT BLOCK DOOR SWINGS OR ACCESS AREAS. REFER TO VENDOR SUPPLIED INSTALLATION, OPERATION, AND MAINTENANCE MANUAL INCLUDED IN THE SOLAR OPERATION AND MAINTENANCE SUPPLEMENTAL DATA.

I2.1 **NOTICE:**
MOUNTING BRACKETS MAY BE WELDED ONLY TO THE SHELL OF THE DUCTS BEFORE INSTALLATION. REFER TO NOTE I2.7 FOR TYPICAL METAL THICKNESS AND MATERIAL TYPE. SEE NOTE 2.24 FOR ADDITIONAL INFORMATION ON WELDING.

I2.2 **CAUTION:**
WHEN ASSEMBLING OR DISASSEMBLING THIS SYSTEM, USE THE LIFTING LUGS PROVIDED. USE THE LUGS TO LIFT COMPONENTS INDIVIDUALLY. IF LIFT LUGS ARE NOT AVAILABLE, EMPLOY INDUSTRY ACCEPTED LIFTING TECHNIQUES; USE COMPONENT WEIGHTS AND GEOMETRIC CENTER OF GRAVITY FOR REFERENCE. DO NOT USE THE LIFTING LUGS FOR PERMANENT MOUNTING.

I2.3 NOTE NOT USED

I2.4 ATTACHING HARDWARE KITS ARE INCLUDED FOR ALL FLANGES IN SOLAR SUPPLIED COMPONENTS OR THE TURBINE INLET INTERFACE FLANGE, (AS APPLICABLE). HARDWARE IS NOT SUPPLIED FOR ANY OTHER UPSTREAM CONNECTIONS. HARDWARE IS NOT SUPPLIED FOR FOUNDATION OR SUPPORT STEEL INTERFACES, UNLESS INCLUDED IN SOLAR SCOPE.

I2.5 THE PRESSURE DROP ACROSS ALL ITEMS SHOWN IS REFERENCED IN THE PROJECT SPECIFIC ENGINE PREDICTED PERFORMANCE. ANY CHANGES TO THE ANCILLARY CONFIGURATION WILL NEED TO BE REVIEWED, AND THE PERFORMANCE PREDICTIONS MODIFIED ACCORDINGLY.

⚠ I2.6 INDIVIDUAL COMPONENTS OF THE TURBINE INLET SYSTEM ARE DESIGNED TO WITHSTAND THE FOLLOWING ENVIRONMENTAL LOADS: WIND LOAD OF I20 MPH [193 KM/H] (FASTEST MILE) PER UBC 1997 OR I60 MPH [257 KM/H] (3-SEC GUST) PER ASCE 7-16; SEISMIC LOADS OF 0.5G APPLIED AS HORIZONTAL ACCELERATION. WIND AND SEISMIC LOADS ARE APPLIED INDEPENDENTLY. APPLICATIONS WITH LOADS BEYOND THESE WILL NEED ADDITIONAL ENGINEERING EVALUATION.

⚠ I2.7 **NOTICE:**
TURBINE AIR INLET DUCT DESIGN GUIDELINES
DESIGN DUCTS PER APPLICABLE API 616 STANDARDS. DUCTS MAY BE CONSTRUCTED OF CARBON STEEL OR 316 STAINLESS STEEL. FOR C40 THROUGH T65 TURBINE PACKAGES, THE EXTERNAL SHELL SHALL BE CONSTRUCTED OF 10 GAGE SHEET METAL THICKNESS MINIMUM. FOR T70 THROUGH T250 TURBINE PACKAGES, THE EXTERNAL SHELL SHALL BE CONSTRUCTED OF 7 GAGE SHEET METAL THICKNESS MINIMUM. CARBON STEEL SURFACES SHALL BE PAINTED IN ACCORDANCE WITH ES 9-58, SYSTEM E, ON EXTERIOR SURFACES AND SYSTEM E OR A, FOR INTERIOR SURFACES. EXTERIOR SURFACES OF STAINLESS STEEL COMPONENTS SHALL HAVE A CLEAN, EVEN APPEARANCE WITHOUT VISIBLE SHOP MARKS, WELD BURNS, OR OTHER EXTRANEOUS MARKINGS. STIFFENERS SHALL BE ADDED TO MAINTAIN DUCTING RIGIDITY AT -20 INCHES H2O.

GALVANIZED MATERIAL IS NOT PERMITTED ON ANY TURBINE AIR INTAKE COMPONENT.
ENCLOSURE VENT DUCT DESIGN GUIDELINES

FOR ENCLOSURE VENTILATION DUCTING, 14 GAGE MINIMUM IS REQUIRED MADE OF CARBON STEEL OR 316 STAINLESS STEEL. CARBON STEEL SURFACES SHALL BE PAINTED IN ACCORDANCE WITH ES 9-58, SYSTEM E, ON EXTERIOR SURFACES AND SYSTEMS A/B, FOR INTERIOR SURFACES. EXTERIOR SURFACES OF STAINLESS STEEL COMPONENTS SHALL HAVE A CLEAN, EVEN APPEARANCE WITHOUT VISIBLE SHOP MARKS, WELD BURNS, OR OTHER EXTRANEOUS MARKINGS. STIFFENERS SHALL BE ADDED TO MAINTAIN DUCTING RIGIDITY AT +/- 10 INCHES H2O.

GALVANIZED MATERIAL IS NOT RECOMMENDED ON ENCLOSURE VENTILATION DUCTING.

ACCESS PORTS SHOULD BE ADDED AFTER THE INLET FILTER (HORIZONTAL) APPROXIMATELY EVERY 10' [3000 MM] AND BEFORE THE SILENCER (VERTICAL), WITH APPROPRIATE STIFFENERS TO MAINTAIN DUCTING RIGIDITY. LEAKS IN DUCTING OR DUCTING INTERCONNECTS CANNOT BE ALLOWED AND MAY CAUSE ENGINE DAMAGE OR FREQUENT ENGINE MAINTENANCE. CARE SHOULD BE TAKEN IN THE DESIGN TO ENSURE THAT NO LOOSE OBJECTS CAN BE INGESTED INTO THE ENGINE. INTAKE DUCTING SHALL BE DESIGNED FOR AN INTERNAL NEGATIVE PRESSURE OF NO LESS THAN 20 INCHES [508 MM] H2O AND WITHSTAND AN INTERNAL NEGATIVE PRESSURE OF 10 INCHES H2O COMBINED WITH A WIND LOAD OF I20 MPH [193 KM/H] (FASTEST MILE) PER UBC 1997 OR I60 MPH [257 KM/H] (3-SEC GUST) PER ASCE 7-16 WITHOUT PERMANENT DEFORMATION. EXHAUST DUCTING SHALL BE DESIGNED FOR AN INTERNAL POSITIVE PRESSURE OF NO MORE THAN 20 INCHES [508 MM] H2O AND WITHSTAND AN INTERNAL POSITIVE PRESSURE OF 10 INCHES H2O COMBINED WITH A WIND LOAD OF I20 MPH [193 KM/H] (FASTEST MILE) PER UBC 1997 OR I60 MPH [257 KM/H] (3-SEC GUST) PER ASCE 7-16 WITHOUT PERMANENT DEFORMATION. THE DESIGN PARAMETERS EXPLAINED HERE HAVE BEEN FOUND TO BE ADEQUATE FOR ALL OPERATING CONDITIONS OF THE ENGINE, ANY DESIGN MUST CONSIDER CONDITIONS OTHER THAN NOMINAL OPERATING. INTAKE DUCTING SHALL BE DESIGNED AND CONSTRUCTED TO AVOID THE USE OF INTERNAL FASTENERS.

NOTE: TURBINE AIRFLOW AND TEMPERATURE VALUES ARE FOR DUCT SIZING CALCULATION PURPOSES ONLY AND DO NOT CORRESPOND TO ANY GIVEN TURBINE CONDITIONS. THESE VALUES WERE CALCULATED AT THE STATED MIN/MAX CONDITIONS AND PERFORMANCE IS EXPECTED AT THE CONDITIONS STATED, NOT GUARANTEED. INLET AND EXHAUST SYSTEMS SHOULD BE DESIGNED SUCH THAT PRESSURE LOSSES DO NOT EXCEED 4" [102 MM] H2O FOR THE INLET, 6" [152 MM] H2O FOR THE EXHAUST AND 10" [254 MM] H2O FOR EXHAUST SYSTEM WITH HEAT RECOVERY. IF THE NORMAL OPERATING TEMPERATURE OF THE TURBINE IS OUTSIDE OR EXCEEDS THE AMBIENT TEMPERATURE RANGE BELOW, CONSULT SOLAR ENGINEERING.

AMBIENT TEMPERATURE MIN	-40°F [-40°C]
AMBIENT TEMPERATURE MAX	140°F [60°C]
EXHAUST TEMP MAX (@ 140°F [60°C] AMBIENT TEMP)	1010° F [543° C]
EXHAUST FLOW MAX	330,090 ACFM [9,347 M3/MIN]
INLET FLOW MAX (@ 59°F [15°C] AMBIENT TEMP)	120,269 ACFM [3,406 M3/MIN]

I2.8 NOTE NOT USED

I2.9 **NOTICE:**
DO NOT INSTALL THE AIR INLET FILTER IN CLOSE PROXIMITY TO THE EXHAUST STACK. AIR HEATED BY THE EXHAUST STACK, AND ENGINE EXHAUST INGESTED BY THE AIR INLET FILTER WILL REDUCE ENGINE PERFORMANCE AND CAUSE FOULING.

I2.10 NOTE NOT USED

I2.11 NOTE NOT USED

I2.12 NOTE NOT USED

I2.13 NOTE NOT USED

I2.14 NOTE NOT USED

I2.15 **WARNING:**
FLAMMABLE GASES MUST BE VENTED TO A SAFE LOCATION. BREATHERS FROM REGULATORS OR RELIEF VALVES AND VENTS FROM VENT VALVES MUST BE TERMINATED TO ATMOSPHERE IN AN AREA WITHOUT AN IGNITION SOURCE. SPECIAL ATTENTION SHALL BE GIVEN TO ENSURE THAT DURING TURBINE OPERATING OR SHUTDOWN OPERATION VENT GAS CANNOT RE-CIRCULATE INTO THE TURBINE AIR INLET DUCT, THE PACKAGE ENCLOSURE VENTILATION AIR INLET OR OUTLET, AND AT EXHAUST LOCATIONS.

I2.16 **NOTE:** AIR ENTERING THE TURBINE AIR INLET SYSTEM MUST COME FROM SAFE NON-HAZARDOUS LOCATION.

VENTS AND DRAINS

I3.0 **NOTICE:**
GENERAL INFORMATION:
SOLAR TURBINE PACKAGES USE ATMOSPHERIC VENTS AND DRAINS FOR CONTROLLED RELEASE OF GAS, PNEUMATIC PRESSURE OR LIQUIDS. THIS ALLOWS PROPER ACTUATION OF SOLENOIDS, SHUTOFF VALVES AND PNEUMATIC VENT VALVES AND PURGING OR DRAINING OF UNWANTED LIQUIDS. IDEALLY, ALL PACKAGE VENT AND DRAIN CONNECTIONS ARE SEPARATE DRAINS AND ATMOSPHERIC VENTS WHICH LEAD DIRECTLY TO THE ATMOSPHERE. GAS VENT AND GAS DRAIN LINES SHALL NOT BE COMBINED WITH DRAINS ASSOCIATED WITH OTHER MEDIA SUCH AS AIR OR OIL. PRESSURIZED GAS SHALL NOT BE USED TO PURGE DRAIN LINES. THE CUSTOMER MUST ENSURE THAT THE USE OF PRESSURIZED GAS TO PURGE ANY OF THE TURBINE PACKAGE LINES DOES NOT INTRODUCE BACKPRESSURE INTO ANY OTHER TURBINE DRAIN AND VENT CONNECTIONS. VENTS AND DRAINS HAVE TO BE LARGE ENOUGH TO HANDLE ANY FLOW GIVEN IN THIS DRAWING WITHOUT EXCEEDING THE MAXIMUM ALLOWABLE BACK PRESSURE. THE GIVEN SIZE OF EACH SKID CONNECTION IS THE MINIMUM SIZE AND CANNOT BE REDUCED UNDER ANY CIRCUMSTANCES. FOR LONGER PIPE RUNS, LINE SIZES HAVE TO BE APPROPRIATELY INCREASED. IT IS MANDATORY TO INTERLOCK THE PACKAGE IF A BLOCK VALVE IS INSTALLED IN ANY VENT CONNECTION EXCEPT WHERE NOTED. THE INSTALLATION OF ANY INTERLOCK, MECHANICAL OR ELECTRICAL, IS THE CUSTOMER'S RESPONSIBILITY. COMMON VENT LINES EXPERIENCE PERIODIC INCREASES IN BACK PRESSURE DURING BLOW DOWN OF OTHER EQUIPMENT. THE BACK PRESSURE MUST NOT EXCEED THE PRESSURES VALUES, EVEN FOR SHORT PERIODS, REGARDLESS IF THE PACKAGE IS RUNNING OR NOT. THE ADDITION OF A CHECK VALVE IS NOT PERMITTED.

I3.1 NOTE NOT USED

I3.2 **NOTICE:**
GAS VENT DESIGN CONSIDERATIONS - GAS VENT TERMINATION SHALL AFFORD PROTECTION FROM RAIN AND SNOW BY MEANS OF A SHIELD OR BY PIPE GEOMETRY AND BE SCREENED TO PREVENT ENTRY OF LARGE FOREIGN OBJECTS. THE VENT MUST BE ROUTED TO A SAFE PLACE WITHOUT LIQUID TRAPS OR RESTRICTIONS. THE VENT LINE MUST NOT BE REDUCED IN SIZE AND MUST NOT BE SUBJECTED TO MORE THAN 5 PSIG [34.47 KPAG] OF BACK PRESSURE. THE VENTS SHOULD NEVER BE TIED TOGETHER ON MULTIPLE UNIT INSTALLATIONS.

I3.3 **NOTICE:**
COMBUSTOR AND EXHAUST COLLECTOR DRAIN - THESE DRAINS ARE CONNECTED TOGETHER WITHIN THE PACKAGE TO FORM A SINGLE DRAIN CONNECTION AND WILL COLLECT ANY LIQUIDS IN THE EXHAUST AND COMBUSTOR. COLLECTED LIQUIDS CAN CONSIST OF WATER, CLEANING SOLUTIONS, AND UNBURNED LIQUID FUEL. THESE LIQUIDS SHALL BE PIPED TO A SUITABLE CONTAINER OR WASTE HANDLING SYSTEM IN A SAFE AREA.

FOR THE MINIMUM RECOMMENDED FLUID WASTE HANDLING REQUIREMENTS, AS WELL AS ADDITIONAL RECOMMENDATIONS FOR THE DRAIN TANK (S) OR WASTE HANDLING SYSTEM, REFER TO PIL 210.

THE RECOMMENDED DRAIN TANK(S) OR WASTE HANDLING SYSTEM IS SIZED TO HANDLE A MINIMUM OF FOUR (4) LIQUID TO GAS FUEL TRANSFERS AND FOUR (4) SHUTDOWNS WITHOUT MAINTENANCE OR DRAINAGE. FOR LIQUID FUEL, FOUR (4) TURBINE SHUTDOWNS ARE TO BE CONSIDERED.

THE TURBINE HAS TWO SKID EDGE CONNECTIONS FROM WHICH THE DISCHARGED LIQUID MUST BE CONTAINED AND HANDLED SAFELY: THE LIQUID FUEL DRAIN AND THE COMBUSTOR DRAIN. IN APPLICATIONS WHERE FLUID WASTE TANK(S) ARE USED TO HANDLE THE FUEL/WATER MIXTURES EXITING THE DRAINS, THE LIQUID FUEL DRAIN AND THE COMBUSTOR/TORCH DRAIN SKID EDGE CONNECTIONS TO THE TANK(S) SHOULD BE INDEPENDENT AND CANNOT EXPERIENCE BACKPRESSURE.

WARNING:
ANY BACK PRESSURE AT THIS CONNECTION OR CLOGGING OF THE DRAIN MAY RESULT IN AN ACCUMULATION OF COMBUSTIBLE LIQUIDS IN THE ENGINE OR EXHAUST DUCTING AND COULD RESULT IN A FIRE. CONNECTION SHOULD NOT BE CONNECTED TO ANY COMMON DRAIN THAT IS USED TO DRAIN OR VENT FLAMMABLE GAS OR FLUIDS.

MINIMUM COMBUSTOR & EXHAUST DRAIN CONTAINER VOLUME	50 GAL [189 L] FOR COMPLETE SIZING DETAILS, SEE PIL 210
DISCHARGE TEMPERATURE	205 F [96.1 C]

I3.4 NOTE NOT USED

I3.5 NOTE NOT USED

I3.6 NOTE NOT USED

I3.7 **CAUTION:**
PRIOR TO STARTING THE ENGINE, ENSURE THAT THE TURBINE AIR INLET DRAIN P-TRAP OR DRAIN CHECK VALVE IS NOT RESTRICTED AND THAT THE AIR INLET DUCT IS FREE OF ACCUMULATED WATER. THE COLLECTED LIQUIDS IN THIS DRAIN ARE MOST LIKELY WATER, LIQUID FUEL (IF USED), LUBE OIL AND ENGINE CLEANING SOLUTIONS, AND MUST BE PROPERLY DISPOSED. ENSURE THIS DRAIN IS NOT TO BE COMBINED WITH UNPOLLUTED WATER DRAINS.

APPROVED	_____	X
APPROVED AS NOTED	_____	
REVISE AND RESUBMIT	_____	
REJECTED	_____	
NOT SUBJECT TO REVIEW	_____	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL 7/17/23
JACOBS Date

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
DRAWING NOTES

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149956
SIZE E
REV B
SH 5 OF 52
CAD IDENT Released B5
SWBNO-1

13.8 **NOTICE:**
LIQUID FUEL DRAIN - AFTER THERE IS A TRANSFER FROM LIQUID TO GAS FUEL OR AFTER THE UNIT IS SHUTDOWN THE LIQUID FUEL LINES ARE PURGED. AS A RESULT OF THIS PURGE THERE IS A DISCHARGE VIA THIS LIQUID FUEL LINE CONSISTING OF LIQUID FUEL, PCD AIR AND WATER.

THE CUSTOMER IS RESPONSIBLE FOR CONNECTION TO A HAZARDOUS WASTE HANDLING SYSTEM TO SAFELY RECEIVE AND DISPOSE OF THIS MATERIAL. CONNECTION FROM PACKAGE SKID EDGE SHALL CONTINUOUSLY SLOPE DOWN WITHOUT TRAPS TO THE COLLECTION CONTAINER OR LIQUID WASTE DRAIN SYSTEM. THE DRAIN CONNECTION SHOULD BE SIZED TO PRODUCE NO BACK PRESSURE AT THE FLOW LISTED. TO PREVENT OVERFLOW, IT IS RECOMMENDED THAT THE WASTE SYSTEM BE EQUIPPED WITH EITHER AN AUTOMATIC DRAIN OR A LEVEL SWITCH. INSTALLATION OF A FLAME ARRESTOR IS ALSO RECOMMENDED FOR THE VENT LINE.

TABLE BELOW SHOWS MAXIMUM VALUES FOR USE IN SYSTEM DESIGN. THESE VALUES REPRESENT A SINGLE TRANSIENT EVENT SUCH AS LIQUID SHUTDOWN OR FUEL TRANSFER. ENSURE THAT THE WASTE SYSTEM IS PROPERLY SIZED TO ACCOMMODATE MANY MORE EVENTS.

CAUTION:
AVOID ANY BACK PRESSURE OR CLOGGING IN THE DRAIN SYSTEM. BACKPRESSURE MAY CAUSE ACCUMULATION
OF COMBUSTIBLE LIQUIDS IN THE ENGINE AND COULD RESULT IN A FIRE OR FUEL SYSTEM DAMAGE.

PCD AIR	N/A
DISCHARGE VOLUME: LIQUIDS (SoLoNoX)	N/A
DISCHARGE TEMPERATURE: AIR	N/A
DISCHARGE DURATION: LIQUID	N/A
DISCHARGE DURATION: AIR FLOW	N/A

SOLAR TO PROVIDE FLOWS

13.9 OIL TANK DRAIN - THE TANK DRAIN MUST BE FITTED WITH A MANUAL VALVE BEFORE THE TANK IS FILLED. IT IS RECOMMENDED THAT THE VALVE BE OF THE LOCKING TYPE AND HAVE A PLUG INSTALLED IN THE OPEN END TO AVOID ACCIDENTAL SPILLS. THIS DRAIN IS USED TO EMPTY THE TANK WHEN NEEDED, AND NORMALLY IS NOT CONNECTED TO A DRAIN SYSTEM.

13.10 **CAUTION:**
DRIP PAN DRAIN - THESE DRAINS MUST BE FITTED WITH MANUAL VALVES, WHICH MUST BE CLOSED DURING TURBINE OPERATION. THIS IS TO PREVENT THE ESCAPE OF THE FIRE SYSTEM AGENT IN CASE OF A FIRE SYSTEM DISCHARGE. THE COLLECTED LIQUIDS IN THESE DRAINS MAY CONSIST OF WATER, LIQUID FUEL (IF USED), LUBE OIL AND ENGINE CLEANING SOLUTIONS. THE AMOUNT OF LIQUID CAN VARY FROM A FEW DROPS TO SEVERAL HUNDRED GALLONS [LITERS] DEPENDING ON THE SOURCE AND CAUSE OF THE LEAK. AVOID CONNECTION TO ANY CLOSED DRAIN SYSTEM; ANY BACK PRESSURE AT THESE DRAINS WILL VENT BACK INTO THE ENCLOSURE CREATING A HAZARDOUS ENVIRONMENT.

13.11 OIL COOLER VENT - THE AIR/OIL COOLER VENT PORT IS EQUIPPED WITH AN ORIFICE WHICH SHOULD BE TUBED BACK TO THE OIL TANK. THIS ORIFICE ALLOWS THE INITIAL AIR, TRAPPED IN THE SYSTEM AT THE STARTUP, TO VENT AND DRAINS THE OIL FROM THE EXTERNAL COOLER LINES BACK TO THE TANK AFTER SHUTDOWN.

13.12 LUBE OIL FILTER DRAIN - THIS DRAIN IS PROVIDED WITH A HAND VALVE INSIDE OF THE SKID. A PLUG MUST BE INSTALLED IN THE DRAIN OUTLET TO AVOID ACCIDENTAL SPILLAGE. THIS IS A MAINTENANCE DRAIN AND NORMALLY NOT CONNECTED TO A DRAIN SYSTEM, BUT MAY BE USED AS A LOW POINT DRAIN SYSTEM.

13.13 NOTE NOT USED

13.14 NOTE NOT USED

13.15 NOTE NOT USED

13.16 WATER PURGE - DRAIN FROM THE WATER PURGE MODULE FOR DUMPING DE-IONIZED WATER UNTIL IT IS CLEAN ENOUGH TO PASS ON TO THE PACKAGE. THIS MAY FLOW UP TO 15 GPM [57 LPM] FOR 1 MINUTE AND CAN BE PIPED TO A SUITABLE DRAIN SYSTEM.

13.17 **CAUTION:**
COALESCING FUEL FILTER VENT AND DRAIN - THE COALESCING FUEL FILTER IS INSTALLED OFF SKID OF THE TURBINE PACKAGE. THE PURPOSE OF THE COALESCENT FUEL FILTER LEVEL GAGE IS TO INDICATE/ALERT THE USER WHEN THE GAS FUEL CONTAINS UNDESIRED HYDROCARBONS (PER SOLAR SPECIFICATION ES 9-98). UNDESIRED LIQUID HYDROCARBONS MAY DAMAGE THE ENGINE.

THE FILTER MAY OR MAY NOT CONTAIN A PURGE AND VENT VALVE AS WELL AS A DRAIN VALVE. ALL OF THESE VALVES MUST REMAIN CLOSED DURING PACKAGE OPERATION. THE OPERATOR SHOULD PERIODICALLY CHECK THE LIQUID LEVEL GAGE ON THE SIDE OF THE COALESCING FILTER. IF LIQUIDS ARE PRESENT, THIS IS A NON-NORMAL OCCURRENCE, AND THE OPERATOR SHOULD IMMEDIATELY INVESTIGATE AND CORRECT THE PROBLEM.

THE RECOMMENDED PROCEDURE TO DRAIN THE COALESCING FILTER:
1. SHUT OFF THE FUEL SUPPLY UPSTREAM OF THE COALESCING FILTER (LOCK OUT AND TAG)
2. OPEN THE VENT VALVE TO BLEED DOWN THE GAS PRESSURE
3. OPEN THE DRAIN VALVE TO DRAIN AWAY THE LIQUID TO A DRAINAGE SYSTEM SUITABLE FOR HAZARDOUS HYDROCARBONS
4. CLOSE BOTH VENT AND DRAIN VALVES. THE PURGE VALVE IS PROVIDED IN CASE THE OPERATOR WISHES TO BLOW DOWN THE SYSTEM WITH AIR OR NITROGEN PRIOR TO OPENING THE FUEL SYSTEM (FOR INSTANCE, TO CHANGE THE FILTER ELEMENT) THE DRAIN VALVE SHOULD BE PLUGGED AND NOT CONNECTED TO ANY OTHER PACKAGE DRAIN SYSTEMS.

13.18 THIS GAS TURBINE PACKAGE IS TO BE INSTALLED IN A NON-HAZARDOUS LOCATION. THE AREA AROUND THE GAS TURBINE PACKAGE SHALL BE SUCH THAT A HAZARDOUS EXPLOSIVE ATMOSPHERE CAN NOT FORM AND EXPOSE THE GAS TURBINE PACKAGE TO A FLAMMABLE EXPLOSIVE ATMOSPHERE. THE VENTILATION AIR ENTERING THE GAS TURBINE HOOD (ENCLOSURE), AND ENGINE AIR ENTERING THE GAS TURBINE ENGINE SHALL BE TAKEN FROM A NON HAZARDOUS LOCATION. IN CASE OF INDOOR INSTALLATION, VENTILATION EXHAUST AIR MUST BE DUCTED OUTSIDE THE BUILDING.

RECOMPRESSION SYSTEM

14.0 NOTE NOT USED

APPROVED		☐
APPROVED AS NOTED		X
REVISE AND RESUBMIT		☐
REJECTED		☐
NOT SUBJECT TO REVIEW		☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL 7/17/23

JACOBS Date

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

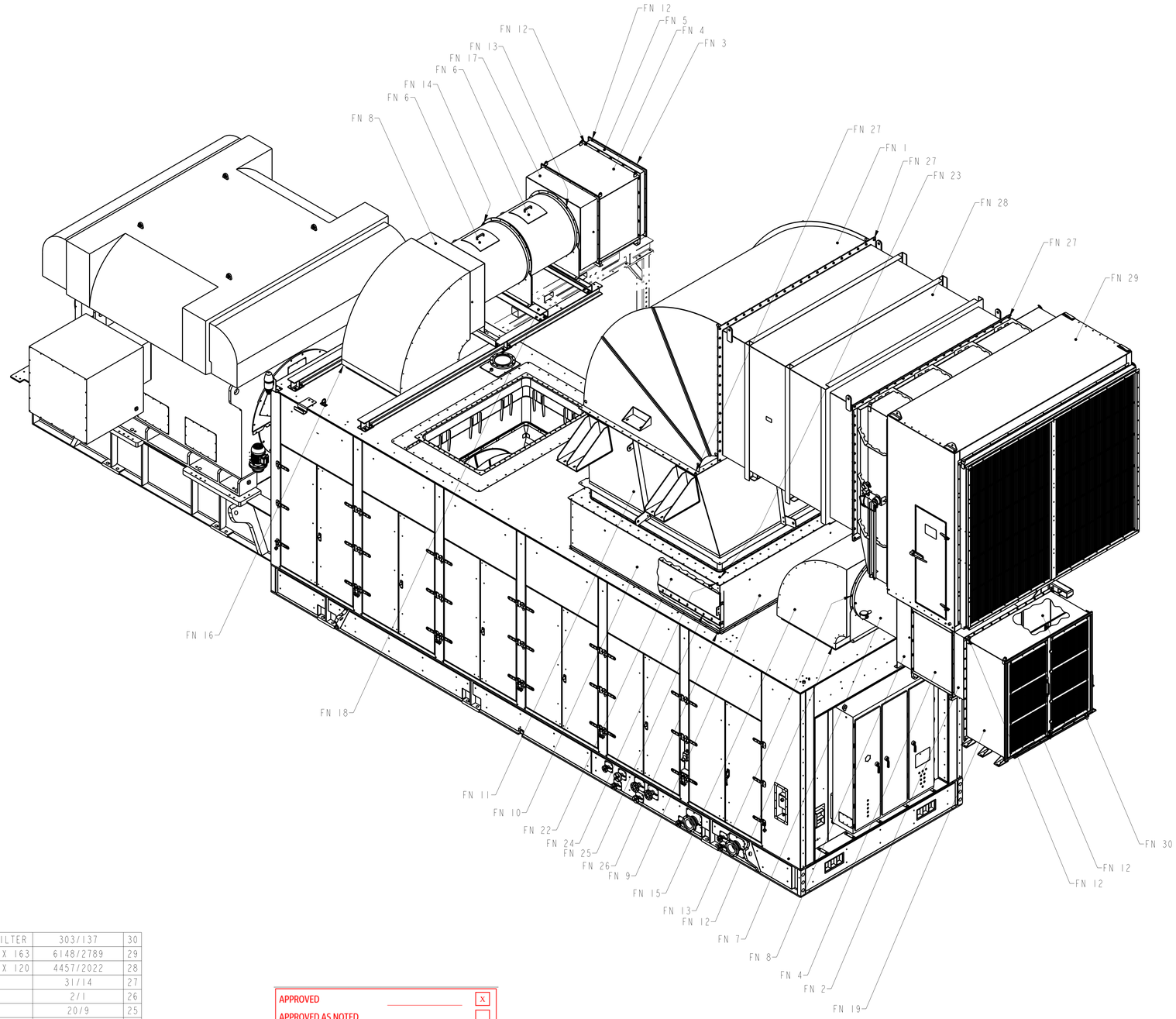
DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
DRAWING NO.

Solar® Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 6 OF 52	

CAD IDENT Released B5

SWBNO-1



NOTES:

1. THE TABLE BELOW CORRESPONDS TO FIND NUMBERS ON SHEET 7 AND 8.

2. THE ITEMS LISTED IN THE TABLE BELOW ARE SHIPPED LOOSE FOR ASSEMBLY OR INSTALLATION BY OTHERS.

QTY. REQ'D	EQUIPMENT PART NUMBER	EQUIPMENT NOMENCLATURE OR DESCRIPTION	EQUIPMENT ENVELOPE SIZE INCHES	EQUIPMENT WEIGHT LBS/KGS	FIND NO.
1	2157956-100	FILTER ELEMENTS,CLASS F8	PART OF FILTER	303/137	30
1	1993654-4F491	FILTER,AIR,INLET,BARRIER	110 X 141 X 163	6148/2789	29
1	1977951-100	DUCT,INLET,STRAIGHT,132X96X120	141 X 109 X 120	4457/2022	28
3	1904700-100	KIT,HDWR,FLANGE,INLET	-	31/14	27
1	1904698-101	KIT,HDWR,FLANGE,INLET	-	2/1	26
2	1901640-100	KIT,HDWR,FLANGE,INLET	-	20/9	25
1	1901637-100	KIT,HDWR,FLANGE,INLET	-	13/6	24
1	1901636-101	KIT,HDWR,TURBINE AIR INLET	-	66/30	23
1	1854443-100	SILENCER,INL,DONASONIC,109X116	126 X 131 X 36	3332/1511	22
1	1814463-101	KIT,HANDLING,ENGINE	-	3115/1413	21
1	1814462-101	KIT,HANDLING,ENGINE	-	1812/822	20
1	1770280-102	FILTER ASSY,ENCL	87 X 80 X 51	1192/541	19
1	1112306-200	SUPPORT, ENCLOSURE, EXHAUST	69 X 212 X 14	3/1	18
1	1112024-4F491	DUCT,VENT,TRNSN,48X48	52 X 52 X 16	197/89	17
1	1111995-100	DUCT,ELBOW,VENT,90°,48X48	53 X 67 X 63	596/270	16
1	1111993-100	DUCT,ELBOW,VENT,90°,48X48	53 X 67 X 63	639/290	15
1	1111267-602	HW KIT, VENT	-	2/1	14
4	1111267-402	HW KIT, VENT	-	2/1	13
9	1111267-102	HW KIT, VENT	-	2/1	12
1	1110299-4A181	DUCT,INLET,FLEX	186 X 132 X 82	3345/1517	11
2	1110041-100	PANEL, INLET, SILENCER	133 X 38 X 5	288/131	10
2	1110040-100	PANEL, INLET, SILENCER	133 X 38 X 5	282/128	9
2	1109684-100	DUCT,VENT,TRNSN,48X48	52 X 52 X 16	135/61	8
1	1109174-800	FAN,VENT,460 VAC,20 HP,42 DIA	53 X 54 X 43	1360/617	7
2	1109174-1100	FAN,VENT,460 VAC,40 HP,42 DIA	53 X 54 X 43	1801/817	6
1	1106404-101	DAMPER, BACKDRAFT	52 X 52 X 6	106/48	5
2	1105655-601	SILENCER,VENT,48X48,STRAIGHT	52 X 56 X 36	196/89	4
1	1105589-100	SCREEN,ENCLOSURE VENTILATION,48X48	52 X 52 X 1	15/7	3
1	1105571-300	DUCT,VENT,STRAIGHT,48X48,12 IN	52 X 52 X 12	80/36	2
1	1096104-100	DUCT, INLET, ELBOW	126 X 126 X 154	4250/1928	1

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

ISO VIEW ⚠
FORWARD-RIGHT

RIGHT FORWARD

CUSTOMER/END USER/PROJECT

SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE

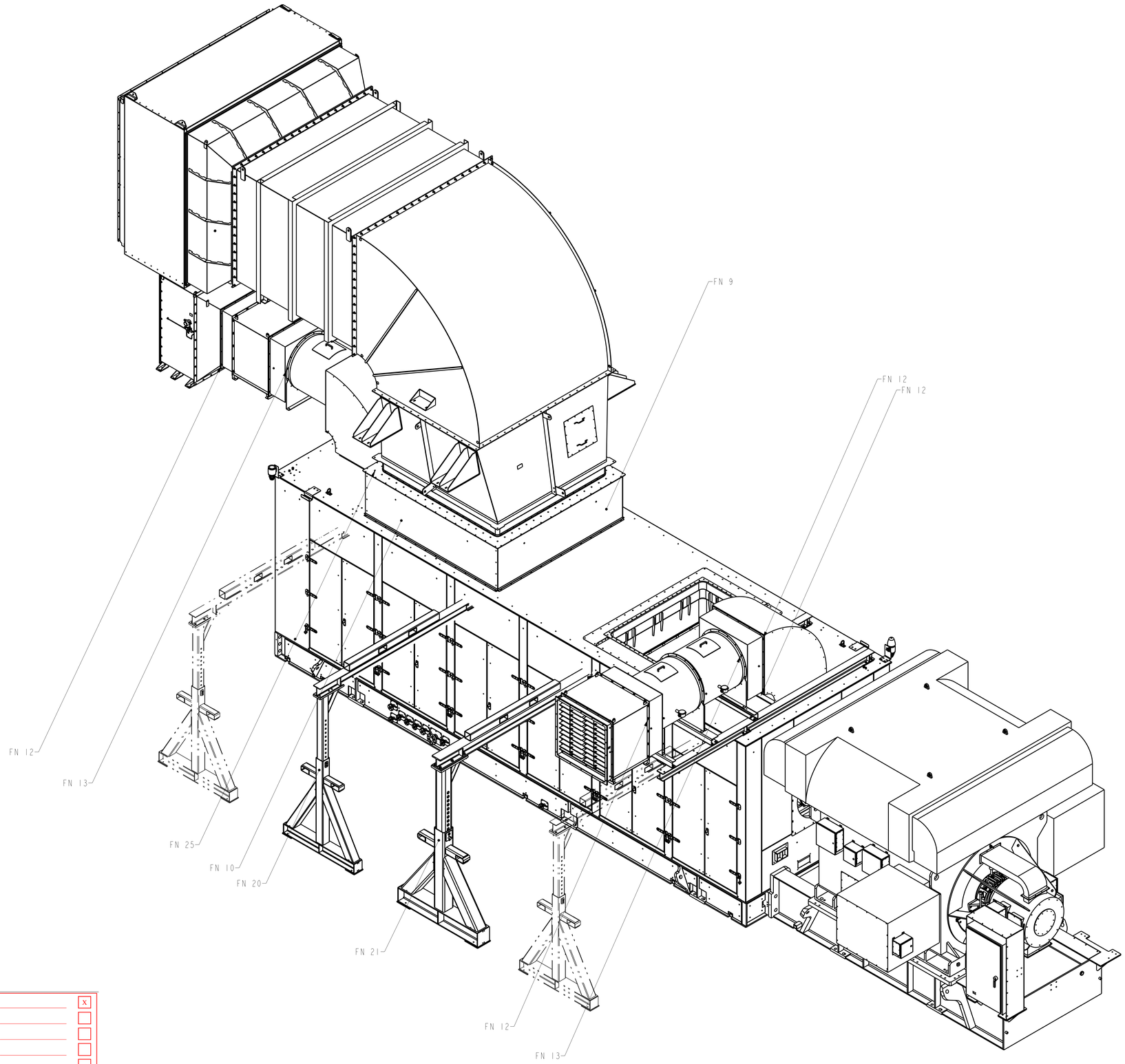
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
ISO VIEW FORWARD-RIGHT

Solar® Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 7 OF 52	

CAD IDENT Released B5

SWBNO-1



ISO VIEW △
AFT-LEFT

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL 7/17/23

JACOBS Date

FORWARD RIGHT

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

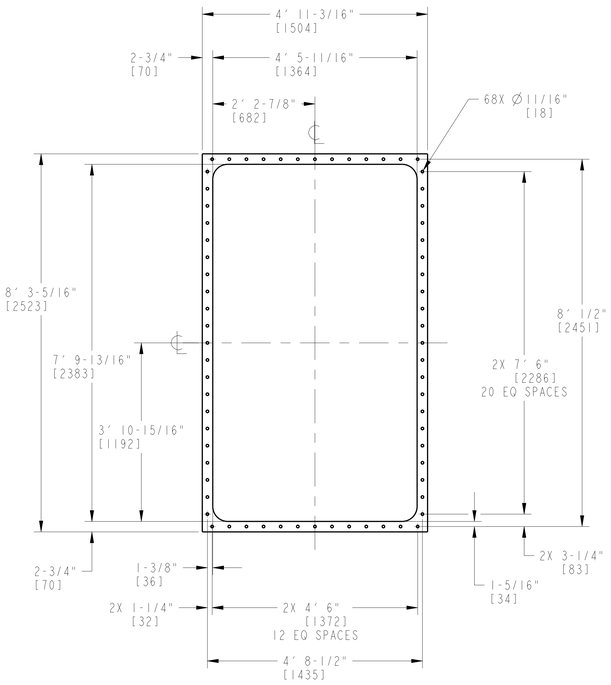
DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
ISO VIEW AFT-LEFT

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149956
SIZE E
REV B
SH 8 OF 52

CAD IDENT Released B5

SWBNO-1



VIEW B-B

TURBINE EXHAUST FLANGE
3/8" [10] THICK
SUPPORT BY OTHERS

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

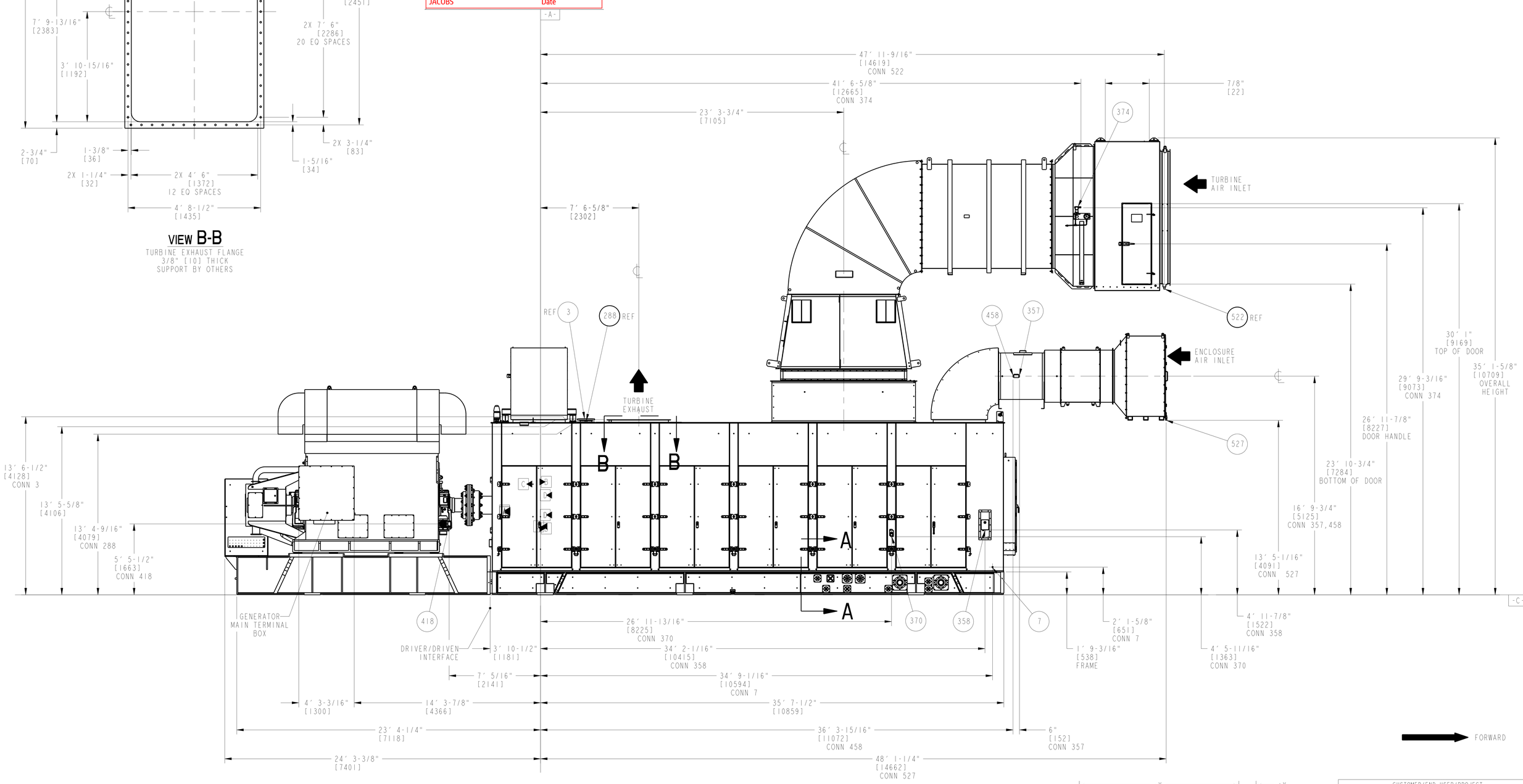
Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

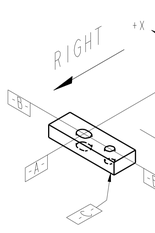
JACOBS — Date

TABLE 1 - CONNECTIONS

ITEM	DESCRIPTION	SIZE & TYPE	Y DIMENSION SEE SHEET 9
7	LUBE OIL COOLER VENT	1/2" NPT FEMALE	SEE SHEET 12
357	AC VOLTS, ENCLOSURE VENT FAN	1 1/4" NPT FEMALE	SEE SHEET 11
358	AC VOLTS, ENCLOSURE LIGHTING	25 MM	-1-7/16" [-36]
370	AC VOLTS, POWER CABLE	M25 CABLE GLAND	-7/8" [-22]
374	DC VOLTS, TURBINE AIR INLET FILTER ANALOG I-O	1/2" NPT FEMALE	SEE SHEET 12
418	AC VOLTS, GENERATOR JACKING LUBE OIL PUMP MOTOR	(SKID) RGS-4 MCT 4.75" X 6.28" (121 X 160) - (DEVICE) 3/4" NPT FEMALE	SEE SHEET 11
458	AC VOLTS, ENCLOSURE VENT FAN SPACE HEATER	1 1/4" NPT FEMALE	SEE SHEET 11
527	ENCLOSURE VENT FILTER DRAIN	1" TUBE	SEE SHEET 12

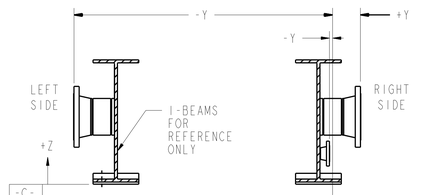


RIGHT SIDE ELEVATION ⚠



-A- PACKAGE TIE-DOWN SLOT
-B- PACKAGE TIE-DOWN SLOT
-C- BOTTOM OF TIE-DOWN PAD
-D- TOP OF BOLLARD

DATUM PLANE ORIENTATION DETAIL



SECTION A-A

LATERAL COORDINATES FOR LOCATING PACKAGE CONNECTIONS ON BOTH SIDES OF THE PACKAGE FRAME REFERENCED FROM DATUM -B- SEE TABLE 1

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
RIGHT SIDE ELEVATION

Solar® Turbines
A Caterpillar Company

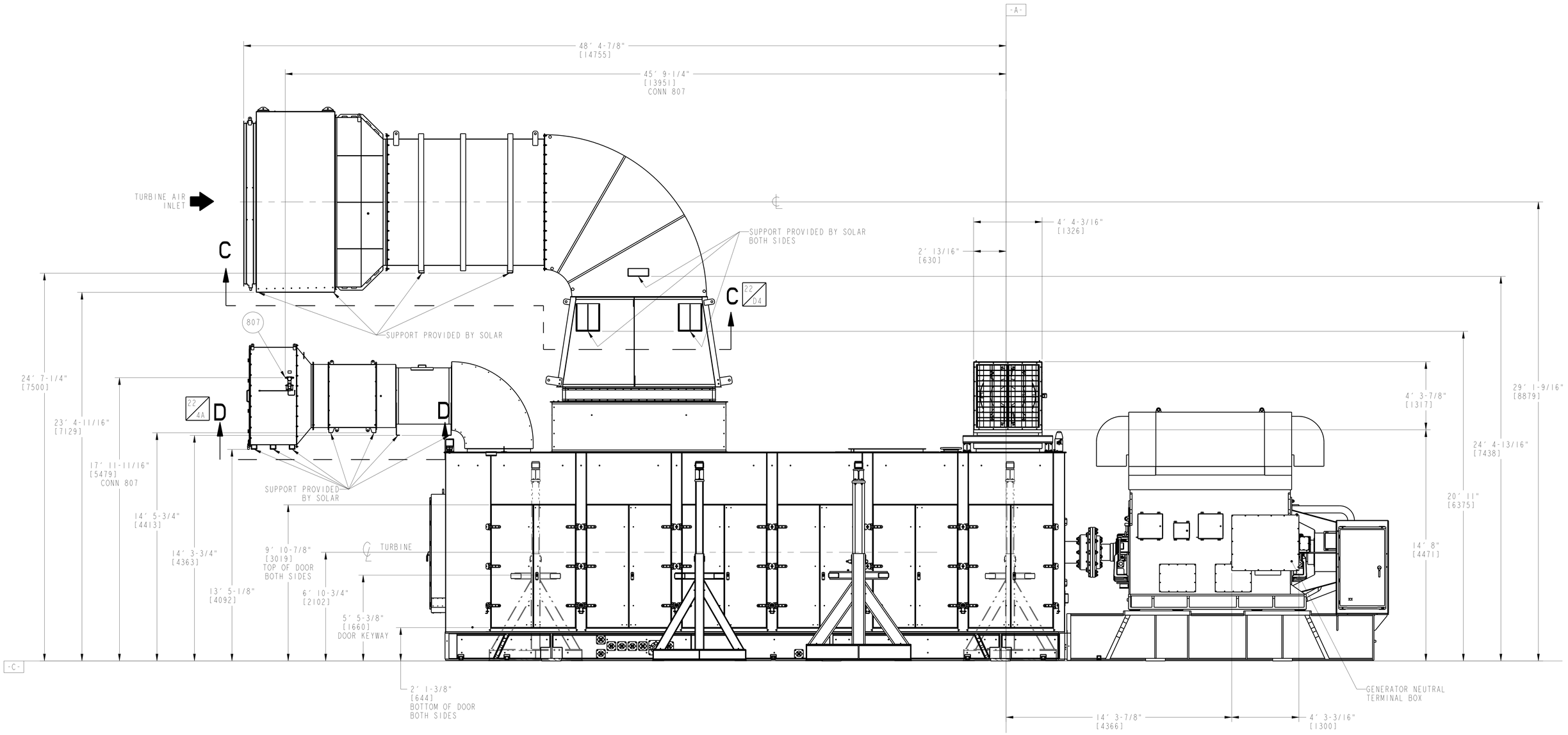
DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 9 OF 52	

CAD IDENT Released B5

SWBNO-1

TABLE 1 - CONNECTIONS

ITEM	DESCRIPTION	SIZE & TYPE	Y DIMENSION SEE SHEET 9
807	DC VOLTS, ENCLOSURE VENT FILTER DELTA PRESSURE TRANSMITTER	1/2" NPT FEMALE	SEE SHEET 12



FORWARD

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL 7/17/23

JACOBS Date

LEFT SIDE ELEVATION ⚠

CUSTOMER/END USER/PROJECT

SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE

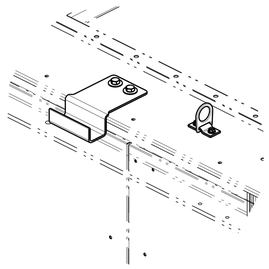
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LEFT SIDE ELEVATION

Solar® Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 10 OF 52	

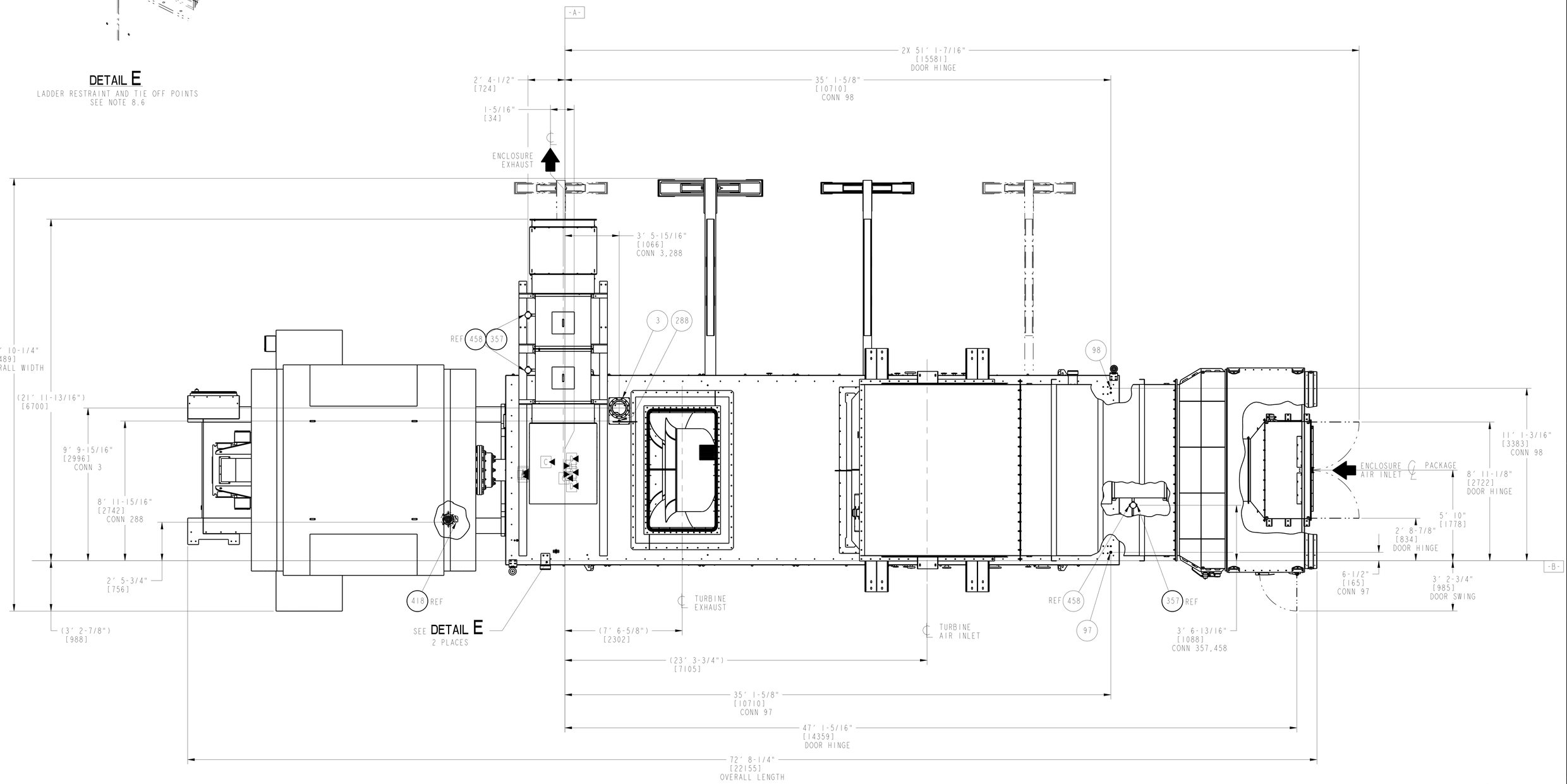
CAD IDENT Released B5

SWBNO-1



DETAIL E
LADDER RESTRAINT AND TIE OFF POINTS
SEE NOTE 8.6

TABLE 1 - CONNECTIONS			
ITEM	DESCRIPTION	SIZE & TYPE	Z DIMENSION SEE SHEET 9
3	LUBE OIL TANK VENT	10" CLASS 150 RF FLANGE	SEE SHEET 9
97	ENCLOSURE FIRE EXT. MEDIUM INLET - MAIN	1" NPT FEMALE	SEE SHEET 12
98	ENCLOSURE FIRE EXT. MEDIUM INLET - EXTENDED	1/2" NPT FEMALE	SEE SHEET 12
288	LUBE OIL MIST SEPARATOR OIL RETURN	1" NPT FEMALE	SEE SHEET 9



APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

PLAN VIEW
MAINTENANCE AREA REQUIREMENTS △1

FORWARD
RIGHT

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
PLAN VIEW

Solar® Turbines
A Caterpillar Company

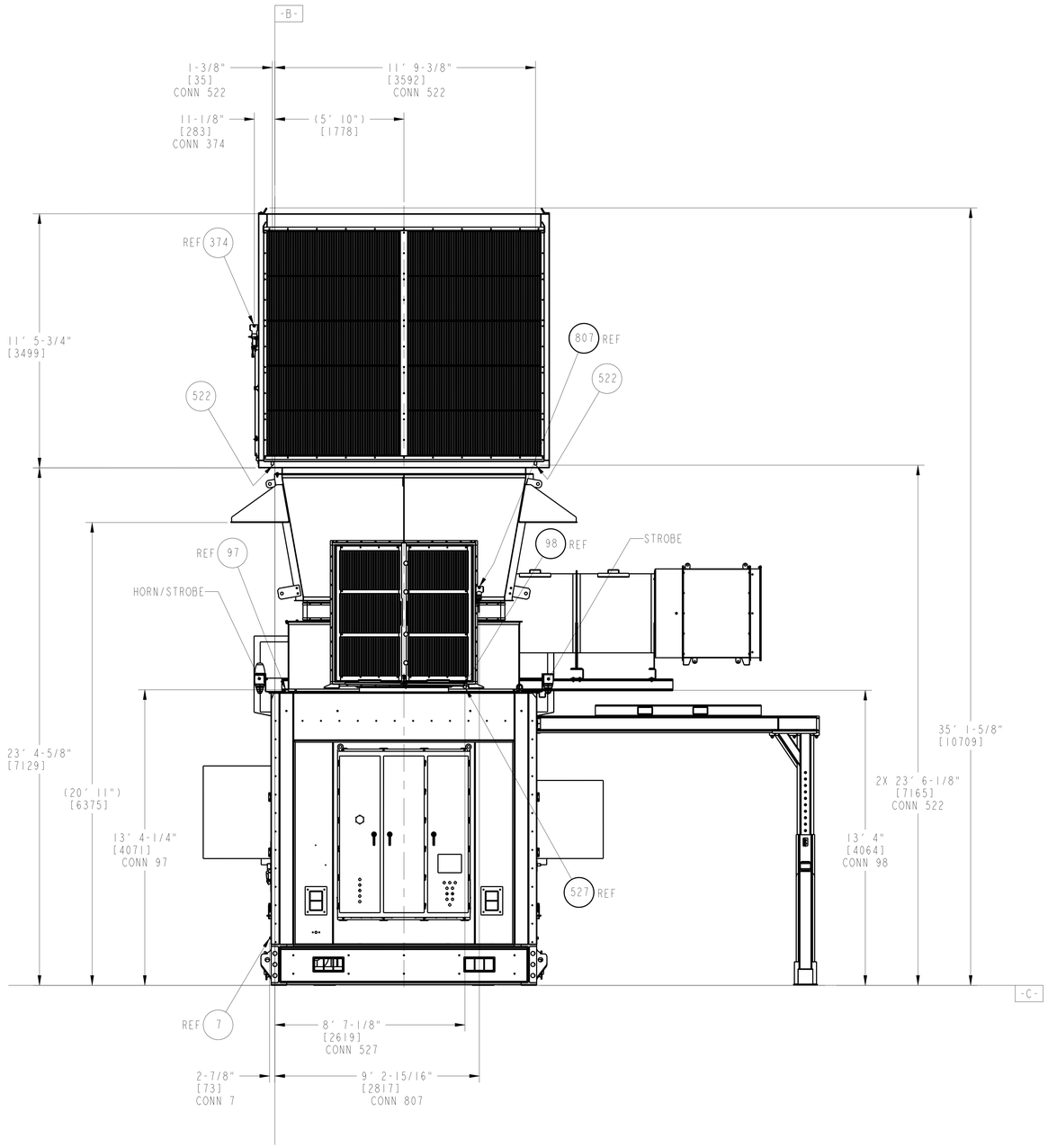
DRAWING NO. 4F491-149956
SIZE E
REV B
SH 11 OF 52

CAD IDENT Released B5

SWBNO-1

TABLE 1 - CONNECTIONS

ITEM	DESCRIPTION	SIZE & TYPE	X DIMENSION SEE SHEET 9
522	AIR INLET FILTER DRAIN (2 PLACES)	1" TUBE	SEE SHEET 9



FORWARD END ELEVATION ⚠

RIGHT

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL 7/17/23

JACOBS Date

CUSTOMER/END USER/PROJECT

SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE

TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
FORWARD END ELEVATION

Solar® Turbines
A Caterpillar Company

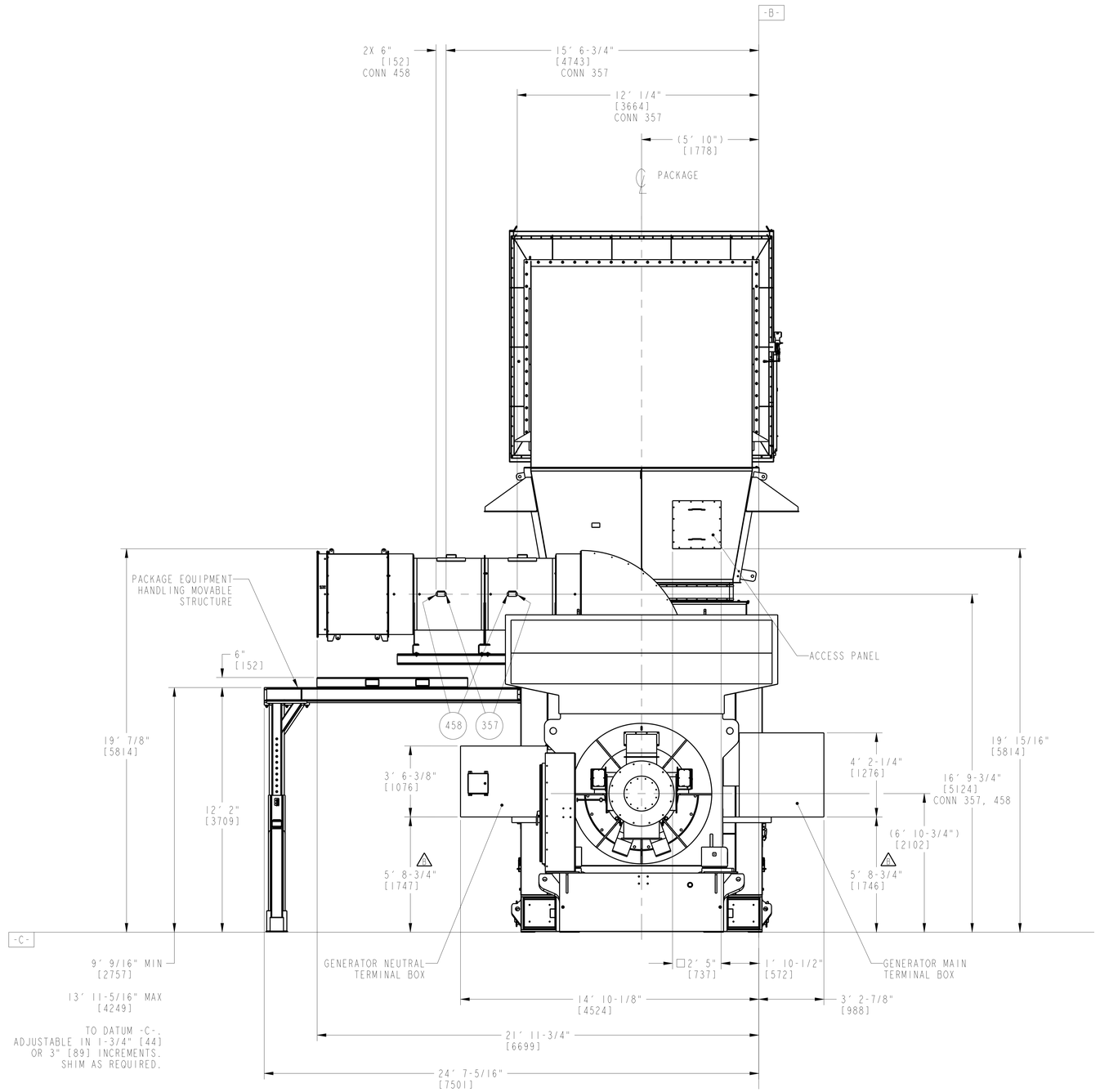
DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 12 OF 52	

CAD IDENT Released B5

SWBNO-1

TABLE 1 - CONNECTIONS

ITEM	DESCRIPTION	SIZE & TYPE	X DIMENSION SEE SHEET 9
357	AC VOLTS, ENCLOSURE VENT FAN (2 PLACES)	1 1/4" NPT FEMALE	SEE SHEET 11
458	AC VOLTS, ENCLOSURE VENT FAN SPACE HEATER (2 PLACES)	1 1/4" NPT FEMALE	SEE SHEET 11



AFT END ELEVATION △

RIGHT

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL 7/17/23

JACOBS Date

CUSTOMER/END USER/PROJECT

SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE

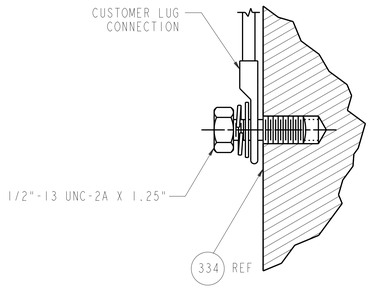
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
AFT END ELEVATION

Solar® Turbines
A Caterpillar Company

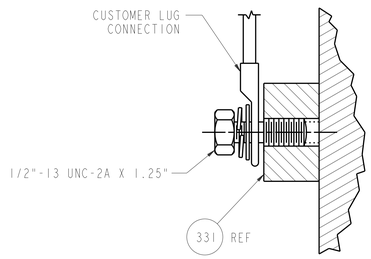
DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 13 OF 52	

CAD IDENT Released B5

SWBNO-1



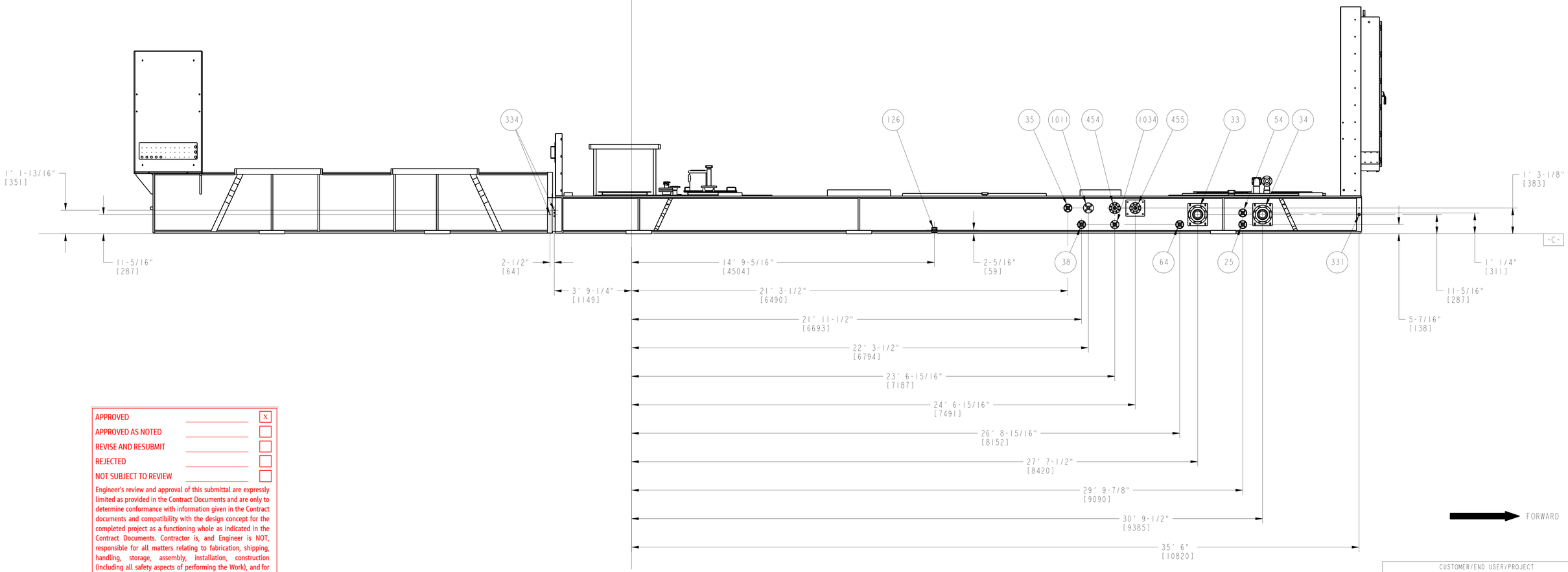
FRAME TO FRAME GROUNDING DETAIL
(TYPICAL)



FRAME GROUNDING
(TYPICAL)

TABLE 1 - CONNECTIONS

ITEM	DESCRIPTION	SIZE & TYPE	Y DIMENSION SEE SHEET 9
25	LUBE OIL FILTER DRAIN - FILTERED	1" CLASS 150 RF FLANGE	4-15/16" [125]
33	LUBE OIL TO COOLER	6" CLASS 150 RF FLANGE	5-13/16" [148]
34	LUBE OIL FROM COOLER	6" CLASS 150 RF FLANGE	5-13/16" [148]
35	LIQUID FUEL INLET	1" CLASS 150 RF FLANGE	4-15/16" [125]
38	LIQUID FUEL DRAIN	1" CLASS 150 RF FLANGE	4-15/16" [125]
54	LUBE OIL FILTER DRAIN - UNFILTERED	1" CLASS 150 RF FLANGE	4-15/16" [125]
64	LOW POINT DRAIN FROM LUBE OIL HEADER	1" CLASS 150 RF FLANGE	4-15/16" [125]
126	OIL DRAIN FROM DRIP PAN	2" NPT FEMALE	1/2" [13]
331	GROUND, PACKAGE FRAME	1/2"-13 UNC	3-1/2" [89]
334	GROUND, FRAME TO FRAME (2 PLACES)	1/2"-13 UNC	-1'-7" [-483]
454	COOLER PCD INLET	2" CLASS 300 RF FLANGE	5-13/16" [148]
455	PCD TO COOLER OUTLET	2" CLASS 300 RF FLANGE	5-13/16" [148]
1011	PILOT LIQUID FUEL INLET	1" CLASS 1500 RF FLANGE	4-15/16" [125]
1034	OUTLET: PILOT AIR TO LIQUID FUEL MODULE	3/8" TUBE FITTING	4-15/16" [125]



RIGHT SIDE ⚠
CUSTOMER CONNECTIONS

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

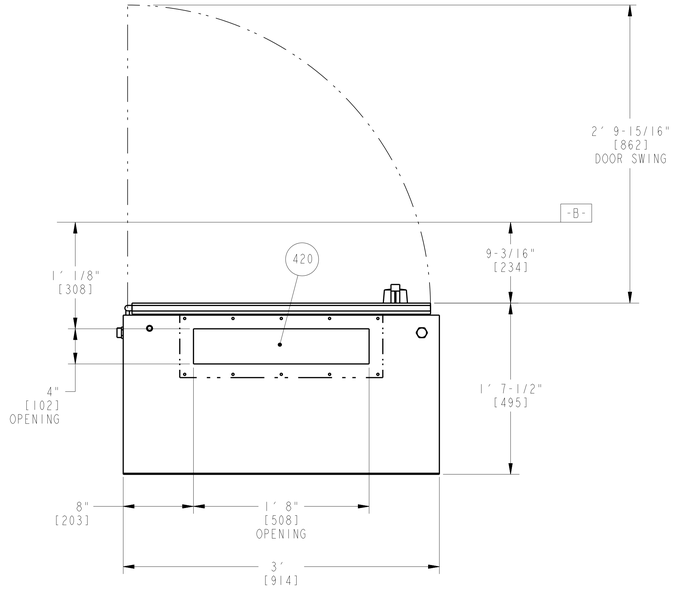
DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
RIGHT SIDE PACKAGE CONNECTIONS

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149956
SIZE E
REV B
SH 14 OF 52

CAD IDENT Released B5

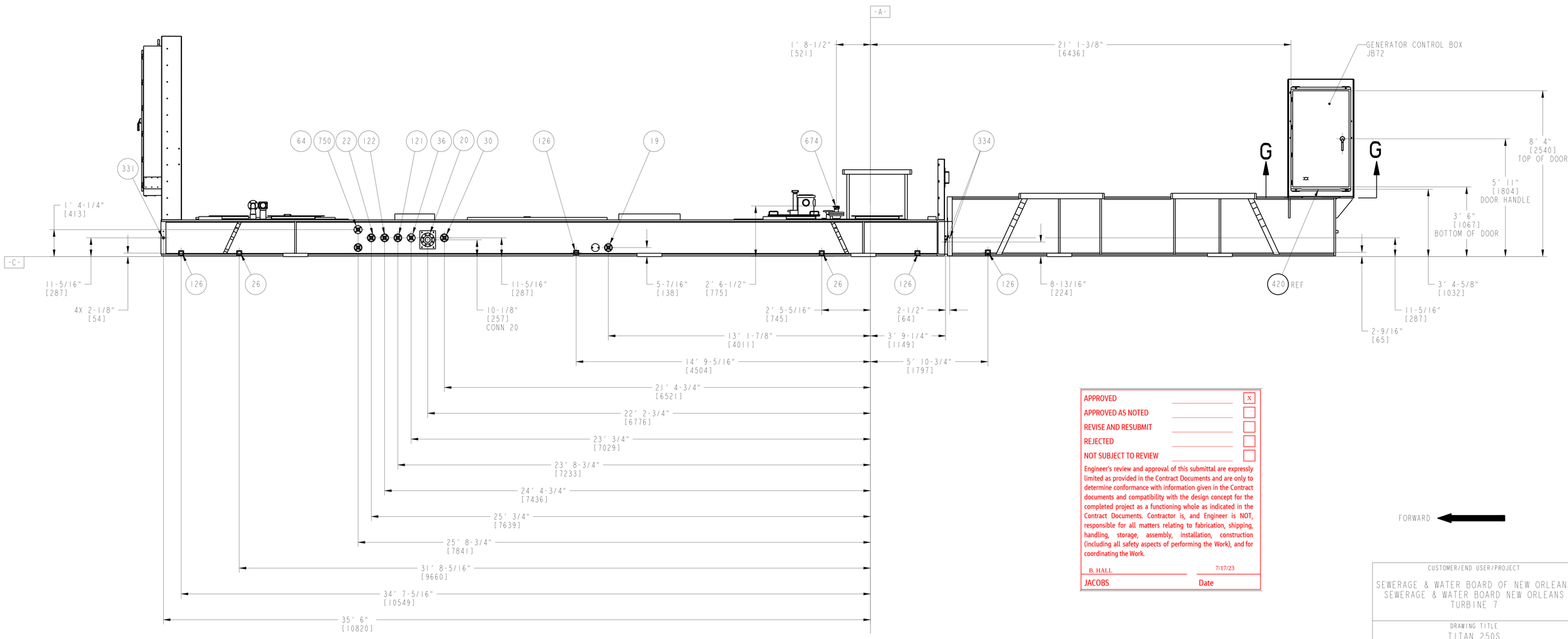
SWBNO-1



VIEW G-G
GENERATOR CONTROL BOX
JB72

TABLE 1 - CONNECTIONS

ITEM	DESCRIPTION	SIZE & TYPE	Y DIMENSION SEE SHEET 9
19	ENGINE EXHAUST COLLECTOR AND COMBUSTOR DRAIN	1" CLASS 150 RF FLANGE	-12' 1/16" [-3360]
20	NATURAL GAS FUEL INLET	3" CLASS 300 RF FLANGE	-12' 1/16" [-3360]
22	ENGINE AIR INLET DUCT DRAIN	1" CLASS 150 RF FLANGE	-12' 1/16" [-3360]
26	LUBE OIL TANK DRAIN (2 PLACES)	2" NPT FEMALE	-11' 8-7/16" [-3568]
30	GAS VENT	1" CLASS 150 RF FLANGE	-12' 1/16" [-3360]
36	PACKAGE AIR SUPPLY	1" CLASS 300 RF FLANGE	-12' 1/16" [-3360]
64	LOW POINT DRAIN FROM LUBE OIL HEADER	1" CLASS 150 RF FLANGE	-12' 1/16" [-3360]
121	ON LINE CLEANING FLUID INLET	1" CLASS 150 RF FLANGE	-12' 1/16" [-3360]
122	ON CRANK CLEANING FLUID INLET	1" CLASS 150 RF FLANGE	-12' 1/16" [-3360]
126	OIL DRAIN FROM DRIP PAN (4 PLACES)	2" NPT FEMALE	-11' 8-7/16" [-3568] -9' 10-3/4" [-3016]
331	GROUND, PACKAGE FRAME	1/2"-13 UNC	-11' 11-1/2" [3645]
334	GROUND, FRAME TO FRAME (2 PLACES)	1/2"-13 UNC	-9' 6-3/4" [2915]
420	GENERATOR CONTROL BOX	4" X 20" (102 X 508) OPENING WITH UNDRILLED GLAND PLATE (SEE DETAIL)	
674	LUBE OIL TANK FILL	2" SPRING RETURN CAP	-9' 1/16" [2745]
750	WATER INLET TO PACKAGE	3/4" NPT FEMALE	-1' 4-1/4" [413]



LEFT SIDE
CUSTOMER CONNECTIONS

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL 7/17/23

JACOBS Date

FORWARD

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LEFT SIDE PACKAGE CONNECTIONS

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149956
SIZE E
REV B
SH 15 OF 52

SWBNO-1

CAD IDENT Released B5

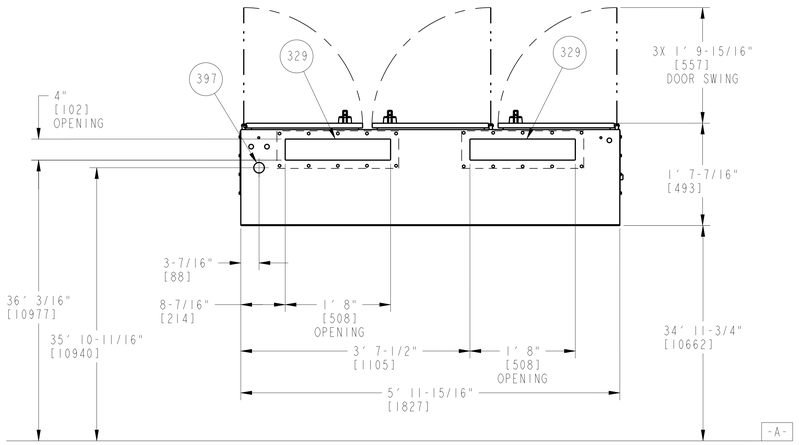
TABLE 1 - CONNECTIONS

ITEM	DESCRIPTION	SIZE & TYPE	X DIMENSION SEE SHEET 9
126	OIL DRAIN FROM DRIP PAN	2" NPT FEMALE	23' 4-15/16" [7136]
313	AC VOLTS, LUBE OIL TANK HEATER	(ENCL) RGSM-4X2-H I MCT 4.75" X 6.28" (121 X 160) - (DEVICE) 3" NPT FEMALE	29' 8-3/8" [9052]
315	AC VOLTS, PRE/POST LUBE OIL PUMP MOTOR	(SKID) RGS-4 MCT 4.75" X 6.28" (121 X 160) - (DEVICE) 1.5" NPT FEMALE	-35 5-3/4" [-10815]
316	AC VOLTS, LIQUID FUEL PRIMARY PUMP MOTOR	(SKID) RGS-4 MCT 4.75" X 6.28" (121 X 160) - (DEVICE) 3" NPT FEMALE	-35 5-3/4" [-10815]
329	DC VOLTS, PACKAGE TO CONSOLE (2 PLACES)	4" X 20" (102 X 508) OPENING WITH UNDRILLED GLAND PLATE (SEE DETAIL)	
331	GROUND, PACKAGE FRAME (2 PLACES)	1/2"-13 UNC	30' 1-5/8" [9185], -29' 7/8" [-8861]
336	DC VOLTS, BACKUP LUBE OIL PUMP MOTOR	(SKID) RGSM-4X3-H I MCT 4.75" X 6.28" (121 X 160) - (DEVICE) 2XM50X1.5 AND 2XM20X1.5	-35 5-3/4" [-10815]
397	DC VOLTS, ELECTRONIC ACTUATOR POWER	2" (50.8) CIRCULAR CUT OUT	
404	AC VOLTS, STARTER MOTOR	(SKID) RGSM-4X3-H I MCT 4.75" X 6.28" (121 X 160) - (DEVICE) UNDRILLED GLAND PLATE	-35 5-3/4" [-10815]
426	AC VOLTS, SPACE HEATER	(ENCL) RGS-4 MCT 4.75" X 6.28" (121 X 160) - (DEVICE) 1" NPT FEMALE	-35 5-3/4" [-10815]

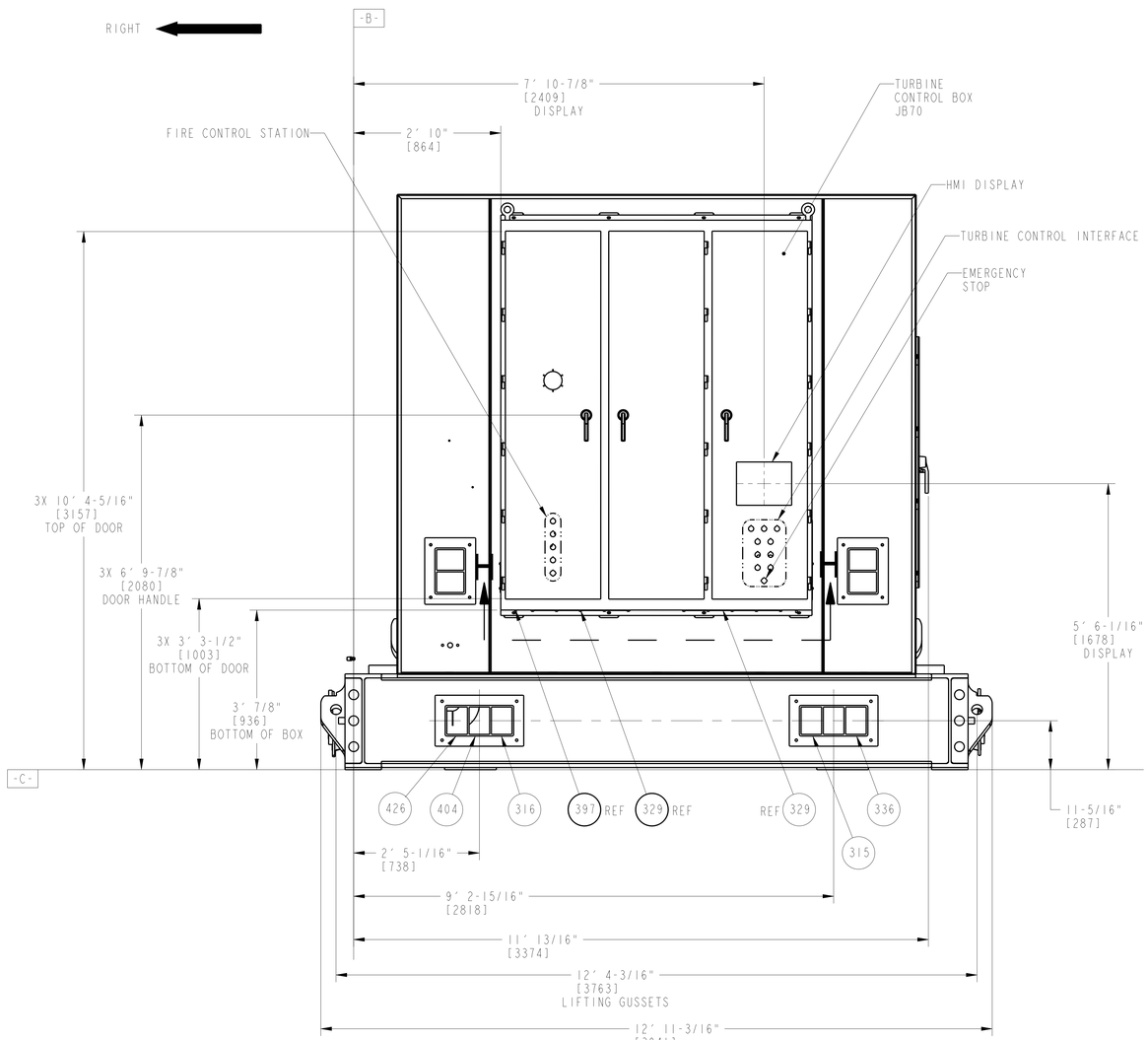
APPROVED [X]
APPROVED AS NOTED [ ]
REVISE AND RESUBMIT [ ]
REJECTED [ ]
NOT SUBJECT TO REVIEW [ ]

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

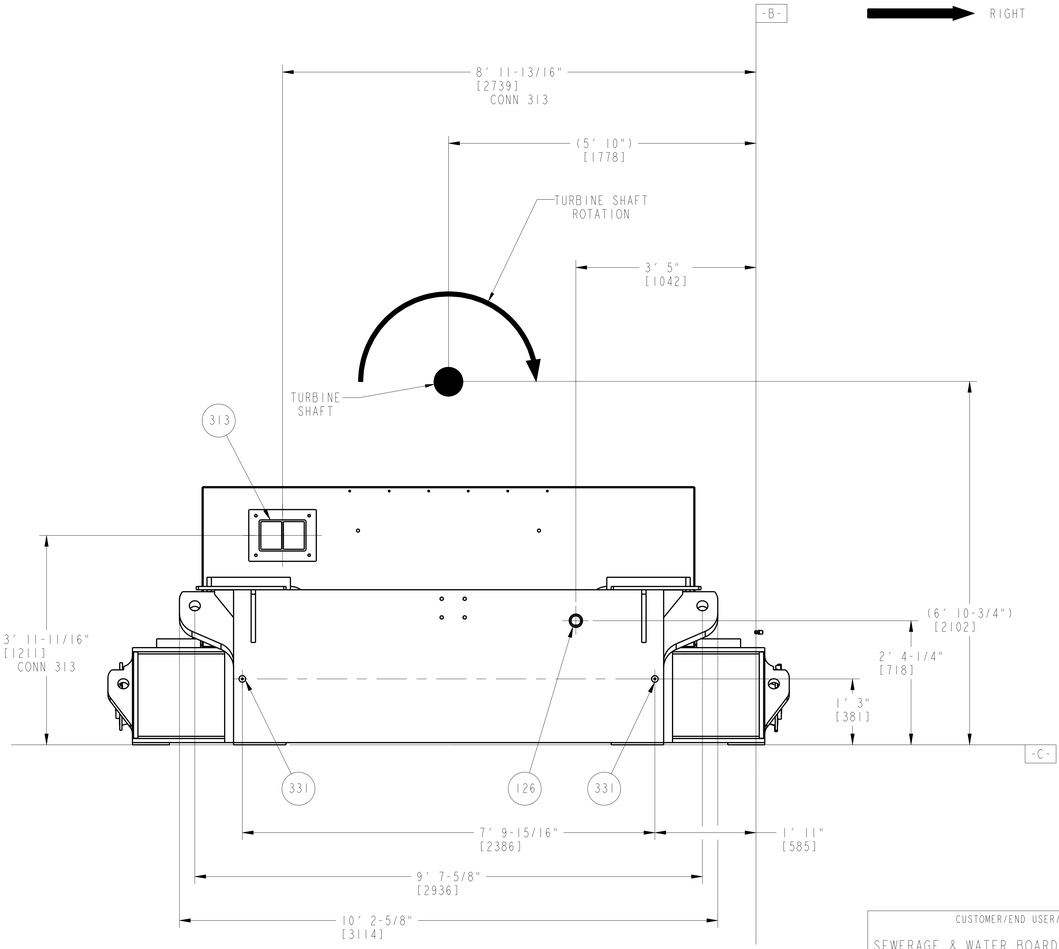
B. 7/17/23
JACOBS Date



VIEW H-H
TURBINE CONTROL BX
JB70



FORWARD END ⚠
CUSTOMER CONNECTIONS



AFT END ⚠
CUSTOMER CONNECTIONS

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
FORWARD AND AFT PACKAGE CONNECTIONS

Solar® Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 16 OF 52	

CAD IDENT Released B5

SWBNO-1

TABLE 2 - SHUTDOWN LEVEL DYNAMIC LOADS - HORIZONTAL AND VERTICAL (SEE NOTES)

ROTOR DESCRIPTION	DYNAMIC FORCE @ ROTOR C.L., lbf (kN)	ROTATIONAL SPEED rpm	PAD A1, A2 DYNAMIC LOAD lbf (kN)	PAD B1, B2 DYNAMIC LOAD (each), lbf (kN)	PAD C1, C2 DYNAMIC LOAD (each), lbf (kN)	PAD D1, D2 DYNAMIC LOAD (each), lbf (kN)	PAD E1, E2 DYNAMIC LOAD (each), lbf (kN)
T250 GAS PRODUCER	±1413 (6.29)H ±3648 (16.2)V	10500	±411 (1.83)H ±1061 (4.72)V	±295 (1.31)H ±763 (3.39)V	- -	- -	- -
T250 POWER TURBINE	±1784 (7.94)H ±3184 (14.2)V	7000	±18 (0.08)H ±32 (0.14)V	±874 (3.89)H ±1560 (6.94)V	- -	- -	- -
GENERATOR	±7727 (34.4) H ±2691 (56.5)V	1800	- -	- -	- -	±2139 (9.52)H ±3768 (16.8)V	±1724 (7.67)H ±3037 (13.5)V
TOTAL LOAD	±10924 (48.6)H ±19523 (86.8)V	-	±429 (1.91)H ±1093 (4.86)V	±1169 (5.20)H ±2323 (10.3)V	- -	±2139 (9.52)H ±3768 (16.8)V	±1724 (7.67)H ±3037 (13.5)V

TABLE 3 - OPERATIONAL LEVEL DYNAMIC LOADS - HORIZONTAL AND VERTICAL (SEE NOTES)

ROTOR DESCRIPTION	DYNAMIC FORCE @ ROTOR C.L., lbf (kN)	ROTATIONAL SPEED rpm	PAD A DYNAMIC LOAD lbf (kN)	PAD B1, B2 DYNAMIC LOAD (each), lbf (kN)	PAD C1, C2 DYNAMIC LOAD (each), lbf (kN)	PAD D1, D2 DYNAMIC LOAD (each), lbf (kN)	PAD E1, E2 DYNAMIC LOAD (each), lbf (kN)
T250 GAS PRODUCER	±785 (3.49)H ±2027 (9.02)V	10500	±228 (1.02)H ±589 (2.62)V	±164 (0.73)H ±424 (1.89)V	- -	- -	- -
T250 POWER TURBINE	±991 (4.41)H ±1769 (7.87)V	7000	±10 (0.04)H ±18 (0.08)V	±486 (2.16)H ±867 (3.86)V	- -	- -	- -
GENERATOR	±4293 (19.1) H ±705I (31.4)V	1800	- -	- -	- -	±1188 (5.29)H ±2093 (9.31)V	±958 (4.26)H ±1687 (7.50)V
TOTAL LOAD	±6069 (27.0)H ±10847 (48.2)V	-	±238 (1.06)H ±607 (2.70)V	±649 (2.89)H ±1291 (5.74)V	- -	±1188 (5.29)H ±2093 (9.31)V	±958 (4.26)H ±1687 (7.50)V

TABLE 4 - STATIC LOAD

PAD	APPROXIMATE STATIC PAD LOAD LB/[KG]
A1, A2	27,350 LBS [12406 KG]
B1, B2	38,250 LBS [17350 KG]
C1, C2	19,450 LBS [8822 KG]
D1, D2	36,200 LBS [16420 KG]
E1, E2	27,150 LBS [12315 KG]

NOTES:

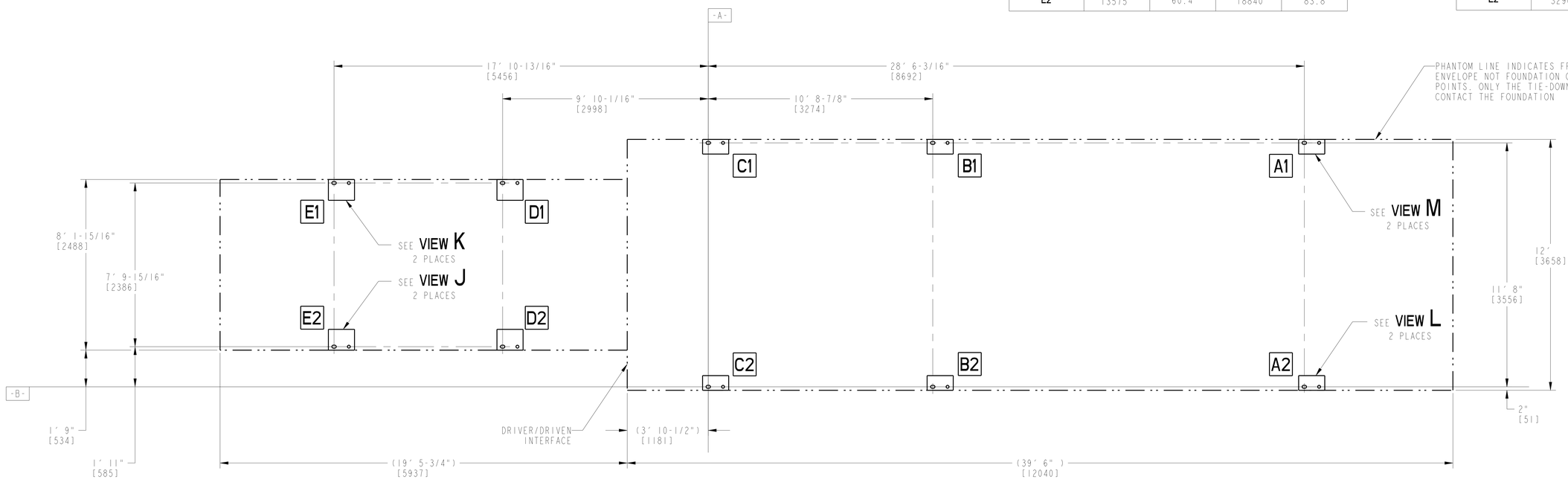
1. H = HORIZONTAL, V = VERTICAL. HORIZONTAL LOADS ARE PERPENDICULAR TO THE PACKAGE CENTERLINE.
2. THE DYNAMIC FORCE AT THE ROTOR CENTERLINES ARE BASED ON SHUTDOWN VIBRATION LEVELS OF THE ROTORS.
3. IT IS ASSUMED THAT THE ROTOR DYNAMIC FORCES ARE TRANSMITTED UNATTENUATED TO THE TIE-DOWN PADS.
4. THE FREQUENCY OF THE DYNAMIC PAD LOADS CORRESPONDS TO THE RPM OF THE ROTOR PRODUCING THE LOAD.
5. THE DYNAMIC PAD LOADS ARE ADDITIVE TO THE STATIC PAD LOADS.

⚠ TABLE 6 - 0.5g SEISMIC LOAD

PAD	HORIZONTAL LOAD (±)		VERTICAL LOAD (±)	
	lbf	kN	lbf	kN
A1	13675	60.8	12740	56.7
A2	13675	60.8	12740	56.7
B1	19125	85.1	17810	79.2
B2	19125	85.1	17810	79.2
C1	9725	43.3	9060	40.3
C2	9725	43.3	9060	40.3
D1	18100	80.5	25120	111.7
D2	18100	80.5	25120	111.7
E1	13575	60.4	18840	83.8
E2	13575	60.4	18840	83.8

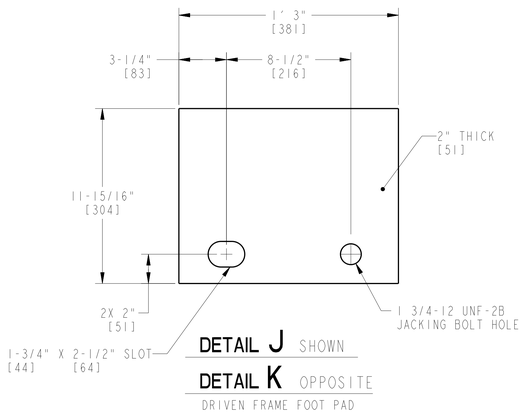
⚠ TABLE 5 - 160 MPH (3-SEC GUST) PER ASCE 7-16 - WIND LOAD

PAD	HORIZONTAL LOAD (±)		VERTICAL LOAD (±)	
	lbf	kN	lbf	kN
A1	6880	30.6	17910	79.7
A2	6880	30.6	17910	79.7
B1	7320	32.6	10410	46.3
B2	7320	32.6	10410	46.3
C1	4680	20.8	6470	28.8
C2	4680	20.8	6470	28.8
D1	3820	17.0	4910	21.8
D2	3820	17.0	4910	21.8
E1	3290	14.6	3640	16.2
E2	3290	14.6	3640	16.2



PACKAGE TIE-DOWN DETAIL ONSHORE

PAD LOADS ARE BASED ON THE INSTALLED PACKAGE WEIGHT SHOWN IN NOTE 2
PAD LOADS ROUNDED UP TO NEAREST 100 LBS [45 KG].



DETAIL J SHOWN

DETAIL K OPPOSITE

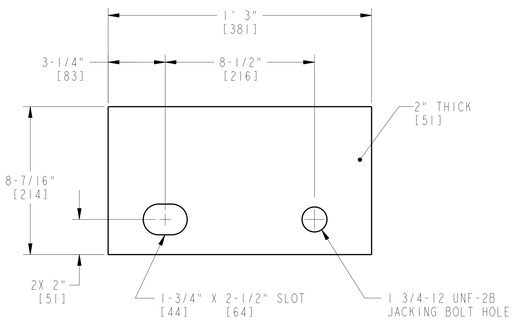
DRIVEN FRAME FOOT PAD

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL 7/17/23

JACOBS Date



DETAIL L SHOWN

DETAIL M OPPOSITE

DRIVER FRAME FOOT PAD

FORWARD

RIGHT

CUSTOMER/END USER/PROJECT

SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE

TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
PACKAGE TIE-DOWN DETAIL

Solar® Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 17 OF 52	

CAD IDENT Released B5

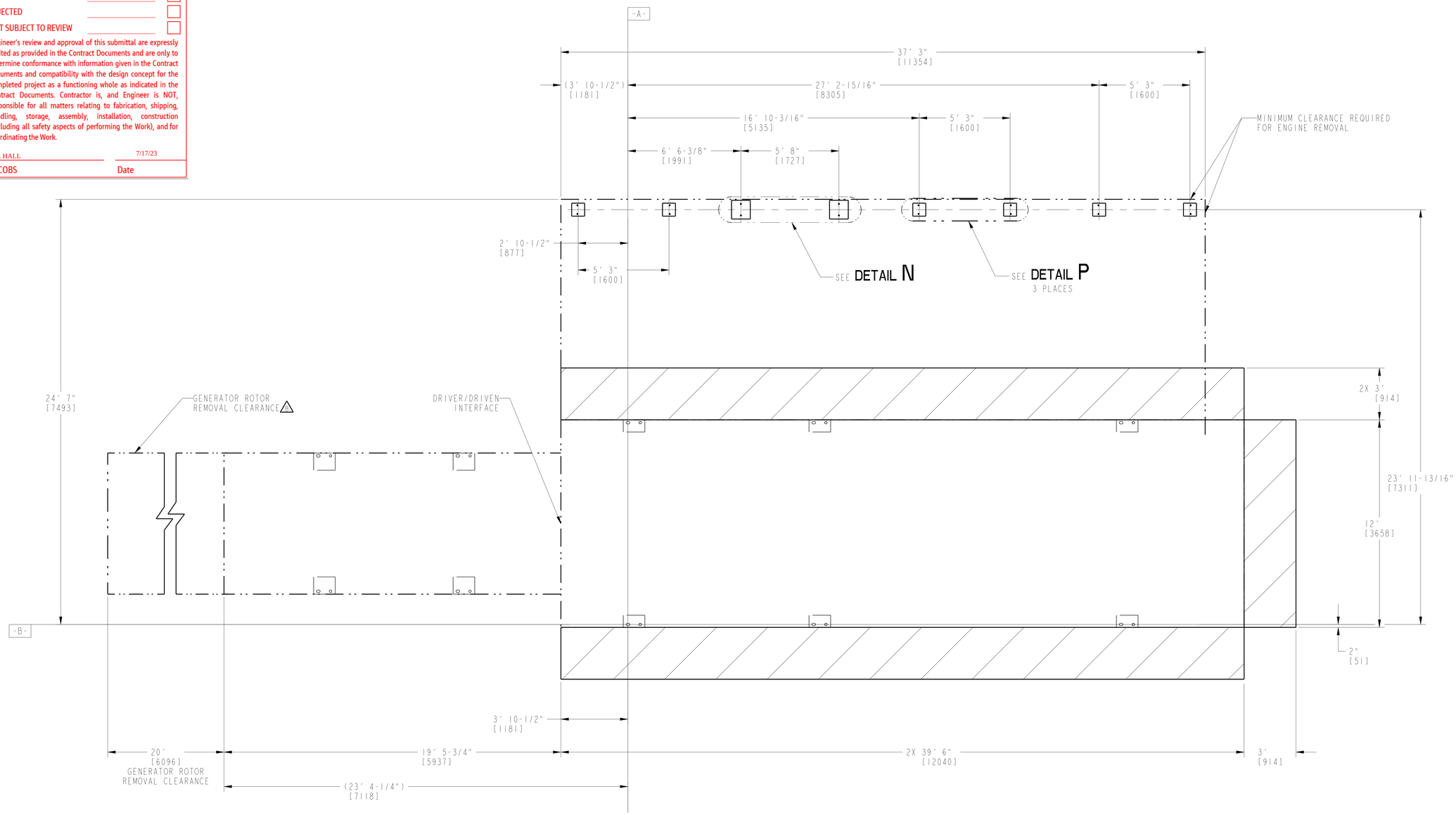
SWBNO-1

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

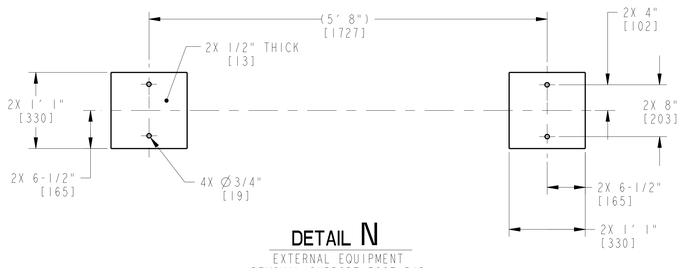
B. HALL — 7/17/23

JACOBS — Date



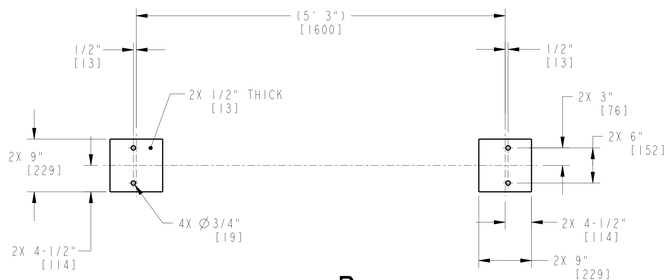
ANCILLARY SUPPORT TIE-DOWN DETAIL

SHADED AREA REPRESENTS MINIMUM CLEARANCE
REQUIRED FOR PACKAGE ACCESS DOORS AND FOR ROUTINE
OPERATION AND MAINTENANCE ACTIVITIES.
OBSTRUCTIONS IN THIS AREA SHOULD BE AVOIDED.



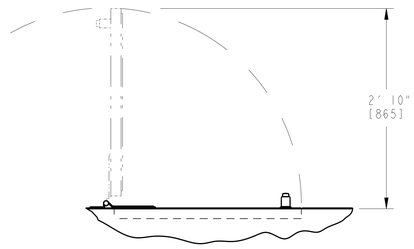
DETAIL N

EXTERNAL EQUIPMENT
REMOVAL SUPPORT FOOT PAD
MAX. DEAD LOAD: 18,200 LBS [8255 KG]



DETAIL P

EXTERNAL EQUIPMENT
REMOVAL SUPPORT FOOT PAD
MAX. DEAD LOAD: 9,800 LBS [4445 KG]



DOOR SWING DETAIL

TYPICAL ENCLOSURE
DOOR SWING

CUSTOMER/END USER/PROJECT

SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE

TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
ANCILLARY EQUIPMENT TIE-DOWN DETAIL

Solar® Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 18 OF 52	

CAD IDENT: Released B5

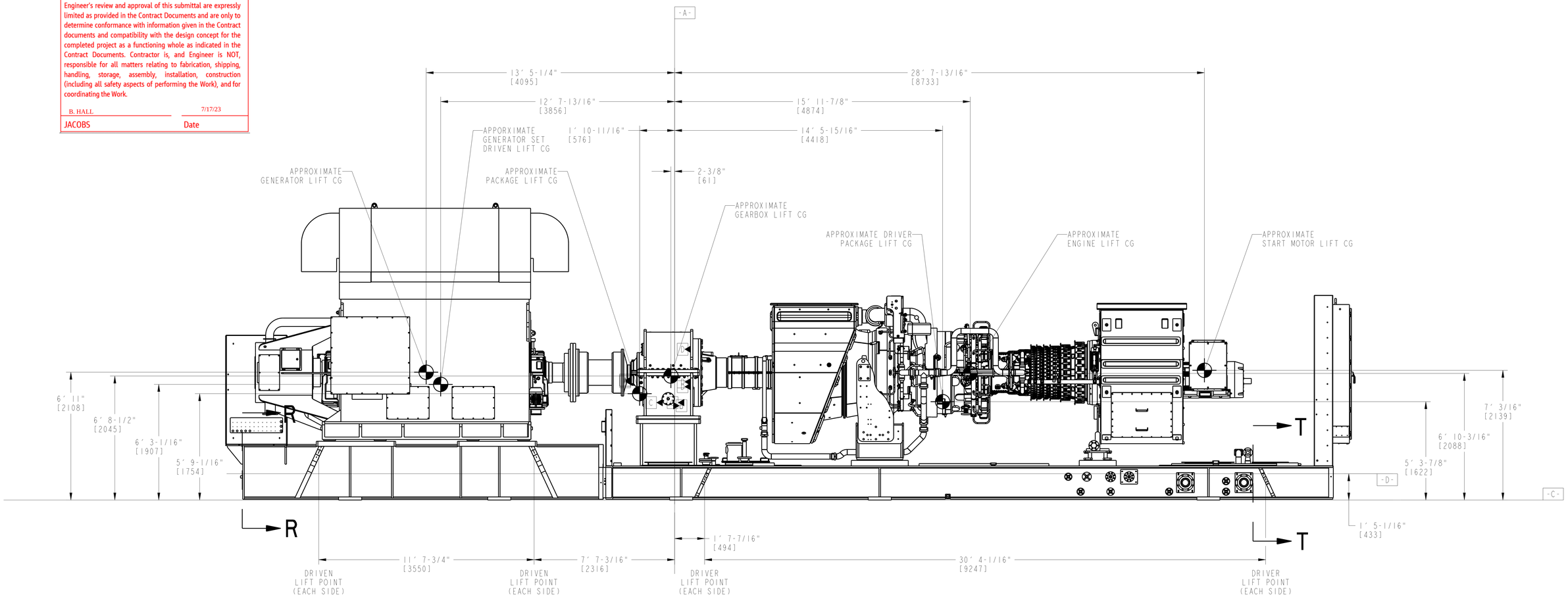
SWBNO1-1

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

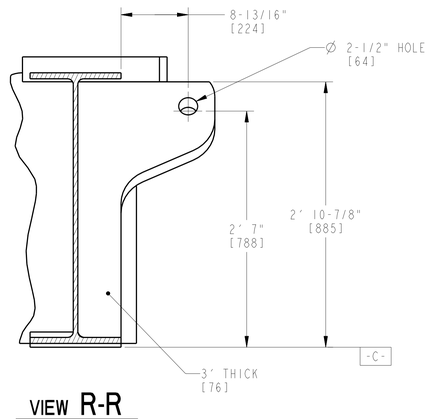
B. HALL 7/17/23

JACOBS Date

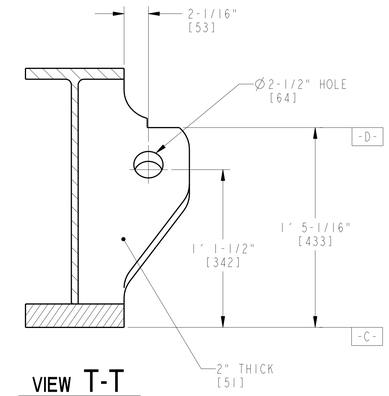


PACKAGE CENTER OF GRAVITY AND LIFT POINTS ⚠

ENCLOSURE OMITTED FOR CLARITY
SEE NOTES 2.0
OVERALL PACKAGE C.G. IS LOCATED ON THE PACKAGE CENTERLINE UNLESS OTHERWISE SPECIFIED



VIEW R-R
DRIVEN
PACKAGE LIFTING GUSSET
2 PLACES BOTH SIDES



VIEW T-T
DRIVER
PACKAGE LIFTING GUSSET
2 PLACES BOTH SIDES

FORWARD

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
CENTER OF GRAVITY AND LIFT POINTS

Solar® Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 19 OF 52	

CAD IDENT Released B5

SWBNO-1

PRE-ALIGNMENT SET-UP

CONSULT SOLAR TPIM 1000 FOR PRODUCT SPECIFIC DRIVE TRAIN ALIGNMENT PROCEDURES.

THIS ALIGNMENT PROCEDURE ASSUMES THAT NO SOFT FOOT OR SHORT FOOT CONDITION EXISTS ON ANY OF THE MACHINES AND THE BASE(S) HAVE BEEN QUALIFIED IN ACCORDANCE WITH SOLAR QUALITY ASSURANCE PROCEDURES.

BASE LEVELING:

BEFORE ALIGNMENT, ENSURE BASE IS LEVEL PER ES9-414.

COLD ALIGNMENT:

ALL MEMBERS NEED 12-24 HOURS TO COOL FROM OPERATING TEMPERATURE. THE OIL TANK HEATER MUST BE TURNED OFF DURING EQUIPMENT ALIGNMENT.

SHIPPING BRACES:

REMOVE SHIPPING BRACES BEFORE STARTING ALIGNMENT.

MANIFOLDS/DUCTING:

VERIFY THAT ALL MANIFOLDS ABOVE TANK LUBE OIL LEVEL ARE LOOSENED TO ALLOW FOR FREE MOVEMENT OF THE MACHINES.

PAD CLEANLINESS:

VERIFY THAT THE SHIMMABLE EQUIPMENT PADS ARE CLEAN AND FREE OF OIL, GREASE AND DEBRIS.

OIL TANK:

IT IS PREFERABLE TO HAVE OIL TANK FILLED TO ITS OPERATING LEVEL AT THIS TIME.

TIEDOWN BOLTS:

VERIFY THAT ALL TIEDOWN BOLTS ARE LUBRICATED WITH ANTI-SEIZE LUBRICANT.

BEARING PRE-LUBRICATION:

IT IS RECOMMENDED TO PRELUBE THE MACHINERY PRIOR TO ROTATION TO PREVENT POSSIBLE BEARING DAMAGE.

PRELIMINARY/ROUGH ALIGNMENT

RUNNING POSITION THRUSTS:

THE PURPOSE OF "RUNNING POSITION THRUSTS" IS TO PLACE THE ROTORS OF ALL THE MACHINES IN THEIR OPERATING THRUST POSITION. REFERENCE TPIM 1000 FOR GEARBOX AND GENERATOR POSITIONING GUIDELINES.

SETTING AXIAL DISTANCE BETWEEN MACHINES:

ONCE THE MACHINERY IS IN ITS RUNNING THRUST POSITION, USE THE PACKAGE'S JACKING BOLTS TO MOVE THE MACHINE AXIALLY AS REQUIRED TO ACHIEVE THE PROPER FACE TO FACE (CALCULATED FLANGE TO FLANGE) DISTANCE BETWEEN MACHINES. SEE DETAIL A. (FOR DRY COUPLINGS, THE ASSEMBLY PARTS LIST (APL) DRAWING SHOULD BE CONSULTED). USE AN INSIDE MICROMETER TO VERIFY DISTANCE TOP AND BOTTOM AND SIDES OF FLANGES. AVERAGE THE READINGS. THIS AVERAGE MUST BE THE CALCULATED FLANGE TO FLANGE IN DETAIL A. HUBS MUST BE IN THEIR NEUTRAL POSITIONS. THE DRY HUBS ARE IN THE NEUTRAL POSITION WHEN ALL LOCK DOWN SCREWS (YELLOW AND RED RESPECTIVELY) ARE LOOSE.

FIXED REFERENCE POINT:

THE GEARBOX IS THE FIXED REFERENCE POINT AND IS DENOTED BY A ✱. NORMALLY IT IS NOT TO BE SHIMMED, OR MOVED.

ALIGNMENT TOOL INSTALLATION:

INSTALL THE ALIGNMENT TOOL(S). REFERENCE TPIM 1000 FOR PRODUCT AND PROCEDURE SPECIFIC TOOLING.

MACHINE ROTATION:

ROTATE MACHINERY IN THE SAME DIRECTION OF NORMAL ROTATION. DO NOT ROTATE OPPOSITE TO OPERATIONAL ROTATION.

LATERAL ALIGNMENT ADJUSTMENT:

DO NOT MOVE THE FIXED REFERENCE POINT DENOTED BY A ✱.

FROM THE LATERAL/HORIZONTAL (BL, BR, FL, FR OR HO, HA) READINGS, ADJUST THE MOVEABLE MACHINES LATERALLY USING THE FEET JACKING BOLTS UNTIL TARGET VALUES IN TABLE II OR TABLE III, FOR DIAL OR LASER RESPECTIVELY, ARE OBTAINED.

REVERIFY AXIAL DISTANCE.

WHEN SATISFIED. FULLY RETRACT JACKING BOLTS.

RECHECK LATERAL ALIGNMENT.

VERTICAL ALIGNMENT ADJUSTMENT:

SHIM CARE:

IF VERTICAL SHIMMING IS NECESSARY, USE CLEAN SHIMS. SHIMS WHICH ARE RUSTED, OILY OR DEFORMED SHOULD NOT BE USED. ONCE THE LATERAL ADJUSTMENT IS SATISFIED. SNUG UP AXIAL AND LATERAL JACKING BOLTS TO PROVENT MACHINE MOVEMENT. PERFORM A SWEEP AND RECORD BB AND FB.

VERTICAL SHIMMING ADJUSTMENT:

FROM THE VERTICAL ALIGNMENT READINGS (BB, FB OR VO, VA), ADD OR REMOVE SHIMS FROM THE NEAR FEET AND FAR FEET AS NEEDED TO OBTAIN TARGET VALUES SHOWN IN TABLE II OR TABLE III, DIAL AND LASER RESPECTIVELY.

SOFT FOOT CHECK:

TORQUE TIE DOWN BOLTS TO 70% SPECIFIED VALUE TO REMOVE CRUSH DOWN AND ENSURE NO SOFT FOOT CONDITION EXIST.

FINAL ALIGNMENT VERIFICATION

WHEN ALL ALIGNMENT READINGS ARE WITHIN THE ALLOWABLE LIMITS, MONITOR THE ALIGNMENT READINGS AS THE FOLLOWING IS BEING COMPLETED.

RECONNECT ALL HARD CONNECTIONS.

ALL JACKING BOLTS ARE FULLY RETRACTED.

ALL TIE-DOWN BOLTS ARE TORQUED IN A "STAR" PATTERN TO 100% THEIR SPECIFIED VALUE.

THE FLEXIBLE INLET AND EXHAUST DUCT ARE TIGHTENED IN PLACE.

THE OIL TANK IS FILLED TO ITS OPERATING LEVEL.

THE OIL HEATERS ARE TURNED ON AND THE OIL TEMPERATURE HAS STABILIZED AT OR ABOVE THE START INHIBIT TEMPERATURE FOR 8 HOURS.

AFTER COMPLYING WITH THE ABOVE REQUIREMENTS. VERIFY THAT THE ALIGNMENT IS STILL WITHIN ALLOWABLE LIMITS.

MAKE ADJUSTMENTS IF NECESSARY. RESWEEP, RESHIM, RECHECK.

NOTE: IF MISALIGNMENT HAS BEEN CAUSED BY ATTACHMENT OF MANIFOLDS OR DUCTING, MAKE CORRECTIONS TO THE OFFENDING ITEM(S). DO NOT REPOSITION THE DRIVER OR DRIVEN MACHINES AS A METHOD OF CORRECTING THE MISALIGNMENT CONDITION.

ALIGNMENT TOOL REMOVAL:

REMOVE THE ALIGNMENT TOOL(S).

COUPLING INSTALLATION (SEE VENDOR INSTALLATION INSTRUCTIONS AND DETAIL PROVIDED):

MATCH MARKS:

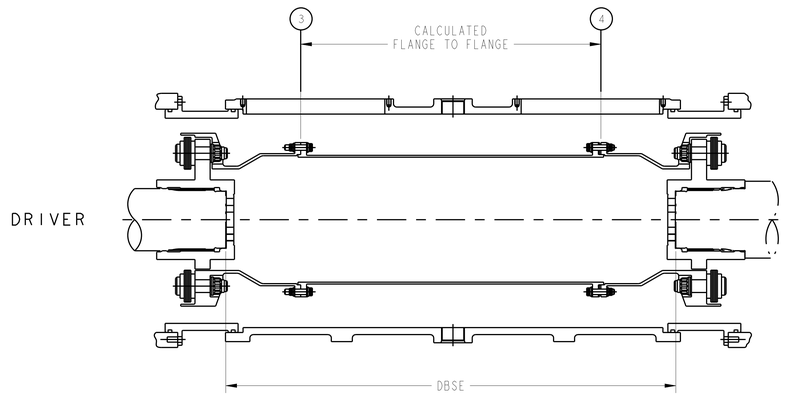
THE SPACER IS TO BE INSTALLED WITH ITS MATCH MARKED LINES LINED UP WITH THE MATCH MARKS ON THE FLANGES. ROTATE THE MACHINERY AS NECESSARY TO LINE UP MATCH MARKS. DO NOT ROTATE SHAFTS OPPOSITE TO OPERATIONAL ROTATION.

TIGHTEN SPACER BOLTS:

ONCE THE SPACER IS INSTALLED. LIGHTLY TIGHTEN EACH SPACER BOLT AROUND THE FLANGE.

FINAL TORQUE:

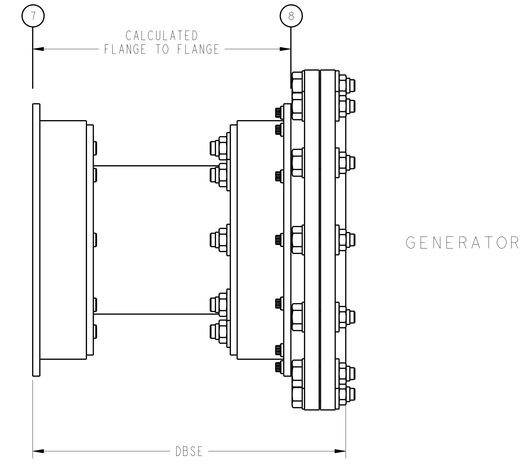
ONCE ALL OF THE BOLTS ARE EQUALLY TIGHTENED, TORQUE EACH BOLT IN A "STAR" PATTERN TO THE VALUE ETCHED ON THE SPACER.



TYPICAL COUPLING CONFIGURATION

FIGURE 1A

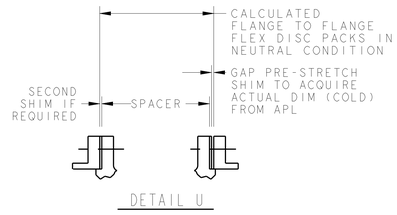
COUPLING ASSY: 1084318-100
INTERCONNECT: 1069960-3800



TYPICAL COUPLING CONFIGURATION

FIGURE 1

COUPLING ASSY: 1084317-100



DETAIL U

TABLE A - SPACER DETAILS

COUPLING CONNECTION	DBSE	SPACER LENGTH	CALCULATED FLANGE TO FLANGE	GAP PRE-STRETCH	MAXIMUM SHIM THICKNESS
DRIVER TO GEARBOX	40.850 (1037.59)	27.118" (688.80)	27.218" ±.100" (691.34 ±2.54)	-------	0.200" (5.08)
GEARBOX TO GENERATOR	35.000 (889.00)	28.867" (733.22)	28.867" ±.010" (733.22 ±.25)	-------	-------

TABLE B - TOOLING

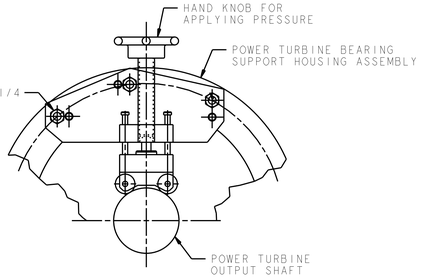
1078526-101	GENERATOR ALIGNMENT TOOL KIT
FT67098	LASER ALIGNMENT KIT (ROTALIGN ULTRA)

APPROVED X
APPROVED AS NOTED
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL 7/17/23

JACOBS Date



STATION 3
FT34701 POWER TURBINE LEVELING TOOL
(APPROXIMATE WEIGHT 19 LBS [8.6KG])

FIGURE 11

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
ALIGNMENT INFORMATION

Solar® Turbines
A Caterpillar Company

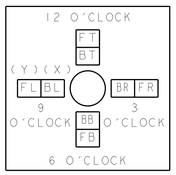
DRAWING NO. 4F491-149956
SIZE E
REV B
SH 20 OF 52

CAD IDENT Released B5

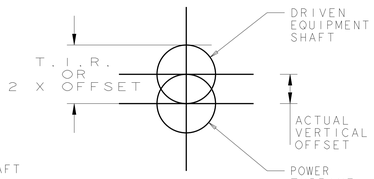
SWBNO-1

DIAL INDICATOR ALIGNMENT CONVENTIONS:

DIAL INDICATOR BORE AND FACE READINGS ARE ILLUSTRATED BELOW. BB=BORE BOTTOM, BL=BORE LEFT,BR=BORE RIGHT,BT=BORE TOP. FACE READINGS ARE THE SAME.



VIEW LOOKING BOTH FORWARD AND AFT
IMPORTANT: ACCURATELY LOCATE THE 90° CLOCKING POSITIONS



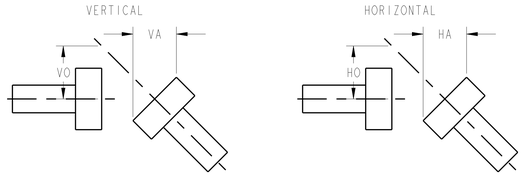
TYPICAL T.I.R. REFERENCE

SIGHT MACHINE:
MACHINE WITH ALIGNMENT TOOL ATTACHED.

TARGET MACHINE:
MACHINE WITHOUT ALIGNMENT TOOL ATTACHED.

LASER ALIGNMENT CONVENTIONS:

ALIGNMENT TARGETS

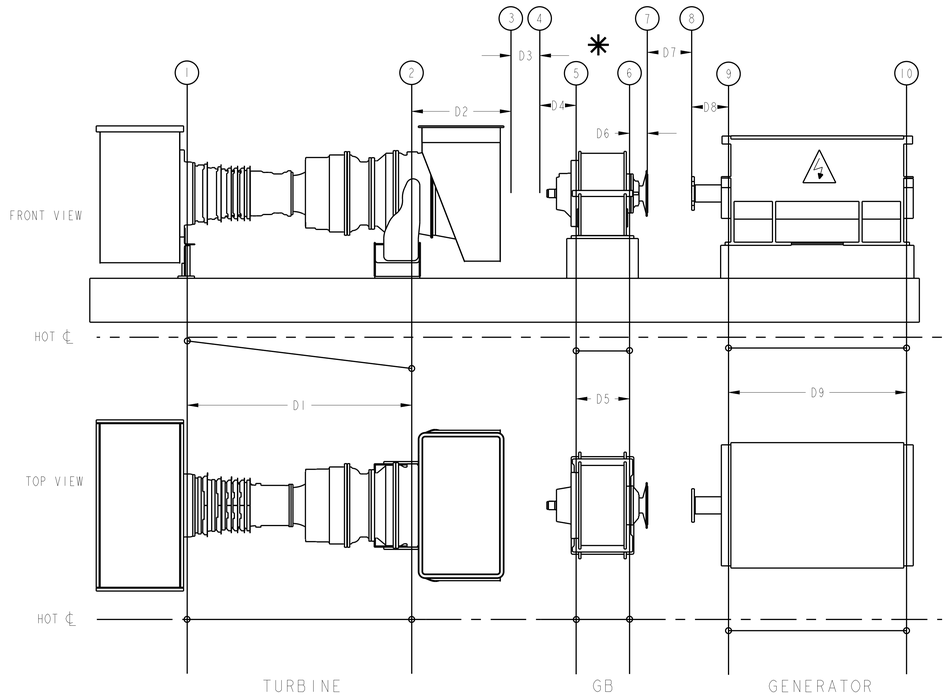


ALL VALUES AND GRAPHICS CORRESPOND TO ROTALIGN LASER ALIGNMENT TOOL.

ALWAYS START ALIGNING FROM FIXED MACHINE MOVING TOWARD LONGEST MACHINE STRING END. THEN ALIGN FROM FIXED MACHINE TOWARD REMAINING MACHINE STRING END. FIXED MACHINE IS DENOTED WITH A ✱.

LASER EMITTER IS MOUNTED ON STATIONARY MACHINE WHICH IS ALWAYS ON THE LEFT WITH THE MOVEABLE MACHINE ON THE RIGHT AS INDICATED IN THE LASER TABLES.

NOTE: USE TARGET VALUES ONLY IN LASER ALIGNMENT. INCLUDING THERMAL GROWTH AND/OR OFFSETS WITH TARGET VALUES WILL RESULT IN AN INCORRECT ALIGNMENT.



FORWARD

DIRECTION OF POSITIVE VERTICAL/LATERAL GROWTH

TABLE I: THERMAL GROWTH

EQUIPMENT			VERTICAL INCHES (mm)	LATERAL INCHES (mm)
TURBINE	T250	FORWARD FOOT	+0.006" (+0.13)	0.000" (0.00)
		AFT FOOT	+0.062" (+1.27)	0.000" (0.00)
GEARBOX		FORWARD FOOT	+0.020" (+0.51)	0.000" (0.00)
		AFT FOOT	+0.020" (+0.51)	0.000" (0.00)
GENERATOR		FORWARD FOOT	+0.013" (+0.32)	+0.002" (+0.06)
		AFT FOOT	+0.013" (+0.32)	+0.002" (+0.06)

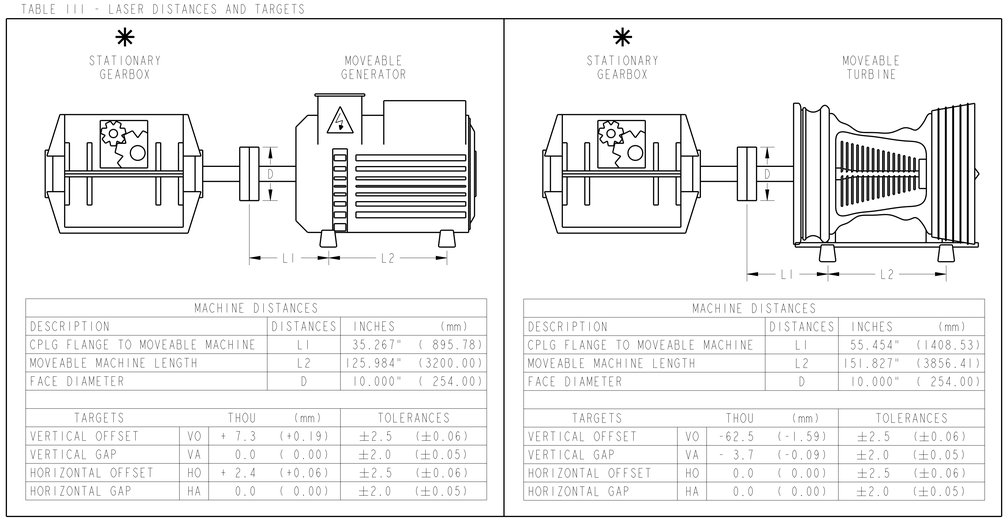
FIGURE 111

THIS FIGURE IS USED TO COMMUNICATE RELATIVE POSITIONS DUE TO THERMAL GROWTH ONLY AND IS NOT INTENDED TO SHOW EXACT PACKAGE CONFIGURATION.

TABLE II - DIAL INDICATOR DISTANCES AND DIAL INDICATOR ALIGNMENT - BORE AND FACE OFFSETS

DISTANCE	DESCRIPTION	INCHES (mm)	ALIGNMENT SEQUENCE	SIGHT "FROM"	TARGET "TO"	OFFSET (BORE OFFSET) BT	BL	BR	BB	ANGULARITY (FACE OFFSET) FT	FL	FR	FB	FACE DIAMETER
D1	TURBINE FORWARD FOOT TO TURBINE AFT FOOT	151.827" (3856.41)	2ND	4	3	00	+0.062" ±.002" (+1.59 ±.05)	+0.062" ±.002" (+1.59 ±.05)	+0.125" ±.005" (+3.17 ±.13) OUTSIDE TIR	00	-0.003" ±.001" (-0.07 ±.03)	-0.003" ±.001" (-0.07 ±.03)	-0.005" ±.002" (-0.13 ±.05)	14.050" (356.87)
D2	TURBINE AFT FOOT TO TURBINE OUTPUT HUB FACE	55.464" (1408.79)												
D3	TURBINE OUTPUT HUB FACE TO GB INPUT HUB FACE	27.218" (691.34)												
D4	GB INPUT HUB FACE TO GB NEAR FOOT	25.290" (642.36)												
D5	DISTANCE BETWEEN GB FEET	37.200" (944.88)												
D6	GB AFT FOOT TO GB OUTPUT HUB FACE	11.232" (285.29)												
D7	GB OUTPUT HUB FACE TO GENERATOR INPUT HUB FACE	28.867" (733.22)	1ST	7	8	00	+0.010" ±.002" (+0.24 ±.05)	+0.005" ±.002" (+0.13 ±.05)	+0.015" ±.005" (+0.37 ±.13) INSIDE TIR	00	0.000" ±.001" (0.00 ±.03)	0.000" ±.001" (0.00 ±.03)	0.000" ±.002" (0.00 ±.05)	25.875" (657.23)
D8	GENERATOR INPUT HUB FACE TO GENERATOR FORWARD FOOT	35.267" (895.78)												
D9	DISTANCE BETWEEN GENERATOR FEET	125.984" (3200.00)												

TABLE III - LASER DISTANCES AND TARGETS



MACHINE DISTANCES		
DESCRIPTION	DISTANCES	INCHES (mm)
CPLG FLANGE TO MOVEABLE MACHINE	L1	35.267" (895.78)
MOVEABLE MACHINE LENGTH	L2	125.984" (3200.00)
FACE DIAMETER	D	10.000" (254.00)

TARGETS		THOU	(mm)	TOLERANCES	
VERTICAL OFFSET	VO	+ 7.3	(+0.19)	±2.5	(±0.06)
VERTICAL GAP	VA	0.0	(0.00)	±2.0	(±0.05)
HORIZONTAL OFFSET	HO	+ 2.4	(+0.06)	±2.5	(±0.06)
HORIZONTAL GAP	HA	0.0	(0.00)	±2.0	(±0.05)

MACHINE DISTANCES		
DESCRIPTION	DISTANCES	INCHES (mm)
CPLG FLANGE TO MOVEABLE MACHINE	L1	55.454" (1408.53)
MOVEABLE MACHINE LENGTH	L2	151.827" (3856.41)
FACE DIAMETER	D	10.000" (254.00)

TARGETS		THOU	(mm)	TOLERANCES	
VERTICAL OFFSET	VO	-62.5	(-1.59)	±2.5	(±0.06)
VERTICAL GAP	VA	- 3.7	(-0.09)	±2.0	(±0.05)
HORIZONTAL OFFSET	HO	0.0	(0.00)	±2.5	(±0.06)
HORIZONTAL GAP	HA	0.0	(0.00)	±2.0	(±0.05)

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

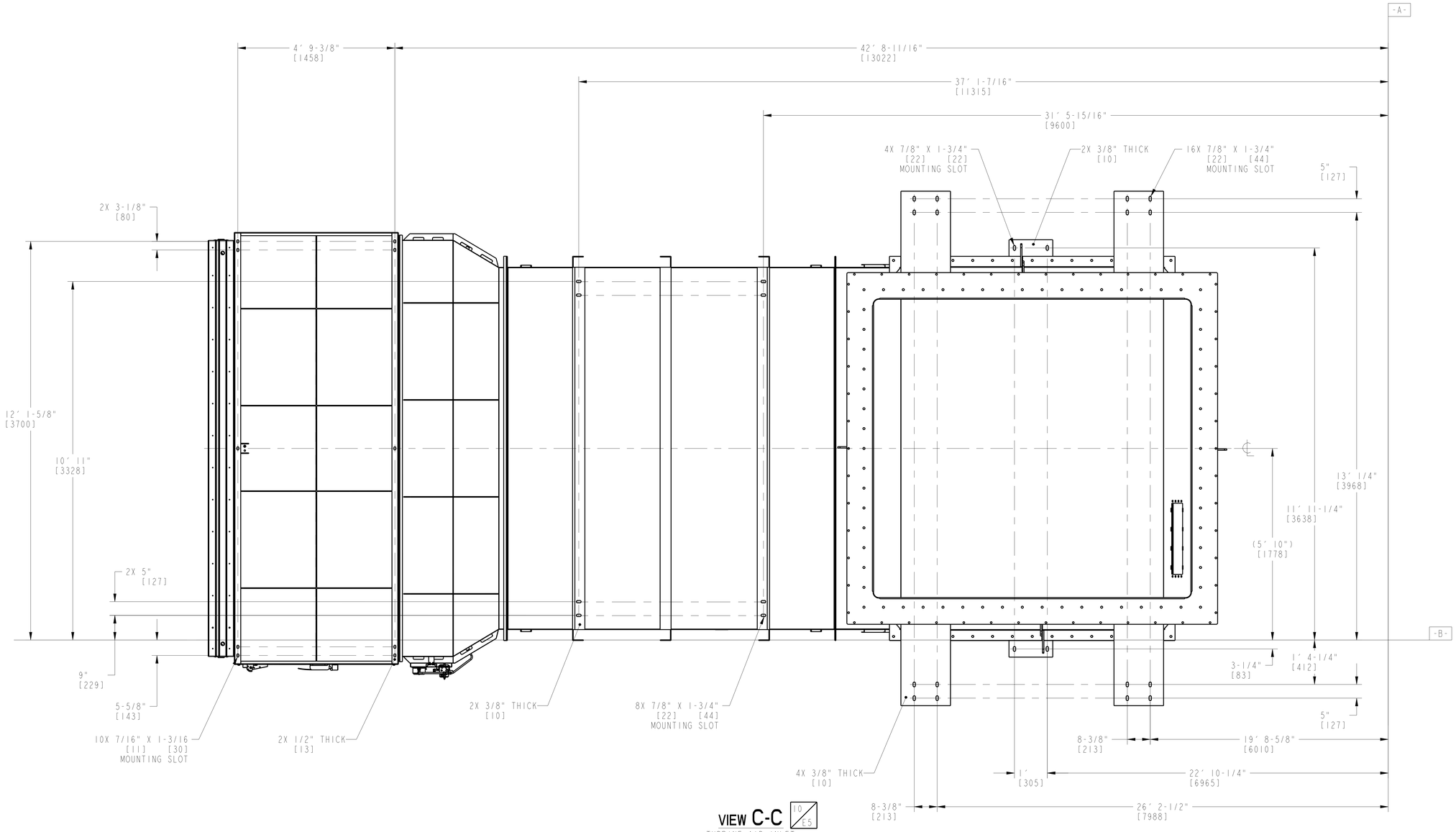
DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
ALIGNMENT INFORMATION

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149956 | SIZE E | REV B | SH 21 OF 52

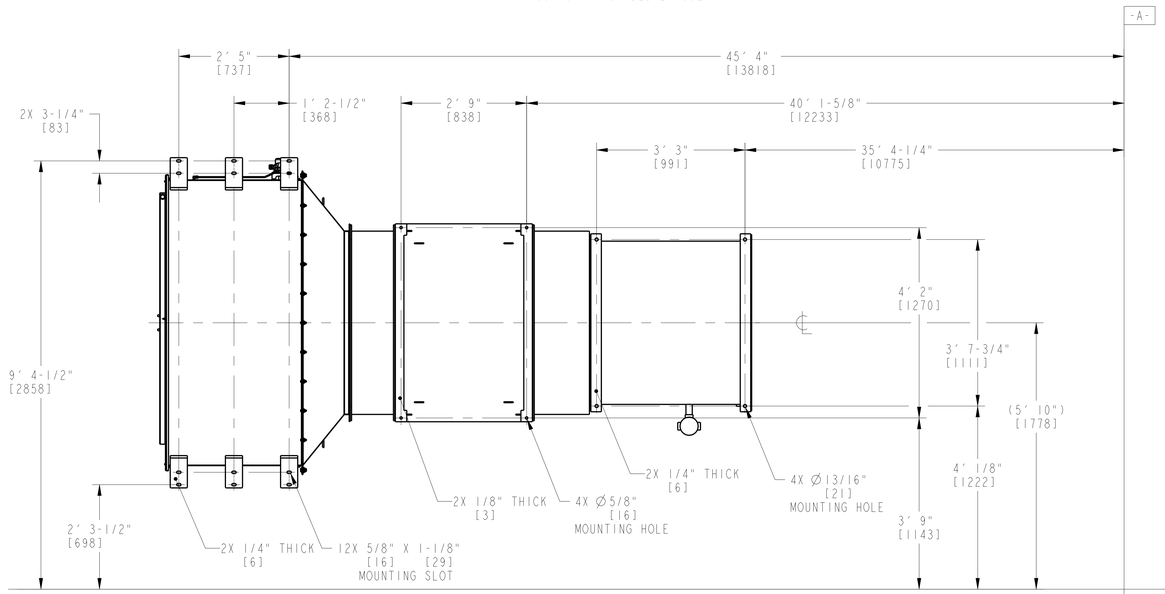
CAD IDENT Released B5

SWBNO1-1



VIEW C-C 10/E5

TURBINE AIR INLET
SYSTEM SUPPORT POINTS
SUPPORT PROVIDED BY SOLAR



VIEW D-D 10/D7

ENCLOSURE AIR INLET
SYSTEM SUPPORT POINTS
SUPPORT PROVIDED BY SOLAR

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL 7/17/23

JACOBS Date

CUSTOMER/END USER/PROJECT

SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE

TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
ANCILLARY SUPPORT POINTS

Solar® Turbines
A Caterpillar Company

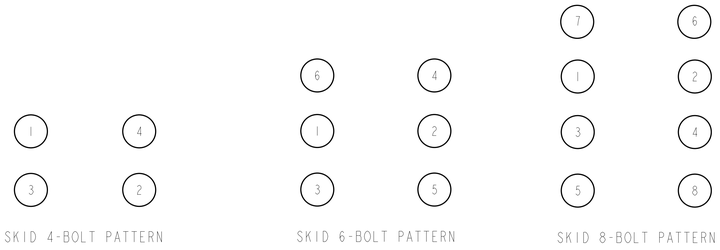
DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 22 OF 52	

CAD IDENT Released B5

SWBNO-1

TORQUING SEQUENCE AND INTERFACE HARDWARE INFORMATION

P/N	SIZES (IN.)	THREAD	MATERIAL	DESCRIPTION	FINISH	TYPICAL LOCATION USED	TORQUE LBS-FT/ N-M	TOLERANCE +/- LBS-FT/ N-M
960427C1	2.00"	8UN	A193 GR, B7	STUD +2 NUTS, 16"	ZINC	SKID INTERFACE	3244	
980784C1	1.50"	6UNC	A193 GR, B7	STUD +2 NUTS, 11"	ZINC	GENERATOR TIE-DOWN (STUD)	1437/1950	40/54



THE TOTAL REQUIRED TORQUE SHOULD BE APPLIED IN THREE INCREMENTS OF 1/3 OF TOTAL REQUIRED TORQUE (I.E., EACH SEQUENCE TO BE COMPLETED 3 TIMES).

NOTES:

1. THE ABOVE TORQUE VALUES ASSUME THAT THE THREADS HAVE BEEN LUBRICATED WITH SOLAR'S P/N 917427C1 (EVERLUBE 811-3) OR EQUIVALENT.

APPROVED _____ X
APPROVED AS NOTED _____ ☐
REVISE AND RESUBMIT _____ ☐
REJECTED _____ ☐
NOT SUBJECT TO REVIEW _____ ☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL 7/17/23
JACOBS Date

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
MAJOR EQUIPMENT ATTACHING HARDWARE

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149956
SIZE E
REV B
SH 23 OF 52

CAD IDENT Released B5

SWBNO-1

LOOSE SHIPPED COMPONENTS

SHEET NO.	COMPONENT DESCRIPTION	QTY	REV
25	ANCHOR BOLT, PKG FRAME	10	
26	BATTERY CHARGER	1	
27	BATTERY / RACK ASSEMBLY	1	
28	MODULE, PILOT LIQUID FUEL	1	B
29	MODULE, OFFSKID, LIQUID FUEL FILTER SYSTEM	1	B
30	WATER PURGE MODULE	1	B
31	DYNAMIC BRAKE RESISTOR, LIQUID FUEL MOTOR	1	
32	RIDE THRU UNIT	1	
33	VARIABLE FREQUENCY DRIVE WITH RIDE THRU UNIT, START MOTOR	1	
34	VARIABLE FREQUENCY DRIVE, WATER PURGE MOTOR	1	
35	VARIABLE FREQUENCY DRIVE, LIQUID FUEL MOTOR, PILOT	1	
36	VARIABLE FREQUENCY DRIVE, LIQUID FUEL MOTOR	1	
37	LUBE OIL TANK MIST SEPARATOR	1	
38	LUBE OIL COOLER	1	B
39	FLOW METER, GAS FUEL	1	B
40	FLAME ARRESTOR, LUBE OIL	1	
41	PCD COOLER, AIR TO AIR	1	
42	LIQUID FUEL DRAIN TANK	1	
43	FLAME ARRESTOR, LIQUID FUEL PURGE TANK VENT	1	
44	FIRE EXTINGUISHING CABINET, CO2	1	
45	FILTER, GAS FUEL	1	
46	ENGINE CLEANING CART	1	B
47	ENCLOSURE VENT FAN, CURRENT TRANSMITTER	4	
48	AUX CONTROL CONSOLE	1	
49	BACKUP LUBE OIL DC START CONTACTOR	1	
50	LINE REACTOR, INPUT, LIQUID FUEL PILOT VFD, FLOOR MOUNTED	1	B
51	LINE REACTOR, INPUT, LIQUID FUEL MAIN VFD, FLOOR MOUNTED	1	B
52	LINE REACTOR, INPUT, WATER PURGE VFD, WALL MOUNTED	1	B

APPROVED [X]
APPROVED AS NOTED [ ]
REVISE AND RESUBMIT [ ]
REJECTED [ ]
NOT SUBJECT TO REVIEW [ ]

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23
JACOBS — Date

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

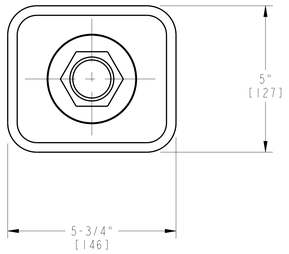
DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENTS

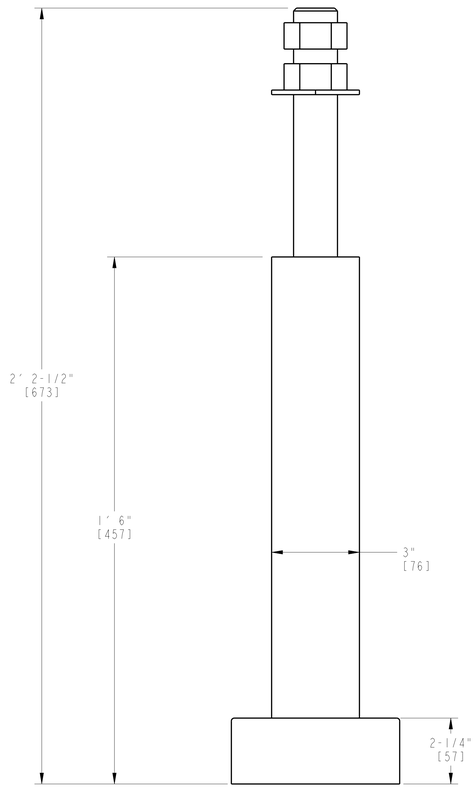
Solar® Turbines
A Caterpillar Company

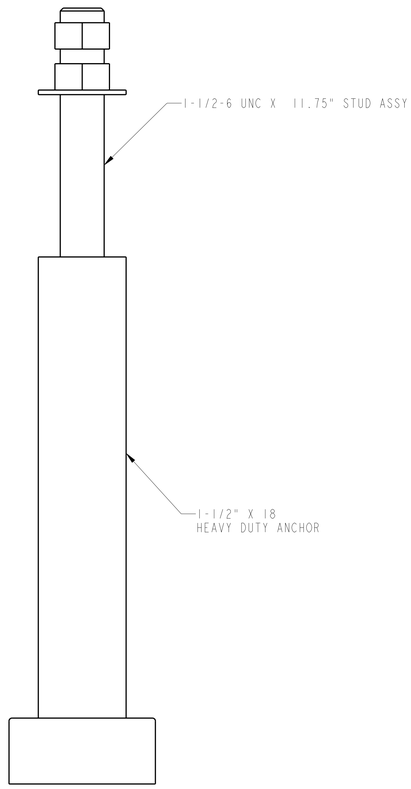
DRAWING NO. 4F491-149956
SIZE E
REV B
SH 24 OF 52

CAD IDENT Released B5

SWBNO-1







APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

ANCHOR BOLT, PKG FRAME

APPROXIMATE WEIGHT: 30 LBS [14 KG]
MATERIAL: C1144 COLD ROLLED STEEL (ASTM-A193)
LOOSE SHIPPED ITEM
P/N: 1071476-500

CUSTOMER/END USER/PROJECT

SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE

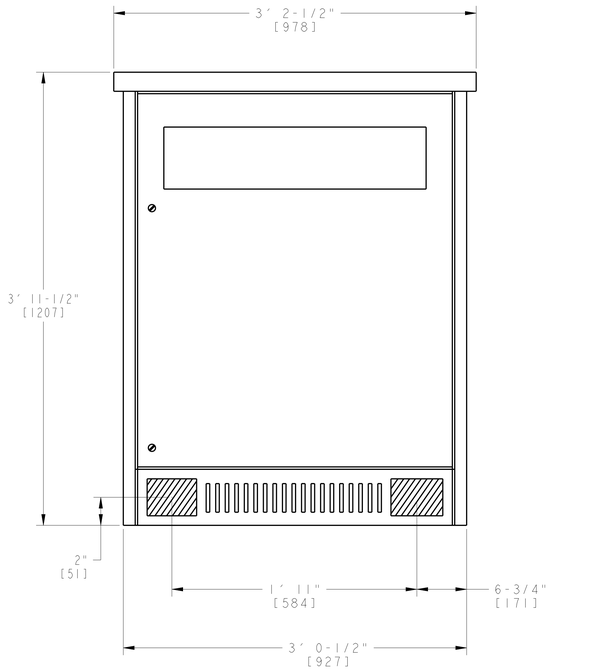
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

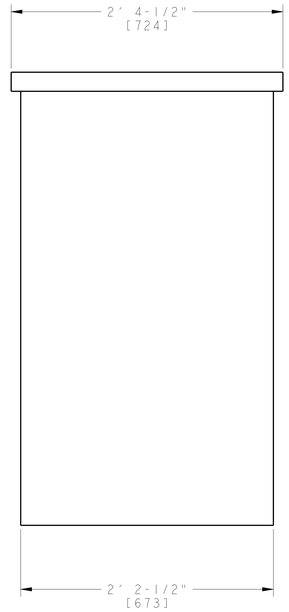
Solar® Turbines
A Caterpillar Company

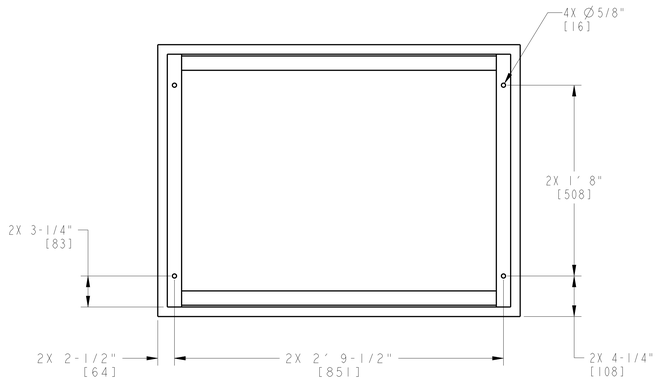
DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 25 OF 52	

CAD IDENT: Released B5

SWBNO-1







APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

BATTERY CHARGER

OUTPUT: 120 - 145 VDC, 100A
WEIGHT: 540 LBS [245 KG]
LOOSE SHIP ITEM
P/N: 1088225-300

CUSTOMER/END USER/PROJECT

SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE

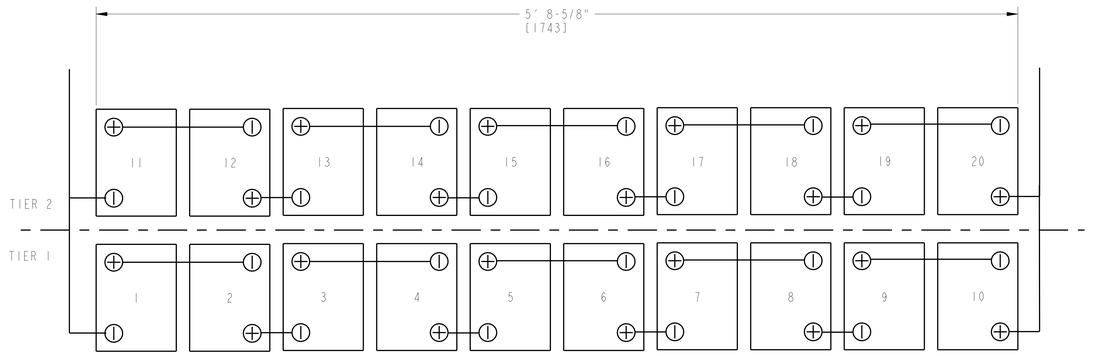
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

Solar® Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 26 OF 52	

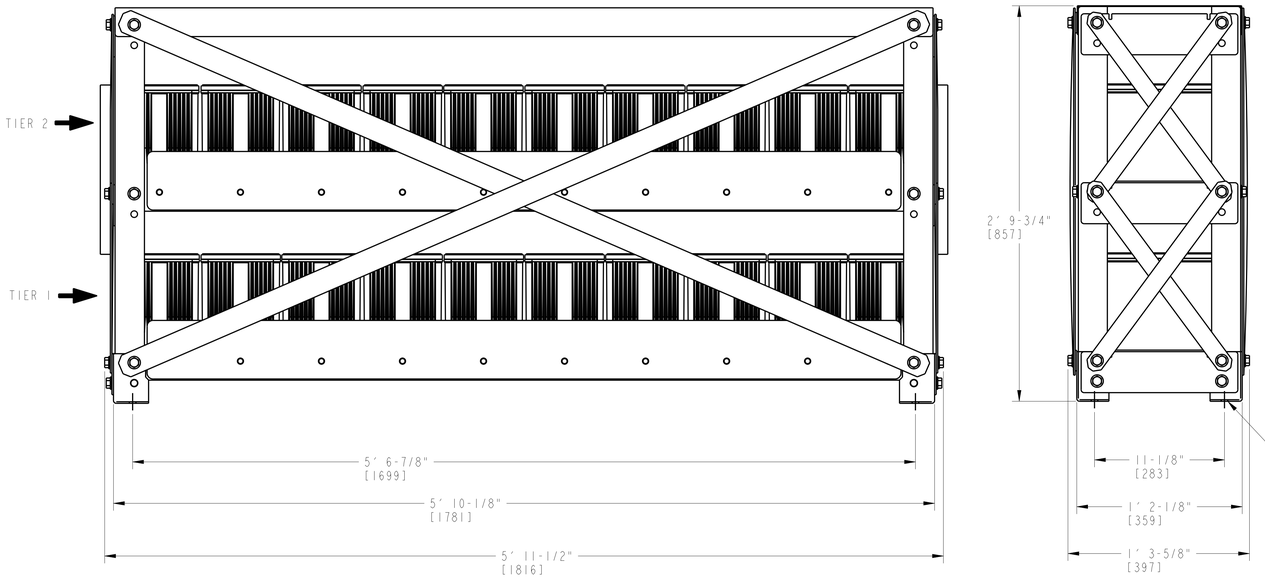
CAD IDENT Released B5

SWBNO-1



BATTERY LAYOUT

VRLA BATTERIES (94 AH)
2 STRINGS, PARALLEL ARRAY (188 AH TOTAL)
HYDRODEN GASSING (FLOAT CHARGE) = 99 ML/HR
HYDRODEN GASSING (HIGH RATE CHARGE) = 434 ML/HR



SIDE VIEW

END VIEW

RACK DIMENSIONS AND LAYOUT

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

BATTERY / RACK ASSEMBLY

APPROXIMATE TOTAL WEIGHT INCLUDING BATTERIES AND RACK:
1,736 LBS [787 KG]
APPROXIMATE RACK ONLY WEIGHT: 131 LBS [59 KG]
20 BATTERY BLOCKS
LOOSE SHIPPED ITEM
P/N: 2429431-500

CUSTOMER/END USER/PROJECT

SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE

TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

Solar® Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B

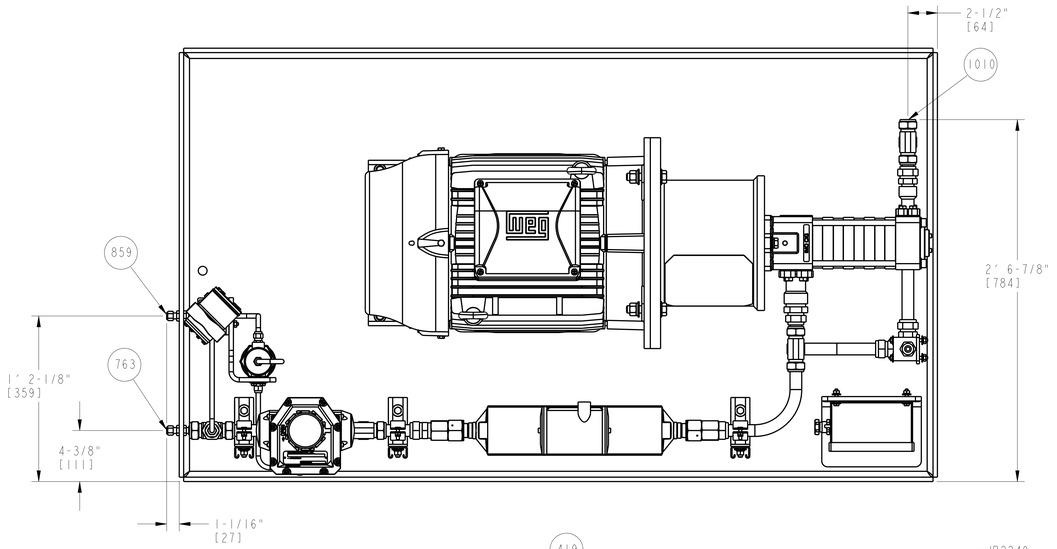
SH 27 OF 52

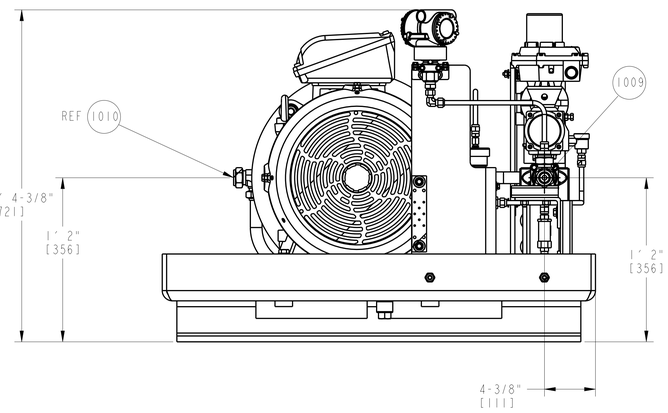
CAD IDENT Released B5

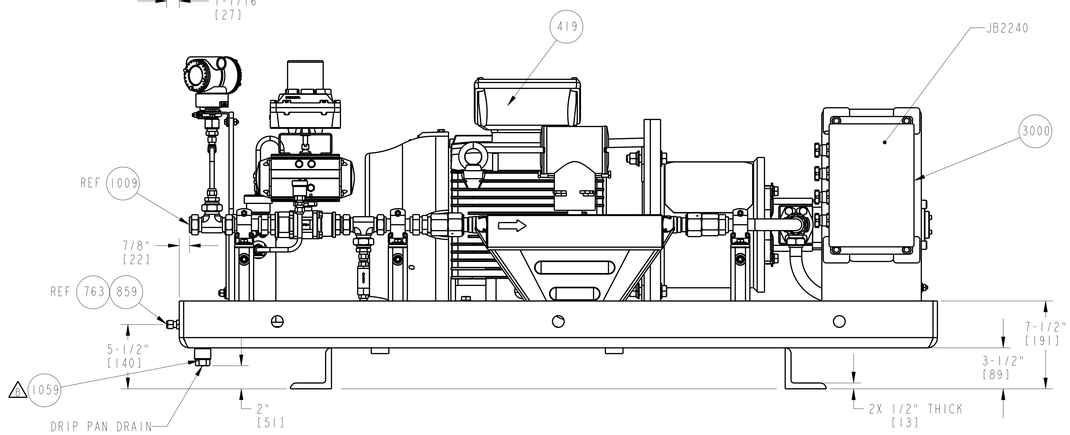
SWBNO-1

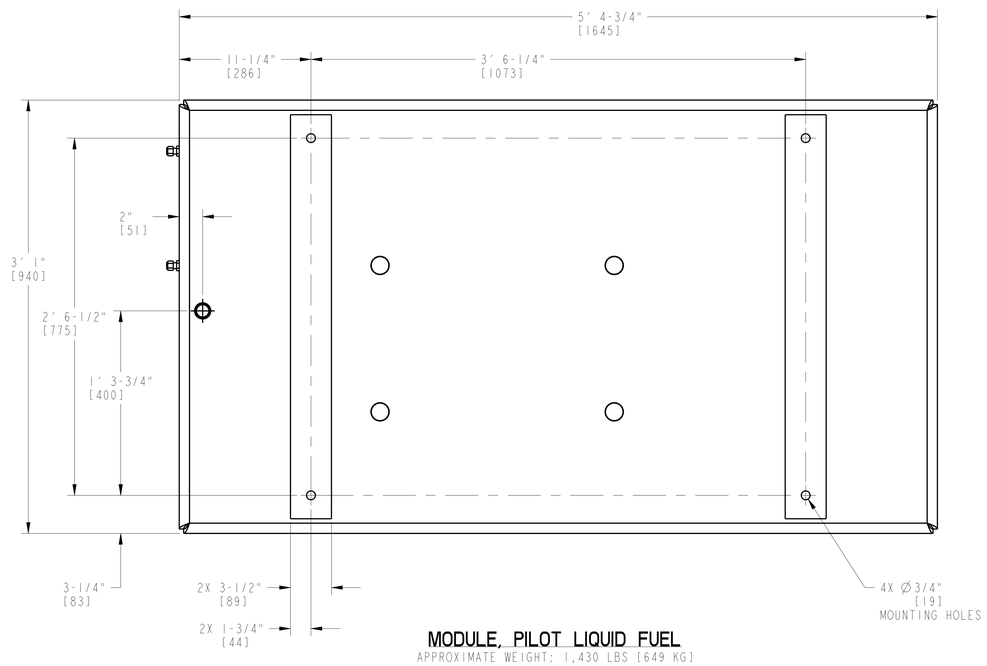
TABLE 1 - CONNECTIONS

ITEM	DESCRIPTION	SIZE & TYPE
419	AC VOLTS, LIQUID FUEL PILOT PUMP MOTOR	2X M50 X 1.5 AND 1X M20 X 1.5 - (DEVICE) 2" NPT
763	DRAIN LIQUID FUEL	3/4" TUBE FITTING
859	PILOT AIR TO LIQUID FUEL MODULE	3/8" TUBE FITTING
1009	PILOT LIQUID FUEL PUMP SKID INLET	1" TUBE FITTING
1010	PILOT LIQUID FUEL INLET	1" TUBE FITTING
⚠1 1059	LIQUID FUEL PUMP MODULE DRAIN	3/8" TUBE FITTING
3000	LIQUID FUEL PILT PUMP SKID J-BOX	4X 0.86" KNOCKOUTS









MODULE, PILOT LIQUID FUEL

APPROXIMATE WEIGHT: 1,430 LBS [649 KG]
MATERIAL: PAINTED CARBON STEEL
LOOSE SHIPPED ITEM
P/N: 1514790-4F491

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

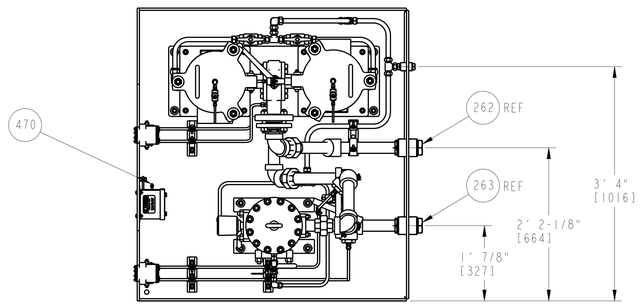
Solar® Turbines
A Caterpillar Company

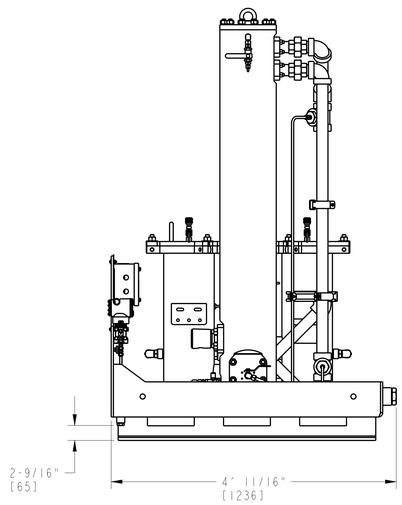
DRAWING NO. 4F491-149956
SIZE E
REV B
SH 28 OF 52

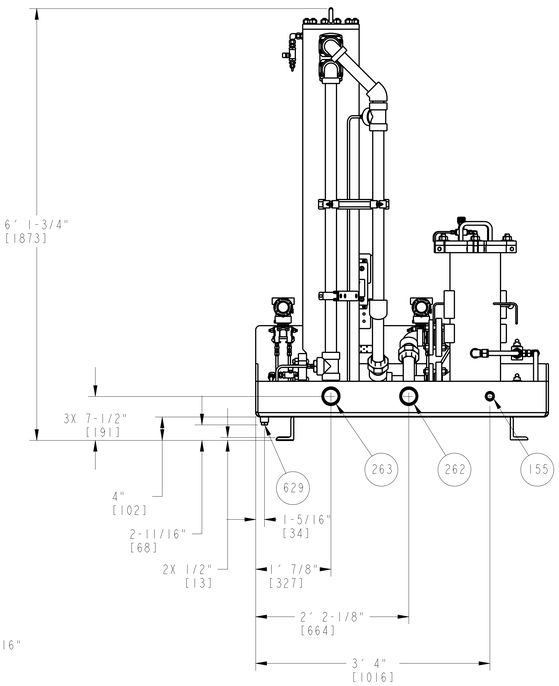
CAD IDENT Released B5

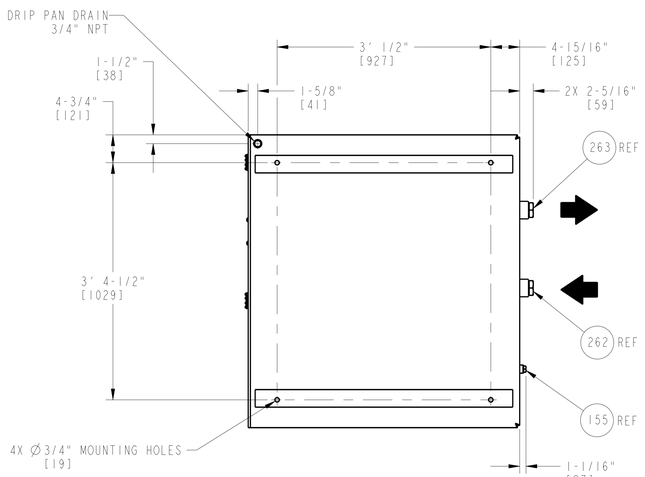
SWBNO-1

TABLE 1 - CONNECTIONS		
ITEM	DESCRIPTION	SIZE & TYPE
155	FUEL FILTER DRAIN	3/4" NPT FEMALE, PLUGGED
262	LIQUID FUEL FILTER INLET	2" NPT FEMALE
263	LIQUID FUEL FILTER OUTLET	2" NPT FEMALE
470	DC VOLTS, OFF-SKID LIQ. FUEL MODULE J-BOX	1/2" NPT FEMALE, PLUGGED
629	LIQUID FUEL FILTER SKID DRIP PAN DRAIN	1" NPT FEMALE









APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

MODULE, OFFSKID, LIQUID FUEL FILTER SYSTEM

APPROXIMATE WEIGHT: 1,500 LBS [680 KG]
LOOSE SHIPPED ITEM
P/N: 1114617-4F491 ⚠

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

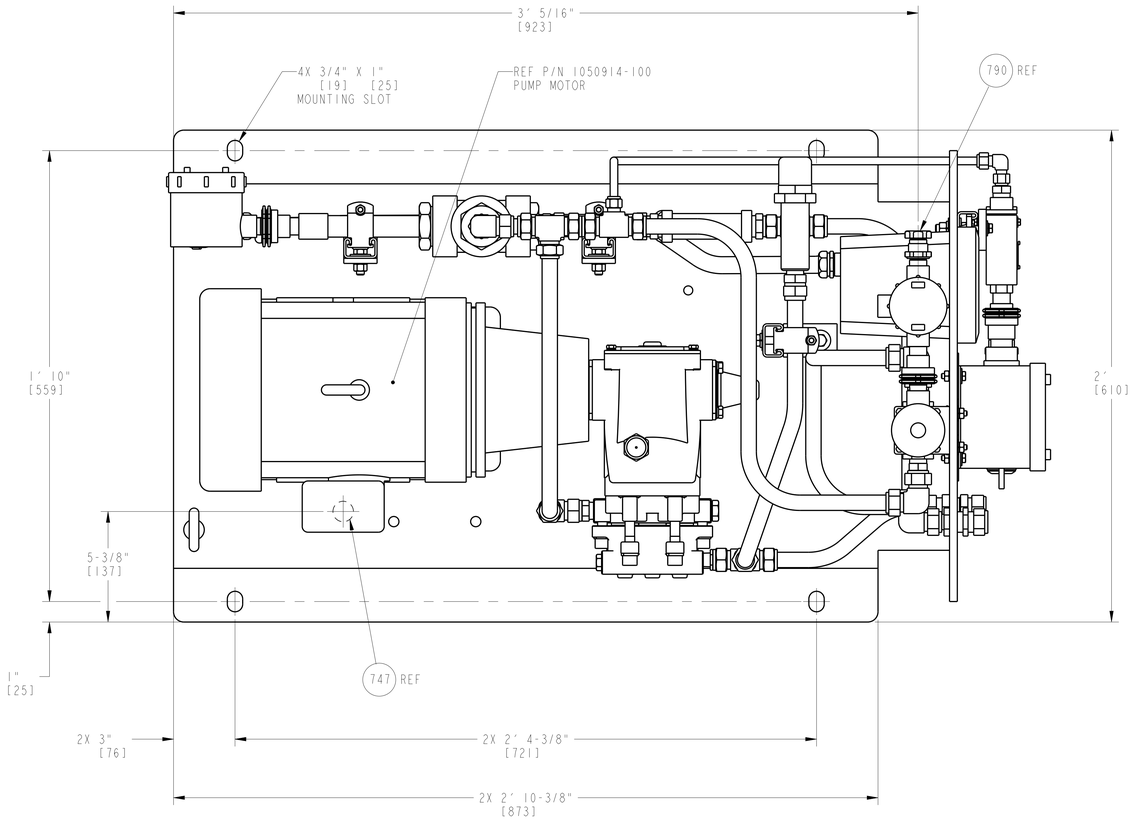
Solar® Turbines
A Caterpillar Company

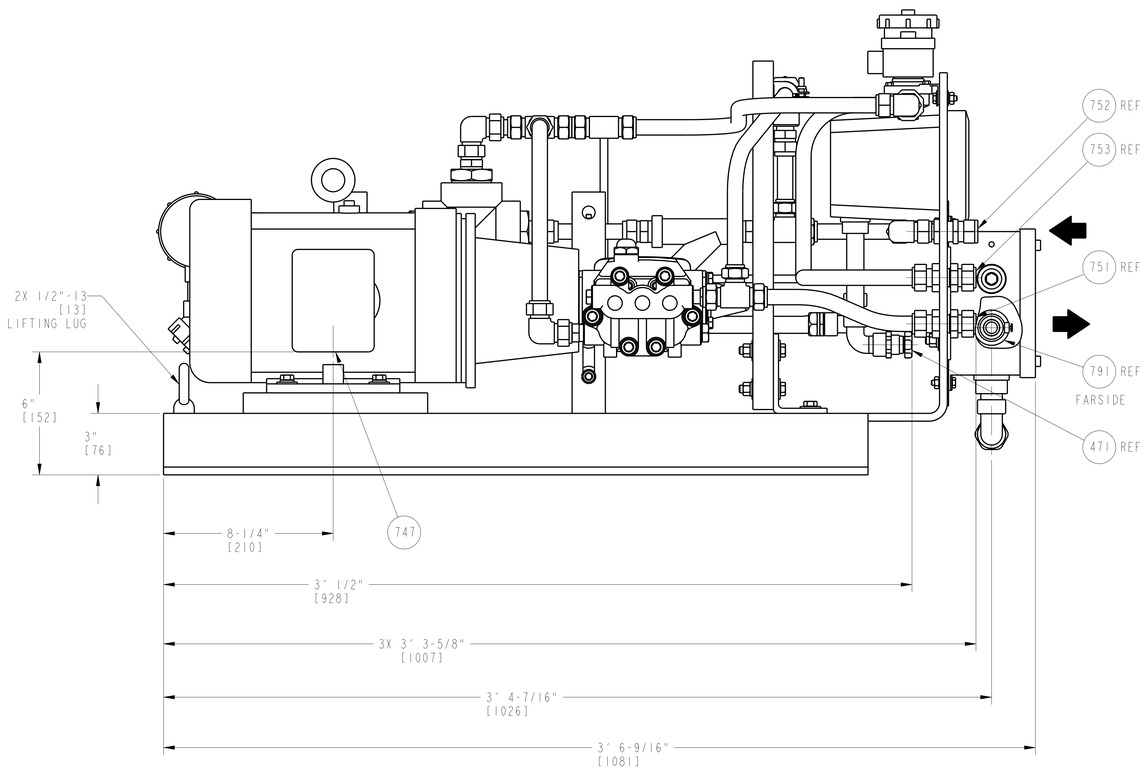
DRAWING NO.	SIZE	REV
4F491-149956	E	B

SH 29 OF 52

CAD IDENT Released B5

SWBNO-1





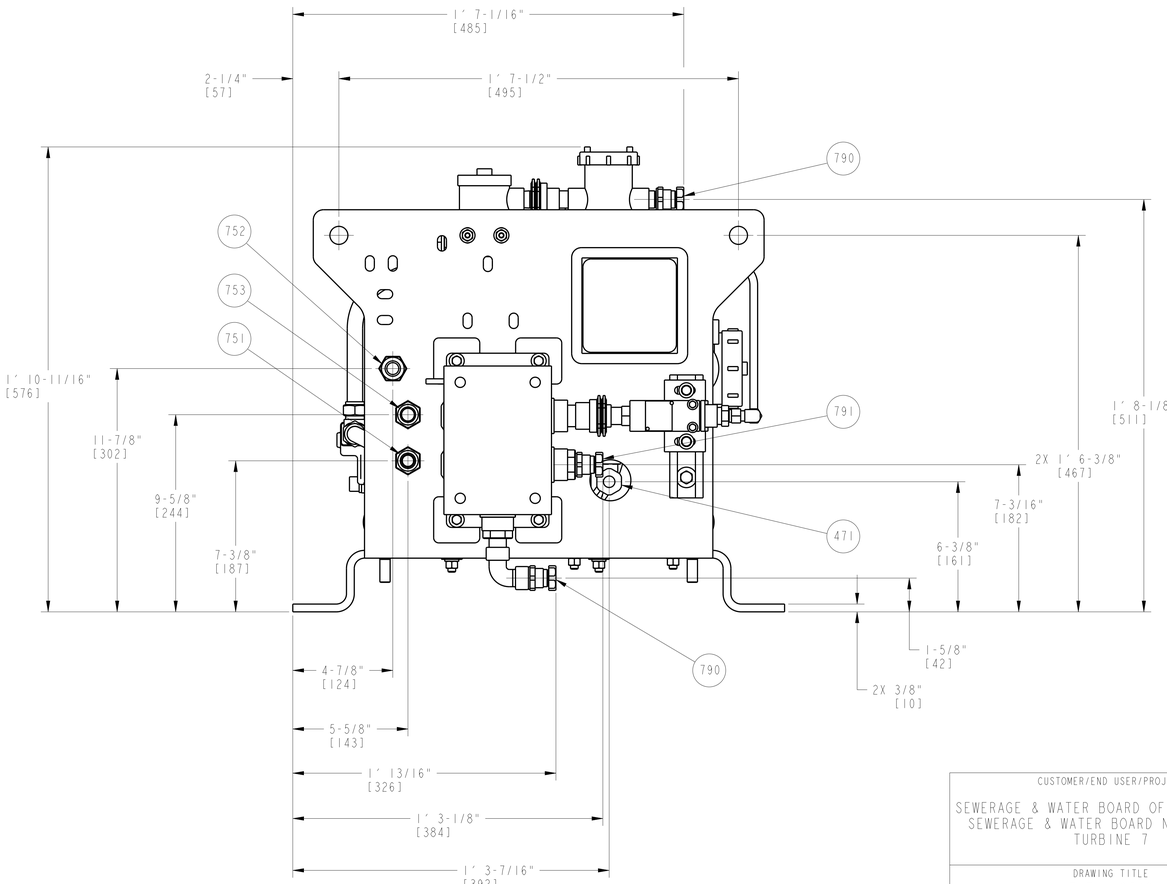


TABLE 1 - CONNECTIONS

ITEM	DESCRIPTION	SIZE & TYPE
471	WATER CONDUCTIVITY ANALYZER	M20 X 1.5
747	AC VOLTS, CUSTOMER INTERFACE	1X M32 X 1.5 AND 2X M20 X 1.5
751	WATER PURGE SKID OUTLET	3/4" TUBE FITTING
752	WATER PURGE SKID INLET	3/4" TUBE FITTING
753	WATER PURGE SKID DRAIN	3/4" TUBE FITTING
790	SOLENOID, ELECTRICAL INTERFACE (2 PLACES)	M20 X 1.5
791	PRESSURE SWITCH, ELECTRICAL CONNECTION	M20 X 1.5

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

WATER PURGE MODEL

APPROXIMATE WEIGHT: 325 LBS [147 KG]
LOOSE SHIPPED ITEM
P/N: 1064190-4F491 △

CUSTOMER/END USER/PROJECT

SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE

TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

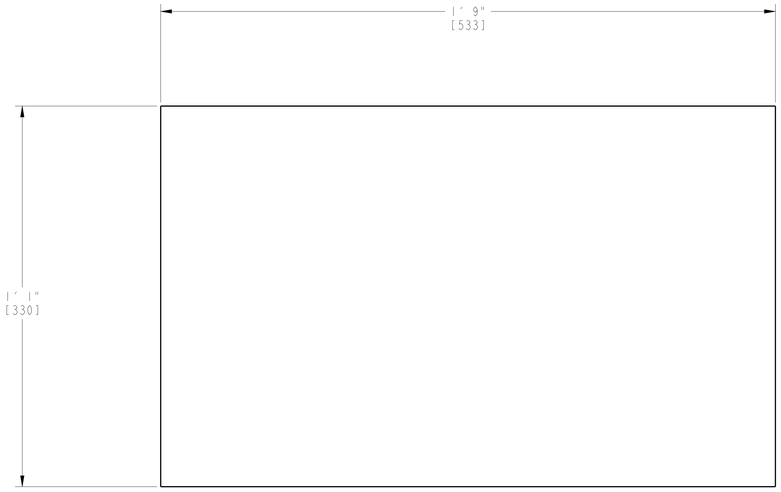
Solar® Turbines
A Caterpillar Company

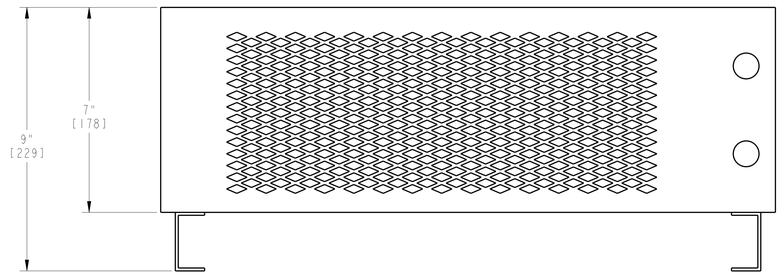
DRAWING NO.	SIZE	REV
4F491-149956	E	B

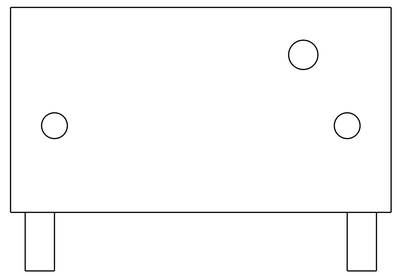
SH 30 OF 52

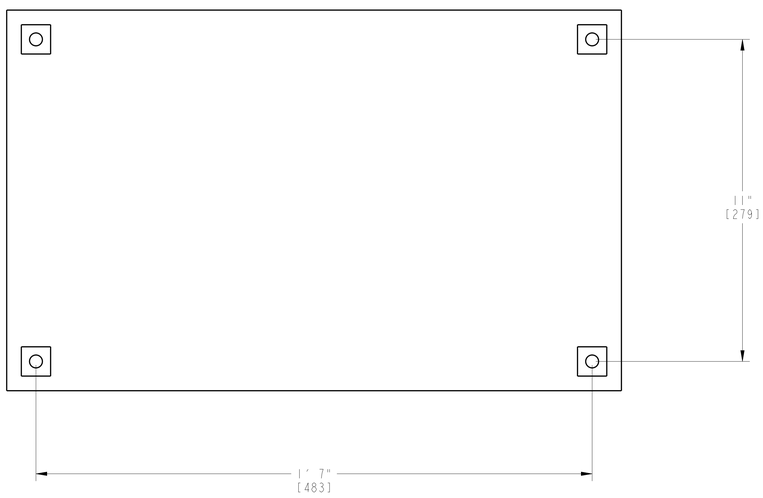
CAD IDENT Released B5

SWBNO-1









APPROVED _____ X
APPROVED AS NOTED _____ ☐
REVISE AND RESUBMIT _____ ☐
REJECTED _____ ☐
NOT SUBJECT TO REVIEW _____ ☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23
JACOBS — Date

DYNAMIC BRAKE RESISTOR, LIQUID FUEL MOTOR

APPROXIMATE WEIGHT: 24 LBS [11 KG]
LOOSE SHIPPED ITEM
P/N 1085042-6

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

Solar® Turbines
A Caterpillar Company

DRAWING NO. 4F491-149956
SIZE E
REV B
SH 31 OF 52

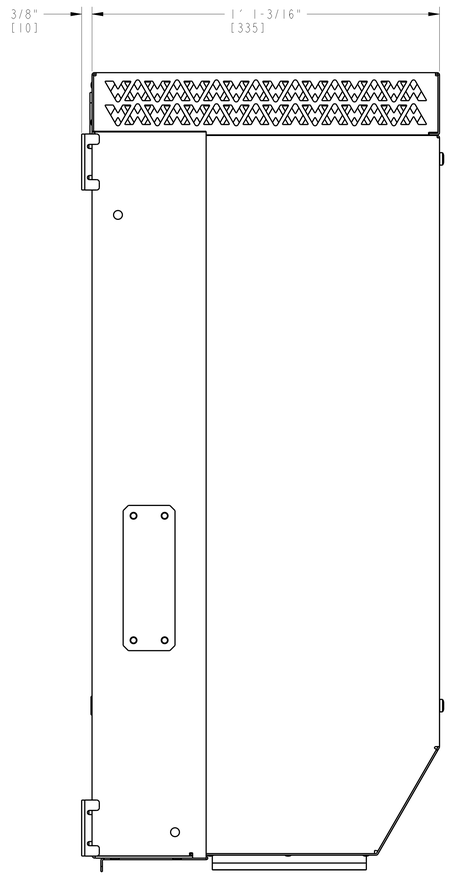
CAD IDENT Released B5

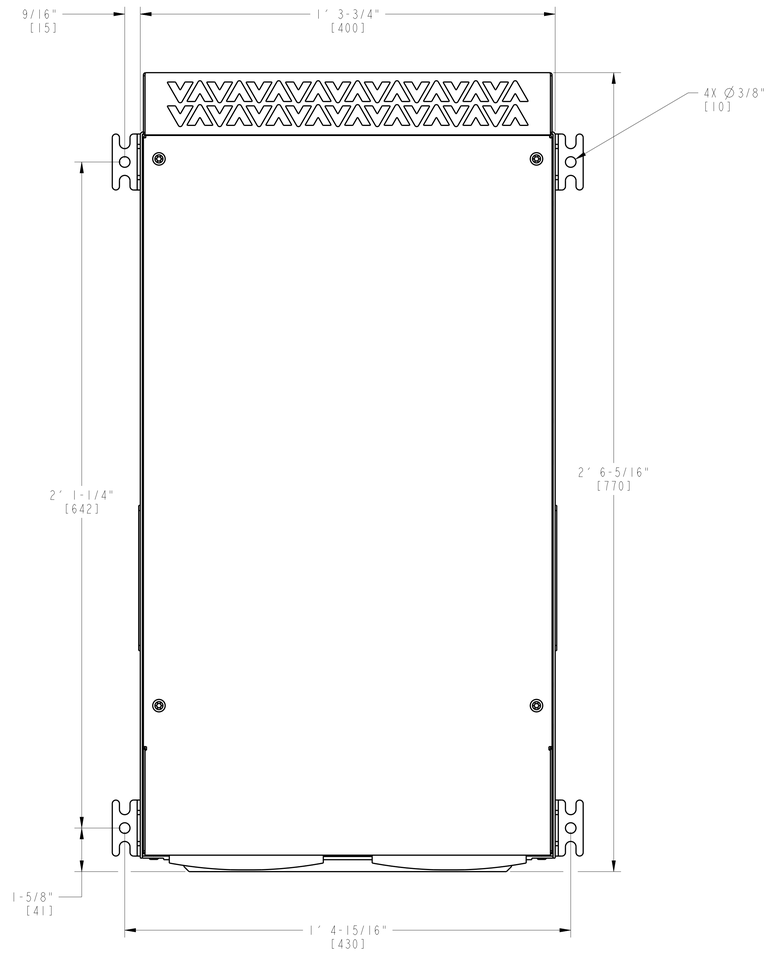
SWBNO-1

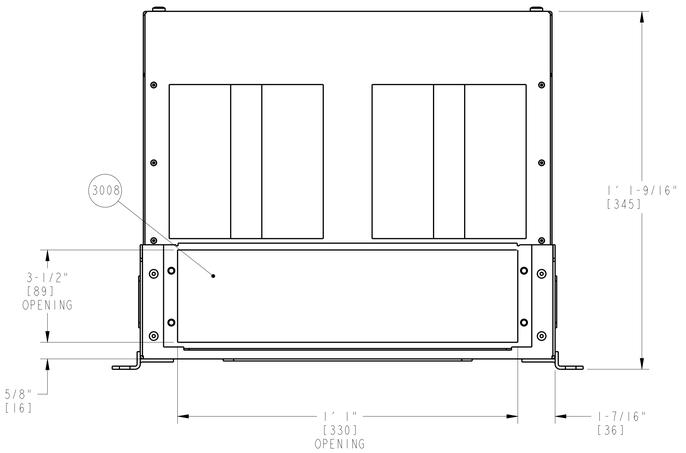
8	7	6	5	4	3	2	1

TABLE 1 - CONNECTIONS

ITEM	DESCRIPTION	SIZE & TYPE
3008	RTU DC/DC CONVERTER	3-1/2" X 13" (89 X 330) OPENING WITH UNDRILLED GLAND PLATE







APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

RIDE THRU UNIT

APPROXIMATE WEIGHT: 77 LBS [35 KG]
LOOSE SHIPPED ITEM
P/N: 1109521-100

CUSTOMER/END USER/PROJECT

SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE

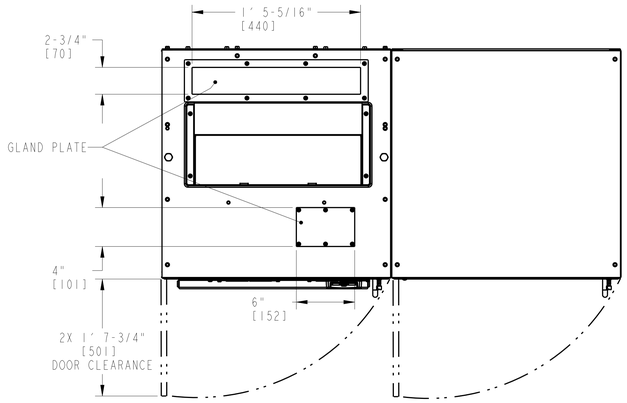
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

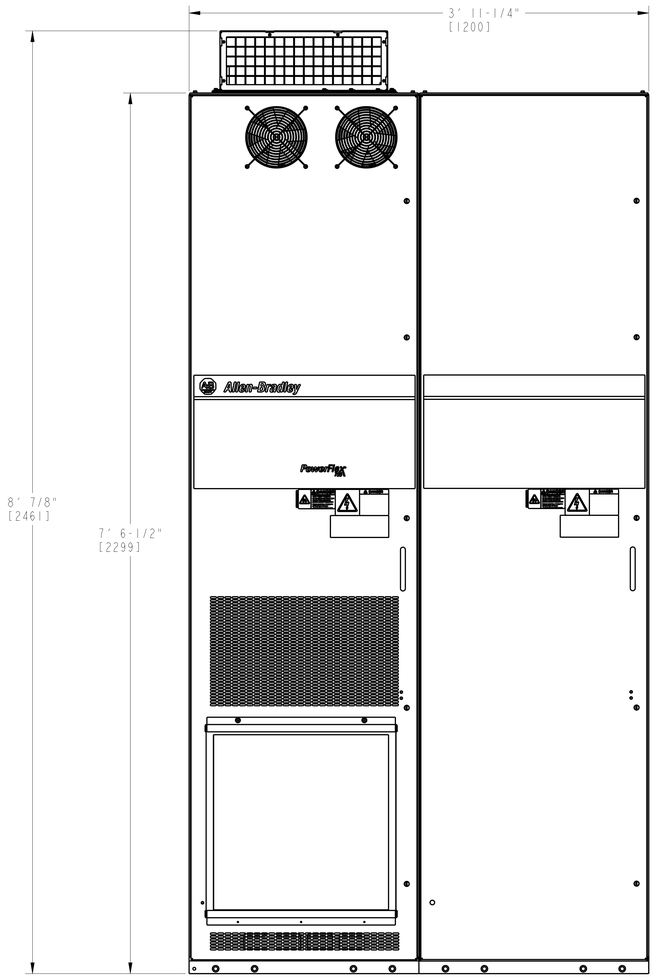
Solar® Turbines
A Caterpillar Company

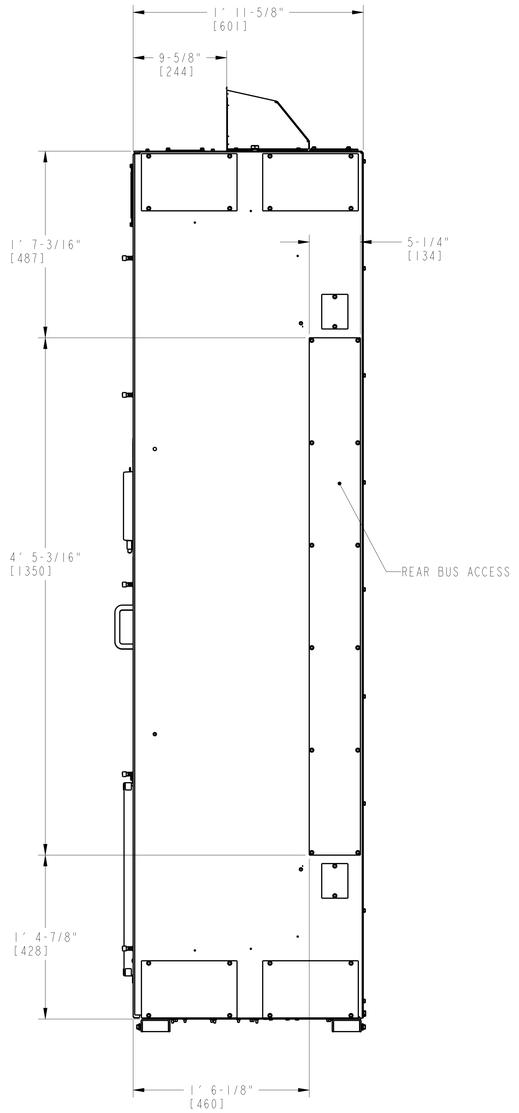
DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 32 OF 52	

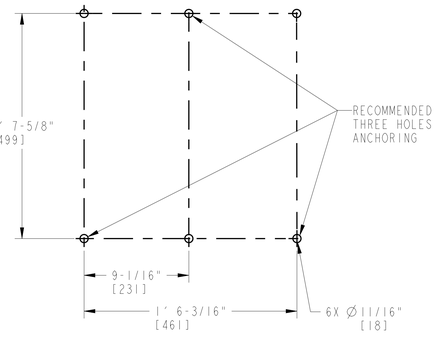
CAD IDENT: Released B5

SWBNO-1

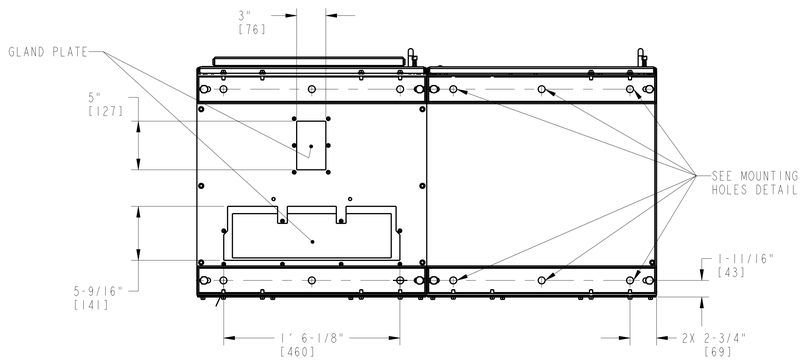








MOUNTING HOLES DETAIL
2 PLACES



APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

VARIABLE FREQUENCY DRIVE WITH RIDE THRU UNIT, START MOTOR

APPROXIMATE WEIGHT: 2,600 LBS (1179 KG)
LOOSE SHIPPED ITEM
P/N: 1322844-1600

CUSTOMER/END USER/PROJECT

SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE

TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

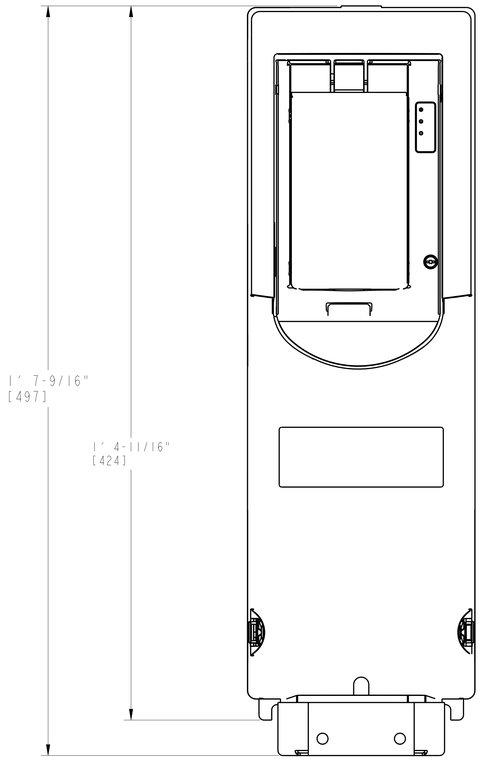
Solar Turbines
A Caterpillar Company

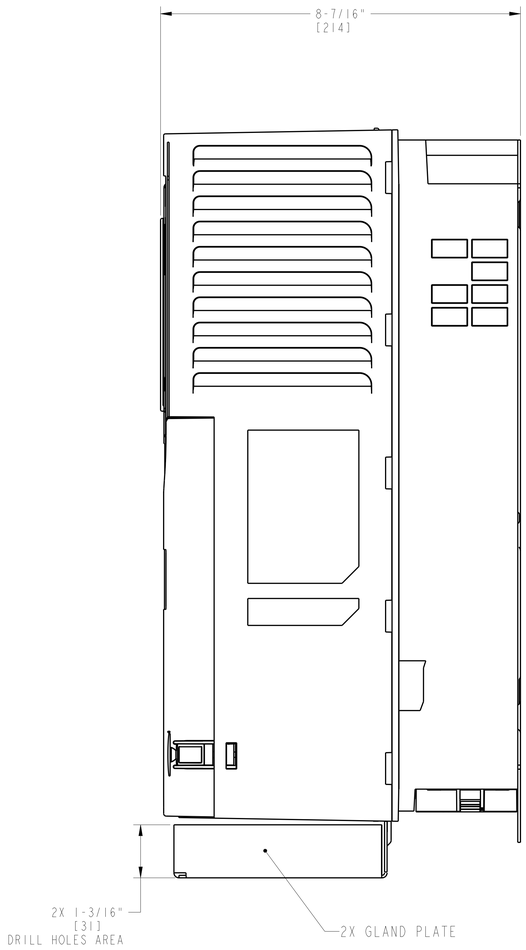
DRAWING NO.	SIZE	REV
4F491-149956	E	B

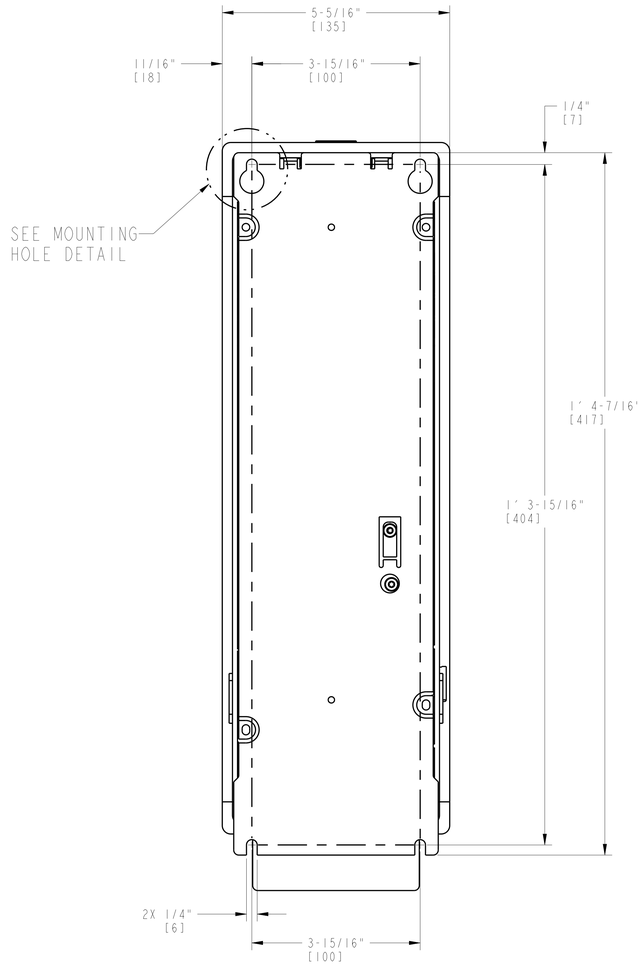
SH 33 OF 52

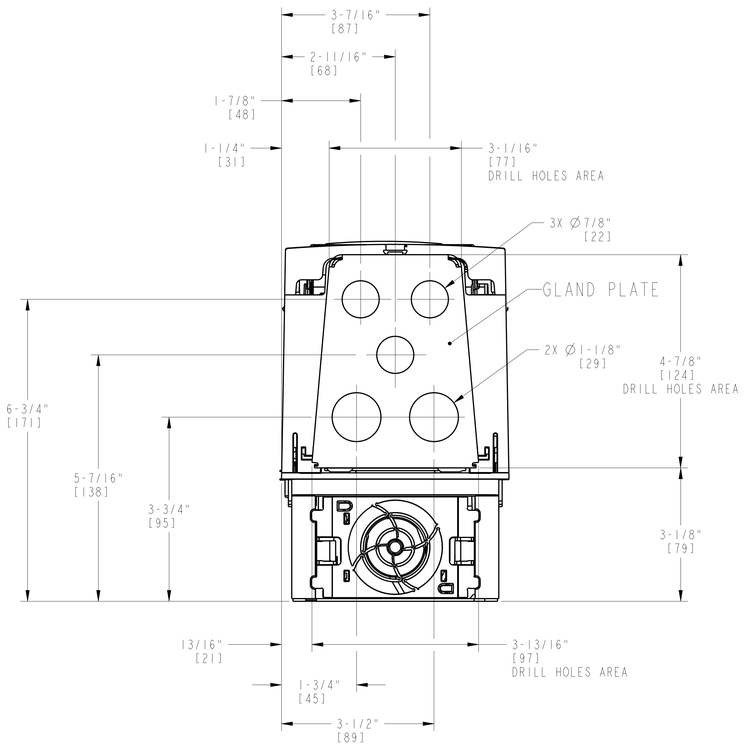
CAD IDENT: Released B5

SWBNO-1







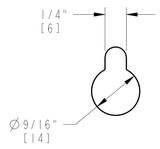


APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date



MOUNTING HOLE DETAIL
2 PLACES

VARIABLE FREQUENCY DRIVE, WATER PURGE MOTOR

APPROXIMATE WEIGHT: 17 LBS [8 KG]
LOOSE SHIPPED ITEM
P/N: 1308818-300

NOTE: POWERFLEX 753, FRAME 2, 380-480 VAC, 3PH POWER SUPPLY

NOTE: VFD'S HAVE REMOVABLE GLAND PLATES TO ALLOW FOR ADDITIONAL HOLES TO BE DRILLED BY CUSTOMERS.

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

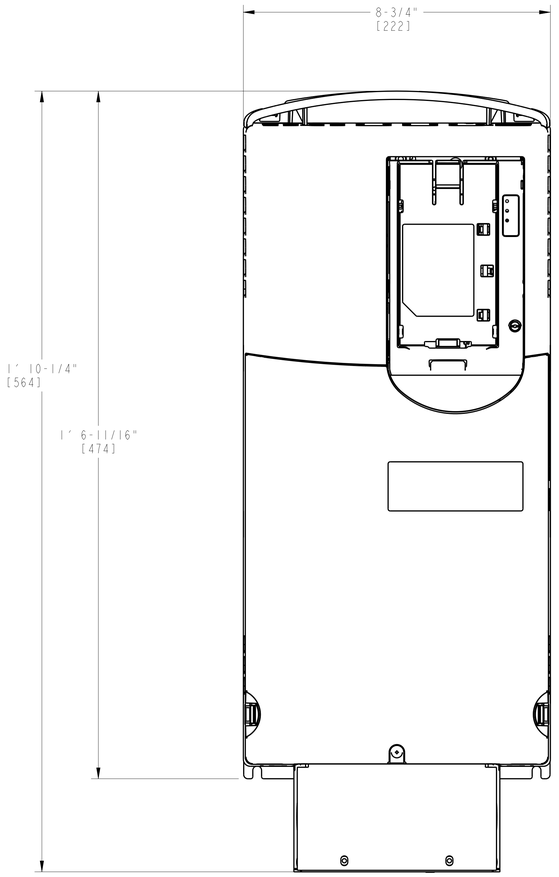
DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

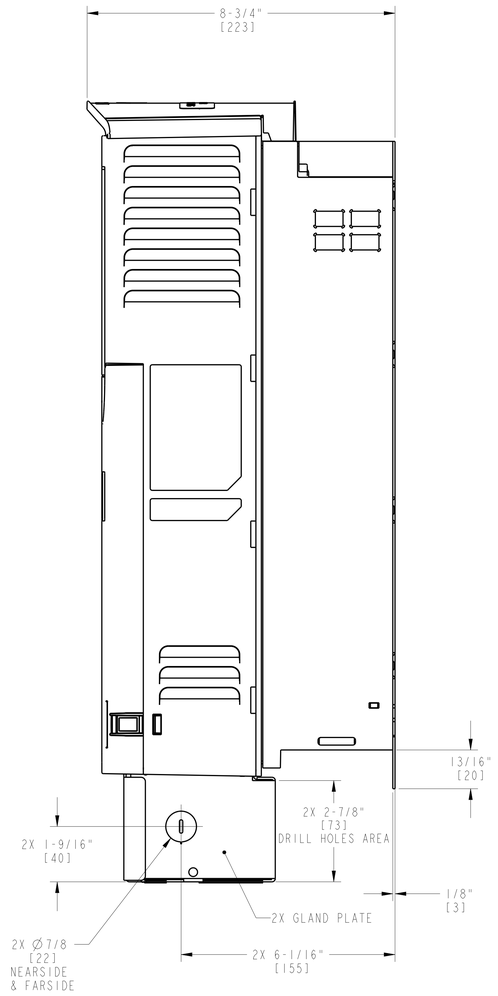
Solar® Turbines
A Caterpillar Company

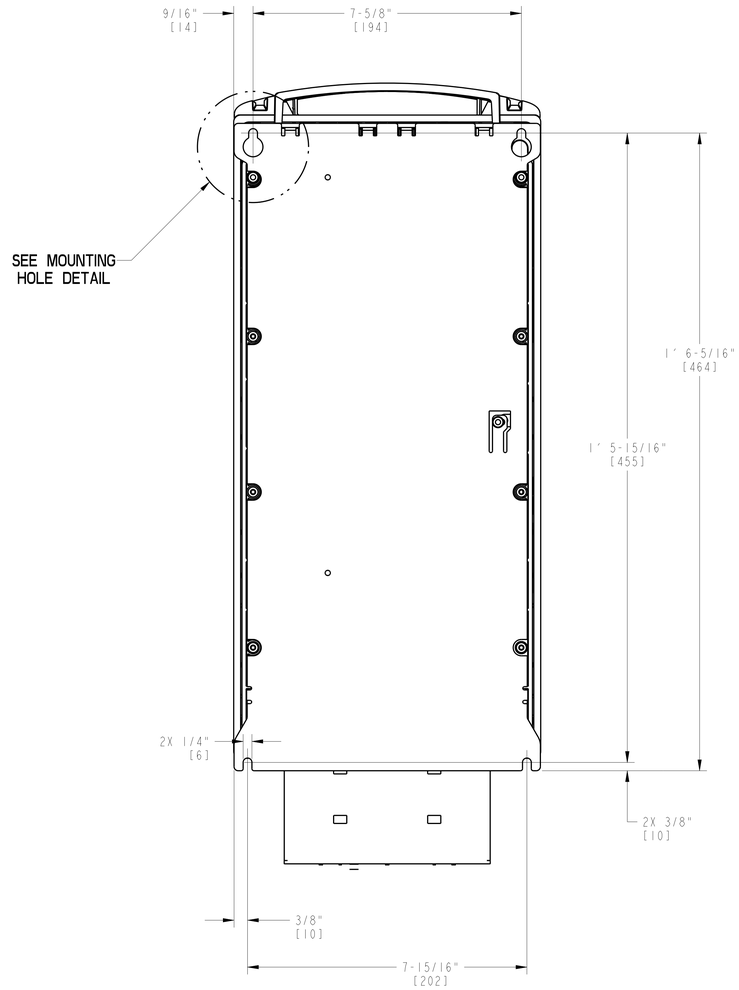
DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 34 OF 52	

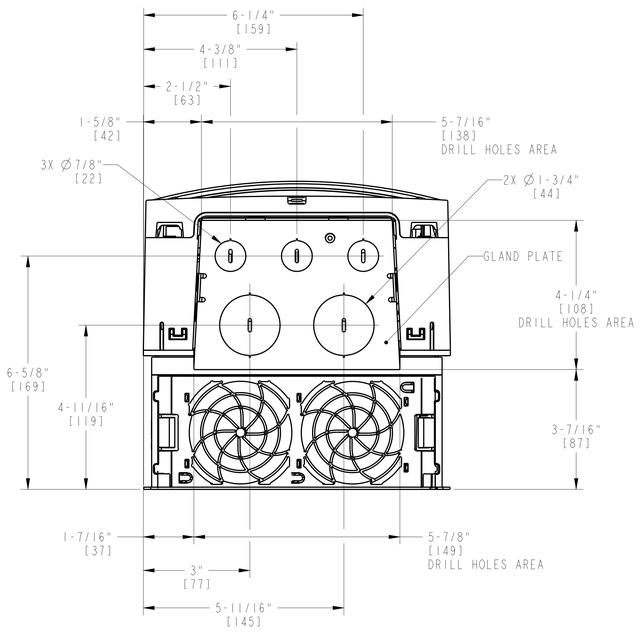
CAD IDENT Released B5

SWBNO1-1







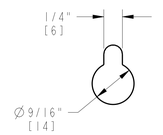


APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date



MOUNTING HOLE DETAIL
2 PLACES

VARIABLE FREQUENCY DRIVE, LIQUID FUEL MOTOR, PILOT

APPROXIMATE WEIGHT: 30 LBS [14 KG]
LOOSE SHIPPED ITEM
P/N: 1308818-1100

NOTE: POWERFLEX 753, FRAME 4, 380-480 VAC, 3 PH POWER SUPPLY.

NOTE: VFD'S HAVE REMOVABLE GLAND PLATES TO ALLOW FOR ADDITIONAL HOLES TO BE DRILLED BY CUSTOMERS.

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

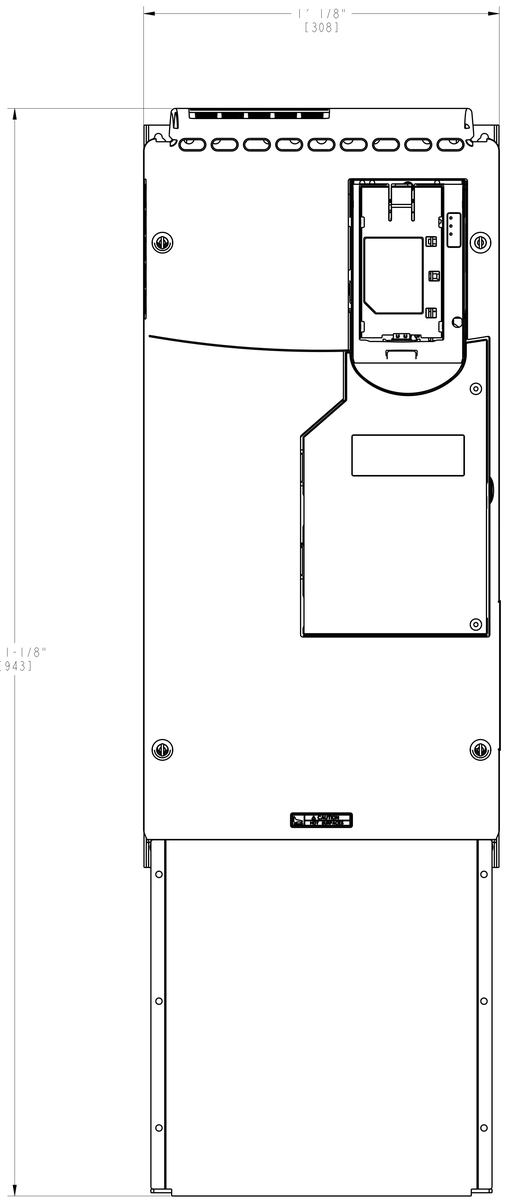
Solar® Turbines
A Caterpillar Company

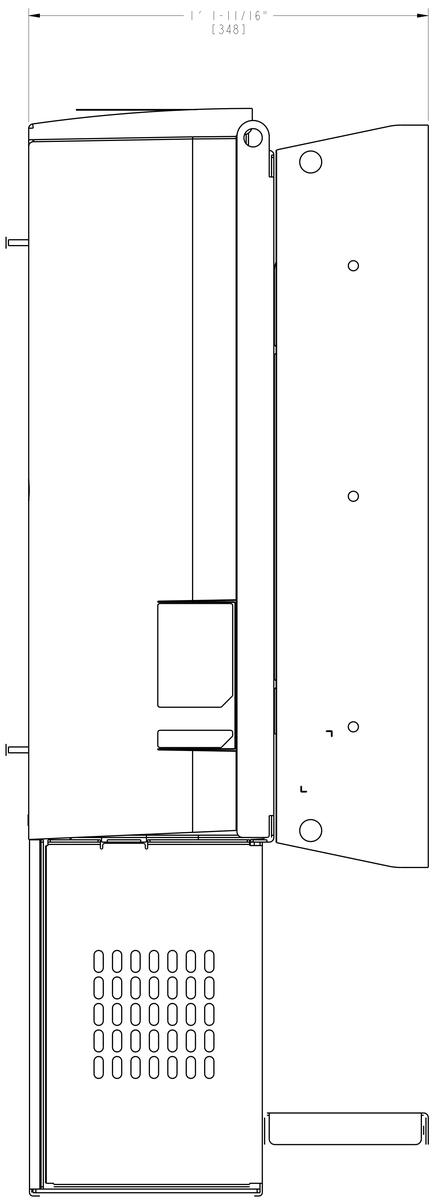
DRAWING NO.	SIZE	REV
4F491-149956	E	B

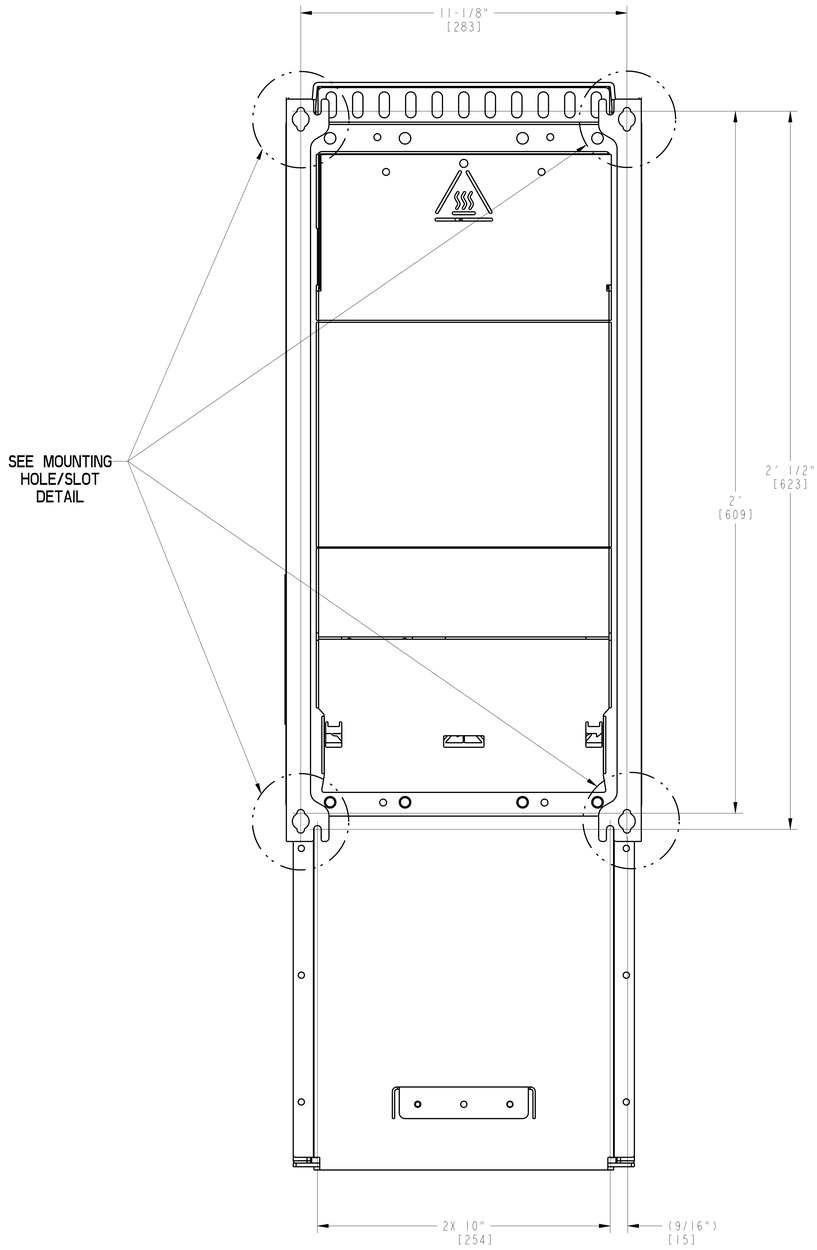
SH 35 OF 52

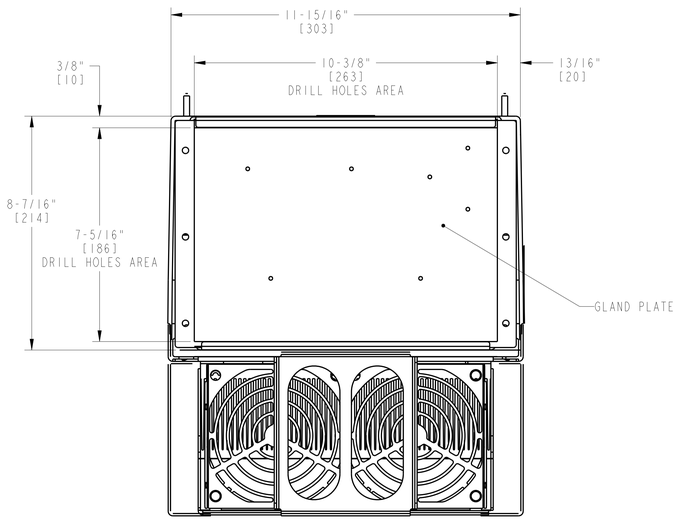
CAD IDENT Released B5

SWBNO-1







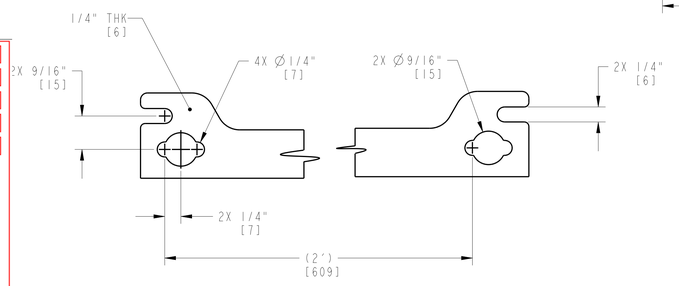


APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date



MOUNTING HOLE/SLOT DETAIL
VIEW ROTATED 90°
2 PLACES

VARIABLE FREQUENCY DRIVE, LIQUID FUEL MOTOR

APPROXIMATE WEIGHT: 85 LBS [39 KG]
LOOSE SHIPPED ITEM
P/N: 1308818-1500

NOTE: POWERFLEX 753, FRAME 6, 380-480 VAC, 3 PH POWER SUPPLY.

NOTE: REMOVABLE GLAND PLATE REQUIRES CUSTOMER DRILLED HOLES.

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

Solar Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B

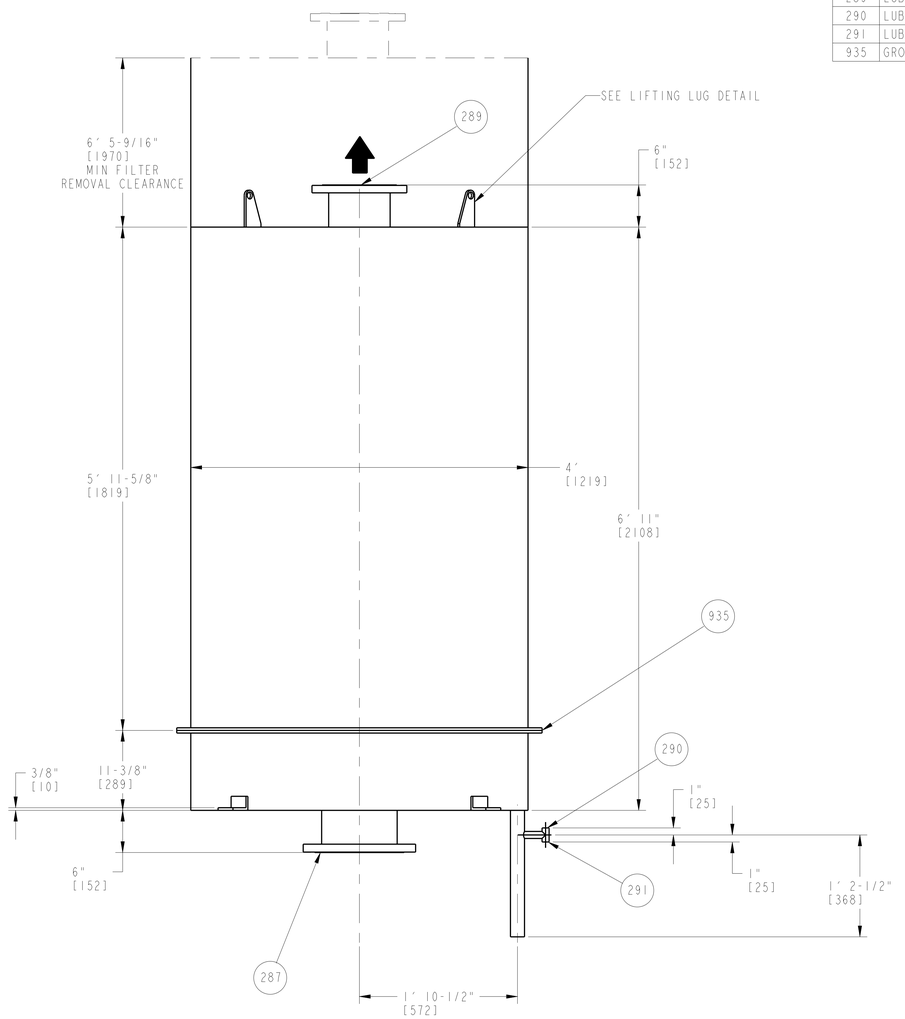
SH 36 OF 52

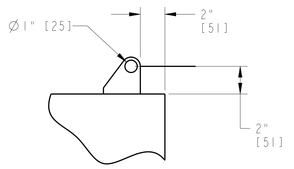
CAD IDENT Released B5

SWBNO-1

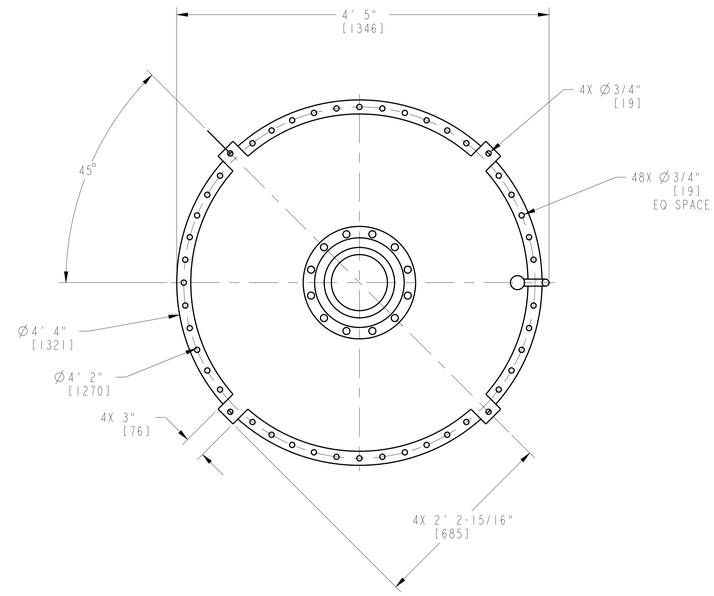
TABLE 1 - CONNECTIONS

ITEM	DESCRIPTION	SIZE & TYPE
287	LUBE OIL MIST SEPARATOR INLET	10" CLASS 150 RF FLANGE
289	LUBE OIL MIST SEPARATOR OUTLET	8" CLASS 150 RF FLANGE
290	LUBE OIL MIST SEPARATOR FILL PORT	1" NPT (PLUGGED)
291	LUBE OIL MIST SEPARATOR RETURN	1" NPT
935	GROUND STUD, DEMISTER	1/4-20 NC STUD





LIFTING LUG DETAIL
2 PLACES



LUBE OIL TANK MIST SEPARATOR

APPROXIMATE DRY WEIGHT: 2,410 LBS [1093 KG]
APPROXIMATE WET WEIGHT: 2,680 LBS [1246 KG]
MATERIAL: CARBON STEEL
LOOSE SHIPPED ITEM
P/N: 190242-700

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

Solar® Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B

SH 37 OF 52

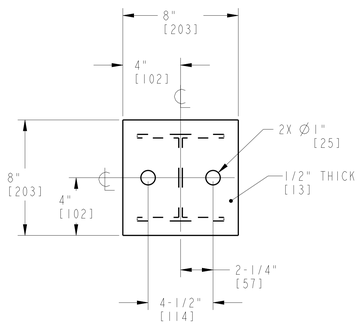
CAD IDENT Released B5

SWBNO-1

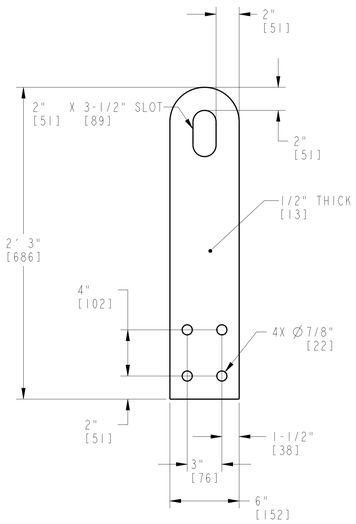
8	7	6	5	4	3	2	1

TABLE 1 - CONNECTIONS

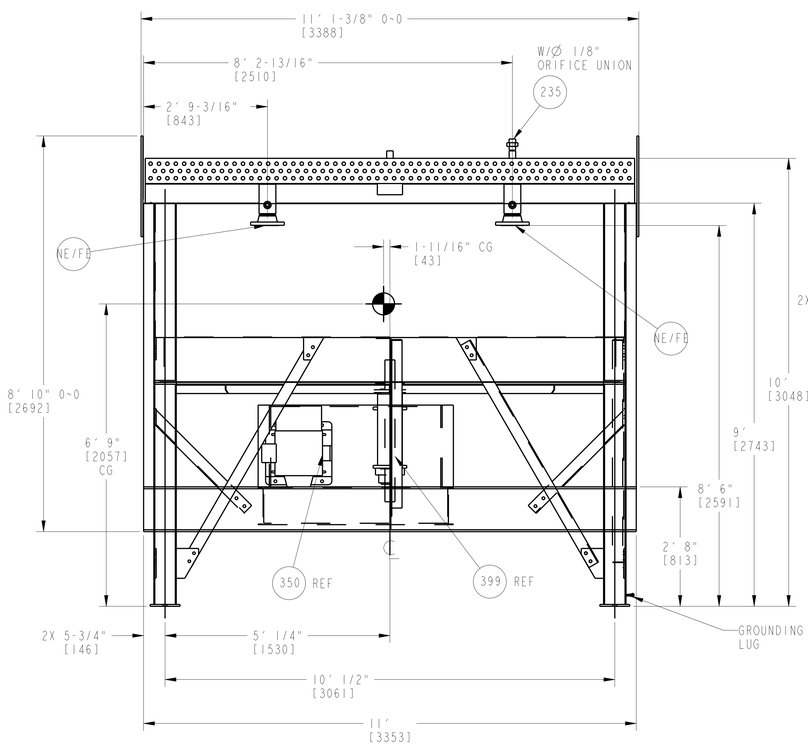
ITEM	DESCRIPTION	SIZE & TYPE
233	LUBE OIL COOLER OIL INLET	4" CLASS 150 RF FLANGE
234	LUBE OIL COOLER OIL OUTLET	4" CLASS 150 RF FLANGE
235	OIL COOLER VENT RETURN TO TANK	3/4" UNION
350	AC VOLTS, LUBE OIL COOLER MOTOR (2 PLACES)	1-1/2" NPT FEMALE
399	DC VOLTS, OIL COOLER VIBRATION SWITCH (2 PLACES)	1/2" NPT FEMALE



MOUNTING PAD DETAIL
6 PLACES



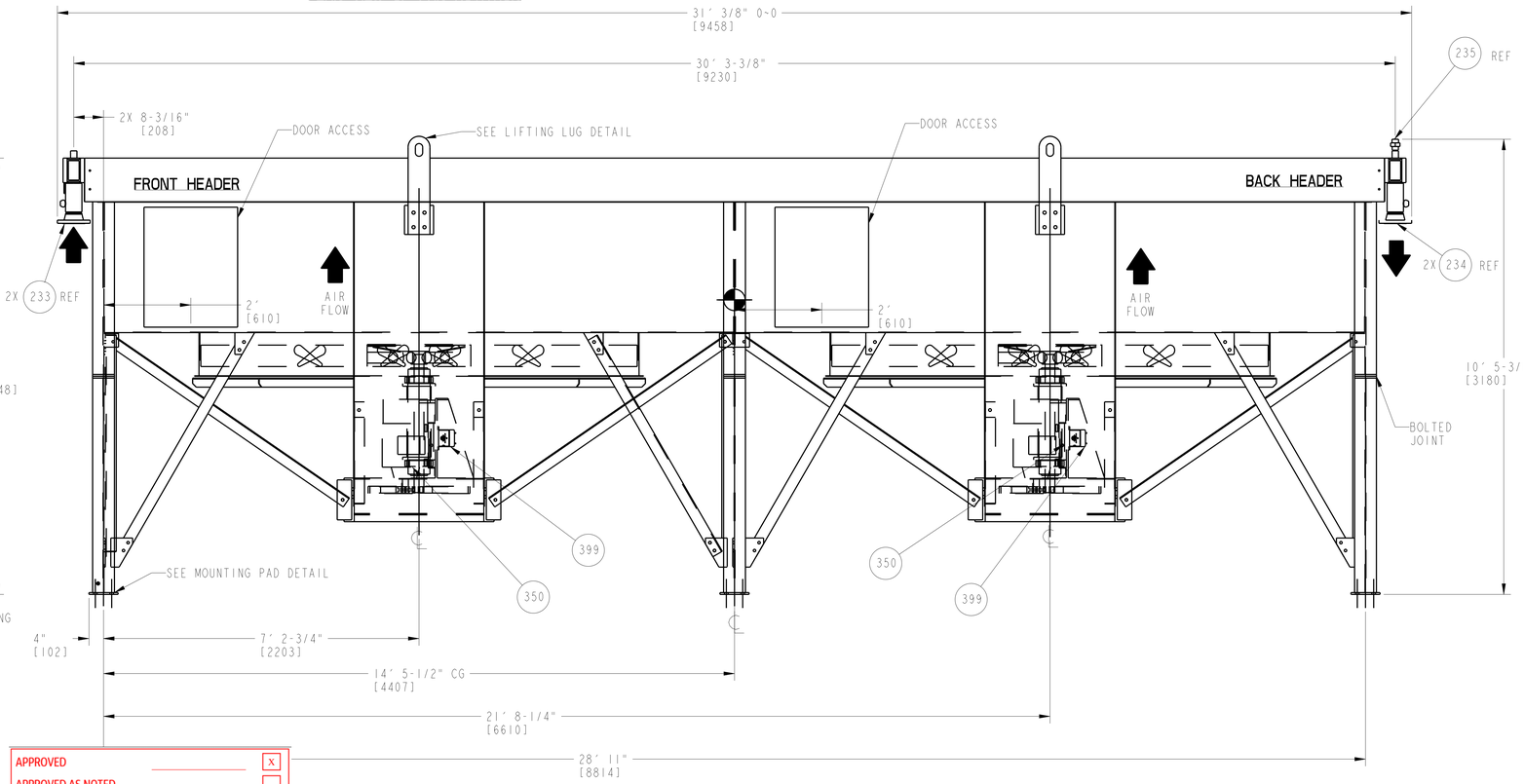
LIFTING LUG DETAIL
4 PLACES



FRONT HEADER END VIEW

PLAN VIEW OF FAN ROTATION

PLAN VIEW OF FAN ROTATION



SIDE ELEVATION VIEW

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

NOTE: THE "0~0" DIMENSIONS REPRESENT THE CLEARANCE REQUIRED FOR ONE OR MORE OF THE FOLLOWING. SHIPPING CRATE CLEARANCE, LIFTING CLEARANCES, OR INSTALLATION INTERFACE CLEARANCES.

LUBE OIL COOLER ⚠

APPROXIMATE DRY WEIGHT: 20,800 LBS [9435 KG]
APPROXIMATE WET WEIGHT: 22,350 LBS [10138 KG]
MATERIAL: STEEL TUBES/HEADERS, GALVANIZED STRUCTURE
LOOSE SHIPPED ITEM
P/N: 4F491-154765

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

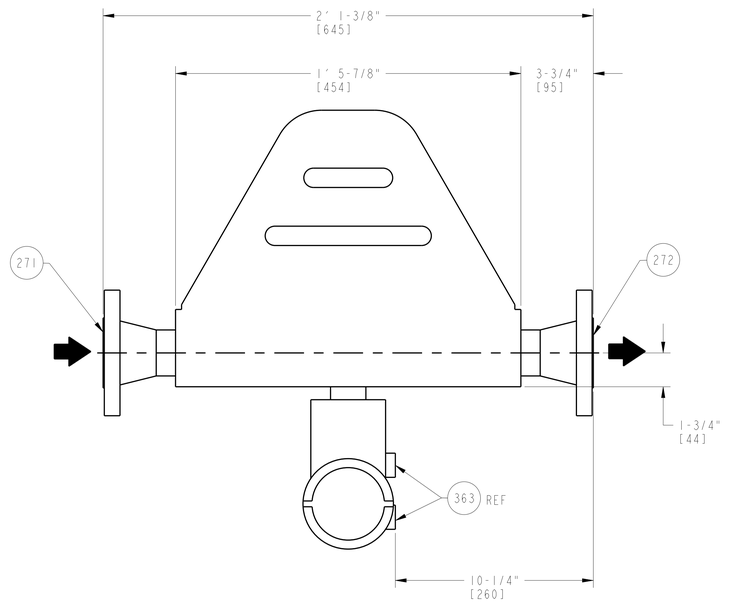
Solar® Turbines
A Caterpillar Company

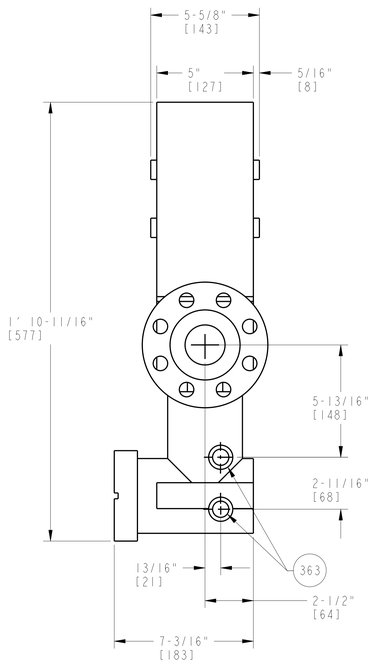
DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 38 OF 52	

CAD IDENT Released B5

SWBNO-1

TABLE 1 - CONNECTIONS		
ITEM	DESCRIPTION	SIZE & TYPE
271	GAS FUEL FLOW METER INLET	2" CLASS 300 RF FLANGE
272	GAS FUEL FLOW METER OUTLET	2" CLASS 300 RF FLANGE
363	DC VOLTS, FUEL GAS FLOW ANALOG 1-0 (2 PLACES)	1/2" NPT FEMALE OR M20 X 1.5





APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL 7/17/23

JACOBS Date

FLOW METER, GAS FUEL

APPROXIMATE WEIGHT: 49 LBS [22 KG]
LOOSE SHIPPED ITEM
P/N: 106571 7-600D2 △1

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

Solar® Turbines
A Caterpillar Company

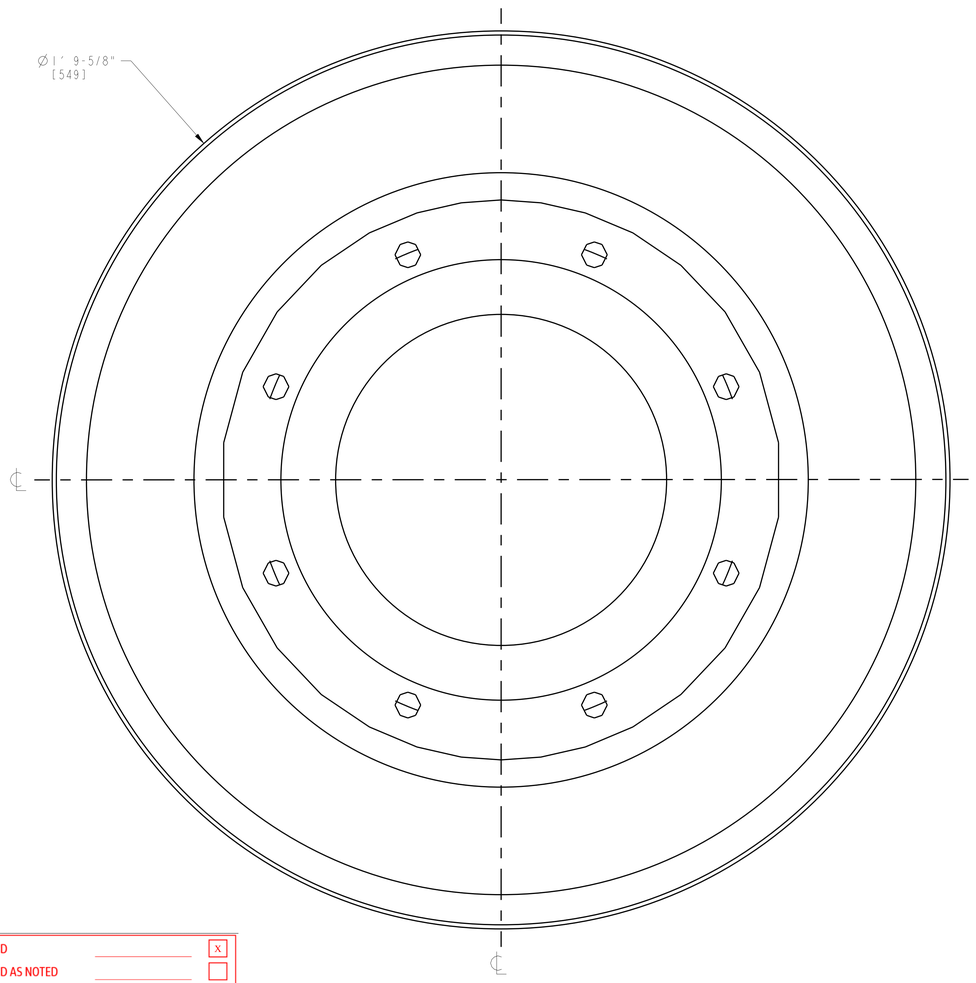
DRAWING NO.	SIZE	REV
4F491-149956	E	B

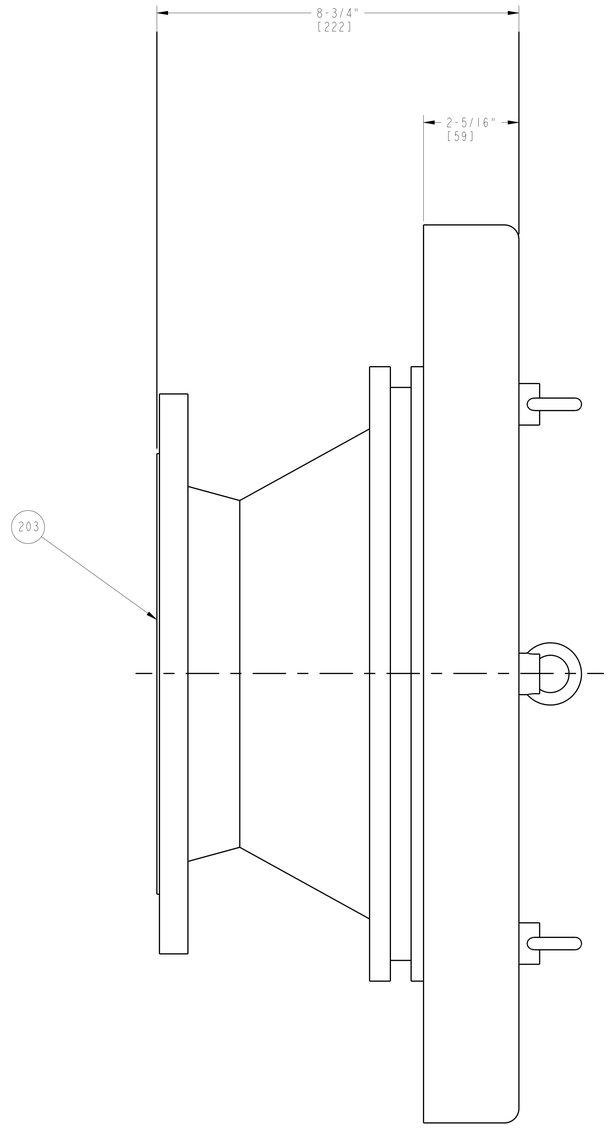
SH 39 OF 52

CAD IDENT Released B5

SWBNO-1

TABLE 1 - CONNECTIONS		
ITEM	DESCRIPTION	SIZE & TYPE
203	FLAME ARRESTOR, LUBE OIL TANK VENT	8" CLASS 150 RF FLANGE





APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

FLAME ARRESTOR, LUBE OIL

APPROXIMATE WEIGHT: 66 LBS [30 KG]
MATERIAL: CARBON STEEL
LOOSE SHIPPED ITEM
P/N: 1065667-5

CUSTOMER/END USER/PROJECT

SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE

TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

Solar® Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B

SH 40 OF 52

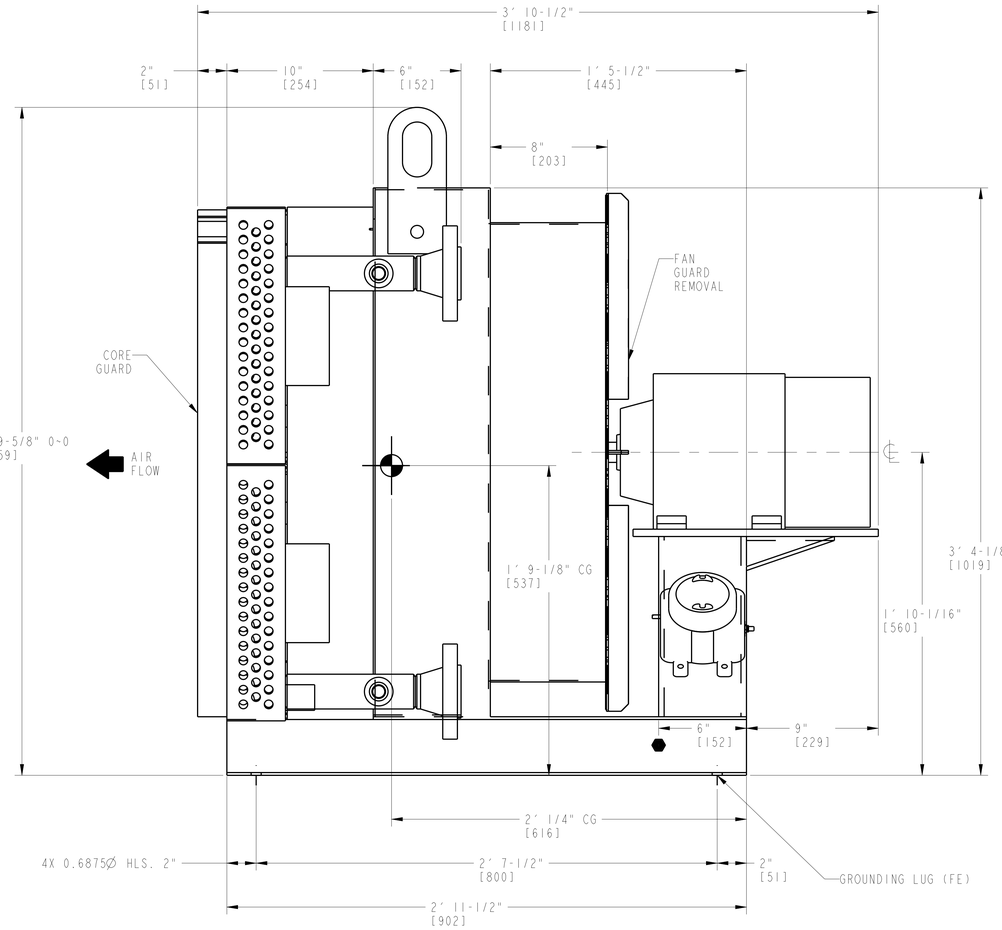
CAD IDENT: Released B5

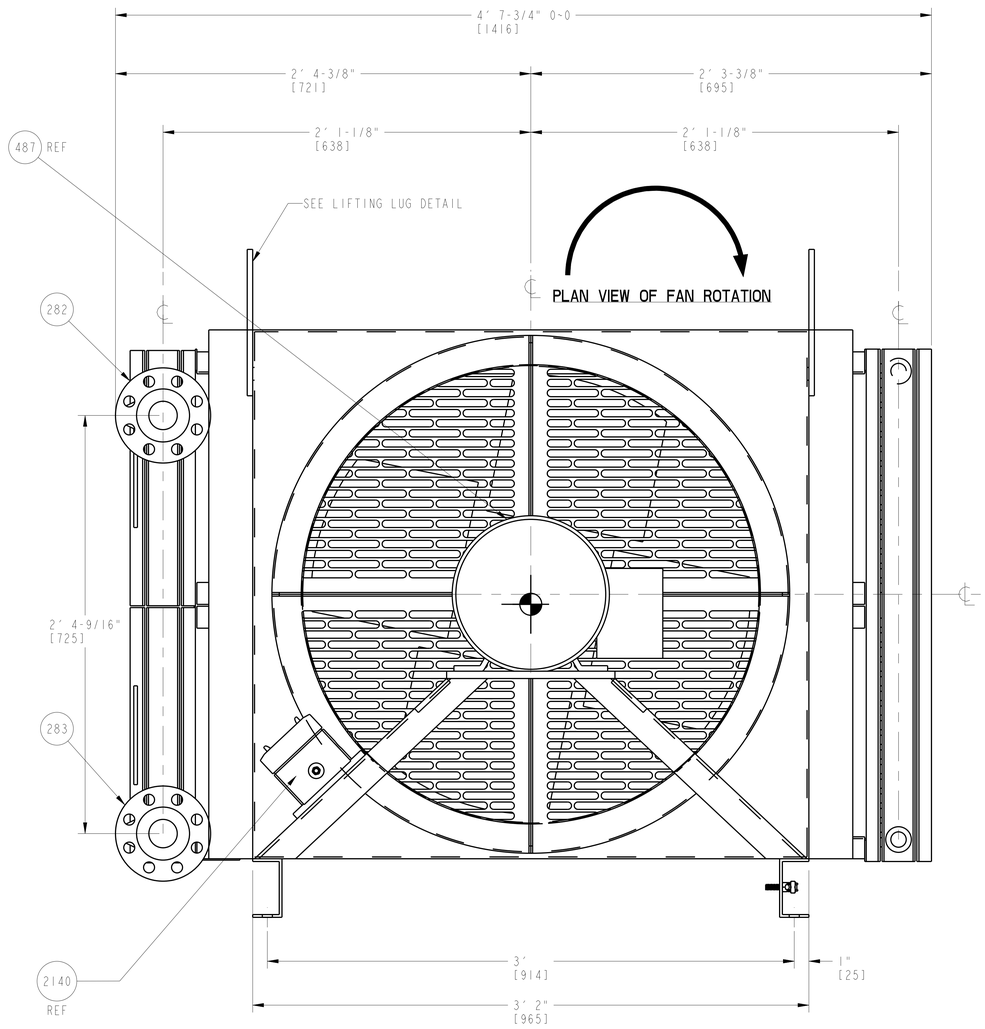
SWBNO-1

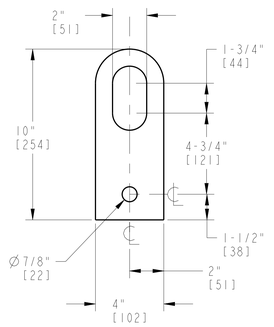
8	7	6	5	4	3	2	1

TABLE 1 - CONNECTIONS

ITEM	DESCRIPTION	SIZE & TYPE
282	AIR COOLER INLET	2" CLASS 600 RFWN FLANGE
283	AIR COOLER OUTLET	2" CLASS 600 RFWN FLANGE
487	AC VOLTS, COOLER MOTOR	1" NPT FEMALE
2140	DC VOLTS, AIR COOLER FAN VIB SWITCH	1/2" NPT FEMALE







LIFTING LUG DETAIL
2 PLACES

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

PCD COOLER, AIR TO AIR

APPROXIMATE DRY WEIGHT: 950 LBS [431 KG]
APPROXIMATE WET WEIGHT: 1,010 LBS [458 KG]
MATERIAL: STAINLESS STEEL TUBES, HEADERS, STRUCTURE
LOOSE SHIPPED ITEM
P/N: 2446559-100

NOTE: THE" 0~0" DIMENSIONS REPRESENT THE CLEARANCE REQUIRED FOR ONE OR MORE OF THE FOLLOWING: SHIPPING CRATE CLEARANCES, LIFTING CLEARANCES, OR INSTALLATION INTERFACE CLEARANCES.

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

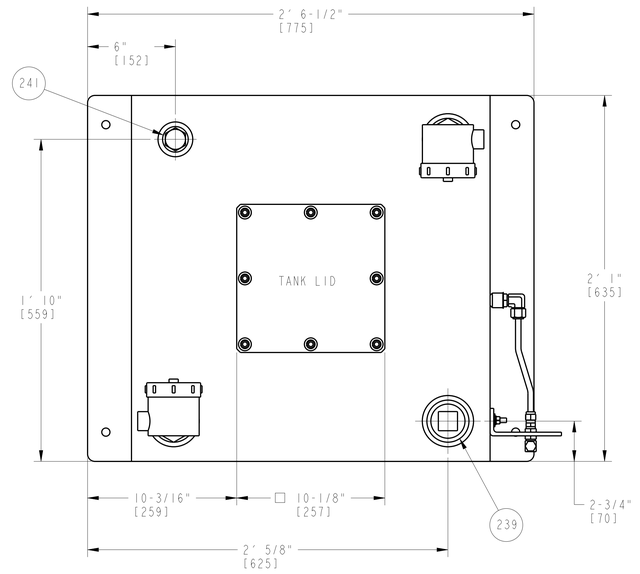
DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

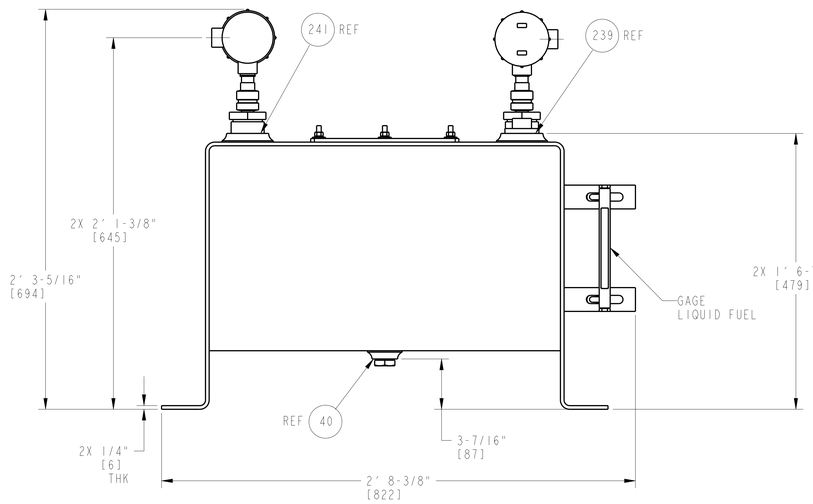
Solar® Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 41 OF 52	

CAD IDENT Released B5

SWBNO-1





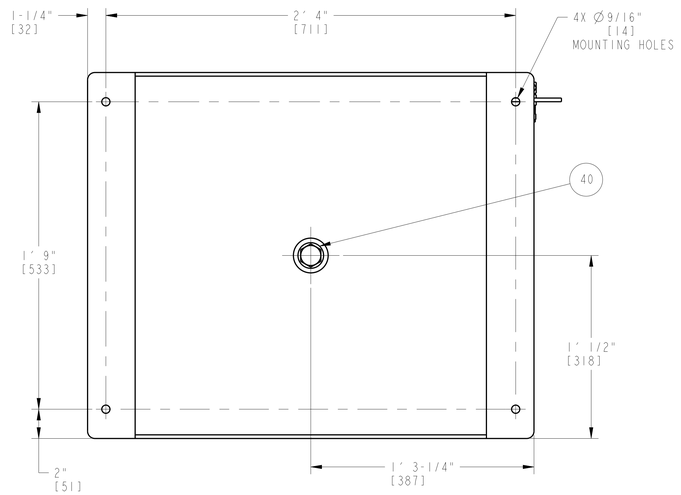


TABLE 1 - CONNECTIONS

ITEM	DESCRIPTION	SIZE & TYPE
40	PURGE TANK DRAIN	1" NPT FEMALE
239	LIQUID FUEL PURGE TANK VENT	2" NPT FEMALE
241	LIQUID FUEL PURGE TANK INLET	1" NPT FEMALE

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

LIQUID FUEL DRAIN TANK (CF)

TOTAL TANK CAPACITY: 32 GAL [121 L]
APPROXIMATE WEIGHT DRY: 230 LBS [104 KG]
APPROXIMATE WEIGHT WET: 490 LBS [222 KG]
P/N: 1038710-4E951

NOTE: APPROXIMATE LEVEL SWITCH ACTIVATION
LS2261: 15 GAL [57 L]
LS2260: 30 GAL [114 L]

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

Solar® Turbines
A Caterpillar Company

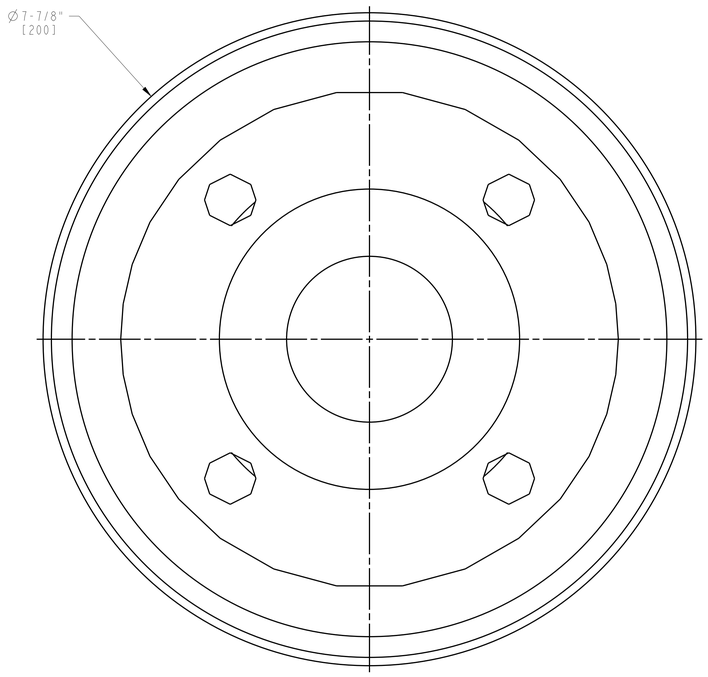
DRAWING NO. 4F491-149956
SIZE E
REV B
SH 42 OF 52

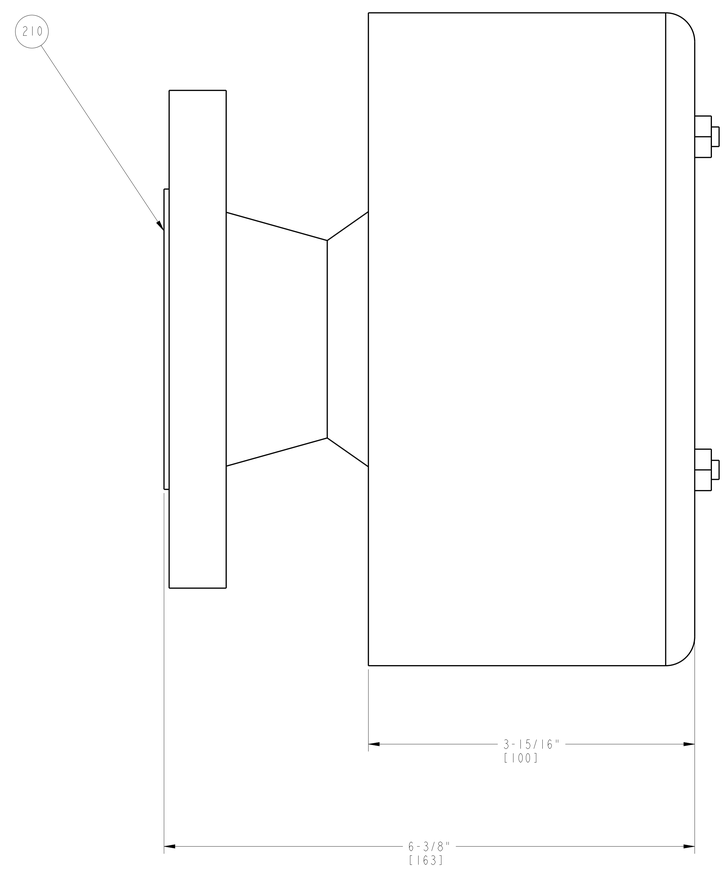
CAD IDENT Released B5

SWBNO1-1

TABLE 1 - CONNECTIONS

ITEM	DESCRIPTION	SIZE & TYPE
210	FLAME ARRESTOR, LIQUID FUEL PURGE TANK VENT	2" CLASS 150 RF FLANGE





APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL 7/17/23

JACOBS Date

FLAME ARRESTOR, LIQUID FUEL PURGE TANK VENT CF

APPROXIMATE WEIGHT: 14 LBS [6 KG]
MATERIAL: CARBON STEEL
LOOSE SHIPPED ITEM
P/N: 1065667-1

CUSTOMER/END USER/PROJECT

SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE

TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

Solar® Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 43 OF 52	

CAD IDENT Released B5

SWBNO-1

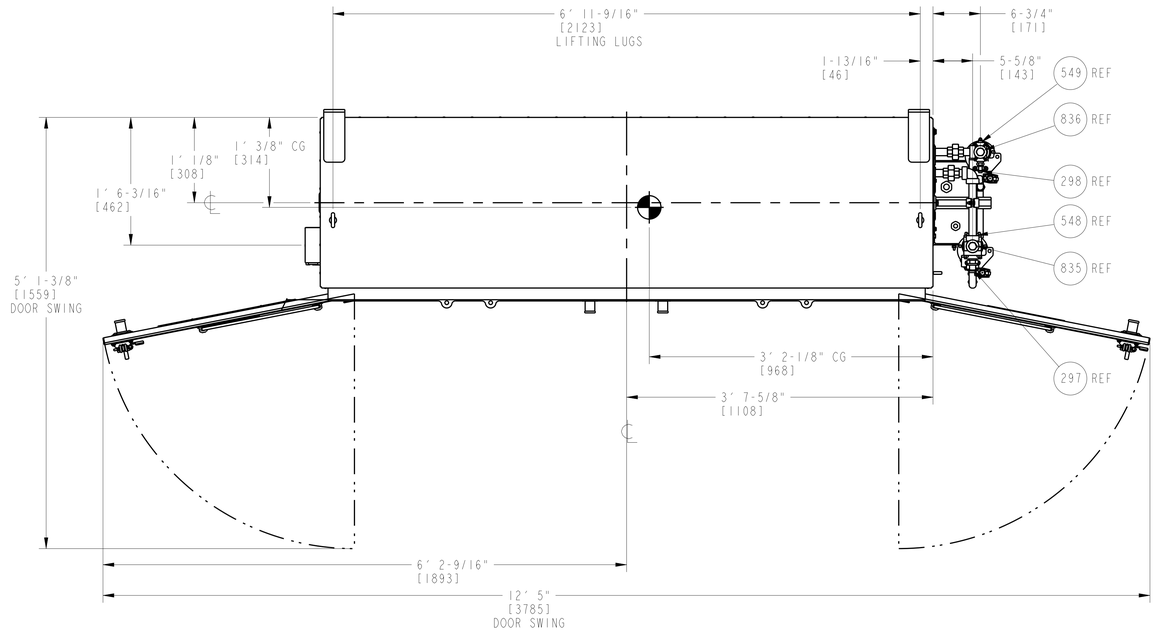
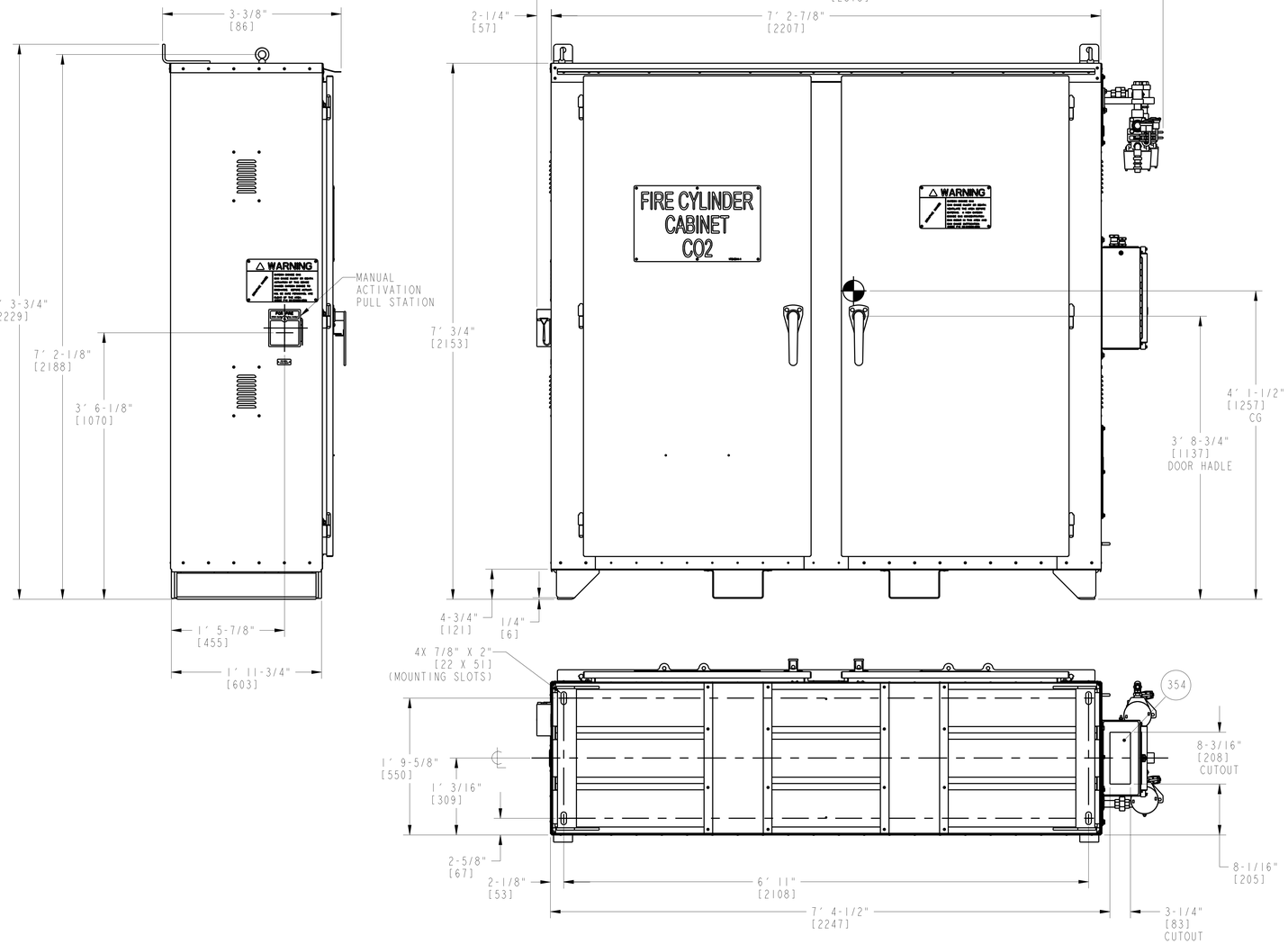


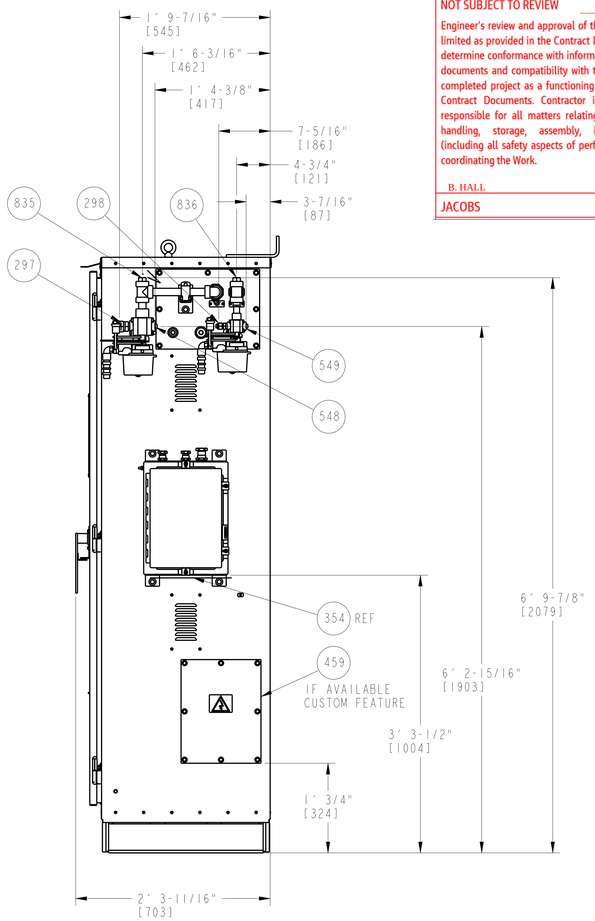
TABLE 1 - CONNECTIONS		
ITEM	DESCRIPTION	SIZE & TYPE
297	FIRE SYSTEM DISCHARGE - MAIN	1" FEMALE TUBE
298	FIRE SYSTEM DISCHARGE - EXTENDED	1/2" FEMALE TUBE
354	DC VOLTS, FIRE SYSTEM	11.75" X 4.56" (292 X 116) UNDRILLED GLAND PLATE
548	VENT, FIRE EXTINGUISHANT, MAIN	3/4" NPT FEMALE
549	VENT, FIRE EXTINGUISHANT, EXTENDED	1/2" NPT FEMALE

APPROVED X
APPROVED AS NOTED
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL 7/17/23
JACOBS Date





NOTE: TOLERANCE ON PIPE CONNECTIONS 1.5 INCHES AND SMALLER IS +/- 1 INCH.

FIRE EXTINGUISHING CABINET, CO2

APPROXIMATE WEIGHT (EXCLUDING CYLINDERS): 1,830 LBS [830 KG]
APPROXIMATE WEIGHT (WITH CYLINDERS, FULL): 3,630 LBS [1647 KG]
MATERIAL: CARBON STEEL
LOOSE SHIPPED ITEM
P/N: 1819015-4F491

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

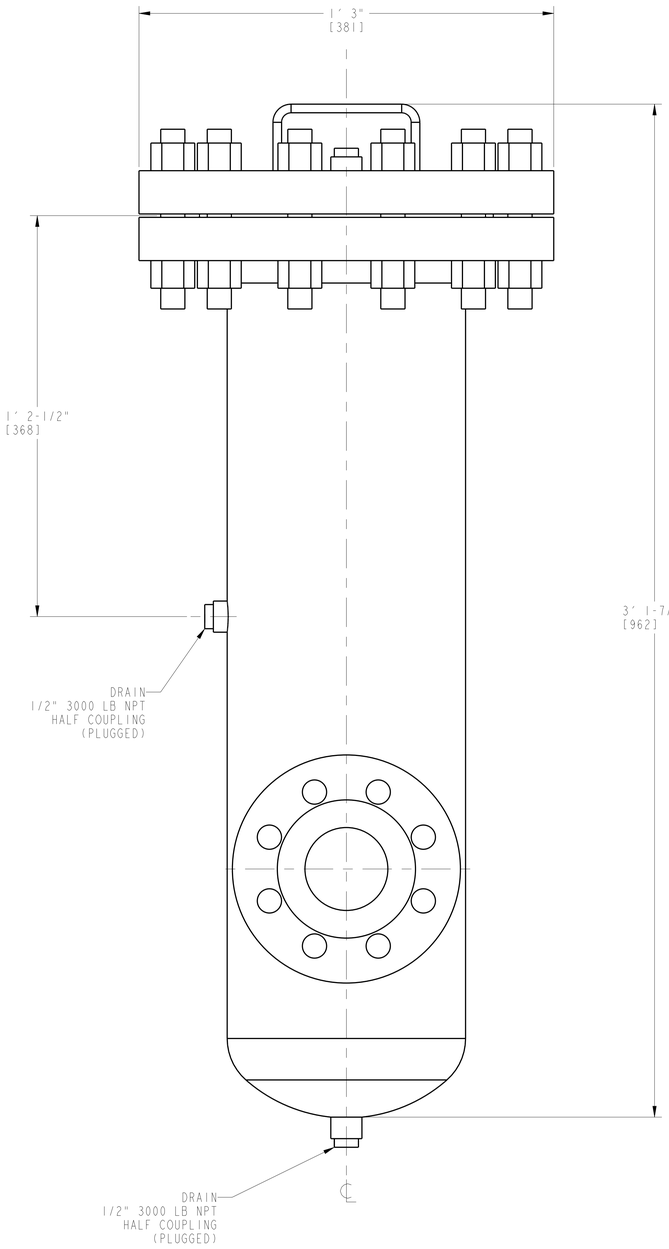
Solar® Turbines
A Caterpillar Company

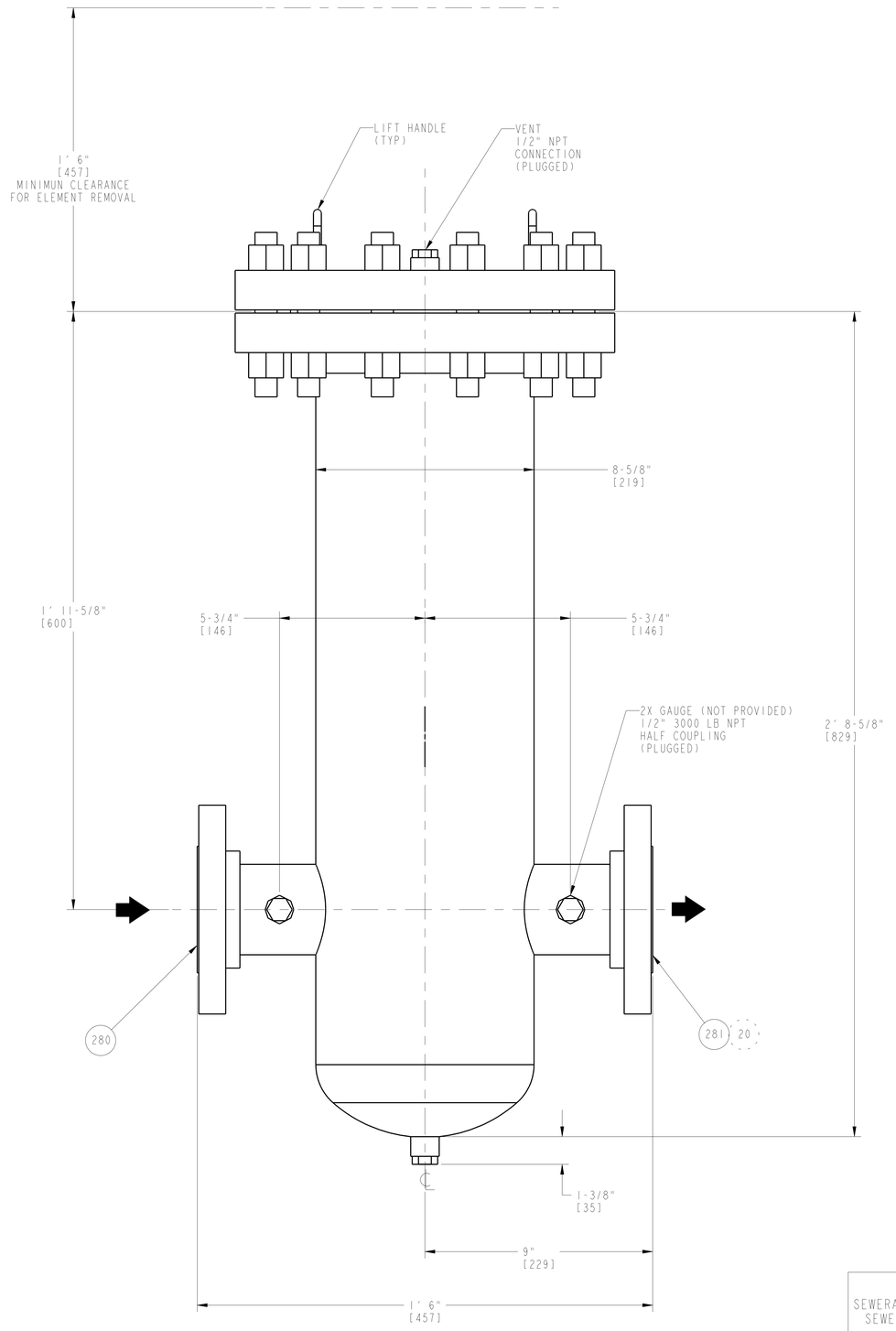
DRAWING NO. 4F491-149956
SIZE E
REV B
SH 44 OF 52

CAD IDENT Released B5

SWBNO1-1

TABLE 1 - CONNECTIONS		
ITEM	DESCRIPTION	SIZE & TYPE
280	GAS FUEL FILTER INLET	3" CLASS 300 RF FLANGE
281	GAS FUEL FILTER OUTLET	3" CLASS 300 RF FLANGE





APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL 7/17/23

JACOBS Date

FILTER, GAS FUEL

APPROXIMATE WEIGHT: 250 LBS [113 KG]
MATERIAL: CARBON STEEL
LOOSE SHIPPED ITEM
P/N: 1060817-900

INSTALL IN UPRIGHT POSITION

CUSTOMER/END USER/PROJECT

SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE

TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

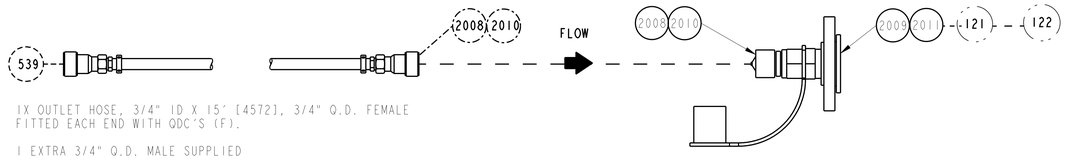
Solar® Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 45 OF 52	

CAD IDENT Released B5

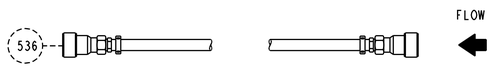
SWBNO-1

ON-LINE/ON-CRANK CONNECTION KIT, PN 1760524-100 ⚠1



1X OUTLET HOSE, 3/4" ID X 15' [4572], 3/4" Q.D. FEMALE FITTED EACH END WITH QDC'S (F).

1 EXTRA 3/4" Q.D. MALE SUPPLIED



1X INLET HOSE, 1/2" ID X 15' [4572], 1/2" Q.D. FEMALE FITTED EACH END WITH QDC'S (F).

1 EXTRA 1/2" Q.D. MALE SUPPLIED

ALL MALE AND FEMALE QUICK DISCONNECTS INCLUDE A SELF-CLOSING SPRING LOCK VALVE

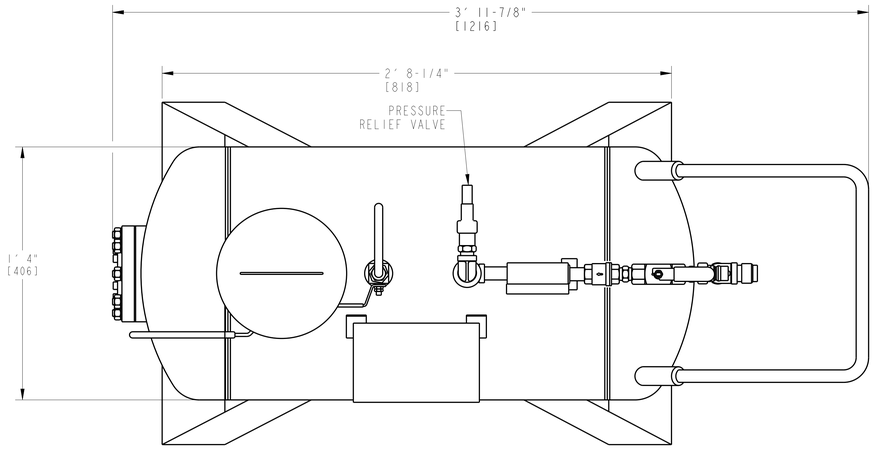


TABLE 1 - CONNECTIONS

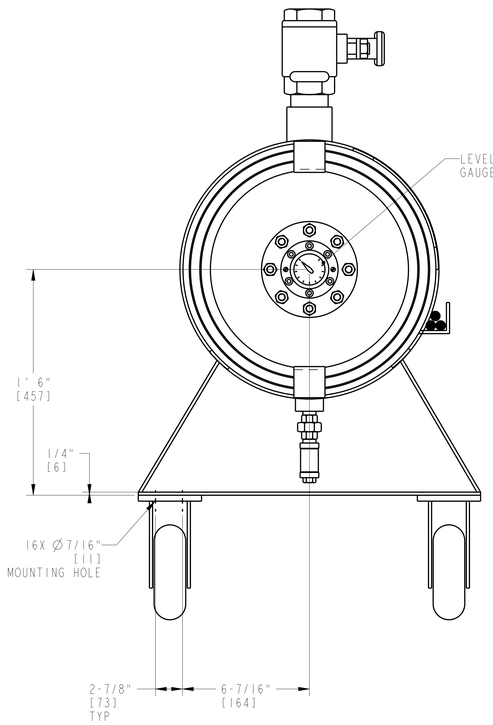
ITEM	DESCRIPTION	SIZE & TYPE
536	ON-LINE/CRANK CLEANING TANK FLUID INLET	1/2" QUICK DISCONNECT MALE
538	ON-LINE/CRANK CLEANING TANK FLUID INLET (AUXILARY)	2" NPT FEMALE
539	ON-LINE/CRANK CLEANING TANK FLUID OUTLET	3/4" QUICK DISCONNECT MALE
540	ON-LINE/CRANK CLEANING TANK DRAIN	1/2" NPT FEMALE
2008	ON-LINE QUICK DISCONNECT ADAPTOR INLET	3/4" QUICK DISCONNECT MALE
2009	ON-LINE QUICK DISCONNECT ADAPTOR OUTLET	1" CLASS 150 RF FLANGE
2010	ON-CRANK QUICK DISCONNECT ADAPTOR INLET	3/4" QUICK DISCONNECT MALE
2011	ON-CRANK QUICK DISCONNECT ADAPTOR OUTLET	1" CLASS 150 RF FLANGE

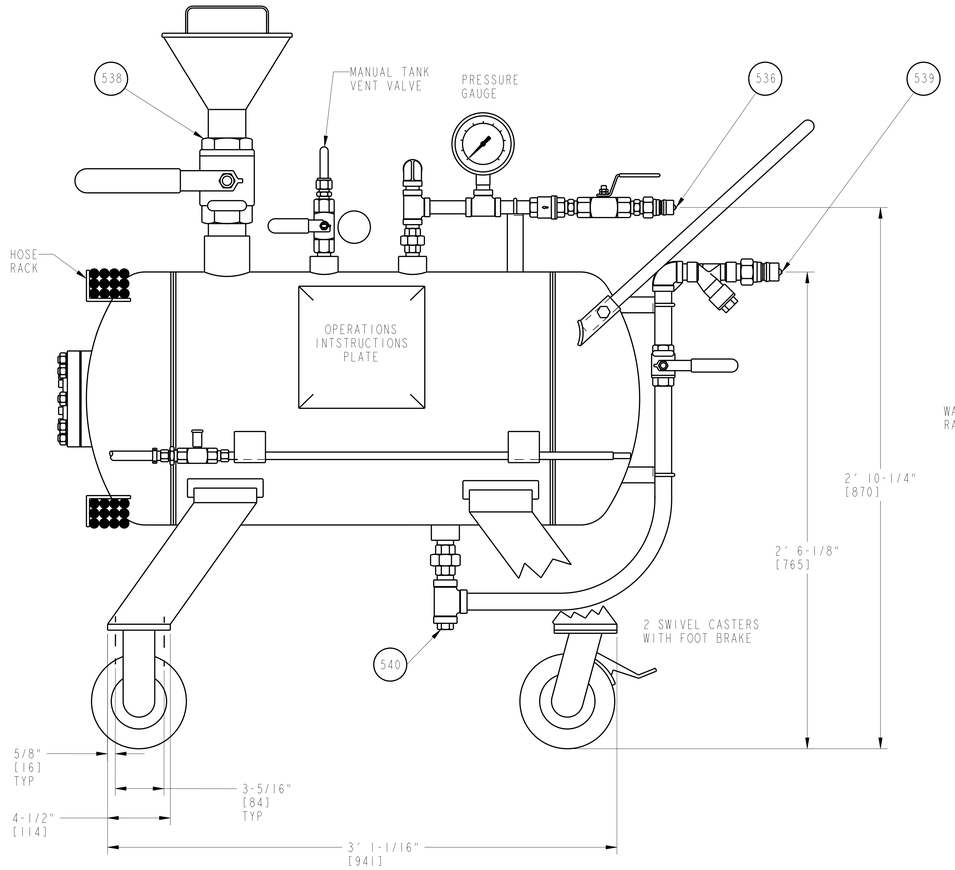
APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

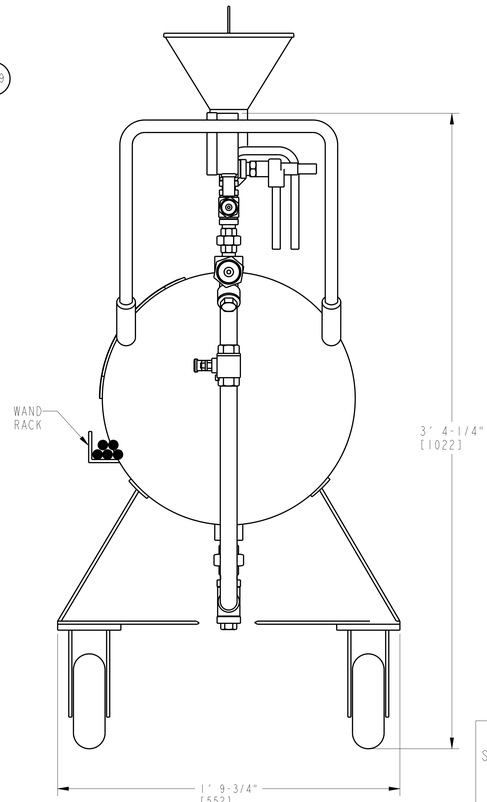
Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date







ENGINE CLEANING CART

APPROXIMATE DRY WEIGHT: 190 LBS [86 KG]
APPROXIMATE WET WEIGHT: 410 LBS [186 KG]
MATERIAL: STAINLESS STEEL
LOOSE SHIPPED ITEM
P/N: 1056012-102

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

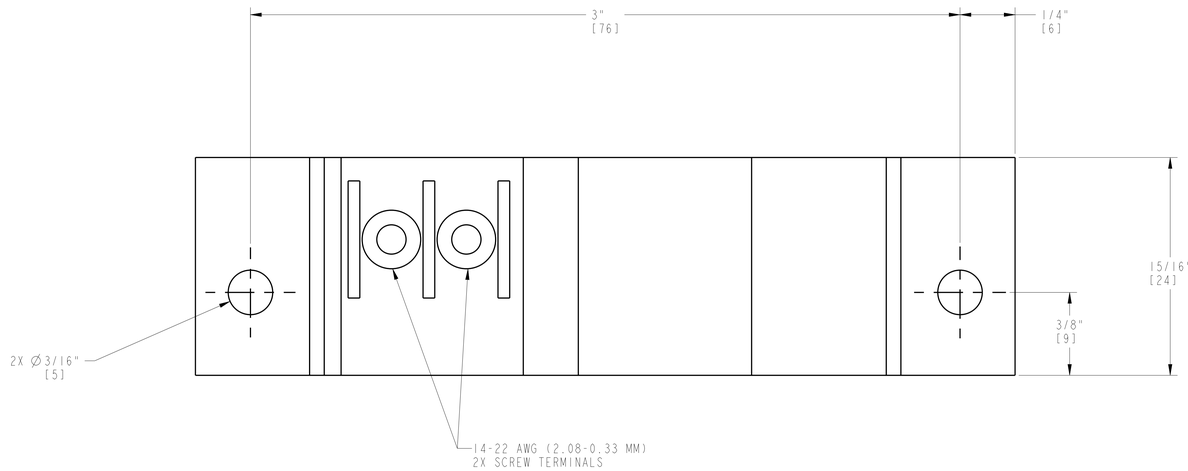
DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

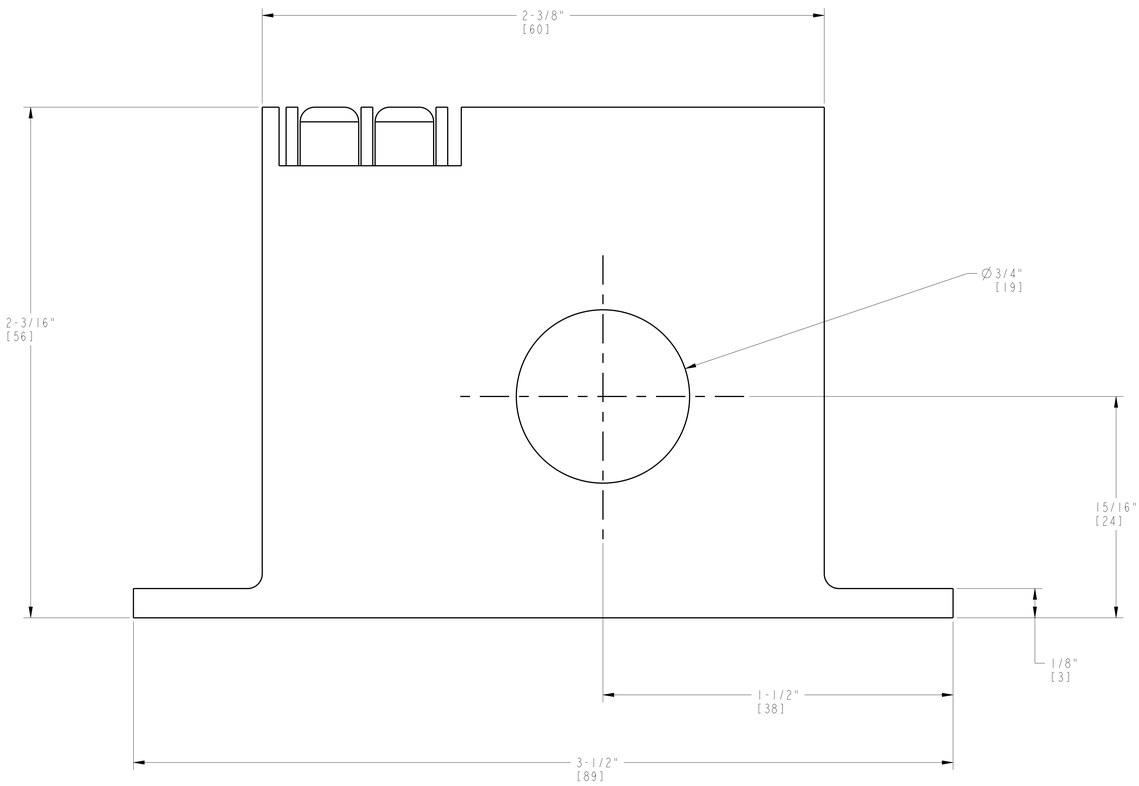
Solar® Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 46 OF 52	

CAD IDENT: Released B5

SWBNO-1





APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

ENCLOSURE VENT FAN, CURRENT TRANSMITTER

APPROXIMATE WEIGHT: 0.188 LBS [0.085 KG]
LOOSE SHIPPED ITEM
P/N: 1107159-2

NOTE: FOR INSTALLATION IN SAFE AREA, MOTOR CONTROL CENTER.

CUSTOMER/END USER/PROJECT

SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE

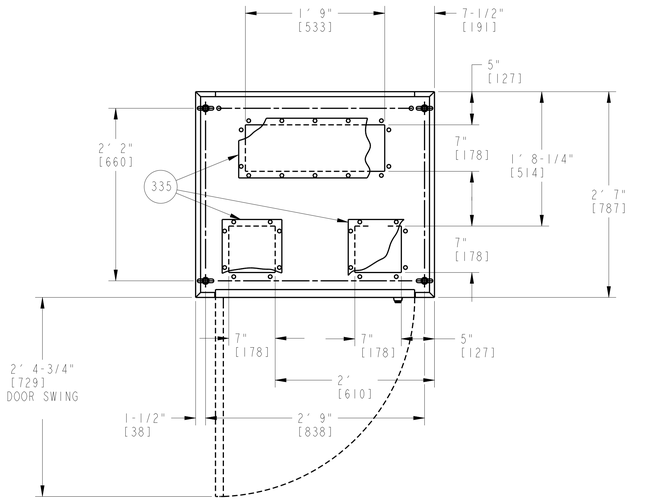
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

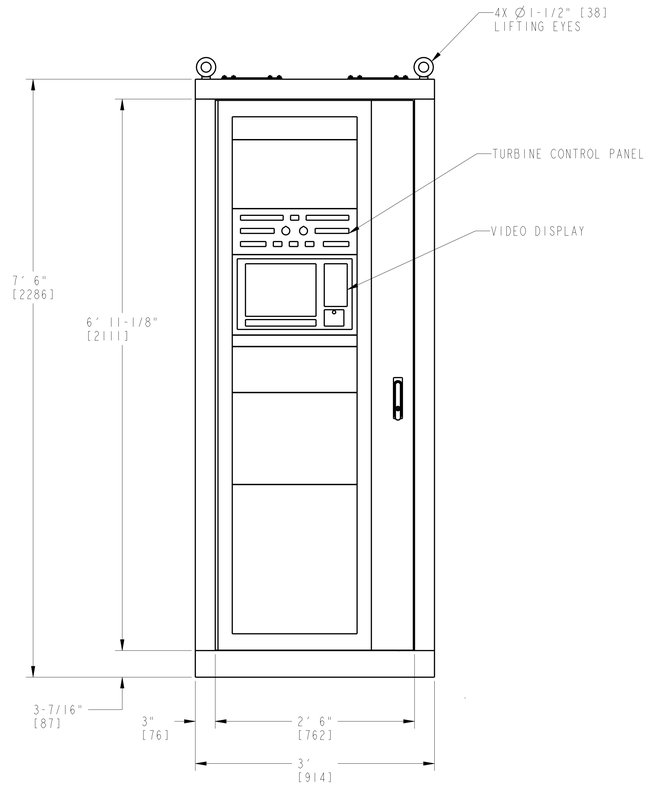
Solar® Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 47 OF 52	

CAD IDENT: Released B5

SWBNO-1





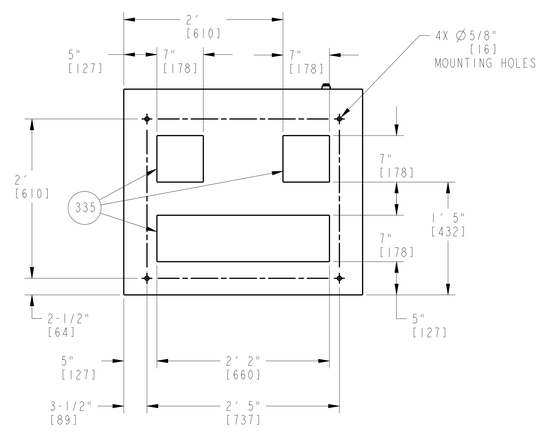


TABLE 1 - CONNECTIONS

ITEM	DESCRIPTION	SIZE & TYPE
335	DC VOLTS, CONTROL CONSOLE (6 PLACES)	UNDRILLED GLAND PLATE

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

AUX CONTROL CONSOLE

TYPICAL CONFIGURATION
THE ARRANGEMENT OF INSTRUMENTS AS SHOWN IS NOT NECESSARILY THAT FOR A SPECIFIC ORDER WHICH MAY VARY DUE TO OPTIONS AND SPECIAL FEATURES CHOSEN REFER TO ELECTRICAL DRAWINGS

APPROXIMATE WEIGHT: 790 LBS [358 KG]
LOOSE SHIPPED ITEM
P/N 1006914-103

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

Solar® Turbines
A Caterpillar Company

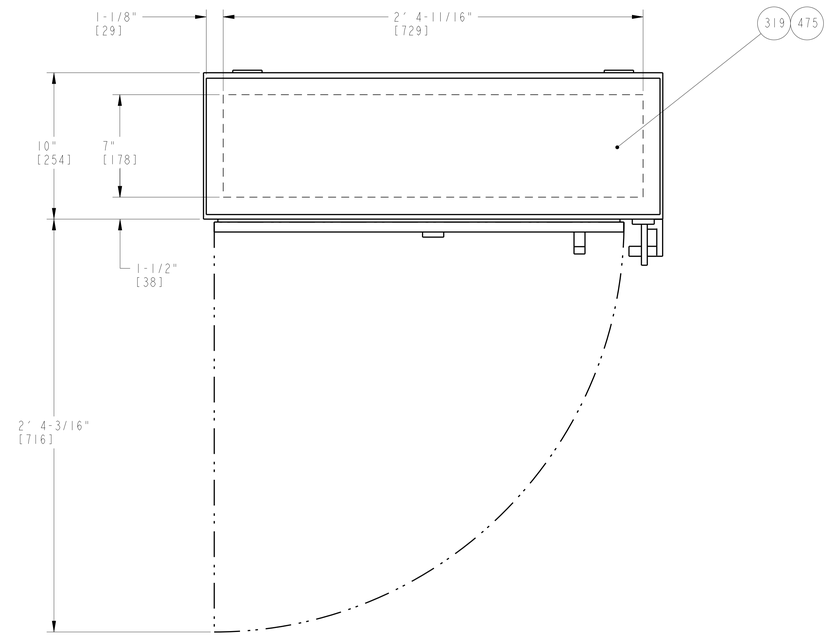
DRAWING NO. 4F491-149956
SIZE E
REV B
SH 48 OF 52

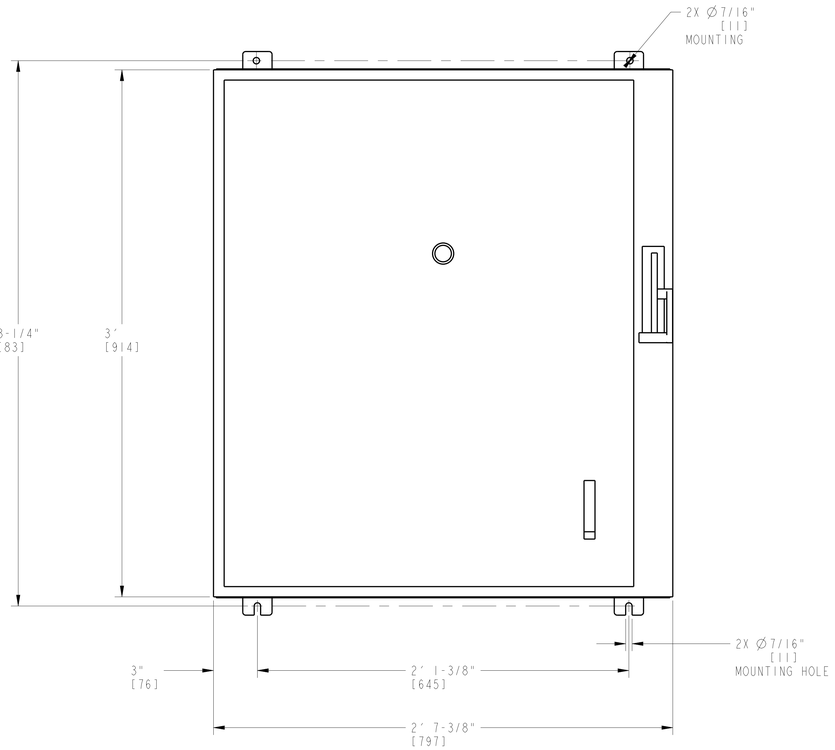
SWBNO-1

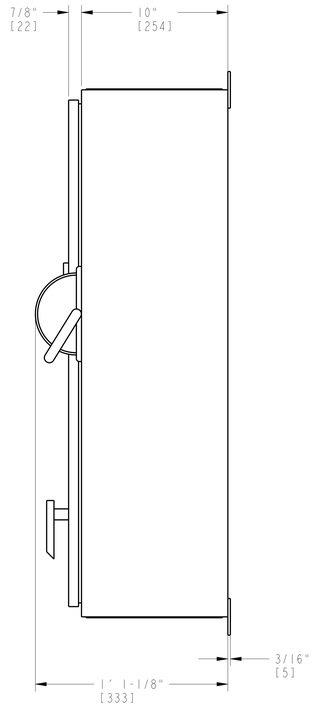
CAD IDENT Released B5

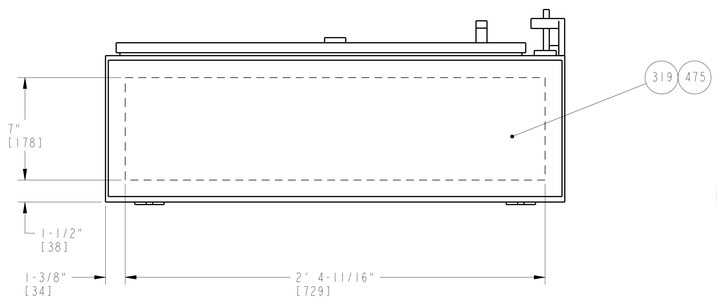
TABLE 1 - CONNECTIONS

ITEM	DESCRIPTION	SIZE & TYPE
319	DC VOLTS, BACKUP PUMP OIL MOTOR STARTER (2 PLACES)	7" X 2' 4-11/16" (178 X 729) OPENING WITH UNDRILLED GLAND PLATE
475	AC VOLTS, BACKUP PUMP OIL MOTOR STARTER (2 PLACES)	7" X 2' 4-11/16" (178 X 729) OPENING WITH UNDRILLED GLAND PLATE









BACKUP LUBE OIL DC START CONTACTOR
APPROXIMATE WEIGHT: 200 LBS [91 KG]
LOOSE SHIPPED ITEM
P/N: 190377-806

APPROVED X
APPROVED AS NOTED
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23
JACOBS — Date

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

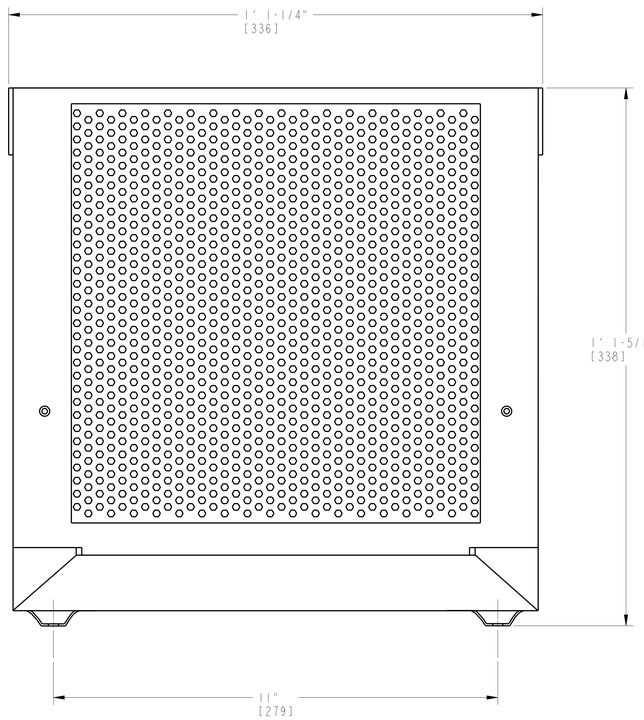
Solar® Turbines
A Caterpillar Company

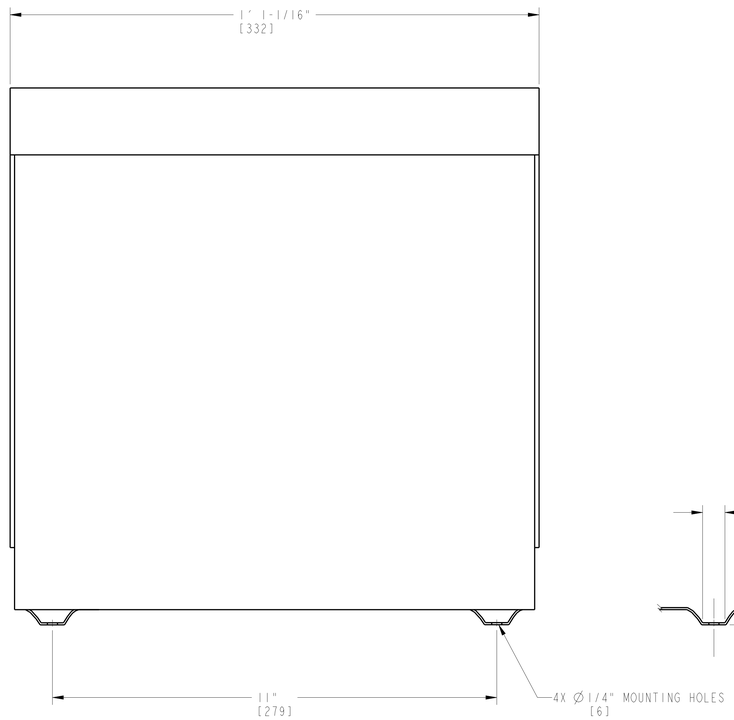
DRAWING NO. 4F491-149956
SIZE E
REV B
SH 49 OF 52

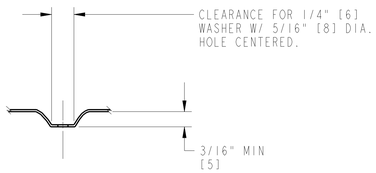
SWBNO-1

CAD IDENT Released B5

NOTE:
ALLOW MINIMUM SIDE, FRONT, AND BACK CLEARANCES OF 12" [305] AND VERTICAL CLEARANCES OF 18" [457] FOR PROPER HEAT DISSIPATION AND ACCESS. DO NOT LOCATE THE ENCLOSURE NEXT TO RESISTORS OR ANY OTHER COMPONENT WITH OPERATING SURFACE TEMPERATURES ABOVE 125°C.







APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

LINE REACTOR, INPUT, LIQUID FUEL PILOT VFD, FLOOR MOUNTED ⚠

APPROXIMATE WEIGHT: 58 LBS [26 KG]
LOOSE SHIPPED ITEM
P/N: 1039135-4

CUSTOMER ACCESS IS TO BE DRILLED AS REQUIRED
TOP CONDUIT ENTRY RECOMMENDED

WIRE RANGE: 6 - 0 AWG

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

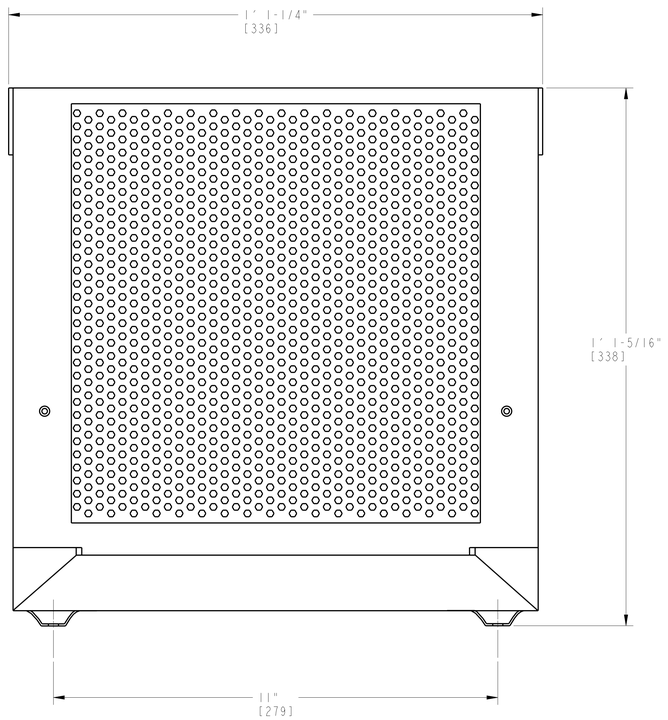
Solar® Turbines
A Caterpillar Company

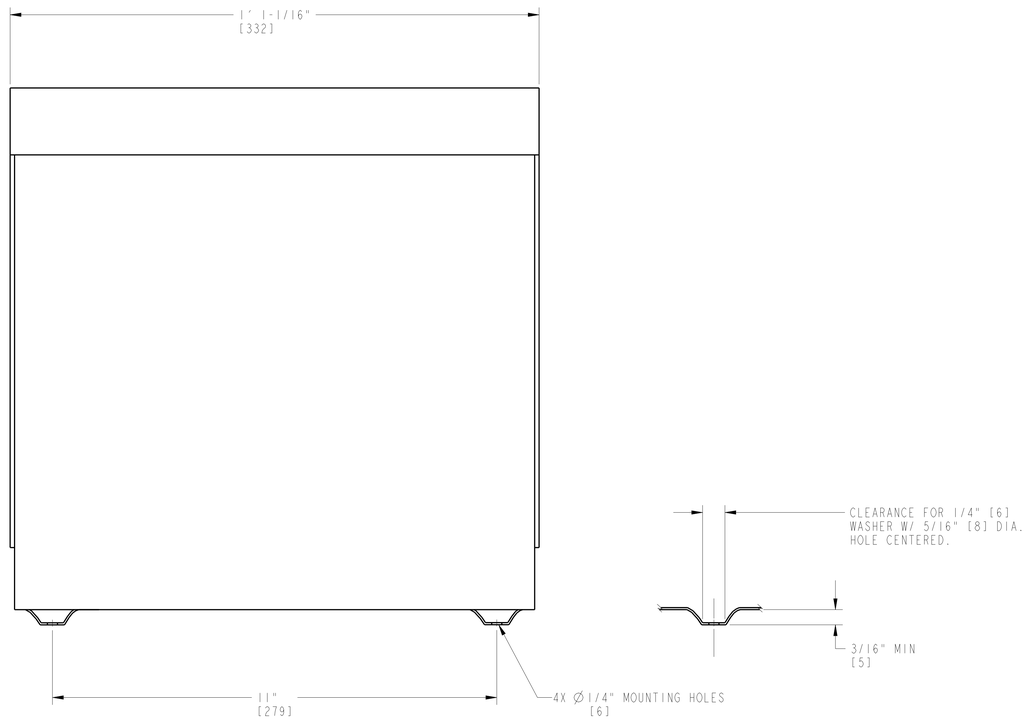
DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 50 OF 52	

CAD IDENT: Released B5

SWBNO-1

NOTE:
ALLOW MINIMUM SIDE, FRONT, AND BACK CLEARANCES OF 12" [305] AND VERTICAL CLEARANCES OF 18" [457] FOR PROPER HEAT DISSIPATION AND ACCESS. DO NOT LOCATE THE ENCLOSURE NEXT TO RESISTORS OR ANY OTHER COMPONENT WITH OPERATING SURFACE TEMPERATURES ABOVE 125°C.





APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

LINE REACTOR, INPUT, LIQUID FUEL MAIN VFD, FLOOR MOUNTED ⚠

APPROXIMATE WEIGHT: 88 LBS [40 KG]
LOOSE SHIPPED ITEM
P/N: 1039135-5

CUSTOMER ACCESS IS TO BE DRILLED AS REQUIRED
TOP CONDUIT ENTRY RECOMMENDED

WIRE RANGE: 2 - 0000 AWG

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

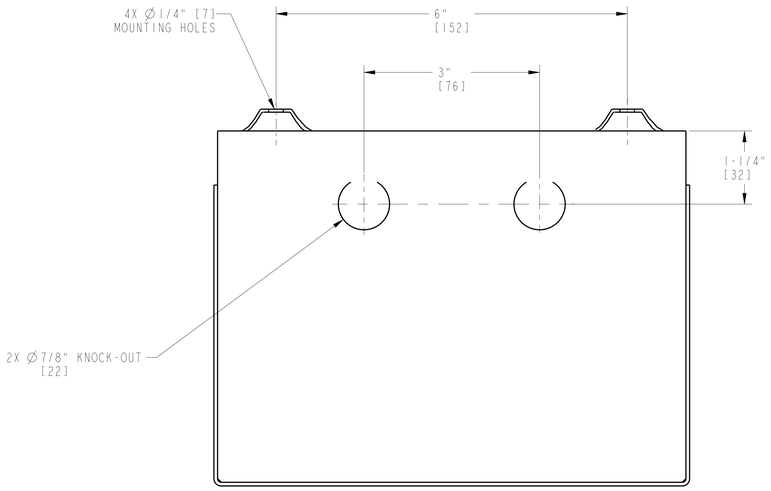
DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

Solar® Turbines
A Caterpillar Company

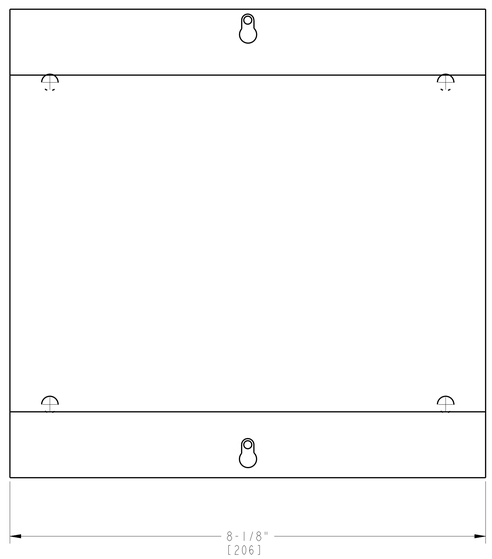
DRAWING NO.	SIZE	REV
4F491-149956	E	B
	SH 51 OF 52	

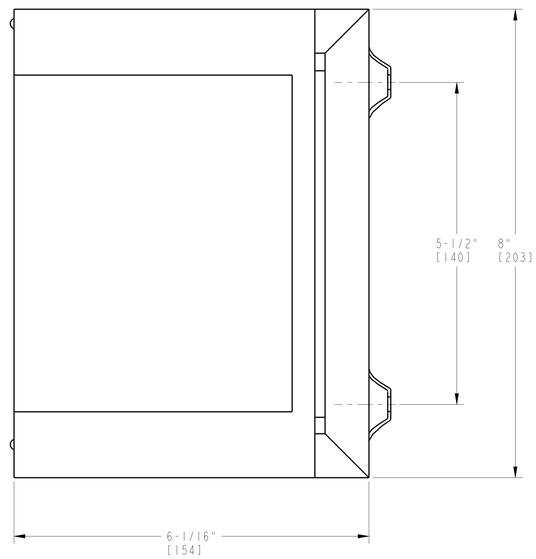
CAD IDENT: Released B5

SWBNO-1



NOTE:
ALLOW MINIMUM SIDE, FRONT, AND BACK CLEARANCES OF 12" [305] AND VERTICAL CLEARANCES OF 18" [457] FOR PROPER HEAT DISSIPATION AND ACCESS. DO NOT LOCATE THE ENCLOSURE NEXT TO RESISTORS OR ANY OTHER COMPONENT WITH OPERATING SURFACE TEMPERATURES ABOVE 125°C.





APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

B. HALL — 7/17/23

JACOBS — Date

LINE REACTOR, INPUT, WATER PURGE VFD, WALL MOUNTED ⚠

APPROXIMATE WEIGHT: 18 LBS [8 KG]
LOOSE SHIPPED ITEM
P/N: 1039135-11

CUSTOMER ACCESS IS TO BE DRILLED AS REQUIRED
TOP CONDUIT ENTRY RECOMMENDED

WIRE RANGE: 22 - 14 AWG

CUSTOMER/END USER/PROJECT
SEWERAGE & WATER BOARD OF NEW ORLEANS
SEWERAGE & WATER BOARD NEW ORLEANS
TURBINE 7

DRAWING TITLE
TITAN 250S
GENERATOR SET
MECHANICAL INTERFACE DRAWING
LOOSE SHIPPED COMPONENT

Solar® Turbines
A Caterpillar Company

DRAWING NO.	SIZE	REV
4F491-149956	E	B

SH 52 OF 52

CAD IDENT: Released B5

SWBNO1-1

Solar® Turbines
A Caterpillar Company

SPECIFICATION

FASTENER INSTALLATION AND TORQUE VALUES

Data Control Level **1**

Release Stamp CDM

SPECIFICATION NO. ES 9-54

ISSUED: 03/24/1971
(Date and ECN No.)

REVISION HISTORY:
(Letter, Date and ECN No.)

A; 06/15/1972
B; 04/18/1973; ERL 92506
C; 02/14/1977; ERL 2212-1
D; 01/19/1978; ERL 92506
E; 08/06/1996; PRD 12730-1
F; 02/25/2000; PRD 14201-1
G; 09/19/2006; ECN 13773
H; 06/20/2016; ECN 97783
J; 08/19/2016; ECN 99091
K; 08/10/2021; ECN 128376

Rev. Ltr.	ECR #	Author(s) / Approver(s)	Date
L	132516	Prepared By: Svetlana Rokhman Materials & Process Consulting Engineer Approved By: Ryan Mitchell Materials & Process Group Manager	07/20/2022

TABLE OF CONTENTS

Paragraph **Page**

Table of Contents

FIGURES

TABLES

1.0 SCOPE

This specification establishes a standard procedure for installation of fasteners such as studs, bolts, screws, nuts, and washers, and specifies the required torque values for the commonly used fastener materials.

1.1 APPLICATION

Reference to this document in drawings and other documents shall be to the titles of the specific paragraph or table, or by reference to Engineering Specification (ES) 9-54. In cases of conflict, information contained in engineering drawings shall take precedence over the requirements contained herein.

2.0 APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the latest issue shall apply.

ANSI Publications

ANSI B1.1	Unified Inch Screw Threads (UN and UNR Thread Form)
ANSI B18.2.1	Square and Hex Bolts and Screws Inch Series

ASTM Publications

ASTM A193	Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service

SAE Publications

SAE J429	Mechanical and Material Requirements for Externally Threaded Fasteners, Standard

3.0 REQUIREMENTS

3.1 GENERAL INSTALLATION AND PROCEDURE

General rules specified herein, with noted exceptions and modifications shall be observed when installing screws, washers, bolt-nut combinations, and stud assemblies.

3.1.1 Bolts and Screws

General rules specified herein, with noted exceptions and modifications shall be observed when installing screws, washers, bolt-nut combinations, and stud assemblies.

a. Screws and bolts installed in a vertical or near-vertical position shall be installed with head upward.
b. Screws and bolts installed in a horizontal (forward-aft) position shall be installed with heads forward.
c. Screws and bolts installed in a horizontal lateral (inboard-outboard) position shall be installed with heads inboard or inside, except as specified in paragraph 3.1.2

3.1.2 Exceptions and modifications

Exceptions and modifications not covered by this specification shall be referred to the cognizant engineer(s). In general, the following exceptions to paragraph 3.1.1 shall apply:

a. Screws and bolts installed on exterior surfaces shall be with heads on outside.

b. Screws and bolts piercing side or cover of junction boxes, except mounting side, shall be installed with heads on outside of box. Length and location of screws and bolts shall be such as to avoid possible damage to wiring or equipment within junction box.
c. Screws and bolts used for final mounting of electrical junction boxes shall be with heads on inside of box.
d. For equipment mounted in a limited access space, screws and bolts shall be installed in a manner, which will facilitate their installation or removal.

3.1.3 Fastener defects

Fastener hardware shall meet the quality requirements of the controlling specification. Installation of a fastener represents the final opportunity for quality assurance. All fasteners should be visually inspected before installation and any fastener that appears defective should be evaluated per the controlling specification and dispositioned accordingly.

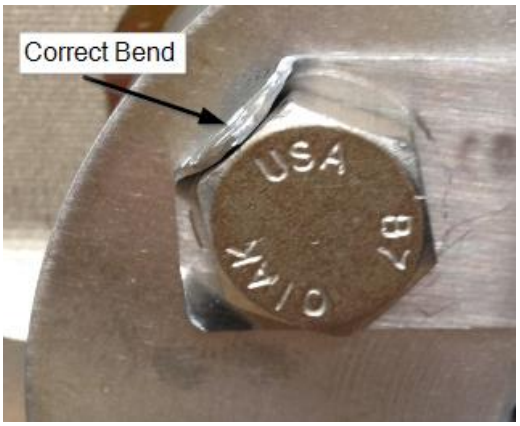
3.1.4 Lock plates

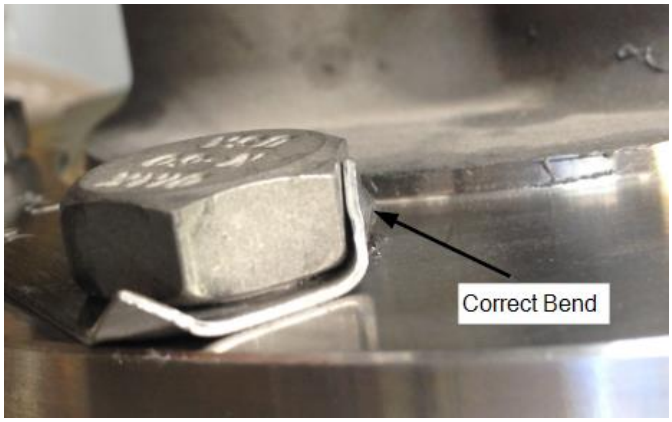
Lock Plates shall be installed as specified on the applicable engineering drawing. In cases where no specific instructions are given, lock plates shall be installed as follows:

1. Pre-bend lock plate corners, if not already pre-bent as received, prior to installation to allow access for final bending.

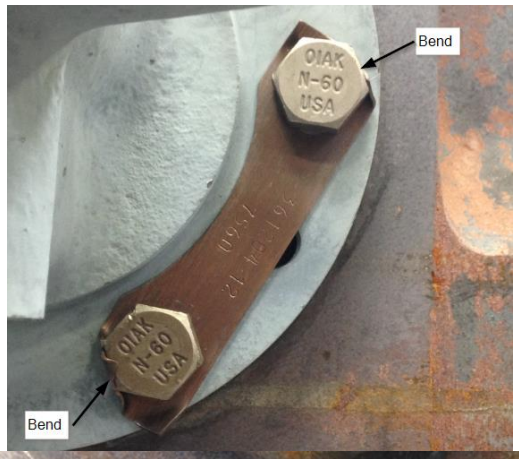
2. Install lock plate with specified fasteners, torque to specified torque value. If necessary, for corner alignment, completely remove bolt and torque again to specified value.\\
3. Bend lock plate corners at Level 1 or Level 2 as specified in the drawing.

   Both Level 1 and 2: To achieve best contact with the bolt head, lock plate should be flat against the bolt head and not curled.





Level 1: Bend two diagonally opposite corners on the lock plate or bend one corner on one end and one flat end of the lock plate on the other end.



Level 2: Bend all four corners of the lock plate, or two corners on one end and one flat end of the lock plate on the other end, or two flat ends of the lock plate on each end.

Note:
* No cracks or nicks are allowed that may cause lock plate failure.
* Lock plates are to be used once and discarded when disassembled.
*To help with ergonomics, ST99348, a pneumatic lock plate bending tool, can be ordered.

3.2 WASHERS

Applicable drawings shall specify washer types to be used. This includes but is not limited to, washers for structural and mechanical applications such as bearing washers for bolts in tension, bushing retainers, spacers on bolts subject to movement and for use in slotted holes.

a. Washers may be used as fillers to accommodate the nearest standard bolt or screw length to avoid use of a special bolt or screw.

b. Use of washers for fillers shall be subject to the following restrictions:

1. One washer under bolt head.
2. Maximum of three washers under non-locking nuts.
3. Maximum of two washers under self-locking nuts.
4. Both self-locking nuts and non-locking nuts must have three complete threads of the mating fastener extending through the nut.

c. When washers are used to span elongated or enlarged holes for alignment, the thickness of the washer must conform to the following equation:

$$t = 1/2 \bullet (D\text{-}d)$$

t = The washer thickness
D = The minimum dimension of the slot or enlarged hole
d = The nominal bolt or screw diameter

3.3 LUBRICATION

The relationship between applied torque and the resulting clamp load is dramatically affected by lubrication. Accordingly, the Torque Tables (Tables 2-18) are based on the following criteria and are only accurate when these lubrication requirements are met:

a. All bolts, socket head cap screws, and studs with thread sizes greater than or equal to one-half inch (1/2") are to be lubricated with the lubricants listed below. Use of these lubricants should be in accordance with the following operating temperatures:

Lubricant	Operating Temperature Range
P/N 917427C1	-95°F to 2400°F
P/N 980376C1	-325°F to 600°F
FSP-400-001	Ambient temperature only
P/N 2302532 (HTS 1400)	-297°F to 2200°F

b. Torque Tables (Tables 2-15 and Tables 17-18) are not applicable to bolts, socket head cap screws, and studs with thread sizes less than one-half inch (1/2 in.) in lubricated condition.

3.4 TIGHTENING TORQUE VALUES TO ACHIEVE DESIGN CLAMP LOADS

3.4.1 Standard Torque tables

The Standard Torque Tables (Tables 2-15 & Appendix I) shall be used for determining torque values when (must meet all criteria):

a. The fastener is a hexagonal head bolt.

b. The fastener is in accordance with ANSI B1.1 and ANSI B18.2.1.

c. The joint is not gasketed.

d. For the specific bolt material, the joint will not be exposed above the maximum usage temperature indicated in Table 1.

e. For the specific bolt material, the nut material must meet or exceed the minimum proof load strength indicated in Table 1.

3.4.1.1 Using the Standard Torque tables

If the requirements of paragraph 3.4.1 are met, then the procedure for using The Standard Torque Tables (Tables 2-15) is as follows:

a. Determine which Torque Table identified in Table 1 corresponds to the bolt material and thread type in question.

b. As indicated on the specified Torque Table (Table 2-15), identify the fastener thread size, the corresponding torque requirement, and the resulting Minimum Clamp Load produced by the specified torque.

3.4.2 Empirical Torque Tables

The Empirical Torque Tables (Tables 16-17 & Appendix 1) shall be used for determining torque values when (must meet all criteria):

a. The specific fastener type or material does not meet the requirements of the Standard Torque Tables (para. 3.4.1 and Tables 1).

b. The fastener is a screw, bolt, socket head screw, or stud that has external threads in accordance with ANSI B1.1.

c. The joint is not gasketed.

d. The joint will not be exposed to temperatures above 1000 °F.

3.4.1.2 Using the Empirical Torque tables

If the requirements of paragraph 3.4.2 are met, then the procedure for using The Empirical Torque Tables (Tables 16 & 17) is as follows:

a. Determine the proper table to use with respect to thread type (Table 16 - Fine Threads; Table 17 - Coarse Threads).

b. From the proper table, identify the specific Torque Constant (TC) and Clamp Constant (CC) that correspond with the specific thread size.

c. In accordance with the applicable specification, identify the minimum required yield strength of the fastener and the nut.

d. Calculate the required torque using the prescribed constants according to the following equation:

$$T = (\sigma_{min}) / (TC)$$

where:

T = Torque Value in inch-pounds

σ_{min} = Yield Strength in pounds per square inch (psi) of the component (fastener or nut) with the lowest yield strength

TC = Torque Constant for the specific fastener (Table 16-17)

(All calculated torque values are to be rounded up to the nearest inch-pound and any value over 240 inch-pounds may be rounded to the nearest foot pound.)

e. Calculate the resulting Minimum Clamp Load using the prescribed constants and the Torque Value ("T" - determined in paragraph 3.4.2.1-section c) according to the following equation:

MC = (T) x (CC)

where:

MC = Minimum Clamp Load in pounds
T = Torque Load in inch-pounds (Calculated in paragraph 3.3.2.1-sec. a)
CC = Clamp Constant for specific fastener (Table 16-17)

3.4.3 Statistical Interpretation of Minimum Clamp load

The minimum clamp load identified in The Standard Torque Tables (Tables 2-15) and calculated using the values from The Empirical Torque Tables (Tables 16-17) is greater than two sigma below the expected mean clamp load (see Appendix I). Accordingly, the resulting clamp load at a prescribed torque has been statistically reduced to determine a specific minimum clamp load value. It is not recommended that the minimum clamp load value be further reduced.

3.4.4 Torque procedure and Auditing of Torque values

In each case, a fastener shall be tightened to the prescribed or calculated torque value (Tables 2-17) and not to a torque range. The tightening tool shall be properly calibrated in accordance with current Solar specification(s) and ISO procedure(s).

In order to audit tightened bolts for quality control, any fastener may be checked with a properly calibrated tool to determine if it has been correctly torqued. A properly tightened fastener must be within ± 5 percent of the prescribed or calculated torque value.

3.4.5 Precautions

a. Torque wrenches shall be calibrated according to current Solar standards to ensure accuracy.

b. Torque shall be measured while nut is continuously tightened in one direction.

Table 1. Criteria for Using Standard Torque Tables

Bolt Type	Thread Type	Nut Minimum Proof Load (psi)	Maximum Usage Temperature (°F)	Torque Table
SAE J429 - Grade 5 (0.25"-1.0" Diameter)	Fine	92,000	600	2
SAE J429 - Grade 5 (Greater than 1.0" diameter)	Fine	81,000	600	2
SAE J429 (0.25"-1.0" Diameter)	Coarse	92,000	600	3
SAE J429 - Grade 5 (Greater than 1.0" diameter)	Coarse	81,000	600	3
SAE J429 - Grade 8	Fine	130,000	600	4
SAE J429 - Grade 8	Coarse	130,000	600	5
ASTM A193 - Grade B7 (Nickel Plated)	Fine	95,000	600	6
ASTM A193 - Grade B7 (Nickel Plated)	Coarse	95,000	600	7
ASTM A193 - Grade B7 (Zinc Plated)	Fine	95,000	600	8
ASTM A193 - Grade B7 (Zinc Plated or Stancoat Coated)	Coarse	95,000	600	9
ASTM A193 - Grade B7M	Fine	80,000	600	10
ASTM A193 - Grade B7M	Coarse	80,000	600	11
ASTM A193 - Grade B8M	Fine	30,000	800	12
ASTM A193 - Grade B8M	Coarse	30,000	800	13
ASTM A193 - Grade B6	Fine	85,000	1000	14
ASTM A193 - Grade B6	Coarse	85,000	1000	15
AMS 5643 – Grade 17-4 PH Stainless Steel	Coarse	125,000	600	16

Table 2. Torque to Produce Minimum Clamp Load
SAE J429 - Grade 5
(Fine Threads)

Fastener Type: SAE J429 - Grade 5 Bolt (Unlubricated - Thread Size Smaller than 1/2")							
Threads* UNF	**Tensile Area (in^2)**	**Yield Strength (psi)**	**Tensile Strength (psi)**	**Mean Coefficient of Friction**	**Torque (in-lbs)**	**Torque (ft-lbs)**	**Minimum Clamp Load (lbs)**
1/4-28	0.03637	92,000	120,000	0.165	133	----	1480
5/16-24	0.05807	92,000	120,000	0.14	237	----	2817
3/8-24	0.08783	92,000	120,000	0.14	414	35	4215
7/16-20	0.11872	92,000	120,000	0.14	647	54	5713
Fastener Type: SAE J429 - Grade 5 Bolt (Lubricated -Thread Size 1/2" or Greater*)							
Threads* UNF	**Tensile Area (in^2)**	**Yield Strength (psi)**	**Tensile Strength (psi)**	**Mean Coefficient of Friction**	**Torque (in-lbs)**	**Torque (ft-lbs)**	**Minimum Clamp Load (lbs)**
1/2-20	0.15995	92,000	120,000	0.073	655	55	11317
9/16-18	0.20298	92,000	120,000	0.088	960	80	10065
5/8-18	0.25596	92,000	120,000	0.088	1340	112	12578
3/4-16	0.37296	92,000	120,000	0.088	2325	194	18243
7/8-14	0.50947	92,000	120,000	0.088	3696	308	24885
1-12	0.66304	81,000	105,000	0.103	5042	420	22168
1 1/8-12	0.85572	81,000	105,000	0.103	7226	602	28343
1 1/4-12	1.07295	81,000	105,000	0.103.	9960	830	35268
1 3/8-12	1.31471	81,000	105,000	0.103	13306	1109	42944
1 1/2-12	1.58102	81,000	105,000	0.103	17330	1444	51369

*** Based on Dimensions for Class 2A External Thread Series, ANSI B1.1. Bolt thread size less than 1/2" to remain unlubricated, bolt thread size 1/2" or greater must be lubricated according to paragraph 3.3.**

Table 3. Torque to Produce Minimum Clamp Load
SAE J429 - Grade 5
(Coarse Threads)

Fastener Type: SAE J429 -Grade 5 Bolt (Unlubricated-Thread Size Smaller Than 1/2")							
Threads* UNC	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/4-20	0.03182	92,000	120,000	0.165	121	----	1335
5/16-18	0.05243	92,000	120,000	0.14	222	----	2603
3/8-16	0.07749	92,000	120,000	0.14	384	32	3832
7/16-14	0.10631	92,000	120,000	0.14	605	50	5254
Fastener Type: SAE J429 - Grade 5 Bolt (Lubricated - Thread Size 1/2" or Greater*)							
Threads* UNC	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/2-13	0.14190	92,000	120,000	0.073	629	52	10255
9/16-12	0.18194	92,000	120,000	0.088	924	77	9374
5/8-11	0.22600	92,000	120,000	0.088	1283	107	11608
3/4-10	0.33446	92,000	120,000	0.088	2240	187	17021
7/8-9	0.46173	92,000	120,000	0.088	3577	298	23385
1-8	0.60575	81,000	105,000	0.103	4880	407	21082
1 1/8-7	0.76328	81,000	105,000	0.103	6939	578	26612
1 1/4-7	0.96911	81,000	105,000	0.103	9622	802	33390
1 3/8-6	1.15488	81,000	105,000	0.103	12733	1061	40050
1 1/2-6	1.40525	81,000	105,000	0.103	16674	1390	48270

* Based on Dimensions for Class 2A External Thread Series, ANSI B1.1. Bolt thread size less than 1/2" to remain unlubricated, bolt thread size 1/2" or greater must be lubricated according to paragraph 3.3.

Table 4. Torque to Produce Minimum Clamp Load
SAE J429 - Grade 8
(Fine Threads)

Fastener Type: SAE J429 - Grade 8 Bolt (Unlubricated - Thread Size Smaller Than 1/2")							
Threads* UNF	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/4-28	0.03637	130,000	150,000	0.221	232	----	1747
5/16-24	0.05807	130,000	150,000	0.181	407	34	4483
3/8-24	0.08783	130,000	150,000	0.181	715	60	6731
7/16-20	0.11872	130,000	150,000	0.181	1114	93	9115
Fastener Type: SAE J429 - Grade 8 Bolt (Lubricated - Thread Size 1/2" or Greater*)							
Threads* UNF	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/2-20	0.15995	130,000	150,000	0.073	950	79	17096
9/16-18	0.20298	130,000	150,000	0.073	1374	115	22482
5/8-18	0.25596	130,000	150,000	0.073	1918	160	28267
3/4-16	0.37296	130,000	150,000	0.073	3327	277	41128
7/8-14	0.50947	130,000	150,000	0.073	5290	441	56156
1-12	0.66304	130,000	150,000	0.074	8193	683	77600
1 1/8-12	0.85572	130,000	150,000	0.074	11744	979	99991
1 1/4-12	1.07295	130,000	150,000	0.074	16190	1349	125210
1 3/8-12	1.31471	130,000	150,000	0.074	21633	1803	153258
1 1/2-12	1.58102	130,000	150,000	0.074	28177	2348	184132

* Based on Dimensions for Class 2A External Thread Series, ANSI B1.1. Bolt thread size less than 1/2" to remain unlubricated, bolt thread size 1/2" or greater must be lubricated according to paragraph 3.3.

Table 5. Torque to Produce Minimum Clamp Load
SAE J429 - Grade 8
(Coarse Threads)

Fastener Type: SAE Grade 8 Bolt (Unlubricated - Thread Size Smaller Than 1/2"							
Threads* UNC	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/4-20	0.03182	130,000	150,000	0.221	210	18	1570
5/16-18	0.05243	130,000	150,000	0.181	416	35	2566
3/8-16	0.07749	130,000	150,000	0.181	654	55	6064
7/16-14	0.10631	130,000	150,000	0.181	1032	86	8316
Fastener Type: SAE J429 - Grade 8 Bolt (Lubricated - Thread Size 1/2" or Greater*)							
Threads* UNC	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/2-13	0.14190	130000	150000	0.073	910	76	15410
9/16-12	0.18194	130000	150000	0.073	1320	110	20599
5/8-11	0.22600	130000	150000	0.073	1834	153	25562
3/4-10	0.33446	130000	150000	0.073	3203	267	37729
7/8-9	0.46173	130000	150000	0.073	5115	426	52013
1-8	0.60575	130000	150000	0.074	7924	660	71371
1 1/8-7	0.76328	130000	150000	0.074	11265	939	89959
1 1/4-7	0.96911	130000	150000	0.074	15625	1302	113995
1 3/8-6	1.15488	130000	150000	0.074	20675	1723	135993
1 1/2-6	1.40525	130000	150000	0.074	27079	2257	165214

* Based on Dimensions for Class 2A External Thread Series, ANSI B1.1. Bolt thread size less than 1/2" to remain unlubricated, bolt thread size 1/2" or greater must be lubricated according to paragraph 3.3.

Table 6. Torque to Produce Minimum Clamp Load
ASTM A193 - Grade B7 Nickel Plated
(Fine Threads)

Fastener Type: ASTM A193 - Grade B7 Nickel Plated Bolt (Unlubricated - Thread Size Smaller Than 1/2")							
Threads* UNF	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/4-28	0.03637	105,000	125,000	0.251	253	21	2354
5/16-24	0.05807	105,000	125,000	0.251	488	41	3754
3/8-24	0.08783	105,000	125,000	0.251	862	72	3652
7/16-20	0.11872	105,000	125,000	0.251	1343	112	7649
Fastener Type: ASTM A193 - Grade B7 Nickel Plated Bolt (Lubricated - Thread Size 1/2" or Greater)							
Threads* UNF	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/2-20	0.15995	105,000	125,000	0.085	826	69	11978
9/16-18	0.20298	105,000	125,000	0.085	1165	97	15200
5/8-18	0.25596	105,000	125,000	0.085	1628	136	19065
3/4-16	0.37296	105,000	125,000	0.085	2825	235	27705
7/8-14	0.50947	105,000	125,000	0.085	4492	374	37814
1-12	0.66304	105,000	125,000	0.085	6699	558	49252
1 1/8-12	0.85572	105,000	125,000	0.085	9604	800	63273
1 1/4-12	1.07295	105,000	125,000	0.085	13242	1104	79038
1 3/8-12	1.31471	105,000	125,000	0.085	17696	1475	96547
1 1/2-12	1.58102	105,000	125,000	0.085	23053	1921	115798
1 3/4-12	2.18726	105,000	125,000	0.085	36327	3027	159586
2-12	2.89171	105,000	125,000	0.085	55127	4594	210234
2 1/4-12	3.69431	105,000	125,000	0.085	78705	6559	267910
2 1/2-12	4.59509	105,000	125,000	0.085	108188	9016	332557

* Based on Dimensions for Class 2A External Thread Series, ANSI B1.1. Bolt thread size less than 1/2" to remain unlubricated, bolt thread size 1/2" or greater must be lubricated according to paragraph 3.3.

Table 7. Torque to Produce Minimum Clamp Load
ASTM A193 - Grade B7 Nickel Plated
(Coarse Threads)

Fastener Type: ASTM A193 - Grade B7 Nickel Plated Bolt (Unlubricated - Thread Size Smaller Than 1/2")							
Threads* UNC	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/4-20	0.03182	105,000	125,000	0.251	225	----	2084
5/16-18	0.05243	105,000	125,000	0.251	448	37	3422
3/8-16	0.07749	105,000	125,000	0.251	776	65	5050
7/16-14	0.10631	105,000	125,000	0.251	1225	102	6926
Fastener Type: ASTM A193 - Grade B7 Nickel Plated Bolt (Lubricated - Thread Size 1/2" or Greater*)							
Threads* UNC	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/2-13	0.14190	105,000	125,000	0.071	786	66	10885
9/16-12	0.18194	105,000	125,000	0.071	1115	93	13933
5/8-11	0.22600	105,000	125,000	0.071	1549	129	17273
3/4-10	0.33446	105,000	125,000	0.071	2709	226	25429
7/8-9	0.46173	105,000	125,000	0.071	4327	361	35006
1-8	0.60575	105,000	125,000	0.071	6473	539	45883
1 1/8-7	0.76328	105,000	125,000	0.071	9203	767	57865
1 1/4-7	0.96911	105,000	125,000	0.071	12786	1066	73050
1 3/8-6	1.15488	105,000	125,000	0.071	16892	1408	87327
1 1/2-6	1.40525	105,000	125,000	0.071	22128	1844	105770
1 3/4-5	1.89946	105,000	125,000	0.071	35050	2921	143174
2-4 1/2	2.49823	105,000	125,000	0.071	52470	4373	188032
2 1/4-4 1/2	3.24769	105,000	125,000	0.071	75481	6290	243034
2 1/2-4	3.99883	105,000	125,000	0.071	103447	8621	299418

* Based on Dimensions for Class 2A External Thread Series, ANSI B1.1. Bolt thread size less than 1/2" to remain unlubricated, bolt thread size 1/2" or greater must be lubricated according to paragraph 3.3.

Table 8. Torque to Produce Minimum Clamp Load
ASTM A193 - Grade B7 Zinc Plated
(Fine Threads)

Fastener Type: ASTM A193 - Grade B7 Zinc Plated Bolt (Unlubricated - Thread Size Smaller Than 1/2")							
Threads* UNF	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/4-28	0.03637	105,000	125,000	0.177	163	----	1724
5/16-24	0.05807	105,000	125,000	0.177	315	26	2745
3/8-24	0.08783	105,000	125,000	0.177	553	46	4109
7/16-20	0.11872	105,000	125,000	0.177	863	72	5569
Fastener Type: ASTM A193 -Grade B7 Zinc Plated Bolt (Lubricated - Thread Size 1/2" or Greater*)							
Threads* UNF	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/2-20	0.15995	105,000	125,000	0.104	894	75	9455
9/16-18	0.20298	105,000	125,000	0.081	1082	90	13887
5/8-18	0.25596	105,000	125,000	0.081	1510	126	17391
3/4-16	0.37296	105,000	125,000	0.081	2619	218	25250
7/8-14	0.50947	105,000	125,000	0.081	4163	347	34454
1-12	0.66304	105,000	125,000	0.058	5152	429	57756
1 1/8-12	0.85572	105,000	125,000	0.058	7351	613	74278
1 1/4-12	1.07295	105,000	125,000	0.058	10096	841	92864
1 3/8-12	1.31471	105,000	125,000	0.058	13448	1121	113513
1 1/2-12	1.58102	105,000	125,000	0.058	17470	1456	136224
1 3/4-12	2.18726	105,000	125,000	0.058	27417	2285	187887
2-12	2.89171	105,000	125,000	0.058	41447	3454	247695
2 1/4-12	3.69431	105,000	125,000	0.058	59013	4918	315803
2 1/2-12	4.59509	105,000	1250,00	0.058	80940	6745	392160

* Based on Dimensions for Class 2A External Thread Series, ANSI B1.1. Bolt thread size less than 1/2" to remain unlubricated, bolt thread size 1/2" or greater must be lubricated according to paragraph 3.3.

Table 9A. Torque to Produce Minimum Clamp Load
ASTM A193 - Grade B7 Zinc Plated
(UNC Series Coarse Threads)

FASTENER TYPE: ASTM A193 - GRADE B7 ZINC PLATED BOLT (Unlubricated – UNC Series Thread Sizes Smaller Than 1/2")							
Threads* UNC	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/4-20	0.03182	105,000	125,000	0.177	149	----	3341
5/16-18	0.05243	105,000	125,000	0.177	294	25	5505
3/8-16	0.07749	105,000	125,000	0.177	508	42	8136
7/16-14	0.10631	105,000	125,000	0.177	800	67	11162
Fastener Type: ASTM A193 - Grade B7 Zinc Plated Bolt (Lubricated – UNC Series Thread Sizes 1/2" or Greater*)							
Threads* UNC	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/2-13	0.14190	105,000	125,000	0.104	846	71	8678
9/16-12	0.18194	105,000	125,000	0.081	1042	87	12817
5/8-11	0.22600	105,000	125,000	0.081	1447	121	15881
3/4-10	0.33446	105,000	125,000	0.081	2527	211	23341
7/8-9	0.46173	105,000	125,000	0.081	4034	336	32105
1-8	0.60575	105,000	125,000	0.058	5078	423	53539
1 1/8-7	0.76328	105,000	125,000	0.058	7225	602	67504
1 1/4-7	0.96911	105,000	125,000	0.058	9667	806	85350
1 3/8-6	1.15488	105,000	125,000	0.058	13228	1102	101946
1 1/2-6	1.40525	105,000	125,000	0.058	17249	1437	123626
1 3/4-5	1.89946	105,000	125,000	0.058	27361	2280	167282
2-4 1/2	2.49823	105,000	125,000	0.058	40899	3408	219776
2 1/4-4 1/2	3.24769	105,000	125,000	0.058	58494	4875	284484
2 1/2-4	3.99883	105,000	125,000	0.058	80213	6684	350433

* Based on Dimensions for Class 2A External Thread Series, ANSI B1.1. Bolt thread size less than 1/2" to remain unlubricated, bolt thread size 1/2" or greater must be lubricated according to paragraph 3.3.

Table 9B. Torque to Produce Minimum Clamp Load
ASTM A193 - Grade B7 Zinc Plated or Stancoat‡ Coated
(UNC Series Coarse Threads)

FASTENER TYPE: ASTM A193 - GRADE B7 ZINC PLATED OR STANCOAT COATED BOLT (Lubricated – UN Series Thread Sizes 1" or Greater*)							
Threads* UN	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1-8	0.60575	105,000	125,000	0.0490	4047	337	41960
1 1/8 -8	0.79045	105,000	125,000	0.0481	5600	467	51954
1 1/4 -8	0.99971	105,000	125,000	0.0481	7656	638	64950
1 3/8 -8	1.23350	105,000	125,000	0.0481	10162	847	79373
1 1/2-8	1.49184	105,000	125,000	0.0473	12747	1062	91092
1 5/8-8	1.77473	105,000	125,000	0.0582	19291	1608	107682
1 3/4-8	2.08216	105,000	125,000	0.0692	27996	2333	125739
1 7/8-8	2.41413	105,000	125,000	0.0658	33261	2772	149272
2-8	2.77064	105,000	125,000	0.0624	38927	3244	176071
2 1/4-8	3.55730	105,000	125,000	0.0678	60138	5012	226361
2 1/2-8	4.44214	105,000	125,000	0.0784	91212	7601	257244

* Based on Dimensions for Class 2A External Thread Series, ANSI B1.1. Bolt thread size less than 1/2" to remain unlubricated, bolt thread size 1/2" or greater must be lubricated according to paragraph 3.3.

‡ Stancoat is a trade name (also referred to as Xylon 1070/540 on Solar Engineering Preferred Parts and Specifications drawings.

Table 10. Torque to Produce Minimum Clamp Load
ASTM A193 - Grade B7M
(Fine Threads)

Fastener Type: ASTM A193 - Grade B7M Bolt (Unlubricated - Thread Size Smaller Than 1/2")							
Threads* UNF	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/4-28	0.03637	80,000	100,000	0.118	108	----	2249
5/16-24	0.05807	80,000	100,000	0.118	208	----	3993
3/8-24	0.08783	80,000	100,000	0.118	363	30	5394
7/16-20	0.11872	80,000	100,000	0.118	567	47	7300
Fastener Type: ASTM A193 - Grade B7M Bolt (Lubricated - Thread Size 1/2" or Greater*)							
Threads* UNF	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/2-20	0.15995	80,000	100,000	0.081	629	52	9787
9/16-18	0.20298	80,000	100,000	0.081	888	74	12419
5/8-18	0.25596	80,000	100,000	0.081	1240	103	18893
3/4-16	0.37296	80,000	100,000	0.081	2152	179	22670
7/8-14	0.50947	80,000	100,000	0.081	3422	285	30946
1-12	0.66304	80,000	100,000	0.081	5104	425	40301
1 1/8-12	0.85572	80,000	100,000	0.081	7317	610	51816
1 1/4-12	1.07295	80,000	100,000	0.081	10089	841	64769
1 3/8-12	1.31471	80,000	100,000	0.081	13483	1124	79160
1 1/2-12	1.58102	80,000	100,000	0.081	17564	1464	94989
1 3/4-12	2.18726	80,000	100,000	0.081	27678	2307	130997
2-12	2.89171	80,000	100,000	0.081	42001	3500	172679
2 1/4-12	3.69431	80,000	100,000	0.081	59966	4997	220148
2 1/2-12	4.59509	80,000	100,000	0.081	82429	6869	273367

* Based on Dimensions for Class 2A External Thread Series, ANSI B1.1. Bolt thread size less than 1/2" to remain unlubricated, bolt thread size 1/2" or greater must be lubricated according to paragraph 3.3.

Table 11. Torque to Produce Minimum Clamp Load
ASTM A193 - Grade B7M
(Coarse Threads)

Fastener Type: ASTM A193 - Grade B7M Bolt (Unlubricated - Thread Size Smaller Than 1/2"							
Threads* UNC	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/4-20	0.03182	80,000	100,000	0.118	99	----	1994
5/16-18	0.05243	80,000	100,000	0.118	195	----	3273
3/8-16	0.07749	80,000	100,000	0.118	336	28	4828
7/16-14	0.10631	80,000	100,000	0.118	530	44	6622
Fastener Type: ASTM A193 - Grade B7M Bolt (Lubricated - Thread Size 1/2" or Greater*)							
Threads* UNC	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/2-13	0.14190	80,000	100,000	0.081	599	50	8855
9/16-12	0.18194	80,000	100,000	0.081	850	71	11338
5/8-11	0.22600	80,000	100,000	0.081	1180	98	14062
3/4-10	0.33446	80,000	100,000	0.081	2064	172	20720
7/8-9	0.46173	80,000	100,000	0.081	3297	275	28539
1-8	0.60575	80,000	100,000	0.081	4932	411	37412
1 1/8-7	0.76328	80,000	100,000	0.081	7012	584	47175
1 1/4-7	0.96911	80,000	100,000	0.081	9728	811	59617
1 3/8-6	1.15488	80,000	100,000	0.081	12870	1073	71228
1 1/2-6	1.40525	80,000	100,000	0.081	16860	1405	86342
1 3/4-5	1.89946	80,000	100,000	0.081	26705	2225	116846
2-4 1/2	2.49823	80,000	100,000	0.081	39977	3331	153495
2 1/4-4 1/2	3.24769	80,000	100,000	0.081	57510	4793	198601
2 1/2-4	3.99883	80,000	100,000	0.081	78817	6568	244650

* Based on Dimensions for Class 2A External Thread Series, ANSI B1.1. Bolt thread size less than 1/2" to remain unlubricated, bolt thread size 1/2" or greater must be lubricated according to paragraph 3.3.

Table 12. Torque to Produce Minimum Clamp Load
ASTM A193 - Grade B8M
(Fine Threads)

Fastener Type: ASTM A193 - Grade B8M Bolt (Unlubricated - Thread Size Smaller Than 1/2")							
Threads* UNF	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/4-28	0.03637	30,000	75,000	0.187	57	----	736
5/16-24	0.05807	30,000	75,000	0.193	107	----	997
3/8-24	0.08783	30,000	75,000	0.193	188	----	1498
7/16-20	0.11872	30,000	75,000	0.193	293	24	2028
Fastener Type: ASTM A193 - Grade B8M Bolt (Lubricated - Thread Size 1/2" or Greater*)							
Threads* UNF	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/2-20	0.15995	30,000	75,000	0.079	216	----	3307
9/16-18	0.20298	30,000	75,000	0.112	412	34	4065
5/8-18	0.25596	30,000	75,000	0.112	577	48	5101
3/4-16	0.37296	30,000	75,000	0.112	1003	84	7414
7/8-14	0.50947	30,000	75,000	0.112	1596	133	10120
1-12	0.66304	30,000	75,000	0.146	3008	251	12893
1 1/8-12	0.85572	30,000	75,000	0.146	4338	362	16583
1 1/4-12	1.07295	30,000	75,000	0.146	6008	501	20736
1 3/8-12	1.31471	30,000	75,000	0.146	8261	688	25350
1 1/2-12	1.58102	30,000	75,000	0.146	10535	878	30427
1 3/4-12	2.18726	30,000	75,000	0.146	16680	1390	41977
2-12	2.89171	30,000	75,000	0.146	25424	2119	55355
2 1/4-12	3.69431	30,000	75,000	0.146	36411	3034	70593
2 1/2-12	4.59509	30,000	75,000	0.146	50176	4181	87679
2 3/4-12	5.59404	30,000	75,000	0.146	67107	5592	106612
3-12	6.69117	30,000	75,000	0.146	87389	7282	127396
3 1/4-12	7.88647	30,000	75,000	0.146	111391	9283	150028
3 1/2-12	9.17995	30,000	75,000	0.146	139353	11613	174509
3 3/4-12	10.57161	30,000	75,000	0.146	171181 4	142651	200838
4-12	12.06143	30,000	75,000	0.146	208859	17405	229015

* Based on Dimensions for Class 2A External Thread Series, ANSI B1.1. Bolt thread size less than 1/2" to remain unlubricated, bolt thread size 1/2" or greater must be lubricated according to paragraph 3.3.

Table 13. Torque to Produce Minimum Clamp Load
ASTM A193 - Grade B8M
(Coarse Threads)

Fastener Type: ASTM A193 - Grade B8M Bolt (Unlubricated Thread Size Smaller Than 1/2")							
Threads* UNC	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/4-20	0.03182	30,000	75,000	0.187	51	----	652
5/16-18	0.05243	30,000	75,000	0.193	99	----	914
3/8-16	0.07749	30,000	75,000	0.193	171	----	1347
7/16-14	0.10631	30,000	75,000	0.193	270	23	1847
Fastener Type: ASTM A193 - Grade B8M Bolt (Lubricated - Thread Size 1/2" or Greater*)							
Threads* UNC	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/2-13	0.14190	30,000	75,000	0.079	208	17	3018
9/16-12	0.18194	30,000	75,000	0.112	388	32	3721
5/8-11	0.22600	30,000	75,000	0.112	540	45	4614
3/4-10	0.33446	30,000	75,000	0.112	947	79	6794
7/8-9	0.46173	30,000	75,000	0.112	1516	126	9355
1-8	0.60575	30,000	75,000	0.146	2837	236	11956
1 1/8-7	0.76328	30,000	75,000	0.146	4029	336	18078
1 1/4-7	0.96911	30,000	75,000	0.146	5630	469	19056
1 3/8-6	1.15488	30,000	75,000	0.146	7420	618	22765
1 1/2-6	1.40525	30,000	75,000	0.146	9776	815	27601
1 3/4-5	1.89946	30,000	75,000	0.146	15456	1288	37349
2-4 1/2	2.49823	30,000	75,000	0.146	23180	1932	49067
2 1/4-4 1/2	3.24769	30,000	75,000	0.146	33587	2799	63507
2 1/2-4	3.99883	30,000	75,000	0.146	45998	3833	78229
2 3/4-4	4.93401	30,000	75,000	0.146	62000	5167	96207
3-4	5.96737	30,000	75,000	0.146	81330	6778	116035
3 1/4-4	7.09891	30,000	75,000	0.146	104299	8692	137712
3 1/2-4	8.32862	30,000	75,000	0.146	131224	10935	161239
3 3/4-4	9.65651	30,000	75,000	0.146	162412	13534	186614
4-4	11.08257	30,000	75,000	0.146	198185	16515	213839

* Based on Dimensions for Class 2A External Thread Series, ANSI B1.1. Bolt thread size less than 1/2" to remain unlubricated, bolt thread size 1/2" or greater must be lubricated according to paragraph 3.3.

Table 14. Torque to Produce Minimum Clamp Load
ASTM A193 - Grade B6
(Fine Threads)

Fastener Type: ASTM A193 - Grade B6 (Unlubricated - Thread Size Smaller Than 1/2")							
Threads* UNF	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/4-28	0.03637	85,000	110,000	0.206	194	----	2622
5/16-24	0.05807	85,000	110,000	0.193	342	29	3883
3/8-24	0.08783	85,000	110,000	0.193	604	50	5855
7/16-20	0.11872	85,000	110,000	0.193	940	78	7920
Fastener Type: ASTM A193 - Grade B6 Bolt (Lubricated - Thread Size 1/2" or Greater*)							
Threads* UNF	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/2-20	0.15995	85,000	110,000	0.108	803	67	9048
9/16-18	0.20298	85,000	110,000	0.119	1133	94	8816
5/8-18	0.25596	85,000	110,000	0.119	1587	132	11035
3/4-16	0.37296	85,000	110,000	0.119	2759	230	16019
7/8-14	0.50947	85,000	110,000	0.119	4390	366	21856
1-12	0.66304	85,000	110,000	0.131	6544	545	23056
1 1/8-12	0.85572	85,000	110,000	0.131	9407	784	29533
1 1/4-12	1.07295	85,000	110,000	0.131	12999	1083	36805
1 3/8-12	1.31471	85,000	110,000	0.131	17404	1450	44873
1 1/2-12	1.58102	85,000	110,000	0.131	22707	1892	53735
1 3/4-12	2.18726	85,000	110,000	0.131	35863	2989	73885
2-12	2.89171	85,000	110,000	0.131	54539	4545	97132
2 1/4-12	3.69431	85,000	110,000	0.131	77980	6498	123600
2 1/2-12	4.59509	85,000	110,000	0.131	107321	8943	153248

* Based on Dimensions for Class 2A External Thread Series, ANSI B1.1. Bolt thread size less than 1/2" to remain unlubricated, bolt thread size 1/2" or greater must be lubricated according to paragraph 3.3.

Table 15. Torque to Produce Minimum Clamp Load
ASTM A193 - Grade B6
(Coarse Threads)

Fastener Type: ASTM A193 - Grade B6 Bolt (Unlubricated - Thread Size Smaller Than 1/2")							
Threads* UNC	Tensile Area in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/4-20	0.03182	85,000	110,000	0.206	174	----	2306
5/16-18	0.05243	85,000	110,000	0.193	316	26	3529
3/8-16	0.07749	85,000	110,000	0.193	546	46	5209
7/16-14	0.10631	85,000	110,000	0.193	862	72	7146
Fastener Type: ASTM A193 - Grade B6 Bolt (Lubricated - Thread Size 1/2" or Greater*)							
Threads* UNC	Tensile Area (in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/2-13	0.14190	85,000	110,000	0.108	753	63	8217
9/16-12	0.18194	85,000	110,000	0.119	1070	89	8158
5/8-11	0.22600	85,000	110,000	0.119	1488	124	10105
3/4-10	0.33446	85,000	110,000	0.119	2610	218	14842
7/8-9	0.46173	85,000	110,000	0.119	4177	348	20408
1-8	0.60575	85,000	110,000	0.131	6252	521	21761
1 1/8-7	0.76328	85,000	110,000	0.131	8884	740	27460
1 1/4-7	0.96911	85,000	110,000	0.131	12366	1031	34529
1 3/8-6	1.15488	85,000	110,000	0.131	16331	1361	41367
1 1/2-6	1.40525	85,000	110,000	0.131	21450	1788	49945
1 3/4-5	1.89946	85,000	110,000	0.131	33948	2829	67674
2-4 1/2	2.49823	85,000	110,000	0.131	50863	4239	88787
2 1/4-4 1/2	3.24769	85,000	110,000	0.131	73416	6118	114316
2 1/2-4	3.99883	85,000	110,000	0.131	100583	8382	140891

* Based on Dimensions for Class 2A External Thread Series, ANSI B1.1. Bolt thread size less than 1/2" to remain unlubricated, bolt thread size 1/2" or greater must be lubricated according to paragraph 3.3.

Table 16. Torque to Produce Minimum Clamp Load
ASTM 5643 - Grade 17-4 PH Stainless Steel
(Coarse Threads)

Fastener Type: AMS 5643 – Grade 17-4 PH Stainless Steel Bolt Lubricated							
Threads* UNC	Tensile Area in^2)	Yield Strength (psi)	Tensile Strength (psi)	Mean Coefficient of Friction	Torque (in-lbs.)	Torque (ft-lbs)	Minimum Clamp Load (lbs)
1/4-20	0.03182	125,000	145,000	0.107	122	10	3680
5/16-18	0.05243	125,000	145,000	0.107	231	19	5457
3/8-16	0.07749	125,000	145,000	0.107	432	36	8880
7/16-14	0.10631	125,000	145,000	0.107	732	61	12927
1/2-13	0.14190	125,000	145,000	0.107	864	72	13487
9/16-12	0.18194	125,000	145,000	0.107	1181	98	16386
5/8-11	0.22600	125,000	145,000	0.107	1670	139	20891
3/4-10	0.33446	125,000	145,000	0.109	3223	269	34078
7/8-9	0.46173	125,000	145,000	0.109	4684	390	41732
1-8	0.60575	125,000	145,000	0.109	6712	559	52394
1 1/8-7	0.76328	125,000	145,000	0.109	8952	746	62033
1 1/4-7	0.96911	125,000	145,000	0.109	12302	1025	77376
1 3/8-6	1.15488	125,000	145,000	0.109	16296	1358	92750
1 1/2-6	1.40525	125,000	145,000	0.109	20834	1736	109435

* Based on Dimensions for Class 2A External Thread Series, ANSI B1.1.

Table 17. Empirical Torque Table for Fine Threads (ANSI B1.1)

Fastener Thread Type: ANSI B1.1 (Unlubricated - Thread Size Smaller Than 1/2")			
Threads UNF	Tensile Area (in^2)	Torque Constant (TC) (in^{-3})	Clamp Constant (CC) (in^{-1})
0-80	0.00180	40640	42.4526
1-72	0.00278	22835	36.8039
2-64	0.00393	14403	32.8945
3-56	0.00523	8672	26.1855
4-48	0.00660	6294	24.0973
5-44	0.00831	4639	22.3596
6-40	0.01014	3250	19.0546
8-36	0.01473	1996	16.9842
10-32	0.01999	1244	14.3267
12-28	0.02579	880.1	13.1046
1/4-28	0.03637	514.1	10.6878
5/16-24	0.05807	279.8	9.7506
3/8-24	0.08783	159.1	8.3298
7/16-20	0.11872	102.0	7.2355
Fastener Type: ANSI B1.1 (Lubricated - Thread Size 1/2" or Greater*)			
Threads UNF	Tensile Area (in^2)	Torque Constant (TC) (in^{-3})	Clamp Constant (CC) (in^{-1})
1/2-20	0.15995	122.8	14.1508
9/16-18	0.20298	82.62	10.8738
5/8-18	0.25596	59.05	9.7418
3/4-16	0.37296	33.99	8.1473
7/8-14	0.50947	21.37	6.9905
1-12	0.66304	13.54	5.3317
1 1/8-12	0.85572	9.420	4.7630
1 1/4-12	1.07295	6.820	4.3047
1 3/8-12	1.31471	5.096	3.9269
1 1/2-12	1.58102	3.907	3.6094
1 3/4-12	2.18728	2.475	3.1488
2-12	2.89171	1.628	2.7274
2 1/4-12	3.69431	1.139	2.4305
2 1/2-12	4.59509	0.8278	2.1920

* Bolt thread size less than 1/2" to remain unlubricated, bolt thread size 1/2" or greater must be lubricated according to paragraph 3.3.

Table 18. Empirical Torque Table for Coarse Threads (ANSI B1.1)

Fastener Type: ANSI B1.1 Threads (Unlubricated - Thread Size Smaller Than 1/2")			
Threads UNC	Tensile Area (in^2)	Torque Constant (TC) (in^{-3})	Clamp Constant (CC) (in^{-1})
1-64	0.00262	23911	36.64
2-56	0.00370	15132	32.73
3-48	0.00486	9189	26.03
4-40	0.00603	6766	23.92
5-40	0.00796	4801	22.28
6-32	0.00909	3551	18.89
8-32	0.01401	2077	16.92
10-24	0.01753	1381	14.18
12-24	0.02416	926.0	13.03
1/4-20	0.03182	571.5	10.57
5/16-18	0.05243	302.5	9.649
3/8-16	0.07749	174.8	8.222
7/16-14	0.10631	110.8	7.150
Fastener Type: ANSI B1.1 Threads (Lubricated - Thread Size 1/2" or Greater*)			
Threads UNC	Tensile Area (in^2)	Torque Constant (TC) (in^{-3})	Clamp Constant (CC) (in^{-1})
1/2-13	0.14190	129.4	13.53
9/16-12	0.18194	86.87	10.51
5/8-11	0.22600	62.50	9.372
3/4-10	0.33446	35.69	7.873
7/8-9	0.46173	22.32	6.776
1-8	0.60575	14.13	5.207
1 1/8-7	0.76328	9.946	4.622
1 1/4-7	0.96911	7.150	4.189
1 3/8-6	1.15488	5.412	3.793
1 1/2-6	1.40525	4.123	3.496
1 3/4-5	1.89946	2.604	2.991
2-4 1/2	2.49823	1.739	2.621
2 1/4-4 1/2	3.24769	1.205	2.346
2 1/2-4	3.99883	0.8797	2.110

* Bolt thread size less than 1/2" to remain unlubricated, bolt thread size 1/2" or greater must be lubricated according to paragraph 3.3.

APPENDIX I

METHOD FOR DETERMINING STANDARD AND EMPIRICAL TORQUE VALUES (ES 9-54, TABLES 2-17)

Part I. Standard Torque Values (ES 9-54, Tables 2-15)

The Standard Torque Tables (Table 2-15) were determined by a combination of experimental, statistical, and mathematical processes that resulted in a usable relationship between applied torque and the resulting minimum clamp load. This process was based on identifying the coefficient of friction and is summarized herein.

Section 1. Experimental and Statistical Development of the Torque Curves

A) Torque Testing

In order to identify the clamp load resulting from a specific torque, a calibrated donut shaped load cell was placed in a bolted joint and the nut was tightened to a specified torque level using a calibrated torque wrench. The resulting clamp load was then recorded.

This method was expanded so that a sound statistical torque curve could be created. For a given fastener size, material type (7 types in all), and lubricant, thirty fasteners were tightened to four different torque levels (120 tests for each material type). These data were then reduced, and a master curve was derived (see Figure A and Table A).

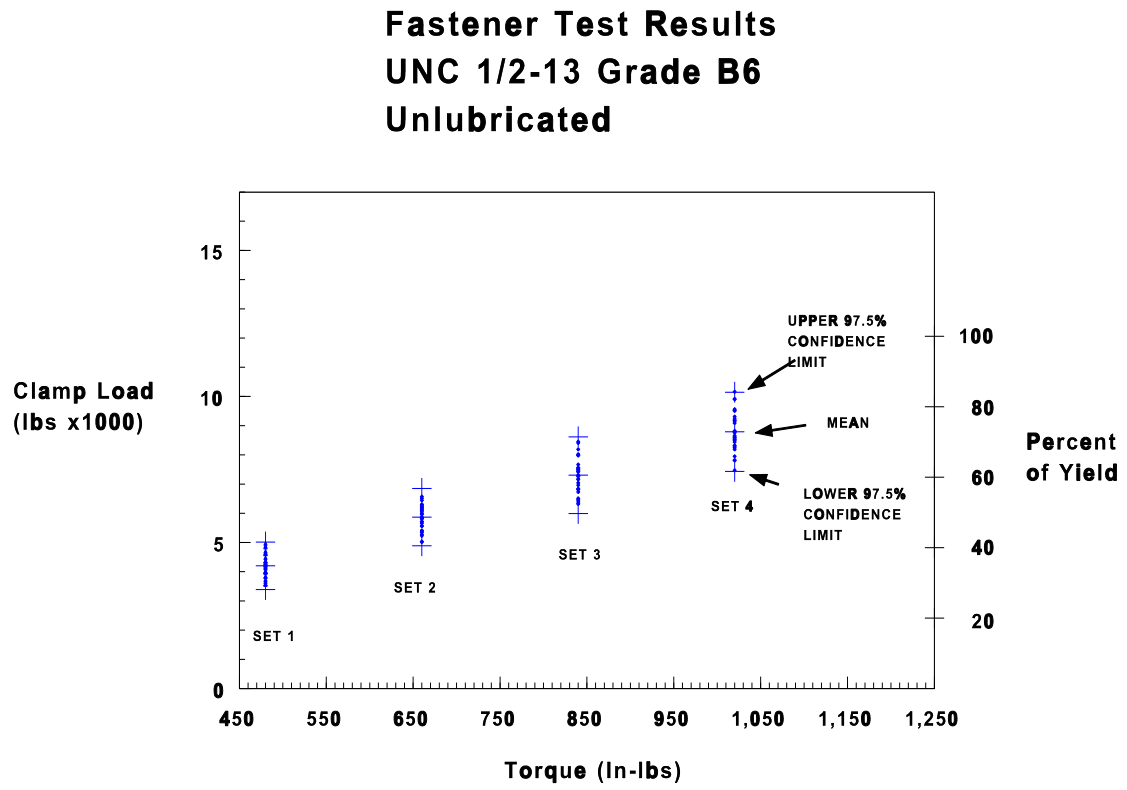


Figure A. Graphical Depiction of 4 Sets of Torque Tests

Table A. Raw Torque Data fo UNC 1/2 -13 Grade B6 Fasteners

Fastener Number	Set 1 480 in-lbs	Set 2 660 in-lbs	Set 3 840 lbs	Set 4 1020 lbs
	Resulting Clamp Load (lbs x 1000)			
1	3.99	6.88	8.99	10.16
2	4.61	6.28	7.52	8.76
3	4.24	6.17	7.67	9.51
4	4.61	6.31	8.41	9.91
5	4.84	5.71	7.42	9.31
6	3.73	5.56	6.84	8.32
7	4.78	6.44	7.99	9.56
8	4.00	5.35	6.81	8.55
9	4.28	5.96	7.55	8.66
10	3.58	5.41	6.35	8.30
11	3.84	5.83	7.04	8.25
12	4.37	5.72	7.28	8.60
13	4.97	6.81	8.19	9.52
14	4.36	5.86	6.96	8.82
15	3.97	5.28	6.32	7.95
16	4.01	5.87	6.83	8.51
17	4.21	5.84	7.31	8.44
18	4.36	6.24	8.02	9.23
19	3.56	5.23	6.51	7.47
20	4.25	6.17	7.43	8.51
21	4.12	5.81	7.17	8.79
22	4.16	5.66	7.26	9.09
23	3.58	5.02	6.47	7.82
24	3.83	5.57	7.16	8.61
25	3.66	5.03	6.73	8.19
26	4.48	5.39	6.42	7.81
27	4.34	5.99	7.48	8.80
28	4.76	6.12	7.56	9.16
29	4.01	6.05	7.49	9.91
30	4.64	6.57	7.98	9.18
Mean	4.20	5.87	7.31	8.79
Upper 97.5 Confidence	5.02	6.85	8.62	10.15
Lower 97.5 Confidence	3.39	4.89	5.99	7.43

B) Statistical Analysis

As depicted in Figure A and Table A, four sets of thirty fasteners were torqued to 480 in-lbs, 660 in-lbs, 840 in-lbs, and 1020 in-lbs, respectively. Statistical analysis at each torque value produced a mean clamp load and both an upper 97.5% confidence level and lower 97.5% confidence level. The 97.5 confidence lines for each set of data were determined by using a Student's t Factor of 2.045 which corresponds to a sample size of 30. The lower confidence line is determined by multiplying the standard deviation by the Student's t Factor and subtracting it

from the mean. The upper confidence line is determined by multiplying the standard deviation by the Student's t Factor and adding it to the mean (See *Equation 1A, 1B* and Ref. 1).

$$UCL = M + (t)(s_x) \qquad \textit{Equation 1A}$$

$$LCL = M - (t)(s_x) \qquad \textit{Equation 1B}$$

where:

UCL	=	Upper Confidence Level
LCL	=	Lower Confidence Level
M	=	Statistical Mean
t	=	Student's t Factor (2.045 for a sample size of 30)
s_x	=	Standard Deviation

At a specific torque value, the upper 97.5 confidence limit is the value where 97.5% of the fasteners were below the corresponding clamp load while the lower 97.5 confidence limit is the value where 97.5% of the fasteners were above the corresponding clamp load.

C) Establishment of Torque and Clamp Load Parameters

Using linear regression, both the confidence limits and the mean were interpolated/extrapolated so a complete curve relating torque to clamp load was developed (see Figure B).

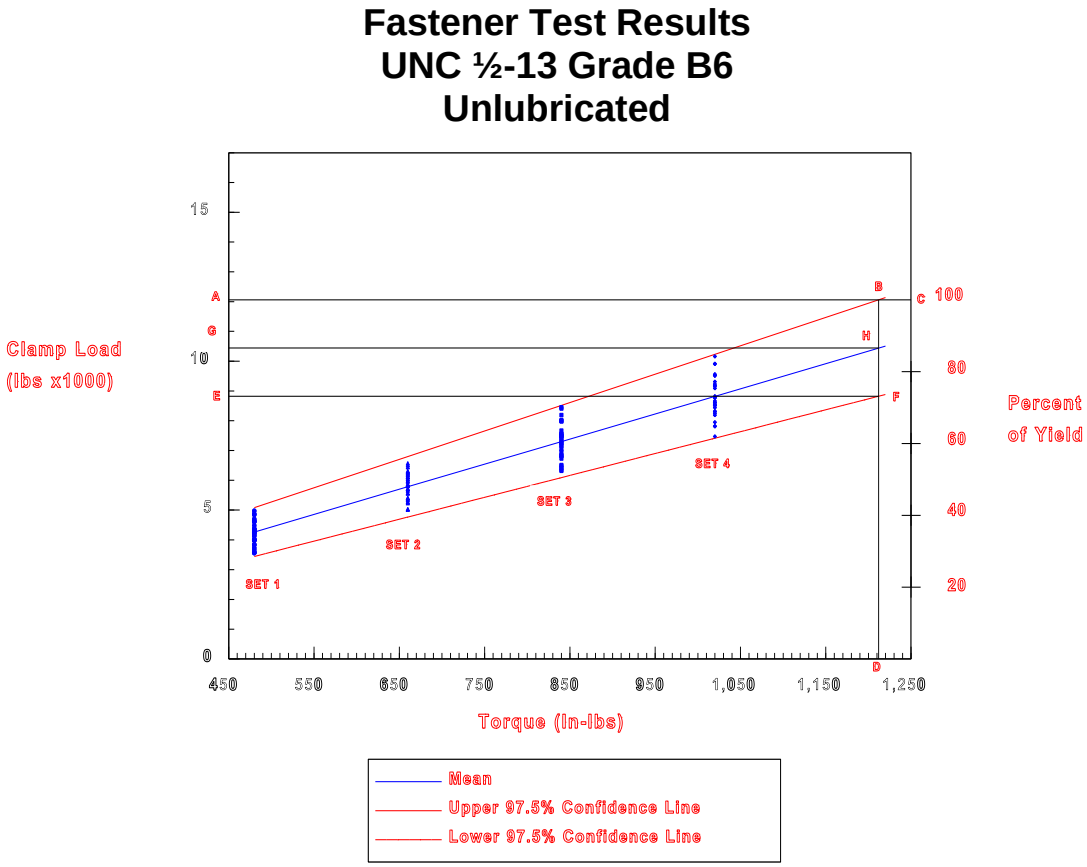


Figure B. Statistically Calculated Torque Curves

In order to optimize the joint, the fastener should be as tight as possible; however, common practice is to use fasteners multiple times. Accordingly, if a fastener was turned too tightly,

yielding could occur and the fastener might be reused in the yielded condition. In an attempt to avoid yielding, the yield load for a specific fastener was determined (line AC in Figure B) and a value at which 97.5% of the fasteners were below the yield load (Upper 97.5 Confidence Limit - point B in Figure B) was chosen for determining the torque value. For example, according to Figure B, the torque value for the fastener (line BD) is 1212 in-lbs, the resulting mean clamp load is 10,440 lbs (line GH), and 97.5% of the fasteners tightened to 1212 in-lbs will be below the yield load of 12,060 lbs (line AB).

Due to the variance from fastener to fastener in clamp load at a given torque value (see Table A), a method was established to guarantee that a specific minimum clamp load would prevail at a prescribed torque load. The clamp value that was chosen is the point at which the torque value (line BD in Figure B) intersects the lower 97.5 confidence line (point F in Figure B). Accordingly, in Figure B, the minimum clamp load is identified by line FE and is 8,820 lbs. For each tested bolt type and material, the minimum clamp is reported in the Standard Torque Tables.

In that 30 fasteners were tested to develop each set of statistics, the difference between the mean clamp load and the lower 97.5% confidence level is the standard deviation multiplied by 2.045 (the corresponding Student's t factor). Accordingly, the resulting minimum clamp load value is 2.045 times the standard deviation below the mean clamp load. Therefore, no further reduction of the resulting minimum clamp load value is recommended.

Section 2. Mathematical Development of Torque Curves for a Fastener Material

In Section 1, the torque value and the resulting minimum clamp load value for a specific fastener type (UNC 1/2-13) and a specific fastener grade (Grade B6) were determined from testing fasteners and then statistically evaluating the data. However, since several fastener sizes exist for each material grade, it is impractical to test each type of fastener. Accordingly, a mathematical method was developed to produce torquing information over the entire range of fastener sizes for a given material grade.

A) Relationship Between Torque, Clamp Load, and Friction

The mathematical equation (Ref. 2) used to identify the relationship between torque, friction, and clamp load for an ANSI B1.1 thread is:

$$T=\{(F)(d_m)/2\} \times [\{\tan\lambda + (\mu)(\sec\alpha)\}/\{1-(\mu)(\tan\lambda)(\sec\alpha)\}] + \{(F)(\mu_c)(d_c)/2\} \qquad \textit{Equation 1}$$

where:

T	=	Torque
F	=	Clamp Load
d_m	=	Mean Bolt Diameter
λ	=	Lead Angle
μ	=	Bolt Coefficient of Friction
α	=	Thread Angle/2
μ_c	=	Collar (Nut) Friction
d_c	=	Mean Collar (Nut) Diameter

Since a specific bolt and its mating nut have common coefficients of friction ($\mu = \mu_c$) due to both common lubricants and material properties, the applicable equation is:

$$T=\{(F)(d_m)/2\} \times [\{\tan\lambda + (\mu)(\sec\alpha)\}/\{1-(\mu)(\tan\lambda)(\sec\alpha)\}] + \{(F)(\mu)(d_c)/2\} \qquad \textit{Equation 2}$$

Equation 2 then represents a line relating torque to the resulting clamp load with both a specific coefficient of friction and geometric features typical of the fasteners.

B) Establishing the Coefficient of Friction from Testing

For the specific bolted joint identified in Figure B, the coefficient of friction for the upper 97.5% confidence line, the mean line, and the lower 97.5% confidence line were determined by using *Equation 2* with the proper geometric factors (d_m , λ, α, d_c,) and then varying the coefficient of friction (μ) until a point on the line is identified.

For example, it was determined in Section 1 that at point B of Figure B the torque was 1212 in-lbs and resulting clamp load was 12,060 lbs. By using this clamp load (F=12,060) and the geometric constants typical of the 1/2-13 fastener into *Equation 2* and then varying the coefficient of friction (μ) until the torque (T) equaled 1212 in-lbs, a coefficient of friction (0.154) for the upper 97.5% confidence line was identified. Using this procedure, the clamp load and torque values at points H sand F (Figure B) were used to determine the coefficient of friction for both the Mean Line and the Lower 97.5% Confidence Line (see Table B).

Table B. Coefficient of Friction for UNC 1/2-13, Grade B6 Fasteners

Fastener Diameter (Inches)	Lubricant	Coefficient of Friction (μ)		
		97.5% Upper Confidence Line	Mean Line	97.5% Lower Confidence Line
1/2	None	0.154	0.181	0.218

For a given fastener material, 1/4" and 1/2" unlubricated bolts as well as 1/2" and 1" lubricated bolts were tested (as described in Section 1) so that Torque vs. Clamp Load curves could be constructed. In each case the coefficients of friction for the Mean Line, the Lower 97.5% Confidence Line, and the Upper 97.5% Confidence Line were determined (see Table C).

Table C. Coefficient of Friction for Torque Tested Grade B6 Fasteners

Fastener Diameter (Inches)	Lubricant	Coefficient of Friction		
		97.5% Upper Confidence Line	Mean Line	97.5% Lower Confidence Line
1/4	None	0.189	0.206	0.226
1/2	None	0.154	0.181	0.218
1/2	P/N 917427C1	0.088	0.108	0.139
1	P/N 917427C1	0.088	0.131	0.231

C) Interpolating the Coefficient of Friction for Untested Fastener Sizes

Since fasteners less than 1/2" in diameter are unlubricated, the coefficient of friction for untested fastener sizes less than 1/2" in diameter were determine by interpolating between the 1/4" and 1/2" fasteners that were tested in an unlubricated condition. Likewise, since fasteners 1/2" or greater in diameter are lubricated, the coefficient of friction for untested fastener 1/2" or greater in diameter were determined by interpolating between 1/2" and 1" fasteners that were tested in the lubricated condition. For sizes greater than 1", the coefficient of friction values for the 1" fasteners were used (see Table D).

Table D. Complete Coefficient of Friction Summary for Grade B6 Fasteners

Fastener Diameter (Inches)	Lubricant	Coefficient of Friction		
		97.5% Upper Confidence Line	Mean Line	97.5% Lower Confidence Line
1/4	None	0.189	0.206	0.226
1/4<&<1/2	-----	0.171	0.193	0.222
1/2	None	0.154	0.181	0.218
1/2	P/N 917427C1	0.088	0.108	0.139
1/2<&<1	----	0.088	0.119	0.185
1	P/N 917427C1	0.088	0.131	0.231
>1	----	0.088	0.131	0.231

D) Calculating Required Torque and Resulting Minimum Clamp Load Values

Once the coefficients of friction for all fastener sizes of a specific material were determined, *Equation 2* can then be used to determine the torque value at the point where the 97.5% confidence line intersect the yield point of the fastener (for example, point B in Figure B). This is done by inputting into *Equation 2* the geometric constants, the interpolated coefficient of friction (from Table D), and the load to produce yield for the specific fastener, and then solving for the Torque.

After the torque at intersection of the 97.5% Confidence Line and the yield load is determined (point B in Figure B), *Equation 2* is manipulated and solved for clamp load (See *Equation 3*). The clamp load at the lower 97.5% Confidence Line is determined by inputting the corresponding coefficient of friction (from Table D), geometric constants, and the torque value produced from *Equation 2*.

$$F = (T)/[\{(d_m)/2\} \times \{\tan\lambda + (\mu)(\sec\alpha)\}/\{1-(\mu)(\tan\gamma)(\sec\alpha)\} + \{(\mu)(d_c)/2\}] \qquad \textit{Equation 3}$$

For each fastener material type included in The Standard Torque Tables (Tables 2-15), actual torque testing combined with interpolation to identify coefficients of friction was the method for determining the resulting minimum clamp load from a given torque value.

Part II. Empirical Torque Values (Tables 16-17)

Due to the wide variety of fastener materials that may be used in combination to tighten a joint, a method of determining torque and resulting minimum clamp load values with respect to yield stress is summarized herein.

Section 1 Determining Torque Values and Resulting Clamp Loads for Untested Fasteners

A) General Torque Equation – Determining the Coeficient of Friction

As outlined, both the association between the confidence levels and torque values (Part I, Sections A-C) and the mathematical relationship between torque and Clamp Load (*Equations 1-3*) are used to form The Empirical Table; however, the method for determining the coefficient of friction is different.

In Part I, the coefficients of friction for the Standard Torque Tables were determine both by torquing fasteners and by interpolating between established friction factors (see Part I, Section B-C). In the case of untested fasteners, the empirical torque values are based on averaging the coefficients of friction that were produced by the standard torque test. Therefore, the coefficients of friction that make up the Empirical Torque Table are typical for a specific fastener size, but less accurate for a given material. The average coefficients of friction for the various fastener sizes are outlined in Table E. It should be noted that the coefficients of friction for 1/4" bolts was also used for bolts smaller than 1/4".

Table E. Average Coefficients of Friction Summary

Fastener Diameter (Inches)	Lubricant	Average Coefficient of Friction (μ)		
		97.5% Upper Confidence Line	Mean Line	97.5% Lower Confidence Line
<1/4	----	0.158	0.195	0.290
1/4	None	0.158	0.195	0.290
1/4<&<1/2	-----	0.150	0.181	0.261
1/2	None	0.141	0.169	0.232
1/2	P/N 917427C1	0.074	0.086	0.108
1/2<&<1	----	0.079	0.094	0.129
1	P/N 917427C1	0.084	0.102	0.149
>1	----	0.084	0.102	0.149

B) General Torque Equation – Torque Value and the Resulting Clamp Load

Once the coefficient of friction is determined, the relationship between Torque and clamp load is calculated by using *Equations 2*. For example, the factor (or Torque Constant) for determining torque requirements for a 1/4" ANSI B1.1 fastener consist of a geometric constants (as

indicated in *Equation 2*) and the coefficient of friction constant at the 97.5% Upper Confidence Line (0.158 from Table E). This Torque Constant ("TC") is then divided into the yield strength (Point B in Figure B) of the joint component that has the lower strength to produce the Torque Value (see *Equation 4*)**.**

$$T = (\sigma_{min})/TC \qquad \textit{Equation 4}$$

where:

T = Torque Value

σ_{min} = Yield Strength of the weaker component

TC = Torque Constant

After determining the Torque Value, the resulting minimum clamp load can be calculated by using *Equation 3*. The same geometric constants for the 1/4" used previously combined with the coefficient of friction constant at the 97.5% Lower Confidence Line (0.290 from Table E) determine the Clamp Constant (CC). The Torque (T) determined from *Equation 4* is then multiplied by the Clamp Constant to calculate the resulting minimum clamp load (see *Equation 5*).

$$MC = (T) \times (CC) \qquad \textit{Equation 5}$$

where:

MC = Minimum Clamp Load
T = Torque
CC = Clamp Constant

For the range of ANSI B1.1 fastener sizes, The Empirical Torque Table identifies the Torque Constants and the Clamp Constants needed to determine torque values and the resulting clamp load. Just like the Standard Torque Tables, the resulting minimum clamp load is at 2.045 times the standard deviation below the mean clamp load (Part I, Section 1-C) and should not be further reduced.

References

1. A.C. Catland, "Measurement Uncertainty", Measurement Technology Company, Newbury Park, California, 1993, pp. 4-2 to 4-4.

2. J.E. Shigley and L.D. Mitchell, Mechanical Engineering Design, 4th Ed., McGraw-Hill, New York, New York, 1983, pp 357-378

Solar Turbines
A Caterpillar Company

SPECIFICATION

INGESTIVE CLEANING SOLAR TURBINE ENGINES

Data Control Level
1

Release Stamp
CDM

SPECIFICATION NO. ES 9-62

ISSUED: 04-10-02; ERL 0716-1
(Date and PRD No.)

REVISION:
(Letter, Date and PRD/CR No.)

A; 10/10/78; EL 2336-1
B; 6/7/82; ERL 5459-1
C; 11/8/85; ERL 8100-3
D; 3/28/88; ERL 9707-1
E; 5/11/89; ERL 9348-5
F; 2/2/90; ERL 0164-1
P; 10/10/07; CR18323

G; 5/29/92; ERL 10236-1
H; 11/29/94; ERL 11248-1
J; 7/8/98; PRD13562-1
K; 04-10-02; PRD14714-1
L; 06/20/02; CR01511
M; 08/28/06; CR14043

Rev. Ltr/	CR#	Signature & Title	Date
R	87498	Prepared By: **Alexander J. Lapid** Sr. Principal Engineer	02-19-15
		Approved By: **John P. Montague** Group Manager Materials Technology	02-19-15

CONTENTS

TABLES

1.0 SCOPE

1.1 PURPOSE - This specification establishes technical requirements for removing contamination in the compressor air path of Solar turbine engines by ingestive cleaning.

1.2 CLEANING PROCEDURES - The requirements defined herein serve as a basis for establishing proper cleaning procedures such that surface contamination in the compressor air path can be removed without damage to the engine. Details of the cleaning methods, cleaning instructions and suitable equipment for each engine model are not a part of this document as they are provided in the Operation and Maintenance Instruction (OMI) manual and in Solar's Service Bulletins.

1.3 CLEANING PRODUCTS - This specification provides the standards for product acceptance to ensure that the cleaning product(s) used are not harmful to the materials of construction.

2.0 DEFINITIONS

2.1 FREEZE POINT DEPRESSANT– Material used to depress the freezing point of the cleaning product.

2.2 CLEANING EQUIPMENT - Accessory equipment used to properly introduce a cleaning product (not solid cleaners) into the air inlet.

2.3 CLEANING MODE - The mode of operation of the engine (on-crank or on-line) while cleaning is performed.

2.4 CLEANING PRODUCT – A chemical solution that is introduced into the air inlet for the purpose of ingestive cleaning of the engine.

2.5 CLEANING SOLUTION – A detergent and/or solvent material that is mixed with water to produce the cleaning product.

2.6 CLEANING SYSTEM - An appropriate combination of cleaning product, cleaning procedure and cleaning equipment to be used for a particular engine model.

2.7 DETERGENT – Cleaning solution that liberates contamination by surface interaction (surfactant).

2.8 INGESTIVE CLEANING - Engine compressor cleaning where cleaning product is introduced through the air inlet.

2.9 ON-CRANK - Engine operation at maximum speed obtainable on starter alone with fuel and ignition deactivated.

2.10 ON-LINE - Engine fired and operating at any power level ranging from idle (no load) to full rated power and load.

2.11 SOLVENT – Cleaning solution that dissolves contamination through reaction at molecular bonds.

3.0 APPLICABLE DOCUMENTS

3.1 SPECIFICATIONS - The following documents of the latest issue in effect on the release date of this specification form a part of this specification to the extent specified herein.

Solar

ES 9-98	Fuel, Air and Water (or Steam) for Solar Gas Turbine Engines

Military

MIL-D-16791	Detergents, General Purpose (Liquid, Nonionaic)
MIL-F-16884	Fuel Oil, Diesel, Marine
MIL-E-9500	Ethylene Glycol, Technical

American Society for Testing Materials

ASTM D482	Standard Test Method for Ash from Petroleum Products
ASTM D512	Chloride Ion in Water and Waste Water, Test for
ASTM D770	Standard Specification for Isopropyl Alcohol
ASTM D857	Standard Test Methods for Aluminum in Water
ASTM D858	Standard Test Methods for Manganese in Water
ASTM D1068	Standard Test Methods for Iron in Water
ASTM D1293	pH of Water, Test for
ASTM D1428	Sodium and Potassium in Water and Water-Formed Deposits by Flame Photometry, Tests for
ASTM D1688	Standard Test Methods for Copper in Water
ASTM D1888	Particulate and Dissolved Matter, Solids, or Residue in Water
ASTM D2699	Standard Specification for Kerosene

4.0 GENERAL REQUIREMENTS

4.1 ON-CRANK VERSUS ON-LINE CLEANING - In general, on-crank cleaning tends to be more effective to remove deposits in the compressor air path. On-line cleaning may be performed in between on-crank cleaning cycles to extend time between on-crank cleaning and to minimize further deposition onto cleaned airfoils. Because the engine is firing during on-line cleaning, the cleaning liquid (either water or cleaning solution) ingested must meet the more stringent requirements defined in this specification to minimize introduction of corrosive/fouling contaminants.

4.2 INTERVALS BETWEEN ENGINE CLEANING – Appropriate intervals for both on-crank and on-line cleaning should be determined by recording and trending engine performance degradation. Cost of the maintenance outage versus that of continued operation with compromised performance must also be considered. However, one should not delay cleaning so long that contamination becomes impossible to remove completely by on-crank cleaning. On-crank cleaning is recommended at maximum intervals of every 4,000 hours of operation, and before full load power degrades more than 5%. For two shaft turbines operating at full load on T5 topping this typically corresponds to a 2.5% drop in Pcd. For two shaft turbines operating at full load on Ngp topping, degree of compressor fouling is more difficult to quantify. As the compressor fouls, T5 will increase with little change in power or Pcd until T5 topping is achieved.

On-line cleaning intervals should be determined by observing the effectiveness in restoring performance. On-line cleaning is best suited to remove the initial buildup of contamination from already clean airfoils. If the airfoils become significantly fouled between on-line cleaning intervals, cleaning will be less effective. Initial on-line cleaning interval should be at most 48 hours of operation. Performance should then be evaluated to determine the effect of each

cleaning operation, and overall rate of performance degradation. After completing an on-crank cleaning, the on-line cleaning interval can be increased to 72 hours of operation. If no significant difference in on-line cleaning effectiveness is observed, the interval may be increased again by 24 hours. Typically, the maximum interval for an effective on-line cleaning program is no more than 96 hours of operation.

Recommended minimum intervals between cleaning operations to avoid excessive ingress of cleaning product into the oil system are:

On-Crank Cleaning - at least 96 operating hours between each on-crank cleaning cycle
On-Line Cleaning - at least 24 operating hours between each on-line cleaning cycle

4.3 CLEANING PROCEDURES - Detailed cleaning procedures are described in the Operation and Maintenance Instruction (OMI) manual provided with each package. An outline of typical procedures are provided here:

On-Crank:

- Shut down turbine normally
- Cool until turbine case temperature at compressor to diffuser flange is less than 66C (150F)
- Open air inlet access covers
- Open air inlet drain port
- Disconnect and isolate Pcd, buffer air and air sensing lines at connection points to compressor or diffuser
- Disconnect combustor, torch and exhaust drain lines
- Prepare cleaning product and cleaning equipment
- Crank turbine on the starter motor and allow speed to stabilize
- Apply cleaning product
- Stop turbine and allow cleaning product to soak for a period of 20 minutes
- Crank turbine on the starter motor and allow speed to stabilize
- Apply rinse water
- Verify that rinse water exiting from drains is clean, indicating that compressor cleaning was effective and repeat cleaning operation as necessary
- Continue crank for 5-10 minutes after rinse water is consumed
- Stop turbine
- Inspect inlet housing and compressor inlet to verify cleanliness
- Reassemble and reconnect all components and lines
- Restart turbine and operate for at least one hour to evaporate remaining rinse water

On-Line:

- Verify that unit is operating normally with steady load and speed
- Prepare cleaning product and cleaning equipment
- Apply cleaning product
- Apply rinse water
- Isolate cleaning equipment

4.4 CLEANING EQUIPMENT - Use of cleaning equipment designed specifically for each turbine model is important to ensure that adequate and uniform atomization occurs at the

compressor inlet. This is particularly important for on-line cleaning to avoid overloading of airfoils that can result from non-uniform distribution or excessively large liquid droplets. Use of inappropriate equipment may result in compressor damage.

Cleaning product is introduced to the turbine inlet through manifolds and nozzles mounted directly to the turbine inlet duct, with separate systems for either on-crank or on-line cleaning. Cleaning product can also be introduced manually using a hand held sprayer wand, but only for the on-crank cleaning procedure. With either application method, cleaning product volume and flow rates must comply with the requirements defined in Section 4.8 of this specification.

4.5 AMBIENT TEMPERATURE DURING ENGINE CLEANING – On-line engine cleaning is permitted only at ambient temperatures above 4°C (39°F).

On-crank engine cleaning is permitted only at ambient temperatures above -20°C (-4°F). When the ambient temperature is between -20°C (-4°F) and 4°C (39°F), a mixture of water and freeze point depressant must be used for on-crank cleaning. The ratio of the water/freeze point depressant mix depends upon the type of freeze point depressant used, and recommended ratios are listed in Table 1. In order to be effective, the solution must be well mixed immediately prior to use.

Table 1. On-Crank Requirements for Water/Freeze Point Depressant Mix Volume Ratio in Cold Ambient Temperatures

Ambient Temperature	Freeze Point Depressant	Volume Ratio Freeze Point Depressant : Water
-20°C(-4°F) to 4°C(39°F)	Methanol	2 : 3
-20°C(-4°F) to 4°C(39°F)	Mono-ethylene Glycol	2 : 3
-10°C(14°F) to 4°C(39°F)	Isopropyl Alcohol	1 : 1

4.6 ENGINE TEMPERATURE DURING ENGINE CLEANING - Prior to on-crank cleaning, the engine casing surface temperature, measured at the compressor to diffuser flange shall not exceed 65°C (150°F).

4.7 RECUPERATED CYCLE APPLICATIONS - Water and/or cleaning solutions are not permitted in recuperators except for Harrison and GEA models. For all other recuperator models, on-crank cleaning must be performed at a reduced crank speed of 800 - 900rpm to avoid depositing cleaning refuse in the recuperator. In addition, a "low-foam" cleaning solution or anti-foaming agent must be used to ensure that cleaning products do not enter the recuperator. On-line cleaning is not permitted for any recuperated units.

4.8 FLOW REQUIREMENTS - Tables 2 and 3 list the total volume of fluid and flow rate required for on-crank and on-line cleaning for each model turbine.

Table 2. On-Crank Cleaning Solution and Rinse Water Flow Requirements

Product Family	On-Crank Cleaning Product Volume	On-Crank Rinse Water Volume	On-Crank Flow Rate [FOR CLEANING OR RINSE]
Titan 130	75.7 – 94.6 liters (20-25 Gallons)	94.6 – 189.3 liters (25-50 Gallons)	17 to 20.8 liter/min (4.5 to 5.5 gpm)
Mars 90/100	56.8 – 75.7 liters (15-20 Gallons)	75.7 – 151.4 liters (20-40 Gallons)	11.4 to 15.1 liter/min (4 to 5 gpm)
Taurus 65/70	56.8 – 75.7 liters (15-20 Gallons)	75.7 – 151.4 liters (20-40 Gallons)	7.5 to 11.3 liter/min (4 to 5 gpm)
Taurus 60	45.4 – 64.3 liters (12-17 Gallons)	64.4 – 128.7 liters (17-34 Gallons)	9.1 to 12.9 liter/min (2.4 to 3.4 gpm)
Centaur 40/50	45.4 – 64.3 liters (12-17 Gallons)	64.4 – 128.7 liters (17-34 Gallons)	9.1 to 12.9 liter/min (2.4 to 3.4 gpm)
Saturn 10/20	30.3 – 37.9 liters (8-10 Gallons)	37.9 – 75.7 liters (10-20 Gallons)	5.7 to 9.5 liter/min (1.5 to 2.5 gpm)
Mercury 50	56.8 – 75.7 liters (15-20 Gallons)	75.7 – 94.6 liters (20-25 Gallons)	6.8 to 7.6 liter/min (1.8 to 2.0 gpm)
Titan 250	75.7 – 94.6 liters (20-25 Gallons)	94.6 – 189.3 liters (25-50 Gallons)	18.9 to 22.0 liter/min (5.5 to 5.8 gpm)

Table 3. On-Line Cleaning Solution and Rinse Water Flow Requirements

Product Family	On-Line Cleaning Product Volume	On-Line Rinse Water Volume	On-Line Flow Rate [FOR CLEANING OR RINSE]
Titan 130	75.7 – 94.6 liters (20-25 Gallons)	94.6 – 189.3 liters (25-50 Gallons)	11.4 to 13.6 liter/min (3 to 3.6 gpm)
Mars 90/100	56.8 – 75.7 liters (15-20 Gallons)	75.7 – 151.4 liters (20-40 Gallons)	8.3 to 10.6 liter/min (2.2 to 2.8 gpm)
Taurus 65/70	56.8 – 75.7 liters (15-20 Gallons)	75.7 – 151.4 liters (20-40 Gallons)	5.3 to 7.6 liter/min (1.4 to 2 gpm)
Taurus 60	45.4 – 64.3 liters (12-17 Gallons)	64.4 – 128.7 liters (17-34 Gallons)	2.3 to 4.5 liter/min (0.6 to 1.2 gpm)
Centaur 40/50	45.4 – 64.3 liters (12-17 Gallons)	64.4 – 128.7 liters (17-34 Gallons)	2.3 to 4.5 liter/min (0.6 to 1.2 gpm)
Saturn 10/20	30.3 – 37.9 liters (8-10 Gallons)	37.9 – 75.7 liters (10-20 Gallons)	1.5 to 3.8 liter/min (0.4 to 1 gpm)
Mercury 50	N/A	N/A	N/A
Titan 250	75.7 – 94.6 liters (20-25 Gallons)	94.6 – 189.3 liters (25-50 Gallons)	13.2 to 15.5 liter/min (3.5 to 4.1 gpm)

5.0 CLEANING PRODUCT

5.1 WATER - Water to be used for ingestive cleaning (or rinsing) of any Solar turbine engine shall comply with the requirements set forth in ES 9-98.

5.2 CLEANING PRODUCT COMPOSITION AND PHYSICAL PROPERTIES – Composition and physical properties of cleaning products must comply with the limits defined in ES 9-98. Failure to comply with these limits can cause corrosive attack and/or other harmful effects resulting in rapid engine deterioration. When the cleaning product consists of a mixture of cleaning solution concentrate and water, the limits in ES 9-98 apply to the resulting cleaning product.

Solar offers various cleaning solutions that when properly mixed as a cleaning product, comply with both on-crank and on-line requirements of ES 9-98. These are available through the Solar Service Parts support network and part numbers are listed in Table 4. Three different types of cleaning solutions are available, each in either concentrate or ready mixed solutions:

Table 4. Solar Cleaning Solutions for On-Line and On-Crank Cleaning

SOLAR PRODUCT NAME	SOLAR P/N	Maximum Strength Volume Ratio (Water:Cleaning Solution)
Solar Gas Turbine Cleaner No. 1 (Petroleum Solvent Based) Concentrate	P/N 701690C2 (6.5 gal)	4:1
	P/N 701691C2 (55 gal)	
Solar Gas Turbine Cleaner No. 1 (Petroleum Solvent Based) Ready-To-Use	P/N 701696C2 (6.5 gal)	Full Strength
	P/N 701697C2 (55 gal)	
Solar Gas Turbine Cleaner No. 2 (Natural Solvent Water Based) Concentrate	P/N 701688C2 (6.5 gal)	4:1
	P/N 701689C2 (55 gal)	
Solar Gas Turbine Cleaner No. 2 (Natural Solvent Water Based) Ready-To-Use	P/N 701694C2 (6.5 gal)	Full Strength
	P/N 701695C2 (55 gal)	
Solar Gas Turbine Cleaner No. 3 (Non-Solvent Water Based) Concentrate	P/N 1011634 (6.5 gal)	4:1
	P/N 1011635 (55 gal)	
Solar Gas Turbine Cleaner No. 3 (Non-Solvent Water Based) Ready-To-Use	P/N 1011636 (6.5 gal)	Full Strength
	P/N 1011637 (55 gal)	

5.2.1 Solar Gas Turbine Cleaner No. 1 – Petroleum solvent based solution is the most effective type for cleaning oil and Carbon based fouling. However, local environmental regulations may require special treatment of the waste from on-crank cleaning. Disposal is not typically a consideration for on-line cleaning because the cleaning product is combusted completely in the turbine.

5.2.2 Solar Gas Turbine Cleaner No. 2 - This biodegradable type of solution is formulated with natural solvents and detergents and is generally less effective than petroleum based solutions.

Warming the solution to approximately 30°C (86°F) and allowing longer soak time can improve effectiveness.

5.2.3 Solar Gas Turbine Cleaner No. 3 – This biodegradable type of solution is formulated with natural detergents and is generally less effective than solutions containing solvents. Warming the solution to approximately 30°C (86°F) and allowing longer soak time can improve effectiveness.

5.3 EMULSIFIED KEROSENE/WATER SOLUTIONS - An emulsified mixture of kerosene and water or diesel fuel and water may be used for on-crank cleaning only. This mixture is formulated by mixing diesel fuel per MIL-F-16884 and water with an emulsifier per MIL-D-16791 (Type II) such that a homogenous, sprayable solution is formed and conforms to the requirements of ES9-62 and ES9-98. Other types of emulsifiers may be used, but they must meet the requirements of ES9-62 and ES9-98.

5.4 ABRASIVE CLEANING – Abrasive cleaners, such as Carboblast, walnut shells, pecan shells or rice, are not recommended for use in Solar's gas turbines. Use of abrasive cleaners can cause plugging of cooling air passages in nozzles and blades, resulting in loss of cooling air and thermal degradation of the component. Abrasive cleaners may also have a detrimental effect on compressor coating.

Solar Turbines
A Caterpillar Company

SPECIFICATION

FUEL, AIR, WATER (OR STEAM) & COMPRESSOR CLEANING FLUIDS FOR *SOLAR*® GAS TURBINE ENGINES

Data Control Level

1

Release Stamp

CDM

SPECIFICATION NO. ES 9-98

ISSUED: 10/29/82; ERL5670-1
(Date and ERL/PRD No.)

REVISION HISTORY:
(Letter, Date and PRD/ECN No.)

A; 03/29/85; ERL8646-1
B; 01/29/87; ERL9338-1
C; 02/20/90; ERL0210-1
D; 05/24/93; ERL10900-1
E; 08/05/93; ERL11071-1
F; 08/10/03; PRD14724-1
G; 03/22/04; CR09269
H; 07/09/04; CR09270
J; 10/14/04; CR10321
K; 01/18/05; CR10788
L; 08/28/06; CR14043
M; 12/12/06, CR15195
N; 01/30/08; CR18878
P; 06/27/08; CR20704
R; 01/06/09; CR22506
T; 02/23/09; CR22863
U; 07/14/09; CR24384
V; 12/16/09; CR24042
W; 02/17/10; CR26201
Y; 05/25/10; CR26924
AA; 03/14/11; CR29413
AB; 12/01/11; CR37814
AC; 12/21/14; CR56424
AD; 06/21/16; ECN97760
AE; 04/28/17; ECN103363
AF; 11/21/19; ECN118860

Rev. Ltr.	ECR #	Author(s) / Approver(s)	Date
AG	85590	Prepared By: Abdul Ahmed Senior Principal Engineer Approved By: Jose Aurrecoechea Manager, Materials & Processes	07-31-20

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd)

TABLE OF CONTENTS (Cont'd)

TABLES

1.0 SCOPE - This specification establishes the quality requirements for the fuel, air, water (or steam) and compressor cleaning solutions to be used in *Solar* gas turbine engines.

This specification supersedes all previous Solar fuel, air, or water specifications, including fuel specification ES 1211, ES 9-247, and ES 9-251, for use in *Solar* gas turbine operation.

1.1 RESPONSIBILITY/DEVIATIONS - It is the responsibility of the end user to ensure that where required by this specification, Solar Turbines' approval has been sought for use of the fluids cited. It is also the responsibility of the end user to ensure on a continuing basis that all fluids entering the gas turbines are compliant with this specification. Deviations from the limits and requirements herein shall not be considered without consultation and specific written approval from Solar Engineering. These approvals can be attained through the Special Engine Request Process.

2.0 APPLICABLE DOCUMENTS - The following documents, of issue in effect on the date of this specification, shall be a part of this specification to the extent specified herein.

Solar Specifications

ES 9-62	Ingestive Cleaning Solar Turbine Engines
ES 2069	Set-up, Installation, and Operating Instructions for Evaporative Coolers
ES 2707	Standard Air Sampling, Site and Laboratory Testing Requirements for TAI Filtration System

Solar Forms

FORM 2594	Liquid Fuel Suitability Inquiry
FORM 2595	Gaseous Fuel Suitability Inquiry
FORM 3091	Total Site Contamination Worksheet

Product Information Letters

PIL 162	Recommendations and Requirements for the Sourcing, Handling, Storage and Treatment for Gas and Liquid Fuels Used for Gas Turbines

American Society for Testing and Materials

ASTM D86	Method of Test for Distillation of Petroleum Products
ASTM D93	Method of Test for Flash Point by Pensky - Martens Closed Tester
ASTM D97	Method of Test for Pour Points
ASTM D130	Method of Test for Copper Corrosion by Petroleum Products, Copper Strip Test
ASTM D240	Method of Test for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter
ASTM D323	Method of Test for Vapor Pressure of Petroleum Products (Reid Method)
ASTM D445	Method of Test for Viscosity of Transparent and Opaque Liquids (Kinematic and Dynamic Viscosities)
ASTM D482	Method of Test for Ash from Petroleum Products
ASTM D511	Tests for Calcium and Magnesium in Water
ASTM D512	Standard Test Method for Chloride Ion in Water
ASTM D664	Standard Test Method for Acid Number of Petroleum Products by Potentiometric Titration
ASTM D524	Method of Test for Ramsbottom Carbon Residue of Petroleum Products
ASTM D808	Tests for Chlorine in New and Used Petroleum Products (Bomb Method)
ASTM D859	Tests for Silica in Water
ASTM D1072	Test for Total Sulfur in Fuel Gases
ASTM D1179	Standard Test Methods for Fluoride Ion in Water
ASTM D1253	Tests for Residual Chlorine in Water
ASTM D1266	Sulfur in Petroleum Products and liquefied Petroleum Gases (Lamp Method)
ASTM D1267	Vapor Pressure of Liquefied Petroleum Gases

ASTM D1293	Tests for pH of Water
ASTM D1298	Density, Specific Gravity or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method
ASTM D1319	Method of Test for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Absorption
ASTM D1657	Test Method for Density or Relative Density of Light Hydrocarbons by Pressure Hydrometer
ASTM D1838	Copper Strip Corrosion by Liquefied Petroleum Gases
ASTM D2163	Analysis of Liquefied Petroleum Gases by Gas Chromatography
ASTM D2500	Method of Test for Cloud Point
ASTM D2598	Calculation of Physical Characteristics of Liquefied Petroleum Gases from Compositional Analysis
ASTM D2622	Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence
ASTM D3605	Trace Metals in Gas Turbine Fuels by Atomic Absorption and Flame Emission Spectroscopy
ASTM D3373	Tests for Vanadium in Water
ASTM D3559	Tests for Lead in Water
ASTM D3868	Standard Test Methods for Fluoride Ion in Brackish Water, Seawater, and Brines
ASTM D3919	Standard Practice for Measuring Trace Elements in Water by Graphite Furnace Atomic Absorption Spectrophotometry
ASTM D4052	Standard Test Method for Density and Relative Density by Digital Density Meter
ASTM D4192	Standard Test Method for Potassium in Water by Atomic Spectrophotometry
ASTM D4294	Standard Test Method for Sulfur in Petroleum and Petroleum Products by Energy Dispersive X-ray Fluorescence Spectrometry
ASTM D4418	Standard Practice for Receipt, Storage, and Handling of Fuels for Gas Turbines
ASTM D4629	Standard Test Method for Trace Nitrogen in Liquid Petroleum Hydrocarbons by Syringe/Inlet Oxidative Combustion and Chemiluminescence Detection
ASTM D5186	Test Method for Determination of Aromatic Content of Diesel Fuels by Supercritical Fluid Chromatography
ASTM D5453	Determination of Total Sulfur in Light Hydrocarbons
ASTM D5673	Standard Test Method for Elements in Water by Inductively Coupled Plasma Spectrometry
ASTM D5762	Standard Test method for Nitrogen in Petroleum and Petroleum Products by Boat-Inlet Chemiluminescence
ASTM D5907	Standard Test Method for Filterable and non-Filterable Matter in Water
ASTM D6079	Evaluating Lubricity of Diesel Fuels by High-Frequency Reciprocating Rig (HFRR)
ASTM D6217	Standard Test Method for Particulate Contamination in Middle Distillate Fuels
ASTM D6304	Standard Test Method for Determination of Water in Petroleum Products
ASTM D6584	Standard Test Method for Determination of Total Monoglycerides, Total Diglycerides, Total Triglycerides, and Free and Total Glycerin in Biodiesel Methyl Esters by Gas Chromatography
ASTM D6591	Standard Test Method for Determination of Aromatic Hydrocarbon Types in Middle Distillates
ASTM D7111	Determination of Trace Elements in Middle Distillate Fuels by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES).

ASTM D7220	Standard Test Method for Sulfur in Automotive, Heating, and Jet Fuels by Monochromatic Energy Dispersive X-ray Fluorescence Spectrometry
ASTM D7371	Standard Test Method for Determination of Biodiesel (Fatty Acid Methyl Esters) Content in Diesel Fuel Oil Using Mid Infrared Spectroscopy (FTIR)
ASTM D7800	Standard Test Method for Determination of Elemental Sulfur in Natural Gas.

European/British Standards

EN 4110	Determination of Methanol Content (British Standard)
EN 14112	Determination of Oxidation Stability (Accelerated Oxidation Test) (British Standard)

Air Filter Efficiency Test Specifications

ASHRAE 52.2	Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size
EN 779	Particulate Air Filters for General Ventilation — Determination of the Filtration Performance (ISO 16890 replaced EN 779)
EN 1822	High Efficiency Air Filters (EPA, HEPA and ULPA)

Natural Gas Processors Association

NGP 2140-70	Liquefied Petroleum Gas Specifications and Test Methods

Deutches Institute Fur Normung (DIN)

DIN 51850	Gross and Net Calorific Value of Pure Gaseous Fuels

US Bureau of Mines

Bulletin 627	Flammability Characteristics of Combustible Gases and Vapors

International Organization for Standardization (ISO)

ISO 8537-1	Compressed Air- Part 1: Contaminants and purity classes
ISO 16890	Air Filters for General Ventilation

3.0 GENERAL REQUIREMENTS - The requirements stated herein govern the quality of air, fuel, and water (steam) entering the engine. Failure to meet the requirements in this specification can result in a negative impact on the performance and life expectations of the engine and package.

3.1 UNDESIRABLE CONTAMINANTS - The contaminants listed here are known to be harmful to engine components and must be controlled to within the maximum allowable limits specified for each contaminant in order to attain maximum engine life. The total quantity of each contaminant ingested by the engine must be limited regardless of whether it enters through the air, fuel, injected water (steam), or as liquid water carryover from evaporative cooling.

The limits for each of the several critical contaminants from all possible sources are provided in Table 1.

3.2 SOURCES OF CONTAMINATION – There are four major potential sources of contamination - air, fuel (gas, liquid, or solid), injected water/steam (for continuous NO_x control) and liquid water carryover from the evaporative cooler (if used). Minor sources of contamination include water for compressor cleaning, water for dual fuel injector purging, and compressor cleaning fluids have also been identified.

In order to effectively control the quality of air, fuel, and water entering the engine as defined in this Specification, Solar's Package Engineering Department shall be consulted in specifying treatment and cleanup systems for the major sources, while the minor sources must meet the quality specified in Tables 4and 5 of this document.

Table 1. Maximum Allowable Contaminant Concentrations

Contaminant	Limit[Note 1] in Fuel Equivalent Concentrations	Test Method
Sulfur (see Notes 2, 3, & 4)	10,000 ppmw FEC (See note 5A, 5B, 5C & 6). Additional restrictions apply for *SoLoNOx* liquid operation (See note 6)	ASTM D1072, D1266, D2622, D4294, D5453 or D7220.
Sodium + Potassium	0.5 ppmw FEC	ASTM D3605 or D7111
Vanadium	0.5 ppmw FEC	ASTM D3605, D3373 or D7111
Lead	1 ppmw FEC	ASTM D3605, D3559 or D7111
Calcium + Magnesium	2 ppmw FEC	ASTM D3605, D511 or D7111
Fluorine	1 ppmw FEC	ASTM D1179, D3868
Chlorine	0.15 weight percent or 1,500 ppmw FEC	ASTM D512, D808, D1253,
Others (See Notes 7 & 8)	0.5 ppmw FEC	

Notes:

(1) The limits given are FUEL EQUIVALENT CONCENTRATIONS (FEC), i.e., the maximum allowable concentration of each contaminant as if each contaminant is found solely in a fuel with LHV - 18,380 Btu/lb. (such as diesel #2). Instructions for performing calculations are provided in Appendix A, Form 3091, Total Site Contamination Worksheet.

(2) For installations with exhaust heat recovery equipment, it is important to maintain sulfur levels at below the SO_3 dew point. Because conversion from SO_2, to SO_3 in the combustor is a function of several factors that are not readily definable, it is recommended that fuel sulfur is limited to less than 0.5% weight FEC. This value is based on 60:1 air-to-fuel ratio at up to 17% conversion for an acid dew point of 240°F.

(3) If sulfur is present in the form of hydrogen sulfide, appropriate precautions must be taken to detect leaks because of the highly toxic nature of this gas even in trace quantities. High sulfur fuels (exceeding limits) may be used with special provisions; however, such fuels must be reviewed and approved in writing by Engineering prior to use.

(4) U.S. Federal and local Air Pollution control districts may require lower limits for sulfur.

(5A) Harsh environment protection hardware and ancillary equipment is required for gas fuel with H_2S concentration greater than 3000 ppmw FEC or liquid fuel with sulfur concentration more than 2000 ppmw FEC.

(5B) Sites with alkali-laden air (Marine, salt beds, salt mines), poor ambient air quality or proximity to sulfur sources require harsh environment protection hardware regardless of sulfur levels.

(5C) Higher sulfur levels (> 10,000 ppmw FEC) can be considered for a specific application and must be approved in writing by engineering.

(6) Liquid fuel sulfur content limits and specific fuel handling and storage requirements are required for *SoLoNOx* liquid fuel operation. Low emissions on diesel fuel require lower sulfur limits. Restrictions do not apply to kerosene or jet fuel A. See section 10.1.

(7) The following contaminants are unlikely to be present except in unusual or accidental contamination of air, fuel or water supplies. However, if detected at levels greater than 0.5 ppmw FEC fuel equivalent, special treatment and precautions are required.

Mercury – Cadmium – Bismuth – Arsenic – Indium – Antimony – Phosphorous – Boron - Gallium –Aluminum + Silicon.

(8) Any other trace element with concentrations over 0.5 ppmw FEC fuel equivalent should be discussed with, and reviewed, by Engineering.

3.3 DETERMINATION OF TOTAL CONTAMINANTS - The total concentration of each of the major potential sources of contaminants entering the engine can be determined by using the equations provided here.

For direct fired applications:

$$\text{Total Contaminant} = \frac{18{,}380}{\text{LHV}} \times [(\text{AFR})A + F + (\text{WFR})W + (\text{CFR})C]$$

For indirect fired applications:

$$\text{Total Contaminant} = 65 \times [A + (\text{WAR})W + (\text{CAR})C]$$

Where:

Total Contaminant	=	total concentration of that particular contaminant, ppmw fuel equivalent (for indirect fired applications, total contaminant is expressed as ppmw air equivalent concentration, normalized to 65 air-to-fuel ratio.
LHV	=	lower heating value of fuel, Btu/lb
AFR*	=	air-to-fuel mass ratio
A	=	concentration of that particular contaminant in air entering the engine, ppmw in air
F	=	concentration of that particular contaminant in fuel, ppmw in fuel
WFR*	=	water-to-fuel mass ratio
W	=	concentration of that particular contaminant in injected water, ppmw in water
CFR*	=	carryover water-to-fuel mass ratio
C	=	concentration of that particular contaminant in evaporative cooler water (or feed water), ppmw in water
WAR	=	water-to-air mass ratio
CAR	=	carryover water-to-air mass ratio

* Fuel ratios are based on actual fuel rather than combustible fuel

A worksheet (Form 3091) with instructions for performing the above calculation is provided in Appendix A. (Derivation of the above equation for directly fired applications and the functional equation used in Form 3091 are included in Appendix B.)

3.4 ADDITIVES - Chemicals can be added to fuel and water treatment systems for specific purposes, e.g., softening, settling out of particulates, inhibition of organic growths, etc. Caution should be exercised to ascertain that the additives are not comprised of critical elements listed in Table 1 and that the maximum allowable limits specified are complied with.

3.5 CUSTOMER SITE DATA REQUIREMENTS - Information as to the condition and quality of the air, water (including steam), and fuel to be ingested by the engine, and other environmentally influenced conditions such as ambient temperature and humidity ranges is required by Solar to adequately define the necessary combustion system configuration, engine controls, settings, protective coatings, devices and operating procedures.

3.5.1 SAMPLING - Sampling and analyses of air, fuel, and water must be performed according to the specified test methods. Unless specifically instructed otherwise, all sampling should be performed at locations just upstream of the engine.

3.5.2 ADDITIONAL SITE DATA - The following information, if available, is required for all installations:

- Ambient temperature range
- Ambient humidity range
- Altitude
- Type of environment (rural, agricultural, residential, arctic, industrial, offshore, marine, coastal, desert, semi-arid, or tropical)
- Fuel conditions (fuel temperature and pressure ranges)

4.0 AIR

4.1 AIR QUALITY - Air borne constituents such as gases, liquid droplets and solid particles, can contain undesirable contaminants that are considered harmful. Adequate air filtration must be used to remove the bulk of such air borne constituents including water carryover from evaporative cooler applications. The combined concentration of contaminants from air, fuel and water (steam) shall meet the requirements of paragraph 3.1 and the maximum limits specified in Table 1.

4.1.1 ADDITIONAL LIMITS - Air used for pulsing self-cleaning air cleaner shall meet the requirements of ISO 8573, Class 4.

4.2 CONCENTRATION OF AIR BORNE CONTAMINANTS - Air borne contaminants constitute only one of several means by which contaminants enter the turbine engine. The minimum air quality allowed depends on the quality of the other fluids, such as injected water, fuel, and water carryover (if applicable). In order to assess the impact of air borne contaminant(s) on the total concentration present in the engine, the fuel equivalent concentration (FEC) of each air borne contaminant can be calculated using the following function.

$$\text{Concentration in air, ppmw FEC} = \text{AFR} \times \frac{18380}{\text{LHV}} \times A\,(1-N)$$

Where:
- AFR = air-to-fuel ratio
- LHV = lower heating value, Btu/lb.
- A = concentration in ambient air, ppmw
- N = air cleaner efficiency, expressed as value 0.999 (99.9%)

4.2.1 CONCENTRATION GUIDELINES FOR AIR BORNE CONTAMINANTS - In general, air borne contaminants are expected to contribute less than 20% of the total concentration allowed except when air and fuel are the two fluids present. Depending on the type of application involved and the potential for system upsets, Table 2 serves as an approximate guideline for air borne contaminants, recognizing that variations in fluid quality can significantly change the balance implied in this guideline.

Table 2. Guidelines for Contaminant Concentrations (for nominal operating conditions with natural gas fuel)

Available Sources	Air Borne Contaminants (% of Total)	Fuel Borne Contaminants (% of Total)	(Inj.) Water Borne Contaminants (% of Total)	Contaminants From E/C Carryover (% of Total)
Air + Fuel	<70	<10	0	0
Air + Fuel + Inj. Water	<20	<10	<50	0
Air + Fuel + Inj. Water + E/C	<20	<10	<20	<30
Air + Fuel + E/C	<20	<10	0	<50
Note: These values are provided only as guidelines and they are based on experience at Solar. Because of the inexactness of some of the values involved in the calculations, a 20% margin is built in to the numbers provided here.				

4.3 SITE SPECIFIC CONTAMINANTS IN AIR - If ambient air at a particular site is known to be of poor quality, based on prior experience or influence of industries and/or activities in the vicinity, consult with Package Engineering to ascertain compliance with all the requirements of this specification.

4.4 MINIMUM AIR FILTER PARTICLE REMOVAL EFFICIENCY REQUIREMENTS - Filters used in air cleaners installed in the combustion air inlet systems of Solar gas turbine packages must meet a minimum airborne particle removal efficiency of ISO ePM_1 85 % (ISO 16890 replaced European standard EN 779, Grade F9) or MERV 15 (U.S. standard ASHRAE 52.2). In harsh environments having air borne and fuel borne contaminant concentrations too high to meet the guidelines in Table 2 using ISO ePM_1 85 % or MERV 15 filters, filters must have a minimum particle removal efficiency of E10 (European standard EN 1822). Note that this information is provided for the purpose of considering filters based on their efficiency in the context of calculations employed to evaluate the contaminant concentration limits expressed in this Engineering Specification. It does not imply that any filter meeting these particle removal efficiencies also meets other filter performance requirements of Solar Turbines Incorporated.

5.0 INJECTED WATER (OR STEAM)

5.1 WATER QUALITY FOR WATER INJECTION TO REDUCE NO_x - The quality of water injected into the combustor for NO_x control must meet the general requirements defined in Section 3.1 as well as the specific requirements described in Table 3.

Table 3. Additional Quality Requirements for Water Injection

Parameter	Requirement	Test Method
pH	5.5 to 8.5	ASTM D1293
Suspended Solids	≤2.6 mg/liter of sediment, solid or hard contaminants, 90% of the 2.6 mg shall be less than 5 micron in size. Max allowable size ≤ 10 micron.	ASTM D5907; ISO 11923
Dissolved Silica	≤0.1 ppmw SiO_2 (≤0.1 mg/l)	ASTM D859
Electrical Conductivity	≤5 µS/cm	ASTM D5391

5.2 CONCENTRATION OF (INJECTED) WATER BORNE CONTAMINANTS - Water borne contaminants from injected water/steam constitute only one of several means by which contaminants enter the turbine engine. The minimum water quality allowed depends on the quality of the other fluids, such as air, fuel, and water carryover (if applicable). In order to assess the impact of water borne contaminant(s) from injected water/steam on the total concentration present in the engine, the fuel equivalent concentration (FEC) of each water borne contaminant can be calculated using the following function.

$$\text{Concentration in water, ppmw FEC} = WFR \times \frac{18380}{LHV} \times W$$

Where:
- WFR = water-to-fuel ratio
- LHV = lower heating value, Btu/lb
- W = concentration of contaminant in injected water, ppmw

5.2.1 CONCENTRATION GUIDELINES FOR (INJECTED) WATER BORNE CONTAMINANTS - In general, water borne contaminants from injected water are expected to contribute less than 50% of the total concentration allowed. Depending on the type of application involved and the potential for system upsets, Table 2 serves as an approximate guideline for injected water (steam) borne contaminants, recognizing that variations in fluid quality can significantly change the balance implied in this guideline.

5.3 BOILER FEEDWATER - In general, boiler feed water is not suitable for use in water injection; additional treatment to remove dissolved and suspended contaminants is usually required to satisfy all the requirements of this specification.

5.4 OPERATION - It is recommended that Package Engineering is consulted in selecting appropriate equipment for treatment water. Continuous monitoring of water quality is strongly recommended with an alarm or automatic shutdown device installed between the final stage of treatment and the fuel injector manifold. The trip point shall be set to ensure that water entering the combustor is within the allowable limits of this specification.

5.5 WATER FOR INJECTOR PURGE AND COMPRESSOR CLEANING – Water is used in small quantities from time to time (not continuous operation), to either aid cleaning the compressor or to purge liquid fuel passages in dual fuel injectors during fuel transfers and liquid fuel shutdown. It has been determined that the contaminant limits for the water can be higher for these duties because the consumption is small and Table 4 shows the limits for the particular application.

Table 4. Contaminant Limits For Short Duration Water Ingestion Duties

	Test Method	Max. Limits for On-Crank Cleaning	Max. Limits for On-Line Cleaning	Max. Limits for Dual Fuel Injector Water Purge
Sodium + Potassium	ASTM D1428	105 ppmw	1.9 ppmw	1.9 ppmw
Fluorine	ASTM; D1179	100 ppmw	1.9 ppmw	1.9 ppmw
Chlorine	ASTM D512	100 ppmw	40 ppmw	40 ppmw
Lead	ASTM D3559	2 ppmw	0.70 ppmw	0.70 ppmw
Vanadium	ASTM D3373	2 ppmw	0.35 ppmw	0.35 ppmw
Iron, Tin, Silicon, Aluminum, Copper, Manganese, Phosphorus	ASTM D857, D858, D1068, D1688	10 ppmw	3.8 ppmw	3.8 ppmw
Calcium + Magnesium	ASTM D3605, D511	100 ppmw	3.8 ppmw	3.8 ppmw
Total Dissolved Solids	ASTM D1888	350 ppmw	5 ppmw	30 ppmw
Suspended solids	ASTM D5907	2.6 mg/l	2.6 mg/l	2.6 mg/l
Maximum particle size		10 microns	10 microns	10 microns
90% of particles		5 microns	5 microns	5 microns
Dissolved Silica		0.1 mg/l SiO_2	0.1 mg/l SiO_2	0.1 mg/l SiO_2
PH	ASTM D1293	6 - 9	6 - 9	6 - 9
Electrical Conductivity		540 µS/cm	8 µS/cm	50 µS/cm

6.0 EVAPORATIVE COOLER WATER

6.1 GENERAL - For operation in hot and dry environments, evaporative cooling is commonly employed for power augmentation. The design/selection, installation and maintenance of evaporative cooler equipment are critical to engine operation and longevity and also affect the extent of water carryover into the airstream. Appropriate treatment of feed water must be specified in order to comply with the total requirements of this specification.

6.1.1 EVAPORATIVE COOLER EQUIPMENT - Instructions for set-up, installation and operation of evaporative coolers are provided in Engineering specification ES 2069.

6.1.2 DEIONIZED WATER - Do not use deionized water unless the evaporative cooler has been specially designed for it. The use of deionized water will require the use of stainless steel construction and binder reinforced media.

6.1.3 SOFT WATER - Soft water is usually high in sodium salts and low in calcium and magnesium salts. Therefore, soft water cannot be used for evaporative cooling unless it can be proven that sodium + potassium (and any other dissolved salts present) are in compliance with the requirements of Section 3.1.

6.2 CONCENTRATION OF CONTAMINANTS IN WATER CARRYOVER - Contaminants from evaporative cooler water carryover constitute only one of several means by which contaminants enter the turbine engine. The minimum evaporative cooler water quality allowed depends on the quality of the other fluids, such as air, fuel, and injected water. In order to assess the impact of contaminant(s) from evaporative cooler water carryover on the total concentration present in the engine, the fuel equivalent concentration (FEC) of each contaminant can be calculated using the following function.

$$\text{Concentration in water carryover, ppmw FEC} = C \times \frac{R}{f} \times 9.2$$

Where:
- C = concentration in water delivered to header of evaporative cooler, ppmw (for recirculating system, C = concentration in reservoir; for non-recirculating system, C = concentration of feed water)
- R = carryover rate, gallons per minute (see Section 6.2.2)
- f = fuel flow rate, MBtu/hour (10^6 Btu/hour)

6.2.1 CONCENTRATION GUIDELINES FOR CONTAMINATION IN EVAPORATIVE COOLER WATER - In general, contaminants from evaporative cooler carryover are expected to contribute less than 50% of the total concentration allowed. Depending on the type of application involved and the potential for system upsets, Table 2 serves as an approximate guideline for water carryover contaminants, recognizing that variations in fluid quality can significantly change the balance implied in this guideline. (Refer to ES 2069 for details on evaporative cooler installation and operation.)

6.2.2 WATER CARRYOVER RATE - Water carryover rate is the rate of water entering the combustion air inlet ducting through the evaporative cooler mist eliminator. An evaporative cooler that is properly designed, manufactured, installed, maintained, and operated, will not contribute water droplets to the combustion inlet air. However, experience has demonstrated that small amounts of water will enter the air stream from the evaporative cooler media, so all evaporative coolers used by Solar Turbines Inc. include a mist eliminator on the downstream side of the cooler. Mist eliminators used on these evaporative coolers supplied by Solar Turbines Incorporated have a drop limit size of 50 micron, which means that they are 99.9% efficient in removing water droplets as small as 50 microns. Because of the low air flow rate through the media (nominally 625 ft/min.) water droplets entrained in the air leaving the media surface are much larger than 50 micron. The recommended water carry over rate to be used in these calculations for all product lines is given below. The water carry over rates given in the table assume that a mist eliminator having an efficiency of not less than 99.9% on 50 micron water droplets is installed on the evaporative cooler. Nevertheless, the general requirements in Paragraph 3.1 include evaporative cooler water carryover as a potential source of contamination. Evaporative coolers without a mist eliminator having an efficiency of at least 99.9% on 50 micron water droplets are not approved for use on gas turbines manufactured by Solar Turbines Incorporated. The estimated evaporative cooler water carry over rate for all packages (C40, C50, M50, T60, T65, T70, M90, M100, T130 and T250) is 0.1 gallons per minute (GPM).

6.3 ADDITIONAL LIMITS FOR EVAPORATIVE COOLER WATER

	Limits
pH	6-9
Turbidity	≤5,000 turbidity units (also known as Jackson units)
Hardness	160 ppmw $CaCO_3$

6.4 OTHER CONTAMINANTS - Algae, aromatic hydrocarbons, oils, grease and wetting/ dispersing agents such as phosphates can be harmful to the evaporative cooler media pad. Precautions must be exercised to prevent the formation or introduction of these contaminants into the feed water.

7.0 COMPRESSOR CLEANING FLUIDS

7.1 COMPRESSOR CLEANING PRODUCT QUALITY – Composition and physical properties of cleaning products must comply with the limits defined in Table 5. Failure to comply with these limits can cause corrosive attack and/or other harmful effects resulting in rapid engine deterioration. When the cleaning product consists of a mixture of cleaning solution concentrate and water, the limits in Table 5 apply to the resulting cleaning product.

Table 5. Requirements for Cleaning Product Used in Ingestive Cleaning of *Solar* Engines

	Test Method	Max. Limits for On-Crank Solutions	Max. Limits for On-Line Solutions
Sodium + Potassium	ASTM D1428	105 ppmw	1.9 ppmw
Fluorine	ASTM D1179	100 ppmw	1.9 ppmw
Chlorine	ASTM D512	100 ppmw	40 ppmw
Lead	ASTM D3559	2 ppmw	0.70 ppmw
Vanadium	ASTM D3373	2 ppmw	0.35 ppmw
Iron, Tin, Silicon, Aluminum, Copper, Manganese, Phosphorus	ASTM D857, D858, D1068, D1688	10 ppmw	3.8 ppmw
Calcium + Magnesium	ASTM D3605 ASTM D511	100 ppmw	3.8 ppmw
Ash	ASTM D482	0.25 wt. %	0.01 wt. %
Flash Point	ASTM D93	>140°F	>140°F
PH	ASTM D 1293	6 - 9	6 - 9

8.0 FUEL

8.1 GASEOUS FUELS - In general, gaseous fuels, which meet the limits in Table 6, can be used in standard fuel systems. The fuels must be free from condensed hydrocarbons, oils or water. Fuels, which do not meet these limits, must be reviewed by Solar. If judged suitable for use, control and/or combustor modifications will generally be required.

Table 6. Definitions of Gaseous Fuels for Use with a Standard Fuel System

Physical and Chemical Descriptions	ES9-98 Limits
Fuel Volume Ratio (1220/WOBBE Index*)	0.9 to 1.1
Fuel Mass ratio (21550/LHV Btu/lb)	<5
Hydrogen Content	<4% by volume
Carbon Monoxide Content**	<12.5% by volume
Hydrogen Sulfide**	10,000 ppmw Max. (See Table 1)
Ratio of Flammability Limits Upper flammability limit *** Lower flammability limit	 >2.2 for Saturn >2.8 for Centaur and Mars
Stoichiometric Flame Temperature with Air Temperature Equal to Compressor Discharge Temperature at Design Point	>3600°F (1980°C)
Total Particulates	<30 ppmw x (LHV/21500)
Maximum Particle Size	10 micron
Fuel Gas Supply Temperature[1] (at inlet flange of package)	No less than the greater of dew point temperature + 50°F for natural gas liquids or dew point temperature + 20°F for water.
	Greater than or equal to - 40°F and less than or equal to 200°F.
	Greater than or equal to 130°F for fuels containing elemental sulfur.
	Greater than or equal to 130°F for Titan 250 SoLoNOx combustion systems.

*WOBBE Index = Lower Heat Value (use ASTM 3588 or DIN 51850 for individual component heating values) in Btu/Scf divided by the square root of the relative density (specific gravity).

**If carbon monoxide or hydrogen sulfide are present in the fuel gas, precautions must be taken to detect leaks.

***Flammability limits at 1 atm and 25°C as defined by M.G. Zabetakis, US Bureau of Mines Bulletin 627.

1) **Note:** If the required fuel temperature is above ambient air temperature, adequate thermal insulation and heat tracing of fuel lines and fuel control system is required to avoid condensation. If condensates form during shutdown or are otherwise introduced, provisions should be made to drain fuel lines just before start up to ensure that gas fuel condensation is completely eliminated.

8.1.1 GASEOUS FUEL SUITABILITY - A fuel composition should be provided to determine the gas fuel suitability for Solar products. In addition, any entrained solid contaminants should be identified, along with their concentrations and size. For gaseous fuels, if water is known to be present, even in minute quantities, the concentration of salts dissolved in this water must be included when calculating the total amount of contaminants. It is also required that a gas analysis including all heavy hydrocarbons beyond C_6 be provided during the proposal stage of the project.

8.1.2 HYDROGEN IN PIPELINE NATURAL GAS – The concentration of hydrogen up to 20% by volume in pipeline natural gas is generally acceptable for SoLoNOx Combustion Systems. Higher concentrations of hydrogen are acceptable for Conventional Combustion Systems. Contact Solar Engineering for evaluation of your specific application.

8.1.3 COKE OVEN GAS – Coke Oven Gas (COG) is the gas released in the process that converts coal into coke. COG is a medium heating value fuel containing mainly hydrogen, methane, water, oxygen, carbon monoxide, nitrogen and carbon dioxide. However, COG also has extreme levels of harmful contaminants including:

- Tar
- Light oil vapors (aromatics), mainly Benzene, Toluene and Xylene (BTX)
- Naphthalene vapor
- Ammonia gas
- Hydrogen sulfide gas
- Hydrogen cyanide gas
- Calcium carbonate from direct water cooling of COG
- Trace metals

The contaminants found in COG must be controlled to levels listed in Tables 1 and 6. Contact Solar for recommendations on Balance of Plant equipment to remove or reduce the contaminants to levels acceptable for gas turbine operation. The superheat level specified in Table 6 is also required for COG to ensure remaining naphthalene and heavy hydrocarbons do not precipitate out in the fuel system.

8.1.4 GASEOUS FUEL SUPPLY PRESSURE - Fuel supply pressure should be maintained at constant level to minimize wear damage to the fuel control system caused by fluctuating and unstable fuel pressures.

8.1.5 GASEOUS FUEL USED FOR PNEUMATIC START SYSTEMS - When gaseous fuel is used to supply the turbine pneumatic start system, it must meet the same quality requirements shown in Table 6.

8.2 DISTILLATE FUELS - Distillate fuel shall be a homogeneous mixture of hydrocarbon compounds. The fuel, when received, shall be clear, bright, and free of any haze, as viewed in ordinary light through a clear vessel. Technical requirements shall be as specified in Tables 7 and 8.

Table 7. Distillate Fuels - Physical and Chemical Requirements (see Note 2)

Physical and Chemical Descriptions	ES9-98 Limits	Test Methods
Sulfur	See Table 1	D2622, D4294, D5453 or D7220.
Aromatics	35% by volume maximum.	ASTM D1319 and D6591 (see Note 1)
Carbon residue on 10% distillation residue	≤ 0.35%.	ASTM D524
Cloud point	At least 10°F (6°C) below expected minimum ambient temperature.	ASTM D2500
Copper strip corrosion	No 3 (3hr at 122°F (50°C)).	ASTM D130
Distillation	90% distillation temperature from 540°F (282°C) to 640°F (338°C). End point at 690°F (366°C) maximum.	ASTM D86
Flash point	> 100°F (38°C) or ≥ legal limit.	ASTM D93
Fuel Bound Nitrogen	Measurement required for liquid emissions guarantees	ASTM D4629 or D5762
LHV	>18,000 Btu/lb, >41838 kJ/kg.	ASTM D240
Lubricity, HFRR @ 60°C	520 micron maximum.	ASTM D6079
Olefins and Diolefins	5% by volume maximum.	ASTM D1319
Pour point	At least 10°F (6°C) below cloud point.	ASTM D97
Reid vapor pressure	< 3 psia, < 20.6 kPa	ASTM D323
Specific Gravity	0.775 - 0.875	ASTM D1298
Viscosity, Kinematic	1 - 12 centistokes at 100°F (38°C)	ASTM D445

Notes:

1) Use ASTM D5186 for fuels having final boiling points over 600°F.
2) These fuel properties are established at the refinery. If the project fuel exceeds these limits, it will not be treatable through centrifuge or filtration at site. If any property deviates from these limits, approval from Solar is required.

Table 8. Distillate Fuels - Contaminant Limits (see Notes 1 & 2)

Description of Contaminants	ES9-98 Limits	Test Methods
Ash (see Note 2)	≤ 0.01 % maximum.	ASTM D482
Liquid, Water	≤ 0.25 cc free water per liter at an ambient temp of 80°F (27°C)	ASTM D6304
Sodium & Potassium	See Table 1.	ASTM D3605 or D7111
Solids	≤2.6 mg/liter of sediment, solid or hard contaminants, 90% of the 2.6 mg shall be less than 5 micron in size. Max allowable size ≤ 10 micron	ASTM D6217
Calcium & Magnesium	See Table 1.	D3605, D511 or D7111
Chlorine	See Table 1.	ASTM D512
Fluorine	See Table 1.	ASTM D1179
Lead	See Table 1.	ASTM D3605, D3559 or D7111
Vanadium (see Note 2)	See Table 1.	ASTM D3605, D3373 or D7111
Others – Aluminum + Silicon, Antimony, Arsenic, Bismuth, Boron, Cadmium, Gallium, Indium, Mercury and Phosphorous	See Table 1.	ASTM D7111

Notes:

1) If the project fuel exceeds these contaminant limits, fuel must be treated to achieve full contaminant quality compliance.
2) Non-compliant fuel-bound organometallic contaminants are not treatable by centrifuge
   a. **Multiple Fuel Sources** - If more than one fuel source is available, individual fuel analyses of all fuel sources must be submitted to review to ensure proper fuel handling.

8.2.1 BIODIESEL - Biodiesel is a fuel that is typically made from various sources including vegetable oils, animal fat and used cooking oils. The oils or animal fats are chemically processed to form a fatty acid methyl ester (FAME). Raw oils from vegetables, animal fats and/or waste cooking oils are not considered to be a biodiesel fuel. The biodiesel is typically blended with the diesel fuel and the fuel blend should not exceed 20 percent (%) by volume and this is referred as B20 biodiesel fuel. Any biodiesel blend above B20 must be reviewed by Solar. The fuel quality must meet the requirements listed in Table 7, 8 and 9.

Table 9. Biodiesel Fuels - Physical and Chemical Requirements

Biodiesel (B20) Properties	Test Method	Limits
Biodiesel/Fatty Acid methyl Ester (FAME)	ASTM D7371	20% by volume maximum
Methanol	EN 14110	0.05% wt maximum
Oxidation Stability	EN 14112	6 hours minimum
Acid Number	ASTM D664	0.3 KOH/g maximum
Monoglyceride	ASTM D6584	0.1% wt maximum
Diglyceride	ASTM D6584	0.05% wt maximum
Triglyceride	ASTM D6584	0.05% wt maximum
Free Glycerin	ASTM D6584	0.005 % wt maximum
Total Glycerin	ASTM D6584	0.05% wt maximum

8.2.2 DISTILLATE FUEL SUPPLY TEMPERATURE - Distillate fuel supply temperature at turbine package fuel inlet shall be no lower than the temperature at which the viscosity is 12 centistokes or cloud point temperature plus 10°F, whichever is higher. The fuel supply temperature shall not be lower than -65°F, nor higher than +140°F.

8.2.3 DISTILLATE FUELS – The Solar Fuel Suitability Inquiry Form in Appendix D must be completed.

8.3 NATURAL GAS LIQUID FUELS - Natural gas liquid fuels shall consist primarily of saturated paraffinic hydrocarbons such as ethane, propane, butane, pentane, hexane and heptane either individually or mixtures of some or all of the above. Technical requirements shall be as specified in Table 10.

Table 10. Natural Gas Liquid Fuels - Physical and Chemical Requirements

Property	Allowable Limits	Test Method
Composition percent by volume	Report	ASTM D2163
Vapor pressure at 100°F (38°C)	780 psia maximum	ASTM D1267 or ASTM D2598
Relative density at 60°F/60°F (15°C/15°C)	0.37 to 0.68	ASTM D1657 or ASTM D1298
Copper strip	No. 1 minimum	ASTM D1838
Moisture content for fuels with relative density 0.37 to 0.51	Pass	Use one of the methods for moisture content as described in the Commercial Propane Dryness Test, Cobalt Bromide Method or Dew Point Method of the Natural Gas Processors Association Publication 2140
Free water content for fuels with relative density of 0.51 to 0.68	None	ASTM D1657 - The presence or absence of water shall be determined by inspection of the sample on which the relative density is determined
Solid contaminants	Less than 2.6 mg of sediment per liter of fuel. 90% of sediment shall be less than 5 microns in size. Maximum size of any solid sediment particle shall be less than 10 microns.	ASTM D6217
Lower Heating Value	18,000 Btu/lb. Minimum	ASTM D240

8.3.1 NATURAL GAS LIQUID SUPPLY TEMPERATURE - Liquid gas supply temperature at the fuel inlet to the package shall be between -65°F and +90°F and shall be in a liquid phase only.

8.3.2 NATURAL GAS LIQUID FUELS - The following information is required to determine the suitability of natural gas liquids:

- Composition on volumetric gases
- Relative density at 60°F
- Vapor pressure at 100°F
- Viscosity at 100°F

8.4 MULTIPLE FUEL SOURCES - If more than one fuel source is available, individual fuel analyses of all fuel sources must be submitted to review to ensure proper fuel handling.

8.5 CONCENTRATION OF FUEL BORNE CONTAMINANTS - Fuel borne contaminants constitute only one of several means by which contaminants enter the turbine engine. The minimum fuel quality allowed depends on the quality of the other fluids, such as air, injected water and water carryover (if applicable). In order to assess the impact of fuel borne contaminants on the total concentration present in the engine, the fuel equivalent concentration (FEC) of each fuel borne contaminant can be calculated using the following function.

$$\text{Concentration in fuel, ppmw FEC} = \frac{18380}{\text{LHV}} \times (1\text{-}K) \times F$$

Where: LHV = lower heating value, Btu/lb

K = fuel cleanup (if applicable), expressed as value <1.0
F = concentration in fuel entering combustor, ppmw

8.5.1 CONCENTRATION GUIDELINES FOR FUEL BORNE CONTAMINANTS - In general, contaminants from fuel are expected to contribute less than 10% of the total concentration allowed. Depending on the fuel of application involved and the potential for system upsets, Table 2 serves as an approximate guideline for fuel borne contaminants, recognizing that variations in fluid quality can significantly change the balance implied in this guideline.

9.0 HANDLING AND STORAGE OF FUELS

9.1 STORAGE AND HANDLING EQUIPMENT – The selection of equipment for storage and handling is a crucial part of ensuring that liquid fuel contaminants generally conform to ES 9-98 when it reaches the engine. Cleanup devices will always be required because contamination frequently occurs during transportation. Solar has identified the types of equipment that are required to ensure that liquid fuel being supplied to an engine will be cleaned up to specification. Product Information Letter PIL 162 outlines recommendations for various liquid fuel applications.

9.2 ADDITIONAL INFORMATION - Refer to PIL 162 and ASTM D4418 for more information on handling and storage of fuels.

10.0 NOTES

10.1 SIGNIFICANCE OF LIMITS - Total contaminants should comply with Table 1. The following subparagraphs explain the significance of limits in the specification.

10.1.1 SULFUR – Sulfur and sulfur compounds can have an impact on the fuel system life and maintenance, turbine hot section life, exhaust system life and a pollutant emissions signature. The presence of sulfur in the combustor will burn or oxidize to form sulfur dioxide. In the presence of even minute quantities of sodium and potassium in the combustor environment (excess oxygen and high thermal load), sodium and potassium sulfates are readily formed. These salts if condensed onto turbine airfoil surfaces will react with the base metal, resulting in hot corrosion degradation. Gas turbines with waste heat recovery equipment must operate above the sulfuric acid dewpoint, which may require additional sulfur control to prevent cold end corrosion. Additionally, US Federal and certain local air pollution regulations require more restrictive limits on sulfur. Fuel bound sulfur in diesel fuel has been found to promote carbon deposition on hot surfaces of lean premix *SoLoNOx*® injectors leading to the build-up of deposits in the premix duct that left unchecked can result in injector or even engine damage. As a result, the sulfur content is being limited for *SoLoNOx* liquid fuel operation for applications based on a complete analysis of the diesel fuel by Solar Engineering.

10.1.1.1 HYDROGEN SULFIDE - Hydrogen sulfide can occur both in natural gas, processed and manufactured gases. It is corrosive to some materials such as bronze and brass used in fuel gas systems, the corrosiveness being more severe in the presence of water and at high pressure. If the sulfur exceeds the limit then the fuel system materials must be upgraded. Hydrogen sulfide burns to sulfur dioxide and sulfur trioxide, which results in the corrosion described above. Some manufactured gases also contain organic sulfur compounds, which are corrosive to some control system materials. Since hydrogen sulfide is toxic, if it is present in the gas, precautions must be taken to detect leaks.

10.1.1.2 ELEMENTAL SULFUR DEPOSITION - Aside from H2S, natural gas may contain other sulfur compounds or sulfur vapor that even in very low concentrations (ppbw) can form solid elemental sulfur. In sufficient quantities, elemental sulfur can impede operation of fuel valves and gas flow measurement devices on the gas turbine package. ASTM D7800 provides a test method to determine if elemental sulfur is contained in a gas fuel. If deposition takes place, the solution is to heat the gas fuel prior to the skid edge. The temperature that the gas must be heated to will depend on the concentration of the sulfur in the gas supply. For standard pipeline gas with low concentrations of total sulfur, fuel heating in the range of 130°F to 160°F (55°C to 70°C) has proven effective at preventing sulfur deposition.

10.1.2 SODIUM AND POTASSIUM - Sodium and potassium can combine with vanadium to form eutectic, which melts at temperatures as low as 1050°F (566°C) and can combine with sulfur in the fuel to yield sulfates with melting points in the operating range of the gas turbine. These compounds produce severe corrosion in the turbine hot section. Accordingly, the sodium plus potassium level must be limited, but each element must be measured separately. These elements can be removed by water washing and subsequent removal with a centrifuge or electrostatic precipitator.

10.1.3 VANADIUM - Vanadium can form low melting compounds such as vanadium pentoxide which melts at 1275°F (691°C), and alkali metal vanadates which melt as low as 1050°F (566°C) which can cause severe corrosive attack on all of the high temperature alloys in the gas turbine hot section.

10.1.4 MERCURY - Mercury compounds are corrosive to aluminum, copper, lead, and silver; therefore, these materials are to be avoided if mercury is present. Mercury compounds are not known to be corrosive to the hot section of a gas turbine. Mercury in the exhaust of the turbine must be limited to comply with local regulations.

10.1.5 LEAD - Lead can cause corrosion and in addition, it can spoil the beneficial effect of magnesium additives on vanadium corrosion. Since lead is rarely found in significant quantities in crude oils, its appearance in fuel oils is primarily the result of contamination during processing or transportation.

10.1.6 FLUORINE AND CHLORINE - Halides such as fluorine and chlorine as well as alkali/mixed halides and alkali sulfates can attack the protective oxide scale on hot turbine components, thus accelerating the rate of oxidation.

10.1.7 CALCIUM AND MAGNESIUM - Calcium and magnesium are not harmful from a corrosion standpoint; in fact, it serves to inhibit the corrosive action of vanadium. However, calcium can produce hard bonded deposits that are not self-spalling when the gas turbine is shut down. These hard bonded deposits are not readily removed by water washing of the turbine (Ref. ES 9-62). The fuel washing systems used to reduce the sodium and potassium levels will also reduce calcium levels.

10.1.8 OTHER TRACE METALS - Oxides of other trace metals with or without other impurities can be deposited on blades and vanes forming extremely hard and difficult-to-remove deposits. The presence of these oxides will also increase the rate of oxidation of blade and vane alloys at high temperatures.

The limits for aluminum and silicon are equal to 0.5 ppmw FEC, which is same as that of other trace metals. The source of aluminum and silicon is typically found to be aluminum silicates catalyst used in the catalytic cracking process that may end up in the fuel. The amount of aluminum and silicon in the fuel should be reduced to acceptable levels. These contaminants could cause abrasive wear of various engine parts. These can be reduced by centrifuge.

10.1.9 PARTICULATES IN AIR - Inert particulates in the turbine inlet air cause erosion and/or fouling of the compressor section. By limiting the size of the particulates, erosion is minimized. Contamination of the compressor blading is caused by smaller particulates. Factors such as humidity, presence of oil or soot and dust particle composition affects the rate of fouling.

10.1.10 SOLIDS IN WATER - Inert solid particles in water can cause wear and plugging of control components and fuel injectors. Malfunctions of the control system and damage to the combustor and turbine section would be the result.

10.1.11 pH OF WATER - The pH of water is limited from slightly acidic to slightly basic. Strong bases or acids would attack various components in the water control and injection system.

10.1.12 FUEL GAS VOLUME RATIO - The fuel gas volume ratio is an indication of the capability of the fuel control to properly schedule the fuel flow. If this ratio is within the specified limits, the standard system without modifications can be used. Ratios with values up to 2 can be handled with minor modifications to the fuel injection system. If the ratio is between 2 and 4, the modifications are substantial and if the ratio is above 4, a redesign of the combustor is required.

10.1.13 FUEL GAS MASS RATIO - The fuel gas mass ratio is an indication of the effects of the fuel mass flow on the performance and matching of the turbine. Ratios up to 5 are acceptable without modification. If the ratio is between 5 and 10 then a fuel meeting the standard requirements must be used for start and acceleration to avoid compressor surge. If the ratio is above 10, extensive turbine redesign is required to accommodate larger turbine mass flow.

10.1.14 HYDROGEN AND CARBON MONOXIDE IN GAS - The presence of hydrogen and/or carbon monoxide in the fuel gas above the specified levels can cause safety and materials problems and the requirements in these tables may apply. For low concentrations of hydrogen mixed with pipeline quality natural gas (20% or less) exceptions to these requirements are often available with approval by Solar engineering.

Table 11. Requirements for Hydrogen in Gaseous Fuels

H_2 LEVEL	REQUIREMENTS
H_2 > 4%	i) Review of fuel system materials for hydrogen embrittlement ii) Special safety precautions may be required such as detectors in the package, separation of the engine and generator compartments, and leak free piping joints iii) Special sequenced start & purge system required
H_2 > 9%	i) Starts and accelerations may be required on a standard fuel with transfer to the high H_2 fuel at idle power or greater ii) Fuel system purge of the high H_2 fuel may be required following each shutdown iii) Control system fuel control software may need modifications

Table 12. Requirements for Carbon Monoxide in Gaseous Fuels

CO LEVEL	REQUIREMENTS
CO > 0%	Since CO is toxic, precautions must be taken to detect leaks.
CO > 12.5%	i) Special safety precautions must be taken such as detectors in the package, separation of the engine and generator compartments, and leak free piping joints ii) Special sequenced start & purge system required
CO > 18%	Starts and accelerations must be made on a standard fuel with transfer to CO rich fuel at idle or above

10.1.15 FLAMMABILITY - The ratio of the upper-to-lower flammability limits is an indication of whether the gas will allow engine starting and adequate range of operation, in particular on single shaft generator sets.

10.1.16 FLAME TEMPERATURE - The adiabatic flame temperature of gas fuels is used to determine its suitability. If the value is below the limit, major combustion system modifications and/or changes to operating procedures may be required.

10.1.17 SILOXANES – The presence of siloxanes in fuel gas is known to result in silicon-based deposition in the gas turbine flow path that can cause damage, high rates of performance

degradation, and higher overhaul costs. The rate of deposition is a function of the type and quantity of silicon-based material contained in the fuel, and is thus produced from the combustion process. As such damage and performance loss is preventable only by control of siloxane levels in the fuel, such damage is not covered by Solar's warranty. It is, therefore, the customer's responsibility to monitor and minimize as appropriate siloxane content through the use of a reliable siloxane removal system.

Based on engine operating experience to date, Solar considers that limiting the amount of silicon, as measured by the Jet-Care SiTest method, to no more than 5 mg Si/Nm^3 CH_4 for the Mercury 50™ and 10 mg Si/Nm^3 CH_4 for all other turbines should result in target time between overhaul with normal performance degradation.

10.1.18 PARTICULATES IN GAS - Solid particles in gas can cause wear and plugging of control components and fuel injectors. Malfunctions of the control system and damage to the combustor and turbine section would be the result.

10.1.19 FUEL SUPPLY TEMPERATURE - For gas fuels, there are four considerations. The most restrictive of the requirements shall apply. 1) The fuel must be supplied at the inlet flange to the package to ensure that no liquids can enter the fuel control and injection system. Liquids in a gas system cause malfunction and serious thermal damage to the engine if liquid is injected with the gas into the engine. 2) The thermal capability of the materials in the fuel delivery system must not be exceeded. 3) The fuel must be supplied at the inlet flange to the package to ensure elemental sulfur de-sublimation does not occur for installations where elemental sulfur is present. 4) The fuel must be supplied at the inlet flange to the package to ensure combustion stability. High performance, high pressure ratio combustion systems as used on the Titan 250 SoLoNOx configuration can be sensitive to changes in fuel density.

For distillate fuels, the temperature must be above the cloud point to prevent plugging of the filters and control components. It must also be above the temperature that corresponds to a viscosity of 12 centistokes to ensure satisfactory atomization required for starting performance. The range of allowable temperatures is determined by the thermal capabilities of the materials in the control system.

For natural gas liquid fuels, the allowable temperature range is determined by the control system materials and the critical point of the lightest fuel. This latter constraint is to limit the vapor pressure on the fuel.

10.1.20 VISCOSITY - Viscosity of a fluid is a measure of its resistance to flow. In distillate fuel it is highly significant since it indicates both the relative ease with which the fuel will flow or may be pumped and a measure of atomization by the fuel injectors. Minimum viscosity is limited because standard fuel pumps will not perform satisfactorily if viscosity reaches too low a value. Maximum viscosity is limited since too high a viscosity can cause excessive pressure losses in the piping system and poor fuel atomization.

10.1.21 RELATIVE DENSITY OF DISTILLATE - Relative density alone is of no significance as an indication of the burning characteristics of fuel oil. However, when used in conjunction with other properties, it is of value in weight-volume relationships and in calculating the heating value of the fuel.

10.1.22 REID VAPOR PRESSURE - The Reid vapor pressure is a criterion of freedom from foaming and fuel slugging due to vaporization of the fuel. Special fuel systems are required if the Reid vapor pressure is above the specified level.

10.1.23 CLOUD AND POUR POINTS - Cloud point is the temperature at which a cloud or haze of wax crystals appears. Operation at temperatures below the cloud point causes plugging of filters. Pour point is an indication of the lowest temperature at which a fuel can be stored and still be capable of flowing under gravitational forces. The cloud and pour points are prescribed in accordance with the conditions of storage and use. Heated tanks and lines may be required where ambient temperature is below the cloud and pour points of the proposed fuels.

10.1.24 FLASH POINT - Flash point is an indication of the maximum temperature at which a fuel can be stored and handled without serious fire hazard. The minimum permissible flash point is usually regulated by Federal, State, or Municipal laws and is based on accepted practices in handling and use.

10.1.25 DISTILLATION - The distillation test indicates the volatility of a fuel and the ease with which it can be vaporized and burned. It also indicates the possibility of carbon deposition and smoke formation.

10.1.26 AROMATICS AND OLEFINS - Combustion of highly aromatic fuels can result in increased smoke. Carbon or soot deposition and increased combustor metal temperature resulting in exhaust particulate emissions, opacity violations, and reduced engine life. Use of fuels with excessive olefin content can result in decomposition of the fuel, which causes plugging of fuel system components including the fuel injectors.

10.1.27 LOWER HEATING VALUE (LHV) - The lower heating value is used to calculate actual fuel consumption. Also, if the value for distillate fuels is below the limit, it is an indication of a heavy fuel, which may have other properties exceed in the limits.

10.1.28 CARBON RESIDUE - Carbon residue is a measure of the carbonaceous material left in a fuel after all the volatile components are vaporized in the absence of air. It is a rough approximation of the tendency of a fuel to form carbon deposits in the combustion system of the gas turbine.

10.1.29 ASH - Ash is the noncombustible material in a fuel. Ash-forming materials may be present in fuel in two forms: (1) solid inert particles and (2) oil or water-soluble metallic compounds. The solid particles are for the most part the same material that is designated as sediment in the water and sediment test. Depending on their size, these particles contribute to wear in the fuel system and to plugging of fuel filter and fuel injectors. The soluble metallic compounds have little or no effect on wear or plugging, but may contain elements that produce hot section corrosion and deposits as described above.

10.1.30 COPPER STRIP CORROSION - This test provides an indication of possible corrosive attack of non-ferrous metals such as copper, brass, and bronze.

10.1.31 WATER AND SEDIMENT IN DISTILLATES - Appreciable amounts of water and sediment in fuel tend to cause fouling of the fuel-handling facilities and to give trouble in the fuel system of the turbine. An accumulation of sediment in storage tanks and on filter screens may obstruct the flow of fuel from the tank to the package. Water in distillate fuels may cause corrosion of tanks and equipment. Water in the fuel also provides a place for microbiological growths to occur. These growths can plug filters and screens and can promote corrosion of fuel tanks.

10.1.32 COMBUSTIBLES IN AIR - If combustibles are ingested into the engine inlet, the hydrocarbon and carbon monoxide levels in the exhaust will be increased assuming none of the combustibles complete combustion.

10.1.33 FUEL BOUND NITROGEN - Fuel Bound Nitrogen (FBN) found in distillate fuels causes NOx in the exhaust to increase. In order to offer liquid emissions guarantee, FBN must be determined by fuel analysis.

10.1.34 LUBRICITY - Low sulfur diesels tend to have a reduced lubricity and that could affect the life and reliability of the fuel pumps. The processes used to remove the sulfur from fuel also remove the natural occurring lubricity compounds in the fuel. Special fuel pumps are required when fuels do not meet the requirement listed in Table 7.

10.1.35 BIODIESEL/FATTY ACID METHYL ESTER (FAME) – Biodiesel fuels are produced from vegetable oil, animal oil/fats and waste cooking oil. Any biodiesel blend above B20 (20% by volume of biodiesel blended with diesel fuel) must be reviewed by Solar.

10.1.36 OXIDATION STABILITY – It is important that the biodiesel blend properties do not change over time during the recommended period of storage and usage. Oxidation Stability is a measure of fuel storability and its deposits formation propensity. The biodiesel fuels contain esters chemical group (contains two oxygen atoms) and unsaturated (double bonds) compounds that can vary based on the feedstock. Due to the esters chemical group and the unsaturation, the oxidation stability of biodiesel fuels is typically lower than that of the diesel fuel. Oxidation of fuel can cause deposits in storage tank, fuel system and fuel injectors and can cause filter clogging.

10.1.37 ACID NUMBER – The acid number is an indicator of the concentration of acids (such as free fatty acids or processing acids) present in the biodiesel or fuel oil when produced, and acids that are formed upon aging. Biodiesel blends with an acid number exceeding the specification have been shown to increase fuel system deposits and can increase the likelihood for corrosion.

10.1.38 GLYCERIN AND GLYCERIDES – Free glycerin and bonded glycerin (mono-, di- and tri-glycerides) are contaminants in biodiesel fuels that get into the fuel during the manufacturing process. Total glycerin is the sum of free glycerin and glycerin portion in glycerides. Free glycerin is a major byproduct of biodiesel production, which is removed during the fuel cleanup. High contents of total glycerin may adversely affect the cold weather properties of the fuel and can cause injector deposits and filter plugging.

10.1.39 METHANOL – Methanol/alcohol is a contaminant which gets into biodiesel during the manufacturing process. Methanol content is analyzed in conjunction with the flash point to meet the safety requirements.

APPENDIX A

TOTAL SITE CONTAMINATION WORKSHEET
FORM 3091

(Blank form and Sample Calculation)

Solar Turbines
A Caterpillar Company

TOTAL SITE CONTAMINATION WORKSHEET

INQUIRY NO.		Q.R. NO./S.O. NO.	
CUSTOMER		DATE ISSUED	DATE REQUIRED
ENGINE MODEL	FUEL	FREQUENCY OF STARTS	RUNNING TIME PER START
EQUIPMENT LOCATION		LOAD CONDITIONS ☐HIGH ☐LOW ☐STEADY ☐CYCLIC	
ALTITUDE FEET	AMBIENT TEMPERATURE RANGE °F MAXIMUM; °F MINIMUM		AVERAGE HUMIDITY %

INSTRUCTIONS - Enter best known values. Explanations and helpful information are provided on the reverse side. Perform calculations as indicated to obtain total site contamination for each (or all) species of interest.

EVAPORATIVE COOLER ☐YES ☐NO WATER INJECTION ☐YES ☐NO

		Concentrations, ppmw	Na + K	S	F	V	Pb	Ca + Mg
	1	Ambient Air, ppmw						
	2	Fuel, ppmw						
	3	Injected Water, ppmw						
	4	Evaporative cooling water, ppmw						
	5	LHV, Btu/lb						
	6	Compute: 18,380/[5]						
Air	7	Air-to-Fuel Ratio						
	8	1 - N (Correction Factor)						
	9	Compute: [1] x [6] x [7] x [8], ppmw FEC						
Fuel	10	1 - K (Fuel Factor)						
	11	Compute: [2] x [6] x [10], ppmw FEC						
Water	12	Water-to-fuel Ratio						
	13	Compute: [3] x [6] x [12], ppmw FEC						
Evaporative Cooling	14	E.C. Carryover Rate, GPM						
	15	Fuel Flow rate, million Btu/hr						
	16	Compute: $\frac{[4]x[5]x[6]x[14]x5x10^{-4}}{[15]}$ ppmw FEC						
	17	Total Contaminants, ppmw FEC [9] + [11] + [13] + [16]						
	18	Max. Allowable Limits, ppmw FEC per ES 9-98	0.5	10,000	1	0.5	1	2

COMMENTS:

PREPARED BY: _____ DATE:_____

Row #	Term Explanation	Typical Values
1	Concentration of contaminant in ambient air, expressed as ppmw in air	Unless available for site of interest, select most appropriate value for S and Na+K from ranges given below. All other contaminants are assumed to be zero unless specifically known to be present. S(ppmw) — Moderately clean: .0.001; City: 0.050-0.007; Industrial: .0.100; Processing/Chemical Plant: >0.100 Na+K(ppmw) — Arctic: >0.001; Agricultural/Residential: >0.010; Industrial: 0.003-0.010; Coastal (less than 1 mile): 0.007-0.260; Desert: 0.010-0.136; Offshore platform: 0.010-3.600
2	Concentration of contaminant in fuel supply expressed as ppmw in fuel	For gas fuels, and residual liquid water from processing can be very high in dissolved salts. If possible, analyses of trace water present in gas fuel is the best method for obtaining reliable data. For liquid fuels, direct measurement for contaminants is recommended. Some APPROXIMATE values for S and Na+K are provided here: S(ppmw) / Na+K(ppmw): 1,000 / .0.1 pipeline gas; >10,000 / >3.0 process gas; >10,000 / >3.0 biomass gas; >10,000 / >1.0 distillate liquid fuel
3	Concentration of contaminant in injected water, expressed as ppmw in water	Contaminants in treated water at entry into combustor should be known, either based on actual water analyses or equipment specifications (auto shut down limit).
4	Concentration of contaminant in water delivered to header of evaporative cooler, expressed as ppmw	Contaminants in reservoir (for recirculating systems) or feedwater (for non-recirculating systems) should be known, either based on actual water analyses or equipment specifications.
5	Lower heating value, expressed as 10^6 But/hr	Available from fuel analysis report.
6	FUEL LHV ADJUSTMENT FACTOR USING 18,380 BTU/# AS REFERENCE FUEL PER ES 9-98.	
7	Air-to-fuel ratio	Use actual value -generated by FASTE run at site-specific conditions with project fuel. Otherwise: Multiply by LHV Btu/pound 20,000 60.04 for *Mars* 100 60.05 64.08 for *Mars* 90 71.58 for *Centaur* 40 58.07 for *Centaur* 50 62.94 for *Saturn* 20 60.61 for *Mercury* 50 57.21 for *Taurus* 60 57.21 for *Taurus* 70 57.74 for *Titan* 130 59.06 for *Titan* 250
8	Correction factor for air cleanup system, N	Use N = 0.99
9	CONTAMINANTS FOUND IN AIR ENTERING ENGINE, [1] x [6] x [7] x [8], PPMW, FUEL EQUIVALENT CONCENTRATION	
10	Fuel factor to account for fuel cleanup system, K	Use K = 0.95 unless instructed otherwise. If no fuel treatment is applicable between supply and engine, use 0 here.
11	CONTAMINANTS FOUND IN FUEL ENTERING ENGINE, [2] x [6] x [10], PPMW, FUEL EQUIVALENT CONCENTRATION	
12	Water-to-fuel ratio	Use actual value. Range is typically from 0.5 to 1.0.
13	CONTAMINANTS FOUND IN INJECTED WATER, [3] X [6] X [12], PPMW, FUEL EQUIVALENT CONCENTRATION	

Row #	Term Explanation	Typical Values
14	Rate of liquid water carried off the evaporation cooler (carryover) into air steam, expressed as gallons per minute	It is expected that during the duty cycle of the engine, liquid water can accidentally enter the air steam. Use the following values unless otherwise instructed by Package Engineering. 0.1 GPM for Titan 250 0.1 GPM for Titan 130 0.1 GPM for Taurus 70 0.1 GPM for Taurus 65 0.1 GPM for Taurus 60 0.1 GPM for Centaur 40 0.1 GPM for Centaur 50 0.1 GPM for Mercury 50 0.1 GPM for Saturn 20
	Adjustment factor for mist eliminator if applicable, E	Mist eliminators are required for evaporative cooler installations. Use the following values unless otherwise instructed. No mist eliminator: evaporative cooler cannot be used Mist eliminator efficiency: 99.9% on 50 micron water droplets (Confirm with evaporative cooler manufacturer that mist eliminator drop limit size is 50 micron or smaller.)
15	Fuel flow rate expressed in million Btu per hour	Conversion from million Btu/hour to pounds per sec of fuel flow is included in the expression in the final expression in [16].
16	CONTAMINANT FOUND IN WATER CARRYOVER FROM EVAPORATIVE COOLER, IF USED $\frac{[4] \times [5] \times [6] \times [14] \times [15] \times 5 \times 10^{-4}}{[15]}$ PPMW, FUEL EQUIVALENT CONCENTRATION.	
17	TOTAL CONTAMINANT FROM ALL SOURCES, [9] + [11] + [13] + [16], PPMW, FUEL EQUIVALENT CONCENTRATION.	
18	MAXIMUM ALLOWABLE LIMITS FOR EACH CONTAMINANT PER ES 9-98, PPMW, FUEL EQUIVALENT CONCENTRATION	

TOTAL SITE CONTAMINATION WORKSHEET

INQUIRY NO.			Q.R. NO./S.O. NO.
CUSTOMER **EXAMPLE**		DATE ISSUED	DATE REQUIRED
ENGINE MODEL **CENTAUR T4000**	FUEL **Diesel**	FREQUENCY OF STARTS **Monthly**	RUNNING TIME PER START **500 hours**
EQUIPMENT LOCATION **San Diego, California**	LOAD CONDITIONS ☐HIGH ☐LOW ☐STEADY ☐CYCLIC		
ALTITUDE 100 FEET	AMBIENT TEMPERATURE RANGE 90°F MAXIMUM; 40°F MINIMUM		AVERAGE HUMIDITY 50% RH

INSTRUCTIONS - Enter best known values. Explanations and helpful information are provided on the reverse side. Perform calculations as indicated to obtain total site contamination for each (or all) species of interest.

EVAPORATIVE COOLER ☐NO WATER INJECTION ☐YES ☐NO

		Concentrations, ppmw	Na + K	S	V	Pb	F	Ca + Mg
	1	Ambient Air, ppmw	0.03	20	0	0	0	0
	2	Fuel, ppmw	0.1	500	0.05	0	0	0
	3	Injected Water, ppmw	0.2	0.1	0	0	0	0
	4	Evaporative cooling water, ppmw	10	100	0	0	0	0
	5	LHV, Btu/lb	20,100					
	6	Compute: 18,380/[5]	0.914					
Air	7	Air-to-Fuel Ratio	68					
	8	1 - N (Correction Factor)	0.01					
	9	Compute: [1] x [6] x [7] x [8], ppmw FEC	0.019	12.4	0	0	0	0
Fuel	10	1 - K (Fuel Factor)	1.0	1.0	1.0	1.0	1.0	1.0
	11	Compute: [2] x [6] x [10], ppmw FEC	0.09	457	0.05	0	0	0
Water	12	Water-to-fuel Ratio	0.8					
	13	Compute: [3] x [6] x [12], ppmw FEC	0.15	0.08	0	0	0	0
Evaporative Cooling	14	E.C. Carryover Rate, GPM	0.1					
	15	Fuel Flow rate, million Btu/hr	40					
	16	Compute: $\frac{[4]x[5]x[6]x[14]x5x10^{-4}}{[15]}$ ppmw FEC	0.22	2.3	0	0	0	0
	17	Total Contaminants, ppmw FEC [9] + [11] + [13] + [16]	0.48	472	0.05	0	0	0
	18	Max. Allowable Limits, ppmw FEC, per ES 9-98	0.5	10,000	0.5	1	1	2

COMMENTS

PREPARED BY: _____ DATE:_____

APPENDIX B

DERIVATION OF TOTAL FUEL EQUIVALENT CONCENTRATION EQUATION FOR UNDESIRABLE CONTAMINANTS

The expression given in paragraph 3.1.3 for directly fired applications is derived from first principles in section 1. Section 2 explains the incorporation of system efficiencies into this fundamental expression and its use in the Total Site Contamination Worksheet, Form, 3091, with the appropriate unit conversions.

B1.0 Derivation of Fundamental Expression for Total Fuel Equivalent Concentration (For Directly Fired Applications Only)

Solar's air, fuel, and water specification is based on FUEL EQUIVALENT CONCENTRATIONS, i.e., the concentration of a given contaminant as if that given contaminant were present in the fuel alone, with the fuel having a LHV of 18,380 Btu/lb or 10,212 kcal/kg.

Nomenclature used in the derivation is given in Table B-1.

Table B1. Nomenclature for Fuel Equivalent Derivation

Input Steam to Gas Turbine	Mass Flow Rate	Concentration of i^{th} Contaminant	Mass Flow Ratios of Each Steam or Fuel
Reference Fuel	r	R_i	1
Fuel	f	F_i	1
Air	a	A_i	a/f or (AFR)
Water	w	W_i	w/f or (WFR)
Steam	s	S_i	s/f or (SFR)
Carryover	c	C_i	c/f or (CFR)

(LHV) = lower heating of a given fuel, Btu/lb
i = Na, K, V, Pb, etc.
T_i = Fuel equivalent for the reference fuel which has a lower heating value of 18,380 Btu/lb (10,212 kcal/kg)

The mass flow of the i^{th} contaminant in the combustion products burning the reference fuel is:

$$rR_i + aA_i + wW_i + sS_i + cC_i \quad (1)$$

The total mass flow of the combustion product is:

$$r + a + w + s + c \quad (2)$$

The concentration of the i^{th} contaminant in the combustion products is:

$$\frac{rR_i + aA_i + wW_i + sS_i + cC_i}{r + a + w + s + c} \quad (3)$$

Next suppose that the total mass flow of the i^{th} contaminant in the combustion products came from the reference fuel alone. Let T_i equal the reference fuel equivalent concentration of the i^{th} contaminant. Then, the concentration of the i^{th} contaminant in the combustion products, the environment of the hot section components, would be:

$$\frac{rT_i}{r + a + w + s + c} \quad (4)$$

Equating Eq. (3) with Eq. (4) and dividing through r gives:

$$T_i = R_i + (a/r)\,A_i + (w/r)\,W_i + (s/r)\,S_i + (c/r)\,C_i \quad (5)$$

In order to have an expression that gives the Fuel Equivalent, T_i, for the cases where a fuel, f, of any heating value (LHV) are used, Eq. (5) must be modified. It is required that, regardless of the LHV of either fuel, the flow of each fuel be such that the same thermal input is provided to the engine. Therefore,

$$r\,(18{,}380\ \text{Btu/lb}) = f\,(\text{LHV}) \quad (6)$$

or

$$r = \frac{f\,(\text{LHV})}{18{,}380\ \text{Btu/lb}}$$

In addition, it is required for the same T_i that the contribution of the contaminant to the total from either fuel r of fuel f be the same.

$$rR_i = fF_i \quad (7)$$

Combining Eq. (6) and Eq. (7) gives:

$$R_i = \frac{18{,}380}{(\text{LHV})}\,F_i \quad (8)$$

Substituting Eq. (6) and Eq. (8) into Eq. (5) gives:

$$T_i = \frac{18{,}380}{(\text{LHV})}\,F_i + \frac{a}{f(\text{LHV}/18{,}380)}\,A_i + \frac{w}{f(\text{LHV}/18{,}380)}\,W_i + \frac{s}{f(\text{LHV}/18{,}380)}\,S_i + \frac{c}{f(\text{LHV}/18{,}380)}\,C_i \quad (9)$$

Finally, rearranging and substituting the nomenclature in the fourth column of Table B-1 gives:

$$T_i = \frac{18{,}380}{(\text{LHV})}\,[F_i + (AFR)A_i + (WFR)W_i + (SFR)S_i + (CFR)C_i] \quad (10)$$

B2.0 Derivation of Expression Used in Form 3091

Taking Eq. (10) and assigning units to the variables result in the following definition of terms. (The steam term is dropped from the basic expression because it is currently not applicable to *Solar* engines.)

$$T_i = \frac{18{,}380}{(LHV)} [F_i + (AFR)A_i + (WFR)W_i + (SFR)S_i + (CFR)C_i]$$

where

T_i = fuel equivalent concentration of contaminant i, in ppmw
LHV = lower heating value of fuel, in Btu/lb
F_i = concentration of contaminant i in fuel entering combustor, in ppmw
AFR = air-to-fuel mass ratio
A_i = concentration of contaminant i in air entering compressor, in ppmw
WFR = water-to-fuel mass ratio
W_i = concentration of contaminant i in water injected into combustor, in ppmw
CFR = carryover water-to-fuel mass ratio
C_i = concentration of contaminant i in carryover water (same as evaporation cooler feedwater), in ppmw

Examining each term in greater detail:

Fuel Term: F_i

Let K = overall efficiency rating for fuel cleanup system

Adjusted fuel term = $F_i (1 - K)$ (11)

Air Term: $(AFR)A_i$

A_i is concentration air entering compressor

$$A_i = (1 - N)A_i^{amb}$$

where N = efficiency of air filter

A_i^{amb} = concentration of contaminant i in ambient air, in ppmw

Adjusted air term = $(AFR)(1 - N)A_i^{amb}$ (12)

Water Term: $(WFR)W_i$

W_i is concentration in water injected into combustor, ALSO THE SET POINT FOR AUTOMATIC SHUTDOWN

Carryover Term: $(CFR)C_i$

Let water carryover rate = R gal/min x 8.337 lb/gal
= 8.337 R lb/min

Let fuel flow rate = f MBtu/hr

$$f \frac{MBtu}{hr} \times \frac{1\ hr}{60\ min.} \times \frac{lb}{LHV\ Btu} \times \frac{10^6\ Btu}{MBtu} = \frac{16{,}700f\ lb/min}{LHV}$$

Let E = efficiency of mist eliminator

Carryover rate = (8.337R) lb/min

$$CFR = \frac{8.337R\ (LHV)\ (1 - E)}{16{,}700f}$$

$$= 4.99 \times 10^{4} R\ (LHV)\ (1 - E)/f \qquad (13)$$

Substitute in Equation (10),

$$T_i = \frac{18{,}380}{LHV}\ [F_i\ (1 - K) + (AFR)\ (1 - N)A_i^{amb} + (WFR)W_i$$

$$+ \frac{[4.99 \times 10^{-4} R\ (LHV)\ (1 - E)]}{f}\ C_i] \qquad (14)$$

or

$$T_i = \frac{(18{,}380)}{LHV}(1 - K)F_i + \frac{(18{,}380)}{LHV}(AFR)\ (1 - N)A_i^{amb}$$

$$+ \frac{(18{,}380)}{LHV}(WFR)W_i + \frac{(18{,}380)}{LHV}(5 \times 10^{-4})R\ (LHV)\ (1 - E)\ \frac{C_i}{f} \qquad (15)$$

where $\frac{(18.380)}{LHV}(1 - K)F_i$ = fuel equivalent concentration of i^{th} contaminant in fuel, ppmw

$\frac{(18{,}380)}{LHV}(AFR)\ (1 - N)A_i^{amb}$ = fuel equivalent concentration of i^{th} contaminant in air, ppmw

$\frac{(18{,}380)}{LHV}(WFR)W_i$ = fuel equivalent concentration of i^{th} contaminant in injected water, ppmw

$\frac{(18{,}380)}{LHV}(5 \times 10^{-4})R\ (LHV)\ (1 - E)\ \frac{C_i}{f}$ = fuel equivalent concentration of i^{th} contaminant in evaporation cooler feedwater, ppmw

T_i = sum of fuel equivalent concentration of i^{th} contaminant from all sources, ppmw

Equation (15) is used in Form 3091.

APPENDIX C

LIQUID FUEL HANDLING AND STORAGE REQUIREMENTS

(MOVED TO PIL 162)

APPENDIX D

LIQUID FUEL SUITABILITY FORM

The table below contains the allowable limits for liquid fuel characteristics and contaminants. Solar's Liquid Fuel System Assessment form should be filled out with the Solar Sales Engineer to specify project information that will identify liquid fuel filtration requirements. In addition to requirements listed in the Liquid Fuel Suitability Form, the properties of the Biodiesel fuels must be tested per the requirements in Table 9.

Liquid Fuel
Suitability Form.doc

Solar Turbines
A Caterpillar Company

SPECIFICATION

SPECIFICATION FOR LUBRICATING OILS FOR USE IN SOLAR GAS TURBINE ENGINES

Data Control Level **1**

Release Stamp CDM

SPECIFICATION NO. ES 9-224

ISSUED: 5/13/65
(Date and PRD No.)

REVISION HISTORY:
(Letter, Date and PRD / ERL / ECR/ ECN No.)

A; 09/01/65
B; 04/04/67
C; 05/16/67
D; 08/21/70
E; 10/07/70; ERL 85514
F; 12/20/72; ERL 91886
G; 11/09/73; ERL 93285
H; 01/14/74; ERL 93514
J; 07/02/75; ERL 1335-1
K; 10/05/75; ERL 1968-1
L; 02/28/78; ERL 2764-1
M; 12/08/80; ERL 4652-1
N; 07/09/82; ERL 5515-1
P; 07/24/84; ERL 8048-1
Q; 08/06/90; ERL 0137-1
R; 07/01/93; ERL 10899-1
T; 12/13/95; ERL 12249-1
U; 10/16/97; PRD 13313-1
V; 12/08/04; CR10612
W; 02/01/07; CR15327
Y; 10/23/12; ECN 62105

Rev. Ltr.	ECR / ECN #	Author(s) / Approver(s)	Date
AA	74756 / 107327	Prepared By: Abdul Ahmed Senior Principal Engineer Approved By: Jose Aurrecoechea Manager, Materials & Processes Mark Lipschutz Group Manager, Materials Technology *Requires owning department manager.*	02/15/18

Department Document Owner:	Original Document Author:
Materials & Processes *Requires owning department name.*	M.H. Consylman *Requires original author's name.*

CONTENTS

CONTENTS (Continued)

TABLES

1.0 SCOPE - This specification establishes the types of lube oil that can be used in Solar gas turbine engines, gears and driven equipment during normal operating service. This specification also provides guidelines on use and replacement of lube oils in the field.

1.1 ENGINE PRESERVATION - The oils in this specification are suitable for preservation of the engine, gears and driven equipment for a period of up to 90 days. If storage, shipping or down time longer than 90 days is expected, special instructions for preservation shall be obtained from Solar. Information on corrosion preventive oils for long term preservation is provided in ES 9-248 and ES 9-248-1. Preservation of air/gas path surface and fuel system shall be in accordance with ES 9-249.

1.2 CONVENTIONAL OIL TYPES - The following oil types are suited for use on Solar turbomachinery provided that they are in compliance with all the requirements of this specification.

- Synthesized Hydrocarbon Oils (SHC)
- Petroleum Oils

1.3 SPECIALTY OIL TYPES - The following specialty types of lubricating oils require a complex project review and approval prior to quotation. The complex project review must examine and ensure all components that may contact the lubricating oil (such as hoses, elastomers, paint systems or sealers used to coat the internal surfaces of components) are fully compatible with the specialty oil type. Changeover to specialty oils in the field is not recommended, unless approved by Solar Engineering

- Synthetic Ester Oils
- Phosphate Ester Oils (Fire Resistant Lubricants)

1.4 USAGE - Where a Solar drawing references this specification without specifying the oil type, only synthesized hydrocarbons and petroleum oils (i.e. Conventional Oils) can be used as defined herein.

1.4.1 EXCEPTIONS - Only Mercury 50 requires the use of Class III (Synthetic Ester) Oils.

1.5 OIL MIXING - Conventional oils are miscible and can be used interchangeably in the lube system. In other words, synthesized hydrocarbons can be added to a lube oil system that is filled with a petroleum oil, as the addition of a higher performing oil type will improve the net properties of the bulk oil mixture. Conversely, the addition of a lower performing oil type such as a petroleum oil to synthesized hydrocarbon will have the net effect of lowering the bulk properties of the oil mixture. Specialty oils must not be mixed with conventional oils nor with each other.

2.0 APPLICABLE DOCUMENTS - the following documents of the issue in effect on the date of this specification from a part of this specification to the extent specified herein.

SOLAR

ES 9-248	Corrosion Preventive Oil for Long Term Preservation
ES 9-248-1	Corrosion Preventive Oil for Factory Test and Long-Term Preservation: Addendum 1 to ES 9-248
ES 9-249	Preservation, Turbomachinery, Air Side and Fuel System

AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM D92	Standard Test Method for Flash and Fire Points by Cleveland Open Cup (AASHTO NO.: T48 (DIN 51 376) (IP 36/84)

ASTM D97	Standard Test Method for Pour Point of Petroleum Oils [IP 15/67(86)]
ASTM D130	Standard Test Method for Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test (IP 154/86) (British Standard 4351)
ASTM D445	Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity) (British Standard 4708) (IP Designation: 71/84)
ASTM D664	Standard Test Method for Acid Number of Petroleum Products by Potentiometric Titration (British Standard 4457) (IP 177/83)
ASTM D665	Standard Test Method for Rust-Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water (IP 135/85)
ASTM D892	Standard Test Method for Foaming Characteristics of Lubricating Oils (British Standard 5092) (IP 146/82)
ASTM D943	Standard Test Method for Oxidation Characteristics of Inhibited Mineral Oils (British Standard 4388)
ASTM D974	Standard Test Method for Acid and Base Number by Color-Indicator Titration (British Standard 2634) (IP 139/86)
ASTM D1169	Standard Test Method for Specific Resistance (Resistivity) of Electrical Insulating Liquids
ASTM D1298	Standard Practice for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method (British Standard 4714) (API MPMS Chapter 9.1) (IP 160/82)
ASTM D1401	Standard Test Method for Water Separability of Petroleum Oils and Synthetic Fluids
ASTM D6304	Standard Test Method for Determination of Water in Liquid Petroleum Products, Lubricating Oils and Additives by Coulometric Karl Fischer Titration
ASTM D2161	Standard Practice for Conversion of Kinematic Viscosity to Saybolt Universal Viscosity or to Saybolt Furol Viscosity
ASTM D2270	Standard Practice for Calculating Viscosity Index from Kinematic Viscosity at 40 and 100EC (British Standard 4459) (IP Designation: 226/91)
ASTM D2272	Standard Test Method for Oxidation Stability of Steam Turbine Oils by Rotating Pressure Vessel
ASTM D2422	Standard Classification of Industrial Fluid Lubricants by Viscosity System

ASTM D3427	Standard Test Method for Gas Bubble Separation Time of Petroleum Oils
ASTM D3605	Standard Test Method for Trace Metals in Gas Turbine Fuels by Atomic Absorption and Flame Emission Spectroscopy
ASTM D4172	Standard Test Method for Wear Preventive Characteristics of Lubricating Fluid (Four-Ball Method)
ASTM D4293	Standard Specification for Phosphate Ester Based Fluids for Turbine Lubrication
ASTM D4308	Standard Test Method for Electrical Conductivity of Liquid Hydrocarbons by Precision Meter
ASTM D4628	Standard Test Method for Analysis of Barium, Calcium, Magnesium, and Zinc in Unused Lubricating Oils By Atomic Absorption Spectrometry
ASTM D5182	Standard Test Method for Evaluating the Scuffing (Scoring) Load Capacity of Oils
ASTM D7843	Standard Test Method for Measuring the Color of Insoluble Deposits in In-Service Turbine Oils using Membrane Patch Colorimetry.
ASTM E659	Standard Test Method for Autoignition Temperature of Liquid Chemicals
MILITARY	
MIL-PRF-23699	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
OTHER	
ISO 4406	Hydraulic Fluid Power - Fluids - Method for Coding Level of Contamination by Solid Particles

3.0 NEW OIL REQUIREMENTS

3.1 SYNTHESIZED HYDROCARBON OILS (ISO VG 32 and 46)

3.1.1 GENERAL - Synthesized hydrocarbons (SHC) are oils that are derived from other chemical compounds; they include polyalphaolefins (PAO, also referred to as olefin oligomers), alkylated aromatics and other products. Additives are blended in, as necessary, in order to meet all the requirements of this specification. Two viscosity grades are allowed for use, ISO VG 32 and ISO VG 46. SHC's must be chemically compatible and miscible with petroleum oils.

3.1.2 ACCEPTANCE REQUIREMENTS - In order for a synthesized hydrocarbon to be suitable for use on Solar equipment, all the physical and chemical property limits in Table 1 must be complied with.

3.1.3 CLASSIFICATION REQUIREMENTS - In addition, an oil shall be assessed for compliance with the classification requirements in Table 1A. In order for an oil to be classified for use as an SHC on Solar packages, it has to meet the Class I requirements in Table 1A. Class I oils are generally expected to be higher performing and more oxidation resistant than petroleum (Class II) oils.

3.1.4 ADDITIVES IN SHC's - Additives blended with the oil shall be thermally stable, water inseparable and uniformly distributed throughout the oil at all temperatures up to 284°F (140°C).

3.2 PETROLEUM OILS (ISO VG 32 and 46)

3.2.1 GENERAL - Petroleum oils, also known as mineral oils, shall consist of refined paraffinic base stock oils that have been blended with suitable additives to meet the physical and chemical property requirements specified in Table 1. Two viscosity grades are allowed for use, ISO VG 32 and 46. In addition, this type of oil must be chemically compatible and miscible with synthesized hydrocarbons.

3.2.2 ACCEPTANCE REQUIREMENTS - In order for a petroleum oil to be suitable for use on Solar equipment, all the physical and chemical property limits in Table 1 must be complied with.

3.2.3 CLASSIFICATION REQUIREMENTS - In addition, an oil shall be assessed for compliance with the classification requirements in Table 1A. In order for an oil to be classified for use as a petroleum oil on Solar packages, it has to meet the Class II requirements in Table 1A.

3.2.4 ADDITIVES IN PETROLEUM OILS - Additives blended with the oil shall be thermally stable, water inseparable and uniformly distributed throughout the oil at all temperatures up to 284°F (140°C).

3.3 SYNTHETIC ESTER OILS

3.3.1 REQUIREMENTS - These oils shall comply with the requirements of MIL-PRF-23699 Class CI and are classified as a Class III oil for use on Solar packages.

3.4 PHOSPHATE ESTER OILS (ISO VG 32 and 46)

3.4.1 GENERAL - Phosphate esters are also known as fire resistant lubricants and they shall be comprised of phosphate esters blended with the necessary additives to meet the physical and chemical property requirements of Table 1.

3.4.2 ACCEPTANCE REQUIREMENTS - In order for a phosphate ester oil to be suitable for use on Solar equipment, the physical and chemical property limits in Table 1 must be complied with.

3.4.3 CLASSIFICATION REQUIREMENTS - In addition, an oil shall be assessed for compliance with the classification requirements in Table 1A. In order for an oil to be classified for use as a phosphate ester oil on Solar packages, it has to meet the Class IV requirements in Table 1A.

3.4.4 ADDITIVES IN PHOSPHATE ESTERS - Additives blended with the oil shall be thermally stable, water inseparable and uniformly distributed throughout the oil at all temperatures up to 284°F (140°C).

4.0 USED OIL REQUIREMENTS

4.1 OIL DETERIORATION - Regardless of the type of oil used, the physical and chemical properties of lube oil are expected to deteriorate over time. As the rate of deterioration depends on many factors (such as engine model, maintenance practice, duty cycle, cleanliness of process gases in boost compressor applications, oil type, etc.), the useful life of lube oils cannot be specifically defined. Based on industry experience, guidelines and standards for the physical and chemical condition of in-service oils are provided here.

Table 1. Acceptance Requirements of New Lube Oils

ASTM	Property	Requirements For New Lube Oil	
D2422	Viscosity Grade	ISO VG 32 (S150)	ISO VG 46 (S215)
D92	Flash Point, COC, °F (°C) Minimum	390°F (199°C)	390°F (199°C)
	Fire Point, COC, °F (°C) Minimum	440°F (227°C)	450°F (232°C)
D130	Copper Corrosion at 212°F (100°C), 3 hours.	Class 1b	Class 1b
D665	Rust Prevention, Procedure B (Procedure A for Class IV)	Pass	Pass
D892	Foam Limits, Milliliters, Maximum Sequence I Sequence II Sequence III	 50/0 50/0 50/0	 50/0 50/0 50/0
D943[1]	Oxidation Resistance, Hours to 2.0 Neutralization Number, Minimum	2000 hours	2000 hours
D1401	Water Separability (Emulsion Test)	40-40-0 (30)	40-40-0 (30)
D4628	Zinc, Weight Percent, Maximum	0.005 wt.%	0.005 wt. %
E659	Autoignition Temp., °F (°C) Minimum	590°F (310°C)	590°F (310°C)
D4172	Wear Preventive Characteristic, Scar Diameter (167°F or 75°C, 1200 rpm, 88.1 lb or 40 kg, 1 hr.), Millimeters, Maximum	0.90 mm	0.90 mm
	Particle Contamination	ISO 4406 Code 16/14/12	ISO 4406 Code 16/14/12
D5182	FZG Visual Method, Failure Load Stage, Minimum	6	7
D3427	Gas Bubble Separation (Air Release) at 122°F (50°C), Minutes, Maximum	5	6
D2272	Rotating Pressure Vessel Oxidation Test (RPVOT), Minutes	(to be reported)	(to be reported)
D4308 or D1169	Electrical Conductivity, pS/m at 32°F (0°C) or Resistivity, MΩAm at 68°F (20°C)	(to be reported)	(to be reported)

[1] - The oxidation stability requirements of MIL-PRF-23699 and ASTM D4293 shall apply to Class III and Class IV oils respectively, in lieu of the ASTM D943 requirement.

4.1.1 CORRECTIVE ACTION - If the physical condition of an in-service oil (per paragraph 4.2) is deteriorated while its chemical condition (per paragraph 4.3) appears to be acceptable, corrective action taken should include checking for possible source(s) of solid/water contamination, check/replace filter elements and, if necessary, oil reconditioning to remove particulate matter and water.

4.2 PHYSICAL CONDITION OF IN-SERVICE OILS - The physical condition of an in-service oil can be determined by inspecting it for color, odor, viscosity, water content and particle contamination. In general, such physical deterioration (as defined by these five properties) can be reversed by reconditioning the oil provided that physical deterioration is not accompanied by chemical deterioration as defined in paragraph 4.3. Functional guidelines/limits for the physical condition of lube oil during service are provided in Table 2.

Table 1A. Classification Requirements For New Oils

ASTM	Property	Class I (SHC)		Class II (Petroleum Oil)		Class IV (Phosphate Ester)	
D2422	Viscosity Grade	ISO VG 32	ISO VG 46	ISO VG 32	ISO VG 46	ISO VG 32	ISO VG 46
D445	Viscosity at 104°F (40°C)	28.8-35.2 cSt (136-165 SUS)	41.4-50.6 cSt (193-235 SUS)	28.8-35.2 cSt (136-165 SUS)	41.4-50.6 cSt (193-235 SUS)	28.8-35.2 cSt (136-165 SUS)	41.4-50.6 cSt (193-235 SUS)
	Viscosity at 212°F (100°C), Minimum	5.40 cSt (44 SUS)	6.04 cSt (46 SUS)	5.09 cSt (43 SUS)	6.04 cSt (46 SUS)	4.09 cSt (40 SUS)	4.8 cSt (42 SUS)
D2270	Viscosity Index	≥100		≥90		___	
D1298	Specific Gravity, 60/60°F (15/15°C)	0.83-0.88		0.83-0.88		1.10-1.20	
D664 or D974	Neutralization (Total Acid Number), Maximum	0.40 mg KOH/g		0.20 mg KOH/g		0.10 mg KOH/g	
D6304	Water (Parts Per Million Weight), Maximum	200 ppmw (0.02 wt.%)		200 ppmw (0.02 wt.%)		1000 ppmw (0.1 wt.%)	
D97	Pour Point, °F (°C)	≤-65°F (≤-50°C)		≤+15°F (≤-9.5°C)		≤0°F (≤-17.8°C)	
D92	Flash Point, COC, °F (°C) Minimum	390°F (199°C)	390°F (199°C)	390°F (199°C)	390°F (199°C)	437°F (225°C)	
	Fire Point, COC, °F (°C) Minimum	440°F (227°C)	450°F (232°C)	440°F (227°C)	450°F (232°C)	617°F (325°C)	
E659	Autoignition Temp., °F (°C) Minimum	705°F (374°C)		590°F (310°C)		1000°F (538°C)	

Class III (Synthesized Ester) - Per MIL-PRF-23699

4.2.1 COLOR (VISUAL APPEARANCE) - Darkening of in-service lube oils, regardless of type, is to be expected, although the rate at which this occurs cannot be quantified. Color darkening and increasing haziness could be indicative of (1) particulate contamination, (2) water contamination, or (3) oil oxidation. Change in oil color may or may not be accompanied by significant changes in its chemical condition as defined in paragraph 4.3.

4.2.2 ODOR - As lube oil deteriorates, intermediate compounds can be formed that can impart a strong odor. As odor is a highly subjective human sensation, such detection should be recognized as a qualitative indicator that needs to be substantiated by quantitative analytical tests to establish the chemical condition of the oil.

4.2.3 VISCOSITY - Changes in oil viscosity may be indicative of changes in oil chemistry due to contamination, high shear rates and/or excessive temperature. A decrease in viscosity can result from contamination with fuel or a less dense fluid. Viscosity increases, which is the more common phenomenon, is generally associated with oil deterioration which can be verified by checking the chemical properties of the oil.

Table 2. Guidelines/Limits for Physical Condition of In-Service Lube Oils

Property	Test Method	Limiting Condition	Recommended Action
Color	Visual observation	Rapid darkening, haziness	Check for possible source(s) of fluid contamination Check chemical properties (see para. 4.3)
Odor	Olfactory observation	Strong odor	Check for possible source(s) of contamination Check chemical properties (see para. 4.3)
Viscosity (104°F/40°C)	ASTM D445	+ 20%/-10% (compared to new oil)	Check for possible source(s) of fluid contamination Check for overtemperature Check chemical properties (see para. 4.3)
Water content	ASTM D6304	max. 2,000 ppmw	Check tank, sumps, for standing water or water leakage Centrifuge or filter oil to remove water or replace oil
Particle contamination	Automatic particle counter/ISO 4406 code	Abrupt increase in particle count	Check bearing points for excessive wear Check other sources of contamination Centrifuge or filter to remove sediments or replace oil

4.2.4 WATER CONTENT - Water contamination of in-service lube oils is of concern because it can be manifested in two ways. When excessive water is present in bulk, the tendency to separate from the oil phase will allow it to collect at the bottom of oil tanks or in stagnated areas in pipelines. In addition, depending on the emulsion characteristics of the oil, finely divided water particles can remain in permanent dispersion in the oil, thereby disrupting the hydrodynamic and corrosion properties of the oil. A maximum limit of 2000 ppm (0.2 weight percent) of water in the oil layer is the criterion to be used for oil change out or oil reconditioning to remove both standing water and water dispersed in the oil.

4.2.5 PARTICLE CONTAMINATION - Particulate matter in lube oil can be due to contamination, wear debris or oil oxidation (coking). Filters in the lube oil system, if properly installed and maintained, will remove most of the particles in the mesh size range. However, the particles that do pass through the filter mesh could continue to be in circulation and even increase in population, unless they are removed by oil conditioning processes. Unless the chemical properties of the oil have deteriorated beyond allowable limits, removal of such particles could restore the oil to service.

4.3 CHEMICAL CONDITION OF IN-SERVICE OILS - The chemical condition of an in-service lube oil is established by analyzing it for acidity, oxidation resistance, foaming characteristics, and air release. Because of the range of values that exists among the various oils, the limits for in-service oils provided in Table 3 are to be compared to new oils, preferably from the same oil lot.

4.3.1 ACIDITY - Oil acidity is determined by obtaining its total acid number (TAN) per ASTM D664 or ASTM D974 and comparing it to that of a new, unused oil sample from the same lot, if possible. An increase in TAN is indicative of oil oxidation (or loss of antioxidant) or hydrolysis and represents irreversible oil deterioration. If other chemical properties are within Table 3 limits, and physical properties are also acceptable, continued use of such oil is possible provided that the monitoring frequency is increased.

4.3.2 OXIDATION RESISTANCE - The oxidation resistance of a lube oil is determined by conducting the rotating pressure vessel oxidation test (RPVOT) per ASTM D2272. With service, the RBOT value will decrease as the antioxidant is depleted. When the RPVOT value decreases to 25% of the new oil value (from the same lot, if possible), the oil is deemed non-acceptable for continued use and must be replaced immediately.

4.3.3 FOAMING CHARACTERISTICS - Oil foaming, as measured by ASTM D892, is a property that is controlled by the use of anti-foaming additives. As the anti-foamant is depleted either from temperature or adsorption on to surfaces and particles, the volume of foam formed and the stability of this foam will increase. As a functional guideline, once the in-service oil reaches 300/10 for Sequences I and II, the oil should be carefully assessed for continued use (see paragraph 4.3.3.1).

4.3.3.1 HIGH FOAMING TENDENCY - For high foaming oils with acceptable TAN and RPVOT values, i.e. well within Table 3 limits, the addition of an anti-foaming agent may be appropriate and the oil supplier should be consulted for correct dosage. However, because of the adverse effect of excessive anti-foamants on air bubble separation and foam stability, the air release property of the oil (see paragraph 4.3.4) should be measured before and after addition to be compared with that of new oil to ensure compliance with Table 3. If high foaming is accompanied by unacceptable or marginal TAN and RPVOT values, the oil should be replaced.

4.3.4 AIR RELEASE - The ability to allow air bubbles to separate from the oil is a critical property that can deteriorate with service or excessive silicone containing additives (such as that used to control foaming). An air release value of 10 minutes at 122°F (50°C), as determined using ASTM D3427, is provided in Table 3 as a limiting guideline (maximum) for this property. Air release must be monitored when anti-foaming agents (or any silicone containing compound) is added to an in-service lube oil.

4.3.5 VARNISH POTENTIAL – Lube oils may have tendencies to form varnish (thin, hard, lustrous, oil-insoluble deposit composed primarily of organic residue) during the engine operation. These deposits are caused by thermal degradation, oxidation and/or contamination. They have limited solubility in the base oil. They can cause filter plugging, excessive wear on parts and could lead to failure bearings or other critical components such as servomechanisms (seizing). Membrane Patch Colorimetry (MPC) test method per ASTM D7843 is typically used to assess the varnish potential of the oil. The oils showing varnish levels higher than 30 ΔE should be carefully assessed for continued use. If the varnish potential is the only issue with the oil, the filtration of the in-service oil and/or the addition of varnish controlling additives may be considered. The lube oil manufacturer must be consulted before the chemical agents are added to the oil. The solid particles and other properties of the lube oil must be checked before and after adding the chemical compounds to the in-service lube oil.

5.0 OPERATING LIMITS

5.1 USE OF VARIOUS OIL TYPES - Use of each lube oil type shall be according to paragraph 1.0, Table 4, and the viscosity and temperature limitations in the applicable functional control system specification. Package specific operating limits are contained in the hydro mechanical schematics and mechanical installation drawings issued for each package.

5.2 OIL SELECTION - In selecting the appropriate oil for use, it is required that the pour point must be at least 11°F (6°C) below the ambient air temperature surrounding the package even in the coldest season. This requirement is to ensure oil flow at the start of the pre-lube cycle.

Table 3. Limits for Chemical Condition of In-Service Lube Oils

Property	Test Method	Limits (Compared to New Oil)
Total Acid Number (TAN)	ASTM D664 or ASTM D974	0.8 mg KOH/g max. for Class I oils 0.6 mg KOH/g max. for Class II oils 2.0 mg KOH/g max. for Class III oils 0.2 mg KOH/g max. for Class IV oils
Rotating Pressure Vessel Oxidation Test (RPVOT)	ASTM D2272	25% of original (new oil) value
Foaming Characteristics	ASTM D892	**(Guideline only, see Section 4.3.3)** Sequence I - 300/10 Sequence II - 300/10
Air Release at 122°F (50°C)	ASTM D3427	**(Guideline only, see Section 4.3.4)** 10 minutes max.
Varnish Potential*	ASTM D7843	**(Guideline only, see Section 4.3.5)** 30 ΔE For Class I and II oils.

*MPC scale (ΔE)
≤ 15 Normal for in-service lube oil
15 to 30 Higher risk of varnish
≥ 30 Take action per Paragraph 4.3.5

Table 4. Lube Oil Usage

Oil Class	Viscosity Grade	Ambient Temperature
Class I (Synthesized Hydrocarbons)	ISO VG 32 ISO VG 46	-54°F to +115°F (-48°C to +46°C) -54°F to +140°F (-48°C to +60°C)
Class II (Petroleum Oils)	ISO VG 32 ISO VG 46	+26°F to +110°F (-3°C to +43°C) +26°F to +135°F (-3°C to +57°C)
Class III (Synthetic Esters)	MIL-L-23699	-54°F to +110°F (-48°C to +43°C)
Class IV (Phosphate Esters)	ISO VG 32 ISO VG 46	+11°F to +110°F (-12°C to +43°C) +11°F to +110°F (-12°C to +43°C)

5.3 OIL TEMPERATURE AT START-UP - Before start-up, the temperature of the oil in the entire lube system, such as tank, lines, cooler, filters, "P" traps, etc. shall be at or above the temperature limits given in the applicable functional control system specification to ensure that the oil entering the engine will have the desired viscosity. Tank heaters and auxiliary pumps may be used to ensure proper oil temperature in the system prior to package start-up.

6.0 ELECTRICAL CONDUCTIVITY/RESISTIVITY OF LUBE OILS

6.1 BACKGROUND - In some applications, flammable gas mixtures may exist in the vicinity of the oil. To avoid incendive sparks (sparks that have enough energy to ignite flammable gases) caused by static electricity the oil must be able to conduct electricity. Grounding of lubricating system components is also required.

6.2 GUIDELINE FOR ELECTRICAL CONDUCTIVITY/RESISTIVITY - A minimum conductivity of 50 (picomho/meter or picoSiemens/meter, pS/m) is generally recognized as being adequate to prevent formation of incendive sparks in Class I and II oils. Due to the inherently higher polarity, and hence higher conductivity, of Class IV oils, maximum conductivity or more commonly minimum resistivity is specified for these oils. A minimum resistivity of 50 (mega ohm meter) MΩAm at 68°F (20°C) is required for Class IV oils.

6.2.1 LOW CONDUCTIVITY OILS - If the conductivity of a lube oil is reported to be less than 50 pS/m at 32°F (0°C), or the lowest ambient temperature at start-up, the lube oil manufacturer should be asked to submit the following to Solar and the equipment operator:

a) Define a commercially available additive, which may be used to enhance conductivity. (Dupont manufactures an additive called Stadis 425, which may be acceptable.)

b) Specify the concentration of additive in new oil which is needed to achieve 50 (pS/m) at 32°F (0°C) or the lowest ambient temperature at start-up.

c) Define the impact of the additive on all of the properties specified in this specification.

7.0 QUALITY ASSURANCE

7.1 PRODUCT QUALITY AND LIABILITY - The equipment operator shall be ultimately responsible for ensuring that the product that is delivered to the site and used in the package, regardless of brand name, meets the requirements of this specification.

7.1.1 VERIFICATION TESTING - As Solar has no control over, and is not necessarily cognizant of changes in, lube oil formulation, processing, blending, and labeling, it is recommended that the equipment operator verify that each batch of oil shipped to the site meets specification requirements. Verification testing is especially useful when a new lube oil supplier is being developed and when new or improved lube oils are being considered for use. Verification could involve conducting all or selected test(s) from Table 1, as determined by operator's previous experience and specific application.

Solar Turbines
A Caterpillar Company

SPECIFICATION

LEVELING AND INSTALLING OF PACKAGE BASES

Data Control Level
1

SPECIFICATION NO. ES 9-414

ISSUED: 12/16/99; PRD 66541-6
(Date and PRD No.)

REVISION: E

Release Stamp
CDM

(Letter, Date and CR No.)
A; 09/05/03; CR8405
B; 05/10/05; CR11594
C; 10/10/06; CR14996
D; 09/03/13; PR 38170

Rev	ECN	Signature and Title	Date	Pages Affected
E CDM	87057	Edited by: Mark Mulock Engineer, Mechanical Analysis	01/30/2015	All
		Approved By: Frank Peterson Group Manager, Mechanical Analysis	01/30/2015	
		Approved By: Chris Patterson Group Manager, Commissioning	01/30/2015	
		Approved By: Jon Windt Manager, Package Development & Integration	01/30/2015	

CONTENTS

Section **Page**

Figure **Page**

1.0 Purpose

To describe the procedure to place Solar Turbines packages on their foundation, establish vertical elevation, level package, and prepare for drivetrain alignment.

2.0 Reference Information

2.0a Applicable Documents

- Project Specific Mechanical Interface Drawing (MID)
- Fastener Installation and Torque Values, ES 9-54
- Package Tie-Down Options, PIL 181
- Turbomachinery Package Installation Guideline (TPIM) 1000, 1010, or 1020
- *Shaft Alignment Handbook, 3rd Edition*, John Piotrowski

2.0b Definition of Terminology

- **Package Frame Interface** – The location where the driver and driven frame are bolted together on a package that is constructed with separate frames. Machined pads on both portions of the package frame form the bolted joint.
- **Machined Equipment Mounting Pads** – The machined upper pads on the package frame onto which the equipment is mounted. These include pads for the Engine spring mounts and trunnions (depending on package type), Gearbox (if applicable), and the Generator or Compressor.
- **Frame Foundation Pads** – The thick steel pads at the lowest part of the package frame that are used to attach the package frame to foundation. These pads have a slot for the tie-down bolt to pass through, and threaded holes for the jacking bolts to pass through.
- **Frame Jacking Pads** – Steel pads at the lowest part of the package frame that are used for jacking purposes only. These pads are smaller than the Frame Foundation Pads, and are often located near the package frame interface.
- **Site Watermark** – An immovable location at site that should be chosen as the reference point to which all equipment is positioned. Careful use of a consistent Site Watermark will aid in the interfacing of equipment.
- **Datum -C-** – The plane that is formed by the underside of the Frame Foundation Pads or the bottom of the frame I-beam in the case of typical PG frames. Solar uses this plane as the "benchmark" during the design process to assign the vertical relationship of all component interfaces including ancillary, hydro-mechanical hook-ups, and electrical connections. It is critical that a relation be established between this design datum, and a Site Watermark for the installation and set-up of the package.
- **Site Elevation Point** – A reference point that should be chosen at site to use for package elevation purposes. The Site Elevation Point should be positioned higher than the Site Water Mark by a distance equal to the distance between Package Datum -C- and Datum -D-. Please refer to the Solar Mechanical Installation Drawing for this relationship.
- **Datum -D-** – The plane that it formed by the machined surfaces located on the tops of the package lifting bollards/gussets. These points are a reference plane that should be used to measure the vertical elevation of the package in relation to the Site Elevation Point. These points are also useful for preliminary package leveling operations, but must not be used for final package leveling.

- **Gimbal Mounts and Anti-Vibration Mounts (AVMs)** – Gimbal mounts are designed to lessen the influence of platform/deck deflections on offshore packages while AVMs are intended to reduce the amount of vibration to and from the package. The mounts will attach to the Frame Foundation Pads or Sub-base. These mounts are optional and will not be supplied with every package.
- **Datum -E-** – The plane that is formed by the underside of the Gimbal Mounts or AVMs on a package that is supplied with these mounts. This datum functions the same way as Datum -C- does on a package without Gimbals or AVMs.

The above listed terms are shown pictorially in Figure 1 for clarification.

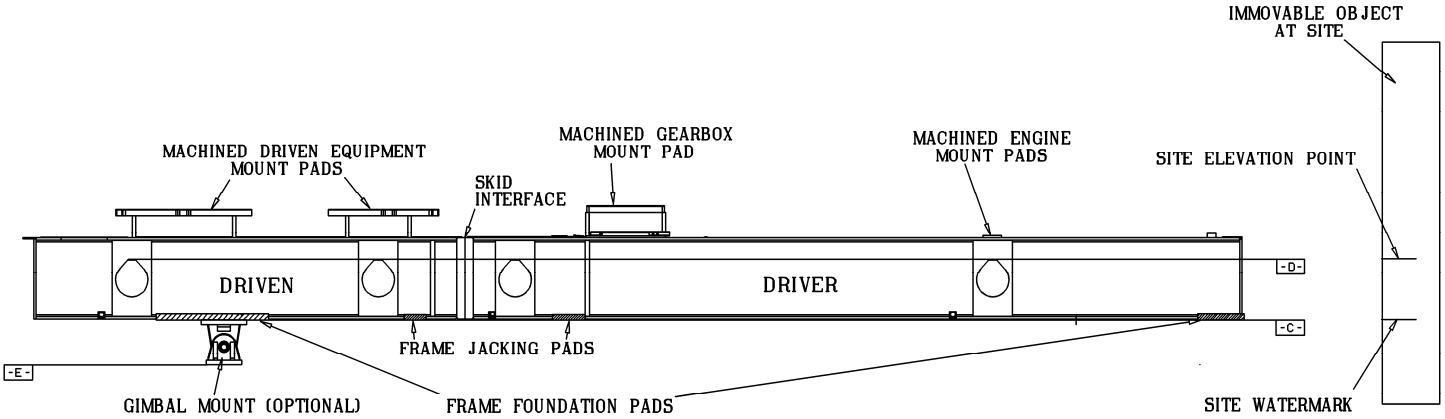


Figure 1: Reference View for Definition of Terms

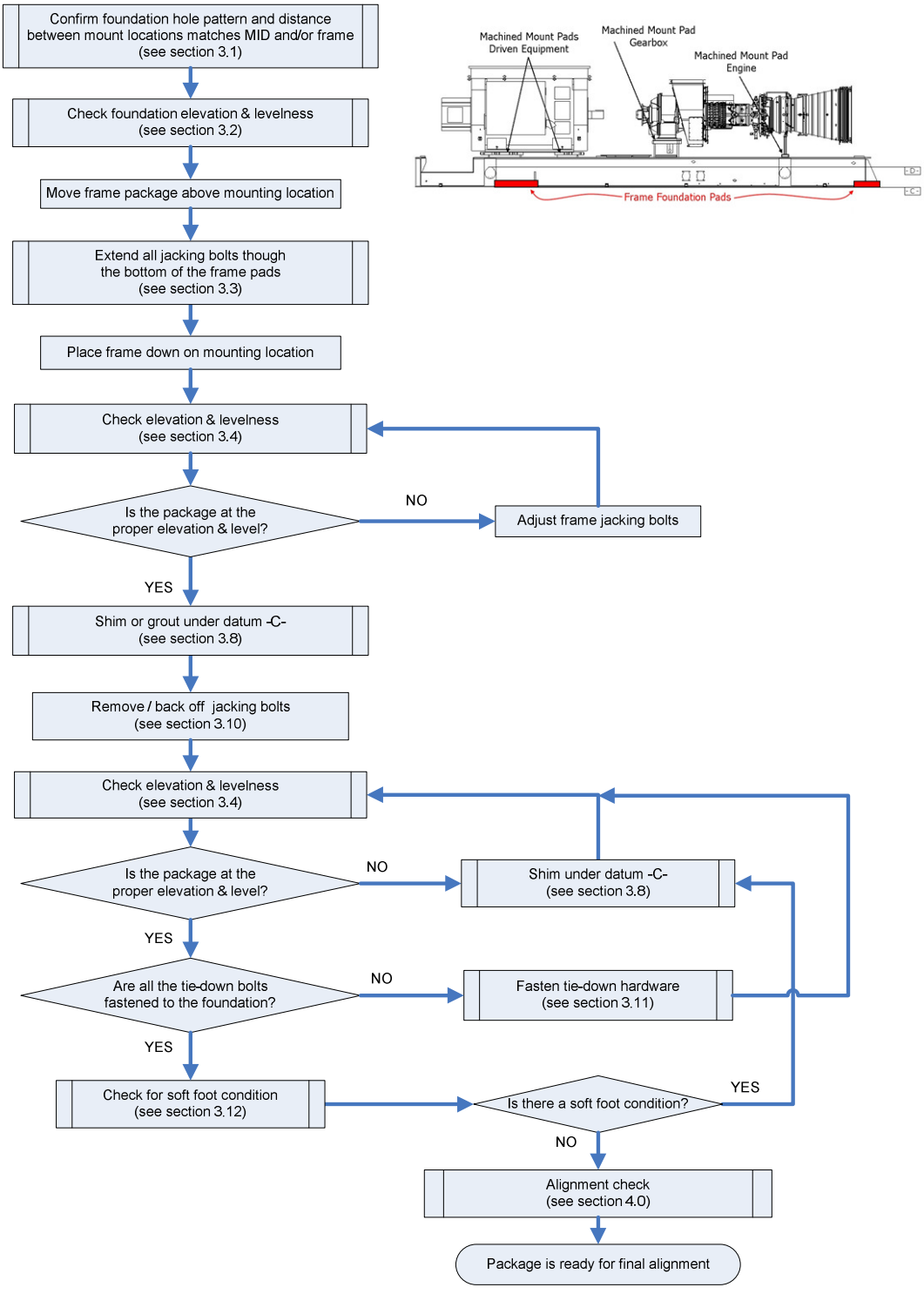
2.0c Use of Flow Charts

The flow charts are intended to make it easier to level and install package bases. They are also used to remove duplication of pages within this specification. Each flow chart will have shapes for a predefined process, process, decision, and terminator. Every predefined process refers to a specific section. This specific section will give more details about the predefined process. Each flow chart is based on the frame type with or without 3-point package mounts. All of the flow charts are kept to one page except for the sub-base installation.

Five flow charts are given:

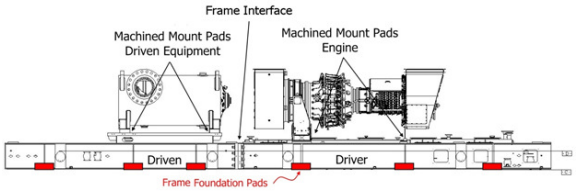
- Single frame package without Gimbals or AVMs,
- Split frame package without Gimbals or AVMs,
- Single frame package with Gimbals or AVMs,
- Split frame package with Gimbals or AVMs, and
- Sub-base (which always includes a Split frame package with Gimbals or AVMs).

2.1 Flow Chart for Leveling and Installing Single Frame Pkg without Gimbals or AVMs.



Sheet 1 of 1

2.2 Flow Chart for Leveling and Installing Split Frame Pkg without Gimbals or AVMs.



Confirm foundation hole pattern and distance between mount locations matches MID and/or frame (see section 3.1)

Check foundation elevation & levelness (see section 3.2)

Move driver frame package above mounting location

Extend all driver frame jacking bolts though the bottom of the frame pads (see section 3.3)

Place driver frame down on mounting location

Move driven frame package above mounting location

Extend all driven frame jacking bolts though the bottom of the frame pads (see section 3.3)

Place driven frame down on mounting location

Check elevation & levelness (see section 3.4)

Loosen bolts at frame interface

Is the package at proper elevation & level? — NO → Adjust frame jacking bolts

YES

Bolt package frame interface (see section 3.7)

Check elevation & levelness (see section 3.4)

Is the package at proper elevation & level? — NO → Loosen bolts at frame interface; YES

Is this a 3-point hard mounted package? — NO; YES

Shim or grout under datum -C- (see section 3.8)

Is the package at proper elevation & level? — YES → Shim or grout under datum -C-; NO → Adjust frame foundation jacking bolts

Adjust frame foundation jacking bolts

Check elevation & levelness (see section 3.4 & 3.6)

Remove / back off jacking bolts (see section 3.10)

Remove / back off jacking bolts except at the three frame foundation pads. (see section 3.10)

Check elevation & levelness (see section 3.4 & 3.6)

Is the package at proper elevation & level? — NO → Shim under datum -C- (see section 3.8)

YES

Are all the tie-down bolts fastened to the foundation? — NO → Fasten tie-down hardware (see section 3.11)

YES

Check for soft foot condition (see section 3.12)

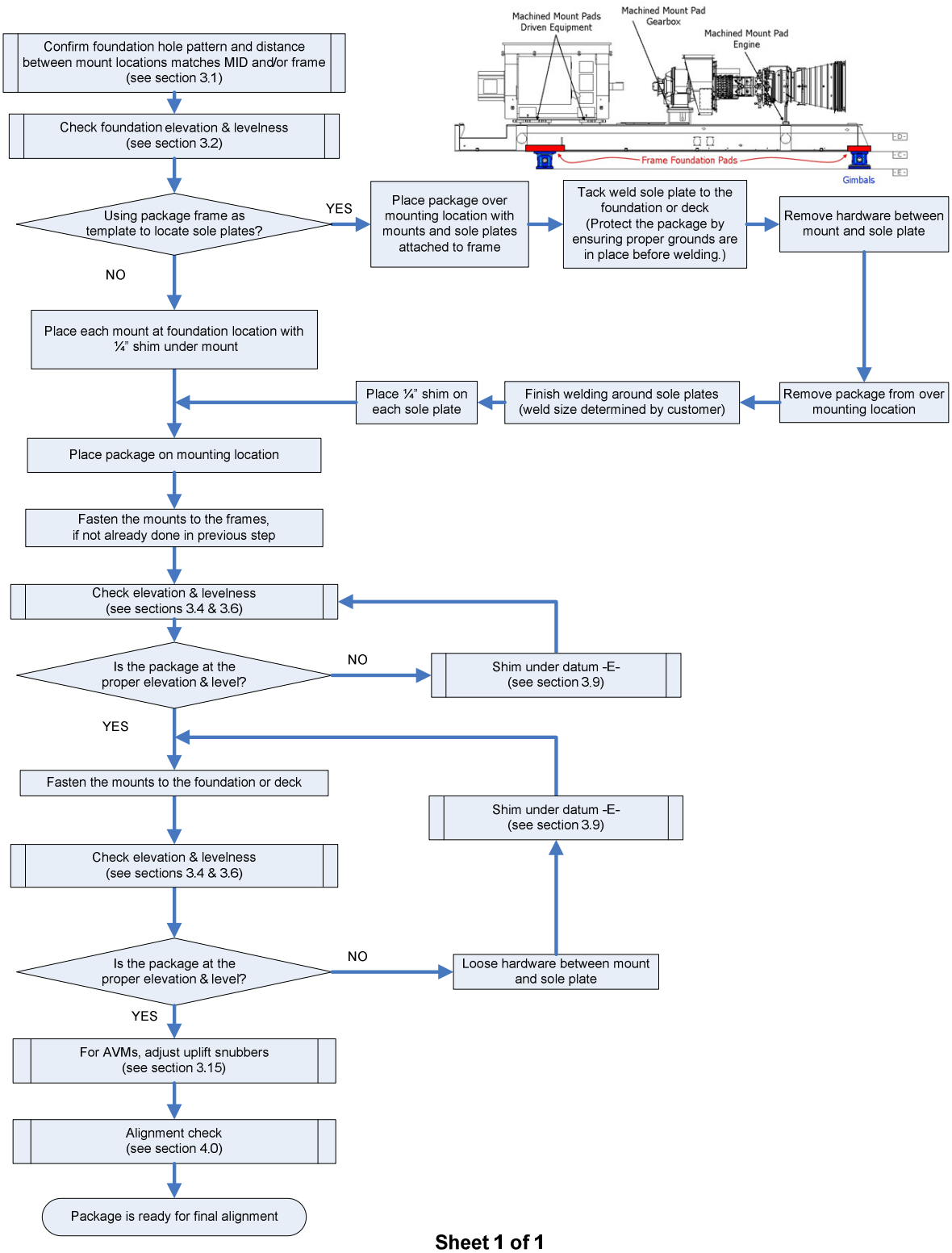
Is there a soft foot condition? — YES; NO

Alignment check (see section 4.0)

Package is ready for final alignment

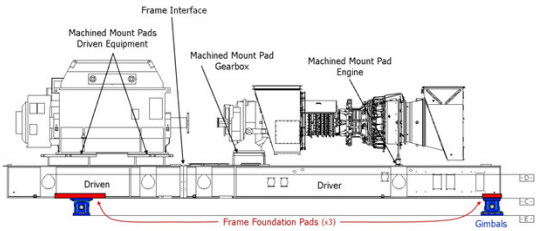
Sheet 1 of 1

2.3 Flow Chart for Leveling and Installing Single Frame Pkg with Gimbals or AVMs.



Sheet 1 of 1

2.4 Flow Chart for Leveling and Installing Split Frame Pkg with Gimbals or AVMs.



Confirm foundation hole pattern and distance between mount locations matches MID and/or frame (see section 3.1)

Check foundation elevation & levelness (see section 3.2)

Using split frame package as template to locate sole plates?

YES

Place package over mounting location with mounts and sole plates attached to frame

Tack weld sole plate to the foundation or deck (Protect the package by ensuring proper grounds are in place before welding.)

Remove hardware between mount and sole plate

Remove package from over mounting location

Finish welding around sole plates (weld size determined by customer)

Place ¼" shim on each sole plate

NO

Place each mount at foundation location with ¼" shim under mount

Place temporary supports (see section 3.13)

Place each frame at it's corresponding mounting location

Fasten the mounts to the frames, if not already done in previous step

Bolt package frame interface (see section 3.7)

Shim under datum -E- (see section 3.9)

Check elevation & levelness (see sections 3.4 & 3.6)

Adjust height of temporary supports, if necessary

Is the package at the proper elevation & level?

NO

Loosen bolts at frame interface

YES

Fasten the mounts to the foundation or deck

Remove temporary supports (see section 3.14)

Check elevation & levelness (see sections 3.4 & 3.6)

Is the package at the proper elevation & level?

NO

Shim under datum -E- (see section 3.9)

YES

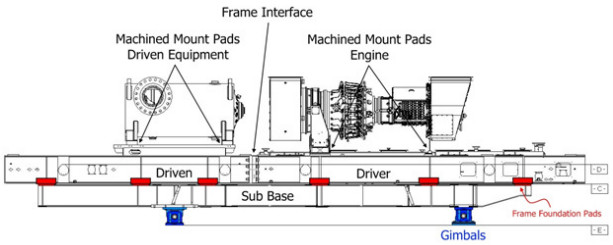
For AVMs, adjust uplift snubbers (see section 3.15)

Alignment check (see section 4.0)

Package is ready for final alignment

Sheet 1 of 1

2.5 Flow Chart for Leveling and Installing Pkg on Sub-base with Gimbals or AVMs.



Confirm foundation hole pattern and distance between mount locations matches MID and/or frame (see section 3.1)

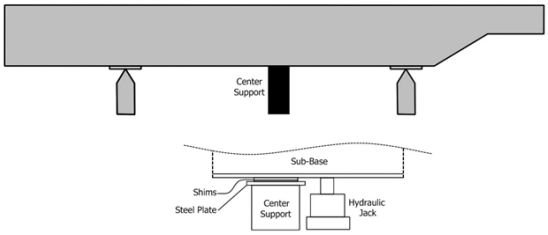
Check foundation elevation & levelness (see section 3.2)

Using sub-base as template to locate sole plates?

YES → Place sub-base over mounting location with mounts and sole plates attached to the sub-base → Tack weld sole plate to the foundation or deck (Protect the package by ensuring proper grounds are in place before welding.) → Remove hardware between mount and sole plate → Remove package from over mounting location → Finish welding around sole plates (weld size determined by customer) → Place ¼" shim on each sole plate

NO → Place each mount at foundation location with ¼" shim under mount

Place temporary supports (see section 3.13)



Temporary center support with hydraulic jack

Place sub-base on mounting location

Fasten the mounts to the sub-base, if not already done in previous step

Check sub-base elevation & levelness (see sections 3.4 & 3.5)

Is the sub-base at the proper elevation & level?

NO → Adjust height of center support, if necessary → Shim under datum -E- (see section 3.9) → Check sub-base elevation & levelness (see sections 3.4 & 3.5)

YES → Move driver frame package above mounting location → Extend all driver frame jacking bolts though the bottom of the frame pads (see section 3.3) → Place driver frame down on mounting location → Move driven frame package above mounting location → Extend all driven frame jacking bolts though the bottom of the frame pads (see section 3.3) → Place driven frame down on mounting location → Check sub-base elevation & levelness (see section 3.5)

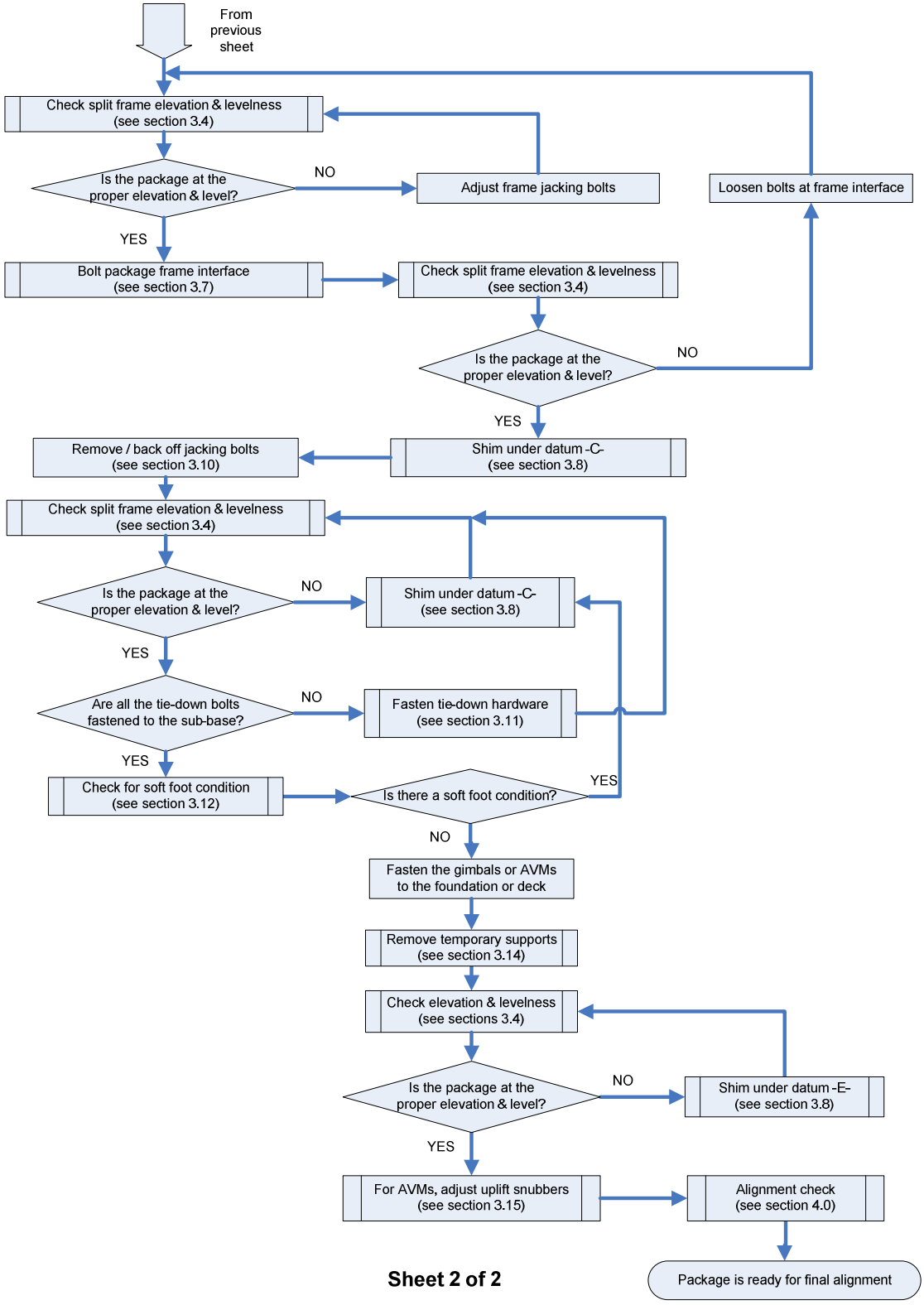
Is the sub-base at the proper elevation & level?

NO → Adjust height of center support, if necessary → Shim under datum -E- (see section 3.9) → Check sub-base elevation & levelness (see section 3.5)

YES → Go to next sheet

Sheet 1 of 2

2.5 Cont. Flow Chart for Leveling and Installing Pkg on Sub-base with Gimbals or AVMs.



Sheet 2 of 2

3.0 Package Elevation and Leveling Details

The goal is to move the package to its proper elevation and levelness before going into final drivetrain alignment. Packages may consist of a single frame or split frame or a sub-base. Each frame configuration can be mounted directly to the foundation or deck or may use a set of Anti-Vibration Mounts (AVMs) or gimbals. A sub-base will always include a driver and driven split frame package with AVMs or gimbals.

3.1 Confirm Pattern and Distance between Frame and Foundation

Before lifting the package into position, confirm that the foundation has been laid out properly, and that all tie-down holes in the foundation also match the Solar Mechanical Installation Drawing (MID). Next, measure the distances between the tie-down foot slots on the package frame and confirm that they match the distances listed on the Solar MID. This process of checking is to confirm that the tie-down locations in the frame and the foundation will line up once the package is lifted into position. It is preferable to do this as early as possible, so that any foundation misalignments can be rectified before expensive lifting equipment is brought to site.

3.2 Foundation Elevation and Leveling

The next step for the installation of any package is the verification of the foundation onto which the package will be mounted. It should be verified that there are no high spots in the foundation between the mounting pads or Sole Plates that could possibly contact the underside of the frame. The foundation pads or Sole Plates should be at least level with, if not higher than the rest of the foundation. Each foundation pad or Sole Plate should be installed flat within 0.030”/ft (2.5 mm/m) and coplanar to 0.120” (3.0 mm) to the other pads.

3.3 Extending Jacking Bolts

On some of the larger Solar packages, it is very difficult to raise the package upward using the package jacking bolts. As the package is lifted into position, the package jacking bolts should be extended or threaded through the package tie-down foot so that they protrude from the underside of the foundation feet as far as possible. The package jacking bolts can then be backed off more easily to lower the package into the level position. Obtain confirmation from the customer that the area beneath the package jacking bolts has sufficient strength to hold the package.

3.4 Frame Elevation and Leveling

It is imperative that a machinist's level or a measuring tool of equivalent resolution (laser beacon or transit) be used to measure the levelness of the frame. Frame level must be measured on the machined equipment mounting pads of the frame, and not the surfaces that make up Datum -D-. (Datum -D- is only to be used for site elevation.) The tops surfaces of the frame I-beam are not Engineering-controlled surfaces and a package will not be considered level if these surfaces are used to measure the levelness of the package.

Caution

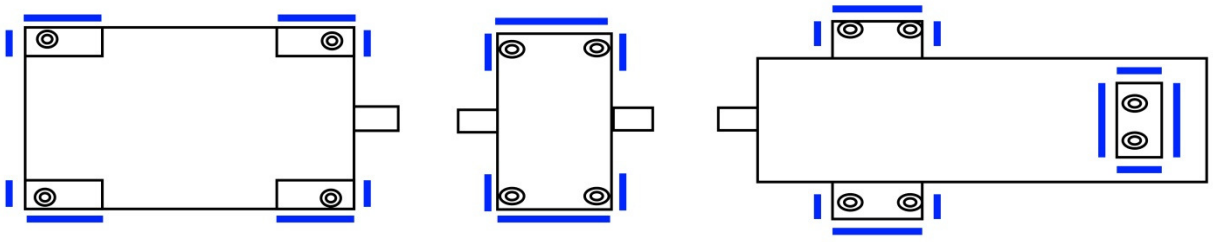
Datum -C- on the Solar MID drawing refers to the underside of the driver and driven frame foundation feet, and **not** the top surface of the foundation. In the case of a package that is equipped with AVM or Gimbal mounts, then Datum -E- is the underside of the AVM or Gimbal. Datum -C- or Datum -E- *MUST* be positioned using a consistent relationship with the same Site Watermark that is used to position all other equipment including ancillary, enclosure, piping, and electrical. Failure to do so could result in equipment misalignments during assembly.

Package jacking bolts have been provided in the package tie down feet and package jacking feet for vertical adjustment for single frame packages and split frame packages without mounts. Lower the package using the package jacking bolts, and use a surveyor's transit or equivalent measuring tool to set the elevation of the package leveling datum points to a previously defined Site Elevation Point. Packages with mounts must use hydraulic jacks to adjust the package height. The individual Datum -D- surfaces should only be used to level and coplanar to the Site Elevation Point within 0.060" (1.5 mm).

Once the package is considered to be at the correct elevation using Datum -D-, then the leveling process can begin. Make sure that the drivetrain equipment hold-down hardware is fully loosened before attempting to level the base. This includes the hardware used to bolt down the engine, gearbox, and the generator or compressor. It is possible to constrain the base in a deflected condition with the drivetrain equipment hardware; the hardware must be loosened to ensure the package frame is leveled properly. For separate frames, level the driven package first and then the driver package.

Note:
Final leveling *must* be done using a calibrated machinist's level, or instrument of equivalent resolution on the machined equipment mounting pads of the package.

With the frame interface hardware still loose, all machine mounting pads must be leveled to within 0.005"/ft (0.42 mm/m). This includes the engine mount pads, gearbox mount pads (if applicable), and the driven equipment pads. This level criteria is for both the forward to aft as well as side-to-side direction. Measure the pad level ***next to the tie-down points*** of each piece of equipment as shown in Figure 2, and get all pads within the level criteria.



= areas on the machined pads where frame level criteria must be held to 0.005”/ft (0.42 mm/m).

Figure 2: Locations to Measure for Package Level

3.5 Sub-Base Elevation and Leveling

Use a surveyor's transit or equivalent measuring tool to set the elevation of the sub-base to a previously defined Site Elevation Point. Sub-bases must use hydraulic jacks to adjust the package height. The top of the foundation pads on the sub-base located in the vertical plane above the mounting locations should be used to level and coplanar to the Site Elevation Point within 0.060” (1.5 mm).

Also ensure the top of the foundation pads on the sub-base are coplanar within 0.030” (0.76 mm). If sub-base needs leveling, use a hydraulic jack to raise sub-base and add needed shims under datum -E-.

Note:
This step establishes and maintains all pads in a horizontal plane for the driver and driven frame installation. ***This center support is required to limit deflection and assure proper load distribution of package during assembly. Additional supports can be added along the sub-base side beams to ensure a rigid base.***

3.6 Special Note for Non-Sub-Base 3-Point Mounted Packages

It is not always possible to have the forward to aft level within tolerance on all of the machined pads on a package that is mounted on 3 points. The package will sag under its own weight, and the machined pads at the forward and aft end of the package will end up being sloped downward toward the center of the package. Depending on the package size and weight, the forward to aft slope may be outside of the 0.005"/ft (0.42 mm/m) tolerance. In this case, the gearbox mount pad becomes the critical point of measurement and this pad must be leveled within 0.005"/ft (0.42 mm/m) in **both** the forward to aft, and side to side directions. All machined pads still must be leveled within 0.005"/ft (0.42 mm/m) from side to side.

> **Note:**
> For non-sub-base supported packages with foundation mounting points spanning more than 35' (10.7 m), the package sag (mid span deflection) can be as much as 0.25" (6.4 mm). This is expected and not a reason for concern.

3.7 Bolt Package Frame Interface

Once the two sections of the package are considered level, obtain the proper equipment to torque the interface bolts. Use the match marks at the package interface pads (when provided) to ensure the elevation of the bases has been retained in relation to each other. The match marks are shown below in Figure 3. The elevation between the two sections of the package should have been set very closely during the prior elevation of Datum -D-, but it needs to be confirmed that correct elevation has not been lost during leveling. If one of the sections of the package is higher than the other, then it must be determined which one should be moved. This must be done evenly and carefully to retain the level of the package.

For packages that do not have match marks or do not match up, these package sections should be elevated or lowered so the holes in the interface plate align with each other. The connecting bolts should be able to move freely; they should not be bolt bound. Remove or fill the incorrect match marks. Make match marks on both Driver and Driven frames and this will become the new match marks.

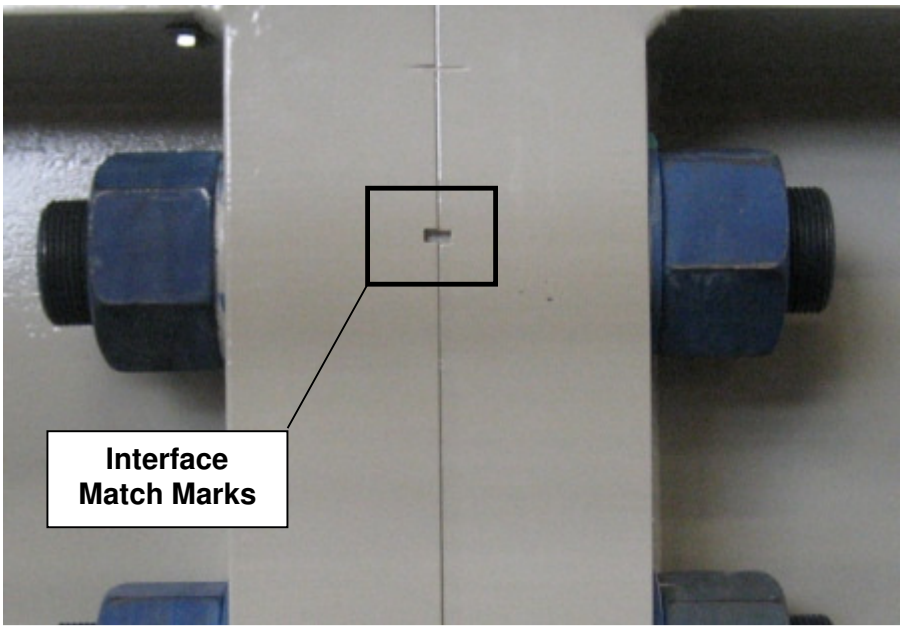


Figure 3: Package Frame Match Marks

Ensure that both sections of the package are still within the level criteria, and then torque the interface bolts to their full torque spec. The interface bolts should be re-tightened in the pattern shown below:

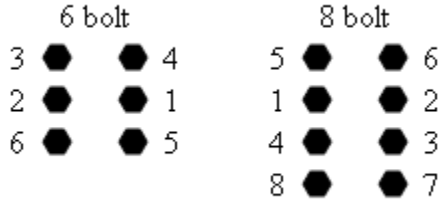


Figure 4: Recommended Torque Sequence

Monitor the level of each package section during the torque sequence, and make sure the package sections are not moving in relation to one another. Make sure all machined pads have remained level after the interface bolts have been torqued. If the combined package is not level, use the package jacking bolts or hydraulic jacks to get the package back within the level spec. If level cannot be achieved simultaneously on all pads, then the two sections of the package were shifted during the interface bolt torque-up, and the joint must be loosened again, and the process must be repeated.

3.8 Shim or Grout under Datum -C-.

Once the frame is in the level position it must be shimmed or grouted properly to minimize any possible movement as the tie-down bolts are torqued.

Customer experience has shown the use of Non-Shrinking Epoxy Grout to be the most successful method for mounting Solar packages on concrete foundations. If grout is chosen to be used, then a grout contractor should be consulted.

The shims must contact the frame with at least 50 in^2 (0.032 m^2) of contact area. The shim should encompass the tie-down bolt as well as possible, and be shaped so that it passes under the nearest structural member such as the vertical web of the I-beam. The shim **does not** need to cover the entire frame foundation foot.

In theory, every mounting surface is perfectly flat but in reality, that is rarely the case. Using a feeler gage, the gap under each frame pad can be determined in multiple locations. Figure 5 shows a generic example of modifying standard shims to achieve support all the way around the tie-down location. After placing the shims under the frame foundation pad and torqueing down the tie-down bolt, physically check to make sure each shim is secure. If a shim is loose, repeat the process under that specific frame foundation pad.

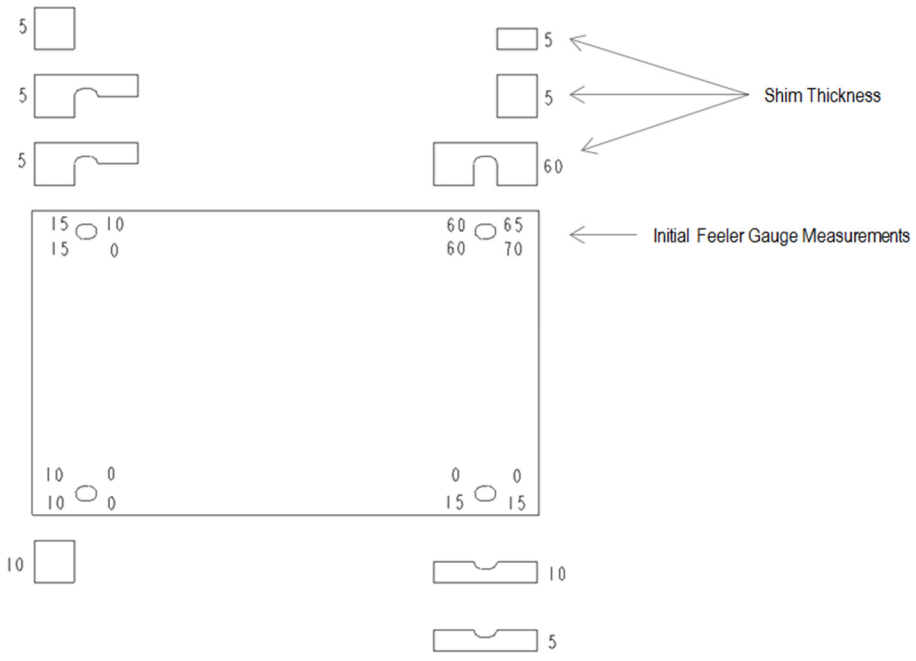


Figure 5: Generic Shimming Practice (dimensions shown in thousandths of an inch).

3.9 Shim under Datum -E-

Datum -E- is under the Gimbal or AVM mount.

A 0.25” (6.4 mm) shim should be placed under datum -E-. This allows for vertical adjustment in both directions. Various sizes of shims for the Gimbal or AVM should have been included. Use these shims to elevate and level the package.

Additional shims may have to be placed between the base frame and temporary supports to assist in elevation and leveling of the package.

3.10 Jackscrews

The jackscrews, used for vertical adjustment, must be backed off prior to torqueing the package to the foundation. The customer can leave the jackscrews in a backed off position or remove them entirely.

3.11 Fasten Tie-Down Hardware

Once the package is fully shimmed, then torque down the tie-down bolts. Know that the tie-down hardware torque values are typically specified by the party responsible for the foundation/deck design. If Solar Turbines is prime then the torque value should be given on the MID or can be found in ES 9-54. For Solar guidelines on tie-down hardware see PIL-181.

Slight adjustments may have to be made to the shim packs to get the frame back within the level criteria if the shim packs were crushed down as the tie-down bolt was torqued. If the shim packs crush down enough to move the frame out of level, then not enough shim was used to fill the gap.

> **Note:**
> Not having enough shim under a foundation pad can lead to the very undesirable condition known as “soft foot”.

If the package came out of the level spec as the tie-down bolts were torqued, then the shim packs should be adjusted slightly to bring it back within the level spec.

3.12 Soft Foot Check

Perform a “spring back” check on each frame foundation foot to ensure that there is no occurrence of “soft foot”. The spring back check should be performed by zeroing a dial indicator on the surface of the frame mount pad, and un-doing the tie down bolts one at a time. If the frame tie-down foot moves more than 0.010” (0.25 mm), then the package shimming needs to be reworked to eliminate the “soft foot”. Re-torque the tie-down bolt before moving to the next frame foundation pad.

3.13 Place Temporary Supports

Placing temporary supports are necessary for safety and ease of installation.

> **Caution**
>
> Ensure the foundation or deck can support the combined weight of the driver and driven packages plus sub-base.

For split frames packages, place four temporary supports at the frame jacking pads near the interface. Place additional hydraulic support jacks near the mounts to allow for vertical adjustment and shim placement.

For sub-bases, place a temporary support on each side of the sub-base, centered between the forward and aft mounts. If the temporary support contact area is less than the width of the sub-base I-beam flange then center the temporary support under the sub-base I-beam. Place additional hydraulic support jacks under the sub-base, located at the pads closest to the driver/driven interface pads. Ensure that the structure under the temporary supports and hydraulic support jacks can bear the loads. Add shims as necessary to fill gap and fully support the sub-base. Slowly release the jack until the sub-base rests on the two temporary supports.

3.14 Remove Temporary Supports

Use hydraulic jacks to raise the frame just high enough to remove the rigid temporary supports. Remove the temporary supports then slowly lower the hydraulic jacks so the entire bolted assembly is supported by the designed three-point mount system.

3.15 AVM Uplift Snubbers

After the AVMs are fastened to the frame and deck, then the uplift snubbers need to be adjusted. Reference the Unpacking, Installation & Maintenance Procedures in the AVM crate. Extra copies of the procedure can be requested from the supplier.

> **Caution**
>
> If the package ever needs to be moved or lifted (i.e. the load is going to be removed from the AVMs) after installation, the uplift snubbers must be unscrewed per the AVM procedures before removing the load. If the uplift snubbers are not unscrewed before the package is moved or lifted, this could damage the AVMs.

4.0 Alignment Check

The package is now ready for a preliminary alignment check. Use the shims provided in the loose ship kit and adjust rotating equipment as necessary. Fill the package oil tank to the level recommended on the MID drawing before beginning the final alignment procedure.

Solar Turbines
A Caterpillar Company

SPECIFICATION

INSTALLATION INSTRUCTIONS FOR LUBE OIL TANK VENT WITH SEPARATOR WITH AND WITHOUT A FLAME ARRESTOR FOR ALL OF SOLAR TURBINES

Data Control Level

1

Release Stamp

ERCC

SPECIFICATION NO. ES 1745

ISSUED: 06/29/79; ERL 3583-1
(Date and CR No.)

REVISION: C
(Letter, Date and Document No.)
A; 12/5/97; ERL 3583-2
B; 06/10/96; PRD 61675-1 (DCR 96-1296)

Rev	CR #	Signature & Title	Date	Pages Affected
C ERCC	11863	**Prepared By: Donald Cameron Hydromechanical Engineer, Power Generation**	**8/16/05**	**This change has combined the following specifications: ES1741, ES1742, ES1745, ES1746, ES1756, & ES1757. The following pages were modified 1-4. Page 9 was added.**
		Approved By: Mark Smolin, Program Manager, Power Generation	**8/16/05**	
		Approved By: Jon Windt, Engineer Product Manager, Oil & Gas	**8/16/05**	

CONTENTS

FIGURES

1.0 SCOPE - This specification establishes the installation instructions for all Solar Turbine packages lube oil tank vent with separator and with & without a flame arrestor.

1.1 INTRODUCTION - Untreated discharge from the lube tank vents of Solar Turbine packages is a mist of oil droplets generated in the bearing and seal cavities, entrained in air that has passed the machines' labyrinth seals. The discharge is made up of droplets ranging from 7 to 10 microns diameter (the size of red blood cells or finely milled flour) down to fractions of a micron (the size of tobacco smoke). Droplets 1 micron or larger comprise less than 1% of the total number of particles but make up about 75% of the oil weight which, if dumped untreated, will deposit on surfaces in the vicinity causing visible wetting in addition to a smoke cloud.

1.1.1 SEPARATOR SYSTEM - With typical oil mist, the separating action of a coalescer/filter will remove all droplets greater than 3 micron, and 99.5% of droplets 3 micron and smaller. The gravitational settling velocity for even the largest discharged particles is negligible, (less than 1/4 inch per minute), so the engine discharged stream is subject to the prevailing wind. It normally has no wetting effect if ducted clear of building surfaces.

2.0 APPLICABLE DOCUMENTS - None required.

3.0 GENERAL REQUIREMENTS

3.1 USE OF SPECIFICATION - ES 1745 shall be used in accordance with the Project Order mechanical drawing. In case of conflict between this specification and the applicable drawing, the drawing shall prevail.

3.2 INSTALLATION CRITERIA -

3.2.1 VENT PIPE SIZING - Vent piping shall be based on the vent flow listed in the Control Specification for each engine. Typically it ranges from 120 scfm to 500 scfm.

A factor of two is applied to the relevant flow, and the following calculation is used to calculate pipe size and pressure loss. In no case shall the back pressure due to vent piping exceed 2 inch W.G. For straight pipe with fairly smooth interior surface at pressure not exceeding 1 psig:

$$Q = 59.16 \sqrt{\frac{hd^5}{L\,[1+(3.6/d)+0.03d]}}$$

or

$$h = \left(\frac{Q}{59.16}\right)^2 \frac{L[1+(3.6/d)+0.03d]}{d^5}$$

where Q = air flow, cubic feet per minute
h = pressure drop, inches of water gage
L = length of pipe in feet
d = internal diameter of pipe in inches

Using the Centaur flow (120 scfm) with a factor of 2, and solving for schedule 10 pipe of the recommended size:

240 scfm in 6 inch size schedule 10 pipe
Inserting L = 100 feet and solving for h,

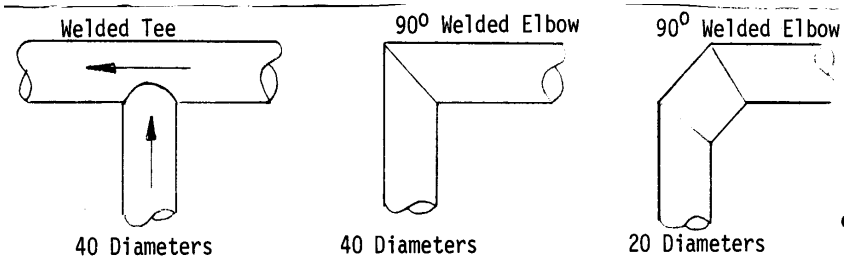
$$240 = 59.16 \sqrt{\frac{h \times 8206}{L \times 1.776}}$$

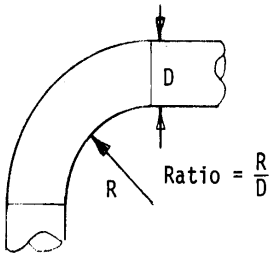
Pressure drop per 100 feet pipe run = 0.356 inch W.G.

Thus, for a maximum back pressure of 2 inch W.G. using 6 inch size schedule 40 pipe and 2 x 120 scfm flow, a Centaur vent may be 560 feet of straight pipe.

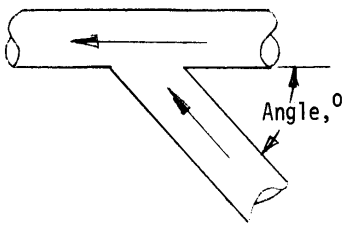
3.2.2 EFFECT OF PIPE BENDS - Although the pressure drops listed above are conservative due to the factored flow rate, the added losses due to bends or junctions in the vent ducting shall be considered. These losses are expressed as number of pipe diameters to be added to the actual pipe length when computing pressure drop. Applicable losses, expressed in diameters, are as follows:

3.2.3 VENT PIPE SUPPORT - The external oil tank vent shall be self-supporting and have a minimum upward slope of 1/4 inch per foot with no traps or restrictions.





Pipe Elbow
Ratio 2 = 5 Diameters
Ratio 1.5 = 6 Diameters
Ratio 1 = 10 Diameters
Ratio 0.75 = 16 Diameters
Ratio 0.5 = 30 Diameters



Angle Branch
90° Angle = 40 Diameters
60° Angle = 17.5 Diameters
45° Angle = 8.8 Diameters
30° Angle = 6.8 Diameters

3.2.4 VENT PIPE TERMINATION - A properly installed vent separator system will be able to prevent wetting of the surroundings at the point of vent pipe termination, but attention shall still be paid to the location and geometry of the exit. It is recommended that wherever possible, the exit shall be above roof or eave level, down wind with respect to the prevailing wind, and routed such that oil vapors will not mix with the turbine inlet or exhaust gases. Suggested vertical and horizontal clearances above roof structure and from adjacent vertical surfaces shall be as follows (see Fig. 1):

Min. Height	Min. Upwind	Min. Downwind
6 feet	8 feet	15 feet

The exit shall afford protection from entry of rain and snow by means of a shield or pipe geometry. Alternatively, a proper dam and drain shall be included to prevent water from draining back into the lube tank (see Fig. 2). Every exit shall carry a screen to prevent entry of birds, trash, etc.

3.2.5 DRAINAGE OF SEPARATED OIL - No adverse effects have been noted from reusing separated oil. Provision shall be made on remote-mounted separator installations to pipe the oil back to tank. The separator drain port may be connected via a U-trap either to the main vent pipe upstream of the separator or by piping to any available drain connection on the tank top (see Figure 3). Package mounted separators include drain piping which provides the same function as the external U-trap specified above. Where separated oil is to be returned via the main vent line, special attention shall be paid to avoiding low points in the vent system where liquid oil may be trapped. Vent piping slope back to tank shall be 1/4 inch per foot run, as a minimum.

3.2.6 FLAME ARRESTOR INSTALLATION - A flame arrestor may be required or requested to prevent flashback of atmospherical deflagrations into the lube oil tank. Two types of flame arrestors may be installed on Solar packages: an older style in-line flame arrestor (reference Solar part number 120369-x), or a newer style end-of-line flame arrestor (reference Solar part number 1065667-x). As indicated by the name, the end-of-line flame arrestor is installed at the exit of the vent duct. The in-line flame arrestor should be installed in the vent ducting as close to the end as possible, and in no case more than 15 feet from the exit.

3.2.7 TURBINE EXHAUST DRAFT DISPERSION – (In-Line Flame Arrestor Only)

CAUTION

When residual discharge from a recommended coalescer/filter unit is to be dispersed by exhaust draft, it is mandatory that an approved flame arrestor be installed in the vent ducting as close to the end as possible, and in no case more than 15 feet from the exit. End-of-line flame arrestors may not be used for this application, since the max allowable operating temperature of mixtures may not exceed 60C for this device. Under no circumstances shall treated tank vent air from a recommended coalescer/filter be brought directly into the turbine exhaust draft for dispersion.

When exhaust draft dispersion is specified, the vent piping shall be brought from the specified flame arrestor to the plane of the end of the turbine exhaust duct on the upwind side and discharged adjacent to the exhaust. On a round exhaust the pipe shall be tangential, and for

rectangular ducting it shall be substantially parallel to one wall. It is recommended that final fit-up of the vent pipe be adjusted at package startup to obtain maximum benefit from the induced airflow around the exhaust (see Figure 4). In no case shall the vent pipe be directed across the exhaust duct.

Under no circumstances shall treated tank vent air from a recommended coalescer/filter be brought directly into the turbine exhaust draft for dispersion.

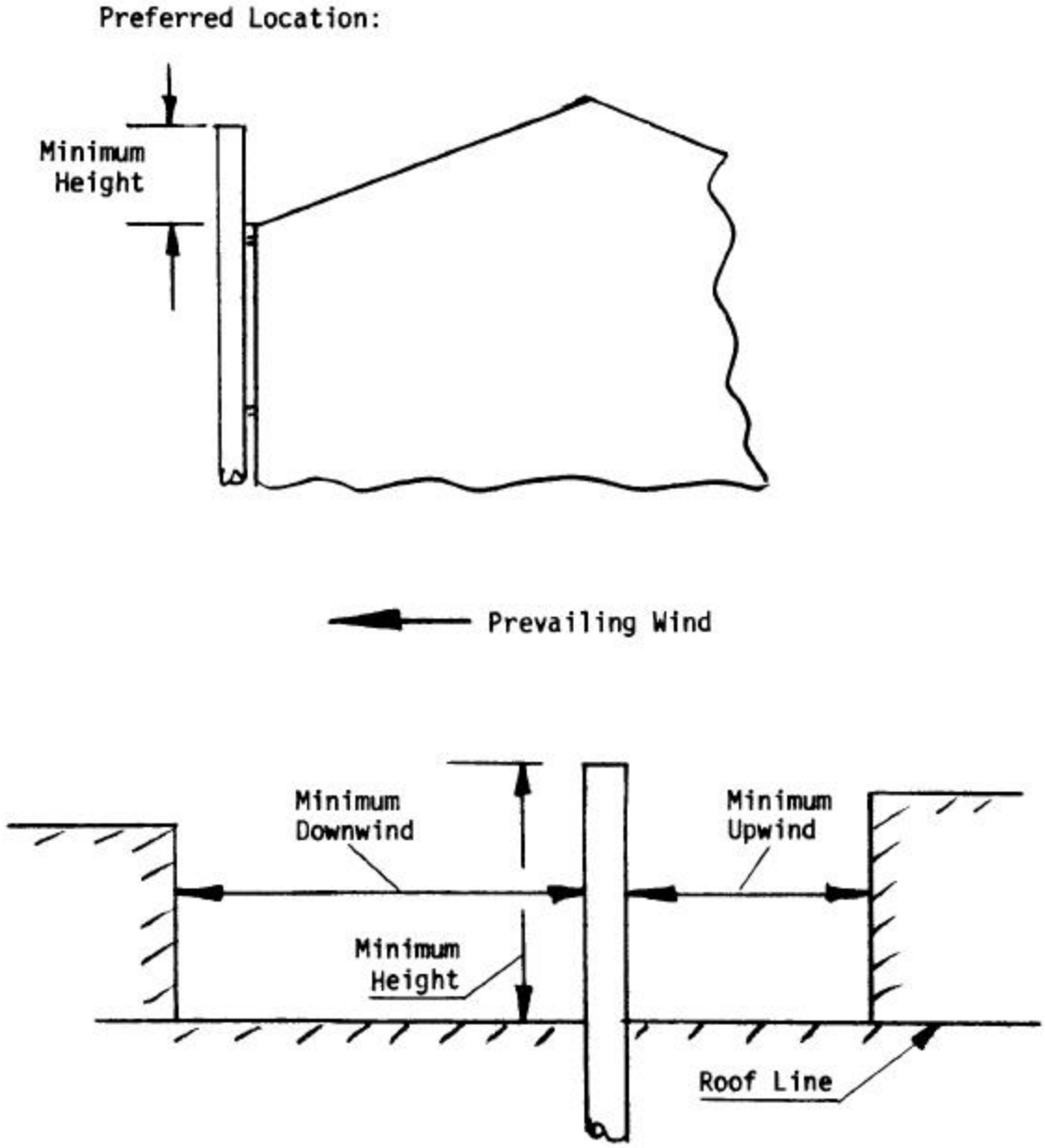


Figure 1 Vent Pipe Location

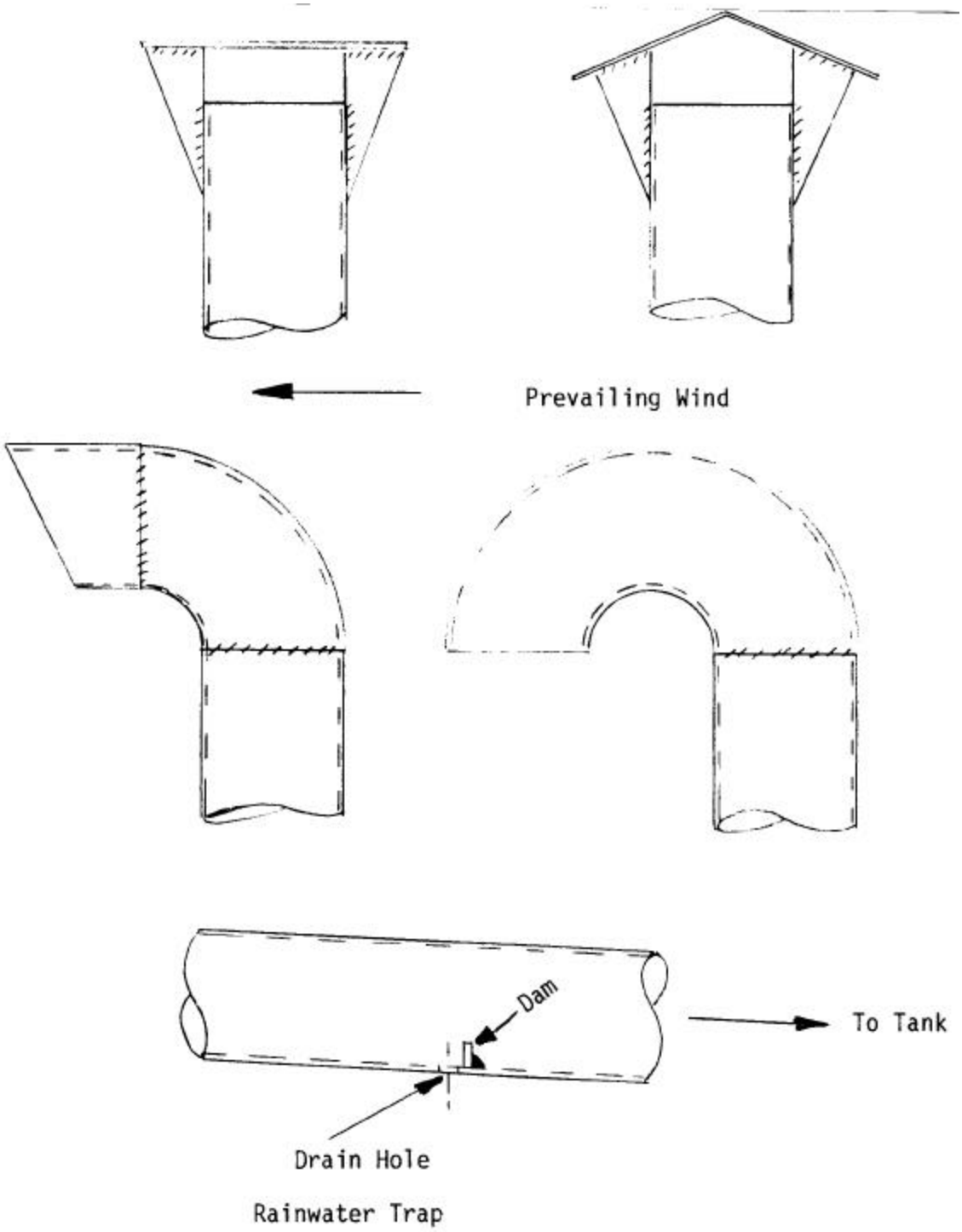


Figure 2 Vent Pipe Termination
(In Line Flame Arrestor Only)

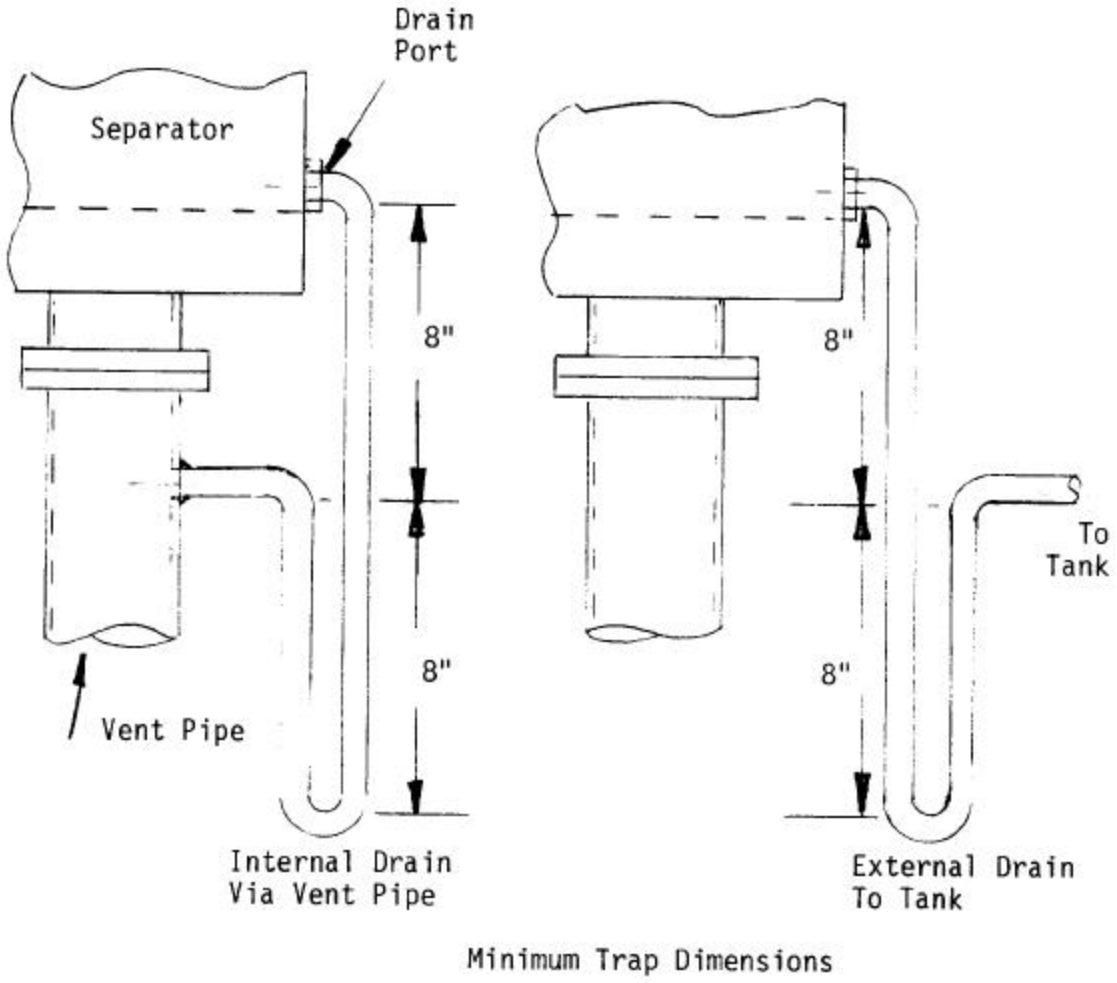
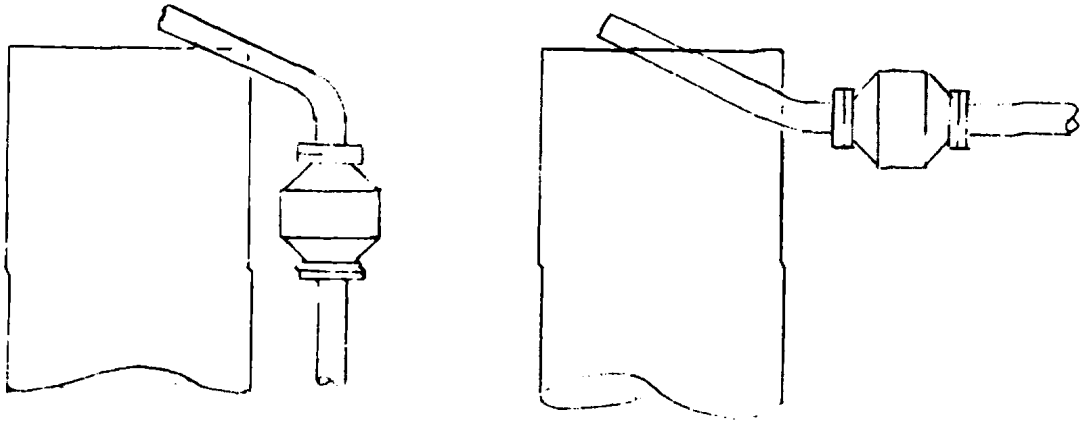
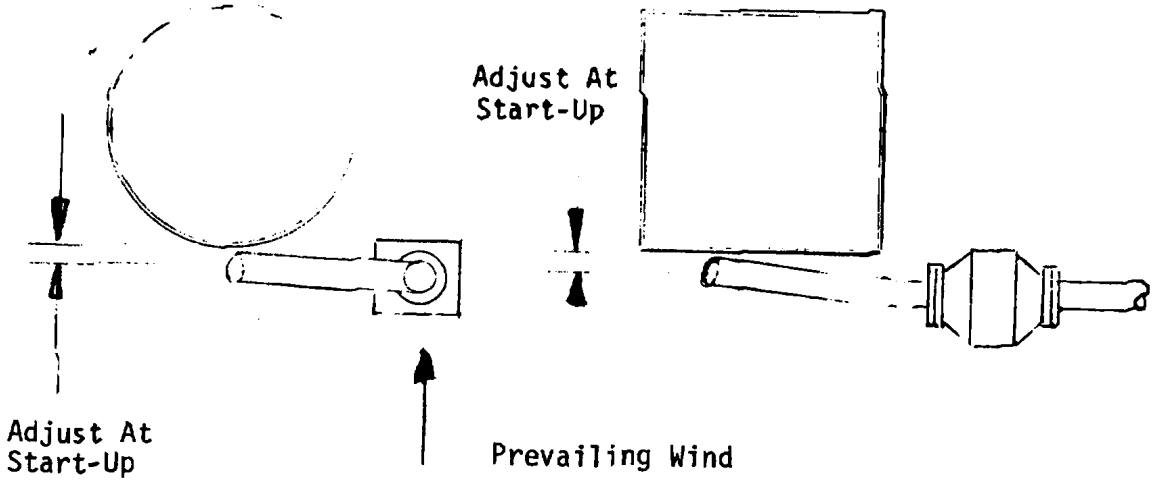


Figure 3 Drainage of Separated Oil



Alternate Flame Arrester Arrangement



Final Fit-Up of Vent Pipe

Figure 4 Exhaust Draft Dispersion
(In-line flame arrestor only)

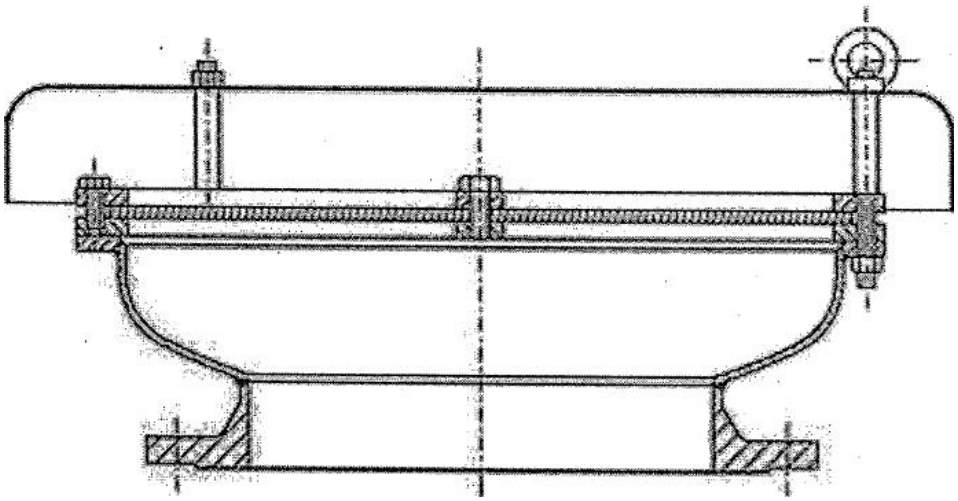


FIGURE 5 Current End of Line Flame Arrestor

Solar Turbines
A Caterpillar Company

SPECIFICATION

CLEANING AND FLUSHING OF HYDRAULIC SYSTEMS/COMPONENTS

Data Control Level
1

SPECIFICATION NO. ES 2184

ISSUED: 2/12/97; PRD 62555-1
(Date and PRD No.)

REVISION HISTORY
(Letter, Date and Releasing Document)

Release Stamp
CDM

A; 10/28/98; PRD 65884-2
B; 12/11/01; PRD 14614-1
C; 04/11/03; CR 04655
D; 07/11/06; CR 12954
E; 08/13/08; CR 20455
F; 09/16/11; CR 50276
G; 09/27/17; ECN 63175

Rev. Ltr.	ECN #	Author(s) / Approver(s)	Date
H	**107982**	Prepared By: Alex Lapid Consulting Engineer, Systems Development Engineering Approved By: Saliha LaCoursiere Group Manager, Systems Development Engineering *Requires owning department manager.*	**04-19-2018**

Department Document Owner:	Original Document Author:
Systems Development Engineering *Requires owning department name.*	Ryan Bergener Package Design Engineer *Requires original author's name.*

CONTENT

TABLE

FIGURE

1.0 SCOPE

This specification covers the preparation and acceptance criteria for the cleaning and flushing of components and piping used in lube, seal and hydraulic systems on Solar packages. Standards such as ASTM D6439 and the flushing sections in API 614 are companion documents to this specification. This specification takes precedence over ASTM D6439 and API 614 for components and piping used on Solar packages. Proper cleaning and flushing will remove the contamination built into components and systems before operation so that sensitive components do not fail prematurely.

Components to be cleaned and flushed include, but may not be limited to the following:

- Lube oil supply and drain lines
- Seal oil supply and drain lines
- Servo system supply and drain lines
- Hydraulic start system supply and drain lines
- Power take off system supply and drain lines
- Lube oil reservoir level control (auto fill) system
- Seal oil interconnect lines
- Lube oil coolers
- Lube oil interconnect lines
- Lube pump assemblies

Reservoirs, tanks, and tank vent piping require mechanical cleaning only (see Appendix A).

This specification covers the flushing requirements for components (such as the turbine package, the lube oil cooler assembly and interconnect piping) at the supplier's facility, the Solar Turbines Incorporated manufacturing plant, and in the field. The procedures described herein have a universal application.

The turbine package is normally flushed prior to delivery and only the external cooler interconnect lines and the coolers need to be flushed in the field if the turbine package integrity is maintained. The fill oil must meet the cleanliness requirements of Solar ES 9-224. Any residual debris on the turbine package that is generated during shipment is captured by the package filter and startup strainers.

The lube oil coolers are pre-flushed at the supplier's facility to the cleanliness levels of this specification, but a field flushing of the oil cooler is recommended as a result of external factors related to transportation and storage prior to the lube oil cooler installation.

2.0 APPLICABLE DOCUMENTS

Solar Specifications
ES 9-224 – Specification for Lubricating Oils for Use in Solar Gas Turbines

ES 9-248 – Corrosion Preventive Oil for Long Term Preservation

ES 9-58 – Specification Standard Paint Program – Turbo Machinery

Other

ISO 4406 – Hydraulic fluid power – Fluids – Method for coding the level of contamination by solid particles

ISO 11171 – Calibration of Automatic Particle Counters

ASTM D6439 – Standard Guide for Cleaning, Flushing, and Purification of Steam, Gas, and Hydroelectric Turbine Lubrication Systems

API Standard 614 – Lubrication, Shaft-sealing and Oil-control Systems and Auxiliaries

3.0 PREPARATION FOR FLUSHING

Rust, scale, machining chips, grit blast, weld slag, etc. shall be thoroughly removed from all tanks, vessels, pipes, etc. prior to flushing.

Tank internal surfaces, tank vent piping and vessels shall be cleaned per Appendix A. Pickling and passivation of carbon steel pipe work and equipment shall be treated, prior to being flushed, as per Appendix B. Stainless steel piping is recommended, as it does not need to be pickled. Sensitive components (bearings, seals, valve, etc.) shall be removed or bypassed during the cleaning and flushing to avoid contamination.

Equipment required: (See Figure 1 for typical flushing system)

1. Flushing pump of sufficient capacity.
2. Flushing fluid heater.
3. Flushing fluid filter rated at 5 micron with an efficiency of 99.5% or better (Beta ratio, $ß_5$ = 200 or better) to remove contamination from flushing loop.
4. Flushing fluid strainer(s) (100 mesh or finer) or filter bag(s) (25 micron or finer) at end of each pipe run or component being flushed for cleanliness verification.
5. Particle Counter (calibrated per ISO 11171) to determine fluid cleanliness (ISO 4406) or optical filter patch kit.
6. Flow measurement device for each piping leg or component.
7. Thermometer(s).
8. Dead blow hammers or pneumatic vibrators.
9. Flushing fluid that is compatible with the mineral based oils in Solar ES 9-224.
10. Flushing oil reservoir. The reservoir is normally contained in a flushing rig external to the package. If the package lube oil tank is used for the flush, then an extra flush loop filter should be installed where the flushing oil re-enters the tank to prevent contamination of the oil tank (see Fig. 1, Note 4).

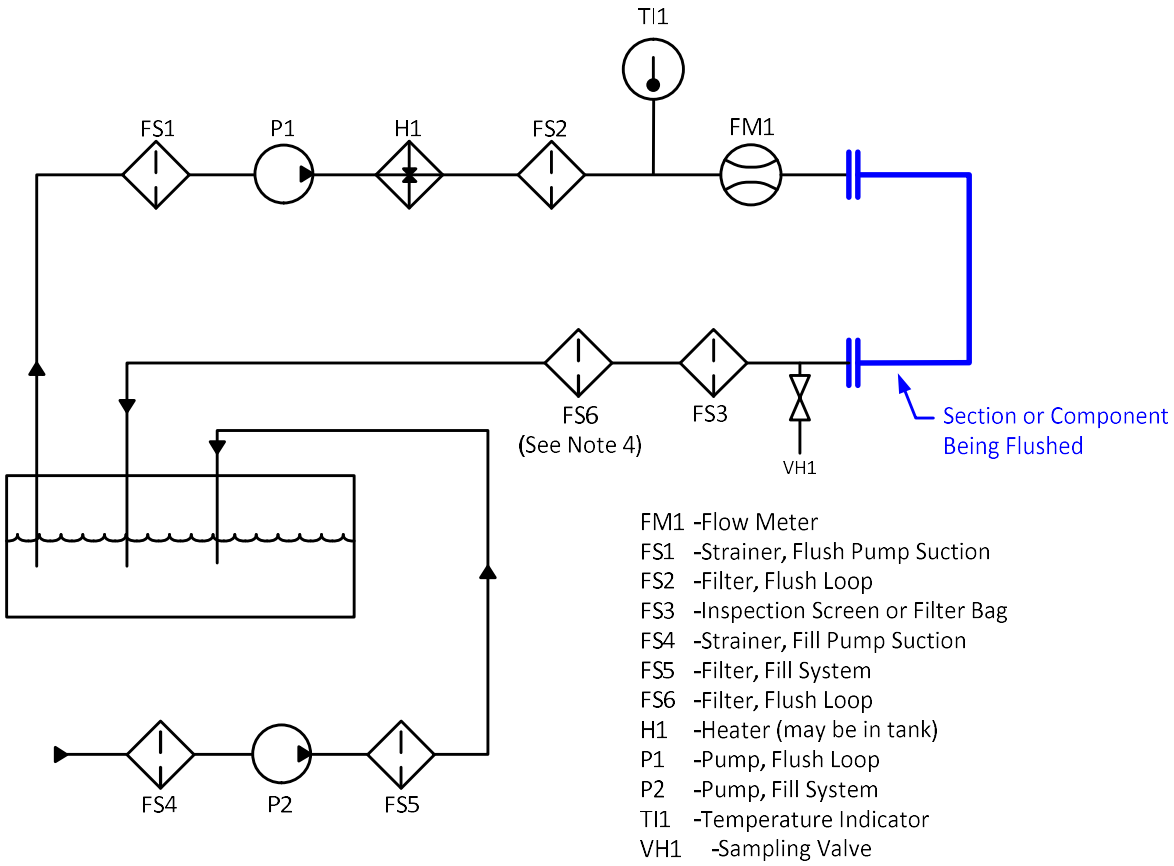


Figure 1. Typical Flushing System

Notes

1. ΔP indicators across filters are required.
2. Pump relief valves are required if positive displacement pumps are used.
3. Flow control valves (a bypassing valve for positive displacement pumps or a throttling valve for centrifugal pumps) are required.
4. If the required flushing sequence in Section 4 isn't followed or if the package lube oil tank is used instead of a separate fill system, then FS6 should be installed to prevent contamination of the package lube oil tank.

4.0 PROCEDURE

The following flushing sequence is required to minimize the possibility of contamination of components and assemblies. It is to be followed at the manufacturing facilities and in the field. Adherence to this sequence as prescribed in Figure 1, will substantially minimize the effort and the time necessary to successfully complete the flushing operations.

Required Flushing Sequence

(1) Clean the oil. Pre-filter the package fill oil or flushing oil to ISO 4406 Code 16/14/12 cleanliness level.

(2) Flush the rig. Loop flush and filter the flushing rig, and any associated piping, that is considered part of the flushing system, at the maximum capacity of the rig to ISO 4406 Code 16/14/12 and no 100-mesh screen captured particles (Section 5.0). (Note: Steps 1 & 2 can be done together if the flushing rig has its own oil reservoir).

(3) Flush the component(s). Add the section or part to be flushed. Flush and filter the package the section or part to ISO 4406 Code 16/14/12 and no 100-mesh screen captured particles (Section 5.0).

Each flow line, cooler, etc. shall be flushed at a flow rate and temperature so that a minimum Reynolds number of 4000 is achieved through each section, or 150% of design flow, whichever is applicable. The Reynolds number can be calculated by:

$$Nr = \frac{3160 \cdot GPM}{CS \cdot D}$$

where GPM = flushing fluid flow rate [gallons per minute]

CS = flushing fluid viscosity [centiStokes]

D = pipe/tube inside diameter [inches]

Table 1 shows the minimum required flow rates for several pipe and tube sizes. Reynolds numbers in excess of 4000 will increase the effectiveness of the flush and will decrease the flushing time required to achieve the required cleanliness. Proper cleaning of individual details before assembly as well as clean assembly processes will also reduce flush times and reduce contamination “hideout”.

Dead blow hammers and/or pneumatic vibrators should be used to help break loose and dislodge debris in the piping. Subjecting the piping to several thermal cycles (hot flushing fluid/cold flushing fluid) will also help reduce flushing time.

Notes for specific components are listed as follows:

(a) Reservoirs, Tanks, and Tank Vent Piping. Reservoirs, tanks, and tank vent piping require a mechanical cleaning only (see Appendix A).

(b) Package Oil Lines. Do not flush package oil lines through the bearings of the engine, driven equipment, and gearboxes. Disconnect package oil lines from bearing inlet ports, and loop these lines back to the flushing reservoir. Flush and filter the package oil lines to ISO 4406 Code 16/14/12 and no 100-mesh screen captured particles (Section 5.0).

(c) Off-Skid Cooler Interconnect Piping. The off-skid cooler interconnect piping to the flush loop

(without package or cooler connection) shall be flushed and filtered to ISO 4406 Code 16/14/12 and no 100-mesh screen captured particles (Section 5.0). Other means of cleaning the cooler interconnect piping may be used, however, the same ISO 4406 Code 16/14/12 cleanliness requirements shall be met.

(d) Oil Coolers. See Section 7.0.

(4) Check the flush. Flushing fluid samples shall be taken downstream of the piping or component being flushed and upstream of any end of line filters or screens. The sample location shall be taken from a section with turbulent flow, *Nr* > 4000 (see below). After flushing for at least one hour a fluid sample can be taken and the strainers or filter bags at the outlet of the flushing rig can be inspected. The acceptance criteria is described in Section 5.0.

TABLE 1
FLOW RATES FOR REYNOLDS NUMBER (*Nr*) = 4000

PIPE/TUBE SIZE	GPM REQUIRED FOR *Nr* = 4000 w/ ISO VG32 OIL		
	80°F Oil 48 cSt	120°F Oil 21 cSt	150°F Oil 12.5 cSt
0.375 x 0.049 tube	16.8	7.4	4.4
0.50 x 0.049 tube	24.4	10.7	6.4
0.75 x 0.049 tube	39.6	17.3	10.3
1.0 x 0.049 tube	54.8	24.0	14.3
1.25 x 0.049 tube	70.0	30.6	18.2
0.75 Sch 80 pipe	45.1	19.7	11.7
1.0 Sch 80 pipe	58.1	25.4	15.1
1.5 Sch 80 pipe	91.1	39.9	23.7
2.0 Sch 40 pipe	117.4	51.5	30.7
3.0 Sch 40 pipe	186.4	81.6	48.5
4.0 Sch 40 pipe	244.5	107.0	63.7
6.0 Sch 40 pipe	368.5	161.2	96.0

5.0 ACCEPTANCE CRITERIA

The following flushing acceptance criteria shall be met for the following conditions.

A. Flushing of Components at the Manufacturing Facility. Unless otherwise stated in this specification, components such as turbine package and tube-fin air-to-oil lube oil coolers shall meet Sections 5.1 and 5.2.

B. Field Flushing. Field flushing operations such as the oil fill, the flushing of the flushing rig, cooler interconnect piping, and cooler shall meet Section 5.1 at a minimum.

5.1 The ISO 4406 cleanliness code range numbers for 4, 6 and 14 micron levels are 16/14/12 or lower (particle counter calibration per ISO 11171).

5.2 There are no visible particles on the 100 mesh screen, or no more than 5 particles no larger than 0.010 inch [0.254 mm] in the 25 micron bag(s).

6.0 POST FLUSH PROCEDURE

After flushing, the piping, system, and components shall be sealed with metal blind flanges or metal plugs to prevent recontamination. If the piping or component will be in storage for any length of time it shall be completely drained and flushed with preservative oil per Solar ES 9-248 or partially filled with a vaporizing preservative oil that is compatible with the mineral based oils in Solar ES 9-224. Preservative oils shall be filtered to meet the cleanliness requirements of this specification. Tanks and vessels shall be preserved per Appendix A.

7.0 LUBE OIL COOLERS

Air-to-Oil Coolers. Tube-fin air-to-oil coolers shall be flushed and filtered to ISO 4406 Code 16/14/12 and no 100 mesh screen captured particles (Section 5.0). The minimum average Reynolds number in the oil cooler headers is 4000. Oil coolers with turbulators shall be flushed in both the forward and reverse flow directions. Oil cooler flushing outside of the manufacturer's facility may only be done in the forward flow direction. Lines that flow upward for more than 10 feet [3 m] shall be flushed in a reverse, downward direction at least 33% of the flush time.

Plate-and-Frame Water to Oil Coolers. Welding on the plate-and-frame oil coolers is usually limited to the nozzles on the pressure plates. The assembly of the thermal plates is an inherently clean assembly process and a Reynolds number of 4000 may not be achievable. The plate-and-frame coolers should be flushed to the following minimum conditions:

a. Flow: 1.5 times the design flow
b. Temperature: 150°F
c. Duration: At least 1-hour before a fluid sample can be taken and the strainers or filter bags at the outlet of the flushing rig can be inspected.
d. Direction: The direction of the oil flow shall be both in the forward and reverse, starting with the reverse direction of flow first.
e. Cleanliness Acceptance Criteria: These coolers must meet the acceptance criteria of Section 5.0 of this specification.

Shell-and-Tube Water-to-Oil Coolers. On a shell-and-tube cooler the oil flows through the shell, and the water flows through the tubes. The pressure created inside the cooler when trying to achieve a turbulent flow that is equivalent to a 4000 Reynolds number may surpass the vessel's design pressure. The shell-and-tube oil cooler shall be flushed to the following minimum conditions:

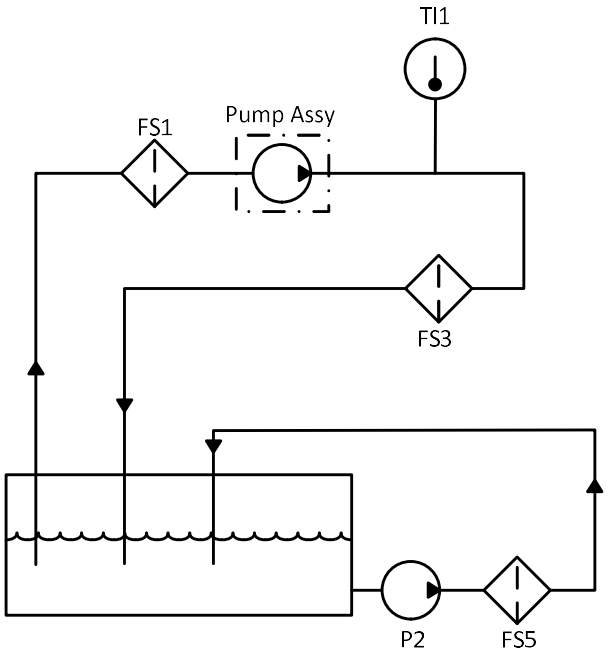
a. Flow: 1.5 times the design flow
b. Temperature: 150°F
c. Duration: At least 1-hour before a fluid sample can be taken and the strainers or filter bags at the outlet of the flushing rig can be inspected
d. Direction: The direction of the oil flow shall be both in the forward and reverse, starting with the reverse direction of flow first.
e. Cleanliness Acceptance Criteria: These coolers must meet the acceptance criteria of Section 5.0 of this specification.

Duplex Coolers with Transfer Valves. The transfer valve and manifold assembly may be flushed separate from the coolers. The transfer valve and manifold assembly shall be flushed per Section 4.0 and shall meet the same cleanliness acceptance criteria of Section 5.0 at the manufacturer's facility.

8.0 PUMP ASSEMBLIES

A pump assembly is defined as an integrated assembly comprising pump(s), manifolds and valves. The assembly process can inject mill scale and liquid sealant, which must be removed by flushing. The minimum flushing requirements are as follows (See Figure 2):

a. Flow: 1.0 times design flow.
b. Temperature: 150°F.
c. Duration: At least 1-hour before the strainers or filter bags at the outlet of the pump assembly can be inspected.
d. Cleanliness Acceptance Criteria: Must meet the acceptance criteria of Section 5.2 of this specification.



FS1- Strainer, Pump Suction
TI1 - Temperature Indicator
FS3- Inspection Screen or Filter Bag
P2 - Pump, Kidney Loop
FS5- Filter, Kidney Loop

Figure 2. Typical Pump Assembly Flushing System

APPENDIX A

CLEANING OF OIL TANK INTERNAL SURFACES AND TANK VENT PIPING

1.0 Surface Preparation

A. Abrasive blast to produce a grayish metallic near white surface with 1 mil minimum profile depth.

B. Steel plugs shall be used for thread protection during the blast and paint process. These plugs shall be removed from all threaded openings and the grit removed by using shop air or vacuuming. Preservative oil per ES 9-248 shall be applied to the threads and plastic plugs inserted into the ports.

C. All flange gasket surfaces must be protected during the blast and paint process. Preservative oil per ES 9-248 shall be applied to the flange gasket surfaces, and shipping covers shall be installed to protect the flange surface and avoid contamination of the lube oil tank.

D. All pipe assemblies that will become part of the base assembly must be blasted internally and swabbed clean before being installed.

E. Lube oil tank covers are to be painted to Solar System E per ES 9-58 unless otherwise specified by engineering drawing.

F. Manifolds which are welded into oil tank covers shall be unpainted on the section that is internal to the tank.

G. Tank associated vent piping is to be mechanically cleaned per Appendix A, Part 2.0.

2.0 All residual grit, scale, flakes, or other foreign matter shall be thoroughly removed from the tank or piping internal surfaces before the application of preservative oil per ES 9-248.

Pipe and manifold sections which are part of the tank assembly as well as the tank vent piping shall be thoroughly cleaned with shop air and have a clean swab or pig drawn through them until the swab or pig is clean of any detectable grit or debris.

No residual grit is permitted. No flaky rust or mill scale is permitted. The assembly shall be considered clean when foreign material such as scale, rust, metal shavings, and sand are not visible to the eye and grittiness is not detectable to the touch.

Cleaned and preserved piping shall be installed in the system and thoroughly sealed against subsequent external source contamination as soon as practical.

3.0 Preservative oil per ES 9-248 can be applied to a surface showing slight discoloration or oxidation provided that the surface does not have flaky rust or mill scale. The preservative oil shall be applied per the manufacturer’s instructions (e.g., spray, roller, or other means) as required for coverage of all unpainted surfaces.

APPENDIX B

PICKLING AND PASSIVATION OF PIPEWORK AND EQUIPMENT

1.0 All carbon steel piping shall be pickled to the following minimum requirements:

A. Ensure that all statutory and safety precautions are taken for carrying out the work and as determined by site conditions.

B. Piping to be cleaned shall be isolated from all equipment, machined surfaces, and non-ferrous components to avoid damage.

C. Piping shall be dismantled in suitable sections to ensure sufficient flow of fluids in each section.

D. Each section shall be degreased. Degreasing shall be performed by use of heavy duty alkaline or detergent solutions maintained at 175° to 195°F for a duration sufficient to remove oils or greases in the piping. After degreasing the piping shall be thoroughly flushed with potable water to remove all traces of degreasing solution.

E. Acid cleaning or pickling shall be carried out by use of 10% solution of hot (not exceeding 150°F) inhibited hydrochloric acid. The piping shall be flushed with acid solution repeatedly until cleanliness is achieved. Pickling shall continue until all loose rust, mill scale, or other foreign materials are not visible in the piping. The strength of the acid shall be monitored to maintain the required concentration and the solution shall be replaced if ferric content exceeds 0.6% by weight.

F. The piping shall be thoroughly rinsed and flushed with potable water as rapidly as possible after the acid cleaning to remove all traces of acid and iron salts to prevent rust. The rinsing/flushing shall continue for 10 minutes after the pH of the effluent water equals the pH of the ingoing water.

G. Passivation of piping surfaces shall be performed after the pickling and flushing. This will be done by circulating a 3% phosphoric acid solution at 160° to 175°F for an adequate duration.

H. The piping shall be thoroughly rinsed after passivation with potable water. After rinsing the piping shall be drained of water and air dried with hot, dry, filtered air at 150° to 170°F.

I. Piping that will not be immediately flushed with oil and put into service shall be internally coated or flushed with a preservative oil per Solar ES 9-248, and capped with metal blind flanges or threaded plugs.

Solar® Turbines

A Caterpillar Company

SPECIFICATION

AUXILIARY SERVICE AIR

Data Control Level 1

Release Stamp

SPECIFICATION NO. ES 2201 ISSUED: 7/6/98 ; PRD 65612-1

(Date and PRD No.)

REVISION:
(Letter, Date and PRD No.)

SIGNATURE PAGE

Rev. Ltr/ PRD No.	Signature and Title	Date	Pages Affected
NEW PRD 65612-1 ERCC	**Prepared By:**		
	Robert Sutherland	7/7/98	
	Approved By:		
	T. Lazet, Manager Hydromechanical Systems Engineering	7/7/98	
	J. Shinn, Manager Package Engineering	6 July 98	
	Prepared By:		
	Approved By:		
	Prepared By:		
	Approved By:		
	Prepared By:		
	Approved By:		
	Prepared By:		
	Approved By:		

CONTENTS

1.0 REFERENCES

ISO 8573-1	International Standards Oranization
CGA G7.1	Compressed Gas Association
ISA S7.3	Instrument Society of America
IES RP-CC-001.3	Illuminating Engineering Society
OSHA 29CFR 1900-1910	Occupational Safety and Health Administration
SAE ARP-1156	Society of Automotive Engineers/Aerospace Recommended Practices
MIL Std 282	Military Standards Organization
Fed STD 209	Federal Standard
Parker Filtration Catalog 1300-300	

Solar Turbines

ES 1211	General Specification for Fuel and Service Gas for Solar Gas Turbine Engines
ES 9-98	Fuel, Air, and Water (or Steam) for Solar Gas Turbine Engines
PIL 140	Product Information Letter

2.0 PURPOSE - The purpose of this specification is to establish the minimum air quality required for usage on Solar turbines packages in auxiliary applications.

3.0 SCOPE - This specification applies to all auxiliary air applications on Solar Turbine's engine packages, but not engine inlet air. Refer to Solar ES 9-98 for engine air requirements. Auxiliary air applications include, but are not limited to, buffer air, pilot air, sparging air, and air assist.

This specification will establish the maximum allowable moisture content, temperature, particle size, and oil content allowable to prevent plugging and wear of critical passages and components for the safe and satisfactory function of these systems.

4.0 DEFINITIONS

Dew Point	The temperature at a given pressure at which water vapor condenses (e.g., -40°F @ 200 psig).
Micron (μ)	Physical dimension equal to a millionth of a meter (0.000001 m).
ppm	Parts per million, given on either weight basis as ppm (w/w) or volume basis as ppm (v/v), is the relative amount of a contaminant to a million parts of air.
mg/m^3	Milligrams per cubic meter, like ppm, used as a measure of contaminant concentration.

5.0 REQUIREMENTS - This specification provides the quality requirements for particle size, oil content, dew point, maximum temperature and contaminants. Refer to sections below for specific requirements.

5.1 PARTICLE SIZE - The particle size in the air stream at Solar's customer connection point shall not exceed 10μ. As it is impractical to achieve 100% removal of all particles of 10μ and larger, this shall be defined as $\beta_{10} > 100$, or 99% efficient. The concentration of particulates 10μ and smaller shall be less than 5 ppm (w/w)

5.2 OIL CONTENT - The oil or hydrocarbon content shall not exceed one (1) ppm (w/w).

5.3 DEW POINT - For indoor or outdoor installations, the dew point at line pressure shall be at least 10°F below the minimum temperature to which any part of the air system is exposed, at any season of the year.

5.4 TEMPERATURE LIMITS - The lower temperature is primarily controlled by dew point requirements. However, the minimum for system design purposes is -20°F. The maximum temperature limit is 200°F.

5.5 CONTAMINANTS - The auxiliary service air shall be free of all corrosive contaminants and hazardous gases, flammable or toxic, which may be drawn into the air stream.

6.0 STANDARDS - An ISO 8573-1 Quality Class 3.2.3 meets this specification for most ambient conditions. This is a Class 3 particle requirement (5μ, 5 mg/m^3), Class 2 dewpoint (-40°F) and Class 3 oil content (1 mg/m^3). ISA S7.3, Instrument Quality Air, exceeds this requirement.

Solar® Turbines
A Caterpillar Company

SPECIFICATION

CUSTOMER STATION GROUNDING REQUIREMENTS

Data Control Level 1

SPECIFICATION NO. ES 2648

REVISION: A

ISSUED: 1/28/10; CR 25305
(Date / Releasing Document)

Release Stamp

ERCC

(Letter, Date and Releasing Document)

Rev.	CR/ ECN	Signature & Title	Date	Pages Affected
A CDM	55029	**Approved By: R. Dickenson** **Group Manager, Systems Engineering & Controls development** **Approved By: S. McGhee** **Group Manager, Systems Integration & Product Management**	2-28-12	6

EXTERNAL GROUNDING, REQUIRED PRACTICES

CONTENTS

1. Purpose

Proper grounding is critical to the reliable operation of electrical instruments, and to the safety of personnel operating it. Signal grounding helps to protect electronic equipment against line disturbances introduced by other adjacent electrical equipment and line transients traveling on the power distribution system. Protective Earth grounding is done for safety reasons, to eliminate the possibility of electrical shock due to floating potentials.

This document addresses the practical considerations for engineering of grounding systems, subsystems and other components of ground network. It also provides basic guidance in the grounding to all standard control panels produced by Solar. Grounds are classified by type of protection and impedance characteristics. The practice defines the use of frame ground, which provides a protective path to ground to eliminate shock hazards, power earth, which provides a clean return path, instrument earth, the quiet ground and intrinsically safe earth in a control panel. The properties and use of each type of ground are discussed. The proper installation of ground system is necessary to reduce electrical noise, effect of power distribution, interference-causing signals in the control system. Bonding, shielding and Hazardous Area Instrument Earth are also discussed as a total grounding system concept. This specification addresses those factors that will enable us to provide a robust ground system.

Local codes prevail where conflicts arise in the recommended practices herein.

2. Related Engineering Documents:

SB 5.0/111D or later Turbine Package Electrical Noise Reduction/Grounding Practices
IEEE STD 1999 Chapter 4.7,
2008 National Electric Code
Article 250.106 Lightning Protection System
Article 250.60 Use of Air Terminal
Article 250.94 Bonding for Other Systems

3. Grounding Terms Defined

3.1 Bonding

Electrical bonding refers to the process of electrically connecting equipment by means of a low impedance conductor. The purpose is to make the structure homogenous with respect to the flow of currents to avoid potential differences that can produce EMI or circulating ground currents and allow fault currents to flow to ground.

3.2 Shielding

The shielding discussed in this specification is only for wires and cables. Shielding is required to prevent the equipment from propagating interference and to protect the equipment from the effects of interference propagated by other devices. Shielding is typically floating on the device end, tied to IE at the Control Console, and is never daisy chained.

3.3 FG (Frame Ground/Protective Earth)

FG refers to the interconnection of instrument chassis, instrument panels, doors and control consoles to a common frame ground. At Solar, this is the skid frame. The purpose of the frame ground is to reduce the possibility of electrical hazard to personnel. Frame ground should be tied in the most direct possible path to a common earth electrode.

3.4 PE (Power Earth)

PE ground provides a route to dissipate the power line transients to earth potential. PE should be tied in the most direct possible path to a common earth electrode.

3.5 IE (Instrument Earth)

IE ground protects sensitive electrical and electronic devices, circuits, and wiring from electromagnetic interference (EMI) and radio frequency interference (RFI). IE should be what Solar refers to as a “quiet ground”, free from transient voltages and electromagnetic noise. It is, therefore, normally isolated from the PE ground. Instrument Earth should be tied in the most direct possible path to a common earth electrode. The BN Power Supply should be grounded to PE while the module itself goes to IE.

3.6 HAIE (Hazardous Area Instrument Earth)

HAIE is required for intrinsically safe 1701/06 vibration system applications. The BN Power Supply should be grounded to IE while the module itself goes to HAIE. Only other 1701/06 HAIE ground terminals should be connected to the HAIE bus bar.

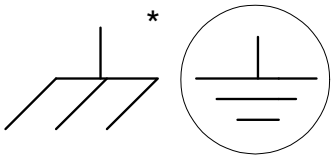
The HAIE bus is a copper bar inside the control console or box and is isolated from FG, PE, IE, and IS buses. The HAIE bus is to be connected in the most direct possible path to a common earth electrode. The measured impedance shall be one (1) ohm or less between the bus and earth electrode.

3.7 IS (Intrinsic Safe Earth)

IS a special type of dedicated ground to be used in intrinsically safe controls. The IS bus should be isolated from FG, PE, IE, and HAIE buses. The IS bus is to be connected in the most direct possible path to a common earth electrode with 2 wires, 12 AWG or larger. *All grounding systems must terminate to a single earth point. THE MINIMUM REQUIRED SYSTEM IS AT LEAST 3 GROUND STAKES IN A TRIANGLE (See Figure 1 below).

4. Symbols Used

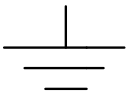
Grounding Symbols
Solar Turbines Inc.



FRAME
GROUND

FG

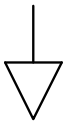
External:
FG is the **Protective Earth**
Protects against electrocution
Instrument Chassis
Instrument Panels
Control Boxes, Doors, Skid
< 5 Ohms to Earth Ground
** Legacy drawings may have either or both symbols.*



POWER
EARTH

PE

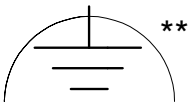
Internal:
Power Earth grounds
"Clean Ground"
Digital and Analog device
Also used for 0V
< 5 Ohms to Earth Ground



INTRINSICALLY
SAFE

IS

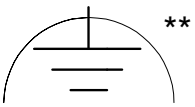
Internal:
Used for Intrinsically Safe Controls
2ea 12 AWG (3mm) wires
<1 Ohm to Earth Ground



INSTRUMENT
EARTH

IE

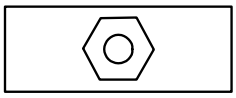
Internal:
Signal Shields
"Quiet Ground"
Din rails with Flex IO Modules attached,
except IJ2 & IRT8 which are tied to 0V
Galvanic Isolators
< 5 Ohms to Earth Ground



HAZARDOUS AREA
INSTRUMENT EARTH

HAIE

Internal:
Unique to Bently Nevada
1701 IS Applications
<1 Ohm to Earth Ground



DIN RAIL
GROUND

RG

Can be tied to: FG, PE, IS or 0V

** *IE and HAIE share the same symbol and Legacy drawings may differ.*

NOTE: 14AWG is the minimum wire gauge size for all panel grounds. Wires should be green/yellow except 0V, which is normally white. The only exception permitted is where the part will not accept 14AWG wire.

See exceptions in the above notes as some Legacy drawing may have different symbology.

5. Building or Station Earth Expectations

5.1 Station Ground Expectations

The station grounding system in use by customers varies dramatically. Solar Turbines Inc. expects that the customer will provide a reference point/points or plane, through approved, industry-recognized distribution and bonding practices. This will ultimately tie FG, PE, IE, HAIE and IS to the same ground reference. While Solar Turbines Inc. does provide protection on critical sensitive equipment impact on the system due to faults welding arcs or lightning nearby should be minimized. To eliminate any potential differences between any of each grounding electrode system, all of the grounding electrodes for FG, PE, IE, HAIE, and IS buses should be tied together as per IEEE STD 1999 Chapter 4.7, 2008 National Electric Code Article 250.106 Lightning Protection System, Article 250.60 Use of Air Terminal, and Article 250.94 Bonding for Other Systems. Having a separate grounding electrode is important, especially to protect the integrity of IE ground bus which must be noise and interference free. Figure 1 shows a required grounding system for a Turbine Package. Additionally, HAIE and IS should be terminated on the IE ground stake.

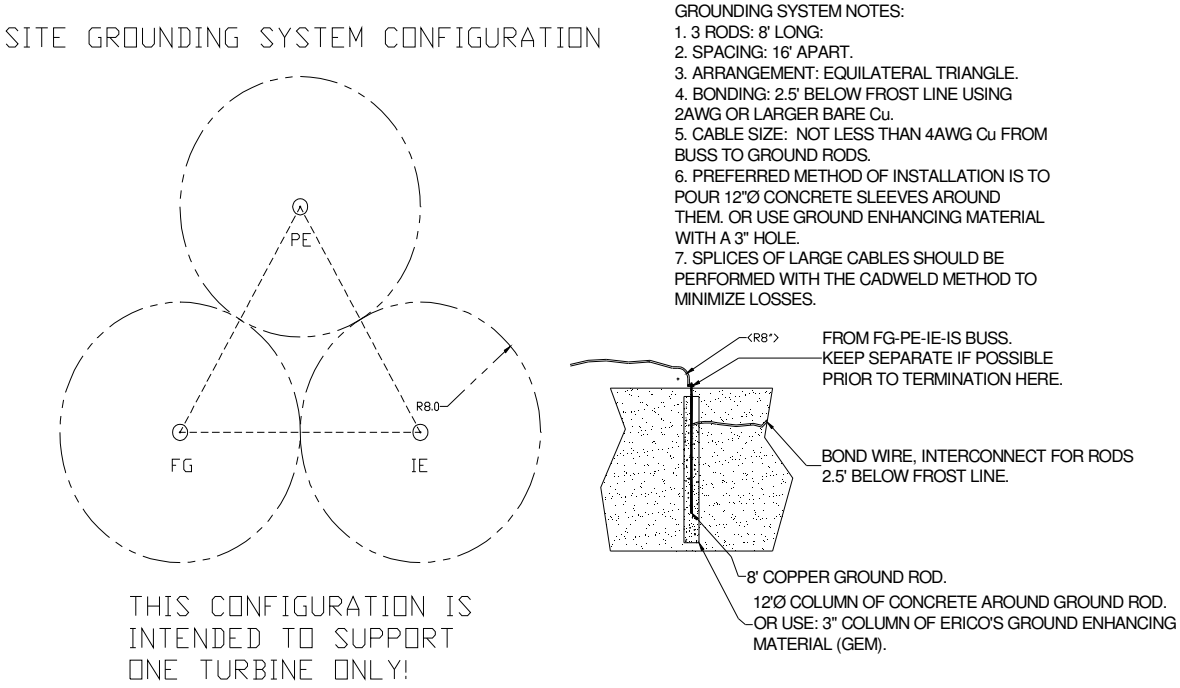


FIGURE 1
MINIMUM GROUNDING SYSTEM REQUIREMENTS

6. Ground Connections

6.1 Control System Grounding Practices

All ground systems in the control system should be wired in a star or multiple star arrangement with the individual grounds balanced between them. That is:

6.1.1 Daisy Chains:

Daisy chaining of grounds is prohibited. Where there are multiple IE bus bars, one shall be selected as the Marshaling bus and the customers station ground termination made on that bus.

6.1.2 Ground Electrodes:

All local grounds such as PE bus, FG stud, IE bus, HAIE bus, and IS bus should be connected separately to the final station grounding electrodes.

6.1.3 Routing of Ground Leads:

All grounds should be routed by the most direct path to the station grounding electrodes. Solar Turbines requires a minimum of 4 AWG cable for these grounding runs.

6.2 Bonding of Ground Connections:

To maintain a high integrity grounding system all grounding connections need to be bonded. Bonding is a process that includes:

6.2.1 Surface Condition:

Creating a clean conductive surface (removal of all paint, anodic film, grease, and lacquer).

6.2.2 Protective Coating:

Coating the clean surface with an approved lubricating compound to prevent corrosion.

6.2.3 Fasteners:

Connecting the ground lug firmly to the clean surface directly or with an approved star washer.

7. Final Ground Termination

7.1 Required Termination to Station Ground:

Figure 2 shows a minimum arrangement required to connect the ground buses to the ground electrode connections. This arrangement is typical on all generator sets and gas pipeline application when the gas pipeline is isolated from earth from the gas turbine compressor set.

7.2 Marine/Platform Grounding:

Figure 3 shows all grounding bus i.e. FG bus, PE bus, IE bus, HAIE bus, and IS bus on the gas turbine skid being tied to the floating ground grid except for PE bus, IE bus, HAIE bus, and IS bus in the remote console.

7.3 Cathodic Protection Oil & Gas Pipeline Applications:

Figure 4 shows only the FG on skid frame ground bus is tied to the floating ground grid. For gas pipeline application the compressor skid may be isolated from earth for cathodic protection. PE, FG, IE, (IS and HAIE not shown) bus from the Control Box are tied to their respective earth electrodes. This applies to both On-Skid and Off-Skid systems designs.

7.4 Multi-Control Box Ground Ties:

All control boxes ground systems should be independently routed to the station earth system. Do not daisy chain control systems prior to termination: cross talk may occur if this is not observed. Notice each bus has a separate wire going to the Station Grounding Rods.

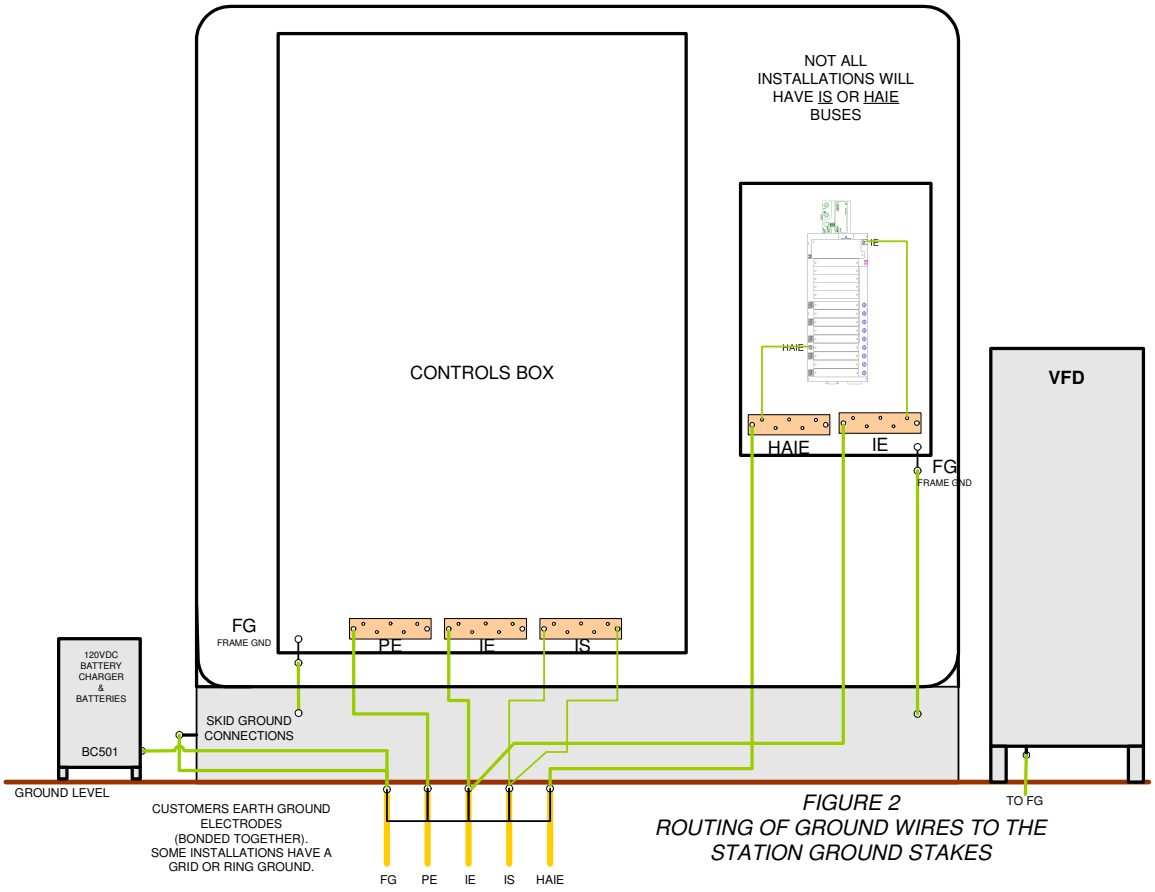


FIGURE 2
ROUTING OF GROUND WIRES TO THE STATION GROUND STAKES

FIGURE 2
REQUIRED TERMINATION TO STATION GROUND

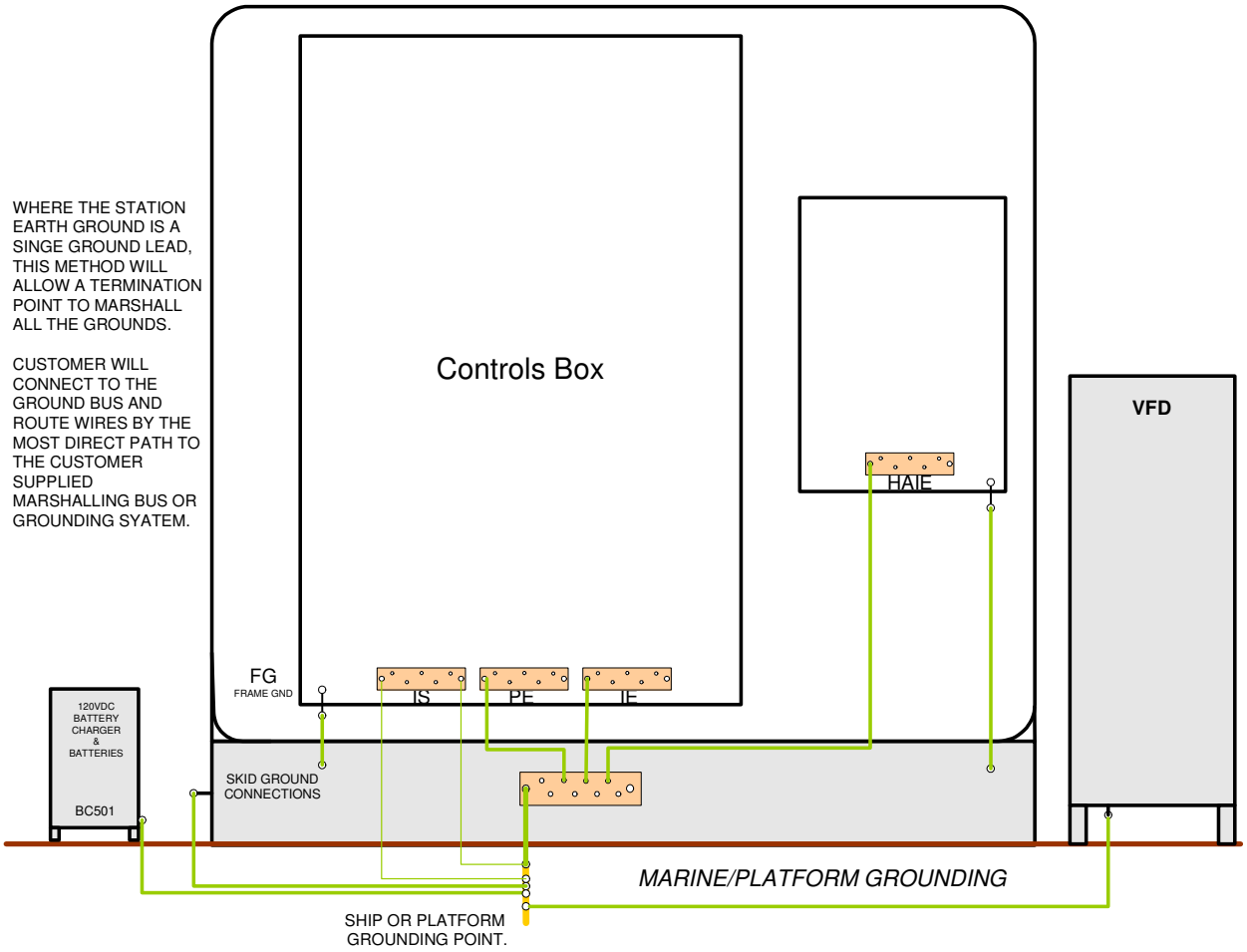


FIGURE 3

This method although not recommended for land installations, may be used for Marine applications where only a single earth ground is available. The common (marshalling) bus must be located as close to the earth ground point or station ground as possible.

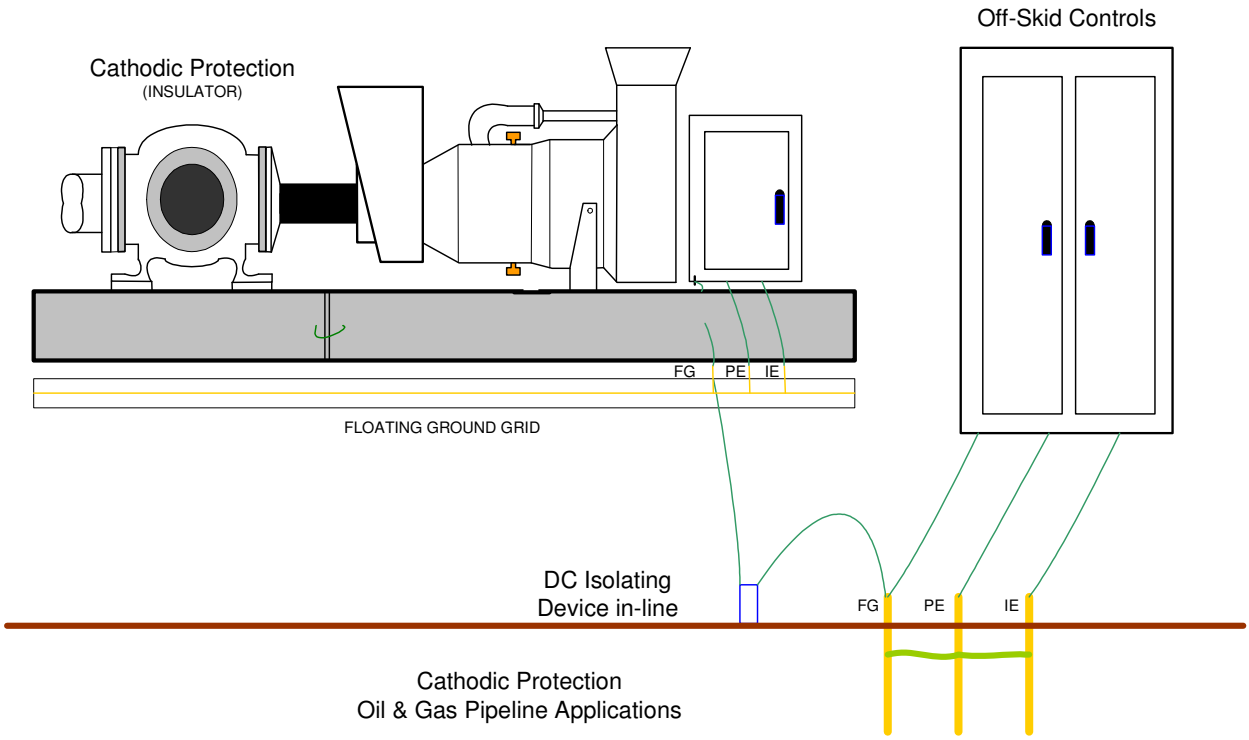


FIGURE 4

8. Bonding Grounding Electrodes

8.1 Bonding:

Grounding electrode is defined in IEEE STD 1100 1999 paragraph 2 as: “A conductor or group of conductors in intimate contact with the earth for the purpose of providing a connection to the ground”. To eliminate any potential differences between any of each grounding electrode system, all the grounding electrodes for FG, PE, IE, HAIE, and IS buses should be bonded together as per IEEE STD 1100 1999 Chapter 4.7, IEEE 142 1991, paragraph 5.5.1, and 2005 National Electric Code Article 250.94 Bonding for Other Systems, Article 250.106 Lightning Protection Systems, & Article 250.60 Use of Air Terminals. The bonding together of grounding electrodes is shown in figures 1, 2 and 3.Noise Interference Reminder: Having a separate grounding electrode is important, especially to protect the integrity of IE ground bus which must be noise and interference free.

8.2 Lightning Exception:

In article 250.60 of 2005 National Electric Code prohibits the use of other grounding electrode system as a lightning-grounding electrode.

Direct-drive AC Start System

Ty Reed
Solar Turbines Incorporated

PURPOSE

The following describes the application and installation, of direct-drive AC start systems. These standard configurations use Rockwell Automation PowerFlex Variable Frequency Drives (VFD). The starting power requirement of the package determines the applicable PowerFlex 750 VFD and motor combination.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. Introduction

1.1 Basic Description

The Direct-drive Alternating Current (DAC) start system is a proven configuration for Solar® gas turbine packages. Since its introduction in 1994, the DAC start system has demonstrated high reliability, and low maintenance, across all of Solar's gas turbine product lines.

The system consists of a solid-state, pulse-width-modulated VFD that converts three-phase utility voltage to a variable voltage, variable frequency supply. This power is applied to a rugged, intermittent duty, AC induction motor that was designed exclusively for this application. The motor is coupled directly to the gearbox through an overrunning clutch and shaft.

The system initiates engine rotation, maintains engine purge speed, assists acceleration to self-sustaining speed, and perpetuates a slow roll speed. Assuming a four-minute purge, the system is designed to provide three consecutive full-speed start cycles with 10-minute motor rest periods between attempts. Fewer or more consecutive start attempts may be possible, depending upon ambient temperature, turbine conditions, purge time, and motor rest time. For an example, see Service Bulletin 2.3/108A DAC start information for the *Mars*® gas turbine.

Because the load on the motor at engine purge / wash speed is below its nameplate rating, the system is capable of extended purge cycles for exhaust Heat Recovery Unit (HRU) applications, and water wash cycles, without concern of overheating.

Slow roll is required on *Taurus*™ 70 and larger engines. Slow roll speeds range from 3-12% NGP, and are required for up to 4 hours. The *Titan*™ 250 Onshore product is equipped with a ride thru device that maintains rotor rotation, in the event of an AC power outage. Other products rely on a constant speed AC or DC motor for slow roll.

The DAC system is certified to the following codes and standards, provided that the VFD is installed in a Motor Control Center (MCC) room or other suitable ordinary (non-hazardous) location:

- National Electrical Code (NEC)
- Underwriters' Laboratories (UL)
- Canadian Standards Association (CSA) Class I, Division 1, Group D, T3
- International Electrotechnical Commission (IEC) and Comité Européen de Normalisation Électrotechnique (CENELEC) Zone 1 Exde IIA T3, ATEX

Additionally, the *Centaur*® 40, *Centaur* 50, and *Taurus* 60 generator set applications are equipped with DAC start systems suitable for NEC Class 1, Group D, Division 1 locations, when the VFD is in an MCC or other suitable ordinary (non-hazardous) location.

A user-supplied fused disconnect, or circuit breaker, is required at the VFD input; filters, line reactors, or transformers may also be necessary.

1.2 Availability

Solar has leveraged more than two decades of experience with Reliance/Allen-Bradley VFDs to develop the configurations used today in the DAC start system. VFD's that are ordered through Solar Turbines are configured specifically for seamless integration with our equipment. While it is possible to order a PowerFlex VFD from a different source, there may be differences in firmware, option cards, etc., which may result in substantial work on-site to modify the VFD system to function successfully in this application.

Once installed, Solar's proprietary *Turbotronic*™ system downloads all the configuration parameters to the VFD for operation in the intended application.

1.2.1 Standard DAC Start System

The standard DAC start system is available on all of Solar's gas turbine packages. It requires a three-phase power supply from 380 to 480 VAC, 50 or 60 Hz. A Custom Feature is required for 600 to 690 VAC supply. This document primarily focusses on the 380-480 VAC systems, but information for 600-690 VAC systems can be provided upon request, and is provided in the same Rockwell documents that are referenced herein.

1.2.2 "High Torque" DAC Start System

Centaur 40 and *Centaur* 50 GS packages, with a generator rotor inertia exceeding 340 kg-m2 (8000 lb-ft2), employ a motor designed for the higher inertia requirements. Inquire with Solar Engineering if this "high torque" application motor is needed.

2. PowerFlex 750 Series Variable Frequency Drives

2.1 PowerFlex 750 Applications

Table 1 lists the 400 VAC (400 VAC is the nominal value, provided by Rockwell Automation for drives designed to operate between 380 – 480 VAC) PowerFlex 750 rating used by engine model. Throughout the referenced Rockwell Automation manuals, **kW Rating** is used to identify VFDs. Some of the referenced tables list duty ratings, and Solar's drives are considered **Normal Duty**.

Table 1: PowerFlex 750 Power Ratings

Package	Frame Size	kW Rating	kVA Rating
Saturn CS & MD	4	37	48.8
Saturn GS	5	55	71.3
Centaur 40 & 50 CS & MD	5	55	71.3
Centaur 40&50 GS (Low Torque)	6	90	115.4
Centaur 40&50 GS (High Torque)	6	132	176.5
Mercury 50	6	132	176.5
Taurus 60 CS & MD	5	55	71.3
Taurus 60 GS	6	132	176.5
Taurus 65 GS	7	200	309.5
Taurus 70 CS & MD	6	110	139.1
Mars CS, MD & GS	6	132	176.5
Titan 130-20500 CS & MD	7	160	205
Titan 130 -23500 CS & MD	7	160	205
Taurus 70 GS	8	315	369.3
Titan 130-20500 GS	8	315	369.5
Titan 130-23000 GS	8	400	512
Titan 250	8	400	512

2.2 3-Phase Power Rating

For rating information, refer to Rockwell Automation Publication: **750-td001, *PowerFlex 750-series AC Drives, Technical Data***. The full technical data includes the 3 second, 1 minute, and continuous current rating for the 750 family of drives.

2.3 Additional Components

In addition to the motor and VFD, the following components may be part of the project scope, if required as indicated.

2.3.1 Line Reactors (Input)

Line reactors can provide protection to the VFD from imbalance in the distribution system. Line reactors also increase the load impedance so that current transients, caused by the VFD, do not cause voltage spikes on the rest of the distribution system.

Line reactors are required for all PowerFlex 750 series applications if any of the following conditions exist:

- The power system has power factor correction capacitors
- The power source has intermittent voltage spikes exceeding 6000V
- The input lines to the VFD have voltage imbalance greater than 2%
- The transformer kVA rating exceeds the values listed in Table 2.

Refer to Table 3 for dimensional information.

Supplied by: *Custom Feature*
Installed at: *VFD input*

Table 2. PowerFlex 750 Series Maximum Transformer kVA

Package	Max. Transformer kVA
Saturn CS & MD	1000
Saturn GS	1000
Centaur 40 & 50 CS & MD	1000
Centaur 40&50 GS (Low Torque)	1500
Centaur 40&50 GS (High Torque)	2500
Mercury 50	2500
Taurus 60 CS & MD	1000
Taurus 60 GS	2500
Taurus 65 GS	3000
Taurus 70 CS & MD	2000
Mars CS, MD & GS	2500
Titan 130-20500 CS & MD	2500
Titan 130 -23500 CS & MD	3000
Taurus 70 GS	4000
Titan 130-20500 GS	4000
Titan 130-23000 GS	4500
Titan 250	4500

Table 3. PowerFlex750 Series Line Reactor Dimensions and Weights

Package	Width		Height		Depth		Weight	
	Mm	in.	mm	in.	mm	in.	kg	lb
Saturn CS & MD	331	13	331	13	331	13	26	58
Saturn GS	331	13	331	13	331	13	37	82
Centaur CS & MD	331	13	331	13	331	13	37	82
Centaur GS (Low Torque)	331	13	331	13	331	13	37	81
Centaur GS (High Torque)	331	13	331	13	331	13	68	151
Mercury 50 GS	331	13	331	13	331	13	68	151
Taurus 60 CS & MD	331	13	331	13	331	13	37	82
Taurus 60 GS	331	13	331	13	331	13	68	151
Taurus 65 GS	432	17	610	24	470	18.5	77	170
Taurus 70 CS & MD	331	13	331	13	331	13	44	98
Mars CS, MD & GS	331	13	331	13	331	13	68	151
Titan 130-20500 CS & MD	432	17	610	24	470	18.5	77	170
Titan 130-23500	432	17	610	24	470	18.5	91	200
Taurus 70 GS	686	27	1195	47	635	25	119	262
Titan 130-20500 GS	686	27	1195	47	635	25	119	262
Titan 130-23000 GS	686	27	1195	47	635	25	132	292
Titan 250	686	27	1195	47	635	25	132	292

2.3.2 Line Reactors (Output)

Line reactors provide inductive reactance to counteract the interconnect capacitive reactance between the VFD and motor. This reduces impedance and increases the voltage at the motor. PowerFlex 753 VFDs may use motor cables up to 1200 ft. in length with or without line reactors. PowerFlex 755 drives require output line reactors when the distance between the VFD and motor exceeds a specified value. Refer to Table 4 for the maximum distance requirements of the PowerFlex 755 drives.

Supplied by: *Custom Feature*

Installed at: *VFD output*

Table 4. PowerFlex 755 380 - 480 VAC VFD-to-Motor Distances

Package	No Reactor m (ft)	Reactor m (ft)
Taurus 70 GS	259.1 (850)	365.8 (1200)
Titan 130-20500 GS	259.1 (850)	365.8 (1200)
Titan 130-23000 GS	259.1(850)	365.8 (1200)
Titan 250	213.4 (700)	365.8 (1200)

2.3.3 Sine Wave Filters

Sine wave filters can be used on the output of the VFD to reduce the noise, and EMI, that is inherent to pulse width modulation. Neither Solar nor Rockwell Automation require the use of sine wave filters for the DAC start system application. If sine wave filters are desired, then Solar Engineering must be consulted. Specific VFD parameters must be configured when sine wave filters are used with PowerFlex 750 series VFDs. Reference Rockwell Automation Publication: ***pflex-at002B, Parameter Settings for PowerFlex Drives Using Sine Wave Filters, dv/dt Filters, and Adjustable Voltage***, for more information on this topic.

Supplied by: User

Installed at: VFD output

2.3.4 Isolation Transformer

When Total Harmonic Distortion (THD) exceeds 5%, the impact of multiple VFD's on the system should be reviewed. Isolation transformers may reduce THD, due to the added impedance, however, alone they are not necessarily more effective than line reactors at harmonic reduction. Isolation transformers are commonly used to isolate the VFD grounding system, especially when multiple drives are on a circuit. They are also used when ground fault detection schemes are employed, such as in marine applications. If more aggressive harmonic content reduction is required, input filters should be considered.

Supplied by: User
Installed at: VFD input

2.3.5 Fuse and Circuit Breaker Requirements

Input fuses are required to protect the cabling to the VFD and other devices on the system. A circuit disconnect is required for VFD servicing. Fuses between the VFD and motor are not required. The VFD is designed to protect the motor, and motor interconnect. Input fuse and/or circuit breaker ratings must not be larger than specified in Rockwell Automation Publication: **750-td001, *PowerFlex 750-series AC Drives, Technical Data***. To avoid nuisance tripping, Solar recommends that circuit breakers be rated at least 115% of the input current rating of the VFD.

Supplied by: User
Installed at: VFD input

2.4 Cable Ampacity Recommendations & Terminal Sizes

Table 5 lists conductor minimum ampacity recommendations, and terminal sizes, for the corresponding VFD and motor. Refer to Section 5 for an example of how these ampacity values were determined. VFD terminal sizes for PF 753 drives are listed in the Rockwell Automation Publication: ***750-in001, PowerFlex 750-Series AC Drives, Installation Instructions***. The PF 755 power connections terminate on the VFD bus bars using customer-supplied lugs.

Table 5. PowerFlex753 380 – 480V Minimum Conductor Ampacity and Terminal Sizes

Package	Minimum Conductor Ampacity		Terminal Sizes	
	VFD (Amps)[3]	Motor (Amps)[4]	ATEX Motor Terminals (Quantity 6) Size (mm^2)	NEC Motor Conduit Entry Size (Inches)
Saturn CS, MD & GS	129	24	16	1
Centaur 40&50, Taurus 60 CS & MD	129	144	95	2
Centaur 40 & 50 GS (Low)	208	144	95	2
Centaur 40 & 50, Taurus 60 GS (High) [1]	318	208	150	4
Mercury 50[1]	318	128	N/A	2
Taurus 60 GS[1]	318	208	150	4
Taurus 65 GS[1]	449	263	150	4
Taurus 70 CS & MD[1]	251	144	95	2
Mars CS, MD & GS[1]	318	202	150	4
Titan 130-20500 CS & MD[1]	370	202	150	4
Titan 130-23500 CS & MD[1]	558	271	150	4
Taurus 70 GS[2]	666	263	150	4
Titan 130-20500 GS[2]	666	438	150	4
Titan 130-23000 GS[2]	924	523	150	4
Titan 250[2]	924	548	9 x 240	4

Notes:

1. ***Frames 6 and 7 have barrel lugs, maximum lug width shown.***
2. ***PowerFlex 755 has barrel lug terminals, using M12 bolts.***
3. ***Calculated by NEC code, VFD Ampacity = Input current x 1.25.***
4. ***Calculated by NEC code, Motor Ampacity = Rated Motor Amps x 1.2 (refer to Section 5 for assumptions made for conductor sizing).***

2.5 VFD Installation

The standard VFDs supplied by Solar are rated IP20 and must be installed in a non-hazardous environment, where adequate ventilation is available, and the drive is protected from dust and moisture. This level of protection enclosure provides little defense against circulating dust, and no protection against water ingress. VFDs are vulnerable to corrosion caused by exposure to environmental conditions that are beyond the rating of the drive enclosure. Moreover, intrusion by foreign debris, can cause internal short circuit or arc-flash events that lead to VFD failure. Care should be taken to protect the VFD during installation and commissioning.

It is critical that location and environmental conditions are considered prior to drive procurement to avoid early failures and loss of package availability. Higher protection enclosures can be provided for drives that are not installed in a suitably controlled environment. Rockwell publication, **DRIVES-AT003B**, I**ndustry Installation Guidelines for Pulse Width Modulated (PWM) AC Drives,** elaborates on the ingress protection options and requirements.

The operating ambient range of the VFD is 0° to +40°C (32° to 104°F), and 5 to 95% relative humidity. Continuous VFD operation above 1000m (3300ft) elevation requires de-rating of the VFD power output, due to reduced ambient cooling capacity. Typical DAC start applications operate in a non-continuous mode and de-rating is not required. Inquire with Solar Engineering if installation conditions are not within these parameters.

VFDs should be positioned such that input wiring from the feeder breaker is as short as possible. MCC manufacturers may not be familiar with the requirements for installing a VFD. Solar recommends that a copy of this document be provided to the MCC manufacturer. PowerFlex 750 series VFDs cannot be installed with a motor interconnect cable length greater than 366 m (1200 ft).

System operation is verified during turbine package test at Solar, so the VFD will not be available for site installation until these procedures are completed. The construction / manufacturing cycle of the MCC should accommodate VFD availability for installation.

2.5.1 PowerFlex 753 Specifics

Solar recommends that VFD installations adhere to Rockwell Automation Publication: **750-in001, *PowerFlex 750-Series AC Drives, Installation Instructions*** including the following:

1. If VFDs are installed in a panel-like cabinet, the cabinet should be “empty” (no bus bars), ventilated (louvers at top and bottom), and should have a back panel suitable for mounting of the VFD. All PowerFlex 753 VFDs are designed to be wall mounted.

2. Cooling requires that ventilation and access minimum clearances are 76.2 mm (3.0 in) at the top and bottom of the drive. Bottom clearance should be increased, as needed, to accommodate cable bend radius requirements.

3. A minimum 600-mm (24-in.) wide cabinet is recommended.

2.5.2 PowerFlex 755 Specifics

Minimum ventilation and access clearances for each VFD are 182 mm (7.2 in.), at the top, and 860 mm (33.9 in.) at the door swing. Clearances should be increased, as required, to accommodate cable bend radius requirements.

The standard PowerFlex 755 VFDs are 600mm deep. Power cables enter the PowerFlex 755 from the top, but a custom feature is available for 800mm deep PowerFlex 755 VFDs, which allow for either top or bottom cable entry. The Titan 250 Onshore VFD, with ride thru capability, is a double wide cabinet.

2.6 VFD Heat Rejection Rates

Refer to Rockwell Automation Publication: **750-td001, *PowerFlex 750-series AC Drives, Technical Data*** for heat rejection rates for the VFD.

Use this information to determine cooling requirements for the installation, when referring to the previous section for VFD mounting recommendations. Except for Waste Heat Recovery Unit (WHRU) applications, the VFD is operating for short intermittent periods. When the gas turbine is

used in a continuous duty application, the VFD produces heat for a fraction of the operating life of the package.

2.7 Grounding Systems

The VFDs are designed to operate using a symmetrical three-phase supply. To comply with IEEE C62.41, the VFD is equipped with Metal Oxide Varistors (MOV) to provide phase-to-phase and phase-to-ground voltage surge protection. The MOV circuit is designed for transient surge protection and not for continuous operation. In ungrounded distribution systems, the phase-to-ground MOV connection can become a continuous current path to ground. Exceeding the published phase-to-phase voltage, phase-to-ground voltage, or energy ratings can damage the MOV. Suitable isolation is required for the VFD when there is potential for high phase-to-ground voltages (exceeding 125% of nominal line-to-line voltage), or when the supply ground is connected to another system or equipment that could cause the ground potential to vary. Solar recommends an isolation transformer when any of these conditions exist.

The VFD contains common mode noise suppression capacitors that are referenced to ground. In installations with ungrounded or high resistance ground systems, the capacitors can capture high frequency common mode or ground fault currents. This can cause bus overvoltage conditions that lead to VFD faults or damage. Systems that are ungrounded, high resistance grounded, or have one phase grounded apply higher than normal voltage stresses directly to the capacitors and can lead to shortened drive life or damage.

When installing a PowerFlex 750 series drive in an ungrounded, high-resistance, or B-phase grounded distribution system, disconnect the phase-to-ground MOV circuit and the common mode capacitors from ground. Refer to Rockwell Automation Publication:

Drives-in001, *Wiring and Grounding for Pulse Width Modulated (PWM) AC Drives, Installation Instructions*.

2.8 *Titan* 250 Onshore Ride Thru Solution

The Titan 250 Onshore product replaces the DC backup turning gear with a Ride-Thru unit. This DC-DC converter enables the DAC start system to continue to slow roll, in the event of an AC power outage, and is supplied by 120V DC power from the package batteries. Battery voltage is converted to 540 VDC, and powers the DC Bus in the VFD. Additionally, a PowerFlex 753 VFD is included in the cabinet to operate the AC cooling fans. This VFD derives power from the primary PowerFlex 755 drive or from the RTU when on battery power. The customer need only connect AC input power to the primary PowerFlex 755 VFD and DC input power from the package batteries to the RTU.

3. Line Harmonics

VFDs introduce current and voltage harmonics into the electrical supply system. The VFD is a nonlinear load that draws current from the supply for very short periods of time. Line harmonics result because the voltage of the input power is sinusoidal, but the current draw is not.

Even-order harmonics (such as the 2^{nd} and 4^{th}) are not a problem: although the load is nonlinear, it is symmetric about the x-axis. Harmonics, divisible by three (such as the 3rd and 9th), are very small when the supply is a balanced three-phase system. With each higher order, the magnitude of the distortion is smaller and usually insignificant beyond the 13th harmonic. The harmonics of concern are the 5th, 7th, 11th, and 13th. The Institute of Electrical and Electronics Engineers (IEEE) standard 519 states that in general, system voltage distortion should be limited to 5% Total Harmonic Distortion (THD). THD is a ratio of harmonic and total voltage or current: at low loads (low current flow), very high harmonic current will be measured. THD measurement should be conducted with the VFD as close to rated current as practicable.

The voltage THD introduced by the drive itself should not exceed 5%. THD examples provided by Rockwell Automation for a PowerFlex 753 100 hp drive are 1.18% (Vrms) and 36.85% (Irms), and for a PowerFlex 755 600 hp drive 4.93% (Vrms) and 32.72% (Irms).

If a large percentage of the plant load includes VFDs, Solar highly recommends that a power system analysis, with an emphasis on harmonics, be conducted. Rockwell Automation provides harmonic simulation tools, available online, as an aid to model a power system and estimate harmonic distortion.

There are several methods to mitigate THD; these vary in cost and effectiveness. Line reactors are a simple and common method. If a more aggressive method of attenuation is required, transformers, filters or 12/18 pulse input rectifiers are available. See Rockwell Automation Publication: **DRIVES-WP011C: *Straight Talk about PWM AC Drive Harmonic Problems and Solutions***. for more information.

4. Description of Operation and Control

4.1 Control Description, Including ControlNet and EtherNet/IP

VFDs are configured, controlled, and monitored from the *Turbotronic* control system using a communications link. The link can be either ControlNet or Ethernet/IP.

The control processor configures the VFD through the communication link by first commanding a reset to default state, and then issuing a series of messages that configure parameters specific to the application. The configuration process is executed automatically upon control system power up, and can be manually initiated from the Human Machine Interface computer.

The control system starts, stops, and controls the VFD speed through the link. VFD status, parameter monitoring, and fault monitoring is also performed using the communication link. The communication link status is continually monitored.

To support legacy control systems with no communications link, a hard-wired interface to the VFD from the control system can be provided.

The motor dual thermostats (or thermistor circuit) are wired to the control terminals of the VFD. In the event of motor thermal overload, the VFD interrupts operation and communicates this information to the control processor.

The VFD provides control for the DAC start motor anti-condensation heater. Global motors are configured to provide connections suitable for 50 and 60 Hz applications. It is critical the applicable leads are used and heater voltage limitations are followed.

A lube oil pressure switch is hardwired to the start VFD. This switch interlocks the drive with the lube oil pressure. If lube oil pressure requirements are not met, the VFD is inhibited.

4.2 Protection against Motor Thermal Overload

The DAC start motor is intentionally operated above the motor nameplate rating. Table 6 depicts the approximate overload by application. The motors used are designed to meet the high current, high torque, short-term demands for starting Solar gas turbines. The motors are certified to UL, CSA, CENELEC and/or ATEX standards as required. These motors have been proven, in all parts of the world, under a wide variety of conditions.

The motor thermostats provide a step-change resistance from near zero to near infinite when the motor windings reach a temperature of 160°C (320°F). This is slightly higher than a T4 temperature code of 135°C (275°F).

In the event of a motor thermal overload, the start sequence is aborted; a shutdown is annunciated, and the motor ramps to a stop. The control processor locks out subsequent start attempts for a period of 30 minutes.

Table 6. Comparison of Motor Nameplate Ratings and Actual Peak Load

Package	Motor NP Current (Amps)	VFD Continuous Current (Amps)
Saturn CS & MD	20	72
Saturn GS	20	104
Centaur CS & MD	106	104
Centaur GS (Low Torque)	106	170
Centaur GS (High Torque)	173	260
Mercury 50 GS	106	260
Taurus 60 CS & MD	106	104
Taurus 60 GS	173	260
Taurus 65 GS	219	367
Taurus 70 CS & MD	106	205
Taurus 70 GS	209	540
Mars CS, MD & GS	168	260
Titan 130-20500 CS & MD	168	302
Titan 130-23500 *CS & MD*	226	302
Titan 130-20500 GS*	362	540
Titan 130-23000 GS*	436	750
Titan 250 CS, MD & GS	456	750

**Titan* 130-20500 GS and *Titan* 130-23000 GS include 2 motors. Divide values by 2 for each motor's rating.

5. Conductor Sizing

ATTENTION: The following example is merely a guide for proper installation. Solar Turbines cannot assume responsibility for the compliance or the noncompliance to any code, national, local or otherwise for the proper installation of this drive or associated equipment. A hazard of personal injury and/or equipment damage exists if codes are ignored during installation. These guidelines are for use by licensed, professional engineers and electricians. The customer's electrical designers are responsible for compliance to all applicable codes. It is strongly recommended that the customer, electrical engineer, and contractor read the VFD manufacturer's documentation referenced in Section 6.

Due to the unusual duty cycle of the DAC system, Solar provides an EXAMPLE of how to select conductor size between the VFD and motor. These sample recommendations are based upon NFPA70 Articles 310 & 430 of the United States National Electrical Code (NEC), 2017 edition, and the VFD and motor supplier. The same general approach can be taken to size conductors according to the International Electrotechnical Commission (IEC).

Inappropriate wiring can cause start-up difficulties, as well as unwanted interaction with other systems. It is recommended that the VFD use copper conductors with an insulation composed of XLPE Type RHW-2, or XHHW-2. Shielding is required for the conductors connecting the VFD to the start motor. Shielded cabling is also strongly recommended at the input to the VFD. Using unshielded cabling on the input can result in disruption of sensitive control components, such as the overspeed monitor.

The VFD conductors should be rated based on supply voltage, NEC Type TC, AC or MC. At least one ground wire must connect the VFD to the start motor. Ground wire(s) should be spaced equidistant to the power wires (such as in the center of a triangular arrangement of power wires). A cable with three symmetrical ground conductors should be used for drives larger than 200 hp (150kW).

5.1 Determining Disconnect and Conductor Sizing (Supply to VFD)

The 2017 edition of NFPA 70 Article 430 specifies the disconnect and conductor sizing requirements for VFDs and motors. Solar recommends that each VFD be protected by a fused disconnect, or circuit breaker, rated not less than 115% of the VFD rated input current.

Input power cable to the VFD can be sized by referencing NFPA 70 Article 430.122, which specifies an ampacity of 125% of the input current rating of the drive. Refer to ***750-in001, PowerFlex 750-Series AC Drives, Installation Instructions*** for VFD terminal size ranges.

5.2 Determining Conductor Sizing (VFD to Motor)

The DAC start system is classified as “Varying duty” Referring to NFPA 70 Article 430.22 (E) Other than Continuous Duty:

> “Conductors for a motor used in a short-time, intermittent, periodic, or varying duty application shall have an ampacity of not less than the percentage of the motor nameplate current rating shown in Table 430.22(E), unless the authority having jurisdiction grants special permission for conductors of lower ampacity.”

Table 7. Duty Cycle Service, NEC Code Table 430.22(E)

Classification of Service	Nameplate Current Rating Percentages			
	5 Minute Rated Motor	15 Minute Rated Motor	30 & 60 Minute Rated Motor	Continuous Rated Motor
Short-time duty operating valves, raising or lowering rolls, etc.	110	120	150	-
Intermittent duty freight or passenger elevators, tool heads, pumps, drawbridges, turntables, etc.	85	85	90	140
Periodic duty rolls, ore- and core handling machines, etc.	85	90	95	140
Varying duty	110	120	150	200

Solar DAC start motors are designed for 15-minute inverter duty, and the required power during slow roll is significantly less than the start motor nameplate rating. The ampacity rating of conductors can be sized to 120% or greater than motor nameplate current rating.

Conservative sizing of conductors, such as using the continuous output current rating of the VFD, is unnecessary and the increased cable diameter can pose significant challenges to cable termination at the motor. A few products use a motor that has a nameplate current rating that is greater than the VFD continuous rating (for example, T60 CS/MD). In this case, the VFD continuous current rating should be used as the baseline amperage, prior to derating, for conductor sizing. This is because the VFD will not allow the motor to continuously draw more current than this limit, even under high load conditions. Refer to Table 6 for a comparison of motor nameplate and VFD continuous current ratings.

Refer to NEC Table 310.15(B)(16) to size conductors based on ampacity. Conductors rated to 90ºC with XHHW-2 insulation are recommended for NEC Solar Packages. Table 310.15(B)(16) uses the following assumptions:

- Total Voltage Drop is Less Than 5%
- Ambient Temperature of 30ºC (86ºF)
- Not More Than Three Current-Carrying Conductors in Raceway, Cable, Earth

Correction factors for voltage drop, ambient temperature, and cable routing must be considered and are referred to by NEC Article 215.2(A), Table 310.15(B)(2)(A), and Table 310.15(B)(3)(a), respectively.

5.3 Voltage Drop Calculation

Solar recommends the total voltage drop (both feeder and branch circuits) not exceed 5%. The branch circuit includes conductors from the supply circuit breaker to the VFD and from the VFD to the motor (NEC Exhibit 430.11). The data listed in Table 6 considers a system designed for a 380 VAC. Assuming a negligible voltage drop for the supply to VFD cable, a maximum voltage drop of 11.4 VAC is allowed between drive and motor. (the VFD converts incoming voltage to 380 VAC output for 380-480 VAC system voltages).

Refer to Table 6 for the maximum current (VFD rated ampacity) and general industry conductor information (for example, NEC Publication 430) for typical conductor resistances to calculate voltage drop.

While the distance between the VFD and motor can be up to 1200 feet, the limitation is typically the size of conduit / cable entry into the motor terminal box. A larger conductor could be used if a customer furnished marshaling box near the package is employed. Smaller conductors may then be used to connect from the marshalling box to the motor, provided that ampacity requirements are still met. Consult Solar Engineering if this is a consideration.

5.4 Example: How to Calculate Conductor Size

The following provides an example of conductor sizing for a Mercury 50 a start system. To calculate conductor size, the following quantities are necessary (the values used for this example are listed in parenthesis):

- Motor Voltage – 380 or 575 (380V)
- Distance between the VFD and motor (220 ft.)
- Motor nameplate amperage rating (106A)
- VFD continuous current rating (260A)
- Ambient temperature (50 C° (122F°))
- Number of conductors in enclosed raceway (6)

With these values known, the minimum cable diameter can be determined by multiplying the motor nameplate amperage rating by 1.2 (per NEC table 430.22(E)).

$$1.2 \times 106 = 127.2\ Amps$$

Table 310.15(B)(16) is used to size conductors based on ampacity. It assumes not more than 3 conductors in a raceway and an ambient temperature of 30 C°, so it is necessary to use Table 310.15(B)(2)(a) to add a temperature correction. An ambient temperature of 50 C° correlates to a derating factor of 0.82 for the Solar recommended cable type.

Table 310.15(B)(2)(a) Ambient Temperature Correction Factors Based on 30°C (86°F)

For ambient temperatures other than 30°C (86°F), multiply the allowable ampacities specified in the ampacity tables by the appropriate correction factor shown below.				
Ambient Temperature (°C)	Temperature Rating of Conductor			Ambient Temperature (°F)
	60°C	75°C	90°C	
10 or less	1.29	1.20	1.15	50 or less
11–15	1.22	1.15	1.12	51–59
16–20	1.15	1.11	1.08	60–68
21–25	1.08	1.05	1.04	69–77
26–30	1.00	1.00	1.00	78–86
31–35	0.91	0.94	0.96	87–95
36–40	0.82	0.88	0.91	96–104
41–45	0.71	0.82	0.87	105–113
46–50	0.58	0.75	0.82	114–122
51–55	0.41	0.67	0.76	123–131
56–60	—	0.58	0.71	132–140
61–65	—	0.47	0.65	141–149
66–70	—	0.33	0.58	150–158
71–75	—	—	0.50	159–167
76–80	—	—	0.41	168–176
81–85	—	—	0.29	177–185

Figure 1. NEC Temperature Correction

$$\frac{127.2\ Amps}{0.82} = 155.1\ Amps$$

For this example, we assume that 6 conductors are being used in parallel (i.e. that conductors from another system are run together with the start cables), and derating for 6 conductors using Table 310.15(B)(3)(a) leads to:

Table 310.15(B)(3)(a) Adjustment Factors for More Than Three Current-Carrying Conductors

Number of Conductors[1]	Percent of Values in Table 310.15(B)(16) Through Table 310.15(B)(19) as Adjusted for Ambient Temperature if Necessary
4–6	80
7–9	70
10–20	50
21–30	45
31–40	40
41 and above	35

[1]Number of conductors is the total number of conductors in the raceway or cable, including spare conductors. The count shall be adjusted in accordance with 310.15(B)(5) and (6). The count shall not include conductors that are connected to electrical components that cannot be simultaneously energized.

Figure 2. NEC Grouping Derating

$$\frac{155.1\ Amps}{.8} = 193.9\ Amps$$

In this example, the derating factors account for an increased current of 66 amps. Prior to final selection of the conductor size, it is necessary to consider the voltage drop. The following equation is used to calculate voltage drop:

$$D = \frac{11.4}{1.732 \times \frac{\Omega}{d} \times I_{\max}}$$

where:

D = Distance between the VFD and motor, m (ft)

11.4 = Maximum voltage drop (3% of 380 VAC)

1.732 = Decimal representation of the square root of 3

Ω/d = Conductor resistance per m (ft)

Imax = VFD continuous current rating

Independent of voltage drop, the conductor size needs to be 2/0 according to 310.15(B)(16). Most cable manufacturers provide a voltage per amp per distance loss, which simplifies the voltage drop calculation. Solar's preferred cable supplier provides this information, and 2/0 cable has a 0.193 Volts/Amp/1000 ft drop. To determine voltage drop, multiply the continuous amperage rating of the VFD by the voltage drop by the distance divided by 1000.

$$260\ Amps\ \times\ 0.193 \frac{Volts}{Amps * 1000\ ft}\ \times\ 200\ ft$$

This results in a value of 10 volts, which is less than a 3% voltage drop. Hence, the 2/0 AWG conductor is the appropriate selection for this example. If the distance between VFD and motor is increased beyond 227 ft, larger conductors would be needed.

6. Summary

The DAC start system is a proven configuration for Solar gas turbine compressor sets, mechanical-drive packages, and generator sets. Since introduction, it has demonstrated high reliability and low maintenance on Solar's packages across all products.

Despite the simplicity, it requires consideration for the environment, conductor selection, grounding, inter-connections, and the effects the VFD might have on other electrical components. It is important that electrical engineers, familiar with site conditions and requirements, be engaged in the system design, selection of supporting components, and installation requirements, to ensure success. The modern technology of the VFD provides many advantages for the DAC start system, when compared to other gas turbine start systems.

7. Source Data Table References

1. Allen-Bradley. (October 2017). *PowerFlex 750-Series AC Drives: Technical Data*. 750-TD001K.
2. Allen-Bradley. (October 2017). *PowerFlex 750-Series AC Drives: Installation Instructions*. 750-IN001Q.
3. Allen-Bradley. (August 2014). *Parameter Settings for PowerFlex Drives Using Sine Wave Filters, dv/dt Filters, and Adjustable Voltage.* PFLEX-at002B.
4. Allen-Bradley. (September 2017). *Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives*. DRIVES-IN001P.
5. Rockwell Automation, (October 2006), *Straight Talk about PWM AC Drive Harmonic Problems and Solutions*. DRIVES-WP011C.
6. Allen-Bradley, (June 2017), *Industry Installation Guidelines for Pulse Width Modulated (PWM) AC Drives,* DRIVES-AT003B.
7. Allen-Bradley. (August 2017). *PowerFlex Low Voltage Drives Selection Guide.* PFLEX-SG002L.
8. Source Control Drawing 1308818 (revision A)
9. Source Control Drawing 1322844 (revision B)
10. Source Control Drawing 1039135, (revision G)
11. Source Control Drawing 1012991 (revision AR)
12. Source Control Drawing 1558822 (revision N/C)
13. Hydro Composite, CPD 600

8. Appendix

Figures 3 thru 17 depict the maximum power consumption for the start system for each product. Load profiles for each product are approximate. Constant acceleration rates and a four-minute purge at 20% NGP are assumed.

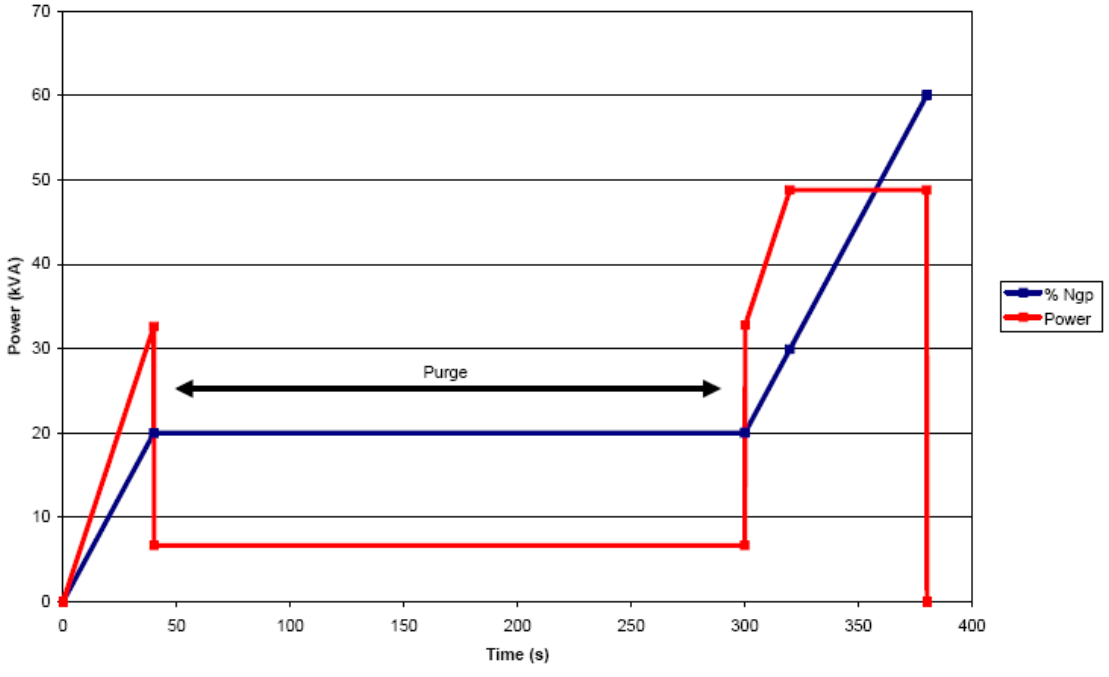


Figure 3. Max Power Consumption of Saturn CS&MD

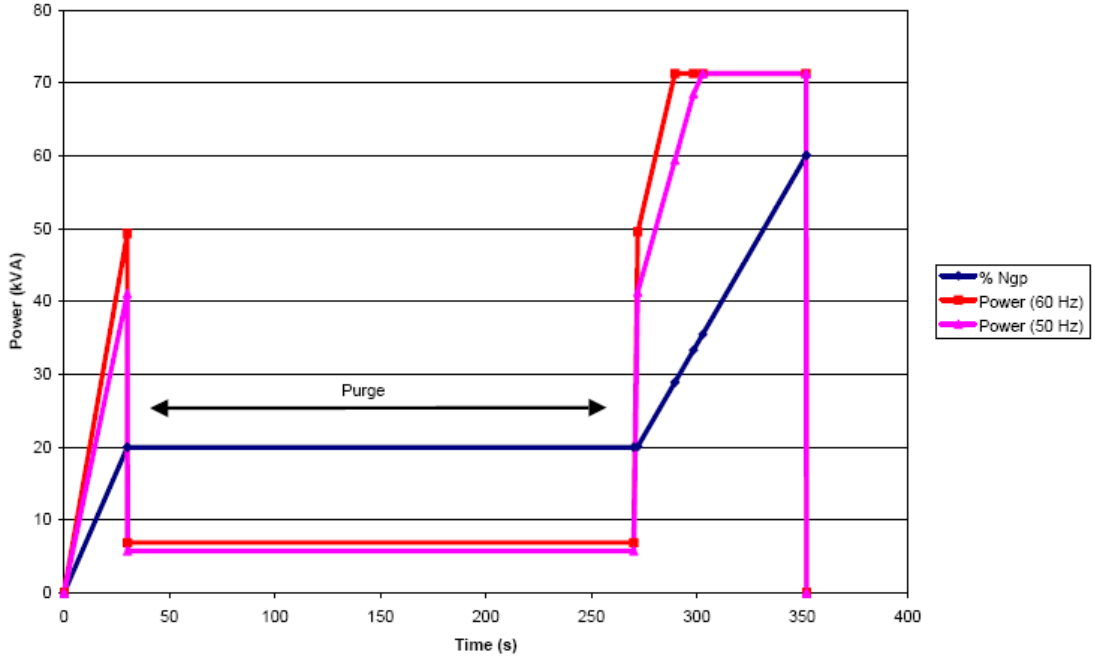


Figure 4. Max Power Consumption of Saturn GS

Note: This curve is different than the others due to the unique starting characteristics of these products

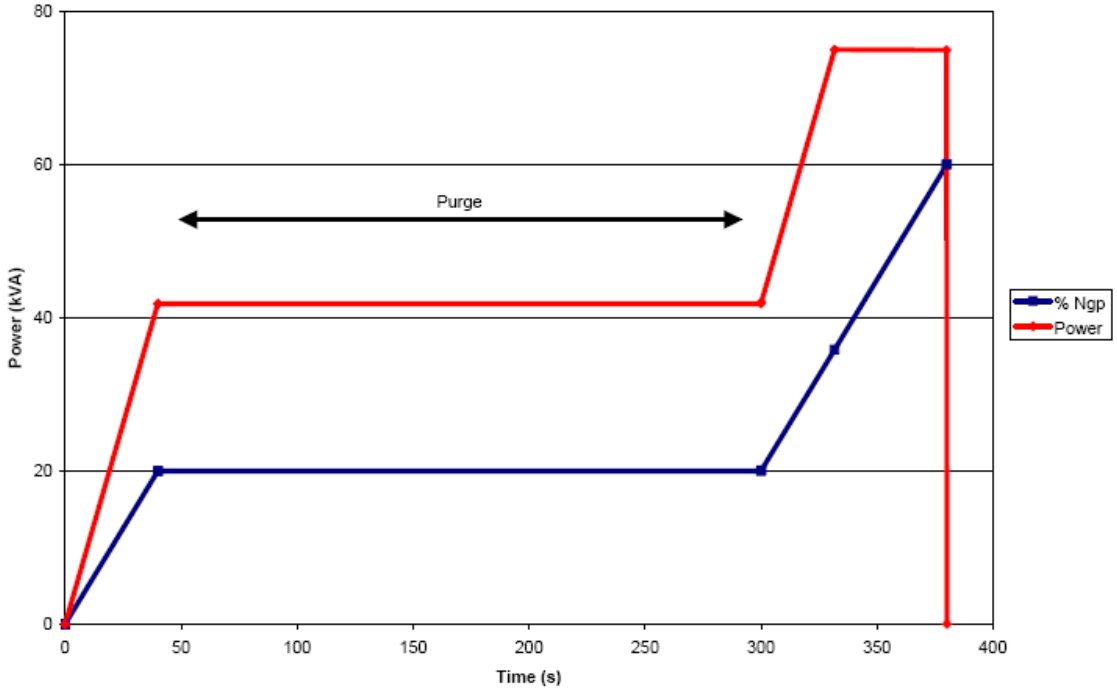


Figure 5. Max Power Consumption of Centaur 40 -Taurus 60 CS&MD

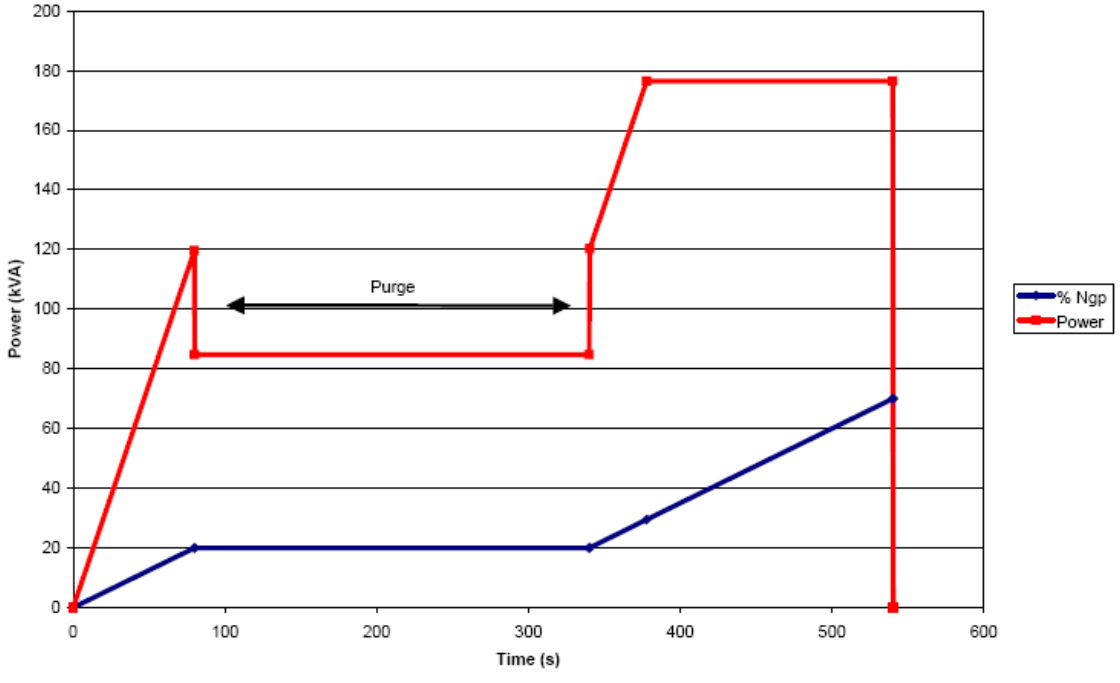


Figure 6. Max Power Consumption of Mercury 50

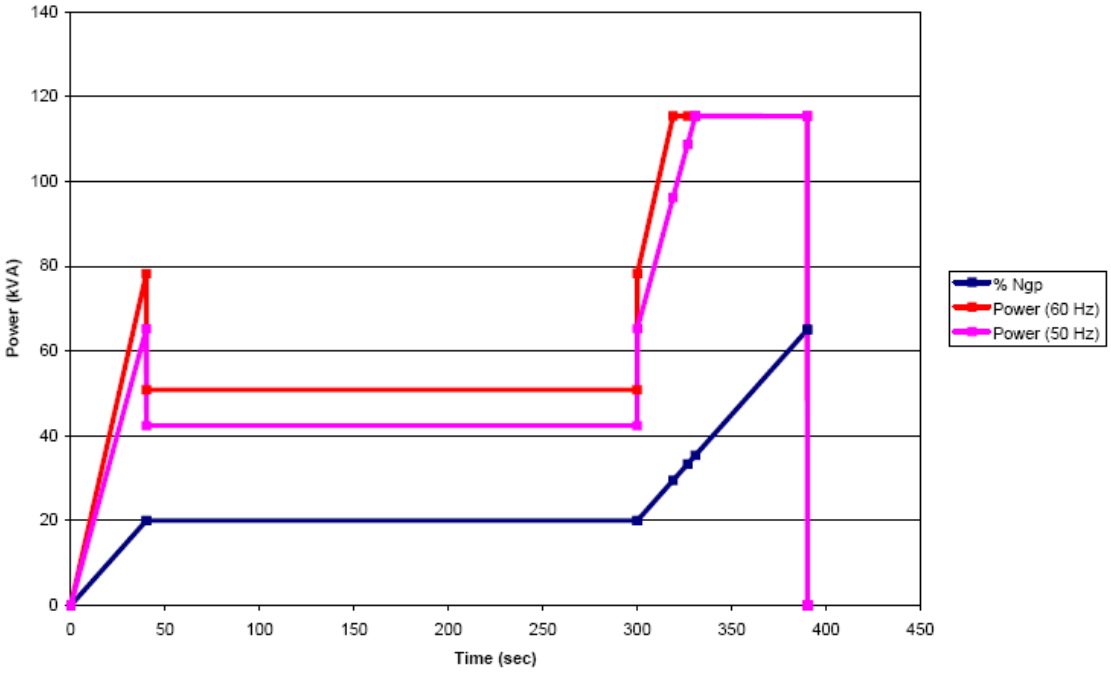


Figure 7. Max Power Consumption of Centaur 40, Centaur 50 GS (Low Torque)

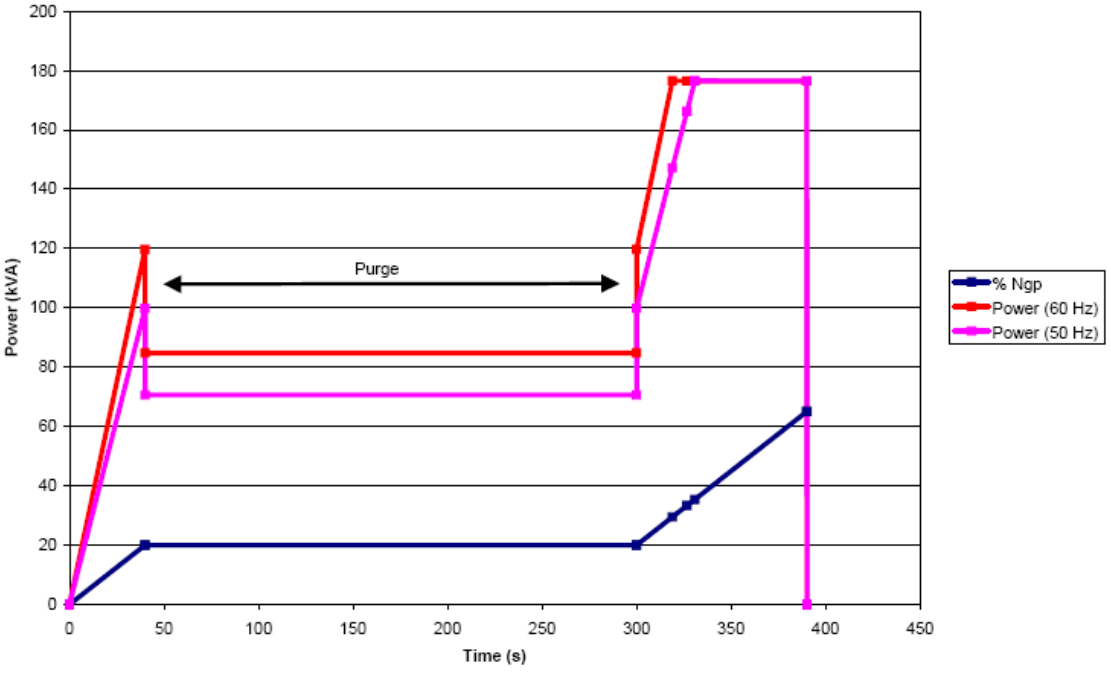


Figure 8. Max Power Consumption of Centaur 40, Centaur 50 GS (High Torque)

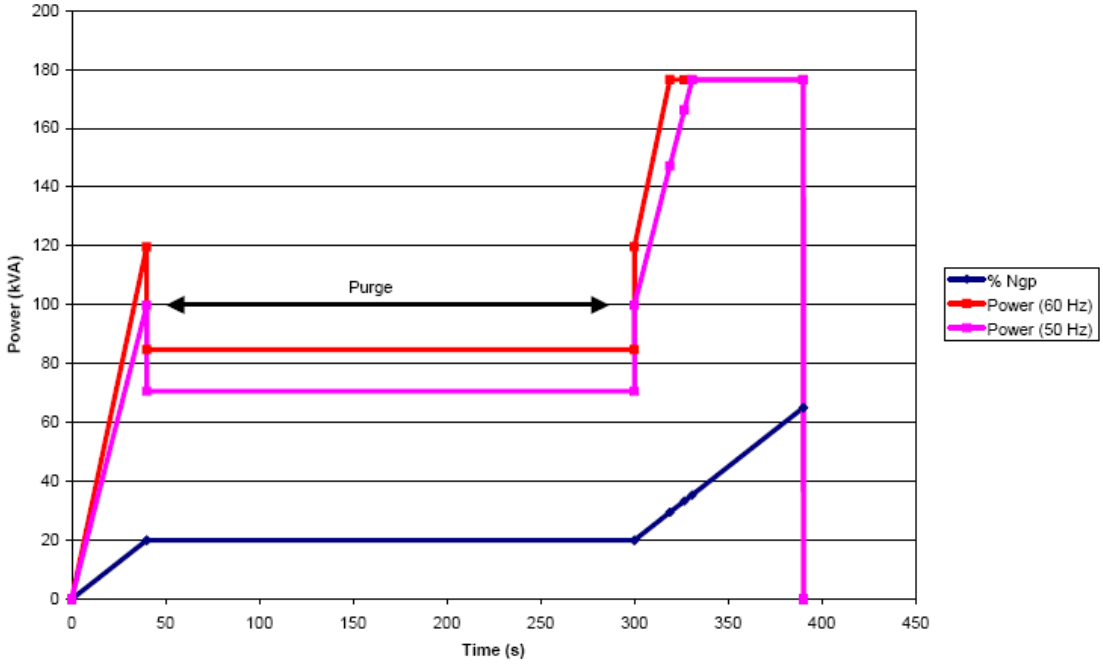


Figure 9. Max Power Consumption of Taurus 60 GS

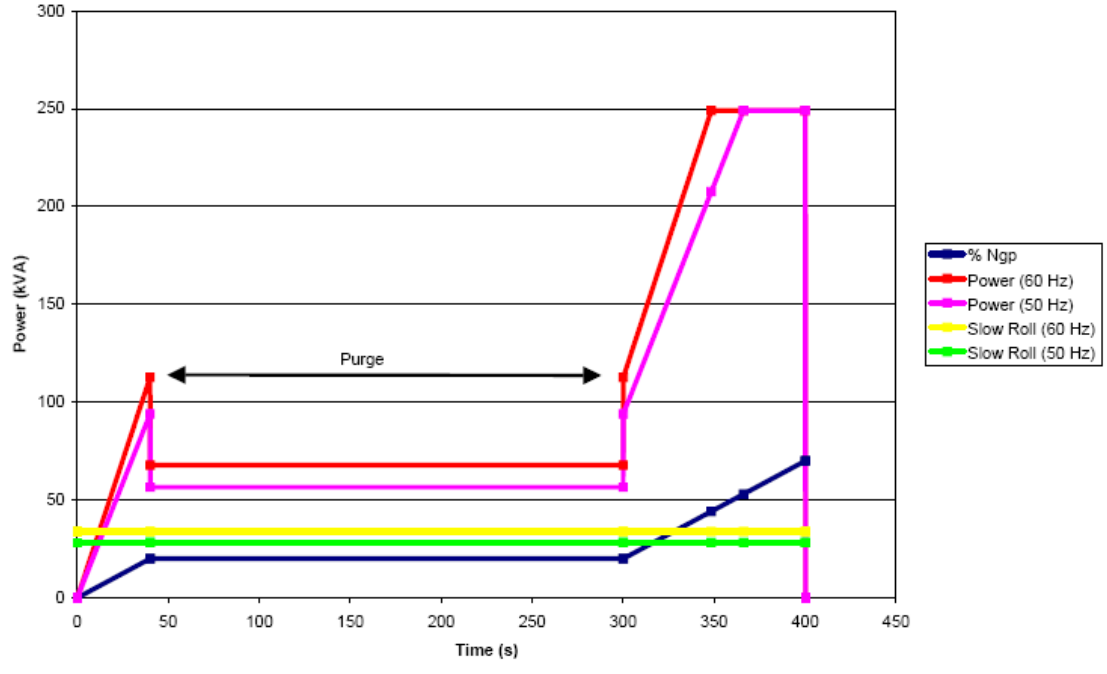


Figure 10. Max Power Consumption of Taurus 65 GS

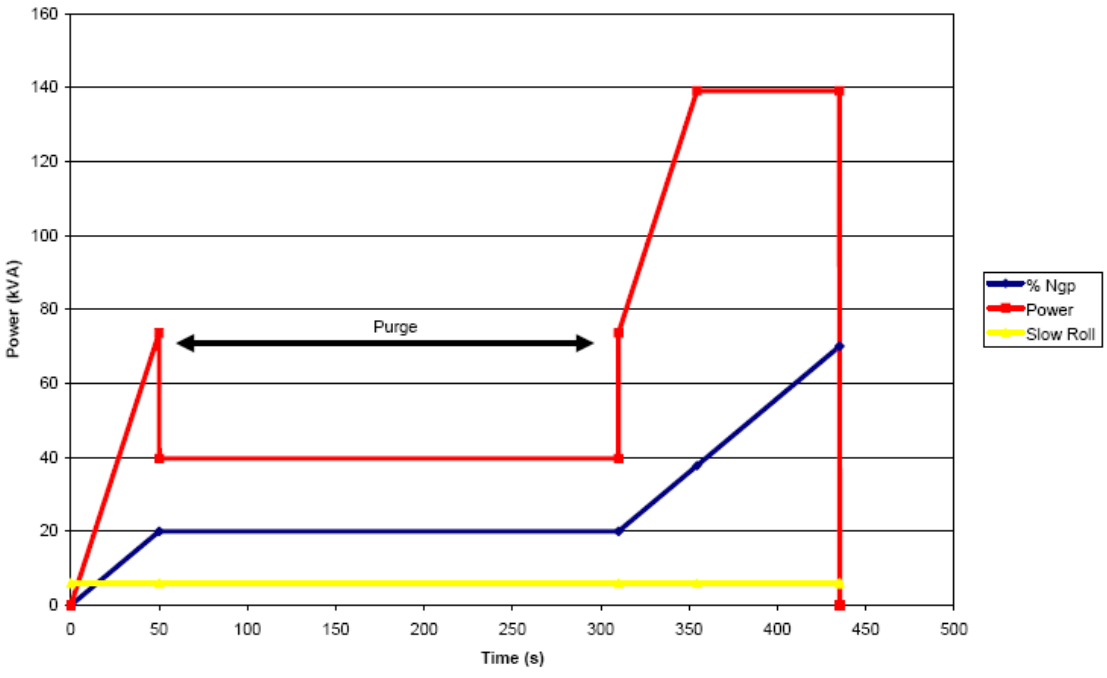


Figure 11. Max Power Consumption of Taurus 70 CS&MD

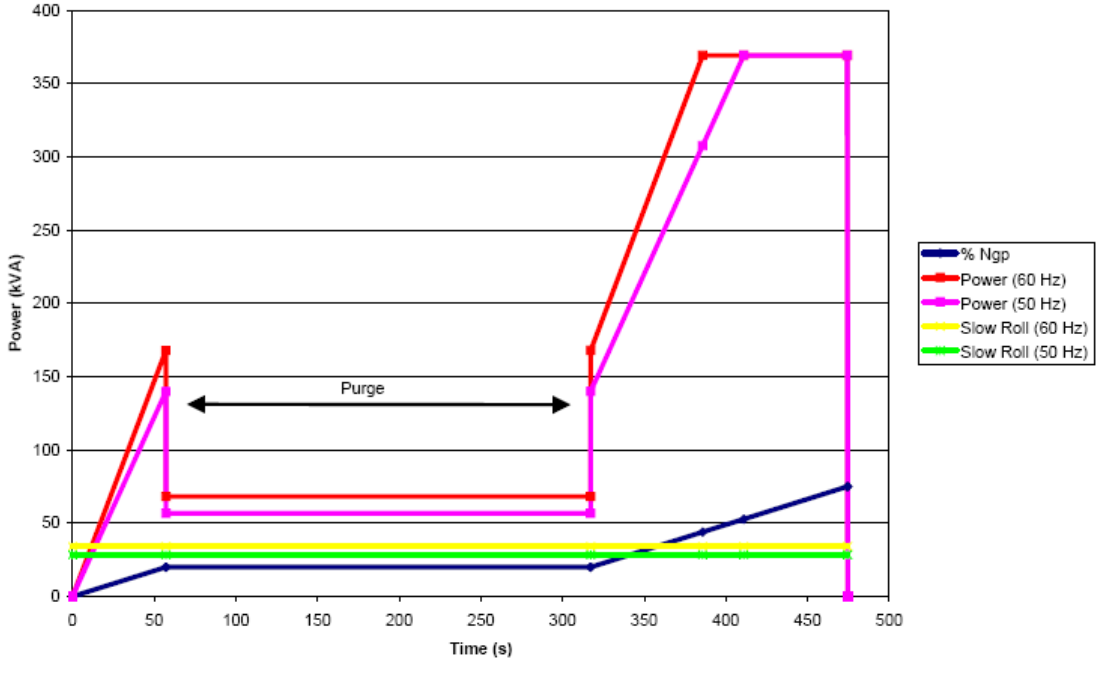


Figure 12. Max Power Consumption of Taurus 70 GS

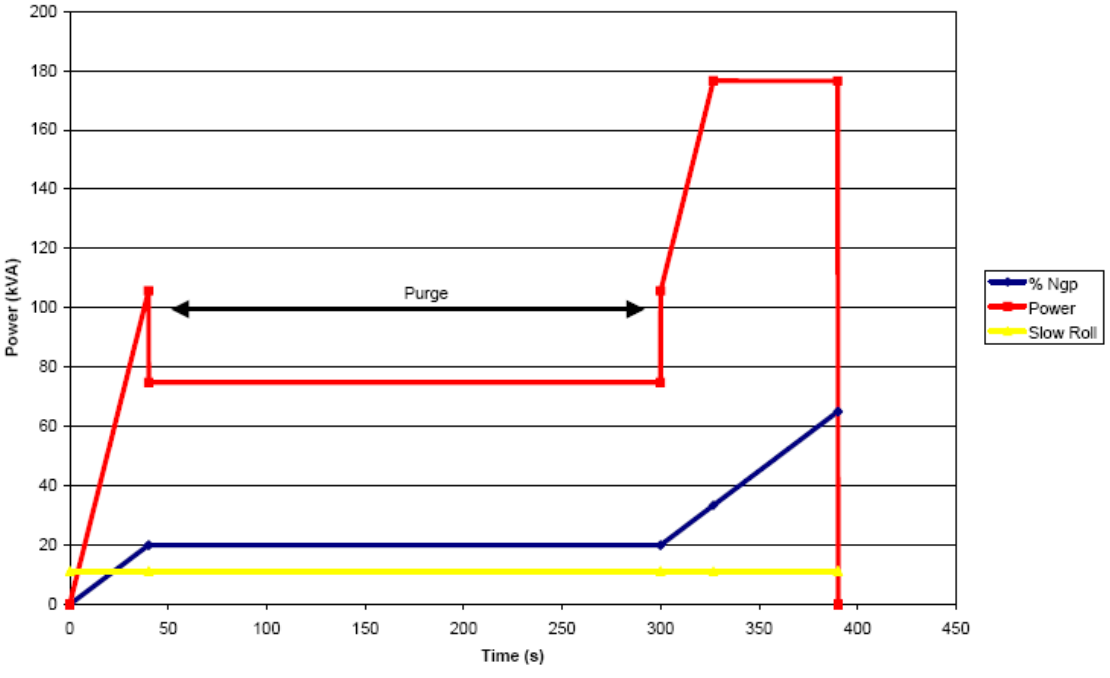


Figure 13. Max Power Consumption of Mars

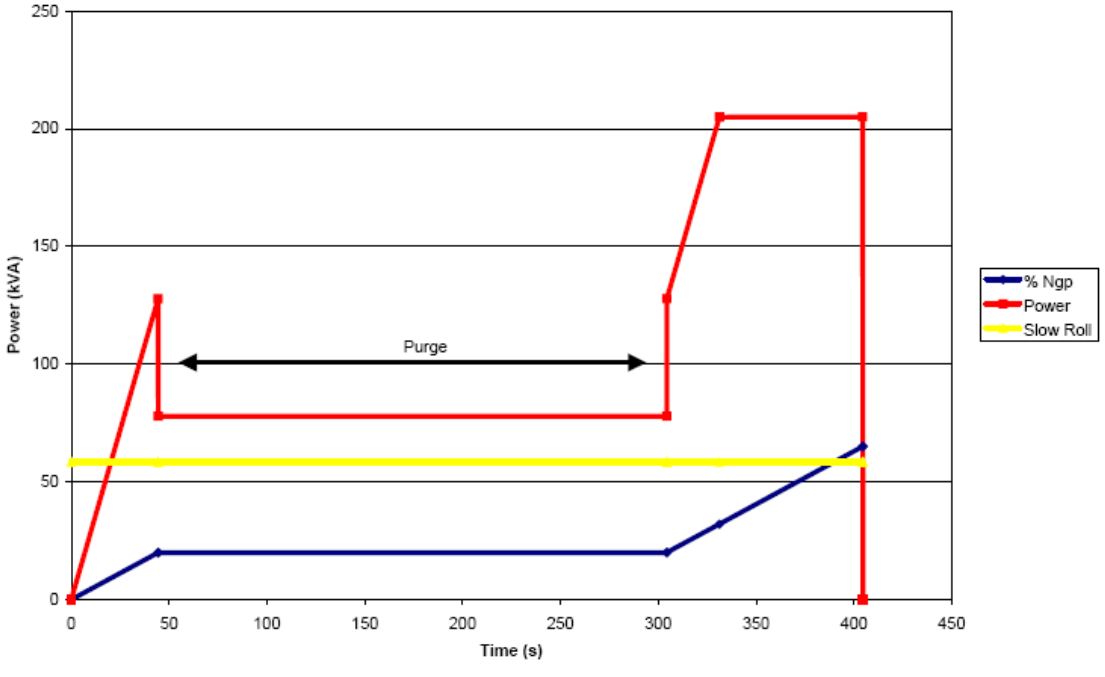


Figure 14. Max Power Consumption of Titan 130 CS&MD

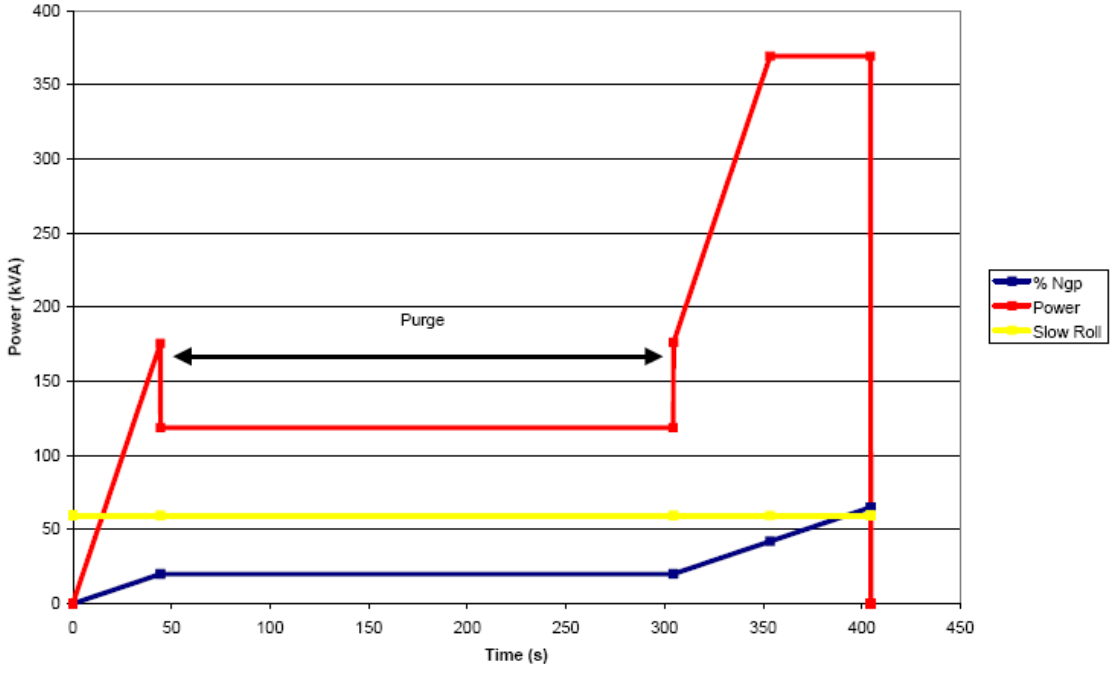


Figure 15. Max Power Consumption of Titan 130 GS 60 Hz

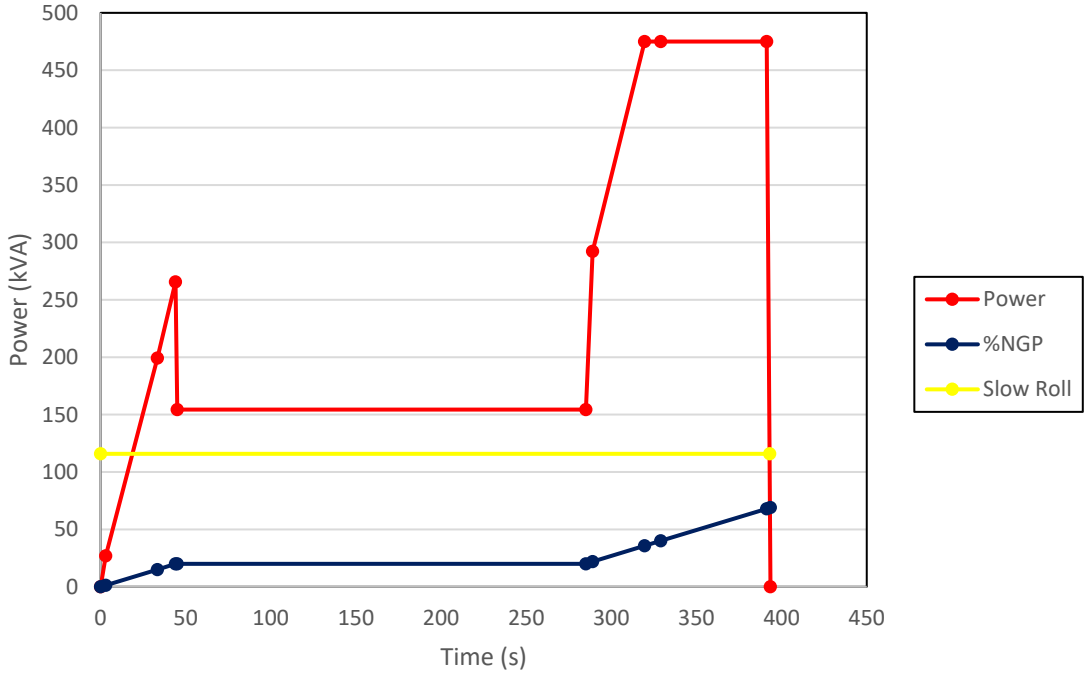


Figure 16. Max Power Consumption of Titan 130E GS 60 Hz

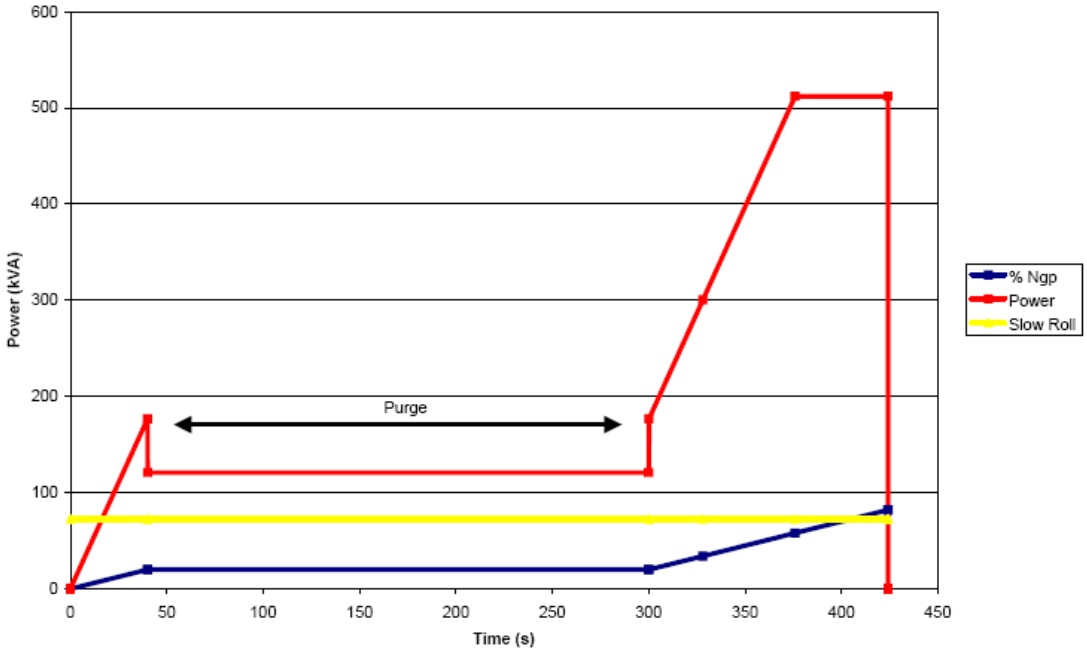


Figure 17. Max Power Consumption of Titan 250

Solar Turbines Incorporated
9330 Sky Park Court
San Diego, CA 92123-5398

Package Lifting Guidelines

Jennifer Eyes & Gino Granda
Solar Turbines Incorporated

INTRODUCTION

The lifting of turbomachinery packages requires extreme caution and the use of suitable lifting equipment. This Product Information Letter provides some general guidelines to assist customers but it is not comprehensive. It is the responsibility of the party performing the package lift to use properly designed equipment and to observe adequate safety precautions.

OVERVIEW

The figures presented in this document depict the typical lifting arrangements used by Solar to lift turbomachinery packages with and without export crates. Other similar lifting arrangements may be used provided they prevent damage to the package enclosure or other package components. The length of the spreader bar/frame should be, at a minimum, as wide as the package being lifted (see Figures 1, 2 and 3).

It is imperative that all of the rigging components used are appropriately sized to handle the weight, configuration, and environment of the package being lifted. Details of the package, including package weight, center of gravity, overall package dimensions, and lifting point sizes and locations, are contained in the corresponding project's Mechanical Interface Drawing.

For single-point lifting arrangements, as shown in Figures 1 and 2, the sling lengths should be selected such that the crane hook is closely aligned with the package's center of gravity. This helps ensure a level lift. Also, to minimize the tension and to keep the lift stable, it is recommended that the lower sling angles for single-point lifts be kept between 60 degrees and 80 degrees from the horizontal as shown in Figure 4.

LIFTING ARRANGEMENT FOR PACKAGES IN EXPORT CRATES

The typical lifting arrangement for the package in an export crate is shown in Figure 1. Export crated packages are designed to be lifted using a basket hitch. Therefore, a sling must be placed under the crate to cradle the package during the lift as shown in the detail. The bottom of the export crate frame is notched, typically 3 ft (0.91 m) from the end of the crate, to help position this sling and prevent it from slipping inward as the package is lifted. Because the sling cradling the crate must be bent to a 90-degree angle, Solar recommends using a synthetic fiber meshed sling. Wire rope slings can be used in a basket hitch configuration, but only one set of wire ropes per export crate can be used due to the permanent kinking of the wire rope around the base of the crate. This is unlike the synthetic slings, which will have one set for all export crate lifts.

LIFTING ARRANGEMENT FOR PACKAGES WITHOUT EXPORT CRATES

Figure 2 depicts a typical lifting arrangement used to lift the majority of Solar's packages when they are not in an export crate. If crane capacity is limited at the lifting site, splitting the package at the skid interface, removing a major component, or using two cranes may be required to lift the package. These types of lifting arrangements are considered non-standard and should be reviewed by engineering before they are performed. An example of a two-point lifting arrangement is shown in Figure 3. Note that the arrangement depicted in Figures 3 is for a package frame equipped with bollards. For a package frames equipped with gussets, the use of a two-point lift should be reviewed by Solar's Mechanical Analysis Group prior to implementation.

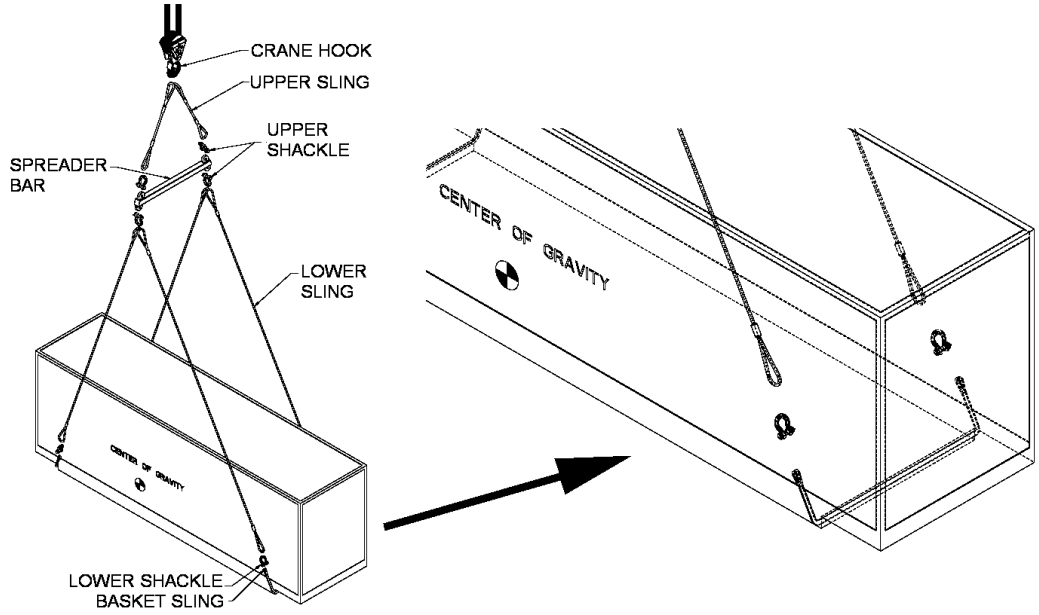


Figure 1. Typical Lifting Arrangement for Package in Export Crate with Details of Sling in Basket Hitch Arrangement

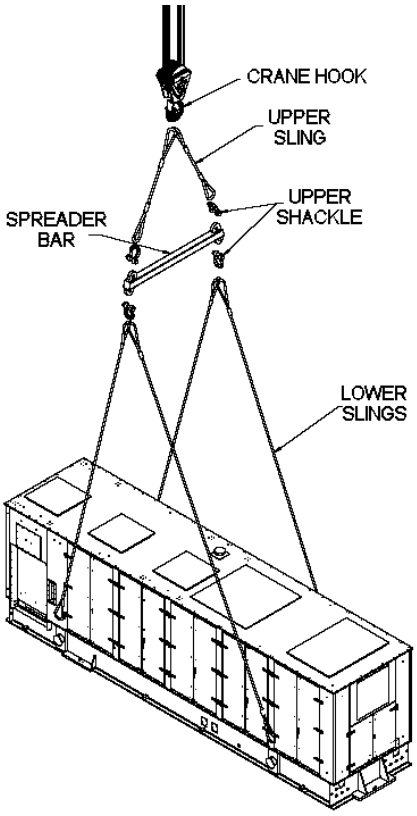


Figure 2. Typical Single-Point Lift

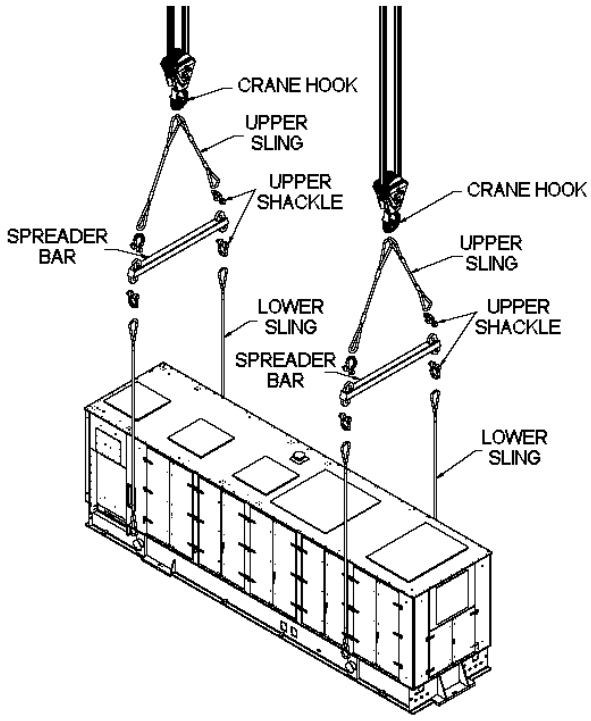


Figure 3. Two-Point Lift

LIFT POINTS

Each package frame is equipped with either bollards or gussets that are used to lift the package (see Figure 4, left and right).

- When lifting a package with bollards, the eye of the sling needs to be large enough to fit over the end cap of the bollard. The eye of the sling should make full contact with the underside of the bollard, fitting properly between the bollard end cap and the package frame.
- When lifting a package with gussets, an appropriately sized shackle fits through the sling eye and attaches to the lifting lug. These components should be sized so that the diameter of the attaching sling is less than or equal to the bow diameter of the shackle. If a binding condition on the shackle is present, the shackle capacity must be de-rated appropriately based on the binding angle.

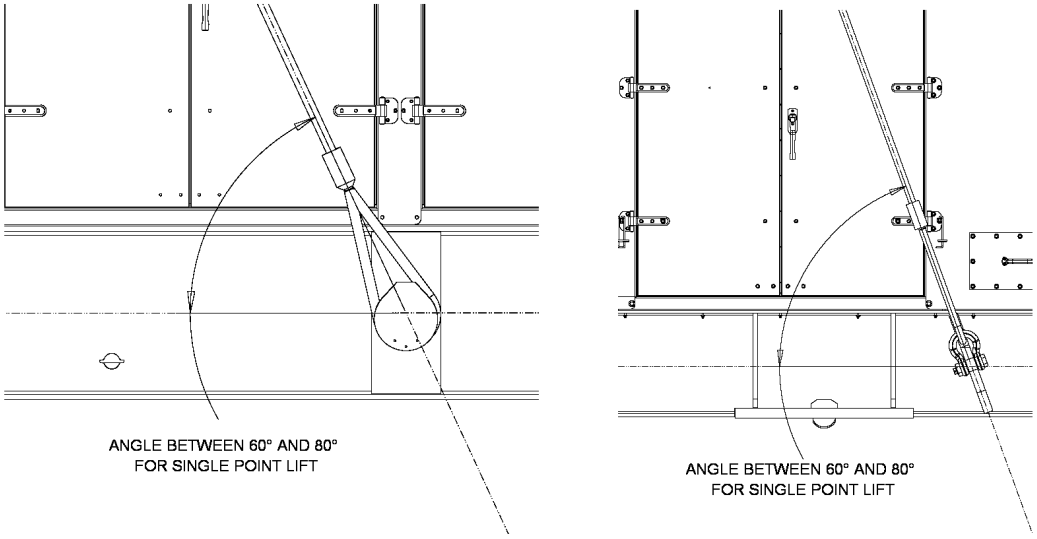


Figure 4. Lift Details for Package with Bollards (left) and with Gussets (right)

SOLAR'S LIFTING KIT OPTIONS

Solar offers certified package lifting kits that can be included as part of the overall turbomachinery purchase. These kits are designed in accordance with Solar's engineering specification ES2335 and are matched to the requirements of the specific package. Standard kits are designed to lift a package with or without the package's export crating using a single-point lifting arrangement. The kit consists of a spreader bar, slings, and associated lifting hardware. Also included is a detailed drawing of the lifting arrangement. Package lift kit calculations can be provided upon request. Contact Solar for more details on guidelines and for any special requirements that may be needed.

Solar Turbines Incorporated
9330 Sky Park Court
San Diego, CA 92123-5398

Dynamix Vibration Monitoring System

Laurent Hayward
Solar Turbines Incorporated

PURPOSE

The Rockwell Automation Dynamix 1444 vibration monitoring system has been integrated with the *Turbotronic*™ control system and is now standard for all turbomachinery products (replacing the Rockwell XM vibration system). The Bently Nevada 3500 system continues to be a supported custom feature.

DISCUSSION

The primary purpose of the turbine vibration monitoring system is to protect the equipment from damage due to excessive vibration levels. The system may also provide information that can be used to evaluate vibration problems and enable the user to trace the root cause before equipment availability is affected. Previous vibration systems provided only overall vibration levels suitable for machinery protection. In addition to overall vibration monitoring, the Dynamix system provides filtered amplitudes (1x, 2x, Not 1x) and phase angles (1x, 2x) and eight user-configurable frequency bands. It also offers on-demand time-waveform and spectral data, as well as event-based transient data; the system will capture a log file of each turbine start, and after any turbine vibration shutdown.

BENEFITS

The primary advantage of the Dynamix vibration system results from the seamless integration with Solar's existing EtherNet/IP-based control system. By integrating the vibration system, the diagnostic information is readily obtained through the existing network configuration and allows for complete condition monitoring of the turbine using pre-configured features on the Human Machine Interface (HMI) computer. Table 1 below highlights the significant additional features of the Dynamix system compared to the Bently Nevada vibration system.

Table 1. Available HMI Data

Feature	Bently Nevada 3500	Dynamix 1444
Overall Vibration Amplitude	√	√
Gap Voltage	√	√
Shaft Speed	Not Available	√
Eight Configurable Discrete Bands (1)	Not Available	√
Discrete Amplitude (1x, 2x, Not 1x) (2)	Not Available	√
Discrete Phase Angle (1x, 2x) (2)	Not Available	√
Spectrum Plot	Not Available	√
Time-Waveform Plot	Not Available	√

Feature	Bently Nevada 3500	Dynamix 1444
Orbit Plot	Not Available	√
1x Polar Plot	Not Available	√
Shaft Centerline Plot	Not Available	√
Cascade Plot	Not Available	√
Waterfall Plot	Not Available	√
Transient Data Gathering	Not Available	√
Event-based Data Gathering	Not Available	√
Integrated Combustor Monitoring	Not Available	√ (3)
Historical Logging	√ (4)	√

(1) Bands are configured to report the maximum vibration amplitude within the band, and the corresponding frequency of that maximum amplitude

(2) Refers to multiples of engine running speed, also referred to as engine orders (EO)

(3) The Dynamix system is used for combustor monitoring on all *SoLoNOx*™ products, irrespective of the configured vibration system

(4) Logging available for overall amplitude and gap voltage only

FEATURES

On each turbomachinery package, the Dynamix system is configured in one or more groups based on the equipment to be monitored. Each group consists of up to five 4-channel dynamic measurement modules paired with one 2-channel tachometer signal conditioner expansion module. Each module type consists of a terminal base and a module, similar to Solar's existing Flex I/O distributed control system (see Figures 1 & 2).

The dynamic measurement modules are configurable to accept non-contact eddy current (proximity) probes, velocity transducers, a standard, integrated electronics piezoelectric (IEPE) accelerometer, dynamic pressure or simple voltage signals. The tachometer converts input signals from common speed sensing transducers into a once-per-revolution TTL-class signal that is provided to each dynamic measurement module through a local bus connection between terminal bases for a given group.

TURBOMACHINERY HARDWARE

To take advantage of all the available features of the Dynamix system, it is important that the system configuration be as complete as possible. All bearings configured for eddy-current sensors in the orthogonal X and Y axes should have both sensors connected to the Dynamix system. Additionally, all shafts on the drivetrain that include at least one X/Y sensor pair should have a speed reference (tachometer sensor) installed. Certain configurations of Solar Turbines equipment have previously shipped with one or more sensors disconnected (or not installed). When upgrading the control system to include the Dynamix 1444 condition monitoring system, it

is highly encouraged to install any missing sensors and associated components/wiring. This enables all the applicable features in Table 1 to be realized for that configuration.

Figure 1. Terminal Base Unit (Left) and Dynamix Module with Base (Right)

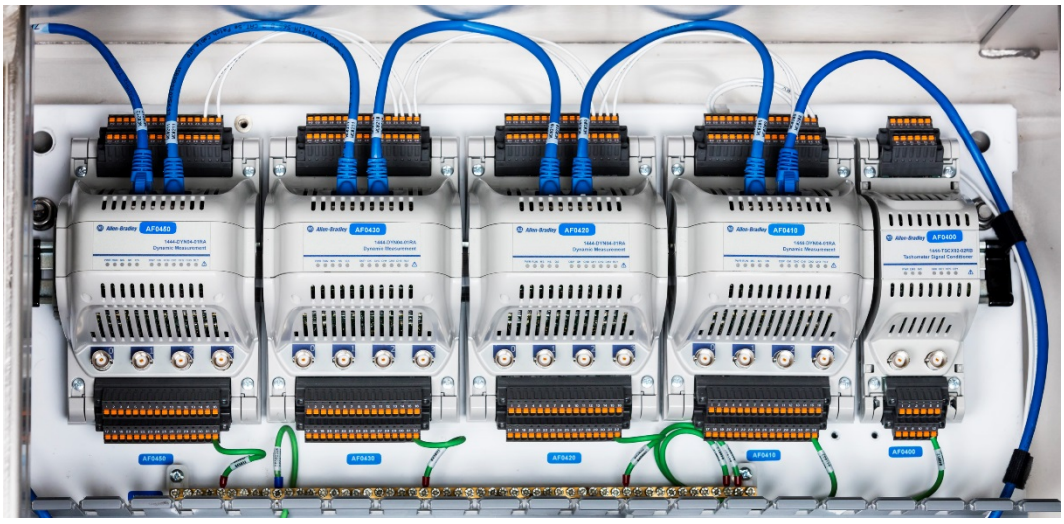


Figure 2. Four Fully Assembled Dynamix Modules with One Tachometer Module

DISPLAY

The HMI display allows the user to examine amplitude and phase information (both overall and filtered), as well as time-waveform and spectral data in a variety of formats detailed in Table 1. With this information, detailed analysis can help diagnose the root cause of vibration problems, increasing equipment availability and service life.

The standard HMI vibration summary screen (Figure 3) is common to all vibration systems (offering only overall amplitude and gap voltage). Packages equipped with the Dynamix system include buttons below each bar graph to access detailed information for each channel.

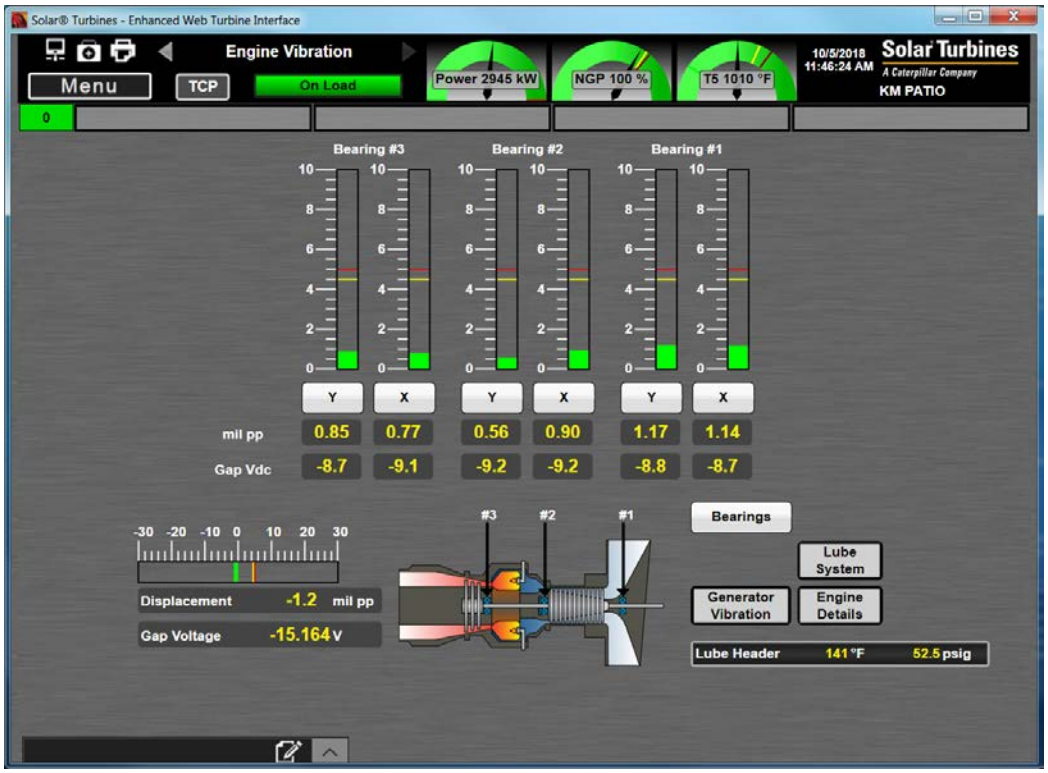


Figure 3. Engine Vibration Summary Screen

The channel summary screen (Figure 4) provides detailed data for each channel as described in Table 1.

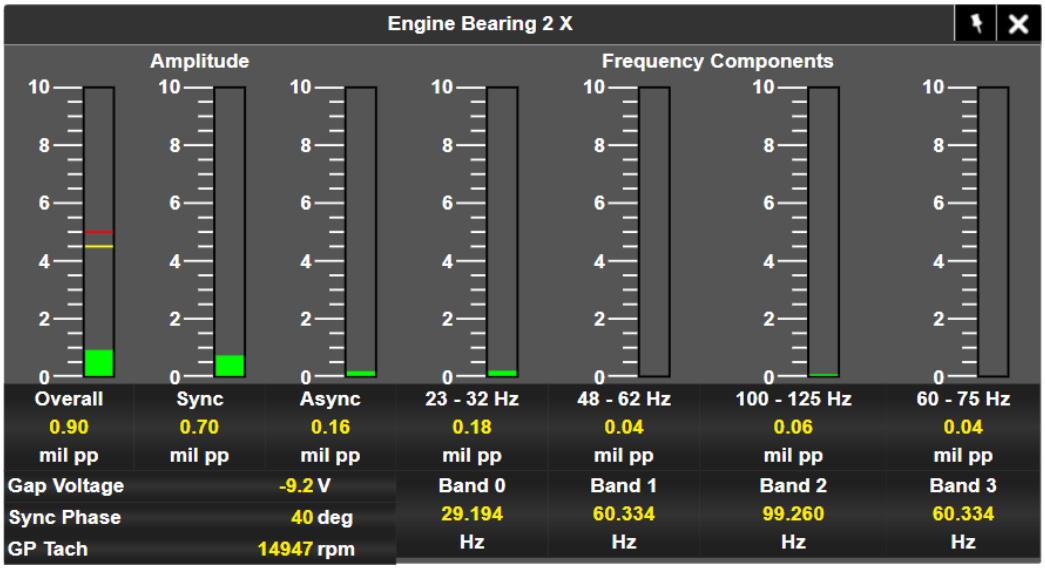


Figure 4. Engine Vibration Single Channel Detailed Screen

By navigating to the “Advanced Vibration” screen (available only with the Dynamix system), the user can access all plotting features and view all vibration logs. The supported live plots include the spectrum and time-waveform plots for all channels, and orbit plots for paired radial channels (driver, gearbox and driven equipment bearings). Logged plots include periodic daily snapshots (spectrum, orbit and time-waveforms captured every 6 hours) and transient data (Shaft Centerline, 1x Polar, Bode, Cascade and Waterfall) for all configured channels. Transient data are logged for each turbine start, alarm data are logged following high vibration shutdowns.

Figure 5 shows the live plot selection screen with the 3 different plot types shown:

1. The Spectrum plot (Figure 5, top left and right) displays the individual amplitudes at each frequency for a single channel. The top right plot also shows the “tool tip” feature, displayed when placing the cursor over a plot data point.
2. The Orbit plot (Figure 5, bottom right) shows the proximity probes’ displacement which indicates the movement of the shaft centerline with respect to the center of the bearing. It is an unfiltered orbit, showing the direct motion of the shaft.
3. The Time-Waveform plot (Figure 5, bottom left) shows an X-Y plot of signal amplitude versus time.

Individual plots within the 4-plot window may be expanded (Figure 6) by clicking the “Open Pop-Up” icon on the upper right of the plot. Expanded spectrum plots include a “peaks list” – a list of the ten highest amplitude peaks, the corresponding frequency and for synchronous channels, the order value.

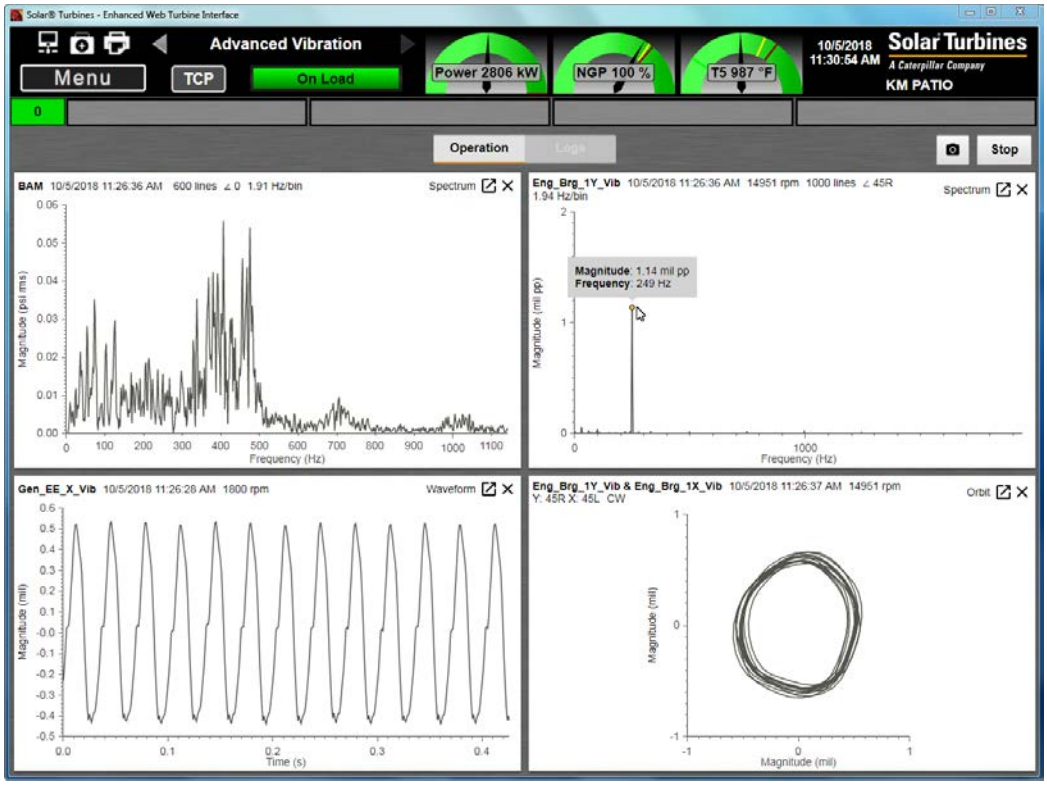


Figure 5. Advanced Vibration Screen

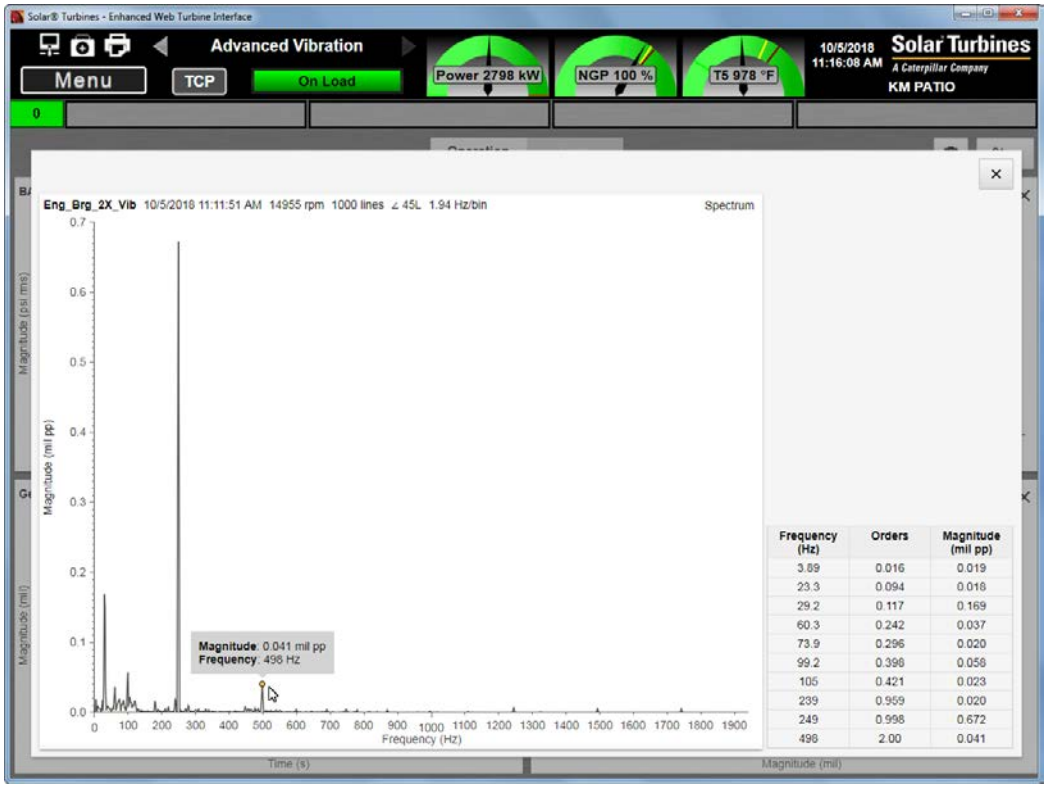


Figure 6. Single Spectrum with Peaks List

By navigating to the log selection screen, the user can select and view periodic or transient logs, offering additional data for machinery diagnostics. Up to twelve periodic plots may be selected, and paging through groups of four is accomplished using the buttons on the upper right of the screen.

The transient log view is similar, offering additional plot types but only displaying one at a time. The user can view the following plot types with a transient log (depend on channel configuration):

1. The Bode plot (Figure 7) displays two separate plots of phase angle versus speed, and a combined plot of overall and 1x amplitude versus speed.
2. The Cascade plot (Figure 8) shows individual spectrums displayed over a change in speed.
3. The 1x Polar plot (Figure 9) shows synchronous phase angle and amplitude in polar coordinates.
4. The Shaft Centerline plot (Figure 10) shows the gap voltage for paired radial sensors, plotted to show the movement of the shaft relative to its zero-speed location.
5. The Waterfall plot (Figure 11) shows individual spectrums displayed over a change in time.

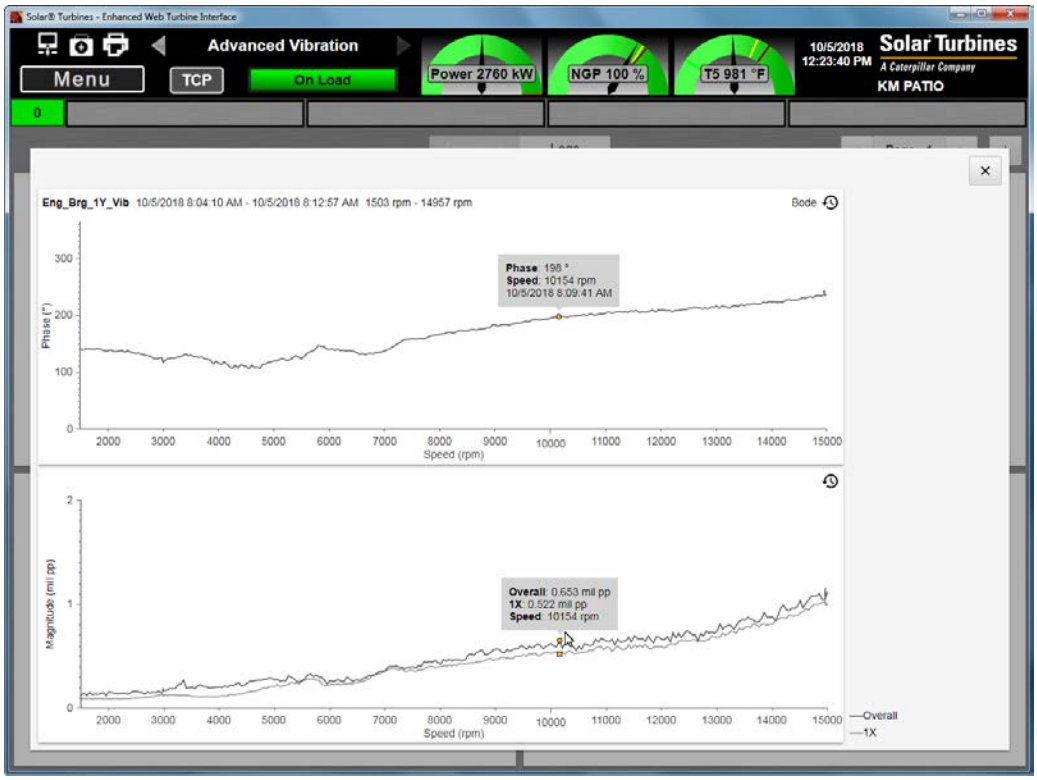


Figure 7. Bode Plot

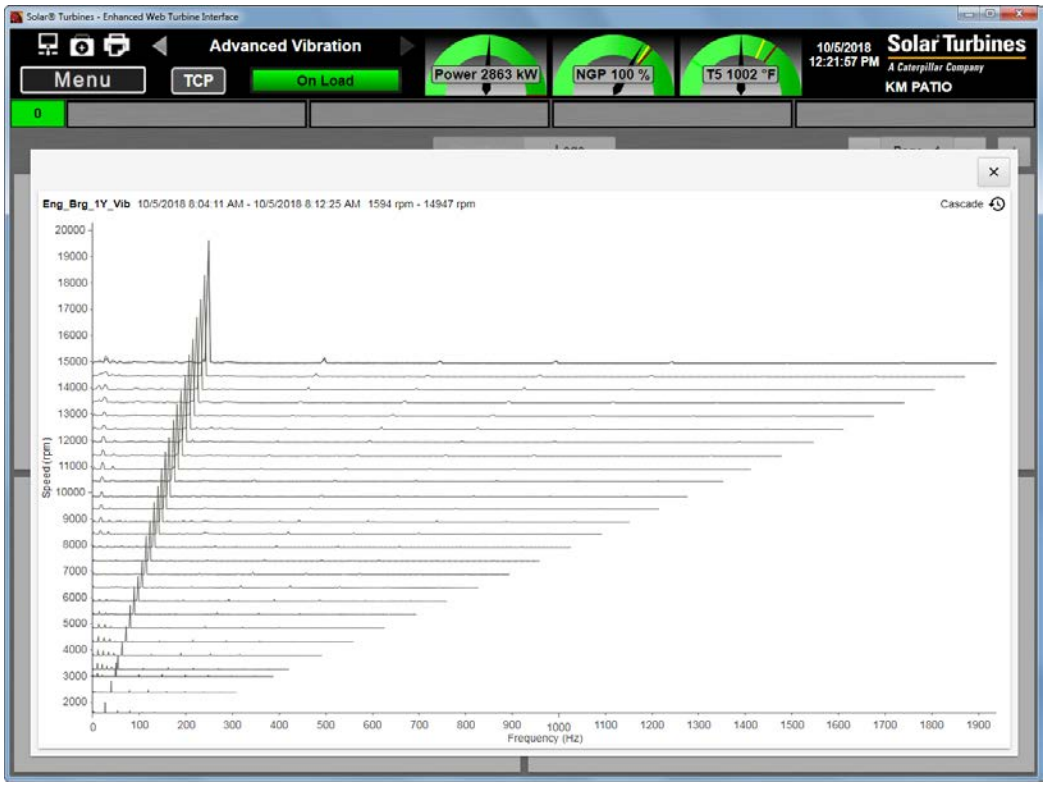


Figure 8. Cascade Plot

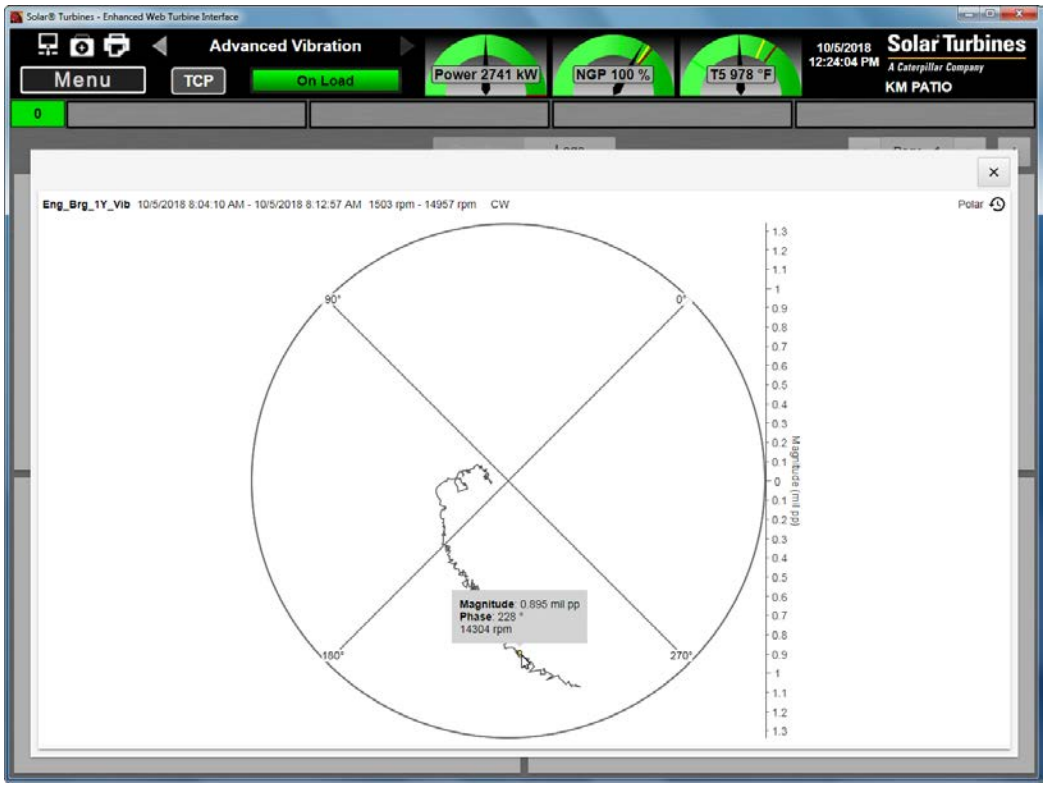


Figure 9. 1x Polar Plot

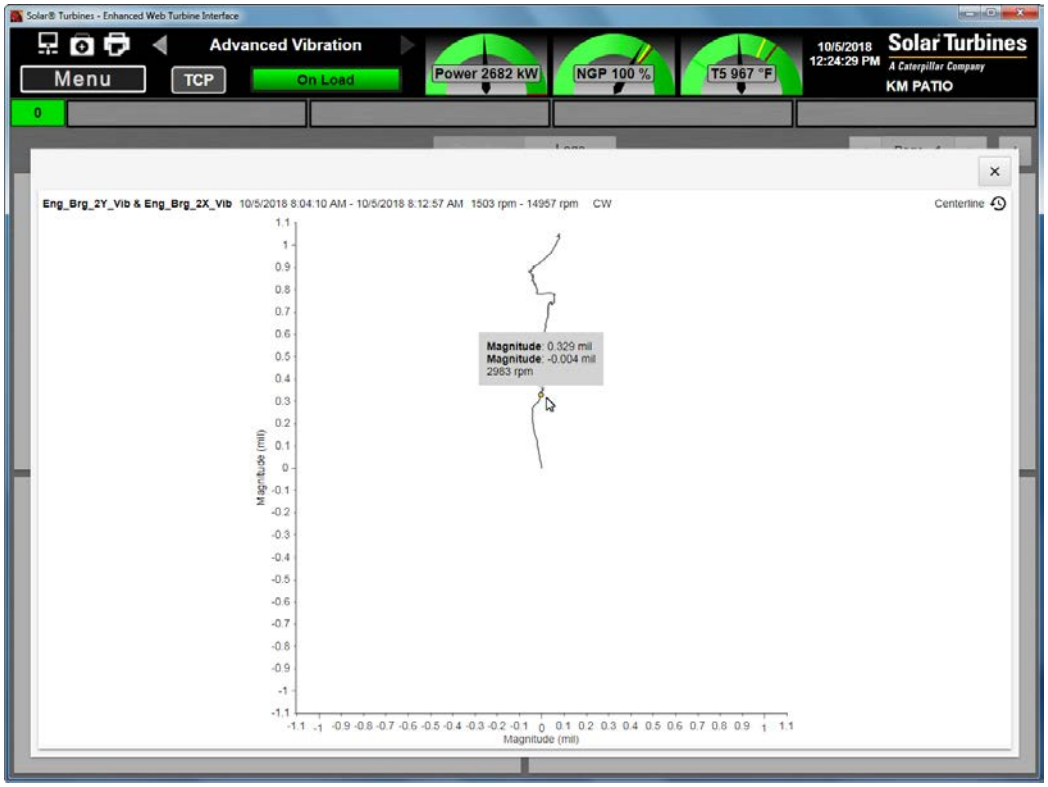


Figure 10. Shaft Centerline Plot

Figure 11. Waterfall Plot

Solar Turbines Incorporated
9330 Sky Park Court
San Diego, CA 92123-5398

LEGENDS:

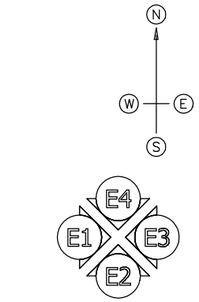
- OUTDOOR LIGHT
- PHOTOCELL
- OUTDOOR RECEPTACLE
- EMERGENCY EXIT LIGHT
- LIGHT SWITCH
- INDOOR RECEPTACLE
- FIRE EXTINGUISHER
- SMOKE DETECTOR
- HEAT DETECTOR
- MANUAL PULL STATION
- OUTDOOR HORN/STROBE
- INDOOR STROBE
- H.O.A SWITCH
- EMERGENCY STOP BUTTON
- HYDROGEN DETECTOR

EQUIPMENT LIST

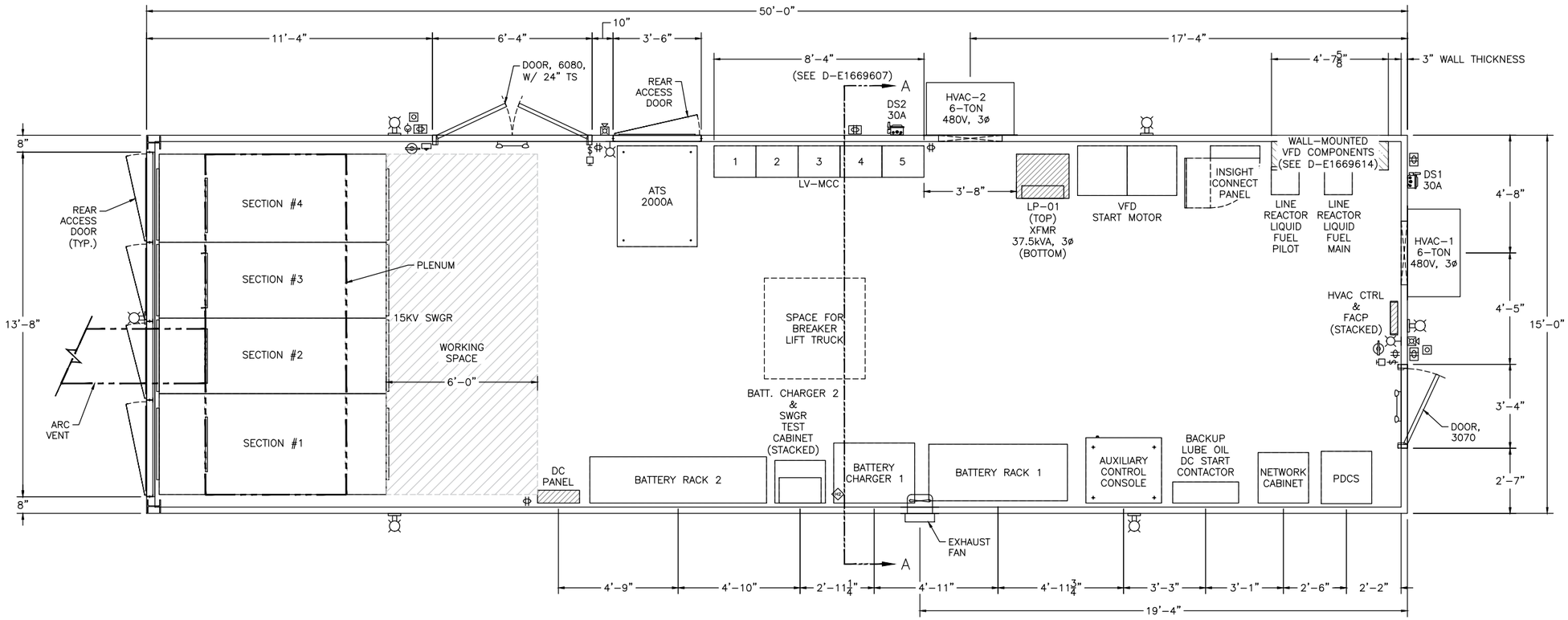
NO.	DESCRIPTION	DIMENSION (W x D x H)	NAME TAG	SUPPLIER	P/N
1	15kV SWITCHGEAR	162" x 108" x 129.25"	WPCCTG-7-EMV60-SG-201	TRC	
2	AUTOMATIC TRANSFER SWITCH	38" x 48" x 91"	WPCCTG-7-ELV60-ATS-401	TRC	
3	LV-MCC	100" x 15" x 92.5"	WPCCTG-7-ELV60-MCC-401	TRC	
4	PDCS	23.6" x 25" x 36"	WPCCTG-7-PDCS-CAB-01	TRC	
5	BATTERY CHARGER 2	24" x 20.15" x 39.07"	WPCCTG-7-EDC-BC-02	TRC	
6	BATTERY RACK 2	84" x 22" x 51.13"		TRC	UC2L2T084AP
7	VFD START MOTOR	47.25" x 23.62" x 96.88"	WPCCTG-7-DAC-M-01-VFD	SOLAR TURBINES	1322844-1600
8	PILOT LIQUID FUEL MOTOR VFD	8.75" x 8.75" x 22.25"	WPCCTG-7-LF-P-01-VFD	SOLAR TURBINES	1308818-1100
9	LIQUID FUEL MOTOR VFD	12.125" x 14" x 37.125"	WPCCTG-7-LF-F-01-VFD	SOLAR TURBINES	1308818-1500
10	RIDE THRU. UNIT	15.75" x 14" x 30.5"		SOLAR TURBINES	1109521-100
11	WATER PURGE MOTOR VFD	5.5" x 8.5" x 19.5"	WPCCTG-7-DI-P-01-VFD	SOLAR TURBINES	1308818-300
12	LINE REACTOR, WATER PURGE VFD	8.125" x 6" x 8"		SOLAR TURBINES	1039135-11
13	DYNAMIC BRAKE RESISTOR, LIQUID FUEL MOTOR	21" x 13" x 9"		SOLAR TURBINES	1085042-6
14	LINE REACTOR, PILOT LIQUID FUEL VFD	13.25" x 13" x 13.5"		SOLAR TURBINES	1039135-4
15	LINE REACTOR, LIQUID FUEL MAIN VFD	13.25" x 13" x 13.5"		SOLAR TURBINES	1039135-5
16	BATTERY CHARGER 1	38.5" x 28.5" x 47.5"	WPCCTG-7-EDC-BC-01	SOLAR TURBINES	1088225-300

EQUIPMENT LIST (CONT.)

NO.	DESCRIPTION	DIMENSION (W x D x H)	NAME TAG	SUPPLIER	P/N
17	BATTERY RACK 1	65.75" x 27.125" x 68.25"		SOLAR TURBINES	2429431-500
18	BACKUP LUBE OIL DC START CONTACTOR	31.325" x 11" x 36"	WPCCTG-7-LO-DCP-01-CONT	SOLAR TURBINES	190377-806
19	AUXILIARY CONTROL CONSOLE	36" x 31" x 90"	WPCCTG-7-TCS-ACC-01	SOLAR TURBINES	1006914-103
19	NETWORK CABINET	24" x 24" x 48"	WPCCTG-7-NET-CAB-01	JACOBS	
20	INSIGHT CONNECT PANEL	24.6" x 18.2" x 18"		SOLAR TURBINES	322NDA
21	TRANSFORMER, 37.5KVA, 1ø	22.3" x 23.8" x 26.7"	WPCCTG-7-ELP60-XFMR-401	SCT	
22	LIGHTING PANEL, 120-240VAC	20" x 6" x 48"	WPCCTG-7-ELP60-PP-401	SCT	
23	DC PANEL, 125VDC	20" x 6" x 48"	WPCCTG-7-EDC-PP-01	SCT	
24	HVAC-1, 6-TON, 480V, 3ø	41.75" x 25.13" x 93"	WPCCTG-7-HV-HVAC-01	SCT	MGA1072AD090N
25	HVAC-2, 6-TON, 480V, 3ø	41.75" x 25.13" x 93"	WPCCTG-7-HV-HVAC-02	SCT	MGA1072AD090N
26	HVAC DISCONNECT SWITCH	8" x 10" x 16"		SCT	DH361URK



ELEVATION KEY



DENOTES EQUIPMENT TO BE SUPPLIED BY SCT

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

COXA1 — 07/10/2023

JACOBS — Date

NOTES:

1. THE APPLICATION FOR THE BUILDING: GENERAL PURPOSE (INSIDE AND OUTSIDE).
2. REFER TO BUILDING GENERAL SPECIFICATIONS FOR OTHER DETAILS.
3. FIRE EXTINGUISHER ARE INSTALLED PER NFPA 10, DRY TYPE ABC, 10 LBS.
4. EXTERIOR RECEPTACLE TO BE WEATHERPROOF AND HAVE A COVER THAT REMAINS CLOSED WHEN CORDS ARE ATTACHED. THE COVER MUST BE LABELED FOR EXTRA-DUTY.

ESTIMATE WEIGHT

BUILDING	54,500 LBS
CUSTOMER EQUIPMENT	28,500 LBS
MISC. EQUIPMENT	2,000 LBS
OTHERS	2,500 LBS
TOTAL	87,500 LBS

REVISIONS

LEVEL	DESCRIPTION	DATE	BY
0	FIRST ISSUE	10/25/22	TD
1	ISSUED FOR CONSTRUCTION	03/02/23	NN
2	ISSUED FOR CONSTRUCTION	04/21/23	NN
3	ISSUED FOR CONSTRUCTION	06/01/23	NN
4			
5			

South Coast Technology, Inc.
16503 Park Row Drive, Houston, Texas, 77084
Phone: (713) 466-9947

DRAWN BY: TD DATE: 10/18/22
CHECKED BY: BL DATE: 10/25/22
APPROVED BY: NN DATE: 10/25/22

TITLE: OUTLINE DIAGRAM - FLOOR PLAN

PROJECT: THE REYNOLDS COMPANY SOLAR TURBINE 7 EER

PROJECT No. B - 60696

DRAWING No. D- E1669603

SCT REFERENCE No.

SCALE: NTS

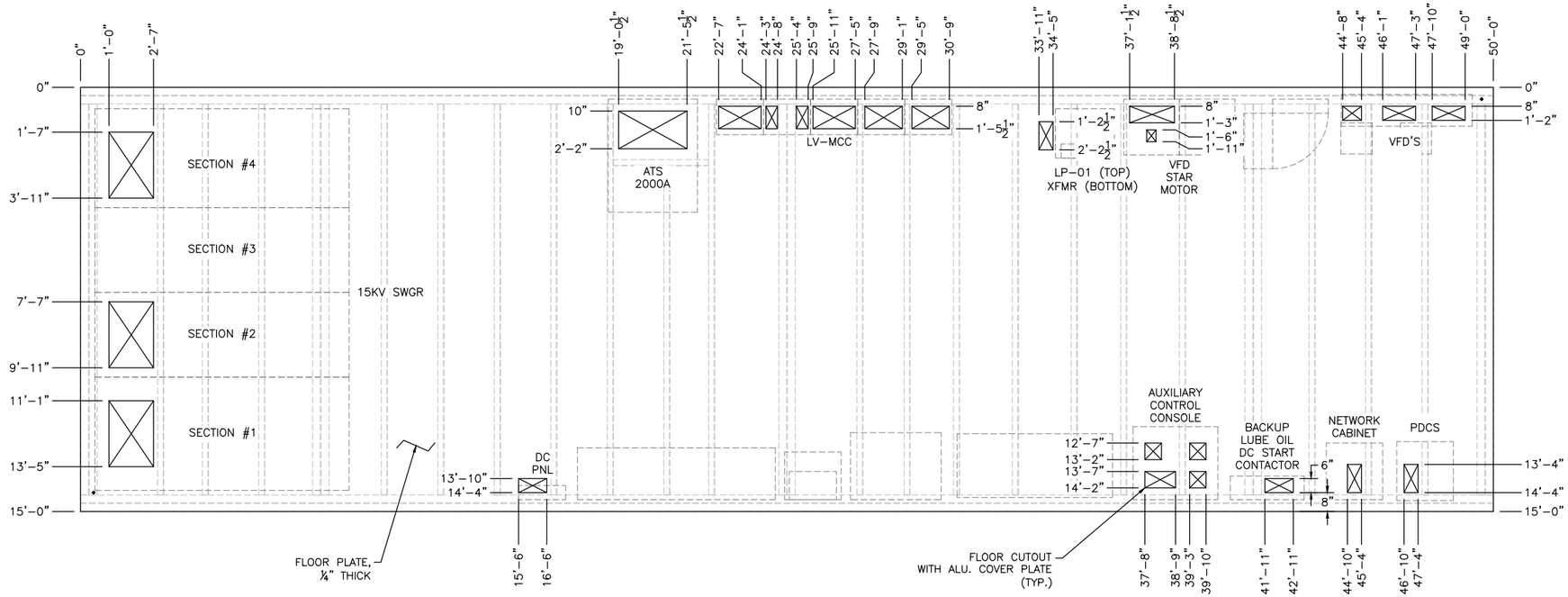
SHEET 1 OF 1

APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

COXA1 — 07/10/2023

JACOBS — Date



NOTES:

1. ALL CUTOUTS TO BE FURNISHED WITH 3/16" ALUMINUM COVER PLATES.

REVISIONS

LEVEL	DESCRIPTION	DATE	BY
0	FIRST ISSUE	10/25/22	TD
1	ISSUED FOR CONSTRUCTION	03/02/23	NN
2	ISSUED FOR CONSTRUCTION	04/21/23	NN
3	IFC – UPDATED REVISIONS	06/01/23	NN
4			
5			

South Coast Technology, Inc.
16503 Park Row Drive, Houston, Texas, 77084
Phone: (713) 466-9947

DRAWN BY: TD DATE: 10/18/22
CHECKED BY: BL DATE: 10/25/22
APPROVED BY: NN DATE: 10/25/22

TITLE: OUTLINE DIAGRAM – FLOOR CUTOUT PLAN

PROJECT: THE REYNOLDS COMPANY
SOLAR TURBINE 7 EER

PROJECT No. B – 60696
DRAWING No. D- E1669605
SCT REFERENCE No.
SCALE: NTS
SHEET 1 OF 1

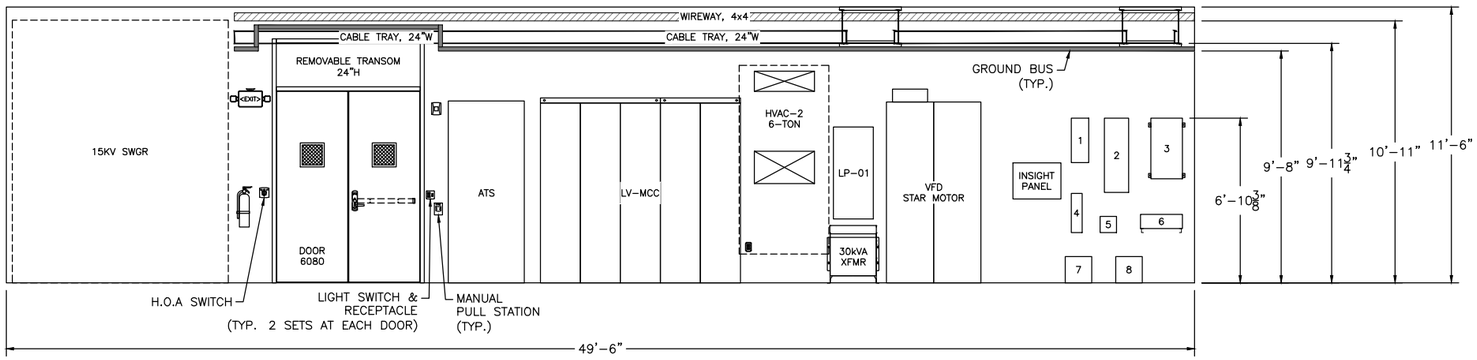
VFD COMPONENTS	
NO.	ITEMS
1	PILOT LIQUID FUEL MOTOR VFD
2	LIQUID FUEL MOTOR VFD
3	RIDE THRU. UNIT
4	WATER PURGE MOTOR VFD
5	LINE REACTOR, WATER PURGE VFD
6	DYNAMIC BRAKE RESISTOR, LIQUID FUEL MOTOR
7	LINE REACTOR, PILOT LIQUID FUEL VFD
8	LINE REACTOR, LIQUID FUEL MAIN VFD

ELEVATION KEY

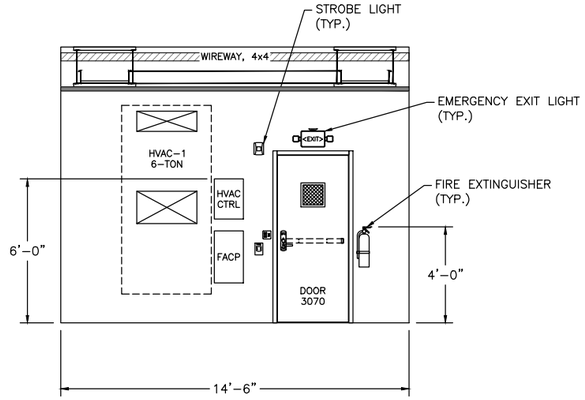
APPROVED X
APPROVED AS NOTED
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

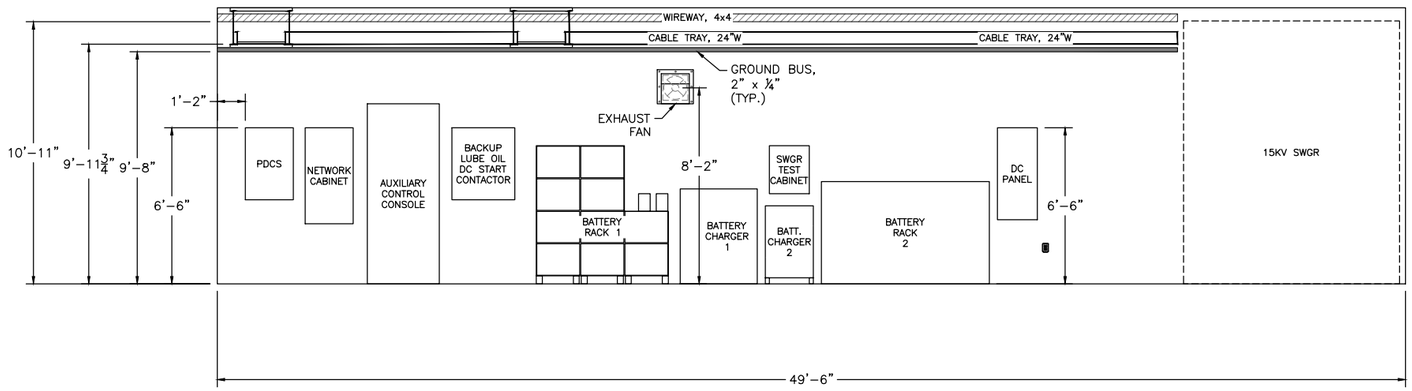
COXA1 07/10/2023
JACOBS Date



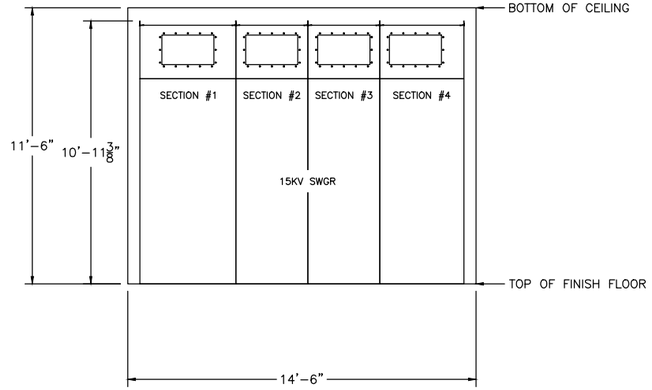
INTERIOR WALL – E4



INTERIOR WALL – E3



INTERIOR WALL – E2



INTERIOR WALL – E1

NOTES:

1. THE APPLICATION FOR THE BUILDING: GENERAL PURPOSE (INSIDE AND OUTSIDE).
2. REFER TO BUILDING GENERAL SPECIFICATIONS FOR OTHER DETAILS.

REVISIONS			
LEVEL	DESCRIPTION	DATE	BY
0	FIRST ISSUE	03/02/23	NN
1	ISSUED FOR CONSTRUCTION	04/21/23	NN
2	IFC – UPDATED REVISIONS	06/01/23	NN
3			
4			
5			

South Coast Technology, Inc.
16503 Park Row Drive, Houston, Texas, 77084
Phone: (713) 466-9947

DRAWN BY: TD DATE: 02/28/23
CHECKED BY: BL DATE: 03/02/23
APPROVED BY: NN DATE: 03/02/23

TITLE: OUTLINE DIAGRAM – INTERIOR ELEVATIONS
PROJECT: THE REYNOLDS COMPANY SOLAR TURBINE 7 EER
PROJECT No. B – 60696
DRAWING No. D- E1669614
SCT REFERENCE No.
SCALE: NTS
SHEET 1 OF 1

South Coast Technology, Inc.
Houston, Texas, USA

Specifications
For
The Reynolds Company - Solar Turbine 7 EER

Site Conditions:

Location:	New Orleans, LA
Elevation:	25 feet
Humidity:	100 % max.
Wind Loading:	157 mph
Installation:	Pier Supports
Cable Entrance:	Bottom

Live Loads:

Roof Load:	40 psf
Floor Load:	250 psf

Area Classification:

Inside:	General Purpose
Outside:	General Purpose

Building Information:

Construction:	Single, Interlocking Panels
Length:	50'-0"
Depth:	15'-0"
Height:	11'-6"
Inside Height:	13'-8"

Estimated Weights:

Building:	54,500 Lbs
Equipment:	33,000 Lbs
Total Weight:	87,500 Lbs

Hardware:

Interior:	Zinc Coated
Exterior:	Stainless Steel

Sealing:

Interior:	General Purpose
Exterior:	Outdoor Application

Insulation:

Floor:	R-15, Spray Foam
Walls:	R-15, Fiberglass
Ceiling:	R-19, Fiberglass

Skid:

Style:	Single
Perimeter:	W16-40#
Main Members:	W16-40#
Supports:	C10-15.3#
Floor Plate:	1/4" Plate
Floor Finish:	Flat

Walls:

Style:	Interlocking Panels, 3"
Exterior Walls:	12 ga. G-90 Galv. Steel
Interior Liners:	16 ga. G-90 Galv. Steel

Roof:

Style:	Interlocking Panels
Roof Top:	12 ga. G-90 Galv. Steel
Roof Cap:	12 ga. G-90 Galv. Steel
Flasher:	18 ga. G-90 Galv. Steel
Slope:	.25" per 12"

Ceiling:

Style:	Interlocking Panels
Material:	16 ga. G-90 Galv. Steel

Painting - Skid:

		Thickness
Surface Preparation:	Abrasively Cleaned	Yes
Primer:	SW Macpropoxy 646	2-3 mils
Top Coat:	SW Acrolon 218HS	1-2 mils
Interior Floor Finish:	Solar Gray - Non stick	
Exterior Eaves Finish:	Solar Gray	

Painting - Walls and Roof (exterior):

Surface Preparation:	Chemical Cleaning	Yes
Primer:	Wash Primer P60G2	0.5-1 mil
Top Coat:	SW Acrolon 218HS	2-3 mils
Color:	Solar Gray	

Painting - Walls and Ceiling (interior):

Surface Preparation:	Chemical Cleaning	Yes
Primer:	Wash Primer P60G2	0.5-1 mil
Top Coat:	SW Acrolon 218HS	2-3 mils
Color:	White	

Painting - Doors:

Surface Preparation:	Chemical Cleaning	Yes
Primer:	Wash Primer P60G2	0.5-1 mil
Top Coat:	SW Acrolon 218HS	2-3 mils
Color:	Solar Gray	

Equipment Door:

Quantity:	1
Dimension:	6080
Style:	Double
Special Provision:	24" Removable Transom

Personal Door:

Quantity:	1
Dimension:	3070
Style:	Single

Rear Access Door:

	4
	Size by Layout

Door Features:

Material:	16 ga. G-90 Galv. Steel
View Window:	10" x 10" minimum
Glass:	1/4" Laminated Safety
Insulation:	Polystyrene
Panic Hardware:	Furnished
Closure:	Furnished
Threshold:	Furnished
Label:	N/A
Canopy:	Furnished

Air Conditioning:

Quantity / Mfg:	2 / Marvair
Style:	Wall Mounted
Capacity:	6-Ton
Heater:	9kW
Power:	480Vac, 3P, 60Hz
Control:	Control Panel
External Disc. Switch:	(2) - 30A, 600V

Manufacturer Information:

South Coast Technology, Inc.
16503 Park Row Drive, Houston, TX 77084
713-466-9947

Electrical:

		Qty
Conduit (indoor):	Aluminum, 3/4" Min.	AR
Conduit (outdoor):	RGS, 3/4" Min.	AR
Cable:	THHW, #12AWG Min.	AR
Receptacle (indoor):	20A, 120Vac, Duplex, GFCI	5
Receptacle (outdoor):	20A, 120Vac, Duplex, GFCI, WP	5
Light Switch:	3-Way, 20A, 120Vac	2
Interior Light:	LED Fixture, 120Vac, 1 ph., 20Amp	12
Exterior Light:	LED, 120Vac, 20A, HPS, 100W	6
Photocell:	115Vac, 15A w/ HOA	1
Emergency Exit Lights:	120Vac with 90 min. b/u Battery	2
XFMR:	37.5kVA, 480-120/240Vac, 1P, Dry Type	1
Lighting Panel:	225A, 120/240Vac, 225MCB, 42Ckts, 10ka	1
DC Panel:	125Vdc, 225A, 200MCB, 30Ckts	1

Other Requirements:

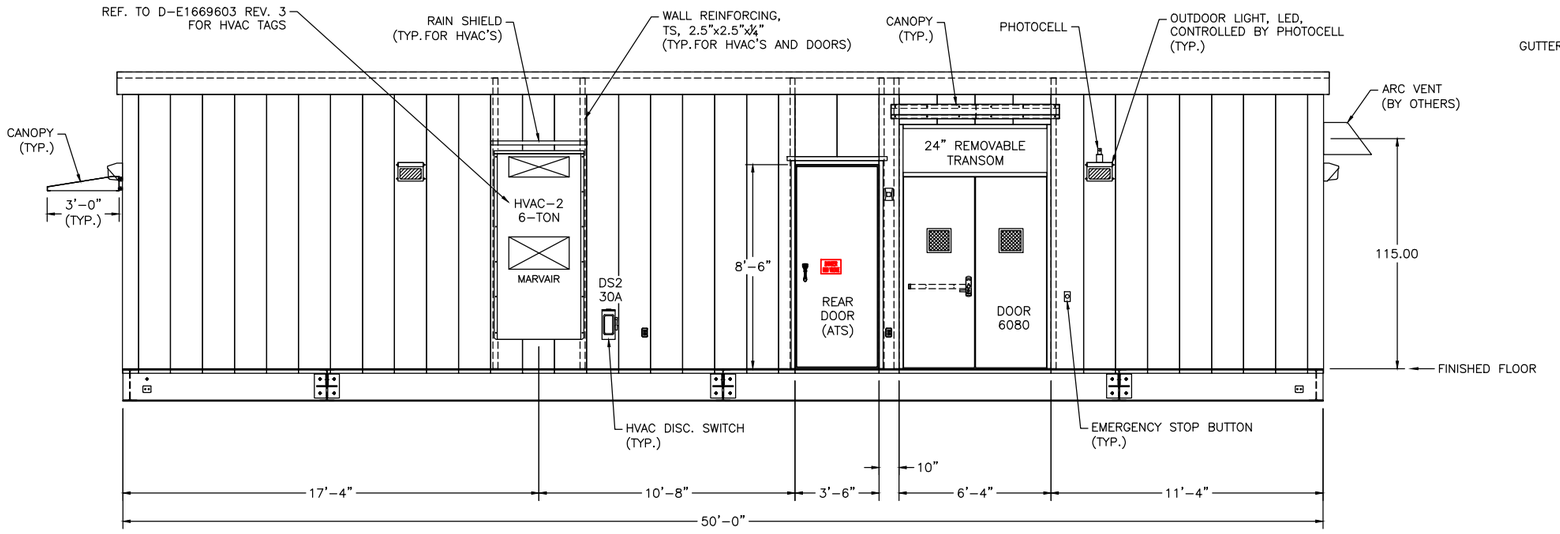
	Qty
Fire Extinguisher, Type ABC, 10 Lbs	2
Wireway, 4"x4"	1 Lot
Cable Tray 24", 9" Rung, 6" side rails	1 Lot
Smoke/Heat Detector/ Strobe/Pull Station	1 Set
FACP	1
Exhaust Fan w/ H2 Detector	1 Set

Applicable Standard Codes:

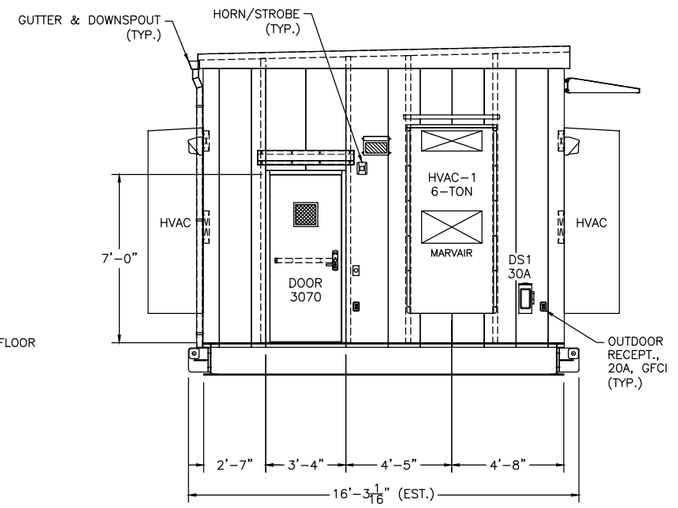
2021 International Building Code
2021 International Mechanical Code
2020 National Electrical Code
National Fire Protection Association
American Welding Society

Building Field Preparation and Installation:

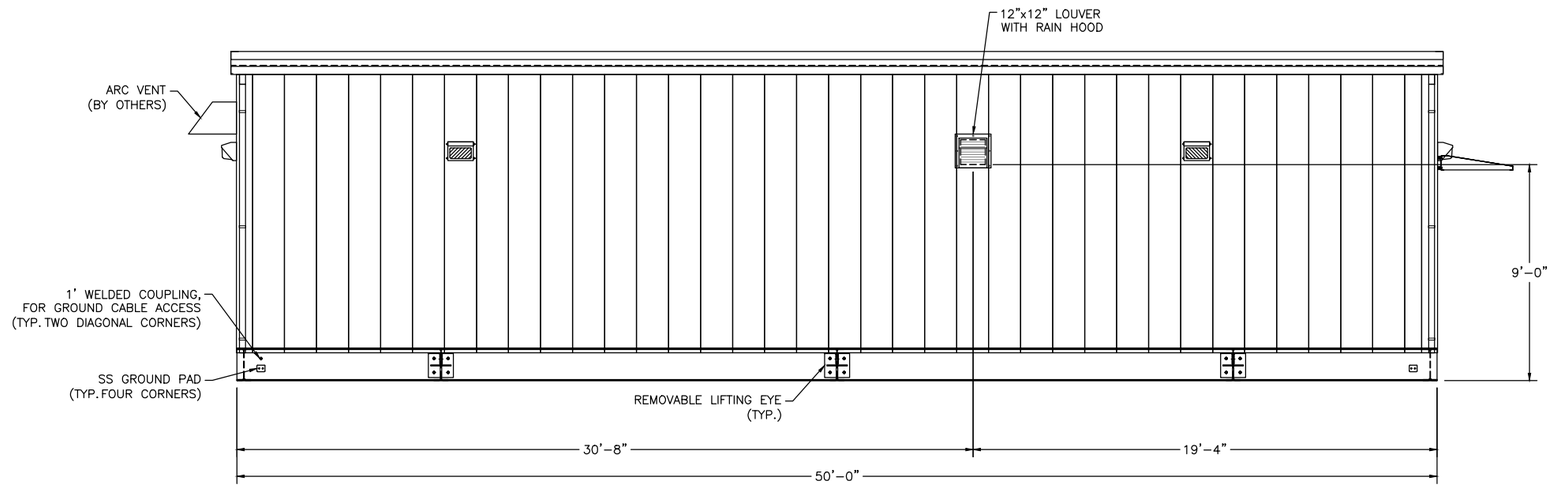
Design:	By Others
Foundation:	By Others
Piers & Pads:	By Others
Setting & Installation:	By Others
Power Connection:	By Others



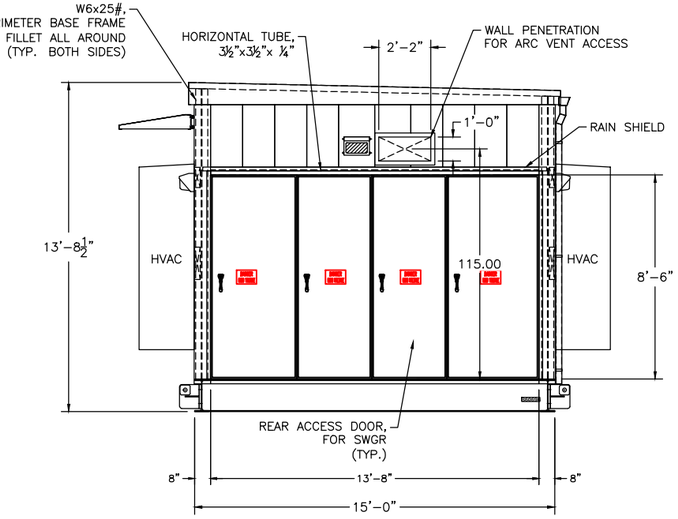
ELEVATION 4



ELEVATION 3



ELEVATION 2



ELEVATION 1

NOTES:

1. THE APPLICATION FOR THE BUILDING: GENERAL PURPOSE (INSIDE AND OUTSIDE).
2. REFER TO BUILDING GENERAL SPECIFICATIONS FOR OTHER DETAILS.
3. HVAC'S AND CANOPIES TO BE REMOVED FOR SHIPPING AND RE-INSTALLED AT SITE BY OTHERS.

REVISIONS

LEVEL	DESCRIPTION	DATE	BY
0	FIRST ISSUE	10/25/22	TD
1	ISSUED FOR CONSTRUCTION	03/02/23	NN
2	ISSUED FOR APPROVAL	06/01/23	NN
3			
4			
5			

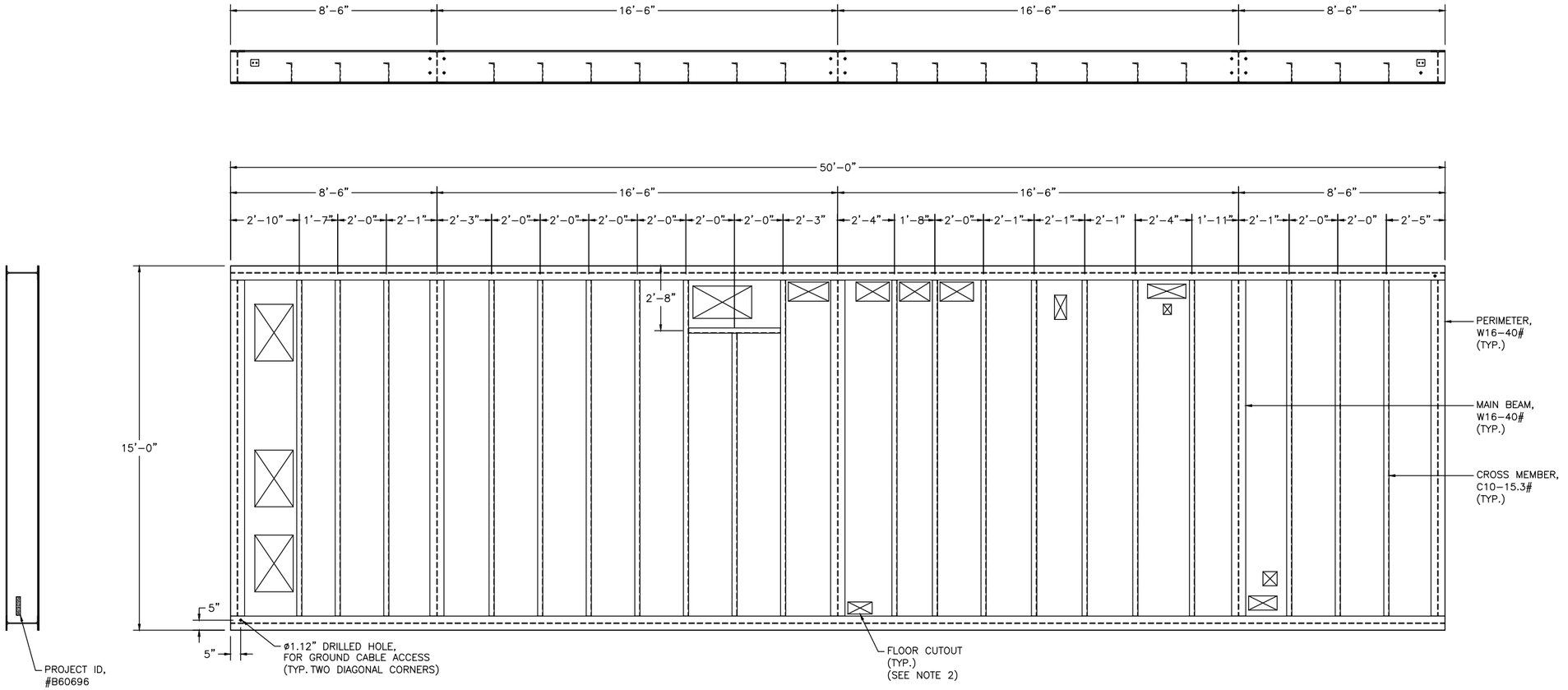
South Coast Technology, Inc.
16503 Park Row Drive, Houston, Texas, 77084
Phone: (713) 466-9947

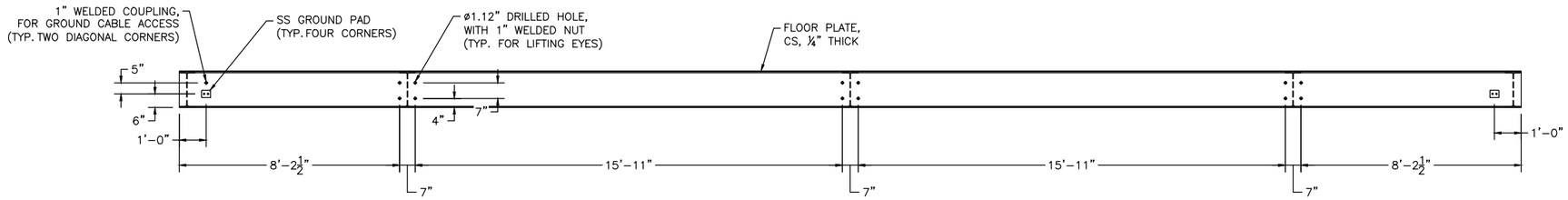
DRAWN BY: TD DATE: 10/18/22
CHECKED BY: BL DATE: 10/25/22
APPROVED BY: NN DATE: 10/25/22

TITLE: OUTLINE DIAGRAM - ELEVATIONS

PROJECT: THE REYNOLDS COMPANY
SOLAR TURBINE 7 EER

PROJECT No. B - 60696
DRAWING No. D- E1669601
SCT REFERENCE No.
SCALE: NTS
SHEET 1 OF 1





NOTES:

1. ALL WELDING TO BE PER AWS D1.1.
2. REFER TO DRAWING #E1669605 FOR FLOOR CUTOUT DIMENSIONS.

ESTIMATE WEIGHT	
W16–40#	7,000 LBS
C10–15.3#	4,600 LBS
FLOOR PLATE	7,700 LBS
OTHERS	1,500 LBS
TOTAL	20,800 LBS

REVISIONS

LEVEL	DESCRIPTION	DATE	BY
0	FIRST ISSUE	10/25/22	TD
1	ISSUED FOR CONSTRUCTION	03/02/23	NN
2			
3			
4			
5			

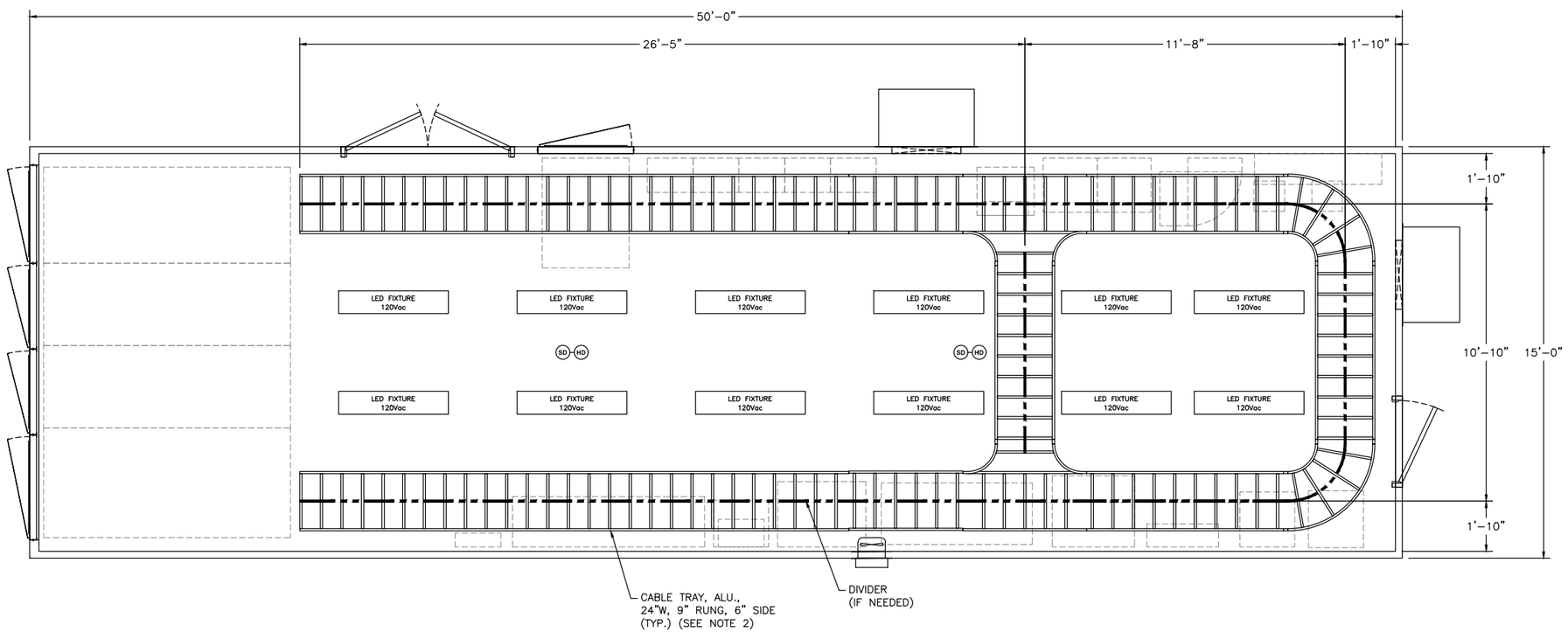
South Coast Technology, Inc.
16503 Park Row Drive, Houston, Texas, 77084
Phone: (713) 466-9947

DRAWN BY: TD DATE: 10/18/22
CHECKED BY: BL DATE: 10/25/22
APPROVED BY: NN DATE: 10/25/22

TITLE: OUTLINE DIAGRAM – BASE FRAME

PROJECT: THE REYNOLDS COMPANY
SOLAR TURBINE 7 EER

PROJECT No. B – 60696
DRAWING No. D– E1669604
SCT REFERENCE No.
SCALE: NTS
SHEET 1 OF 1



NOTES:

1. ALL CABLE TRAY TO BE ALUMINUM, SUSPENDED FROM THE CEILING BY UNISTRUT AND GALVANIZED HARDWARE.
2. REFER TO DRAWING #E1669607 FOR CABLE TRAY ELEVATIONS.
3. CABLE TRAY INSTALLATION AND GROUNDING PER 2020 NEC. 392.18 AND 392.60.

REVISIONS

LEVEL	DESCRIPTION	DATE	BY
0	FIRST ISSUE	10/25/22	TD
1	ISSUED FOR CONSTRUCTION	03/02/23	NN
2	ISSUED FOR APPROVAL	04/21/23	NN
3			
4			
5			

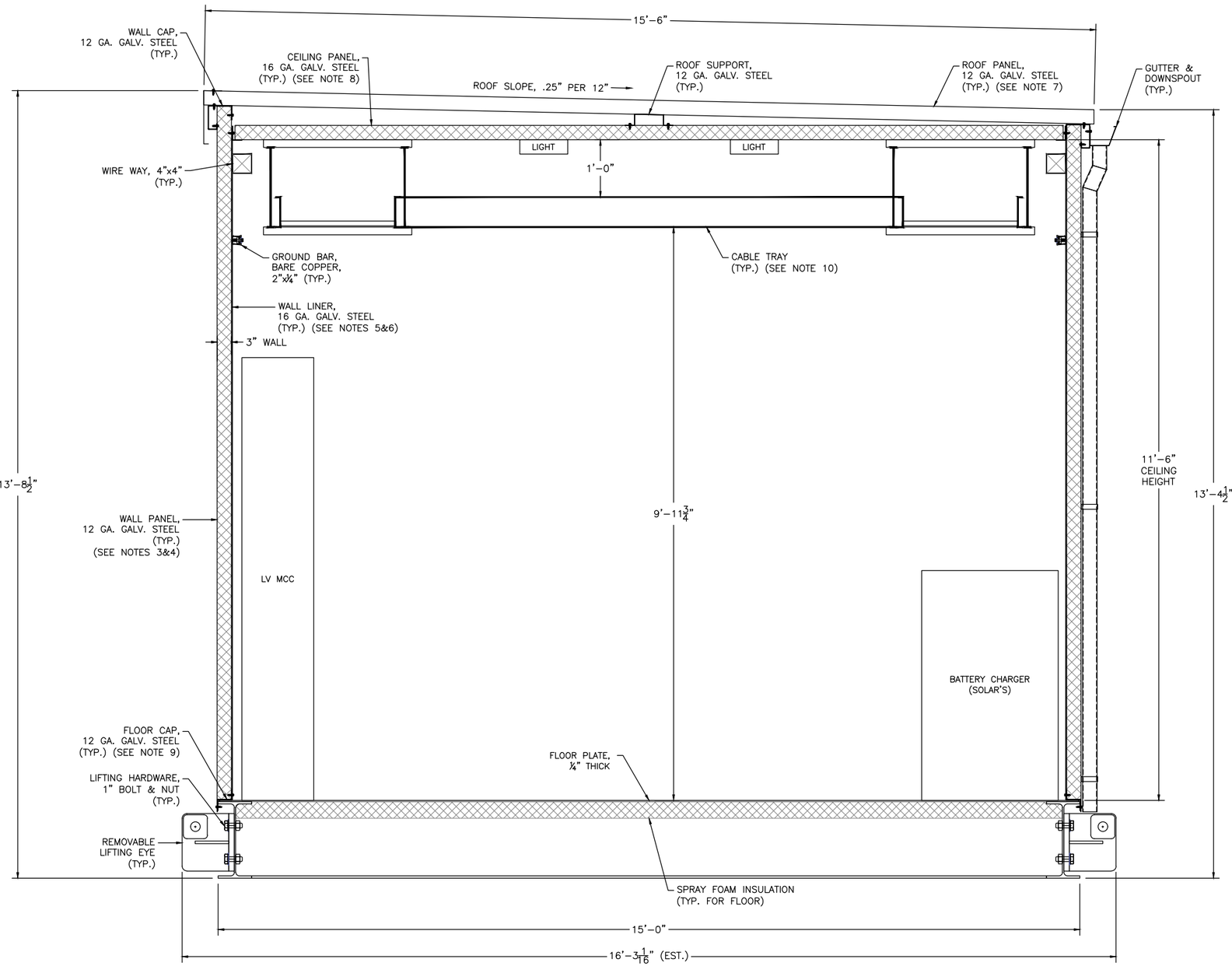
South Coast Technology, Inc.
16503 Park Row Drive, Houston, Texas, 77084
Phone: (713) 466-9947

DRAWN BY: TD DATE: 10/18/22
CHECKED BY: BL DATE: 10/25/22
APPROVED BY: NN DATE: 10/25/22

TITLE: OUTLINE DIAGRAM – CABLE TRAY PLAN

PROJECT: THE REYNOLDS COMPANY
SOLAR TURBINE 7 EER

PROJECT No. B – 60696
DRAWING No. D– E1669606
SCT REFERENCE No.
SCALE: NTS
SHEET 1 OF 1



NOTES:

1. THE APPLICATIONS AREA FOR PDC: GENERAL PURPOSE (INSIDE AND OUTSIDE).
2. REFER TO BUILDING GENERAL SPECIFICATIONS FOR OTHER DETAILS. #14 TEK SCREW: STAINLESS STEEL, ASTM A493, SAE J78.
3. ALL EXTERIOR WALL PANEL JOINTS: SECURING #14 TEK SCREW, SPACING @16" OC.
4. FOR ALL EXTERIOR WALL PANEL BOTTOM SECURED TO Z BASE CAP: SECURING 3–#14 TEK SCREWS PER PANEL.
5. FOR ALL WALL LINERS SECURED TO WALL PANEL FLANGES: USING #14 TEK SCREW @18" OC.
6. FOR WALL LINER BOTTOM SECURED TO Z BASE CAP: SECURING 3–#14 TEK SCREWS PER LINER.
7. ALL ROOF PANEL JOINTS: SECURING #14 TEK SCREW @32" OC. ALL ROOF PANELS TO END WALL CAP: SECURING #14 TEK SCREW @32" OC
8. ALL CEILING PANEL JOINTS: SECURING #14 TEK SCREW @32" OC.
   ALL CEILING PANELS TO END WALL CAP: SECURING #14 TEK SCREW @32'' OC. AND APPLYING 3–5/16" SPOT WELDS AT ENDS.
9. FOR Z BASE CAP, PROVIDE PUDDLE WELDS TO FLOOR PLATE @12" OC.
10. CABLE TRAY SYSTEM TO BE ALUMINUM, SUSPENDED FROM THE CEILING BY GALVANIZED HARDWARE.

REVISIONS

LEVEL	DESCRIPTION	DATE	BY
0	FIRST ISSUE	10/25/22	TD
1	ISSUED FOR CONSTRUCTION	03/02/23	NN
2	ISSUED FOR APPROVAL	08/01/23	NN
3			
4			
5			

South Coast Technology, Inc.
16503 Park Row Drive, Houston, Texas, 77084
Phone: (713) 466-9947

DRAWN BY: TD DATE: 10/18/22
CHECKED BY: BL DATE: 10/25/22
APPROVED BY: NN DATE: 10/25/22

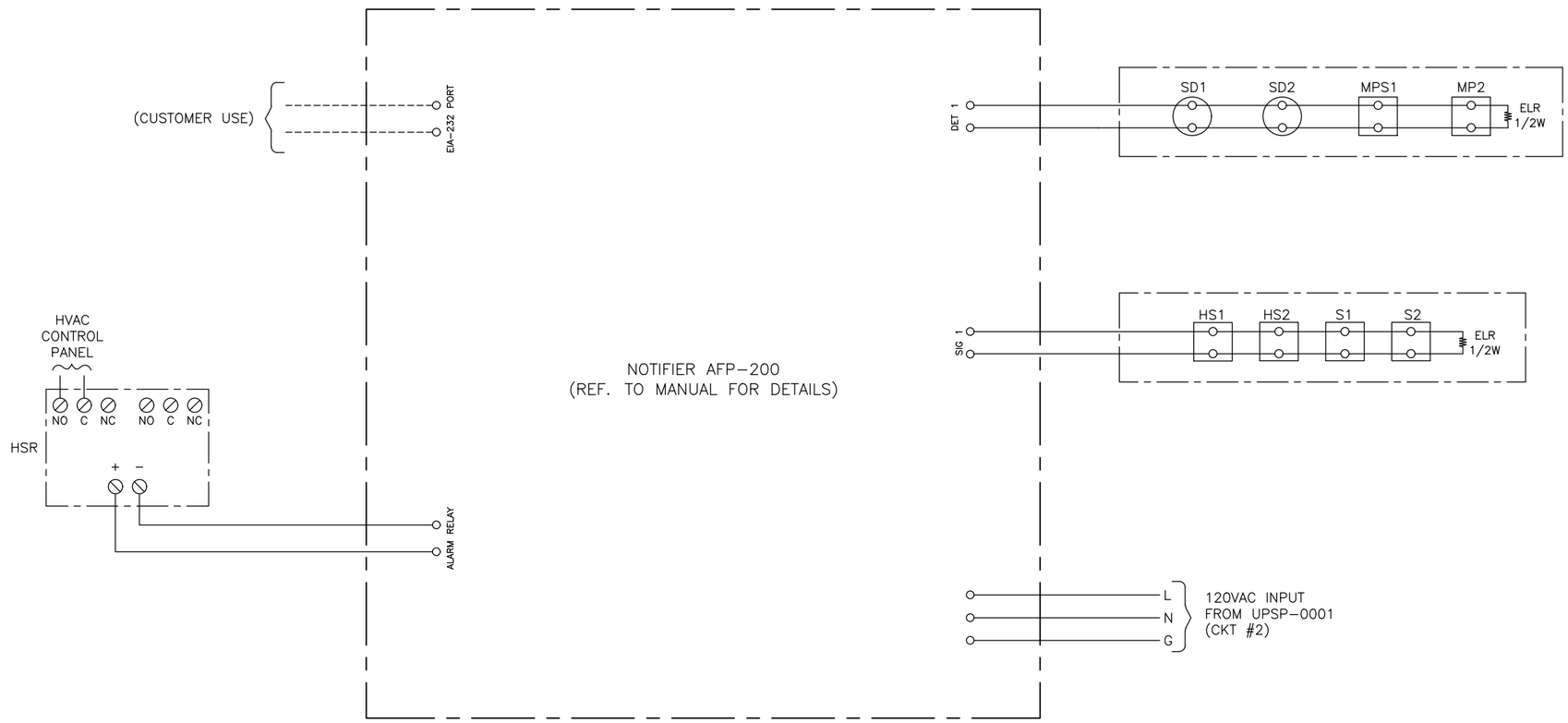
TITLE: OUTLINE DIAGRAM – SECTIONAL VIEW

PROJECT: THE REYNOLDS COMPANY
SOLAR TURBINE 7 EER

PROJECT No. B – 60696
DRAWING No. D– E1669607
SCT REFERENCE No.
SCALE: NTS
SHEET 1 OF 1

LEGEND:

SD	SMOKE/HEAT DETECTOR
MPS	MANUAL PULL STATION
HS	HORN/STROBE
ELR	END OF LINE RESISTOR
DET	DETECTION CIRCUIT
SIG	SIGNAL CIRCUIT
HSR	HVAC SHUTDOWN RELAY (FAIL SAFE)



FACP

FIRE ALARM CONTROL PANEL

LEGENDS:

---------- WIRING TO BE DONE AT SITE BY OTHERS.

NOTES:

1. ALL CABLE TO BE #12 THHW EXCEPT AS NOTED.
2. FOR INTERIOR, WIRING IS RUN THROUGH EMT CONDUIT PER ARTICLE 358 OF THE 2020 NEC.
3. FOR EXTERIOR, WIRING IS RUN THROUGH RIGID GALVANIZED CONDUIT PER ARTICLE 344 OF THE 2020 NEC.

REVISIONS

LEVEL	DESCRIPTION	DATE	BY
0	FIRST ISSUE	10/25/22	TD
1	ISSUED FOR APPROVAL	08/01/23	NN
2			
3			
4			
5			

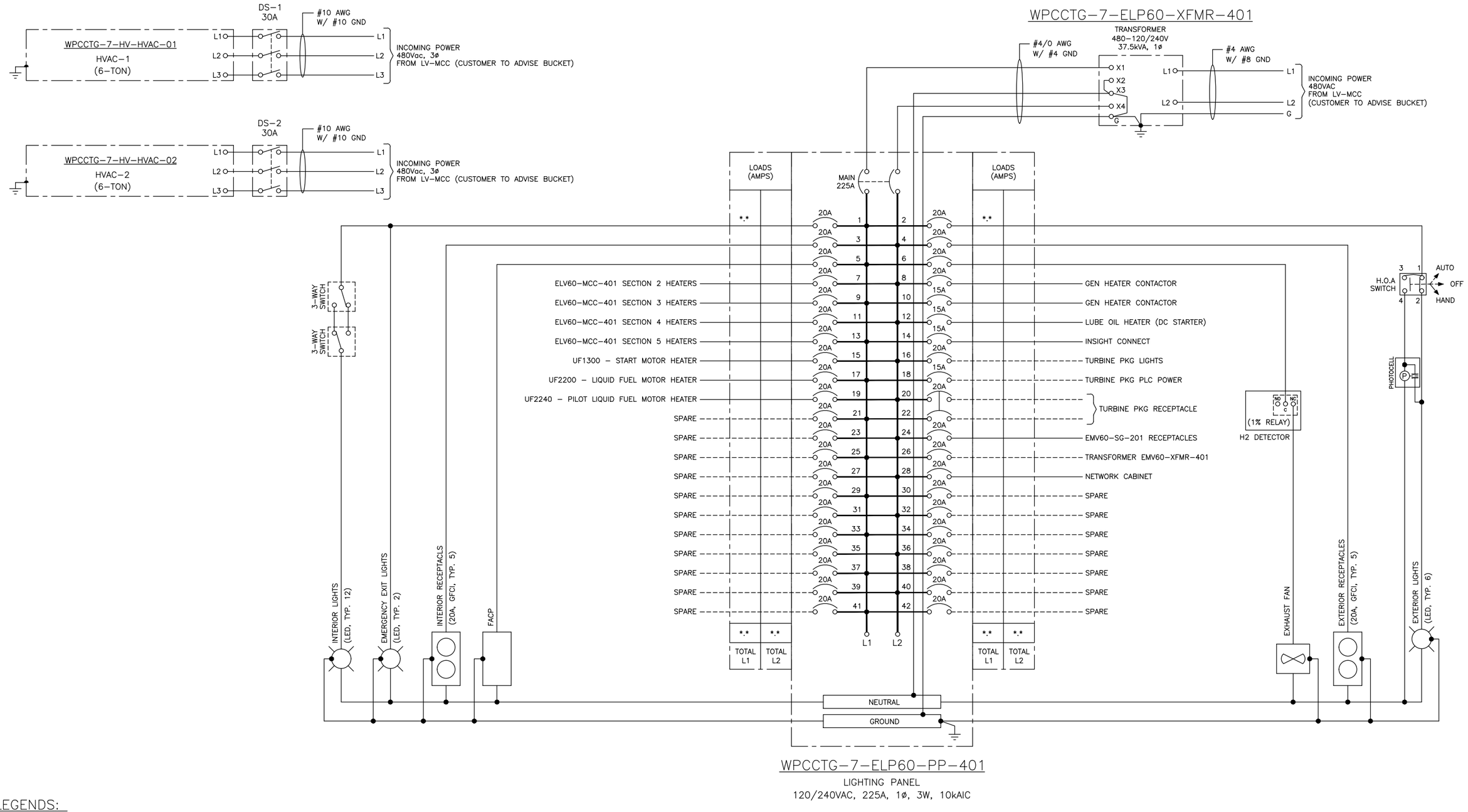
South Coast Technology, Inc.
16503 Park Row Drive, Houston, Texas, 77084
Phone: (713) 466-9947

DRAWN BY: TD DATE: 10/18/22
CHECKED BY: BL DATE: 10/25/22
APPROVED BY: NN DATE: 10/25/22

TITLE: SCHEMATIC DIAGRAM – FIRE ALARM CONTROL PANEL

PROJECT: THE REYNOLDS COMPANY
SOLAR TURBINE 7 EER

PROJECT No. B - 60696
DRAWING No. D- E2669601
SCT REFERENCE No.
SCALE: NTS
SHEET 1 OF 1



LEGENDS:

---------- WIRING TO BE DONE AT SITE BY OTHERS.

NOTES:

1. ALL CABLE TO BE #12 THHW EXCEPT AS NOTED.
2. FOR INTERIOR, WIRING IS RUN THROUGH EMT CONDUIT PER ARTICLE 358 OF THE 2020 NEC.
3. FOR EXTERIOR, WIRING IS RUN THROUGH RIGID GALVANIZED CONDUIT PER ARTICLE 344 OF THE 2020 NEC.

REVISIONS

LEVEL	DESCRIPTION	DATE	BY
0	FIRST ISSUE	10/25/22	TD
1	ISSUED FOR CONSTRUCTION	03/02/23	NN
2	ISSUED FOR CONSTRUCTION	04/21/23	NN
3	ISSUED FOR APPROVAL	08/01/23	NN
4			
5			

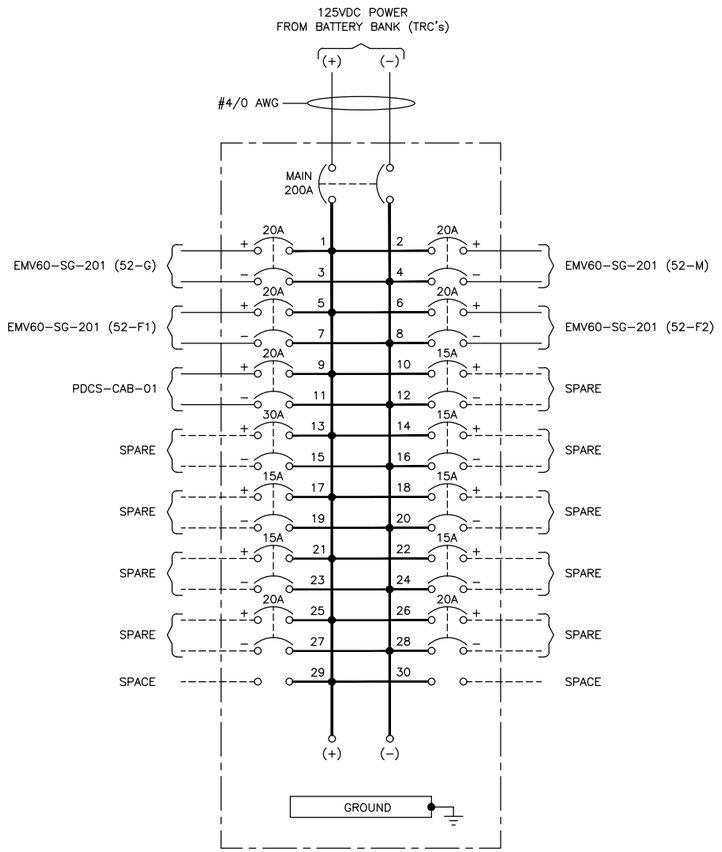
South Coast Technology, Inc.
16503 Park Row Drive, Houston, Texas, 77084
Phone: (713) 466-9947

DRAWN BY: TD DATE: 10/18/22
CHECKED BY: BL DATE: 10/25/22
APPROVED BY: NN DATE: 10/25/22

TITLE: SCHEMATIC DIAGRAM - LIGHTING PANEL

PROJECT: THE REYNOLDS COMPANY
SOLAR TURBINE 7 EER

PROJECT No. B - 60696
DRAWING No. D- E8669601
SCT REFERENCE No.
SCALE: NTS
SHEET 1 OF 1



WPCCTG–7–EDC–PP–01

DC PANEL
125VDC, 225A, 10kA

LEGENDS:

---------- WIRING TO BE DONE AT SITE BY OTHERS.

NOTES:

1. ALL CABLE TO BE #12 THHW EXCEPT AS NOTED.
2. FOR INTERIOR, WIRING IS RUN THROUGH EMT CONDUIT PER ARTICLE 358 OF THE 2020 NEC.
3. FOR EXTERIOR, WIRING IS RUN THROUGH RIGID GALVANIZED CONDUIT PER ARTICLE 344 OF THE 2020 NEC.

REVISIONS

LEVEL	DESCRIPTION	DATE	BY
0	FIRST ISSUE	10/25/22	TD
1	ISSUED FOR CONSTRUCTION	03/02/23	NN
2	ISSUED FOR APPROVAL	08/01/23	NN
3			
4			
5			

South Coast Technology, Inc.
16503 Park Row Drive, Houston, Texas, 77084
Phone: (713) 466-9947

DRAWN BY: TD DATE: 10/18/22
CHECKED BY: BL DATE: 10/25/22
APPROVED BY: NN DATE: 10/25/22

TITLE: SCHEMATIC DIAGRAM – 125VDC PANEL

PROJECT:
THE REYNOLDS COMPANY
SOLAR TURBINE 7 EER

PROJECT No. B – 60696
DRAWING No. D– E8669602
SCT REFERENCE No.
SCALE: NTS
SHEET 1 OF 1

PROCEEDING AS BUILT REVISIONS

COVER SHEET REV.	REVISION, AFFECTED SHEETS, AND DESCRIPTION OF CHANGE

NOTE:
THE ABOVE PROCEEDING AS BUILT REVISIONS AREA SHALL BE USED TO RECORD ALL DRAWING CHANGES AFTER THE REVISION LEVEL OF AS BUILT. ALL CHANGES MADE TO THE CUSTOMERS DRAWINGS INITIATED OUTSIDE THE POINT 8 FACILITY SHALL BE DOCUMENTED ON A FIELD CHANGE NOTICE "FCN". (FORM F-38)

THE REYNOLDS CO LLC

SOLAR TURBINE 7

13.8kV, 3ø, 3W, 60HZ, 1200A, 40KA RMS SYM

MEDIUM VOLTAGE ARC-RES SWITCHGEAR

P.O.# 8934082

Change Cover Sheet Title ownership to "Sewerage & Water Board of New Orleans" (TYP)

DRAWING LIST

SHEET	REV	DRAWING TITLE
C	0A	COVER SHEET WITH DRAWING LIST
D1	0A	DETAIL SHEET
D2	0A	SYMBLOS, 3
D3	0A	DEVICE ID'S
D4	0A	DEVELOPMENTS (1 OF 3)
D5	0A	DEVELOPMENTS (2 OF 3)
D6	0A	DEVELOPMENTS (3 OF 3)
L1	0A	ARRANGEMENT DETAILS
L2	0A	SIDE VIEWS (1 OF 2)
L3	0A	SIDE VIEWS (2 OF 2)
L4	0A	BACKPAN DETAILS (1 OF 2)
L5	0A	BACKPAN DETAILS (2 OF 2)
L6	0A	BASE DETAILS
L7	0A	TOP DETAILS
L8	0A	REAR VIEW
M1	0A	BILL OF MATERIAL (1 OF 2)
M2	0A	BILL OF MATERIAL (2 OF 2)
N1	0A	NAME PLATE DETAILS (1 OF 2)
N2	0A	NAME PLATE DETAILS (2 OF 2)
OL	0A	ONE LINE DIAGRAM
1	0A	GENERATOR BREAKER SCHEMATICS (1 OF 3)
2	0A	GENERATOR BREAKER SCHEMATICS (2 OF 3)
3	0A	GENERATOR BREAKER SCHEMATICS (3 OF 3)
4	0A	FEEDER BREAKER1 SCHEMATICS (1 OF 3)
5	0A	FEEDER BREAKER1 SCHEMATICS (2 OF 3)
6	0A	FEEDER BREAKER1 SCHEMATICS (3 OF 3)
7	0A	FEEDER BREAKER2 SCHEMATICS (1 OF 3)
8	0A	FEEDER BREAKER2 SCHEMATICS (2 OF 3)
9	0A	FEEDER BREAKER2 SCHEMATICS (3 OF 3)
10	0A	MAIN BREAKER SCHEMATICS (1 OF 3)
11	0A	MAIN BREAKER SCHEMATICS (2 OF 3)
12	0A	MAIN BREAKER SCHEMATICS (3 OF 3)
13	0A	AC SCHEMATICS
14	0A	COMMUNICATION CIRCUIT
15	0A	TERMINAL BLOCK LAYOUT (1 OF 2)
16	0A	TERMINAL BLOCK LAYOUT (2 OF 2)

Fix spelling

Supplier shall CLOUD ALL revision changes made throughout set for clarity. (TYP)

POINT 8 POWER
pointeightpower.com
Partner in design

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED		
APPROVED AS NOTED		X
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 12/06/2022
JACOBS — Date

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT 8 POWER
POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

COVER SHEET WITH DRAWING LIST
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	C

1.0 MEDIUM VOLTAGE SWITCHGEAR CONSTRUCTION DETAILS

SECTION	1.1 GENERAL
1.101	STANDARD: *IEEE C37.20.2 & IEEE C37.20.7*
1.102	ENCLOSURE TYPE: *NEMA 1*
1.103	MATERIAL: *MILD STEEL (STD)*
1.104	MAINTENANCE & CABLE ACCESS: *REAR ACCESS REQUIRED (STD)*
1.105	POWER CABLE ENTRY: *BOTTOM*
1.106	STRUCTURAL BASE: *1.5" CHANNEL*
1.107	BOTTOM CABLE GLAND PLATES: *NONE (STD)*
	1.2 FRONT DOORS
1.201	PADLOCK PROVISIONS: *ALL BREAKER DOORS (STD)*
	CONTROL DOORS: *VICE ACTION LATCHES (STD)*
	DOORS STOPS: *DOORS WITH ELECTRICAL DEVICES (STD)*
	INTERIOR LIGHT WITH SWITCH: *YES*
	GASKET: *RUBBER BUMPERS (STD)*
1.202	MIMIC BUS: *NONE (STD)*
	1.3 REAR ACCESS
1.301	TYPE: *COVERS (STD)*
	NAMEPLATES: *NONE (STD)*
	HANDLES: *NONE (STD)*
	GASKET: *YES*
	IR WINDOWS: *NONE (STD)*
	MISCELLANEOUS
1.10	BARRIER TYPE: *METAL CLAD (STD)*
1.11	VENT OPENING PROTECTION: *(SEE NOTES)*
1.12	SEISMIC RATING: *NONE (STD)*
1.13	UTILITY METERING: *NONE (STD)*
	PAINT SYSTEM
1.14	METHOD: *INDOOR PER ANSI C37.20.2 (STD)*
	COLOR: *ANSI 61 LIGHT GRAY (STD)*
	INTERNAL MOUNTING SURFACES: *GALVANIZED (STD)*
	FINISH: *TEXTURED (STD)*

SECTION	1.M MARINE CONSTRUCTION SUPPLEMENT
1.M01	ADD'L MARINE REQUIREMENTS: *N/A (BELOW DO NOT APPLY)*
	ARC RESISTANT TYPE PER ABS:
	INSULATED REAR GUARD RAILS:
	NON-CONDUCTIVE HANDRAILS:
	DOORS STOPS:
	ANTI-VIBRATION MATTING: *NONE*
	OTHER: *NONE*
	MARINE STANDARDS CONSTRUCTED TO (NOTE YEAR/RULE)
1.M02	ABS: *N/A (BELOW DO NOT APPLY)*
	USCG:
	IEEE 45:
	OTHER:

SECTION	1.AR ARC RESISTANT CONSTRUCTION SUPPLEMENT
1.AR01	ARC RESISTANT: *YES, PER IEEE C37.20.7*
	AR TYPE: *2B*
	AR TIME RATING: *0.500 SEC*
	TOP PLENUM: *YES (IDENTIFY EXITS IN NOTES)*

SECTION	OTHER NOTES (REFERENCE ABOVE APPLICABLE SECTION)
1.11	SCREEN ON DOOR VENTILATION WILL BE PLACED ON THE OUTSIDE OF THE DOORS.

SECTION	2.1 ELECTRICAL CERTIFICATIONS	
2.101	UL LABELED REQUIRED:	*UL_DLAH*
2.102	DESIGNED TO (IF NO UL LABELED):	*C37.20.2*
2.103	MARINE CERTIFICATION:	*NONE (STD)*
SECTION	2.2 ELECTRICAL RATINGS	
2.201	NOMINAL VOLTAGE (kV):	*13.8*
2.202	RATED MAXIMUM (kV):	*15*
2.203	POWER FREQ. WITHSTAND (kV):	*36*
2.204	BIL (kV):	*95*
2.205	PHASE/WIRE:	*3ø, 3W*
2.206	HERTZ:	*60*
2.207	RATED SHORT-TIME INTERRUPTING (kA RMS SYM):	*40*
2.208	RATED MOMENTARY INTERRUPTING (kA PEAK):	*104*
2.209	MAIN BUS AMPS:	*1200*
2.210	AMBIENT TEMPERATURE (°C):	*40*
2.211	GROUNDING METHOD:	*LOW RESISTANCE*

SECTION	2.3 PROTECTIVE RELAYS	
2.301	SETTINGS PROVIDED BY:	*OTHERS*
2.302	CONTROL VOLTAGE:	*125VDC*
2.303	CONTROL VOLTAGE SOURCE:	*REMOTE (STD)*

SECTION	2.4 ELECTRICAL BUS REQUIREMENTS	
2.401	AS VIEWED FROM FRONT:	*A-B-C FRONT TO BACK, TOP TO BOTTOM, LEFT TO RIGHT UNLESS NOTED OTHERWISE*
2.402	TORQUEING:	*ALL CONNECTIONS SHALL BE TORQUED AND MARKED*
2.403	MATERIAL:	*COPPER*
2.404	PLATING:	*SILVER (STD)*
2.405	HARDWARE:	*ZINC DICHROMATE PLATED GRADE 5 STEEL (STD)*
2.406	INSULATOR TYPE:	*GLASS POLYESTER (STD)*
2.407	INSULATED:	*EPOXY POWDER COATED (STD)*
2.408	INSULATING BOOTS:	*YES, WITH EXTERNAL CABLE BOOTS*
2.409	GROUND BUS:	*1/4" X 3"*
2.410	BUS TRANSITION TO:	*N/A*
2.411	MAIN BUS SIZE (FOR MARINE):	*N/A*
2.412	MAIN BUS SIZING METHOD:	*UL_DLAH*
2.413	CT ON BUS:	*NONE*
2.414	AUX PT DRAWER CONNECTION:	*CABLE (STD)*
2.415	GROUNDING STUDS:	*YES*

SECTION	2.5 MISCELLANEOUS ELECTRICAL DEVICES	
2.501	LIGHTNING ARRESTORS:	*DISTRIBUTION CLASS*
2.502	SURGE CAPACITORS:	*NONE*
2.503	GLOW TUBE INDICATORS:	*NONE*
2.504	EARTHING SWITCHES:	*NONE*

SECTION	OTHER NOTES (REFERENCE ABOVE APPLICABLE SECTION)

SECTION	3.0 CONTROL WIRING DETAILS			
3.1	TYPE:	*SIS, EXTRA FLEXIBLE EXCEPT WHERE NOTED*		
	(UNLESS OTHERWISE NOTED)	GAUGE	LUG TYPE	COLOR
3.2	PLC:	*#18 (STD)*	*LOCKING FORK/PIN*	*GRAY*
3.3	SHIELDED:	*#18 (STD)*	*LOCKING FORK/PIN*	*GRAY*
3.4	BREAKER TRIPPING:	*#14 (STD)*	*LOCKING FORK/PIN*	*GRAY*
3.5	CURRENT TRANSFORMER:	*#10*	*RING*	*GRAY*
3.6	INSTRUMENTS AND CONTROL:	*#14 (STD)*	*LOCKING FORK/PIN*	*GRAY*
3.7	SAFETY GROUNDS:	*#14*	*RING*	*GREEN*
3.8	MARKING:	*HEAT SHRINK TYPE*		
3.9	NO. TERMINATIONS PER POINT:	*2- MAXIMUM*		
3.10	SPLICING:	*NOT PERMITTED*		
3.11	ETHERNET CABLES:	*CAT 6 UNLESS OTHERWISE NOTED*		
	SPECIAL WIRING DETAILS			
3.12	WIRING DIAGRAMS:	*YES, WITH ORIGIN/DESTINATION WIREMARKERS*		
3.13	SHIELDED WIRE DRAIN:	*UNCOVERED*		
3.14	REAR OF DOOR DEVICES COVERED:	*N/A*		
3.15	HIGH TEMP SPACE HEATER WIRING:	*N/A*		
3.16	SPECIAL WIRE COLORING:	*N/A*		
3.17	WIRING SEGREGATION:	*N/A*		

SECTION	OTHER NOTES (REFERENCE ABOVE APPLICABLE SECTION)

SECTION	4.0 GENERAL NOTES	
4.1	APPROXIMATE WEIGHT (LBS):	*15,000 lbs*
4.2	PEP PROPOSAL:	*Q2005083*
4.3		
4.4		
4.5		

Yellow

APPROVED		
APPROVED AS NOTED		X
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 12/06/2022

JACOBS — Date

[1] Change Title Block Name to
"Sewerage & Water Board of New Orleans"
(TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block.
(TYP ALL DRAWINGS)

NO.	REVISION	DATE	DFT	DES	PM	APP
5A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND.

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM — www.PointEightPower.com — 800.284.1522

DETAIL SHEET

THE REYNOLDS CO LLC 3

SOLAR TURBINE 7

13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM

MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	D1

11/04/22
2022-11-04T22:32:34

DEVICE SYMBOLS

- NORMALLY CLOSED CONTACT
- NORMALLY OPEN CONTACT
- RELAY COIL
- STANDARD LIGHT (COLOR AS INDICATED)
  - A - AMBER
  - B - BLUE
  - C - CLEAR
  - G - GREEN
  - O - ORANGE
  - OP OPALESCENT
  - P - PURPLE
  - R - RED
  - W - WHITE
  - Y - YELLOW
- LED (COLOR AS INDICATED)
- EARTH GROUND
- CHASSIS GROUND
- NORMALLY CLOSED SWITCH
- NORMALLY OPEN SWITCH
- CAPACITOR
- VACUUM CIRCUIT BREAKER
- CIRCUIT BREAKER
- VOLTAGE COIL
- CURRENT TRANSFORMER
- CURRENT COIL
- NORMALLY CLOSED LEVEL SWITCH
- NORMALLY OPEN LEVEL SWITCH
- DIODE (WITH CONNECTORS)
- STANDARD DIODE
- DISCONNECT
- FUSE
- HORN
- NORMALLY CLOSED PUSHBUTTON
- NORMALLY OPEN PUSHBUTTON
- HEATER COIL
- THERMAL OVERLOAD
- RESISTOR
- THERMOSTAT
- THYRISTOR
- NORMALLY CLOSED PRESSURE SWITCH
- NORMALLY OPEN PRESSURE SWITCH
- NORMALLY CLOSED TEMPERATURE SWITCH
- NORMALLY OPEN TEMPERATURE SWITCH
- RHEOSTAT
- NORMALLY OPEN DISCONNECTING CONTACT
- NORMALLY CLOSED DISCONNECTING CONTACT
- SINGLE PHASE TRANSFORMER
- METER
- HAND OFF AUTO SWITCH
- POWER CONDUCTOR
- CONTROL WIRING
- REMOTE WIRING
- BATTERY
- NORMALLY CLOSED TIMED OPEN
- NORMALLY OPEN TIMED CLOSED
- NORMALLY CLOSED TIMED CLOSED
- NORMALLY OPEN TIMED OPEN
- X = STARTER SIZE
  Y = WIRING DIAGRAM
- WIRE CONTINUATION SYMBOL
- INSTALLATION
- LOCATION
- +XXX DEVICE ID
- ITALICIZED TEXT REMOTE DEVICES
- COMMON DOOR INDICATOR (SIMILAR NUMBER = SIMILAR LAYOUTS)
- COMMON PANEL INDICATOR (SIMILAR NUMBER = SIMILAR LAYOUTS)
- TERMINAL BLOCK

Fix to match terminal block symbol used throughout drawing set. (TYP)

APPROVED	☐
APPROVED AS NOTED	☒
REVISE AND RESUBMIT	☐
REJECTED	☐
NOT SUBJECT TO REVIEW	☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022

JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
2A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTIAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND.

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS. THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM — www.PointEightPower.com — 800.284.1522

[1] Fix spelling.

[2] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[3] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

SYMBLOS

THE REYNOLDS CO LLC

SOLAR TURBINE 7

13,8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM

MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	D2

11/04/22
2022-11-04T22:32:36

DEVICE ID LIST			
DEVICE ID	PAGE LINE NO	BOM MARK #	FUNCTION
+ACTB	1504D	19	TERMINAL BLOCK, SECTIONAL
+B587Z	D525D	42	BUS DIFFERENTIAL RELAY
+B86	D501H	49	LOCKOUT RELAY
+BMPT	1009H	38	TRANSFORMER, POTENTIAL
+BMPT	1009H	39	POTENTIAL TRANSFORMER DRAWER
+BMPT	1009H	40	MINIATURE CIRCUIT BREAKER
+BPTB:1	1009I	50	TERMINAL BLOCK, BOARD
+CAT6	1418C	41	
+CAT6	1418F	42	
+F152	D303G	22	POWER CIRCUIT BREAKER
+F152	D303G	23	POWER CIRCUIT BREAKER CASSETTE
+F1751	D312G	2	MULTIFUNCTION RELAY
+F186	D303J	12	LOCKOUT RELAY
+F1CB1	506B	24	CIRCUIT BREAKER, MINIATURE
+F1CB2	506B	24	CIRCUIT BREAKER, MINIATURE
+F1CB3	506B	24	CIRCUIT BREAKER, MINIATURE
+F1CB4	515H	29	CIRCUIT BREAKER, MINIATURE
+F1CBS	D324J	11	SWITCH, CIRCUIT BREAKER
+F1CT1	407A	18	CURRENT TRANSFORMER
+F1CT2	409A	18	CURRENT TRANSFORMER
+F1CT3	411A	18	CURRENT TRANSFORMER
+F1CT4	423A	15	CURRENT TRANSFORMER
+F1CT5	425A	15	CURRENT TRANSFORMER
+F1CT6	427A	15	CURRENT TRANSFORMER
+F1GBS	L212H	27	GROUNDING BALL STUD
+F1GBS	L212H	28	GROUNDING EQUIPMENT, ACCESSORY, COVER
+F1LRS	D319I	10	LOCAL REMOTE SWITCH
+F1LT1	505J	7	TRIP STATUS
+F1LT2	509J	8	LOCAL STATUS
+F1LT3	513J	9	REMOTE STATUS
+F1MMS	D331H	31	MAINT.MODE SWITCH
+F1MOC	D303I	16	MECHANISM OPERATED CELL SWITCH
+F1MOCTB	607C	19	TERMINAL BLOCK, SECTIONAL
+F1PB	D331F	32	OPEN/CLOSE PUSH BUTTON
+F1SA	434A	37	SURGE PROTECTION,ARRESTER
+F1SB	434A	37	SURGE PROTECTION,ARRESTER
+F1SC	434A	37	SURGE PROTECTION,ARRESTER
+F1STB1	423C	25	SHORTING TERMINAL BLOCK
+F1STB2	407C	25	SHORTING TERMINAL BLOCK
+F1TB	503B	19	TERMINAL BLOCK, SECTIONAL
+F1TOC	D312I	17	TRUCK OPERATED CELL SWITCH
+F1TOCTB	535C	19	TERMINAL BLOCK, SECTIONAL
+F1TSW1	D327H	4	TEST SWITCH
+F252	D403B	22	POWER CIRCUIT BREAKER
+F252	D403B	23	POWER CIRCUIT BREAKER CASSETTE
+F2751	D417E	2	MULTIFUNCTION RELAY
+F286	D403F	12	LOCKOUT RELAY
+F2CB1	805B	24	CIRCUIT BREAKER, MINIATURE
+F2CB2	805B	24	CIRCUIT BREAKER, MINIATURE
+F2CB3	805A	24	CIRCUIT BREAKER, MINIATURE
+F2CB4	815H	29	CIRCUIT BREAKER, MINIATURE
+F2CBS	D417G	11	SWITCH, CIRCUIT BREAKER
+F2CT1	707A	18	CURRENT TRANSFORMER
+F2CT2	709A	18	CURRENT TRANSFORMER
+F2CT3	711A	18	CURRENT TRANSFORMER
+F2CT4	723A	15	CURRENT TRANSFORMER
+F2CT5	725A	15	CURRENT TRANSFORMER
+F2CT6	727A	15	CURRENT TRANSFORMER
+F2GBS	L222H	27	GROUNDING BALL STUD
+F2GBS	L222H	28	GROUNDING EQUIPMENT, ACCESSORY, COVER
+F2LRS	D429F	10	LOCAL REMOTE SWITCH
+F2LT1	805J	7	86 TRIP STATUS
+F2LT2	809J	8	LOCAL STATUS
+F2LT3	813J	9	REMOTE STATUS
+F2MMS	D423F	31	MAINT.MODE SWITCH
+F2MOC	D413B	16	MECHANISM OPERATED CELL SWITCH
+F2MOCTB	907C	19	TERMINAL BLOCK, SECTIONAL

DEVICE ID LIST			
DEVICE ID	PAGE LINE NO	BOM MARK #	FUNCTION
+F2PB	837C	32	OPEN/CLOSE PUSH BUTTON
+F2STB1	707C	25	SHORTING TERMINAL BLOCK
+F2STB2	723C	25	SHORTING TERMINAL BLOCK
+F2TB	802B	19	TERMINAL BLOCK, SECTIONAL
+F2TOC	D423B	17	TRUCK OPERATED CELL SWITCH
+F2TOCTB	835C	19	TERMINAL BLOCK, SECTIONAL
+F2TSW1	D434A	4	TEST SWITCH, VOLTAGE/CURRENT
+G52	D303A	22	POWER CIRCUIT BREAKER
+G52	D303A	23	POWER CIRCUIT BREAKER CASSETTE
+G700G	D311A	1	MULTIFUNCTION RELAY
+G86	D319C	12	LOCKOUT RELAY
+G941	216J	13	CONTROL RELAY
+G942	218J	13	CONTROL RELAY
+GCB1	204B	24	CIRCUIT BREAKER, MINIATURE
+GCB2	204A	24	CIRCUIT BREAKER, MINIATURE
+GCB3	204A	24	CIRCUIT BREAKER, MINIATURE
+GCB4	222H	29	CIRCUIT BREAKER, MINIATURE
+GCB5	224H	29	CIRCUIT BREAKER, MINIATURE
+GCBS	D332A	11	SWITCH, CIRCUIT BREAKER
+GCT1	104A	15	CURRENT TRANSFORMER
+GCT2	106A	15	CURRENT TRANSFORMER
+GCT3	108A	15	CURRENT TRANSFORMER
+GCT4	114A	15	CURRENT TRANSFORMER
+GCT5	116A	15	CURRENT TRANSFORMER
+GCT6	118A	15	CURRENT TRANSFORMER
+GCT7	122A	15	CURRENT TRANSFORMER
+GCT8	124A	15	CURRENT TRANSFORMER
+GCT9	126A	15	CURRENT TRANSFORMER
+GGBS	L221D	27	GROUNDING BALL STUD
+GGBS	L221D	28	GROUNDING EQUIPMENT, ACCESSORY, COVER
+GLPT	129C	38	TRANSFORMER, POTENTIAL
+GLPT	129C	39	POTENTIAL TRANSFORMER DRAWER
+GLPT	129C	40	MINIATURE CIRCUIT BREAKER
+GLPTB:1	129E	50	TERMINAL BLOCK, BOARD
+GLRS	D319D	10	LOCAL REMOTE SWITCH
+GLT1	205J	7	86 TRIP STATUS
+GLT2	209J	8	LOCAL STATUS
+GLT3	220J	9	REMOTE STATUS
+GMMS	D325D	31	MAINT.MODE SWITCH
+GMOC	D303C	16	MECHANISM OPERATED CELL SWITCH
+GMOCTB	303C	19	TERMINAL BLOCK, SECTIONAL
+GPB	D322D	32	OPEN/CLOSE PUSH BUTTON
+GPM	D331E	3	POWER MONITOR 1500
+GSAA	136A	37	SURGE PROTECTION,ARRESTER
+GSAB	136A	37	SURGE PROTECTION,ARRESTER
+GSAC	136A	37	SURGE PROTECTION,ARRESTER
+GSTB1	104C	25	SHORTING TERMINAL BLOCK
+GSTB2	114C	25	SHORTING TERMINAL BLOCK
+GSTB3	122C	25	SHORTING TERMINAL BLOCK
+GSTB4	125I	25	SHORTING TERMINAL BLOCK
+GSTB5	105I	26	SHORTING TERMINAL BLOCK
+GTB	110G	19	TERMINAL BLOCK, SECTIONAL
+GTOC	D311C	17	TRUCK OPERATED CELL SWITCH
+GTOCTB	213H	19	TERMINAL BLOCK, SECTIONAL
+GTSW1	D332C	4	TEST SWITCH
+GTSW2	D335C	4	TEST SWITCH
+GTSW3	D340C	4	TEST SWITCH
+M2740	D514J	41	ETHERNET SWITCH
+M52	D501B	22	POWER CIRCUIT BREAKER
+M52	D501B	23	POWER CIRCUIT BREAKER CASSETTE
+M751	D501D	30	MULTIFUNCTION RELAY
+M86	D517F	12	LOCKOUT RELAY
+MCB1	1104B	24	CIRCUIT BREAKER, MINIATURE
+MCB2	1104A	24	CIRCUIT BREAKER, MINIATURE
+MCB3	1104A	24	CIRCUIT BREAKER, MINIATURE
+MCB4	1123H	29	CIRCUIT BREAKER, MINIATURE
+MCB5	1123H	29	CIRCUIT BREAKER, MINIATURE

DEVICE ID LIST			
DEVICE ID	PAGE LINE NO	BOM MARK #	FUNCTION
+MCB6	1127H	29	CIRCUIT BREAKER, MINIATURE
+MCB7	1129H	29	CIRCUIT BREAKER, MINIATURE
+MCBS	D525F	11	SWITCH, CIRCUIT BREAKER
+MCT1	1004A	15	CURRENT TRANSFORMER
+MCT2	1006A	15	CURRENT TRANSFORMER
+MCT3	1008A	15	CURRENT TRANSFORMER
+MCT4	1013A	15	CURRENT TRANSFORMER
+MCT5	1015A	15	CURRENT TRANSFORMER
+MCT6	1017A	15	CURRENT TRANSFORMER
+MCT7	1021A	15	CURRENT TRANSFORMER
+MCT8	1024A	15	CURRENT TRANSFORMER
+MCT9	1026A	15	CURRENT TRANSFORMER
+MGBS	L322I	27	GROUNDING BALL STUD
+MGBS	L322I	28	GROUNDING EQUIPMENT, ACCESSORY, COVER
+MLPT	1029C	38	TRANSFORMER, POTENTIAL
+MLPT	1029C	39	POTENTIAL TRANSFORMER DRAWER
+MLPT	1029C	40	MINIATURE CIRCUIT BREAKER
+MLRS	D529H	10	LOCAL REMOTE SWITCH
+MLT1	1113J	7	TRIP STATUS
+MLT2	1117J	8	LOCAL STATUS
+MLT3	1121J	9	REMOTE STATUS
+MMMS	D537D	31	MAINT.MODE SWITCH
+MMOC	D511B	16	MECHANISM OPERATED CELL SWITCH
+MMOCTB	1203C	19	TERMINAL BLOCK, SECTIONAL
+MPB	D532F	32	OPEN/CLOSE PUSH BUTTON
+MPM	D531B	3	POWER MONITOR 1500
+MPTB:1	1029E	50	TERMINAL BLOCK, BOARD
+MSAA	1036A	37	SURGE PROTECTION,ARRESTER
+MSAB	1036A	37	SURGE PROTECTION,ARRESTER
+MSAC	1036A	37	SURGE PROTECTION,ARRESTER
+MSTB1	1004C	25	SHORTING TERMINAL BLOCK
+MSTB2	1013C	25	SHORTING TERMINAL BLOCK
+MSTB3	1021C	25	SHORTING TERMINAL BLOCK
+MTB	1009K	19	TERMINAL BLOCK, SECTIONAL
+MTOC	D502B	17	TRUCK OPERATED CELL SWITCH
+MTOCTB	1109H	19	TERMINAL BLOCK, SECTIONAL
+MTSW1	D502F	4	TEST SWITCH
+MTSW2	D508F	4	TEST SWITCH
+MTSW3	D514F	4	TEST SWITCH
+S1CB	1507E	6	CIRCUIT BREAKER, MINIATURE
+S1RECP	1509E	5	RECEPTACLE
+S2CB	1515E	6	CIRCUIT BREAKER, MINIATURE
+S2RECP	1517E	5	RECEPTACLE
+S3CB	1523E	6	CIRCUIT BREAKER, MINIATURE
+S3RECP	1525E	5	RECEPTACLE
+S4CB	1531E	6	CIRCUIT BREAKER, MINIATURE
+S4RECP	1533E	5	RECEPTACLE

Fix on Generator Breaker and Main Breaker one-line diagram and ELSEWHERE in set. (TYP)

Verify Device ID's shown here with those same ID's used elsewhere in set. Make consistent throughout drawing set. (TYP)

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

POINT EIGHT POWER
POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

DEVICE ID'S
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13,8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	D3

11/04/22
2022-11-04T22:32:09

+G52		
POWER CIRCUIT BREAKER		
TERMINAL POINTS	FUNCTION	ZONE
AØ,BØ,CØ	MAIN BUS TERMINALS	110A
13,14	52 a	235B
17,18	52 a	
15,16	52 b	233B
19,20	52 b	1113C
6,11	52 b	
3,23	52 b	
8,12	SHUNT TRIP	200E
4,10	SR CLOSING COIL	212F
1,9	M MOTOR	207E

+G700G			
MULTIFUNCTION RELAY			
TERMINAL GROUP	TERMINAL POINT	FUNCTION	ZONE
A	01,02	CONTROL PWR	222J
	03,04	O101-CLOSE	
	05,06	O102-TRIP	200B
	07,08,09	O103	
	10,11	I101-LOCAL STATUS	211J
	12,11	I102	
	GND	(PE) GROUND	227H
B	PORT 1A	ETHERNET	1421D
	PORT 1B	ETHERNET	
	TX,RX	FIBER OPTIC	
	PORT 3	EIA-232	
	PORT F	EIA-232	
C	01,02	O301-CLOSE PERMISSIVE	212D
	03,04	O302-TRIP	200B
	05,06	O303 - SYNC	209B
	07,08	O304	
	09,10	I301- BKR TRIP	200B
	11,12	I302-TRIP	200B
	13,14	I303-86 TRIP STATUS	207J
	15,16	I304-BKR DISC.STATUS	213J
D	01,02	O40152-G BREAKER STATUS	313H
	03,04	O402-BREAKER READY STATUS	317H
	05,06	O403-ALARM	321H
	07,08	O404	
	09,10	I401-MAINT.MODE STATUS	215J
	11,12	I402-OPEN/CLOSE PUSH BUTTON	238E
	13,14	I403-BREAKER CLOSED STATUS	237E
	15,16	I404	
E	01,02	IAY	104D
	03,04	IBY	106D
	05,06	ICY	108D
	07,08	VS, NS	1005J
	09	N/C	
	10	N/C	
	11,12	VN, NN	
Z	01,02	IAX	125K
	03,04	IBX	127K
	05,06	ICX	129K
	07,08	IN	105J
	09,10,11,12	VAX,VBX,VCX,NX	121F

+GMOC		
MECHANISM OPERATED CELL SWITCH		
TERMINAL POINTS	FUNCTION	ZONE
1,2	A	303B
3,4	B	333G
5,6	A	307B
7,8	B	311B
9,10	A	315B
11,12	B	319B
13,14	A	323B
15,17	B	327B
16,18	A	331B
19;20	B	335B

+GTOC		
TRUCK OPERATED CELL SWITCH		
TERMINAL POINTS	FUNCTION	ZONE
1,2	B - DISC	213H
3,4	A - CONNECT	303E
5,6	B - DISC	307E
7,8	A - CONNECT	311E
9,10	B - DISC	315E
11,12	A - CONNECT	319E
13,14	B - DISC	323E
15,17	A - CONNECT	327E
16,18	B - DISC	331E
19;20	A - CONNECT	335E

+G86
LOCKOUT RELAY

DECK #	TERMINATIONS		POS. TRIP	POS. RESET	
FRONT	B	C		X	200E
	F	G		X	
#1	#1 ⊣⊢ #3			X	212E
	#2 ⊣⊢ #8	X		X	329H
	#5 ⊣⊢ #7			X	307H
	#4 ⊣⊢ #6	X		X	218C
#2	#1 ⊣⊢ #3			X	
	#2 ⊣⊢ #8	X		X	303H
	#5 ⊣⊢ #7			X	
	#4 ⊣⊢ #6	X		X	207H
#3	#1 ⊣⊢ #3			X	
	#2 ⊣⊢ #8	X		X	
	#5 ⊣⊢ #7			X	
	#4 ⊣⊢ #6	X		X	

+GLRS
LOCAL/REMOTE

DECK #	TERMINATIONS		POS. LOCAL	POS. REMOTE	
1	2 ⊣⊢ 1		X		325H
	6 ⊣⊢ 5		X		220H
	7 ⊣⊢ 3			X	211H
2	2 ⊣⊢ 1		X		215B
	6 ⊣⊢ 5		X		
	7 ⊣⊢ 3			X	

+GPB
OPEN/CLOSE PUSH BUTTON

CONTACT CONFIGURATION AS VIEWED FROM FRONT			PUSH BUTTON ACTIVATED	
DECK	L	R		
1		NC	X	□
		NO	□	X

238B

+GMMS
MAINT.MODE SWITCH

CONTACT CONFIGURATION AS VIEWED FROM FRONT			OPERATOR POSITION OFF	OPERATOR POSITION ON	
DECK	L	R			
1		NO	□	X	215H
		NO	□	X	

[1] "+GPM" and "+MPM" are used elsewhere in set, but on one-line diagram this is listed as "+GMPQ", which is correct? Fix. (TYP)

[2] On BOM this is listed as "Power Monitor 1500" and NOT "Power Monitor 5000", which is correct? Fix. (TYP)

[3] Make note of SEL735 change on sheet M1. (TYP)

+GTSW1

A	B	C	D	E	F	G	H	I	J	K	L	M	N
P	P	P	C - C		C - C		C - C		C - C		P	P	P
1	2	3	4	5	6	7	8	9	10	11	12	13	14
121F		123F	125F		104C		106C		108C		127F	214C	216C

+GTSW2

A	B	C	D	E	F	G	H	I	J	K	L	M	N
P	P	P	C - C		C - C		C - C		C - C		P	P	P
1	2	3	4	5	6	7	8	9	10	11	12	13	14
129F		131F	133F		114C		116C		118C		135F	1005J	1007J

+GTSW3

A	B	C	D	E	F	G	H	I	J	K	L	M	N
P	P	P	C - C		C - C		C - C		C - C		P	P	P
1	2	3	4	5	6	7	8	9	10	11	12	13	14
218C		219C	200C		125J		127J		129J		105J	220C	

+GCBS
BREAKER CONTROL

DECK #	TERMINATIONS		POS. TRIP	POS. NORMAL	POS. CLOSE	
TB	1 ⊣⊢ 8		X			221C
	6 ⊣⊢ 7				X	
LED	A	D	L-OPEN			233E
	B	E	R-CLOSED			235E
	C	F	T/B-TRIPPED			

+GPM		
POWER MONITOR 5000		
TERMINAL POINTS	FUNCTION	ZONE
IAH,IAL	CURRENT AØ	114D
IBH,IBL	CURRENT BØ	116D
ICH,ICL	CURRENT CØ	118D
INH,INL	CURRENT NEUTRAL	
VA,VB,VC,VN	VOLTAGE INPUTS	129F
L(+),N(-)	POWER SUPPLY	224J
GND	PE GROUND	227I
RS-485	COM 1	
RS-485	COM 2	
1,2,3	PULSE OUTPUT 1	
4,5,6	PULSE OUTPUT 2	
7,8,9	PULSE OUTPUT 3	
10,11,12	PULSE OUTPUT 4	
RJ45	10/100 BASE-TX	1421B
RJ45	10/100 BASE-TX	

+F152		
POWER CIRCUIT BREAKER		
TERMINAL POINTS	FUNCTION	ZONE
AØ,BØ,CØ	MAIN BUS TERMINALS	416A
13,14	52 a	531C
17,18	52 a	
15,16	52 b	529C
19,20	52 b	
6,11	52 b	
3,23	52 b	
8,12	SHUNT TRIP	525E
4,10	SR CLOSING COIL	513E
1,9	M MOTOR	509E

+F1751			
MULTIFUNCTION RELAY			
TERMINAL GROUP	TERMINAL POINT	FUNCTION	ZONE
A	01,02	CONTROL PWR	515J
	03,04	O101-CLOSE	
	05,06	O102	525C
	07,08,09	O103	
	10,11	I101-BREAKER CLOSE STAUS	533E
	12,11	I102	
	GND	(PE) GROUND	522I
B	RS-232	FRONT PORT	
	RJ-45	10-100 BASE-T PORT 1A	1421E
	RJ-45	10/100 BASE-T PORT 1B	
	RS-232	RS-232 PORT3	
C	01,02	O301	
	03,04	O302-TRIP	527C
	05,06	O303	
	07,08	O304	
	09,10	I301	
	11,12	I302	507J
	13,14	I303	511J
	15,16	I304	
D	01,02	O401-BREAKER STATUS	615G
	03,04	O402-BREAKER READY	619G
	05,06	O403-ALARM	623G
	07,08	O404	
	09,10	I401-MAINT.MODE STATUS	
	11,12	I402-OPEN/CLOSE PUSH BUTTON	
	13,14	I403	
	15,16	I404	
Z	01,02	CURRENT AØ	407D
	03,04	CURRENT BØ	409D
	05,06	CURRENT CØ	411D
	07,08	NEUTRAL	
	09,10,11,12	VA,VB,VC,N	

+F1PB
OPEN/CLOSE PUSH BUTTON

CONTACT CONFIGURATION AS VIEWED FROM FRONT			PUSH BUTTON ACTIVATED	
DECK	L	R		
1		NC	X	□
		NO	□	X

APPROVED	
APPROVED AS NOTED	X
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

+F1MOC		
MECHANISM OPERATED CELL SWITCH		
TERMINAL POINTS	FUNCTION	ZONE
1,2	A	605C
3,4	B	535G
5,6	A	609C
7,8	B	613C
9,10	A	617C
11,12	B	621C
13,14	A	625C
15,17	B	629C
16,18	A	633C
19;20	B	637C

+F1TOC		
TRUCK OPERATED CELL SWITCH		
TERMINAL POINTS	FUNCTION	ZONE
1,2	B - DISC	535C
3,4	A - CONNECT	605E
5,6	B - DISC	609E
7,8	A - CONNECT	613E
9,10	B - DISC	617E
11,12	A - CONNECT	621E
13,14	B - DISC	625E
15,17	A - CONNECT	629E
16,18	B - DISC	633E
19;20	A - CONNECT	637E

+F1TSW1

A	B	C	D	E	F	G	H	I	J	K	L	M	N
P	P	P	C - C		C - C		C - C		C - C		P	P	P
1	2	3	4	5	6	7	8	9	10	11	12	13	14
515D		517D	519D		407C		409C		411C		525D	526D	527D

+F1MMS
MAINT.MODE SWITCH

CONTACT CONFIGURATION AS VIEWED FROM FRONT			OPERATOR POSITION OFF	OPERATOR POSITION ON	
DECK	L	R			
1		NO	□	X	
		NO	□	X	

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

+F1LRS
LOCAL/REMOTE

DECK #	TERMINATIONS		POS. LOCAL	POS. REMOTE	
1	2 ⊣⊢ 1		X		627G
	6 ⊣⊢ 3			X	517B
	5 ⊣⊢ 7		X		511H
2	2 ⊣⊢ 1		X		627G
	6 ⊣⊢ 3			X	
	5 ⊣⊢ 7		X		513H

+F186
LOCKOUT RELAY

DECK #	TERMINATIONS		POS. TRIP	POS. RESET	
FRONT	B	C		X	527E
	F	G		X	
#=1	#1 ⊣⊢ #3			X	513E
	#2 ⊣⊢ #8	X			519C
	#5 ⊣⊢ #7			X	
	#4 ⊣⊢ #6	X			507H
#=2	#1 ⊣⊢ #3			X	605G
	#2 ⊣⊢ #8	X			609G
	#5 ⊣⊢ #7			X	
	#4 ⊣⊢ #6	X			631G
#=3	#1 ⊣⊢ #3			X	
	#2 ⊣⊢ #8	X			
	#5 ⊣⊢ #7			X	
	#4 ⊣⊢ #6	X			

+F1GND			
GROUND PAD			
TERMINAL GROUP	TERMINAL POINT	FUNCTION	ZONE
1	.1	GROUND TERMINAL	412C
	.2	GROUND TERMINAL	437A
2	.1	GROUND TERMINAL	523I
	.2	GROUND TERMINAL	1320F
3	.1	GROUND TERMINAL	
	.2	GROUND TERMINAL	
4	.1	GROUND TERMINAL	
	.2	GROUND TERMINAL	
5	.1	GROUND TERMINAL	
	.2	GROUND TERMINAL	
6	.1	GROUND TERMINAL	
	.2	GROUND TERMINAL	

+F1CBS
BREAKER CONTROL

DECK #	TERMINATIONS		POS. TRIP	POS. NORMAL	POS. CLOSE	
#=1	1 ⊣⊢ 8		X			523C
	6 ⊣⊢ 7				X	
LED	A	D	L-OPEN			529E
	B	E	R-CLOSED			531E
	C	F	T/B-TRIPPED			

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER
POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

DEVELOPMENTS (1 OF 3)
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13,8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	D4

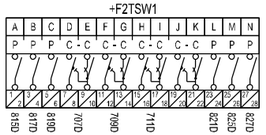
11/04/22
2022-11-04T22:32:42

+F252		
POWER CIRCUIT BREAKER		
TERMINAL POINTS	FUNCTION	ZONE
AØ,BØ,CØ	MAIN BUS TERMINALS	716A
13,14	52 a	831C
17,18	52 a	
15,16	52 b	829C
19,20	52 b	
6,11	52 b	
3,23	52 b	
4,10	SR CLOSING COIL	813F
8,12	SHUNT TRIP	825F
1,9	M MOTOR	809F

+F2MOC		
MECHANISM OPERATED CELL SWITCH		
TERMINAL POINTS	FUNCTION	ZONE
1,2	A	905B
3,4	B	935G
5,6	A	909B
7,8	B	913B
9,10	A	917B
11,12	B	921B
13,14	A	925B
15,17	B	929B
16,18	A	933B
19,20	B	937B

+F2TOC		
TRUCK OPERATED CELL SWITCH		
TERMINAL POINTS	FUNCTION	ZONE
1,2	B - DISC	835C
3,4	A - CONNECT	905E
5,6	B - DISC	909E
7,8	A - CONNECT	913E
9,10	B - DISC	917E
11,12	A - CONNECT	921E
13,14	B - DISC	925E
15,17	A - CONNECT	929E
16,18	B - DISC	933E
19,20	A - CONNECT	937E

+F2TSW1



+F2GND			
GROUND PAD			
TERMINAL GROUP	TERMINAL POINT	FUNCTION	ZONE
1	.1	GROUND TERMINAL	712C
	.2	GROUND TERMINAL	
2	.1	GROUND TERMINAL	820J
	.2	GROUND TERMINAL	1328F
3	.1	GROUND TERMINAL	
	.2	GROUND TERMINAL	
4	.1	GROUND TERMINAL	
	.2	GROUND TERMINAL	
5	.1	GROUND TERMINAL	
	.2	GROUND TERMINAL	
6	.1	GROUND TERMINAL	
	.2	GROUND TERMINAL	

+F2751			
MULTIFUNCTION RELAY			
TERMINAL GROUP	TERMINAL POINT	FUNCTION	ZONE
A	01,02	CONTROL PWR	815J
	03,04	O101-CLOSE	811C
	05,06	O102	825C
	07,08,09	O103	
	10,11	I101-BREAKER CLOSE STATUS	833F
	12,11	I102	
	GND	(PE) GROUND	819I
B	RS-232	FRONT PORT	
	RJ-45	10-100 BASE-T PORT 1A	1421F
	RJ-45	10/100 BASE-T PORT 1B	
	RS-232	RS-232 PORT3	
C	01,02	O301	
	03,04	O302	
	05,06	O303-TRIP	827C
	07,08	O304	
	09,10	I301-BREAKER DISC STATUS	835F
	11,12	I302-TRIP STATUS	807J
	13,14	I303-LOCAL STATUS	811J
	15,16	I304-REMOTE STATUS	
D	01,02	O401-BREAKER STATUS	915G
	03,04	O402-BREAKER READY STATUS	919G
	05,06	O403-ALARM	923G
	07,08	O404	
	09,10	I401-MAINT.MODE STATUS	803J
	11,12	I402-OPEN/CLOSE PUSH BUTTON	807F
	13,14	I403	
	15,16	I404	
Z	01,02	CURRENT AØ	707E
	03,04	CURRENT BØ	709E
	05,06	CURRENT CØ	711E
	07,08	NEUTRAL	
	09,10,11,12	VA,VB,VC,N	

+F286
LOCKOUT RELAY

DECK #	TERMINATIONS		POS. TRIP	POS. RESET	
FRONT	B	C		X	827F
	F	G		X	
#=1	#1 ⊣⊢ #3			X	813E
	#2 ⊣⊢ #8		X		819C
	#5 ⊣⊢ #7			X	
	#4 ⊣⊢ #6		X		807H
#=2	#1 ⊣⊢ #3			X	905G
	#2 ⊣⊢ #8		X		909G
	#5 ⊣⊢ #7			X	
	#4 ⊣⊢ #6		X		931G
#=3	#1 ⊣⊢ #3			X	
	#2 ⊣⊢ #8		X		
	#5 ⊣⊢ #7			X	
	#4 ⊣⊢ #6		X		

+F2PB
OPEN/CLOSE PUSH BUTTON

CONTACT CONFIGURATION AS VIEWED FROM FRONT			PUSH BUTTON ACTIVATED	
DECK	L	R		
1		NC	X	□
		NO	□	X

+F2CBS
BREAKER CONTROL

DECK #	TERMINATIONS	POS. TRIP	POS. NORMAL	POS. CLOSE	
#=1	1 ⊣⊢ 8	X			823C
	6 ⊣⊢ 7			X	
LED	A → D	L-OPEN			829F
	B → E	R-CLOSED			831F
	C → F	T/B-TRIPPED			

+F2MMS
MAINT.MODE SWITCH

CONTACT CONFIGURATION AS VIEWED FROM FRONT			OPERATOR POSITION OFF	OPERATOR POSITION ON	
DECK	L	R			
1		NO	□	X	803H
		NO	□	X	

+F2LRS
LOCAL/REMOTE

DECK #	TERMINATIONS	POS. LOCAL	POS. REMOTE	
1	2 ⊣⊢ 1	X		811H
	⊣⊢ 3		X	817B
	6 ⊣⊢ 5	X		
	⊣⊢ 7		X	813H
2	2 ⊣⊢ 1	X		
	⊣⊢ 3		X	927G
	6 ⊣⊢ 5	X		
	⊣⊢ 7		X	

[1] Change Title Block Name to
"Sewerage & Water Board of New Orleans"
(TYP ALL DRAWINGS)

[2] ADD Equipment Tag
(WPCCTG-7-EMV60-SG-201) to Title Block.
(TYP ALL DRAWINGS)

APPROVED	
APPROVED AS NOTED	X
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
3	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER
www.PointEightPower.com
800.284.1522

DEVELOPMENTS (2 OF 3)
THE REYNOLDS CO LLC
SOLAR TURBINE ?
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	D5

11/04/22
2022-11-04T22:32:48

+M52
POWER CIRCUIT BREAKER

TERMINAL POINTS	FUNCTION	ZONE
AØ,BØ,CØ	MAIN BUS TERMINALS	1010A
13,14	52 a	1107H
17,18	52 a	
15,16	52 b	1103H
19,20	52 b	212C
6,11	52 b	
3,23	52 b	
8,12	SHUNT TRIP	1129E
4,10	SR CLOSING COIL	1113F
1,9	M MOTOR	1107F

+MMOC
MECHANISM OPERATED CELL SWITCH

TERMINAL POINTS	FUNCTION	ZONE
1,2	A	1203B
3,4	B	1205J
5,6	A	1207B
7,8	B	1211B
9,10	A	1215B
11,12	B	1219B
13,14	A	1223B
15,17	B	1227B
16,18	A	1231B
19;20	B	1235B

+MTOC
TRUCK OPERATED CELL SWITCH

TERMINAL POINTS	FUNCTION	ZONE
1,2	B - DISC	1109H
3,4	A - CONNECT	1203E
5,6	B - DISC	1207E
7,8	A - CONNECT	1211E
9,10	B - DISC	1215E
11,12	A - CONNECT	1219E
13,14	B - DISC	1223E
15,17	A - CONNECT	1227E
16,18	B - DISC	1231E
19;20	A - CONNECT	1235E

[1] "+GPM" and "+MPM" are used elsewhere in set, but on one-line diagram this is listed as "+GMPQ", which is correct? Fix. (TYP)

[2] On BOM this is listed as "Power Monitor 1500" and NOT "Power Monitor 5000", which is correct? Fix. (TYP)

[3] Make note of SEL735 change on sheet M1. (TYP)

+MPM
POWER MONITOR 5000

TERMINAL POINTS	FUNCTION	ZONE
IAH,IAL	CURRENT AØ	1013D
IBH,IBL	CURRENT BØ	1015D
ICH,ICL	CURRENT CØ	1017D
INH,INL	CURRENT NEUTRAL	
VA,VB,VC,VN	VOLTAGE INPUTS	1021G
L(+),N(-)	POWER SUPPLY	1129J
GND	PE GROUND	1133H
RS-485	COM 1	
RS-485	COM 2	
1,2,3	PULSE OUTPUT 1	
4,5,6	PULSE OUTPUT 2	
7,8,9	PULSE OUTPUT 3	
10,11,12	PULSE OUTPUT 4	
RJ45	10/100 BASE-TX	1421C
RJ45	10/100 BASE-TX	

+M751
MULTIFUNCTION RELAY

TERMINAL GROUP	TERMINAL POINT	FUNCTION	ZONE
A	01,02	CONTROL PWR	1123J
	03,04	O101-CLOSE	
	05,06	O102	
	07,08,09	O103	
	10,11	I101	
	12,11	I102	
	GND	(PE) GROUND	1133H
B	RS-232	FRONT PORT	
	RJ-45	10-100 BASE-T PORT 1A	1421D
	RJ-45	10/100 BASE-T PORT 1B	
	RS-232	RS-232 PORT3	
C	01,02	O301-TRIP	1129B
	03,04	O302-TRIP	1133B
	05,06	O303 - CLOSE PERMISSIVE	1113E
	07,08	O304-SYNC	1109B
	09,10	I301-BKR DISC. STATUS	1109J
	11,12	I302-M88 TRIP STATUS	1115J
	13,14	I303-LOCAL STATUS	1119J
	15,16	I304-BREAKER CLOSE STATUS	1105J
D	01,02	O401BREAKER STATUS	1221G
	03,04	O402-BREAKER READY STATUS	1225G
	05,06	O403-ALARM	1229G
	07,08	O404	
	09,10	I401-TRIP STATUS	1127B
	11,12	I402-86 TRIP STATUS	1131B
	13,14	I403-MAINT.MODE STATUS	1111J
	15,16	I404-OPEN/CLOSE PUSH BUTTON	87E
	01,02	VS,NS	1010J
	03,04	VB+,VB-	
	05T,05R	AF1	
	06T,06R	AF2	
	07T,07R	AF3	
	08T,08R	AF4	
Z	01,02	CURRENT AØ	1013E
	03,04	CURRENT BØ	1015E
	05,06	CURRENT CØ	1017E
	07,08	NEUTRAL	
	09,10,11,12	VA,VB,VC,N	1029G

+B587Z
BUS DIFFERENTIAL RELAY

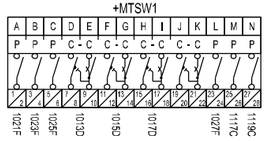
TERMINAL POINTS	FUNCTION	ZONE
101,102	87A	1021E
103,104	87B	1023E
105,106	87C	1025E
107,108	IA	
109,110	IB	
111,112	IC	
201,202	IN1	
203,204	OUT1-TRIP	1135B
205,206	OUT2	
207,208	IN2	
209,210	OUT3	
211,212	OUT4	
213,214	ALARM	
215,216	POWER (+/H,-/N)	1125J
217	GND	
EIA-232	EIA-232, PORT F	
EIA-232	EIA-232, PORT 1	

+MMMS
MAINT.MODE SWITCH

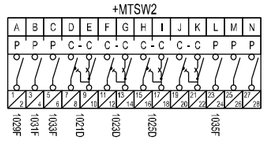
CONTACT CONFIGURATION AS VIEWED FROM FRONT			OPERATOR POSITION	
			OFF	ON
DECK	L	R		
1		NO	□	X
	NO		□	X

1111H

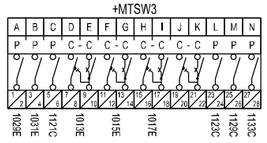
+MTSW1



+MTSW2



+MTSW3



+MCBS
BREAKER CONTROL

DECK #	TERMINATIONS		TRIP	NORMAL	CLOSE	POS.
#1	1 ⊣⊢ 8		X			1125B
	6 ⊣⊢ 7				X	
LED	A ⊣⊗⊢ D		L-OPEN			1103J
	B ⊣⊗⊢ E		R-CLOSED			1107J
	C ⊣⊗⊢ F		T/B-TRIPPED			

+MPB
OPEN/CLOSE PUSH BUTTON

CONTACT CONFIGURATION AS VIEWED FROM FRONT			PUSH BUTTON		
				ACTIVATED	
DECK	L	R			
1		NC	X	□	1137B
	NO		□	X	

+B86
LOCKOUT RELAY

DECK #	TERMINATIONS		TRIP	RESET	POS.
FRONT	B	C		X	1135E
	F	G		X	
#1	#1 ⊣⊢ #3			X	212E
	#2 ⊣⊢ #8		X		1021C
	#5 ⊣⊢ #7			X	513E
	#4 ⊣⊢ #6		X		1023C
#2	#1 ⊣⊢ #3			X	813E
	#2 ⊣⊢ #8		X		1025C
	#5 ⊣⊢ #7			X	1113E
	#4 ⊣⊢ #6		X		521C
#3	#1 ⊣⊢ #3			X	
	#2 ⊣⊢ #8		X		821C
	#5 ⊣⊢ #7			X	
	#4 ⊣⊢ #6		X		1123B
#4	#1 ⊣⊢ #3			X	
	#2 ⊣⊢ #8		X		219C
	#5 ⊣⊢ #7			X	
	#4 ⊣⊢ #6		X		
#5	#1 ⊣⊢ #3			X	1211G
	#2 ⊣⊢ #8		X		1215G
	#5 ⊣⊢ #7			X	
	#4 ⊣⊢ #6		X		

+M86
LOCKOUT RELAY

DECK #	TERMINATIONS		TRIP	RESET	POS.
FRONT	B	C		X	1133E
	F	G		X	
#1	#1 ⊣⊢ #3			X	1113E
	#2 ⊣⊢ #8		X		1121B
	#5 ⊣⊢ #7			X	
	#4 ⊣⊢ #6		X		1115H
#2	#1 ⊣⊢ #3			X	1203G
	#2 ⊣⊢ #8		X		1207G
	#5 ⊣⊢ #7			X	
	#4 ⊣⊢ #6		X		1237G
#3	#1 ⊣⊢ #3			X	
	#2 ⊣⊢ #8		X		
	#5 ⊣⊢ #7			X	
	#4 ⊣⊢ #6		X		

+MLRS
LOCAL/REMOTE

DECK #	TERMINATIONS		LOCAL	REMOTE	POS.
1	2 ⊣⊢ 1		X		1119H
		3		X	1121H
	6 ⊣⊢ 5		X		1233G
		7		X	1119B
2	2 ⊣⊢ 1		X		
		3		X	
	6 ⊣⊢ 5		X		
		7		X	

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

+MGND
GROUND PAD

TERMINAL GROUP	TERMINAL POINT	FUNCTION	ZONE
1	.,1	GROUND TERMINAL	1019C
	.,2	GROUND TERMINAL	1027C
2	.,1	GROUND TERMINAL	1037E
	.,2	GROUND TERMINAL	1019J
3	.,1	GROUND TERMINAL	1040A
	.,2	GROUND TERMINAL	1134I
4	.,1	GROUND TERMINAL	1336F
	.,2	GROUND TERMINAL	
5	.,1	GROUND TERMINAL	
	.,2	GROUND TERMINAL	
6	.,1	GROUND TERMINAL	
	.,2	GROUND TERMINAL	

+M2740
ETHERNET SWITCH

SLOT	PORT/TML #	FUNCTION/TYPE	ZONE
PS-A	1	POWER GROUND (PG)	1133I
	2,3	POWER SUPPLY (+/H,-/N)	1127J
PS-B	1	POWER GROUND (PG)	
	2,3	POWER SUPPLY (+/H,-/N)	
A	1,2,3	SDN FLOW PROCESS	
B	ETH 1	10-100-1000 CU (RJ45)	1414B
	ETH 2	10-100-1000 CU (RJ45)	1414C
	ETH 3	10-100-1000 CU (RJ45)	1414D
	ETH 4	10-100-1000 CU (RJ45)	1414D
C	ETH 1	10-100-1000 CU (RJ45)	1414E
	ETH 2	10-100-1000 CU (RJ45)	1414F
	ETH 3	10-100-1000 CU (RJ45)	1414F
	ETH 4	10-100-1000 CU (RJ45)	1414G
D	ETH 1	10-100-1000 CU (RJ45)	1414H
	ETH 2	10-100-1000 CU (RJ45)	1414H
	ETH 3	10-100-1000 CU (RJ45)	
	ETH 4	10-100-1000 CU (RJ45)	
E	ETH 1	10-100-1000 CU (RJ45)	
	ETH 2	10-100-1000 CU (RJ45)	
	ETH 3	10-100-1000 CU (RJ45)	
	ETH 4	10-100-1000 CU (RJ45)	
F	TX1, RX1	100BASE-FX	1414I
	TX2, RX2	100BASE-FX	1414J
	TX3, RX3	100BASE-FX	
	TX4, RX4	100BASE-FX	
CG	C1	CHASSIS GROUND (CG)	

APPROVED
APPROVED AS NOTED — X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 12/06/2022
JACOBS — Date

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTIAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND.

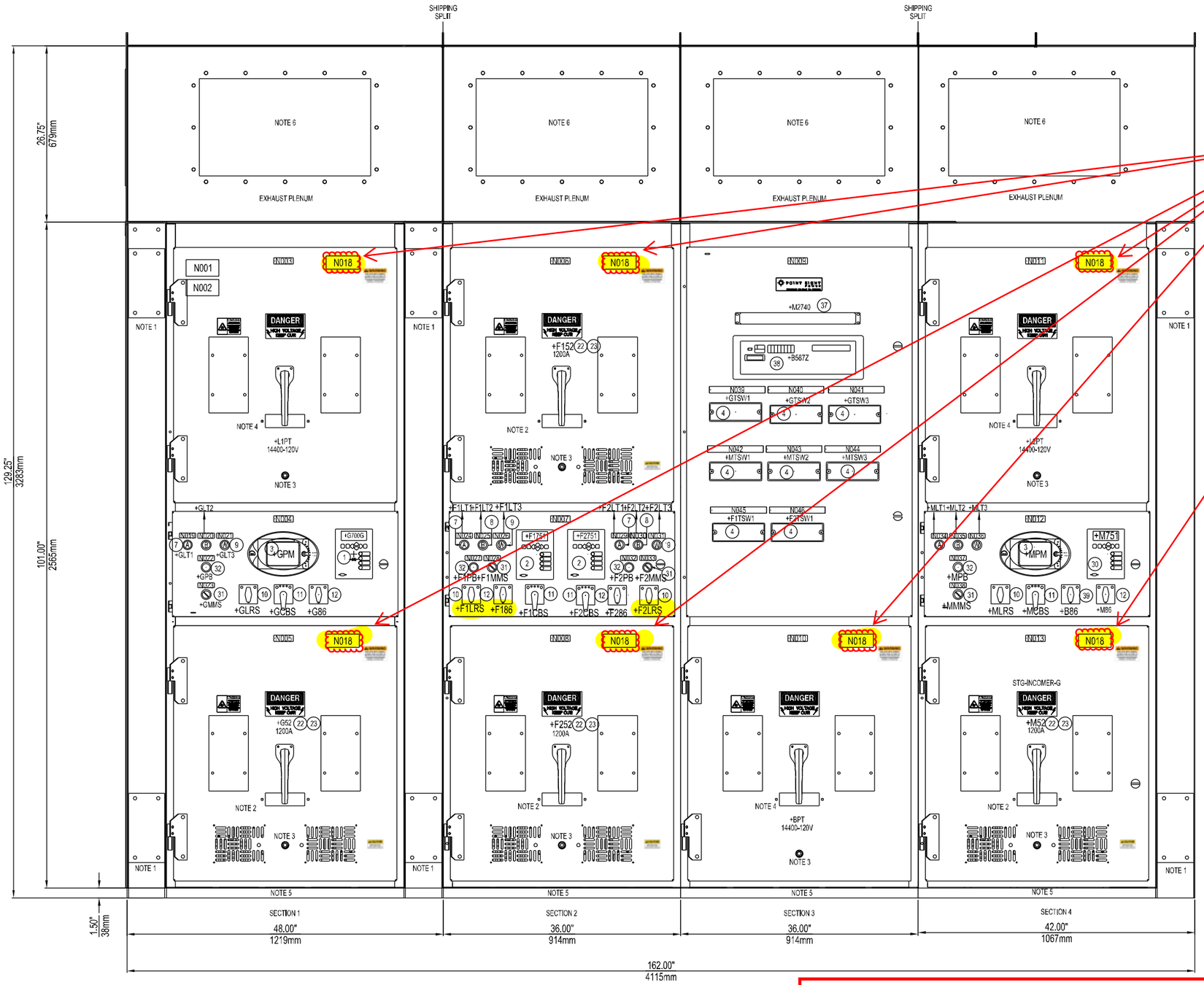
CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS. THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

DEVELOPMENTS (3 OF 3)
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13,8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	D6

11/04/22
2022-11-04T22:32:52



Where is Detail N018 on Sheets N1 and N2? (TYP)

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

NOTES:

1. CABLE ACCESS COVERS.
2. BREAKER POSITION VIEWING WINDOW.
3. REMOTE RACKING PORT.
4. PT DRAWER VIEWING WINDOW.
5. 1.5" CHANNEL BASE
6. ACCESS COVER

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

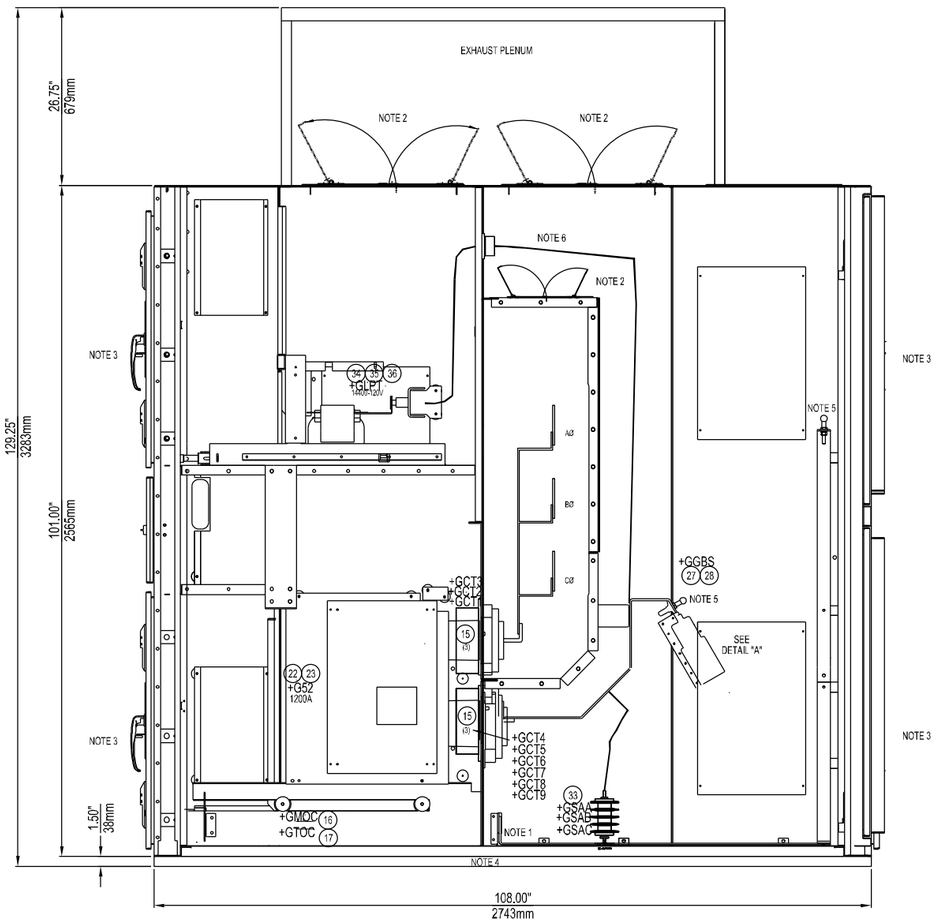
CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER
www.PointEightPower.com
800.284.1522

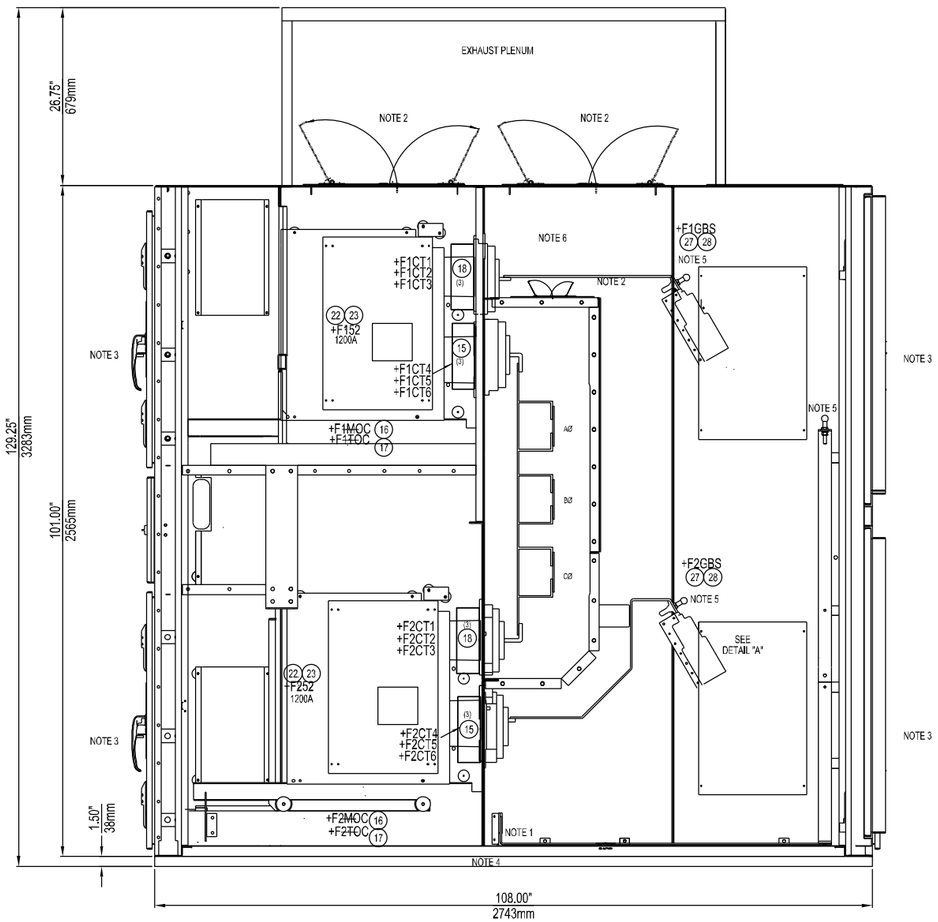
ARRANGEMENT DETAILS
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
1/8"=1"	CS	VR	R64672-01	L1

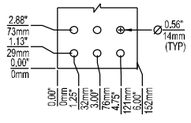
11/04/22
2022-11-04122-3304



SECTION #1



SECTION #2



DETAIL "A"
(NOT TO SCALE)

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED	☐
APPROVED AS NOTED	☒
REVISE AND RESUBMIT	☐
REJECTED	☐
NOT SUBJECT TO REVIEW	☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

NOTES:
1. GROUND BUS
2. PRESSURE RELIEF VENT
3. REAR COVERS
4. 1.5" CHANNEL BASE
5. 1 / 0" GROUND STUD WITH COVER
6. #2 AWG CABLE

NO.	REVISION	DATE	DFT	DES	PM	APP
5A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND.

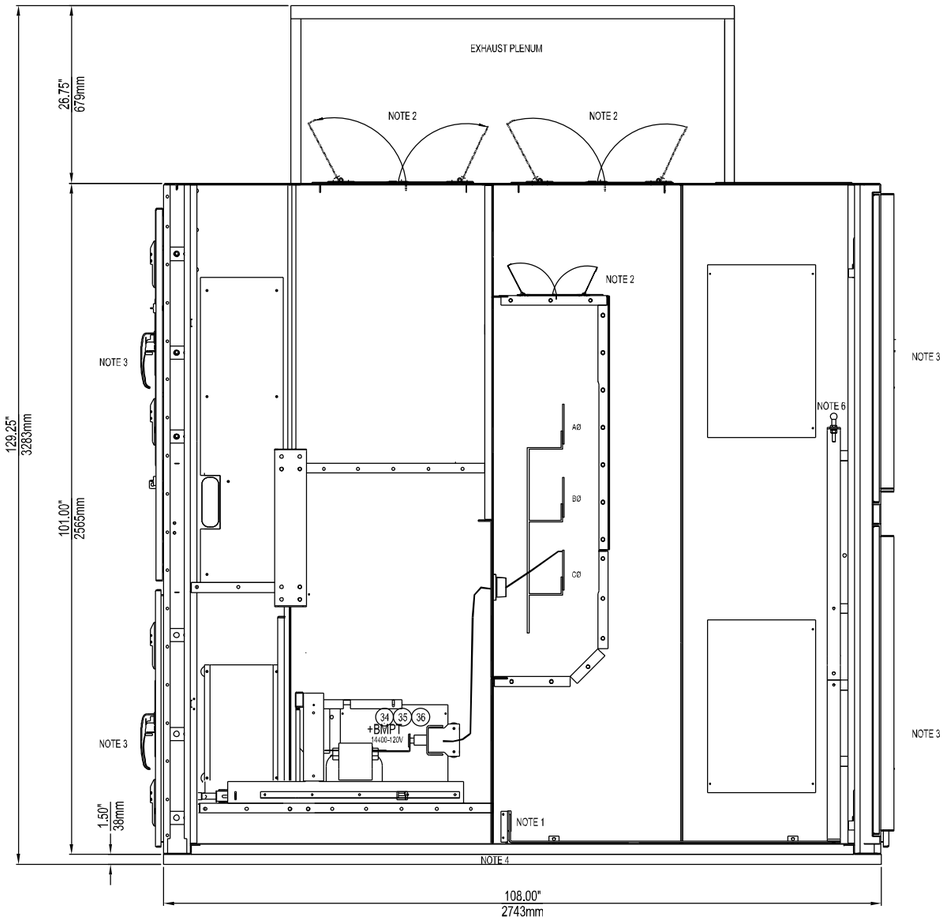
CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER
www.PointEightPower.com
800.284.1522

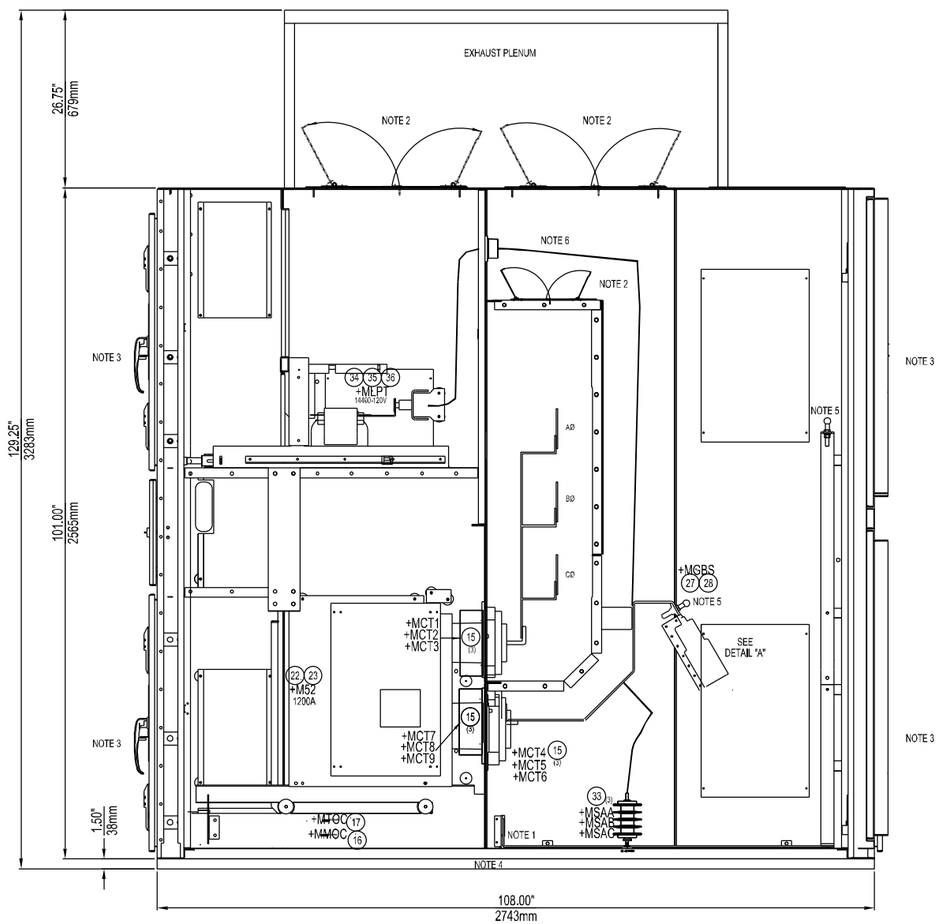
SIDE VIEWS (1 OF 2)
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
3/32"=1"	CS	VR	R64672-01	L2

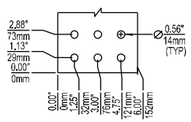
11/04/22
2022-11-04122-3315



SECTION #3



SECTION #1



DETAIL "A"
(NOT TO SCALE)

[1] Change Title Block Name to
"Sewerage & Water Board of New Orleans"
(TYP ALL DRAWINGS)

[2] ADD Equipment Tag
(WPCCTG-7-EMV60-SG-201) to Title Block.
(TYP ALL DRAWINGS)

APPROVED	
APPROVED AS NOTED	X
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

NOTES:
1. GROUND BUS
2. PRESSURE RELIEF VENT
3. REAR COVERS
4. 1.5" CHANNEL BASE
5. 1 / PH GROUND STUD WITH COVER
6. #2 AWG CABLE

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

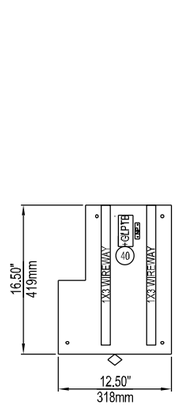
CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER
www.PointEightPower.com
800.284.1522

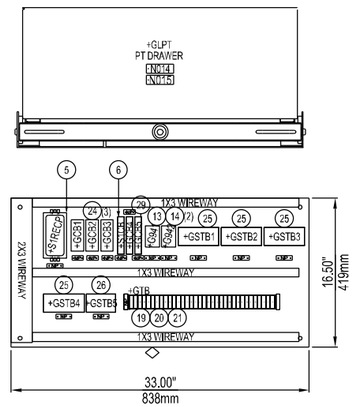
SIDE VIEWS (2 OF 2)
"THE REYNOLDS CO LLC"
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
3/32"=1"	CS	VR	R64672-01	L3

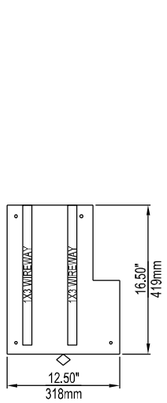
11/04/22
2022-11-04T223322



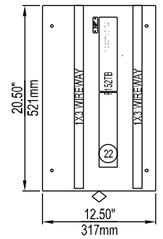
LEFT SIDE PAN



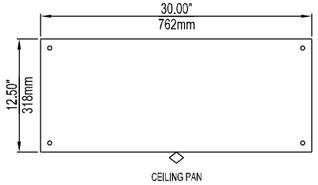
MOUNTING PAN



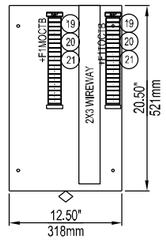
RIGHT SIDE PAN



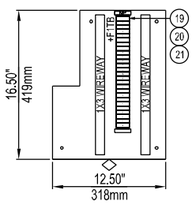
LEFT SIDE PAN IN UPPER BREAKER COMPARTMENT

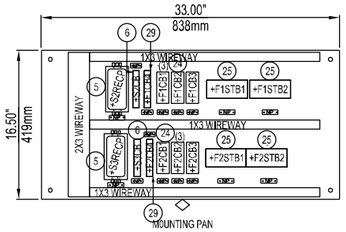


CEILING PAN

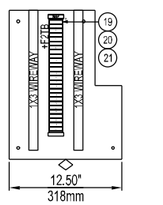


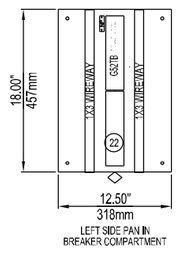
RIGHT SIDE PAN IN UPPER BREAKER COMPARTMENT



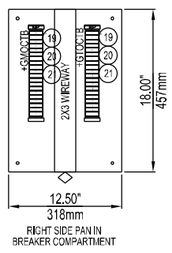


MOUNTING PAN



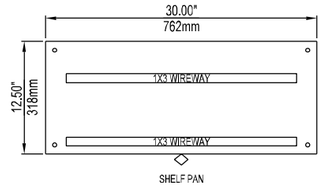


LEFT SIDE PAN IN BREAKER COMPARTMENT

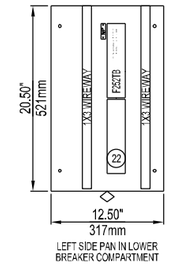


RIGHT SIDE PAN IN BREAKER COMPARTMENT

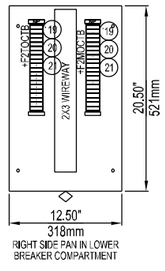
SECTION #1



SHELF PAN



LEFT SIDE PAN IN LOWER BREAKER COMPARTMENT



RIGHT SIDE PAN IN LOWER BREAKER COMPARTMENT

SECTION #2

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED						
APPROVED AS NOTED		X				
REVISE AND RESUBMIT						
REJECTED						
NOT SUBJECT TO REVIEW						

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 12/06/2022

JACOBS — Date

NO.	REVISION	DATE	DFT	DES	PM	APP
3	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — www.PointEightPower.com — 800.284.1522

BACKPAN DETAILS (1 OF 2)

THE REYNOLDS CO LLC

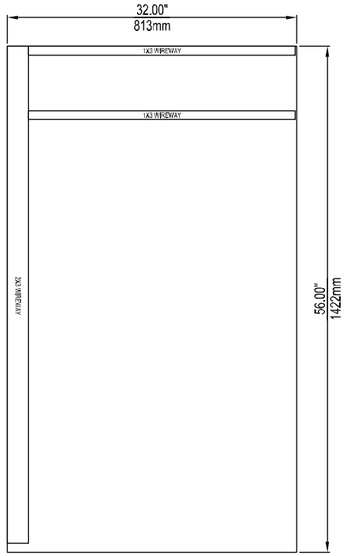
SOLAR TURBINE 7

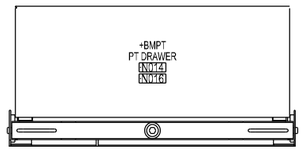
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM

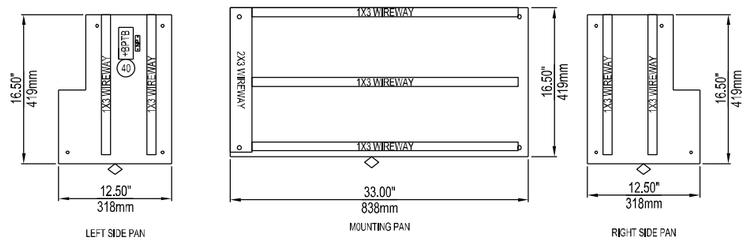
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
1/8"=1"	CS	VR	R64672-01	L4

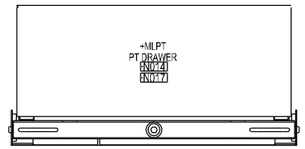
11/04/22
2022-11-04T22:33:33

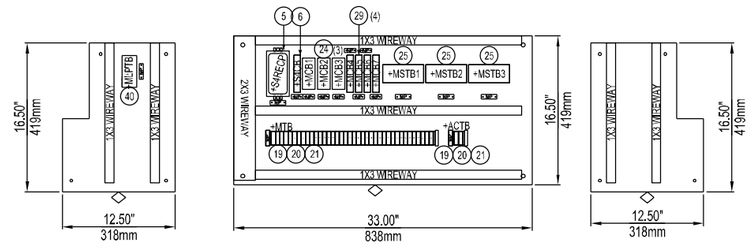






SECTION #3





SECTION #4

[1] Change Title Block Name to
"Sewerage & Water Board of New Orleans"
(TYP ALL DRAWINGS)

[2] ADD Equipment Tag
(WPCCTG-7-EMV60-SG-201) to Title Block.
(TYP ALL DRAWINGS)

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

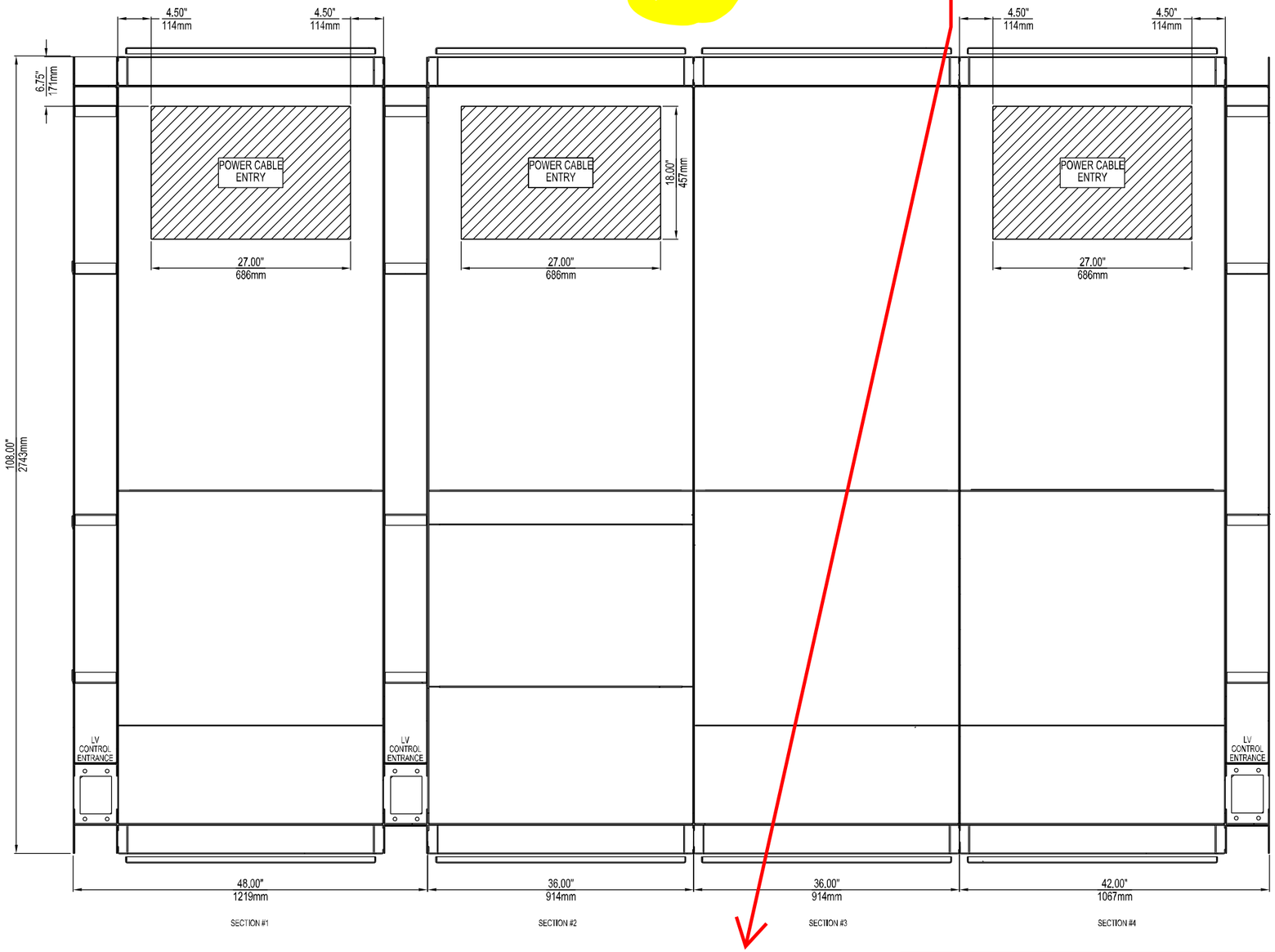
POINT EIGHT POWER
POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

BACKPAN DETAILS (2 OF 2)
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
1/8"=1"	CS	VR	R64672-01	L5

11/04/22
2022-11-04T22:33:40

Indicate FRONT and REAR of this BASE PLAN VIEW. (TYP)



BASE DETAILS

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED		
APPROVED AS NOTED		X
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 12/06/2022

JACOBS — Date

NO.	REVISION	DATE	DFT	DES	PM	APP
2	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND.

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM — www.PointEightPower.com — 800.284.1522

BASE DETAILS

THE REYNOLDS CO LLC

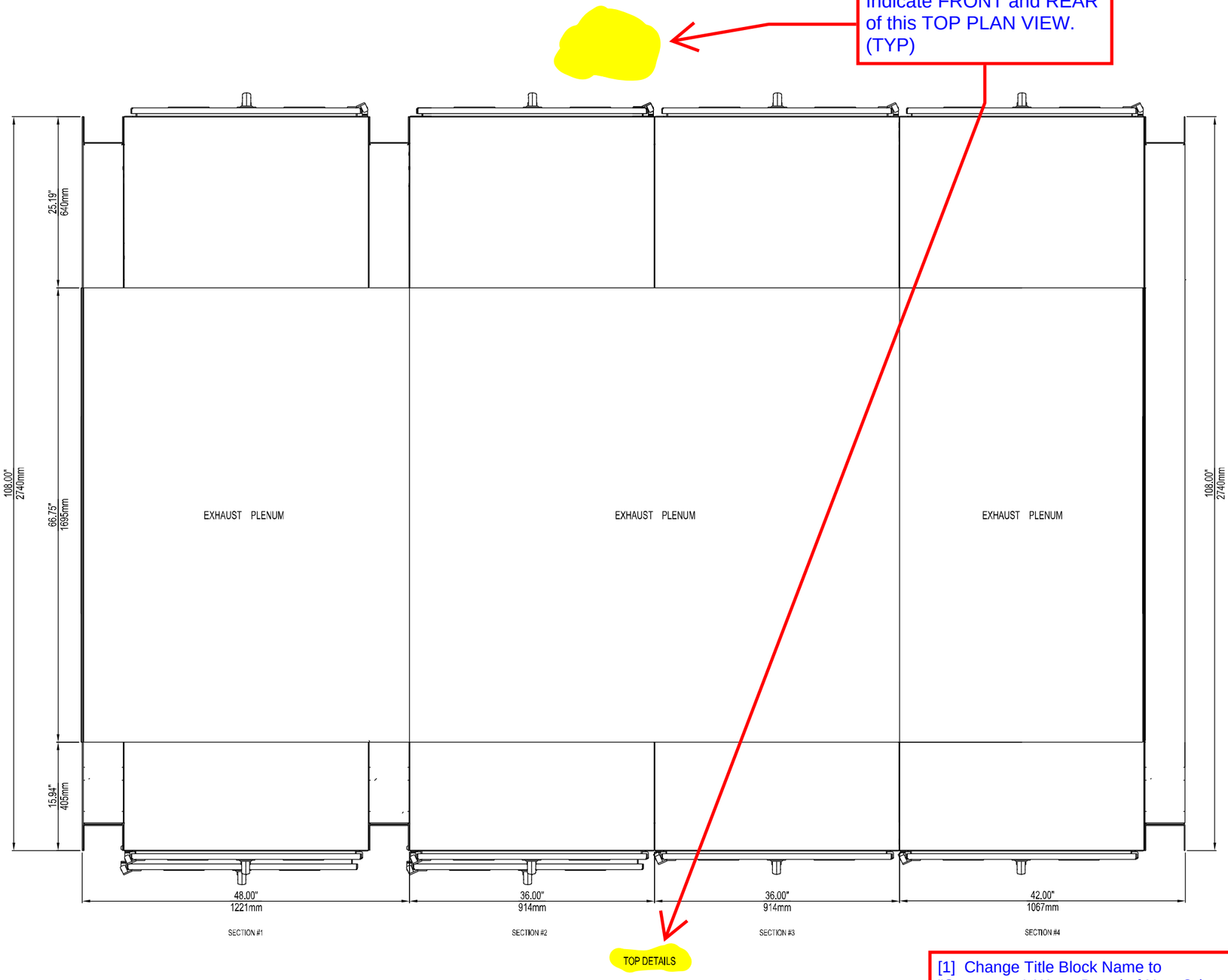
SOLAR TURBINE 7

13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM

MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
1/8"=1	CS	VR	R64672-01	L6

11/04/22
2022-11-04122-3344



[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED ☐
APPROVED AS NOTED ☒ X
REVISE AND RESUBMIT ☐
REJECTED ☐
NOT SUBJECT TO REVIEW ☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
2	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

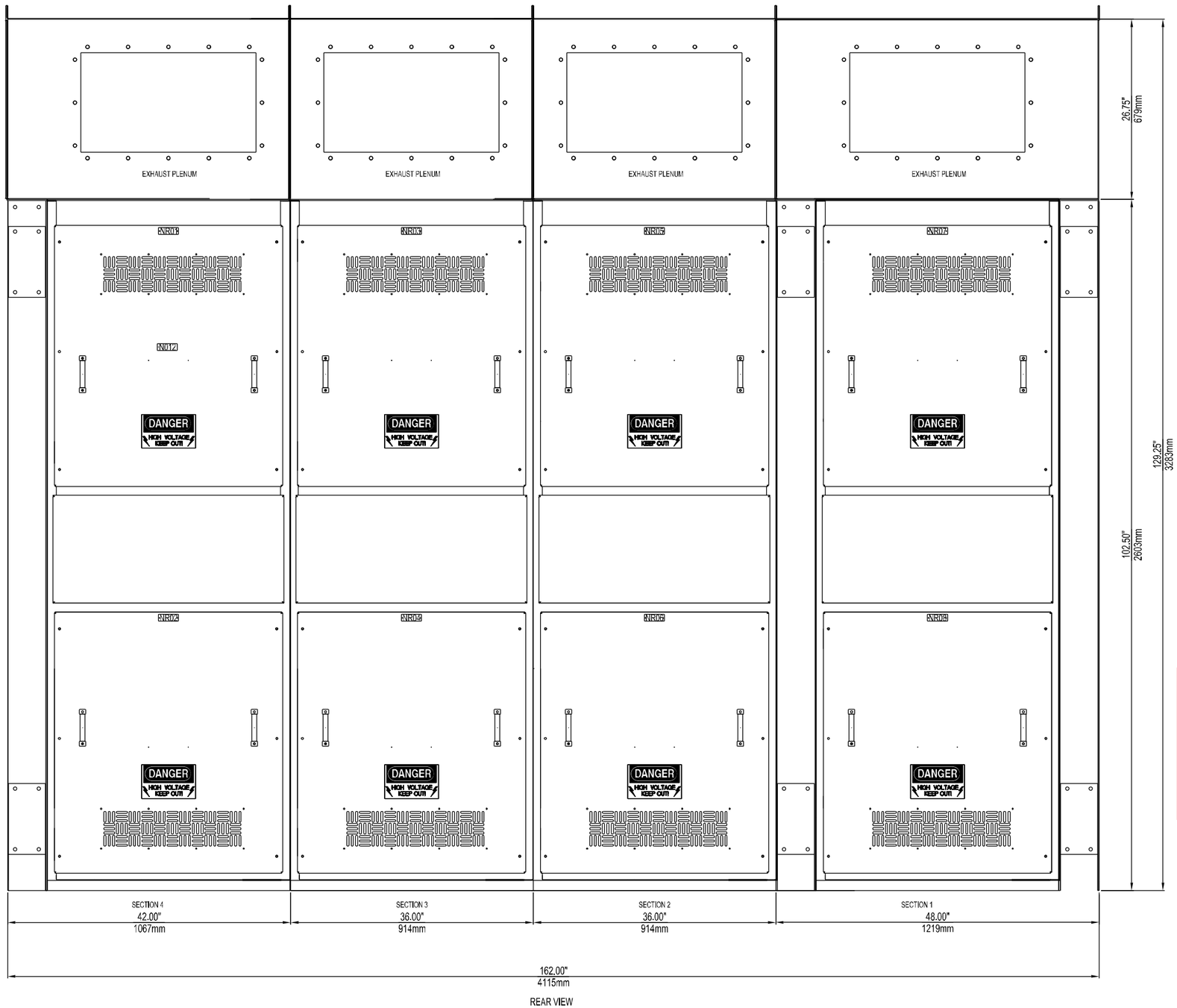
CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER
www.PointEightPower.com
800.284.1522

TOP DETAILS
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
1/8"=1	CS	VR	R64672-01	L7

11/04/22
2022-11-04T22:33:48



REAR VIEW

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED						
APPROVED AS NOTED		X				
REVISE AND RESUBMIT						
REJECTED						
NOT SUBJECT TO REVIEW						

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 12/06/2022

JACOBS — Date

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTIAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT 8 POWER — POINTEIGHTPOWER.COM — www.PointEightPower.com — 800.284.1522

REAR VIEW

THE REYNOLDS CO LLC

SOLAR TURBINE 7

13,8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM

MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
1/8"=1	CS	VR	R64672-01	L8

11/04/22
2022-11-04T224542

BILL OF MATERIAL

MARK	DEVICE ID	QTY	FUNCTION	MFG	PART NO	DESCRIPTION
1	+G700G	1	RELAY, PROTECTION, MULTIFUNCTION	SEL	0700G11A1A1A76850610	110-250 VDC; 110-240 VAC; 50/60HZ; 5A; SLOT A: PWR SPLY; SLOT B: EIA 232 F & R, DUAL10/100 ETH; SLOT C: 4
						DI/4DO; SLOT D: 4DI/4DO; SLOT E: 3ACI/2AVI; SLOT Z: 4ACI/3AVI, 2X16LCD W/8PB; IEC 61850;
2	+F1751 +F2751	2	RELAY, PROTECTION, MULTIFUNCTION	SEL	751001A1A1A0X850F10	110-250VDC,110-240VAC;50/60HZ;SLOTA:PWR SPLY;SLOT B:EIA232 FRONT DUAL 10/100BASE-T ETH, EIA232 REAR; SLOT C:
						4DI/4DO; SLOT D: 4DI/4DO;SLOT E: EMPTY;
3	+GPM +MPM	2	POWER MONITOR	NEXUS	NEXUS1500+-D2-60-20-V3-485P-NTRJ-X-X	277/480VAC L-P;90-265 VAC/100-370VDC;60Hz; OR100-3700VDC,5A AC, MULTIMETER FUNCTION;10A NOMINAL CT
						SECONDARY;DIGITAL,PQM 1500MODEL,PANEL MTG;
4	+F1TSW1 +F2TSW1 +GTSW1 +GTSW2 +GTSW3	8	TEST SWITCH, VOLTAGE/CURRENT	ABB	FT4A14T06BN4044	P1 P1 P1 C1-C1 C1-C1 C1-C1 C1-C1 P1 P1 P1; 30A@600V; (6)P & (8)CS; SCREW TERM; PANEL MNT; NOTES: ABB, FT-14,
	+MTSW1 +MTSW2 +MTSW3					STD, BLACK COVER; UL-E103204
5	+S1RECP +S2RECP +S3RECP +S4RECP	4	RECEPTACLE, COMERCIAL	LEVITON	N7899-DIN	SOLID OR STRANDED TERMINAL; 12-10AWG; DIN-RAIL MOUNT; 20A; 125V; GFCI RECEPTACTACLE; UL-E48380
6	+S1CB +S2CB +S3CB +S4CB	4	MINIATURE CIRCUIT BREAKER	A-B	1489-M1C150	1POLE; AC; 15A; 10kA; DIN RAIL MOUNTING; NOTES: UL489, C-CURVE; UL E-197878
7	+F1LT1 +F2LT1 +GLT1 +MLT1	4	PILOT DEVICE, LIGHT	ALLEN BRADLEY	800T-QH2A	30mm; LED; AMBER; 12-130VAC/VDC; SCREW TERM; 22-12 AWG; PANEL MNT; UL-E14840, E10314
8	+F1LT2 +F2LT2 +GLT2 +MLT2	4	PILOT DEVICE, LIGHT	ALLEN BRADLEY	800T-QH2B	30mm; LED; BLUE; 12-130VAC/VDC; SCREW TERM; 22-12 AWG; PANEL MNT; UL-E14840, E10314
9	+F1LT3 +F2LT3 +GLT3 +MLT3	4	PILOT DEVICE, LIGHT	ALLEN BRADLEY	800T-QH2W	30mm; LED; WHITE; 12-130VAC/VDC; SCREW TERM; 22-12 AWG; PANEL MNT; UL-E14840, E10314
10	+F1LRS +F2LRS +GLRS +MLRS	4	SWITCH , SELECTOR, LOCAL/REMOTE	SHALLCO	26202B	DPDT/DK; OVAL; 2DK; 45DEG; 2P; TITLE(LOCAL/REMOTE); 12(LOCAL); 1:30(REMOTE); PANEL MNT; NOTES: SHALLCO, 26,
						UL-E208327
11	+F1CBS +F2CBS +GCBS +MCBS	4	SWITCH, CIRCUIT BREAKER	SHALLCO	2638D-125VDCABC	40-140VDC INPUT; 125VDC; DPST/DK; PISTOL GRIP; 1DK; GREEN/AMBER/RED LED'S; 90DEG; 2P; TITLE(BREAKER CONTROL);
						12-RED FLAG; 1:30(CLOSE); 10:30(TRIP); PANEL MNT; NOTES: SHALLCO, 26 SERIES; UL-RECOGNIZED
12	+F186 +F286 +G86 +M86	4	RELAY, LOCKOUT	SHALLCO	7603D	LOR; AC/DC; 125V; 30-140V; 3PST/DECK; 20A@120VAC, 3A@125VAC, 1A@250VAC; SILVER CONTACTS; WIPER; SCREW TERM
						8-32; 3 DECK; PANEL MNT
13	+G941 +G942	2	RELAY, GENERAL PURPOSE	POTTER & BRUMFIELD	KRPA-11DG-125VDC	8PIN OCTAL TYPE; 125 VDC; 2PDT; 10A, 240VAC; ENCLOSED; SILVER CADIUM OXIDE; SOCKET MOUNTING; NO INDICATING
						LAMP; UL E22575; CSA LR15734
14	+G941 +G942	2	RELAY, SOCKET	IDEC	SR2P-06	RELAY SOCKET; PIN (DPDT); SCREW TERM; 2-12AWG; DIN RAIL MTG; NOTES: IDEC, RR; UR-E66043
15	+F1CT4 +F1CT5 +F1CT6 +F2CT4 +F2CT5	24	TRANSFORMER, CURRENT	ITI	780-152	600V; WINDOW; 1500/5A; STUD TERM; C200, B#; 50-400Hz; 10kVBIL; H9.88,W9.88,D3.38; WD6.5; NOTES: ITI, 780;
	+F2CT6 +GCT1 +GCT2 +GCT3 +GCT4					UR-E93779
	+GCT5 +GCT6 +GCT7 +GCT8 +GCT9					
	+MCT1 +MCT2 +MCT3 +MCT4 +MCT5					
	+MCT6 +MCT7 +MCT8 +MCT9					
16	+F1MOC +F2MOC +GMOC +MMOC	4	CIRCUIT BREAKER, ACCESSORY, MOC	EATON	1C20007G28	5/15kV; 36" ; VCPW;5A/4B (TEST AND CONNECT) RING-TONGUE TERMINALS
17	+F1TOC +F2TOC +GTOC +MTOC	4	CIRCUIT BREAKER, ACCESSORY, TOC	EATON	1C20006G15	5/15kV; 36"; VCPW; 4A/5B(TOC) RING-TONGUE TERMINALS
18	+F1CT1 +F1CT2 +F1CT3 +F2CT1 +F2CT2	6	TRANSFORMER, CURRENT	ITI	780-401	600V; WINDOW; 400/5A; STUD TERM; C50, B#; 50-400Hz; 10kVBIL; H9.88,W9.88,D3.38; WD6.5; NOTES: ITI,
	+F2CT3					780; UR-E93779
19	+ACTB(2) +F1MOCTB(20) +F1TB(26) +F1TOCTB(20) +F2MOCTB(20)	286	TERMINAL BLOCK, SECTIONAL	IDEC	BNH30W	SCREW TERMIANL; 18 TO 10 AWG; DIN RAIL MOUNT; 600V; 30A; BLACK; 1 POLE; UR-E78117
	+F2TB(26) +F2TOCTB(20) +GMOCTB(20) +GTB(34) +GTOCTB(20)					
	+MMOCTB(20) +MTB(38) +MTOCTB(20)					
20	+ACTB:1 +ACTB:2 +F1MOCTB:1 +F1MOCTB:20 +F1TB:1	26	TERMINAL BLOCK, ACCESSORY, END PLATE	IDEC	BNE30W	END PLATE FOR BNH30W TERMINAL BLOCK
	+F1TB:26 +F1TOCTB:1 +F1TOCTB:20 +F2MOCTB:1 +F2MOCTB20					
	+F2TB:1 +F2TB:26 +F2TOCTB:1 +F2TOCTB:20 +GMOCTB:1					
	+GMOCTB:20 +GTB:1 +GTB:34 +GTOCTB:1 +GTOCTB:20					
	+MMOCTB:1 +MMOCTB:20+MTB:1 +MTB:38 +MTOCTB:1					
	+MTOCTB:20					
21	+ACTB:1 +ACTB:2 +F1MOCTB:1 +F1MOCTB:20 +F1TB:1	26	TERMINAL BLOCK, ACCESSORY, END CLAMP	IDEC	BNL6	DIN RAIL STOP
	+F1TB:26 +F1TOCTB:1 +F1TOCTB:20 +F2MOCTB:1 +F2MOCTB20					
	+F2TB:1 +F2TB:26 +F2TOCTB:1 +F2TOCTB:20 +GMOCTB:1					
	+GMOCTB:20 +GTB:1 +GTB:34 +GTOCTB:1 +GTOCTB:20					
	+MMOCTB:1 +MMOCTB:20+MTB:1 +MTB:38 +MTOCTB:1					
	+MTOCTB:20					
22	+F152 +F252 +G52 +M52	4	POWER CIRCUIT BREAKER	EATON	150VCP-W40 REFER DESC	3P; 1200A; 15kV; BIL-95kV; 36kV RMS; 40kA RMS SCR; 104kA PEAK, MOM.; DRAWOUT; 125VDC-ST; MTR; CC;
						VCP-W-ANSI,5-CYCLE
23	+F152 +F252 +G52 +M52	4	POWER CIRCUIT BREAKER CASSETTE	EATON	1C19907G111	5/15kV; 36" ; VCPW; 1200A,; 41kA; LINE & BUS; GLASS POLYESTER
24	+F1CB1 +F1CB2 +F1CB3 +F2CB1 +F2CB2	12	MINIATURE CIRCUIT BREAKER	A-B	1492-D2C160	2POLE; DC; 16A; 10kA @500VDC, DIN RAIL MOUNTING; NOTES: UL1077, TYPE-C; UL-E65138
	+F2CB3 +GCB1 +GCB2 +GCB3 +MCB1					
	+MCB2 +MCB3					
25	+F1STB1 +F1STB2 +F2STB1 +F2STB2 +GSTB1	11	TERMINAL BLOCK, SHORTING	ITI	IKU6S	SCREW TERMINAL; 18-10AWG; SURFACE MOUNTING; 300V; 50A; BLACK; 6 POLE; NOTES: 30A WITH BARE WIRE; UR-E241554
	+GSTB2 +GSTB3 +GSTB4 +MSTB1 +MSTB2					
	+MSTB3					
26	+GSTB5	1	TERMINAL BLOCK, SHORTING	ITI	IKU4S	SCREW TERMINAL; 18-10AWG; SURFACE MOUNTING; 300V; 50A; BLACK; 4 POLE; NOTES: 30A WITH BARE WIRE; UR-E241554
27	+F1GBS +F2GBS +GGBS +MGBS	16	GROUNDING BALL STUD	HUBBELL	C6002102	43kA @ 15CY, 30kA @ 30CY; BALL STUD; 1/2113UNC X 2-1/8
28	+F1GBS +F2GBS +GGBS +MGBS	12	GROUNDING EQUIPMENT, ACCESSORY, COVER	HUBBELL	C4060416	GROUNDING STUD COVER (USE WITH C6002102)
29	+F1CB4 +F2CB4 +GCB4 +GCB5 +MCB4	8	MINIATURE CIRCUIT BREAKER	A-B	1492-D1C030	1POLE; DC; 3A; 10kA @250VDC, DIN RAIL MOUNTING; NOTES: UL489, TYPE-C; UL-E197878
	+MCB5 +MCB6 +MCB7					
30	+M751	1	RELAY, PROTECTION, MULTIFUNCTION	SEL	751001A1A1A70850F10	110-250VDC,110-240VAC;50/60HZ;SLOTA:PWR SPLY;SLOT B:DUAL 10/100BASE-T ETH, EIA232 REAR; SLOT C: 4DI/4DO; SLOT
						D: 4DI/4DO;SLOT E: VSYNC/VBAT/4AFDI; SLOT Z: 3VAC,5A P,5A N; 2X16LCD W/8PB; IEC 61850;
31	+F1MMS +F2MMS +GMMS +MMMS	4	PILOT DEVICE, SWITCH	IDEC	ASD220NU	30mm; 2 POS; 90 INDEX; 2NO; 1 DECK; BLACK; KNOB; 10A @ 24-110VAC, 8A @ 24VDC; SILVER CONTACTS; SCREW TERM;
						22-12 AWG; PANEL MNT; IP65; NOTES: TWND, SW, MAINTAINED; UL-E68961
32	+F1PB +F2PB +F2PB +MPB	4	PILOT DEVICE, PUSH BUTTON	IDEC	ABD111NUB	30mm, 1NO,1NC, 1 DECK, BLACK, FLUSH BUTTON, 10A @ 24-110VAC, 8A @ 24VDC, SILVER CONTACTS, SCREW TERM, 22-12
						AWG, PANEL MNT, IP65, TWND, PB, MOMENTARY, UL-E68967
33	+F1SA +F1SB +F1SC +GSAA +GSAB	9	SURGE PROTECTION, ARRESTER	GENERAL ELECTRIC	9L20FXX015XHS	1 POLE; POLYMER; 15kVrms; 12.7kVrms(L-N); DISTRIBUTION; NOTES: GE, TRANQUELL

Change to SEL735#03 for Generator and Main Power Monitor. (TYP)

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED	
APPROVED AS NOTED	X
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 12/06/2022

JACOBS — Date

NO.	REVISION	DATE	DFT	DES	PM	APP
DA	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND.

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS. THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM — www.PointEightPower.com — 800.284.1522

BILL OF MATERIAL (1 OF 2)

THE REYNOLDS CO LLC

SOLAR TURBINE 7

13,8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM

MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	M1

11/04/22
2022-11-04T22:33:58

BILL OF MATERIAL

MARK	DEVICE ID	QTY	FUNCTION	MFG	PART NO	DESCRIPTION
	+GSAC +MSAA +MSAB +MSAC					
34	+BMPT +GLPT +MLPT	3	TRANSFORMER, POTENTIAL	ITI	PTG5-1-110-1442F	PRI,1PH; 14400V; SEC,1PH; 120V; 120/1; 1500VA@30C; 15.5kV, BIL110kV; 0.3WXMY,1.2Z@100%,120V; SCREW TERM;
						SURFACE MTG; NOTES: ITI, PTG5, (1)0.5E FUSE; UR-E145172
35	+BMPT +GLPT +MLPT	3	DRAWER, MPT	PEP	LDR-MA-15K3M-01	ASSEMBLY, AUXILLARY, MA, LG XFMR DRAWER, TYPE 2, 15K3M (ITI)
36	+BMPT +GLPT +MLPT	3	MINIATURE CIRCUIT BREAKER	EATON	GHC3015	3 POLE; AC/DC; 15A; 480Y/277 VAC; 125/250 VDC; DIN RAIL MOUNTABLE
37	+M2740	1	NETWORK DEVICE, SWITCH	SEL	2740S#G4MM	20 PORT; SLOT A SDN FLOW PROCESSOR; SLOT B,C,D,E, 4PORT 10/100/1000Mbps CU ENet;SLOT F 4-Port 100BASE-FX
						Multimode Fiber 2 km Distance; PS-A 120VAC/125VDC;RACKMT,SDN SWITCH
38	+B587Z	1	RELAY, BUS DIFFERENTIAL	SEL	0587Z0X625312XX	UNIV; 125/250 VDC OR VAC CONTROL PWR; 2 MOVs - 5000J, 2000V; 5A SEC. INPUT; 50/60HZ; HORIZONTAL PANEL MOUNT;
						EIA-232 FRONT & REAR; STD PLUS MODBUS RTU; UL-E212775
39	+B86	1	RELAY, LOCKOUT	SHALLCO	7605D	LOR; AC/DC; 125V; 30-140V; 3PST/DECK; 20A@120VAC, 3A@125VAC, 1A@250VAC; SILVER CONTACTS; WIPER; SCREW TERM
						8-32; 3 DECK; PANEL MNT
40	+BPTB:1 +GLPTB:1 +MLPTB:1	3	TERMINAL BLOCK, BOARD	GENERAL ELECTRIC	CR151B6	SCREW TERM; SURFACE MTG; 600VAC; 30A; BLACK; 6 POLE; NOTES: GE, CR151B; UL-E15494
41	+CAT6	3	CABLE, PATCH	QUEST TECH INTERNATIONAL	NPC-6210	CAT6 ETHERNET CABLE; BLUE; 10FT; SNAGLESS; UL E466009
42	+CAT6	3	CABLE, PATCH	QUEST TECH INTERNATIONAL	NPC-6205	CAT6 ETHERNET CABLE; BLUE; 5FT; SNAGLESS; UL E466009

APPROVED ____ ☐
APPROVED AS NOTED ____ ☒
REVISE AND RESUBMIT ____ ☐
REJECTED ____ ☐
NOT SUBJECT TO REVIEW ____ ☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 12/06/2022
JACOBS — Date

NO.	REVISION	DATE	DFT	DES	PM	APP
2A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — www.PointEightPower.com — 800.284.1522

BILL OF MATERIAL (2 OF 2
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	M2

11/04/22
2022-11-04T22:34:01

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

EXTERIOR NAMEPLATE SCHEDULE

MARK	QTY	TYPE	COLOR	1ST LINE	2ND LINE	3RD LINE
N001	1	S	SS	SEE DETAIL		
N002	1	S	SS	SEE DETAIL		
N003	1	A	WB	GENERATOR BREAKER	LINE PT	COMPARTMENT
N004	1	A	WB	GENERATOR BREAKER	CONTROL	COMPARTMENT
N005	1	A	WB	GENERATOR BREAKER	COMPARTMENT	1200A
N006	1	A	WB	FEEDER BREAKER 1	COMPARTMENT	1200A
N007	1	A	WB	FEEDER BREAKER 1 & 2	CONTROL	COMPARTMENT
N008	1	A	WB	FEEDER BREAKER 2	COMPARTMENT	1200A
N009	1	A	WB	MAIN BREAKER	CONTROL	COMPARTMENT
N010	1	A	WB	MAIN BREAKER 1	BUS PT	COMPARTMENT
N011	1	A	WB	MAIN BREAKER	LINE PT	COMPARTMENT
N012	1	A	WB	MAIN BREAKER	COMPARTMENT	1200A
N013	1	A	WB	MAIN BREAKER	COMPARTMENT	1200A
N014	1	A	WB	SEE DETAIL		
N015	1	A	WB	SEE DETAIL		
N016	1	A	WB	SEE DETAIL		
N017	1	A	WB	SEE DETAIL		
N018	1	S	WB	SEE DETAIL		
N019	1	B	WB	GENERATOR BREAKER	86 TRIP LIGHT	
N020	1	B	WB	GENERATOR BREAKER	LOCAL LIGHT	
N021	1	B	WB	GENERATOR BREAKER	REMOTE LIGHT	
N022	1	B	WB	OPEN/CLOSE	PUSH BUTTON	
N023	1	B	WB	MAINT.MODE	SWITCH	ON OFF
N024	1	B	WB	FEEDER BREAKER 2	86 TRIP LIGHT	
N025	1	B	WB	FEEDER BREAKER 2	LOCAL LIGHT	
N026	1	B	WB	FEEDER BREAKER 2	REMOTE LIGHT	
N027	1	B	WB	OPEN/CLOSE	PUSH BUTTON	
N028	1	B	WB	MAINT.MODE	SWITCH	ON OFF
N029	1	B	WB	FEEDER BREAKER 1	86 TRIP LIGHT	
N030	1	B	WB	FEEDER BREAKER 1	LOCAL LIGHT	
N031	1	B	WB	FEEDER BREAKER 1	OPEN LIGHT	
N032	1	B	WB	OPEN/CLOSE	PUSH BUTTON	
N033	1	B	WB	MAINT.MODE	SWITCH	ON OFF
N034	1	B	WB	MAIN BREAKER	86 TRIP LIGHT	
N035	1	B	WB	MAIN BREAKER	LOCAL LIGHT	
N036	1	B	WB	MAIN BREAKER	REMOTE LIGHT	
N037	1	B	WB	OPEN/CLOSE	PUSH BUTTON	
N038	1	B	WB	MAINT.MODE	SWITCH	ON OFF
N039	1	S	WB	SEE DETAIL		
N040	1	S	WB	SEE DETAIL		
N041	1	S	WB	SEE DETAIL		
N042	1	S	WB	SEE DETAIL		
N043	1	S	WB	SEE DETAIL		
N044	1	S	WB	SEE DETAIL		
N045	1	S	WB	SEE DETAIL		
N046	1	S	WB	SEE DETAIL		
NR01	1	A	WB	MAIN BREAKER	LINE PT	COMPARTMENT
NR02	1	A	WB	MAIN BREAKER	COMPARTMENT	1200A
NR03	1	A	WB	CONTROL	COMPARTMENT	
NR04	1	A	WB	MAIN BREAKER	BUS PT	COMPARTMENT
NR05	1	A	WB	FEEDER BREAKER 1	COMPARTMENT	1200A
NR06	1	A	WB	FEEDER BREAKER 2	COMPARTMENT	1200A
NR07	1	A	WB	GENERATOR BREAKER	LINE PT	COMPARTMENT
NR08	1	A	WB	GENERATOR BREAKER	COMPARTMENT	1200A

Where is Detail N018 on Sheet N2?

INTERIOR NAMEPLATE SCHEDULE

QTY	TYPE	COLOR	1st LINE	2nd LINE	3rd LINE
1	C	WB	+ACTB		
1	C	WB	+F152TB		
1	D	WB	+F1CB1	16A,125VDC	CLOSED CKT
1	D	WB	+F1CB2	16A,125VDC	TRIP CKT
1	D	WB	+F1CB3	16A,125VDC	CONTROL CKT
1	D	WB	+F1CB4	3A,125VDC	TO F1751 CONTROL POWER
1	C	WB	+F1STB1		
1	C	WB	+F1STB2		
1	D	WB	+F2CB1	16A,125VDC	CLOSE CKT
1	D	WB	+F2CB2	16A,125VDC	TRIP CKT
1	D	WB	+F2CB3	16A,125VDC	CONTROL CKT
1	D	WB	+F2CB4	3A,125VDC	TO F2751 CONTROL POWER
1	C	WB	+F2STB1		
1	C	WB	+F2STB2		
1	C	WB	+F2TB		
1	C	WB	+G941		
1	C	WB	+G942		
1	D	WB	+GCB1	16A,125VDC	CLOSED CIRCUIT
1	D	WB	+GCB2	16A,125VDC	TRIP CIRCUIT
1	D	WB	+GCB3	16A,125VDC	CONTROL CIRCUIT
1	D	WB	+GCB4	3A,125VDC	TO 700G CONTROL POWER
1	D	WB	+GCB5	3A,125VDC	TO GPM POWER SUPPLY
1	C	WB	+GSTB1		
1	C	WB	+GSTB2		
1	C	WB	+GSTB3		
1	C	WB	+GSTB4		
1	C	WB	+GSTB5		
1	C	WB	+GTB		
1	D	WB	+MCB1	16A,125VDC	CLOSE CKT
1	D	WB	+MCB2	16A,125VDC	TRIP CKT
1	D	WB	+MCB3	16A,125VDC	CONTROL CKT
1	D	WB	+MCB4	3A,125VDC	TO M751 CONTROL POWER
1	D	WB	+MCB5	3A,125VDC	B587Z TO CONTROL POWER
1	D	WB	+MCB6	3A,125VDC	TO M2470S POWER SUPPLY
1	D	WB	+MCB7	3A,125VDC	TO MPM POWER SUPPLY
1	C	WB	+MSTB1		
1	C	WB	+MSTB2		
1	C	WB	+MSTB3		
1	D	WB	+S1CB	15A, 120VAC	TO RECEPTACLE
1	D	WB	+S2CB	15A, 120VAC	TO RECEPTACLE
1	D	WB	+S3CB	15A, 120VAC	TO RECEPTACLE
1	D	WB	+S4CB	15A, 120VAC	TO RECEPTACLE

Note GPM and MPM changes per Sheet M1. (TYP)

APPROVED ☐
APPROVED AS NOTED X
REVISE AND RESUBMIT ☐
REJECTED ☐
NOT SUBJECT TO REVIEW ☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 12/06/2022
JACOBS — Date

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

NO.	REVISION	DATE	DFT	DES	PM	APP
6A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

NAME PLATE DETAILS (1 OF 2)
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	N1

11/04/22
2022-11-04123404

Supplier shall perform a point to point nameplate check to confirm consistency of information between this sheet (N2) and that of Sheets N1 and OL (TYP)

8.46"
215mm
8.08"
205mm
1.00"
25mm

+GTSW1

LINE VOLTAGE (+G700G) VA VB VC VN | PHASE CURRENT (+G700G) IA IB IC | REMOTE TRIP | TRIP STATUS TO PDCS

DETAIL N039

+GTSW2 (+GPM)

LINE VOLTAGE VA VB VC VN | PHASE CURRENT IA IB IC

DETAIL N040

+GTSW3

LINE VOLTAGE (+G700G) VA VB VC VN | PHASE CURRENT (+G700G) IA IB IC | REMOTE CT | +G86 +G52 | +B86 +G52 | +G700GTRIP +G52 | +G70G TRIP +G86

DETAIL N041

+MTSW1

LINE VOLTAGE (+MPM) VA VB VC VN | PHASE CURRENT (+MPM) IA IB IC | REMOTE TRIP | TRIP STATUS TO PDCS

DETAIL N042

+MTSW2

LINE VOLTAGE (+M751) VA VB VC VN | PHASE CURRENT (+B687Z) IA IB IC

DETAIL N043

+MTSW3

LINE VOLTAGE (+M751) SYNC INPUT SYNC INPUT | PHASE CURRENT (+M751) IA IB IC | +M86 +M52 | +B86 +M52 | +M751 TRIP +M52 | +M751 TRIP +M86

DETAIL N044

+F1TSW1

REMOTE TRIP +F152 | TRIP STATUS TO PDCS +F152 | PHASE CURRENT (+F1751) IA IB IC | +F186 +F152 | +F186 +F152 | +F1751TRIP +F152 | +F1751 TRIP +F186

DETAIL N045

+F2TSW1

REMOTE TRIP +F252 | TRIP STATUS TO PDCS +F252 | PHASE CURRENT (+F2751) IA IB IC | +F286 +F252 | +F286 +F252 | +F2751TRIP +F252 | +F2751 TRIP +F286

DETAIL N046

Reconcile with Sheet D1. (TYP)

5.00"
127mm
4.69"
119mm
2.19"
56mm
2.50"
64mm

POINT EIGHT POWER
1510 ENGINEERS ROAD
BELLE CHASSE, LA 70037

W/O NO. R64672-01 DATE 12/2022
VOLTAGE, PH, WIRE & FREQ. 15kV, 3Ø, 3W, 60Hz
MAIN BUS RATINGS 1200A, 40kA RMS SYM

DETAIL N001

SWITCHGEAR RATING
LOW FREQUENCY WITHSTAND VOLTAGE: 60kV RMS
IMPULSE WITHSTAND VOLTAGE: 125kV BIL
RATED SHORT TIME CURRENT: 40kA RMS SYM
RATED MOMENTARY CURRENT: 68kA PEAK
ENCLOSURE CATEGORY: C

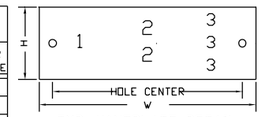
DETAIL N002

STANDARD NAMEPLATE SIZES

TYPE	SIZE H	SIZE W	HOLE CNTR	LINES	LETTER HEIGHT	LETTER PER LINE
A	1	3	2.625	3	.187	17
B	.75	2.5	2.125	2	.156	16
				3	.156	16
C	.5	1.75	1.375	2	.125	12
D	.5	1.25	.875	3	.125	10
E	2	5	4.625	3	.25	22
S	SPECIAL SEE DETAIL					

NAMEPLATE STANDARDS

1. COLOR CODE FOR LAMINATED PLASTIC MATERIAL
   WB - WHITE FACE WITH BLACK LETTERS
   BW - BLACK FACE WITH WHITE LETTERS
   RW - RED FACE WITH WHITE LETTERS
   SS - STAINLESS STEEL
   ALUM - ALUMINUM
2. NAMEPLATES TO HAVE 5/32 DRILLED HOLES
3. NAMEPLATES TO BE AFFIX WITH 4/40 STAINLESS STEEL SELF TAPPING SCREWS
4. INTERIOR DEVICE NAMEPLATES TO BE TYPE "C" AND LOCATED AS PER ARRANGEMENT DRAWINGS AND IN ACCORDANCE WITH "INTERIOR DEVICE NAMEPLATE SCHEDULE"



TYP. NAMEPLATE DETAIL

14400V ??? per Sheet OL

CAUTION
DISCONNECT SECONDARY BEFORE OPENING DRAWER

DETAIL N014

+GLPT
14400V 0.5E PRIMARY
120VAC 15A SECONDARY

DETAIL N015

+BAPT
26400V 0.5E PRIMARY
120VAC 15A SECONDARY

DETAIL N016

+MLPT
26400V 0.5E PRIMARY
120VAC 15A SECONDARY

DETAIL N017

Detail N018 missing. Reference Sheet N1

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS. THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER
POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

NAME PLATE DETAILS (2 OF 2)
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	N2

11/04/22
2022-11-04T22:34:07

APPROVED	
APPROVED AS NOTED	X
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

Will become 400:5A ratio CT.

Identify symbol here and on "Symbols" sheet. (TYP)

Add Solar PT circuit to One-Line as shown on 3-Line diagram for Generator Breaker.

Why 15A CB here?

Is this PT (and other PTs) in a PT "drawer" / draw out configuration? (TYP)

Identify as "+GPM" power monitoring device and elsewhere in set. Fix. (TYP)

Add Solar PT circuit to One-Line as shown on 3-Line diagram for MAIN Breaker.

Why 15A CB here?

Is this PT (and other PTs) in a PT "drawer" / draw out configuration? (TYP)

Change to 1200:5A ratio CTs

30MVA

Identify symbol here and on "Symbols" sheet. (TYP)

Why 15A CB here?

Identify as "+MPM" power monitoring device and elsewhere in set. Fix. (TYP)

1.0 MVA Aux Transformer

26MVA Load Bank

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 12/06/2022
JACOBS — Date

NO.	REVISION	DATE	DFT	DES	PM	APP
6A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM — www.PointEightPower.com — 800.284.1522

ONE LINE DIAGRAM
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13,8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	OL

11/04/22
2022-11-04T22:34:10

ONE-LINE DIAGRAM

CONTINUED AT +G701/X

GND
AØ
BØ
CØ

MAIN BUS - 13.8KV, 3Ø, 3W, 60Hz, 1200A, 40kA RMS SYM

CONTINUED AT 403A

+GCT1 1500/5A C200, 0.3B1.8
+GCT2 1500/5A C200, 0.3B1.8
+GCT3 1500/5A C200, 0.3B1.8
+GCT4 1500/5A C200, 0.3B1.8
+GCT5 1500/5A C200, 0.3B1.8
+GCT6 1500/5A C200, 0.3B1.8
+GCT7 1500/5A C200, 0.3B1.8
+GCT8 1500/5A C200, 0.3B1.8
+GCT9 1500/5A C200, 0.3B1.8

+G52 D404A 1200AF

+GSTB1 — CT104.1, CT104.2, CT104.3, CT105.1, CT105.2, CT104.4, CT106.1, CT106.2, CT106.3, CT107.1, CT107.2, CT106.4, CT108.1, CT108.2, CT108.3, CT109.1, CT109.2, CT108.4 — G109.2 — 1.1 +GGND D404D — D432D
+GTSW1 — D-E, F-G, H-I — D432D
+G700G — E01, E02, E03, E04, E05, E06 — D426A

+GSTB2 — CT114.1, CT114.2, CT114.3, CT115.1, CT114.4, CT114.5, CT116.1, CT116.2, CT116.3, CT117.2, CT116.4, CT116.5, CT118.2, CT118.3, CT118.4, CT119.2, CT118.5, CT118.1 — G120.1 — 1.2 +GGND D404D — D435D
+GTSW2 — D-E, F-G, H-I — D432D
+GPM — IAH, IAL, IBH, IBL, ICH, ICL

+GSTB3 — CT122.1, CT122.2, CT124.1, CT124.2, CT126.1, CT126.2, CT422.1, CT123.1, CT124.3, CT125.1, CT126.3, CT127.1 — 423D, 424D, 425D, 426D, 427D, 428D

TO BUS DIFF CIRCUIT

+B587Z from one-line??? Add one-line text here for clarity. (TYP)

See comments earlier in set for Power Monitor. (TYP)

Where is this on one-line? If needed, add circuit to One-Line

+GLPT — 10.5:1 — H1.1, H2.1, H1.2, H2.2, H1.3, H2.3 — X1.1, X2.1, X1.2, X2.2, X1.3, X2.3 — 1PE, 2PE, 3PE — 1500VA 14400-120V — IGB — EGB
FLAP F1, F2, F3
P1, P2, P3, P4 — R1, R2, R3, R4
+GLPTB — 1, 2, 3, 4, 5 — A135.1 — G130.2 — 2.1 +GGND D405D

#2 AWG 15 kV CABLE

+GSAA+GSAB+GSAC #2AWG 15kV CABLE — 1 1 1 15kV — 2 2 2 2 — AØ BØ CØ — G137.1 — 4.2 +GGND D407D

+GTB 1, 2, 3, 4 — A135.1

TO SOLAR TURBINE

+GTSW1 — A121.1, A123.1, A125.1, A126.1 — D432D
+G700G — Z09, Z10, Z11, Z12 — D430A
+GTSW2 — A129.1, A131.1, A133.1, A134.1 — D435D
+GPM — VA, VB, VC, VN — D432D

TITAN 250 13.8kV 18MW — W V U — W V U

G103.1 — 6.1 +GGND D409D
400A (10 SEC) NGR
REMOTE CT'S 1500:5A

+GSTB5 — G109.1 — 2.2 +GGND D405D
+GTSW3 — CT105.4, CT105.5 — D440D
+G700G — Z07, Z08 — D430A

CROSS CURRENT

FOR METERING

+GSTB4 — CT125.2, CT126.4, CT127.2, CT128.1, CT129.1, CT130.1 — G130.1 — 4.1 +GGND — D440D
+GTSW3 — D-E, F-G, H-I
+G700G — Z01, Z02, Z03, Z04, Z05, Z06 — D430A

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

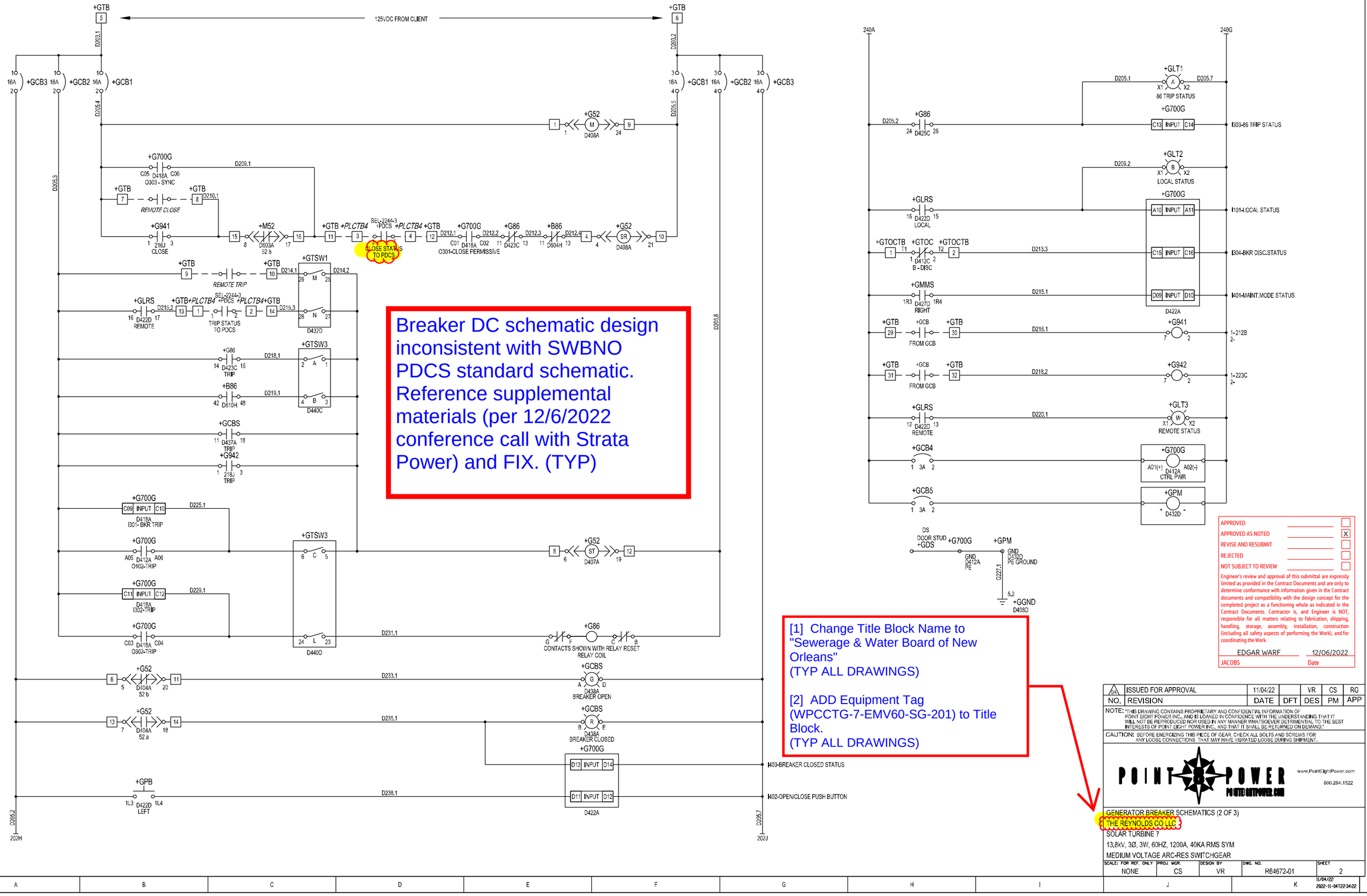
CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM — www.PointEightPower.com — 800.284.1522

GENERATOR BREAKER SCHEMATICS (1 OF 3)
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	1

11/04/22
2022-11-04T23:34:16



Breaker DC schematic design inconsistent with SWBNO PDCS standard schematic. Reference supplemental materials (per 12/6/2022 conference call with Strata Power) and FIX. (TYP)

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
5A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTIAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

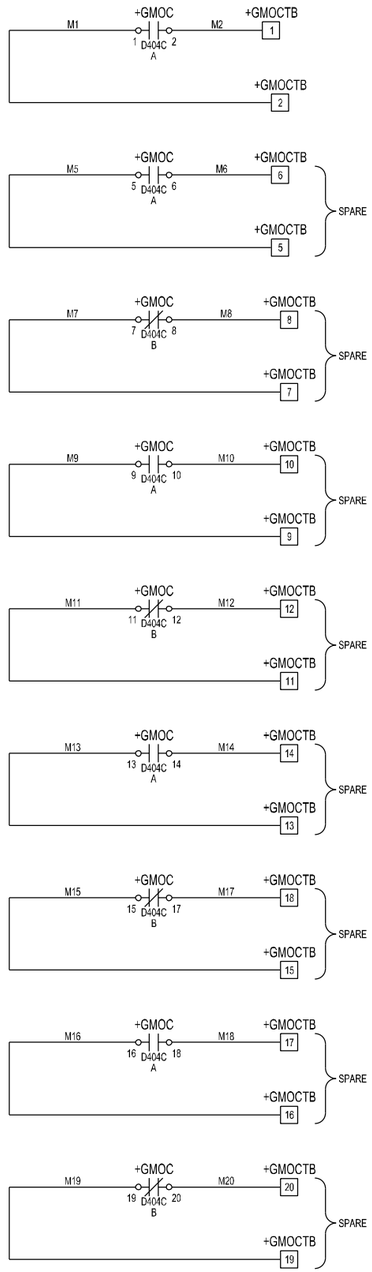
CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

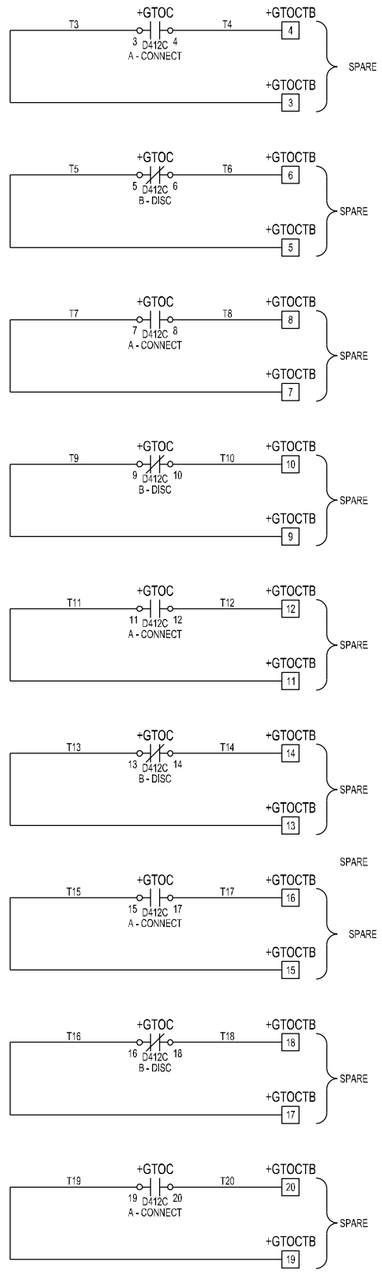
POINT EIGHT POWER — POINTEIGHTPOWER.COM — www.PointEightPower.com — 800.284.1522

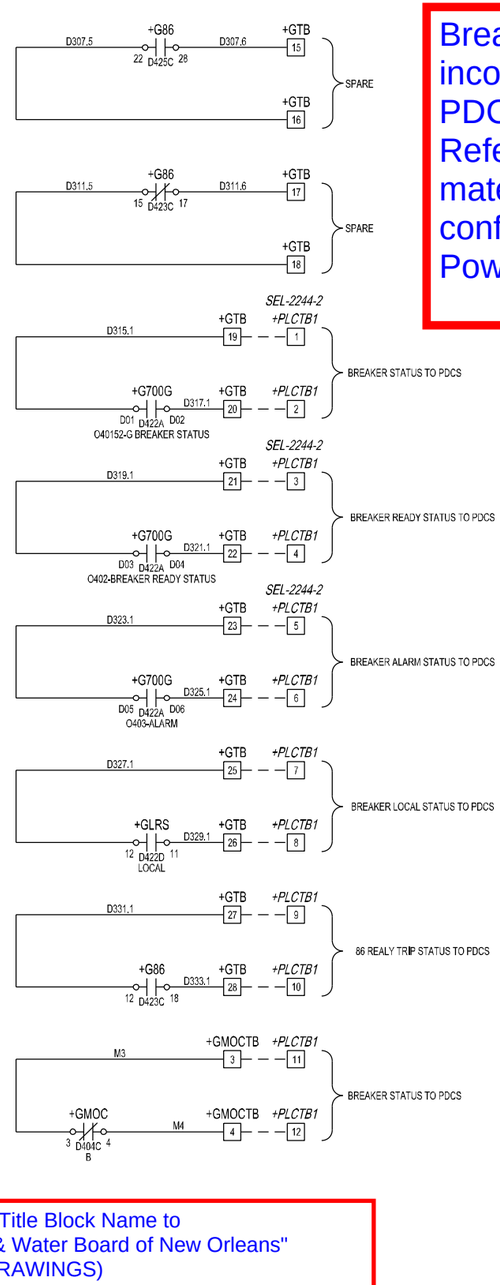
GENERATOR BREAKER SCHEMATICS (2 OF 3)
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	2

11/04/22
2022-11-04T22:34:22







Breaker DC schematic design inconsistent with SWBNO PDCS standard schematic. Reference supplemental materials (per 12/6/2022 conference call with Strata Power) and FIX. (TYP)

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

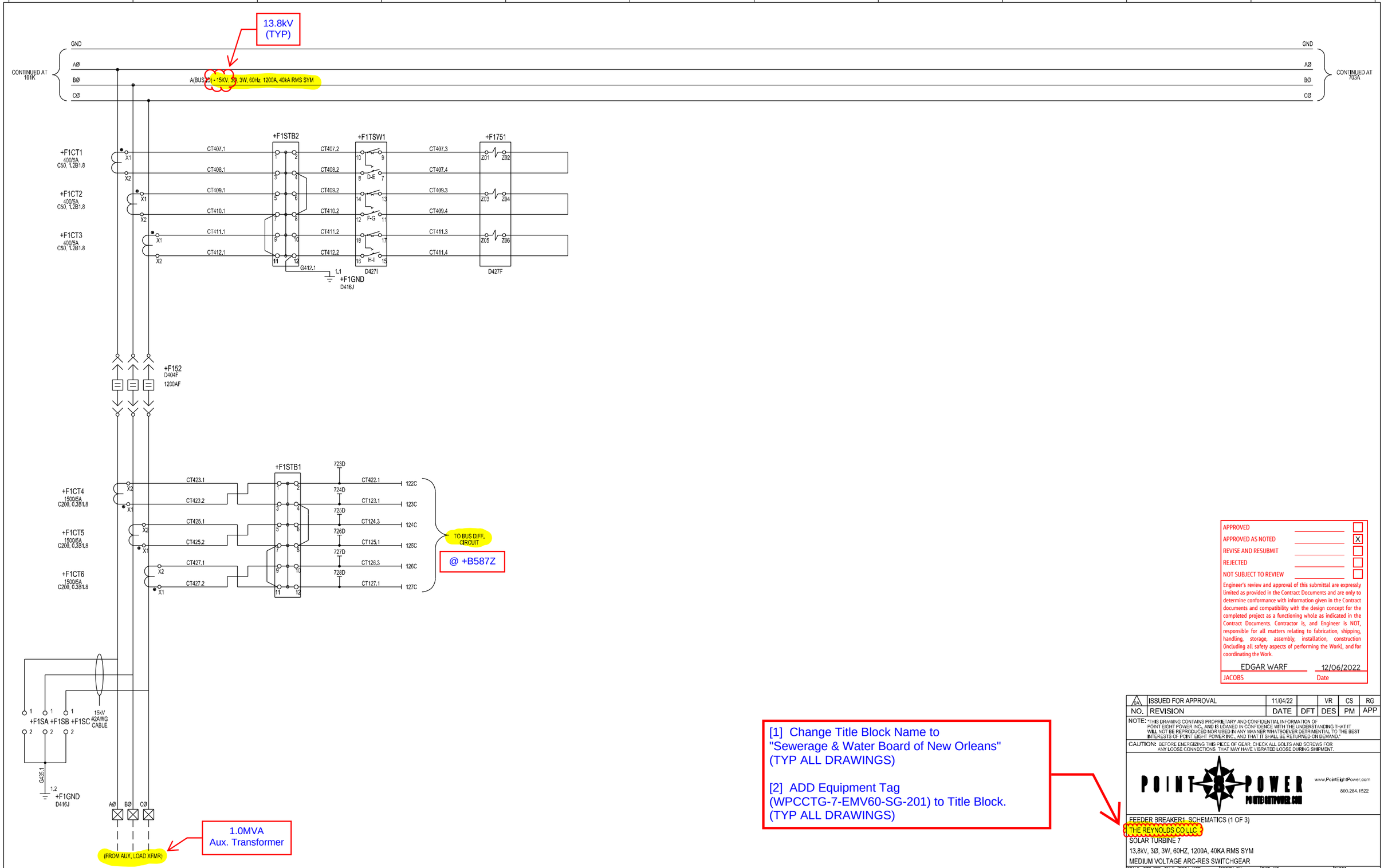
NO.	REVISION	DATE	DFT	DES	PM	APP
5	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

POINT EIGHT POWER
POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

GENERATOR BREAKER SCHEMATICS (3 OF 3)
THE REYNOLDS CO LLC
SOLAR TURBINE ?
13,8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	3

11/04/22
2022-11-04T23:34:25



APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 12/06/2022
JACOBS — Date

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

NO.	REVISION	DATE	DFT	DES	PM	APP
5	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

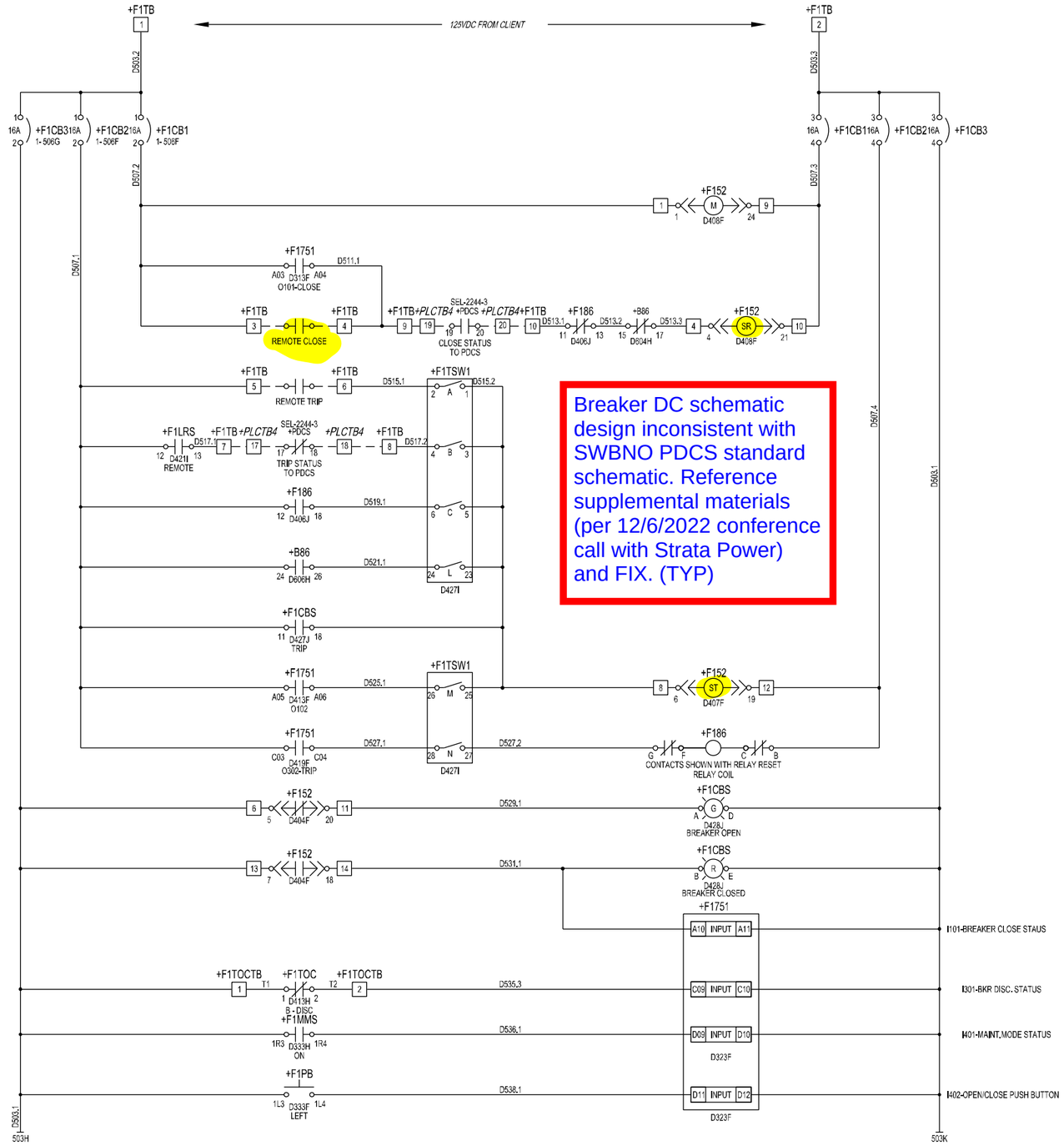
CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

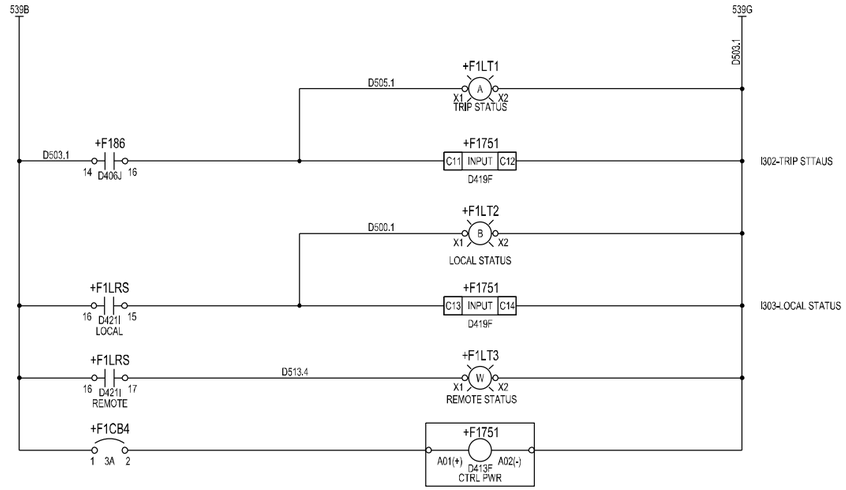
FEEDER BREAKER1 SCHEMATICS (1 OF 3)
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

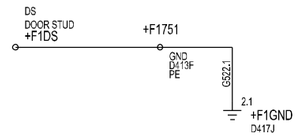
SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	4

11/04/22
2022-11-04T22:34:28



Breaker DC schematic design inconsistent with SWBNO PDCS standard schematic. Reference supplemental materials (per 12/6/2022 conference call with Strata Power) and FIX. (TYP)





[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED	
APPROVED AS NOTED	X
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022

JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
3	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — www.PointEightPower.com — 800.284.1522

FEEDER BREAKER1 SCHEMATICS (2 OF 3)

THE REYNOLDS CO LLC

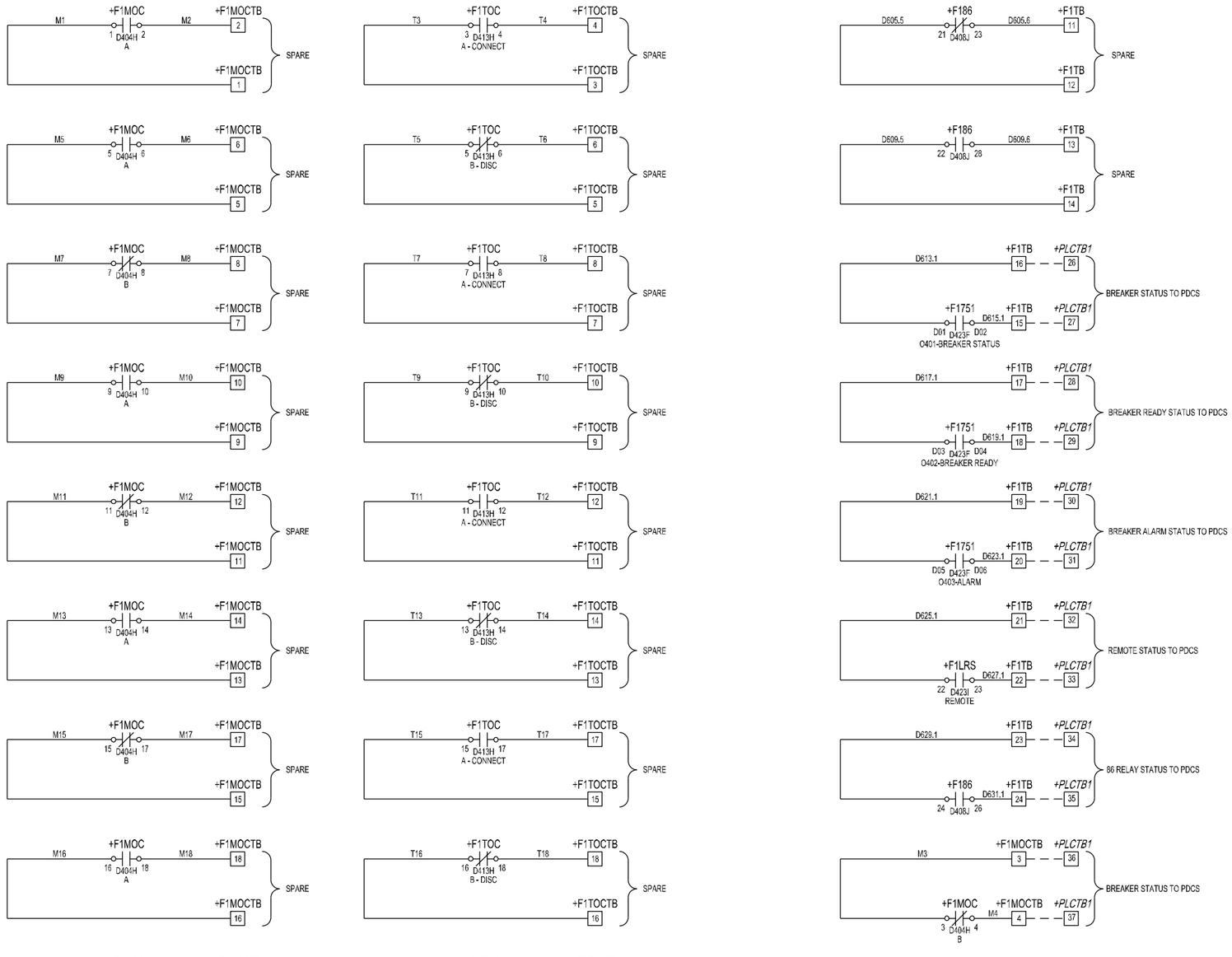
SOLAR TURBINE 7

13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM

MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	5

11/04/22
2022-11-04T22:34:31



Breaker DC schematic design inconsistent with SWBNO PDCS standard schematic. Reference supplemental materials (per 12/6/2022 conference call with Strata Power) and FIX. (TYP)

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED		
APPROVED AS NOTED		X
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 12/06/2022

JACOBS — Date

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — www.PointEightPower.com — 800.284.1522

FEEDER BREAKER1 SCHEMATICS (3 OF 3)

THE REYNOLDS CO LLC

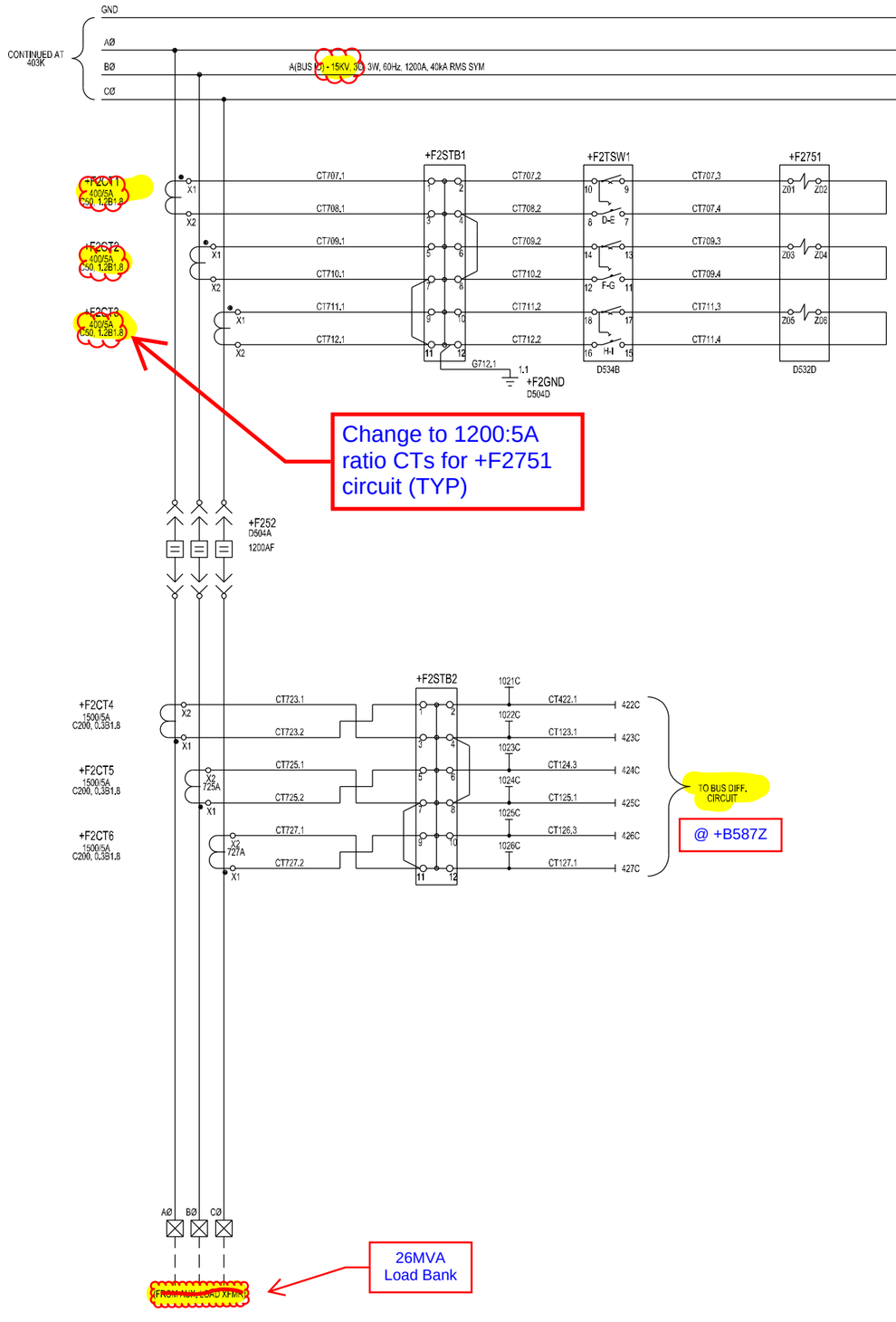
SOLAR TURBINE 7

13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM

MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	6

11/04/22
2022-11-04T22:34:34



APPROVED	☐
APPROVED AS NOTED	☒
REVISE AND RESUBMIT	☐
REJECTED	☐
NOT SUBJECT TO REVIEW	☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 12/06/2022

JACOBS — Date

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — www.PointEightPower.com — 800.284.1522

FEEDER BREAKER2 SCHEMATICS (1 OF 3)

THE REYNOLDS CO LLC

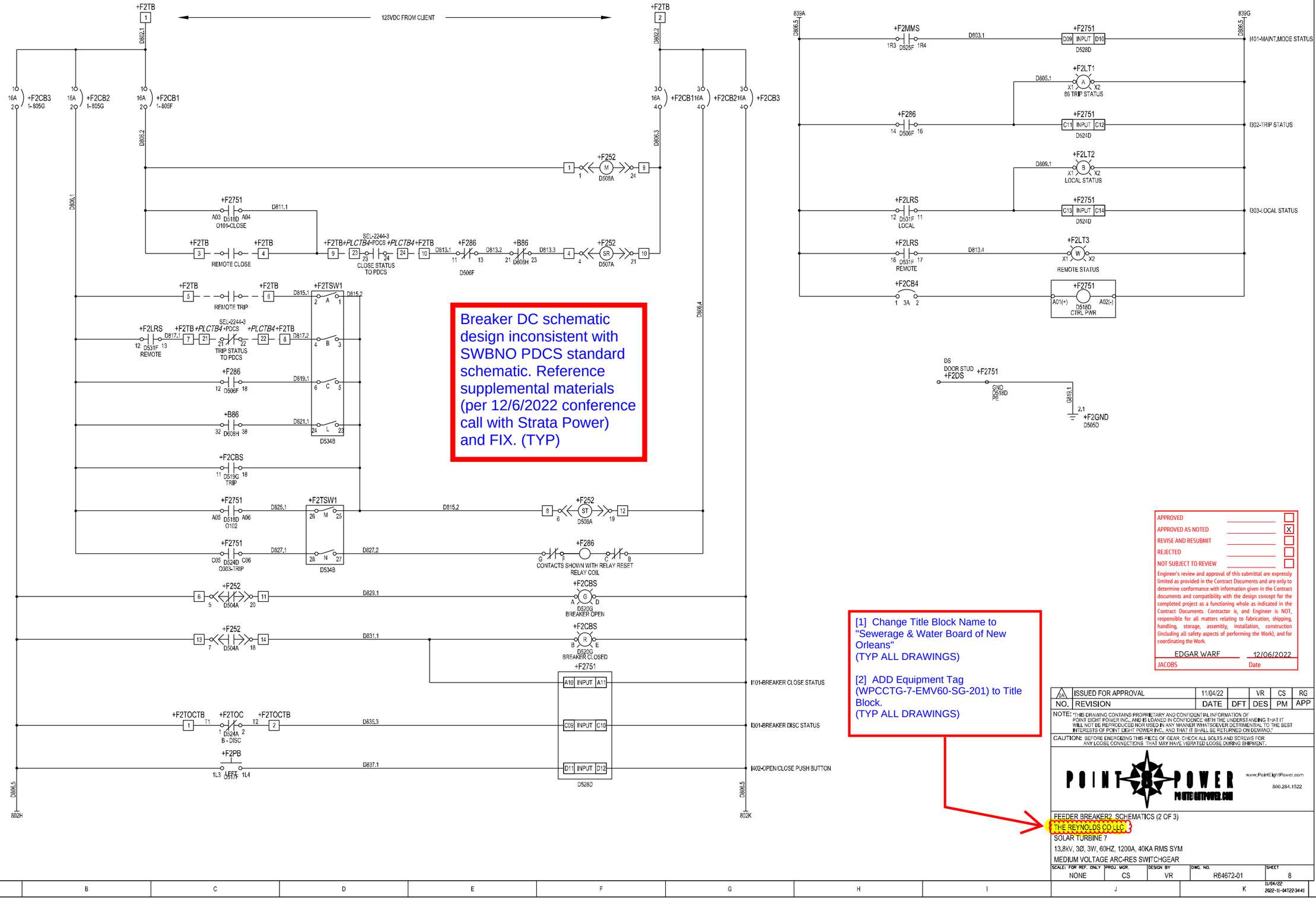
SOLAR TURBINE 7

13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM

MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	7

11/04/22
2022-11-04T22:34:38



Breaker DC schematic design inconsistent with SWBNO PDCS standard schematic. Reference supplemental materials (per 12/6/2022 conference call with Strata Power) and FIX. (TYP)

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
2A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND.

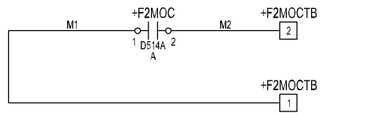
CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

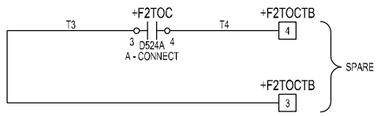
POINT EIGHT POWER — POINTEIGHTPOWER.COM — www.PointEightPower.com — 800.284.1522

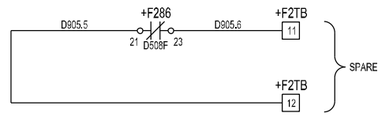
FEEDER BREAKER2 SCHEMATICS (2 OF 3)
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

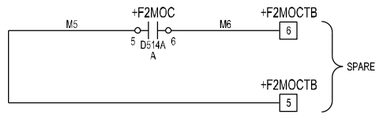
SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	8

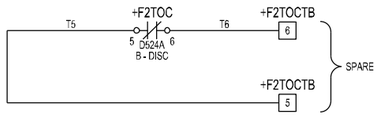
11/04/22
2022-11-04T22:34:41

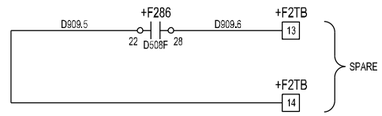


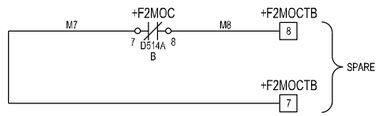


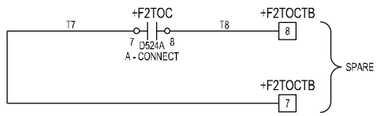


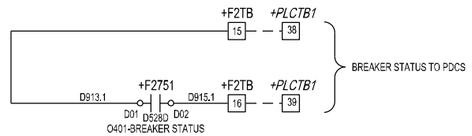


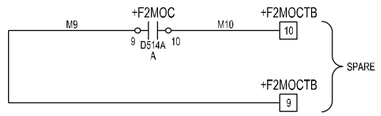


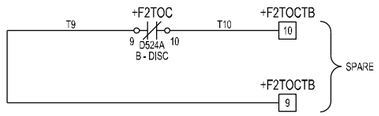


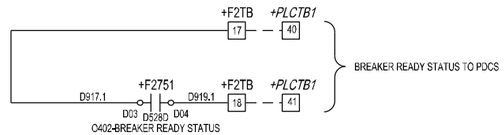


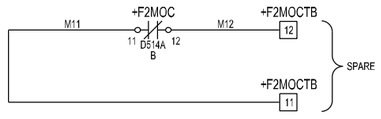


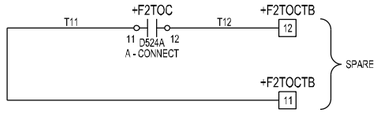


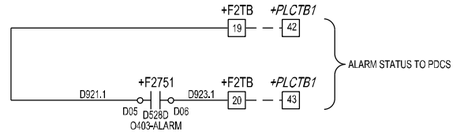


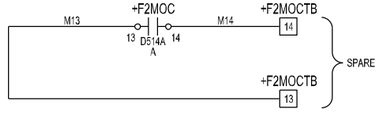


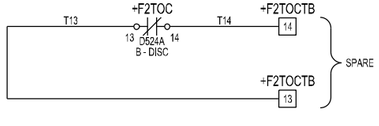


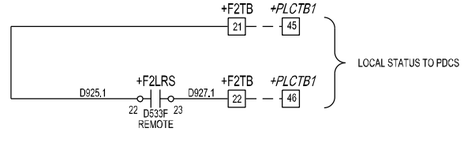


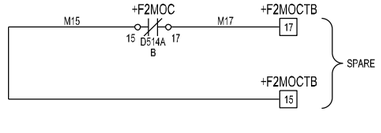


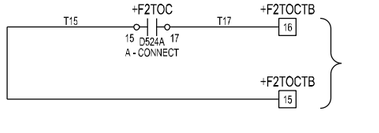


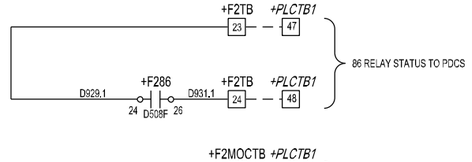


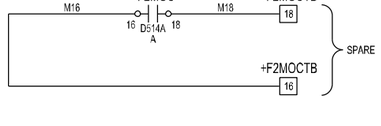


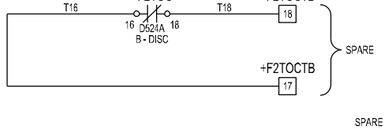


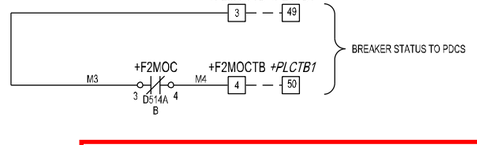




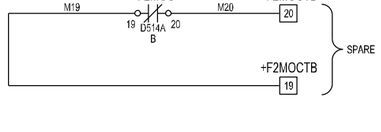


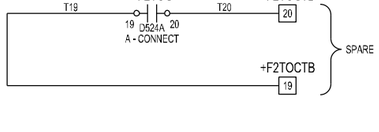






SPARE





Breaker DC schematic design inconsistent with SWBNO PDCS standard schematic. Reference supplemental materials (per 12/6/2022 conference call with Strata Power) and FIX. (TYP)

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

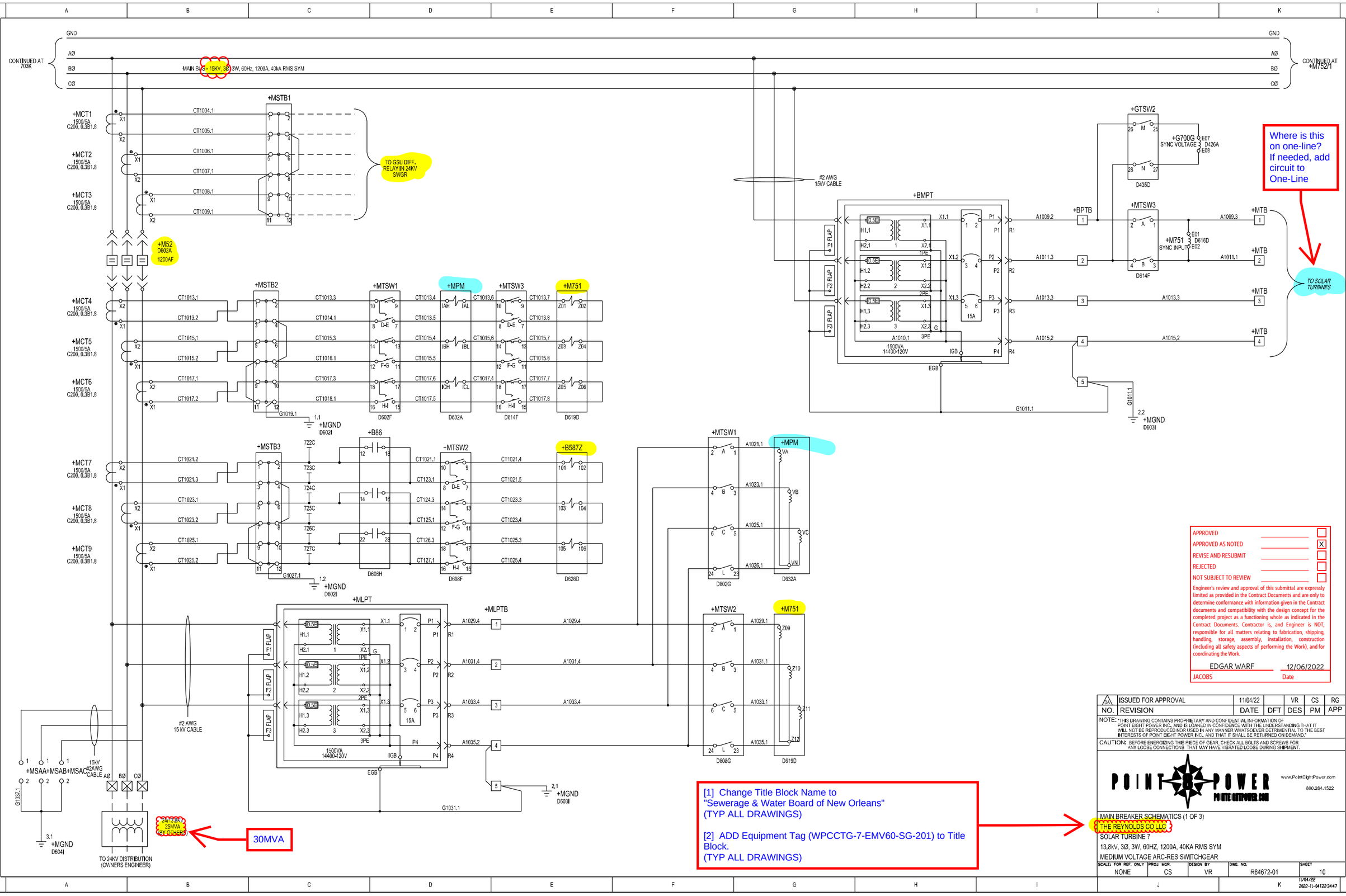
CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM — www.PointEightPower.com — 800.284.1522

FEEDER BREAKER2 SCHEMATICS (3 OF 3)
"THE REYNOLDS CO LLC"
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	9

11/04/22
2022-11-04T23:34:44



[1] Change Title Block Name to
"Sewerage & Water Board of New Orleans"
(TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block.
(TYP ALL DRAWINGS)

APPROVED	
APPROVED AS NOTED	X
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

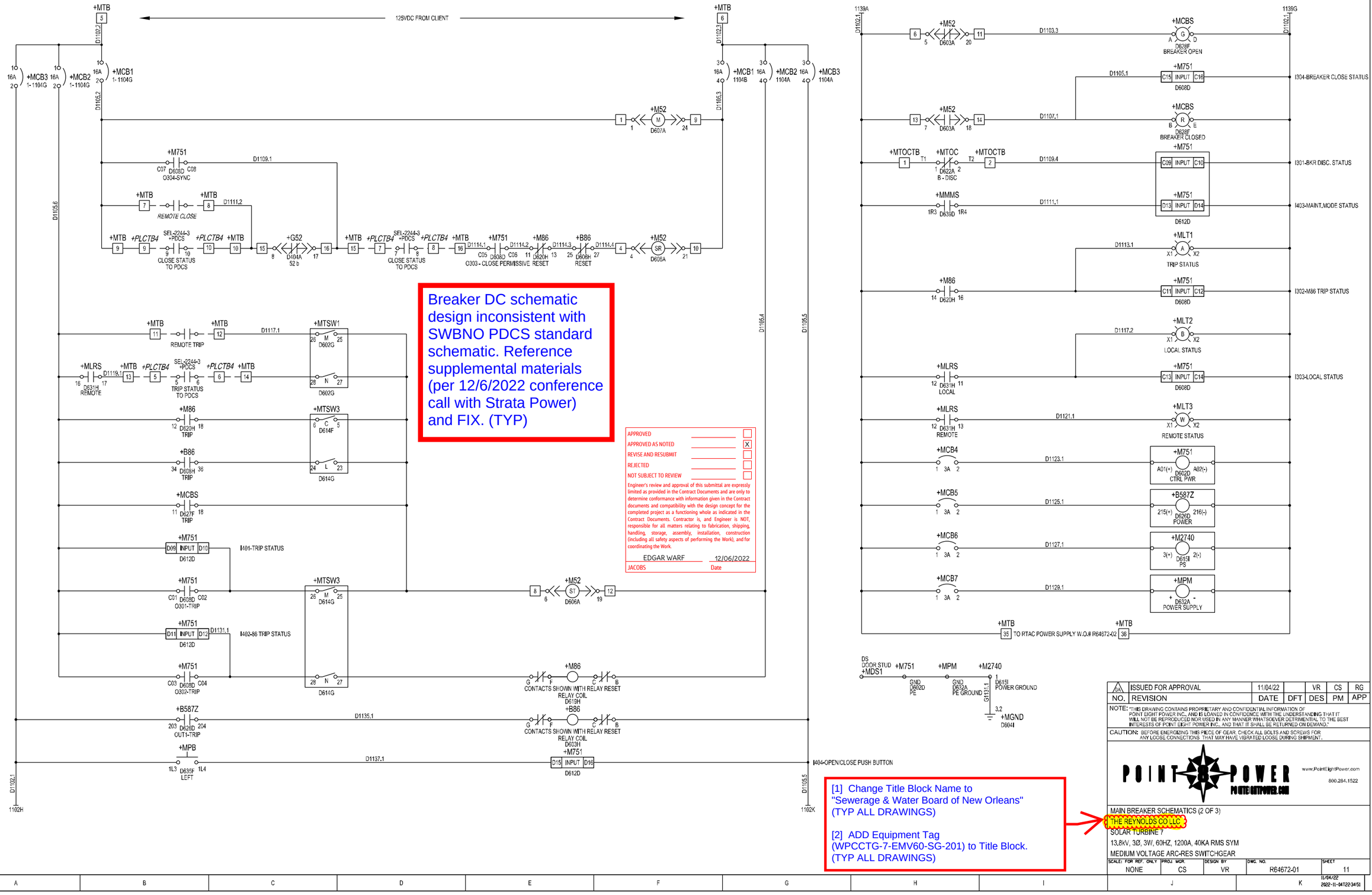
CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM — www.PointEightPower.com — 800.284.1522

MAIN BREAKER SCHEMATICS (1 OF 3)
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	10

11/04/22
2022-11-04T23:34:47



APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

NO.	REVISION	DATE	DFT	DES	PM	APP
3A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

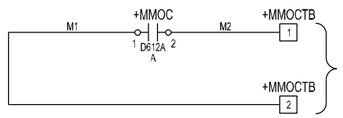
CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

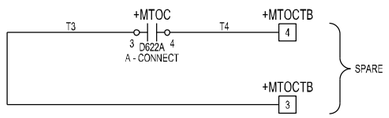
POINT EIGHT POWER — POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

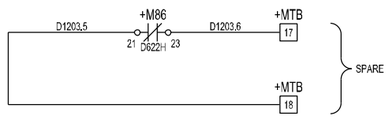
MAIN BREAKER SCHEMATICS (2 OF 3)
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

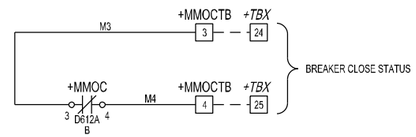
SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	11

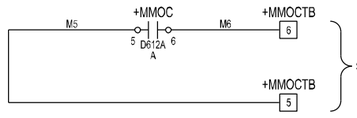
11/04/22
2022-11-04T22:34:51

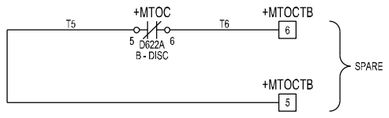


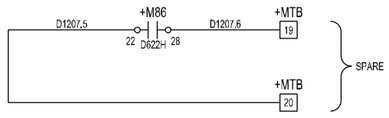


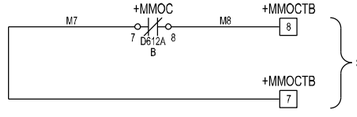


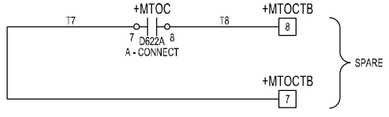


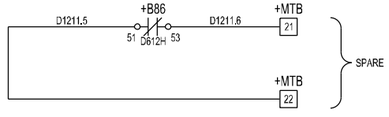


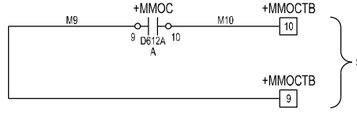


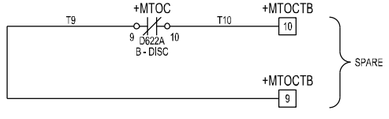


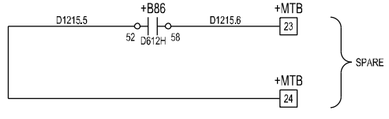


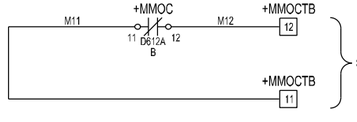


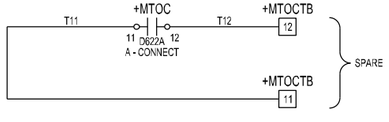


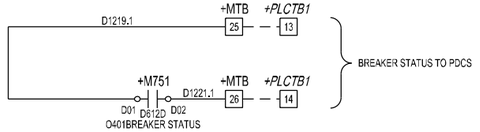


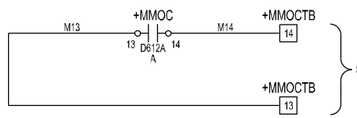


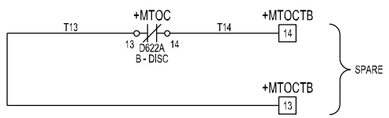


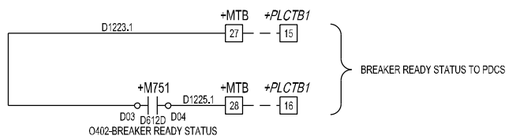


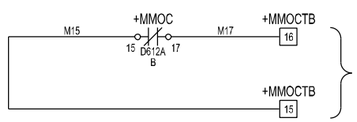


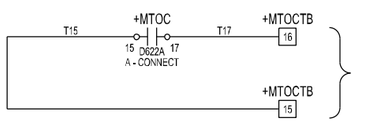


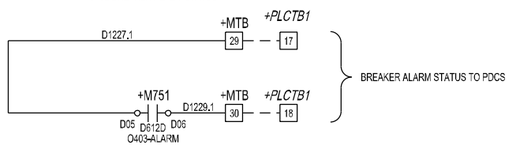


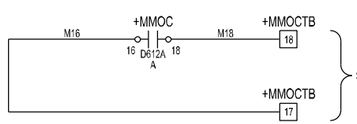


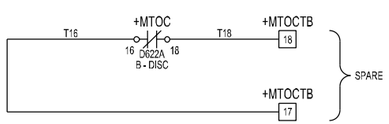


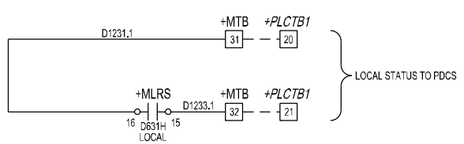




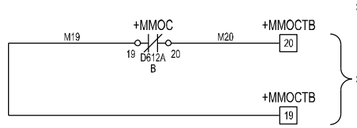




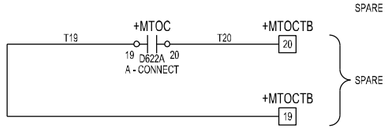


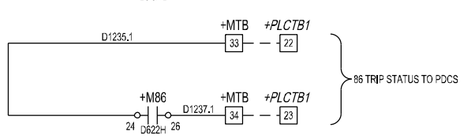


SPARE



SPARE





Breaker DC schematic design inconsistent with SWBNO PDCS standard schematic. Reference supplemental materials (per 12/6/2022 conference call with Strata Power) and FIX. (TYP)

[1] Change Title Block Name to
"Sewerage & Water Board of New Orleans"
(TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block.
(TYP ALL DRAWINGS)

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
5	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND.

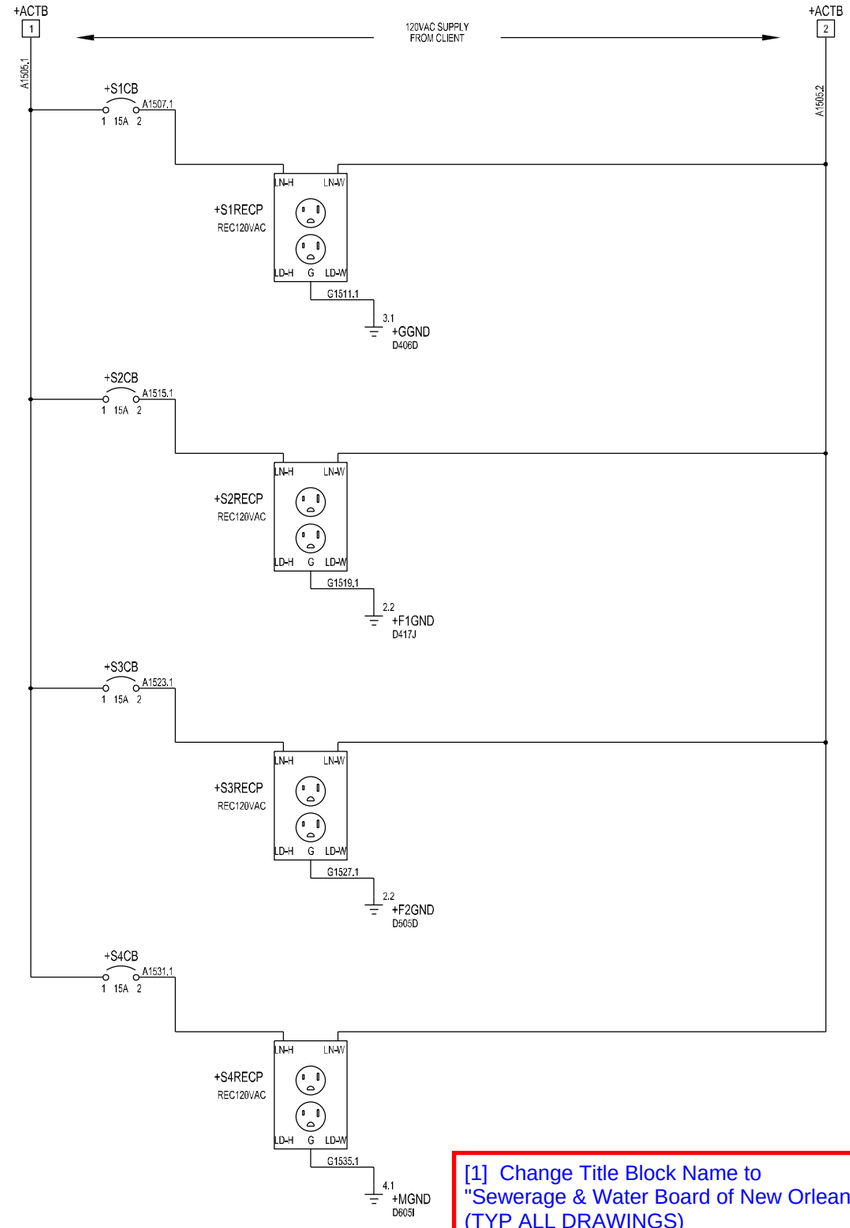
CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER
POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

MAIN BREAKER SCHEMATICS (3 OF 3)
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	12

11/04/22
2022-11-04T23:34:55



[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

NO.	REVISION	DATE	DFT	DES	AE	APP
2A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND.

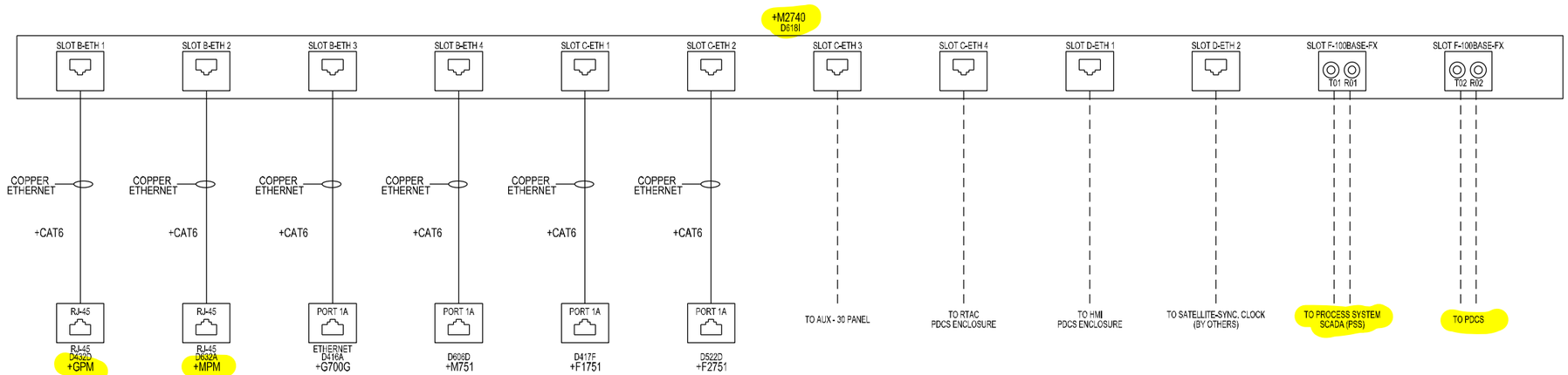
CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER
Controlling the Power You Generate
www.PointEightPower.com
800.284.1522

AC SCHEMATICS
THE REYNOLDS CO LLC
SOLAR TURBINE ?
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	13

11/04/22
2022-11-04T23:34:57



APPROVED ☐
APPROVED AS NOTED ☒
REVISE AND RESUBMIT ☐
REJECTED ☐
NOT SUBJECT TO REVIEW ☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 12/06/2022
JACOBS — Date

[1] Change Title Block Name to
"Sewerage & Water Board of New Orleans"
(TYP ALL DRAWINGS)

[2] ADD Equipment Tag
(WPCCTG-7-EMV60-SG-201) to Title Block.
(TYP ALL DRAWINGS)

NO.	REVISION	DATE	DFT	DES	PM	APP
0A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTIAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

COMMUNICATION CIRCUIT
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	14

11/04/22
2022-11-04T22:35:00

+GTB

GTSW1:2:A135,1:14;GY	1	TO SOLAR TURBINE
GTSW1:4:A135,1:14;GY	2	TO SOLAR TURBINE
GTSW1:6:A135,1:14;GY	3	TO SOLAR TURBINE
GTSW1:24:A135,1:14;GY	4	TO SOLAR TURBINE
GCB3:1:D203,1:14;GY	5	125VDC FROM CLIENT
GCB1:3:D203,2:14;GY	6	125 VDC FROM CLIENT
G700G:C05:D205,4:14;GY,G941:1:D205,4:14;GY	7	REMOTE CLOSE
G941:3:D210,1:14;GY	8	REMOTE CLOSE 1
GLRS:16:D206,3:14;GY,GCB2:2:D205,3:14;GY	9	REMOTE TRIP
GTSW1:26:D214,1:14;GY	10	REMOTE TRIP
M52:16:D209,1:14;GY	11	CLOSE STATUS TO PDCS
G700G:C01:D212,1:14;GY	12	CLOSE STATUS TO PDCS
GLRS:17:D215,2:14;GY	13	TRIP STATUS TO PDCS
GTSW1:28:D215,3:14;GY	14	TRIP STATUS TO PDCS
G86:28:D307,6:14;GY	15	SPARE
G86:22:D307,5:14;GY	16	SPARE
G86:17:D311,6:14;GY	17	SPARE
G86:15:D311,5:14;GY	18	SPARE
G700G:D01:D315,1:14;GY	19	BREAKER STATUS TO PDCS
G700G:D02:D317,1:14;GY	20	BREAKER STATUS TO PDCS
G700G:D03:D319,1:14;GY	21	BREAKER READY STATUS TO PDCS
G700G:D04:D321,1:14;GY	22	BREAKER READY STATUS TO PDCS
G700G:D05:D323,1:14;GY	23	BREAKER ALARM STATUS TO PDCS
G700G:D06:D325,1:14;GY	24	BREAKER ALARM STATUS TO PDCS
GLRS:12:D327,1:14;GY	25	BREAKER LOCAL STATUS TO PDCS
GLRS:11:D329,1:14;GY	26	BREAKER REMOTE STATUS TO PDCS
G86:12:D331,1:14;GY	27	86 REALY TRIP STATUS TO PDCS
G86:18:D333,1:14;GY	28	86 REALY TRIP STATUS TO PDCS
GTB:31:D205.2;14;GY,GMMS:1R3:D205.2:14;GY	29	FROM GCB
G941:7:D216,1:14;GY	30	FROM GCB
GLRS:12:D205.2;14;GY,GTB:28:D205.2:14;GY	31	FROM GCB
G942:7:D218,2:14;GY	32	FROM GCB
	33	SPARE
	34	SPARE

+F1TB

F1CB3:1:D503,2:14;GY	1	125VDC FROM CLIENT
F1CB1:3:D503,3:14;GY	2	125 VDC FROM CLIENT
F1751:A03:D507,2:14;GY	3	REMOTE CLOSE
F1751:A04:D511,1:14;GY,F1TB:9d:D511,1:14;GY	4	REMOTE CLOSE
F1LRS:12:D507,1:14;GY,F1CB2:2:D507,1:14;GY	5	REMOTE TRIP
F1TSW1:2:D515,1:14;GY	6	REMOTE TRIP
F1LRS:13:D517,1:14;GY	7	TRIP STATUS TO PDCS
F1TSW1:4:D517,2:14;GY	8	TRIP STATUS TO PDCS
F1TB:4:D511,1:14;GY	9	CLOSE STATUS TO PDCS
F186:11:D513,1:14;GY	10	CLOSE STATUS TO PDCS
F186:23:D605,8:14;GY	11	SPARE
F186:21:D605,5:14;GY	12	SPARE
F186:28:D609,6:14;GY	13	SPARE
F186:22:D609,5:14;GY	14	SPARE
F1751:D02:D615,1:14;GY	15	BREAKER STATUS TO PDCS
F1751:D01:D613,1:14;GY	16	BREAKER STATUS TO PDCS
F1751:D03:D617,1:14;GY	17	BREAKER READY STATUS TO PDCS
F1751:D04:D619,1:14;GY	18	BREAKER READY STATUS TO PDCS
F1751:D05:D621,1:14;GY	19	BREAKER ALARM STATUS TO PDCS
F1751:D06:D623,1:14;GY	20	BREAKER ALARM STATUS TO PDCS
F1LRS:22:D625,1:14;GY	21	REMOTE STATUS TO PDCS
F1LRS:23:D627,1:14;GY	22	REMOTE STATUS TO PDCS
F186:24:D629,1:14;GY	23	86 RELAY STATUS TO PDCS
F186:26:D631,1:14;GY	24	86 RELAY STATUS TO PDCS
	25	SPARE
	26	SPARE

+F2TB

F2CB3:1:D802,1:14;GY	1	125VDC FROM CLIENT
F2CB1:3:D802,2:14;GY	2	125VDC FROM CLIENT
F2751:A03:D806,2:14;GY	3	REMOTE CLOSE
F2TB:9d:D811,1:14;GY,F2751:A04:D811,1:14;GY	4	REMOTE CLOSE
F2CB2:2:D806,1:14;GY,F2LRS:12:D806,1:14;GY	5	REMOTE TRIP
	6	REMOTE TRIP
F2LRS:13:D817,1:14;GY	7	TRIP STATUS TO PDCS
	8	TRIP STATUS TO PDCS
F2TB:4:D811,1:14;GY	9	CLOSE STATUS TO PDCS
F286:11:D813,1:14;GY	10	CLOSE STATUS TO PDCS
F286:23:D905,6:14;GY	11	SPARE
F286:21:D905,5:14;GY	12	SPARE
F286:28:D909,6:14;GY	13	SPARE
F286:22:D909,5:14;GY	14	SPARE
F2751:D01:D913,1:14;GY	15	BREAKER STATUS TO PDCS
F2751:D02:D915,1:14;GY	16	BREAKER STATUS TO PDCS
F2751:D03:D917,1:14;GY	17	BREAKER READY STATUS TO PDCS
F2751:D04:D919,1:14;GY	18	BREAKER READY STATUS TO PDCS
F2751:D05:D921,1:14;GY	19	ALARM STATUS TO PDCS
F2751:D06:D923,1:14;GY	20	ALARM STATUS TO PDCS
F2LRS:22:D925,1:14;GY	21	LOCAL STATUS TO PDCS
F2LRS:23:D927,1:14;GY	22	LOCAL STATUS TO PDCS
F286:24:D929,1:14;GY	23	86 RELAY STATUS TO PDCS
F286:26:D931,1:14;GY	24	86 RELAY STATUS TO PDCS
	25	SPARE
	26	SPARE

[1] Breaker DC schematic design inconsistent with SWBNO PDCS standard schematic. Reference supplemental materials (per 12/6/2022 conference call with Strata Power) and FIX. (TYP)

[2] Supplier shall validate terminations shown here against modified DC breaker schematics (i.e., Generator, Main, and Feeder schematics). (TYP)

+GMOCTB

GMOC:2:M2:14;GY	1	BREAKER OPEN STATUS
GMOC:1:M1:14;GY	2	BREAKER OPEN STATUS
GMOC:3:M3:14;GY	3	BREAKER STATUS TO PDCS
GMOC:4:M4:14;GY	4	BREAKER STATUS TO PDCS
GMOC:5:M5:14;GY	5	SPARE
GMOC:6:M6:14;GY	6	SPARE
GMOC:7:M7:14;GY	7	SPARE
GMOC:8:M8:14;GY	8	SPARE
GMOC:9:M9:14;GY	9	SPARE
GMOC:10:M10:14;GY	10	SPARE
GMOC:11:M11:14;GY	11	SPARE
GMOC:12:M12:14;GY	12	SPARE
GMOC:13:M13:14;GY	13	SPARE
GMOC:14:M14:14;GY	14	SPARE
GMOC:15:M15:14;GY	15	SPARE
GMOC:16:M16:14;GY	16	SPARE
GMOC:18:M18:14;GY	17	SPARE
GMOC:17:M17:14;GY	18	SPARE
GMOC:19:M19:14;GY	19	SPARE
GMOC:20:M20:14;GY	20	SPARE

+F1MOCTB

F1MOC:1:M1:14;GY	1	SPARE
F1MOC:2:M2:14;GY	2	SPARE
F1MOC:3:M3:14;GY	3	BREAKER STATUS TO PDCS
F1MOC:4:M4:14;GY	4	BREAKER STATUS TO PDCS
F1MOC:5:M5:14;GY	5	SPARE
F1MOC:6:M6:14;GY	6	SPARE
F1MOC:7:M7:14;GY	7	SPARE
F1MOC:8:M8:14;GY	8	SPARE
F1MOC:9:M9:14;GY	9	SPARE
F1MOC:10:M10:14;GY	10	SPARE
F1MOC:11:M11:14;GY	11	SPARE
F1MOC:12:M12:14;GY	12	SPARE
F1MOC:13:M13:14;GY	13	SPARE
F1MOC:14:M14:14;GY	14	SPARE
F1MOC:15:M15:14;GY	15	SPARE
F1MOC:16:M16:14;GY	16	SPARE
F1MOC:17:M17:14;GY	17	SPARE
F1MOC:18:M18:14;GY	18	SPARE
F1MOC:19:M19:14;GY	19	SPARE
F1MOC:20:M20:14;GY	20	SPARE

+F2MOCTB

F2MOC:1:M1:14;GY	1	BREAKER STATUS TO PDCS
F2MOC:2:M2:14;GY	2	BREAKER STATUS TO PDCS
F2MOC:3:M3:14;GY	3	BREAKER STATUS TO PDCS
F2MOC:4:M4:14;GY	4	BREAKER STATUS TO PDCS
F2MOC:5:M5:14;GY	5	SPARE
F2MOC:6:M6:14;GY	6	SPARE
F2MOC:7:M7:14;GY	7	SPARE
F2MOC:8:M8:14;GY	8	SPARE
F2MOC:9:M9:14;GY	9	SPARE
F2MOC:10:M10:14;GY	10	SPARE
F2MOC:11:M11:14;GY	11	SPARE
F2MOC:12:M12:14;GY	12	SPARE
F2MOC:13:M13:14;GY	13	SPARE
F2MOC:14:M14:14;GY	14	SPARE
F2MOC:15:M15:14;GY	15	SPARE
F2MOC:16:M16:14;GY	16	SPARE
F2MOC:17:M17:14;GY	17	SPARE
F2MOC:18:M18:14;GY	18	SPARE
F2MOC:19:M19:14;GY	19	SPARE
F2MOC:20:M20:14;GY	20	SPARE

+GTOCTB

GMMS:1R3:D205.2;14;GY,GLRS:16:D205.2:14;GY	1	GTOC :1 ;T1;14;GY
G700G:C15:D213.3;14;GY	2	GTOC :2 ;T2;14;GY
GTOC:3;T3:14;GY	3	SPARE
GTOC:4;T4:14;GY	4	SPARE
GTOC:5;T5:14;GY	5	SPARE
GTOC:6;T6:14;GY	6	SPARE
GTOC:7;T7:14;GY	7	SPARE
GTOC:8;T8:14;GY	8	SPARE
GTOC:9;T9:14;GY	9	SPARE
GTOC:10;T10:14;GY	10	SPARE
GTOC:11;T11:14;GY	11	SPARE
GTOC:12;T12:14;GY	12	SPARE
GTOC:13;T13:14;GY	13	SPARE
GTOC:14;T14:14;GY	14	SPARE
GTOC:15;T15:14;GY	15	SPARE
GTOC:17;T17:14;GY	16	SPARE
GTOC:16;T16:14;GY	17	SPARE
GTOC:18;T18:14;GY	18	SPARE
GTOC:19;T19:14;GY	19	SPARE
GTOC:20;T20:14;GY	20	SPARE

+F1TOCTB

F1TOC:1;T1:14;GY	1	F152 :13 :D503,1:14;GY,F1MMS :1R3 :D503,1:14;GY
F1751:C09:D535,3:14;GY	2	F1TOC :2 ;T2;14;GY
F1TOC:3;T3:14;GY	3	SPARE
F1TOC:4;T4:14;GY	4	SPARE
F1TOC:5;T5:14;GY	5	SPARE
F1TOC:6;T6:14;GY	6	SPARE
F1TOC:7;T7:14;GY	7	SPARE
F1TOC:8;T8:14;GY	8	SPARE
F1TOC:9;T9:14;GY	9	SPARE
F1TOC:10;T10:14;GY	10	SPARE
F1TOC:11;T11:14;GY	11	SPARE
F1TOC:12;T12:14;GY	12	SPARE
F1TOC:13;T13:14;GY	13	SPARE
F1TOC:14;T14:14;GY	14	SPARE
F1TOC:15;T15:14;GY	15	SPARE
F1TOC:16;T16:14;GY	16	SPARE
F1TOC:17;T17:14;GY	17	SPARE
F1TOC:18;T18:14;GY	18	SPARE
F1TOC:19;T19:14;GY	19	SPARE
F1TOC:20;T20:14;GY	20	SPARE

+F2TOCTB

F252:13;D806,5:14;GY,F2PB:1L3;D806,5:14;GY	1	F2TOC :1 ;T1;14;GY
F2751:C09;D835,3:14;GY	2	F2TOC :2 ;T2;14;GY
F2TOC:3;T3;14;GY	3	SPARE
F2TOC:4;T4;14;GY	4	SPARE
F2TOC:5;T5;14;GY	5	SPARE
F2TOC:6;T6;14;GY	6	SPARE
F2TOC:7;T7;14;GY	7	SPARE
F2TOC:8;T8;14;GY	8	SPARE
F2TOC:9;T9;14;GY	9	SPARE
F2TOC:10;T10;14;GY	10	SPARE
F2TOC:11;T11;14;GY	11	SPARE
F2TOC:12;T12;14;GY	12	SPARE
F2TOC:13;T13;14;GY	13	SPARE
F2TOC:14;T14;14;GY	14	SPARE
F2TOC:15;T15;14;GY	15	SPARE
F2TOC:16;T16;14;GY	16	SPARE
F2TOC:17;T17;14;GY	17	SPARE
F2TOC:18;T18;14;GY	18	SPARE
F2TOC:19;T19;14;GY	19	SPARE
F2TOC:20;T20;14;GY	20	SPARE

APPROVED		☐
APPROVED AS NOTED		☒
REVISE AND RESUBMIT		☐
REJECTED		☐
NOT SUBJECT TO REVIEW		☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 12/06/2022

JACOBS — Date

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

NO.	REVISION	DATE	DFT	DES	PM	APP
5	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: "THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND."

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

POINT EIGHT POWER — www.PointEightPower.com — 800.284.1522

TERMINAL BLOCK LAYOUT (1 OF 2)

THE REYNOLDS CO LLC

SOLAR TURBINE 7

13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM

MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	15

11/04/22
2022-11-04T22:35:05

+MTB

M751:E01:A1009.3:14:GY,MTSW3:1:A1009.3:14:GY	1	TO SOLAR TURBINES
MTSW3:3:A1011.1:14:GY	2	TO SOLAR TURBINES
BPTB:3:E3:A1013.3:14:GY	3	TO SOLAR TURBINES
BPTB:4:E4:A1015.2:14:GY	4	TO SOLAR TURBINES
MCB1:1:D1102.2:14:GY	5	125VDC FROM CLIENT
MCB1:3:D1102.3:14:GY	6	125VDC FROM CLIENT
M751:C07:D1105.2:14:GY,MTB:9:D1105.2:14:GY	7	REMOTE CLOSE
MTB:10:E:D1111.2:14:GY	8	REMOTE CLOSE
MTB:7:D1105.2:14:GY	9	CLOSE STATUS TO PDCS
G52:15:D1111.2:14:GY,MTB:8:E:D1111.2:14:GY	10	CLOSE STATUS TO PDCS
MLRS:16:D1105.6:14:GY,MCB2:2:D1105.6:14:GY	11	REMOTE TRIP
MTSW1:26:D1117.1:14:GY	12	REMOTE TRIP
MLRS:17:D1119.1:14:GY	13	TRIP STATUS TO PDCS
MTSW1:28:14:GY	14	TRIP STATUS TO PDCS
G52:16:D1109.1:14:GY	15	CLOSE STATUS TO PDCS
M751:C05:D1114.1:14:GY	16	CLOSE STATUS TO PDCS
M86:23:D1203.6:14:GY	17	SPARE
M86:21:D1203.5:14:GY	18	SPARE
M86:28:D1207.6:14:GY	19	SPARE
M86:22:D1207.5:14:GY	20	SPARE
B86:53:D1211.6:14:GY	21	SPARE
B86:51:D1211.5:14:GY	22	SPARE
B86:58:D1215.6:14:GY	23	SPARE
B86:52:D1215.5:14:GY	24	SPARE
M751:D01:D1219.1:14:GY	25	BREAKER STATUS TO PDCS
M751:D02:D1221.1:14:GY	26	BREAKER STATUS TO PDCS
M751:D03:D1223.1:14:GY	27	BREAKER READY STATUS TO PDCS
M751:D04:D1225.1:14:GY	28	BREAKER READY STATUS TO PDCS
M751:D05:D1227.1:14:GY	29	BREAKER ALARM STATUS TO PDCS
M751:D06:D1229.1:14:GY	30	BREAKER ALARM STATUS TO PDCS
MLRS:16:D1231.1:14:GY	31	LOCAL STATUS TO PDCS
MLRS:15:D1233.1:14:GY	32	LOCAL STATUS TO PDCS
M86:24:D1235.1:14:GY	33	86 TRIP STATUS TO PDCS
M86:26:D1237.1:14:GY	34	86 TRIP STATUS TO PDCS
MCB7:1:D1102.1:14:GY	35	TO RTAC POWER SUPPLY W.O.# R64672-02
MPM:-D1102.1:14:GY	36	TO RTAC POWER SUPPLY W.O.# R64672-02
	37	SPARE
	38	SPARE

+MMOCTB

MMOC:2:M2:14:GY	1	BREAKER OPEN STATUS
MMOC:1:M1:14:GY	2	BREAKER OPEN STATUS
MMOC:3:M3:14:GY	3	BREAKER CLOSE STATUS
MMOC:4:M4:14:GY	4	BREAKER CLOSE STATUS
MMOC:5:M5:14:GY	5	SPARE
MMOC:6:M6:14:GY	6	SPARE
MMOC:7:M7:14:GY	7	SPARE
MMOC:8:M8:14:GY	8	SPARE
MMOC:9:M9:14:GY	9	SPARE
MMOC:10:M10:14:GY	10	SPARE
MMOC:11:M11:14:GY	11	SPARE
MMOC:12:M12:14:GY	12	SPARE
MMOC:13:M13:14:GY	13	SPARE
MMOC:14:M14:14:GY	14	SPARE
MMOC:15:M15:14:GY	15	SPARE
MMOC:17:M17:14:GY	16	SPARE
MMOC:16:M16:14:GY	17	SPARE
MMOC:18:M18:14:GY	18	SPARE
MMOC:19:M19:14:GY	19	SPARE
MMOC:20:M20:14:GY	20	SPARE

+MTOCTB

M52:13:D1102.1:14:GY,MMMS:1R3:D1102.1:14:GY	1	MTOC :1 :T1:14:GY
M751:C09:D1109.4:14:GY	2	MTOC :2 :T2:14:GY
MTOC:3:T3:14:GY	3	SPARE
MTOC:4:T4:14:GY	4	SPARE
MTOC:5:T5:14:GY	5	SPARE
MTOC:6:T6:14:GY	6	SPARE
MTOC:7:T7:14:GY	7	SPARE
MTOC:8:T8:14:GY	8	SPARE
MTOC:9:T9:14:GY	9	SPARE
MTOC:10:T10:14:GY	10	SPARE
MTOC:11:T11:14:GY	11	SPARE
MTOC:12:T12:14:GY	12	SPARE
MTOC:13:T13:14:GY	13	SPARE
MTOC:14:T14:14:GY	14	SPARE
MTOC:15:T15:14:GY	15	SPARE
MTOC:17:T17:14:GY	16	SPARE
MTOC:16:T16:14:GY	17	SPARE
MTOC:18:T18:14:GY	18	SPARE
MTOC:19:T19:14:GY	19	SPARE
MTOC:20:T20:14:GY	20	SPARE

+ACTB

S1CB:1:A1505.1:14:GY	1	120VAC SUPPLY BY CLIENT
S1RECP:LN-W:A1505.2:14:GY	2	120VAC SUPPLY BY CLIENT

[1] Breaker DC schematic design inconsistent with SWBNO PDCS standard schematic. Reference supplemental materials (per 12/6/2022 conference call with Strata Power) and FIX. (TYP)

[2] Supplier shall validate terminations shown here against modified DC breaker schematics (i.e., Generator, Main, and Feeder schematics). (TYP)

[1] Change Title Block Name to "Sewerage & Water Board of New Orleans" (TYP ALL DRAWINGS)

[2] ADD Equipment Tag (WPCCTG-7-EMV60-SG-201) to Title Block. (TYP ALL DRAWINGS)

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 12/06/2022
JACOBS Date

NO.	REVISION	DATE	DFT	DES	PM	APP
2A	ISSUED FOR APPROVAL	11/04/22		VR	CS	RG

NOTE: THIS DRAWING CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF POINT EIGHT POWER INC., AND IS LOANED IN CONFIDENCE WITH THE UNDERSTANDING THAT IT WILL NOT BE REPRODUCED NOR USED IN ANY MANNER WHATSOEVER DETRIMENTAL TO THE BEST INTERESTS OF POINT EIGHT POWER INC., AND THAT IT SHALL BE RETURNED ON DEMAND.

CAUTION: BEFORE ENERGIZING THIS PIECE OF GEAR, CHECK ALL BOLTS AND SCREWS FOR ANY LOOSE CONNECTIONS, THAT MAY HAVE VIBRATED LOOSE DURING SHIPMENT.

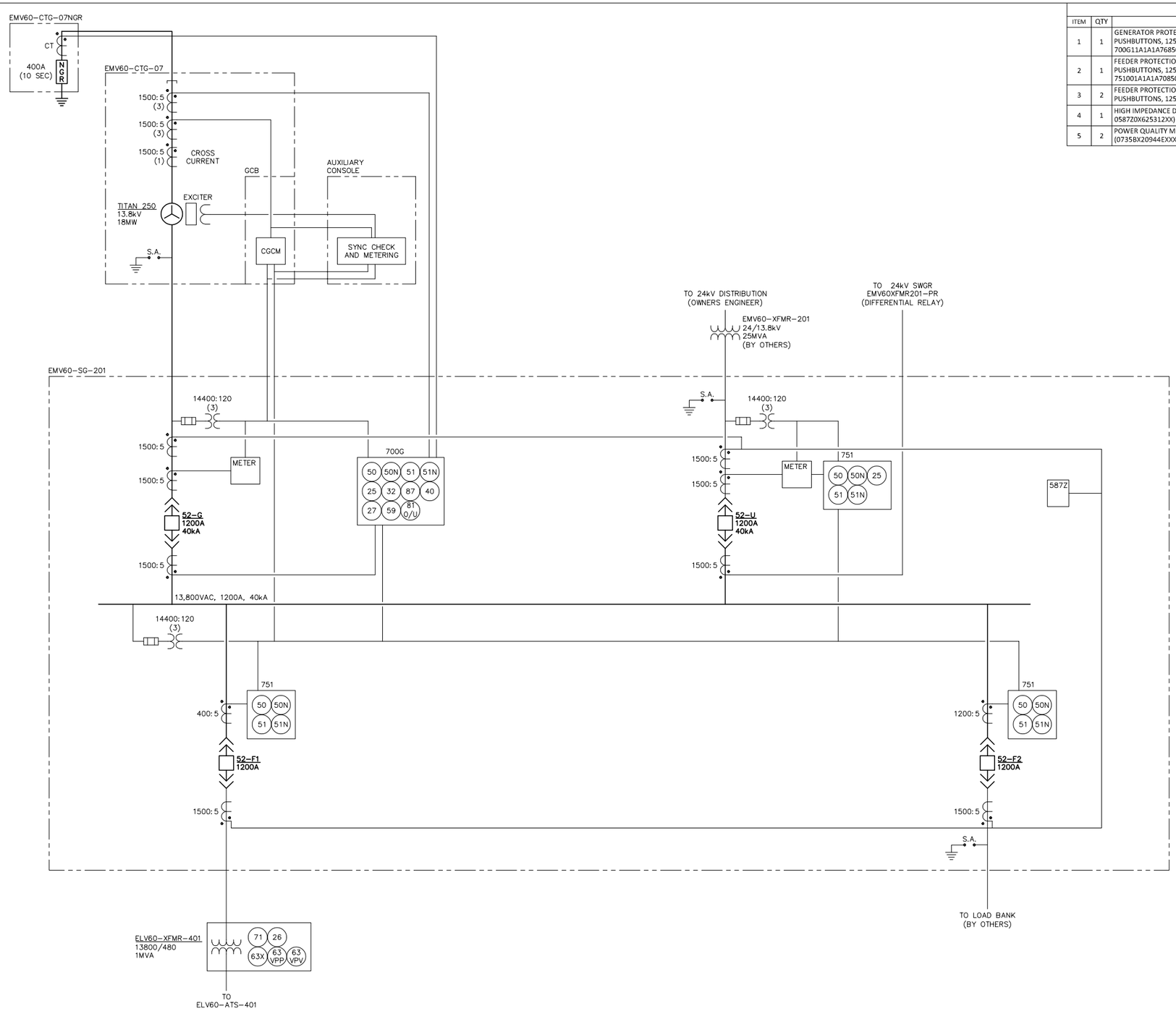
POINT EIGHT POWER — POINTEIGHTPOWER.COM
www.PointEightPower.com
800.284.1522

TERMINAL BLOCK LAYOUT (2 OF 2)
THE REYNOLDS CO LLC
SOLAR TURBINE 7
13.8kV, 3Ø, 3W, 60HZ, 1200A, 40KA RMS SYM
MEDIUM VOLTAGE ARC-RES SWITCHGEAR

SCALE: FOR REF. ONLY	PROJ. MGR.	DESIGN BY	DWG. NO.	SHEET
NONE	CS	VR	R64672-01	16

11/04/22
2022-11-04T22:39:53

METERS AND RELAYS					
ITEM	QTY	DESCRIPTION	MAKE	MODEL	SUPPLIED BY
1	1	GENERATOR PROTECTION RELAY, 2x16 LCD DISPLAY, 8 PUSHBUTTONS, 125VDC, VSYNC INPUT (P/N 700G11A1A1A76850610)	SEL	700G1+	SWITCHGEAR VENDOR
2	1	FEEDER PROTECTION RELAY,2x16 LCD DISPLAY, 8 PUSHBUTTONS, 125VDC, VSYNC INPUT (P/N 751001A1A1A70850F10)	SEL	751	SWITCHGEAR VENDOR
3	2	FEEDER PROTECTION RELAY,2x16 LCD DISPLAY, 8 PUSHBUTTONS, 125VDC (P/N 751001A1A1A0X850F10)	SEL	751	SWITCHGEAR VENDOR
4	1	HIGH IMPEDANCE DIFFERENTIAL RELAY (P/N/ 0587Z0X625312XX)	SEL	587Z	SWITCHGEAR VENDOR
5	2	POWER QUALITY METER (0735BX20944EXXXXXX162201XX)	SEL	735	SWITCHGEAR VENDOR



NOTES:

1. SUPPLIER TO SPECIFY PLENUM EXHAUST CLEARANCE REQUIREMENTS.

NOT FOR CONSTRUCTION

05/31/2023 7:30:44 AM

DATE PRINTED: May 31, 2023 - 6:52:30 AM

REFERENCE DRAWINGS				
REF NO.	COMPANY	DRAWING NUMBER	SHT NO.	REV. NO

STRATA POWER GROUP
10731 TREENA ST.
SUITE 101
SAN DIEGO, CA
92131

SWBNO
COMBUSTION TURBINE
GENERATOR 7

REVISIONS						
REV	DESCRIPTION	PROJECT #	DATE	DWG	DES	ENG
A	ISSUED TO EER RFQ (DWG. SKETCH02-A)	21829	06/17/22	KDF		
B	ISSUE FOR SINGLE LINE REVIEW	21829	08/16/22	KDF	KDF	
C	ISSUE FOR REVIEW	21829	05/19/23	KDF	KDF	

SEWERAGE AND WATER BOARD OF NEW ORLEANS

EMV60-SG-201
OVERALL
SINGLE LINE

LOCATION	DWG NO.	SHEET	REV
NO	03-0301A	001	C

DWG. NO. 0034-080010-426

7.500"

7.125"

Ø0.188 HOLE (4 PLACES)

GENERATOR STEP-UP TRANSFORMER

EQUIPMENT NAME: CTG-6, CTG-7

TAG NUMBER: CWPCTG-6-EMV60-XFMR-300

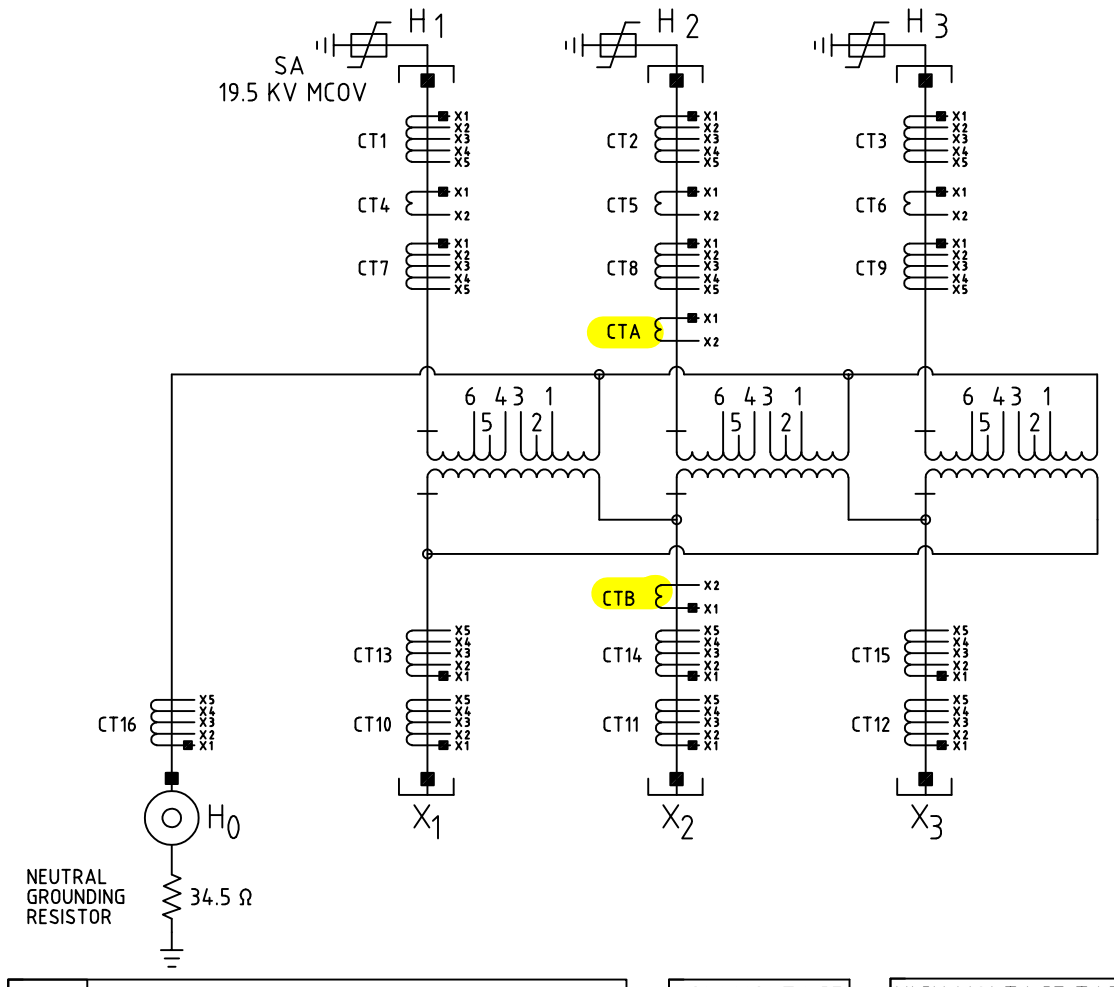
TAG NUMBER: WPCCTG-7-EMV60-XFMR-201

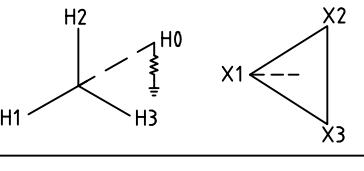
CLASS KNAN/KNAF/KNAF — 3-PHASE 60 HERTZ

MVA 18/24/30 — CONT. TEMP. RISE 65°C

HV 24000 GRDY/13856	VOLTS	BIL 150 KV
LV 13800 DELTA	VOLTS	BIL 110 KV
HV NEUTRAL		BIL 150 KV

IMPEDANCE 00.00 % AT 24000-13800 VOLTS AND 18 MVA



VECTOR DIAGRAM	
YNd1	

FOR STEP UP OPERATION
ADD'L DETAILS ON NAMEPLATE 0034-080020-426
HI PRODUCT INSTRUCTION MANUAL HI-120

LOW VOLTAGE	
VOLTS LL	AMPS AT 30 MVA
13800	1255.1

HIGH VOLTAGE TAP CHANGER DE-ENERGIZED OPERATION			
VOLTS LL	AMPS AT 30 MVA	POS.	CONNECTS
25200	687.3	1	3 - 4
24600	704.1	2	4 - 2
24000	721.7	3	2 - 5
23400	740.2	4	5 - 1
22800	759.7	5	1 - 6

SERIAL NUMBER: 000000-0000 MANUFACTURE DATE: 00/00

ALL WINDINGS CU HOWARD INDUSTRIES, INC. ELLISVILLE, MS

PLATE NO. 0034-080010-426 REV.1

9.125

9.500

DELETE this text. (TYP)

Provide an INDIVIDUAL drawing for EACH GSU transformer, where there is one (1) tag per nameplate. (TYP)

Complete this information, as it's already known. (TYP)

APPROVED		☐
APPROVED AS NOTED		☒
REVISE AND RESUBMIT		☐
REJECTED		☐
NOT SUBJECT TO REVIEW		☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 03/17/2023

JACOBS Date

CUSTOMER: _____

P.O. NUMBER: _____

LOCATION: _____

MATERIAL: 0.018" THK. 304 STAINLESS STEEL

ACTUAL IMPEDANCE, SERIAL NUMBER, AND MANUFACTURE DATE WILL BE ADDED AFTER TEST.
CUSTOMER, PO#, AND LOCATION WILL BE FILLED IN WHEN CUSTOMER BOOKS ARE PRINTED.

TRANSFORMER DESIGNED FOR A NOMINAL IMPEDANCE OF 5.00% @ 18 MVA

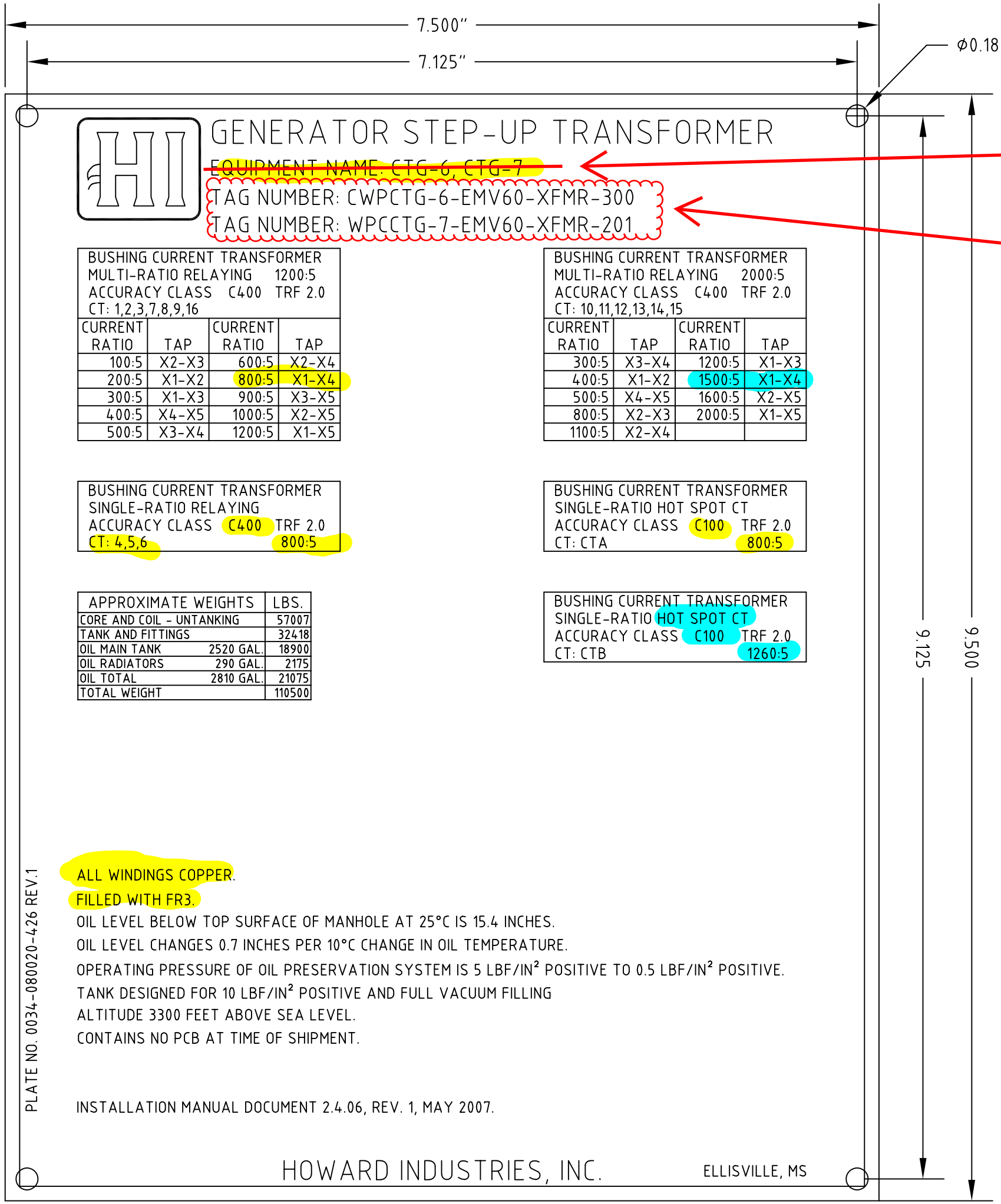
REV.	DATE	DESCRIPTION	BY	APP.
1	03/15/23	Added equipment name and tag number Added hotspot CTA on H2 bushing.	VT	ZTK

HOWARD INDUSTRIES INC.

LAUREL, MISS. USA 39440
MFG. OF TRANSFORMERS

NAME	NAMEPLATE	C.C.	0018		
DESC.	18/24/30 MVA				
CAT.	3418-000426-000				
SCALE	FULL	DWG. BY	VT	CHK. BY	VT
DATE	02/13/23				

DWG. NO. 0034-080020-426



GENERATOR STEP-UP TRANSFORMER

EQUIPMENT NAME: CTG-6, CTG-7

TAG NUMBER: CWPCTG-6-EMV60-XFMR-300

TAG NUMBER: WPCCTG-7-EMV60-XFMR-201

DELETE this text. (TYP)

Provide an INDIVIDUAL drawing for EACH GSU transformer, where there is one (1) tag per nameplate. (TYP)

BUSHING CURRENT TRANSFORMER
MULTI-RATIO RELAYING 1200:5
ACCURACY CLASS C400 TRF 2.0
CT: 1,2,3,7,8,9,16

CURRENT RATIO	TAP	CURRENT RATIO	TAP
100:5	X2-X3	600:5	X2-X4
200:5	X1-X2	800:5	X1-X4
300:5	X1-X3	900:5	X3-X5
400:5	X4-X5	1000:5	X2-X5
500:5	X3-X4	1200:5	X1-X5

BUSHING CURRENT TRANSFORMER
MULTI-RATIO RELAYING 2000:5
ACCURACY CLASS C400 TRF 2.0
CT: 10,11,12,13,14,15

CURRENT RATIO	TAP	CURRENT RATIO	TAP
300:5	X3-X4	1200:5	X1-X3
400:5	X1-X2	1500:5	X1-X4
500:5	X4-X5	1600:5	X2-X5
800:5	X2-X3	2000:5	X1-X5
1100:5	X2-X4		

BUSHING CURRENT TRANSFORMER
SINGLE-RATIO RELAYING
ACCURACY CLASS C400 TRF 2.0
CT: 4,5,6 800:5

BUSHING CURRENT TRANSFORMER
SINGLE-RATIO HOT SPOT CT
ACCURACY CLASS C100 TRF 2.0
CT: CTA 800:5

APPROXIMATE WEIGHTS		LBS.
CORE AND COIL - UNTANKING		57007
TANK AND FITTINGS		32418
OIL MAIN TANK	2520 GAL.	18900
OIL RADIATORS	290 GAL.	2175
OIL TOTAL	2810 GAL.	21075
TOTAL WEIGHT		110500

BUSHING CURRENT TRANSFORMER
SINGLE-RATIO HOT SPOT CT
ACCURACY CLASS C100 TRF 2.0
CT: CTB 1260:5

ALL WINDINGS COPPER.
FILLED WITH FR3.
OIL LEVEL BELOW TOP SURFACE OF MANHOLE AT 25°C IS 15.4 INCHES.
OIL LEVEL CHANGES 0.7 INCHES PER 10°C CHANGE IN OIL TEMPERATURE.
OPERATING PRESSURE OF OIL PRESERVATION SYSTEM IS 5 LBF/IN^2 POSITIVE TO 0.5 LBF/IN^2 POSITIVE.
TANK DESIGNED FOR 10 LBF/IN^2 POSITIVE AND FULL VACUUM FILLING
ALTITUDE 3300 FEET ABOVE SEA LEVEL.
CONTAINS NO PCB AT TIME OF SHIPMENT.

INSTALLATION MANUAL DOCUMENT 2.4.06, REV. 1, MAY 2007.

HOWARD INDUSTRIES, INC. ELLISVILLE, MS

PLATE NO. 0034-080020-426 REV.1

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 03/17/2023
JACOBS Date

Complete this information, as it's already known. (TYP)

CUSTOMER: _____
P.O. NUMBER: _____
LOCATION: _____

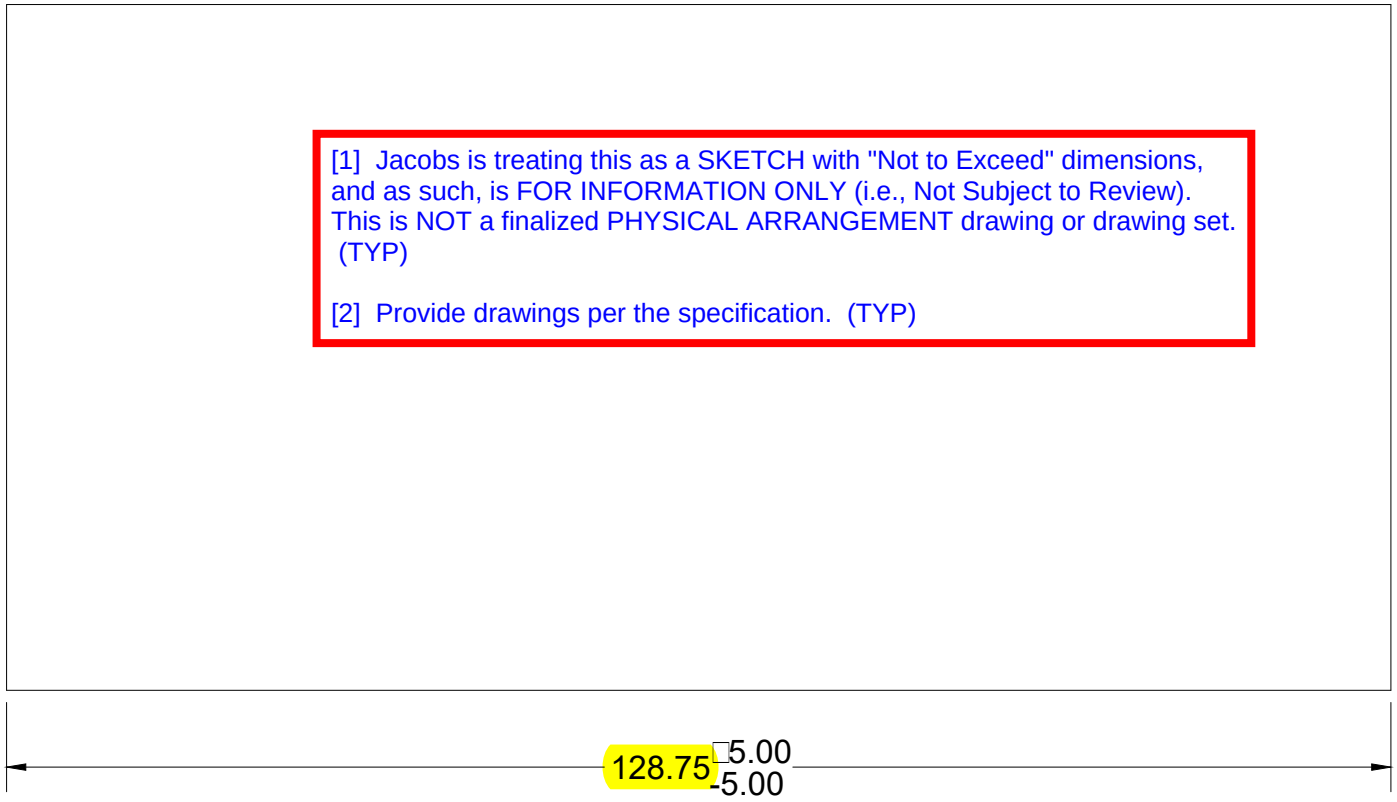
MATERIAL: 0.018" THK. 304 STAINLESS STEEL

CUSTOMER, PO#, AND LOCATION WILL BE FILLED IN WHEN CUSTOMER BOOKS ARE PRINTED.

REV.	DATE	DESCRIPTION	BY	APP.
1	03/15/23	Added equipment name and tag number Added hotspot CTA on H2 bushing.	VT	ZTK

HOWARD INDUSTRIES INC.
LAUREL, MISS. USA 39440
MFG. OF TRANSFORMERS

NAME NAMEPLATE		C.C. 0018	
DESC. 18/24/30 MVA			
CAT. 3418-000426-000			
SCALE FULL	DWG. BY VT	CHK. BY VT	DATE 02/13/23



TOTAL WEIGHT APPROX = 110500 LBS

E□UIPMENT NAME: CTG-6, CTG-7
TAG NUMBER: CWPCTG-6-EMV60-□FMR-300
TAG NUMBER: WPCCTG-7-EMV60-□FMR-201

APPROVED	☐
APPROVED AS NOTED	☐
REVISE AND RESUBMIT	☐
REJECTED	☐
NOT SUBJECT TO REVIEW	☒

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 03/17/2023
JACOBS Date

SHEET 1 of 1

HOWARD INDUSTRIES INC.
ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

NAME:	Base Foot Print Sketch	CC	0741
DESCRIPTION:	Base Foot Print Sketch		
ID: 3418-000426-000	P.N.	B Sketch 426	

SCALE	SIZE	DWG. BY	CHK. BY	DATE:
	A	M.J.P.	V.A.T.	2/13/2023

REVISION HISTORY

REV	DESCRIPTION	DATE	APPROVED
1	Added e□uipment and tag □	03/01/2023	M.J.P.

APPROVED	☐
APPROVED AS NOTED	☐
REVISE AND RESUBMIT	☐
REJECTED	☐
NOT SUBJECT TO REVIEW	☒

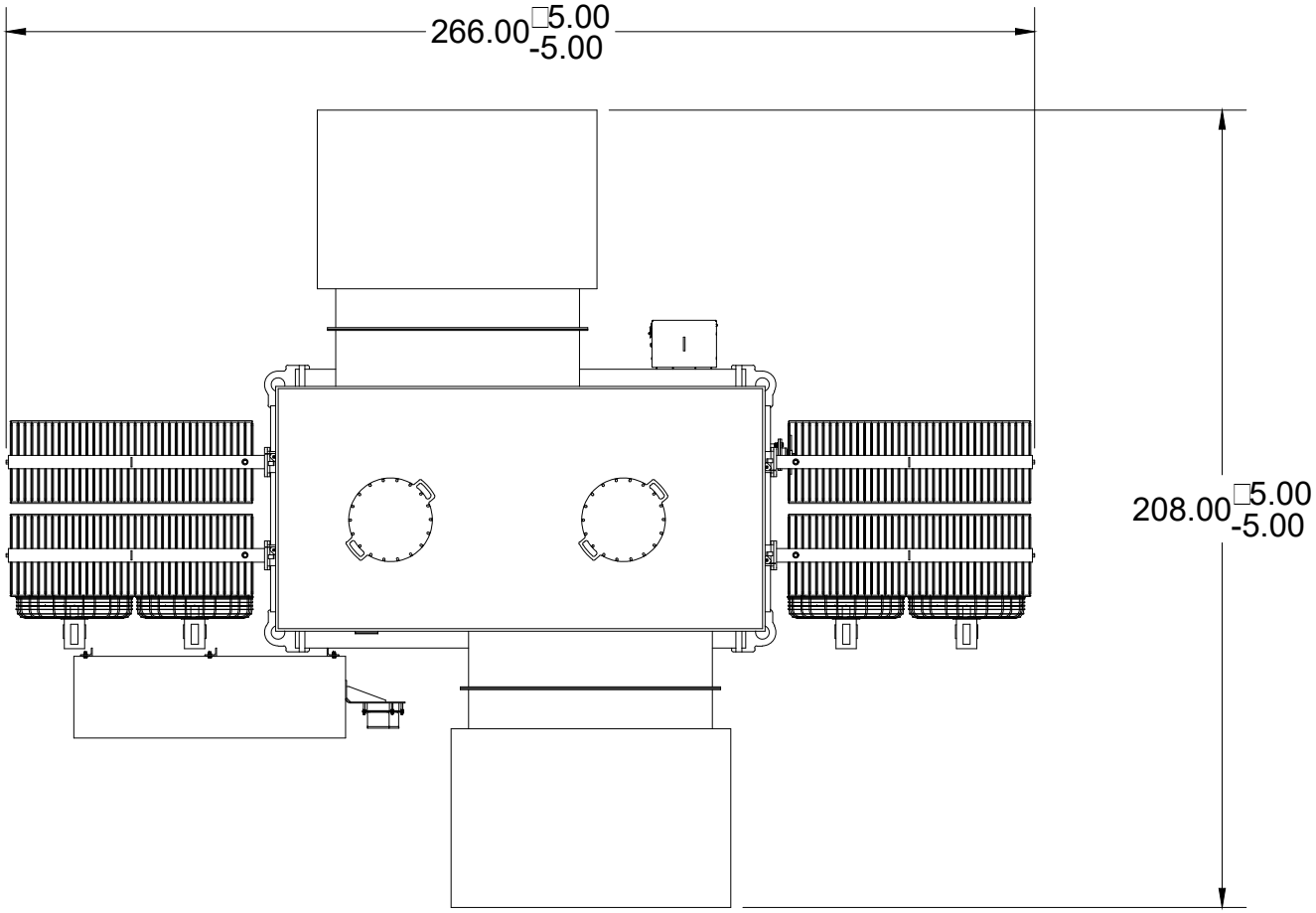
Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 03/17/2023

JACOBS — Date

[1] Jacobs is treating this as a SKETCH with "Not to Exceed" dimensions, and as such, is FOR INFORMATION ONLY (i.e., Not Subject to Review). This is NOT a finalized PHYSICAL ARRANGEMENT drawing or drawing set. (TYP)

[2] Provide drawings per the specification. (TYP)



TOTAL WEIGHT APPROX = 110500 LBS

SHEET 1 of 1

E□UIPMENT NAME: CTG-6, CTG-7
TAG NUMBER: CWPCTG-6-EMV60-□FMR-300
TAG NUMBER: WPCCTG-7-EMV60-□FMR-201

HOWARD INDUSTRIES INC.

ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

NAME:	Unit Foot Print Sketch	CC	0741
DESCRIPTION:	Unit Foot Print Sketch		
ID: 3418-000426-000	P.N.	U Sketch 426	
SCALE	A	DWG. BY M.P.	CHK. BY V.A.T.	DATE: 3/1/2023

REV	DESCRIPTION	DATE	APPROVED
1			

REVISION HISTORY

DWG. NO. 0034-080010-426

7.500"

7.125"

Φ0.188 HOLE (4 PLACES)

GENERATOR STEP-UP TRANSFORMER

TAG NUMBER: WPCCTG-7-EMV60-XFMR-201

CLASS KNAN/KNAF/KNAF — 3-PHASE 60 HERTZ

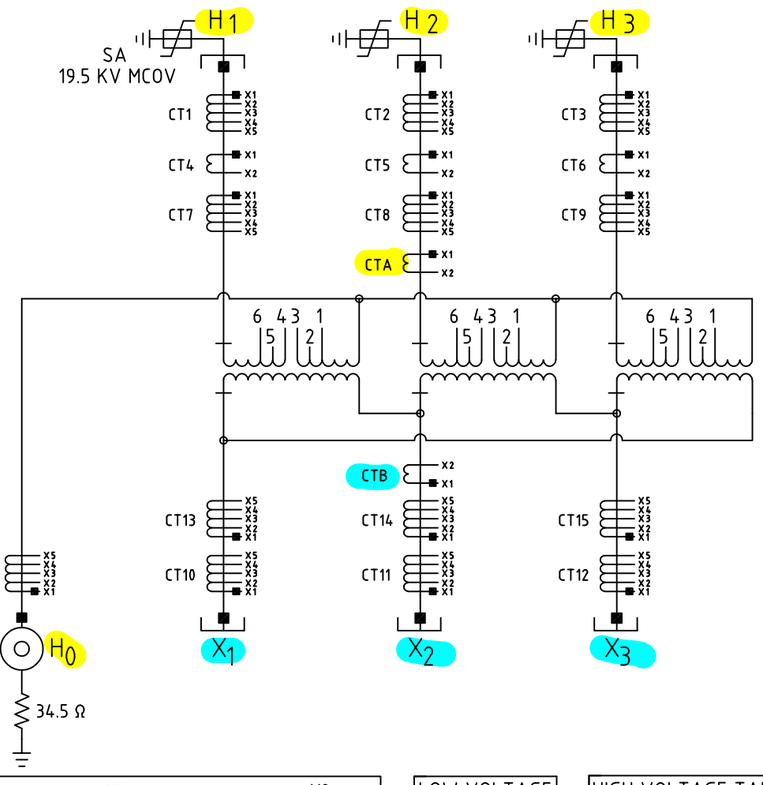
MVA 18/24/30 — CONT. TEMP. RISE 65°C

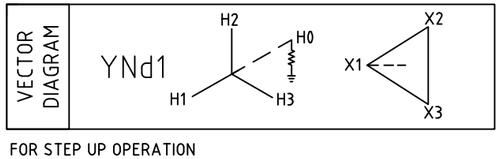
HV 24000 GRDY/13856 VOLTS — BIL 150 KV

LV 13800 DELTA VOLTS — BIL 110 KV

HV NEUTRAL — BIL 150 KV

IMPEDANCE 00.00 % AT 24000-13800 VOLTS AND 18 MVA





FOR STEP UP OPERATION
ADD'L DETAILS ON NAMEPLATE 0034-080020-426
HI PRODUCT INSTRUCTION MANUAL HI-120

LOW VOLTAGE	
VOLTS LL	AMPS AT 30 MVA
13800	1255.1

HIGH VOLTAGE TAP CHANGER DE-ENERGIZED OPERATION			
VOLTS LL	AMPS AT 30 MVA	POS.	CONNECTS
25200	687.3	1	3 - 4
24600	704.1	2	4 - 2
24000	721.7	3	2 - 5
23400	740.2	4	5 - 1
22800	759.7	5	1 - 6

SERIAL NUMBER: 000000-0000

MANUFACTURE DATE: 00/00

ALL WINDINGS CU

HOWARD INDUSTRIES, INC. ELLISVILLE, MS

PLATE NO. 0034-080010-426 REV.2

9.125

9.500

[1] If this drawing number is for WPCCTG-7-EMV60-XFMR-201 nameplate, then ALL OTHER drawing numbers (for each nameplate) should be distinct/unique. (TYP)

[2] Drawing numbers for CWPCTG-6-EMV60-XFMR-300 nameplates (i.e., the two other nameplates) are NOT unique/distinct. Correct this. (TYP)

Hasn't this information been provided already?

CUSTOMER: SEWERAGE & WATER BOARD OF NEW ORLEANS

P.O. NUMBER: 22-225-TP-5890

LOCATION: NEW ORLEANS, LA

MATERIAL: 0.018" THK. 304 STAINLESS STEEL

ACTUAL IMPEDANCE, SERIAL NUMBER, AND MANUFACTURE DATE WILL BE ADDED AFTER TEST. CUSTOMER, PO#, AND LOCATION WILL BE FILLED IN WHEN CUSTOMER BOOKS ARE PRINTED.

TRANSFORMER DESIGNED FOR A NOMINAL IMPEDANCE OF 5.00% @ 18 MVA

APPROVED	
APPROVED AS NOTED	X
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/16/20223

JACOBS Date

REV.	DATE	DESCRIPTION	BY	APP.
2	03/23/23	Revised per customer's marked-up.	VT	ZTK
1	03/15/23	Added equipment name and tag number Added hotspot CTA on H2 bushing.	VT	ZTK

HOWARD INDUSTRIES INC.

LAUREL, MISS. USA 39440

MFG. OF TRANSFORMERS

NAME	NAMEPLATE	C.C.	0018
DESC.	18/24/30 MVA		
CAT.	3418-000426-000		
SCALE	FULL	DWG. BY VT	CHK. BY VT	DATE 02/13/23

DWG. NO. 0034-080010-426

7.500"

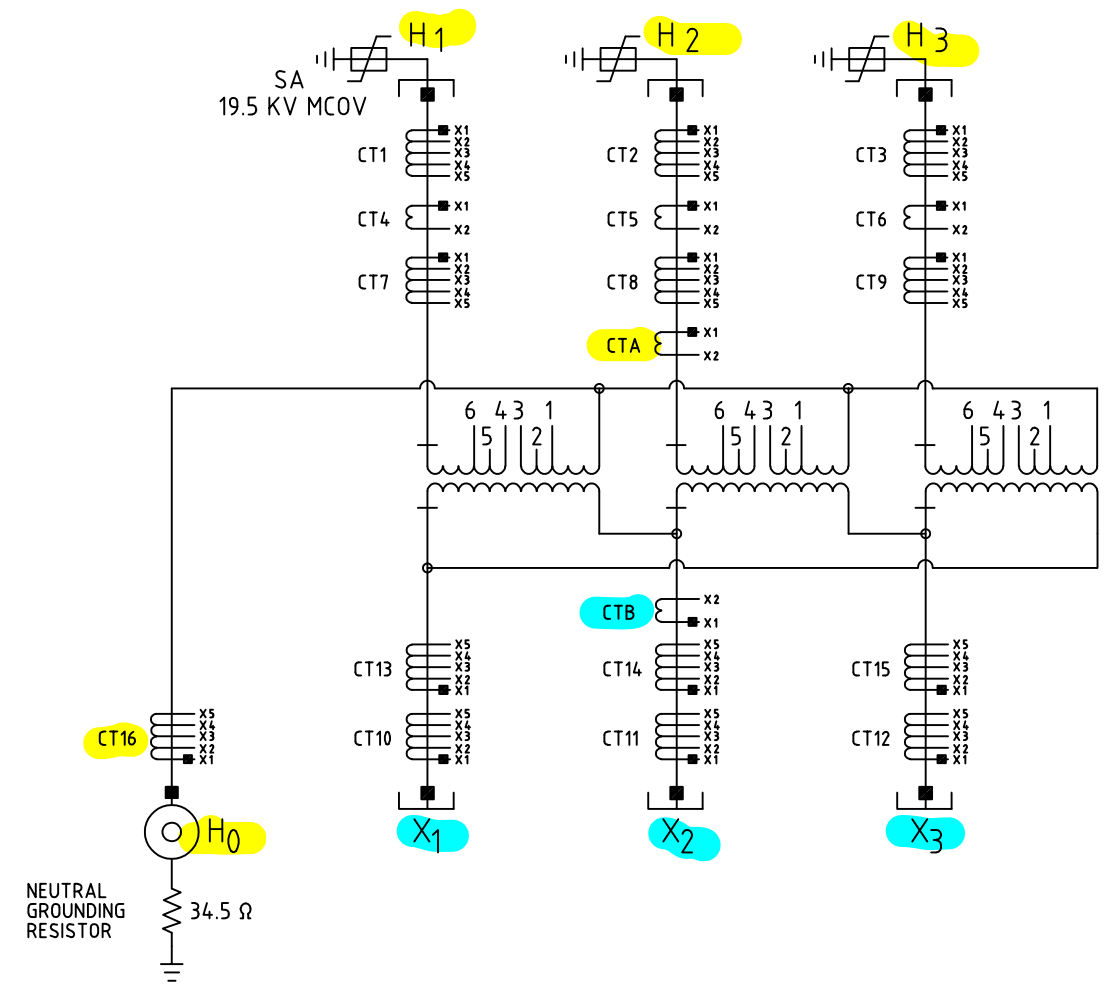
7.125"

Φ0.188 HOLE (4 PLACES)

GENERATOR STEP-UP TRANSFORMER

TAG NUMBER: CWPCTG-6-EMV60-XFMR-300

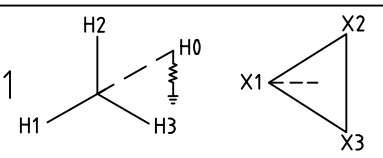
CLASS KNAN/KNAF/KNAF — 3-PHASE 60 HERTZ
MVA 18/24/30 — CONT. TEMP. RISE 65°C
HV 24000 GRDY/13856 VOLTS — BIL 150 KV
LV 13800 DELTA VOLTS — BIL 110 KV
HV NEUTRAL — BIL 150 KV
IMPEDANCE 00.00 % AT 24000-13800 VOLTS AND 18 MVA



9.125

9.500

VECTOR DIAGRAM



LOW VOLTAGE	
VOLTS LL	AMPS AT 30 MVA
13800	1255.1

HIGH VOLTAGE TAP CHANGER DE-ENERGIZED OPERATION

VOLTS LL	AMPS AT 30 MVA	POS.	CONNECTS
25200	687.3	1	3 - 4
24600	704.1	2	4 - 2
24000	721.7	3	2 - 5
23400	740.2	4	5 - 1
22800	759.7	5	1 - 6

FOR STEP UP OPERATION
ADD'L DETAILS ON NAMEPLATE 0034-080020-426
HI PRODUCT INSTRUCTION MANUAL HI-120

SERIAL NUMBER: 000000-0000

MANUFACTURE DATE: 00/00

ALL WINDINGS CU

HOWARD INDUSTRIES, INC.

ELLISVILLE, MS

PLATE NO. 0034-080010-426 REV.2

[1] If this drawing number is for CWPCTG-6-EMV60-XFMR-300 nameplate, then ALL OTHER drawing numbers (for each nameplate) should be distinct/unique. (TYP)

[2] Drawing numbers for WPCCTG-7-EMV60-XFMR-201 nameplates (i.e., the two other nameplates) are NOT unique/distinct. Correct this. (TYP)

Hasn't this information been provided already?

CUSTOMER: SEWERAGE & WATER BOARD OF NEW ORLEANS
P.O. NUMBER: 22-225-TP-5890
LOCATION: NEW ORLEANS, LA

MATERIAL: 0.018" THK. 304 STAINLESS STEEL

ACTUAL IMPEDANCE, SERIAL NUMBER, AND MANUFACTURE DATE WILL BE ADDED AFTER TEST.
CUSTOMER, PO#, AND LOCATION WILL BE FILLED IN WHEN CUSTOMER BOOKS ARE PRINTED.

TRANSFORMER DESIGNED FOR A NOMINAL IMPEDANCE OF 5.00% @ 18 MVA

2	03/23/23	Revised per customer's marked-up.	VT	ZTK
1	03/15/23	Added equipment name and tag number Added hotspot CTA on H2 bushing.	VT	ZTK
REV.	DATE	DESCRIPTION	BY	APP.

APPROVED ☐
APPROVED AS NOTED ☒
REVISE AND RESUBMIT ☐
REJECTED ☐
NOT SUBJECT TO REVIEW ☐

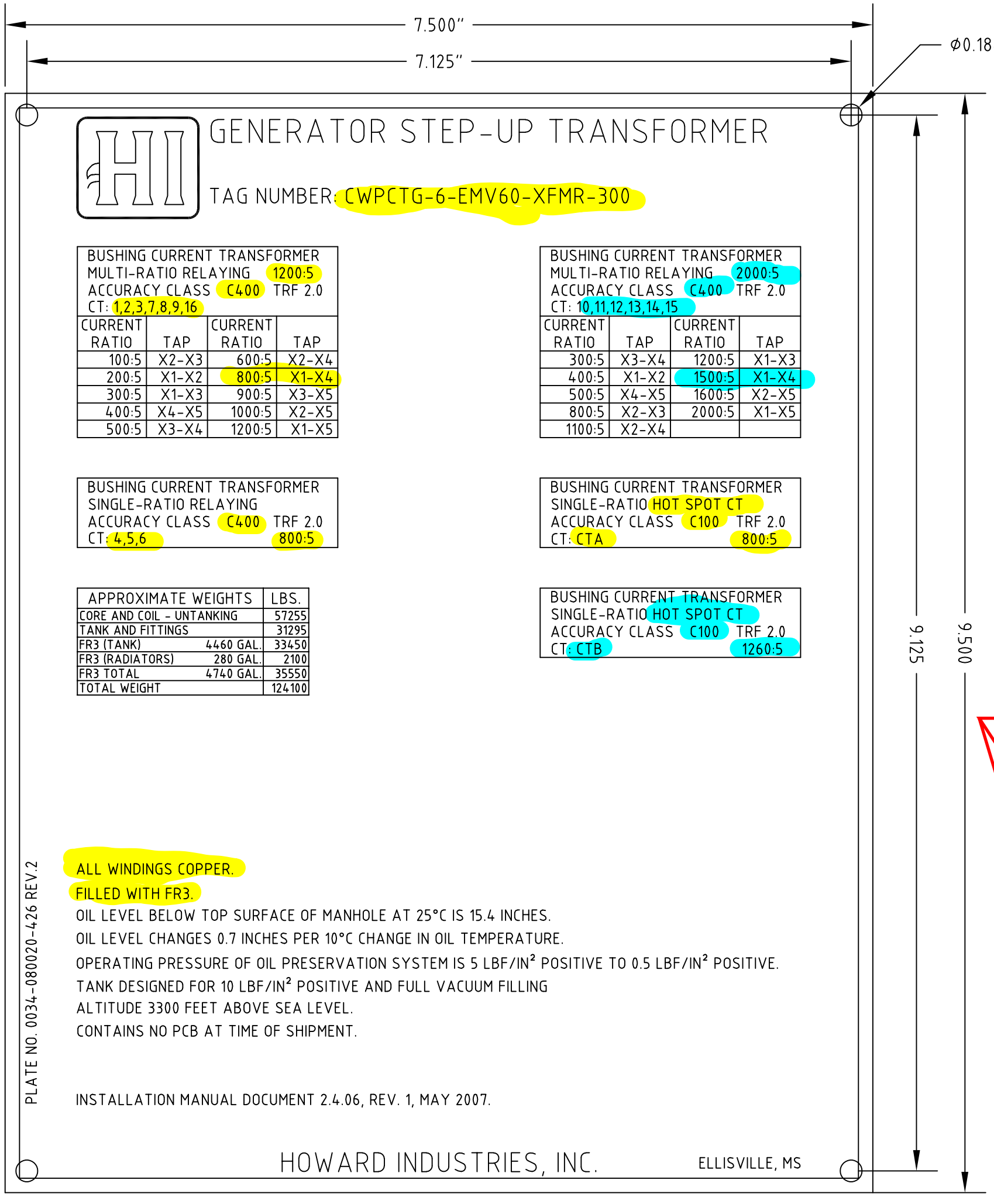
Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 06/16/2023
JACOBS — Date

HOWARD INDUSTRIES INC.
LAUREL, MISS. USA 39440
MFG. OF TRANSFORMERS

NAME NAMEPLATE		C.C. 0018	
DESC. 18/24/30 MVA			
CAT. 3418-000426-000			
SCALE FULL	DWG. BY VT	CHK. BY VT	DATE 02/13/23

DWG. NO. 0034-080020-426



GENERATOR STEP-UP TRANSFORMER

TAG NUMBER: CWPCTG-6-EMV60-XFMR-300

BUSHING CURRENT TRANSFORMER
MULTI-RATIO RELAYING 1200:5
ACCURACY CLASS C400 TRF 2.0
CT: 1,2,3,7,8,9,16

CURRENT RATIO	TAP	CURRENT RATIO	TAP
100:5	X2-X3	600:5	X2-X4
200:5	X1-X2	800:5	X1-X4
300:5	X1-X3	900:5	X3-X5
400:5	X4-X5	1000:5	X2-X5
500:5	X3-X4	1200:5	X1-X5

BUSHING CURRENT TRANSFORMER
MULTI-RATIO RELAYING 2000:5
ACCURACY CLASS C400 TRF 2.0
CT: 10,11,12,13,14,15

CURRENT RATIO	TAP	CURRENT RATIO	TAP
300:5	X3-X4	1200:5	X1-X3
400:5	X1-X2	1500:5	X1-X4
500:5	X4-X5	1600:5	X2-X5
800:5	X2-X3	2000:5	X1-X5
1100:5	X2-X4		

BUSHING CURRENT TRANSFORMER
SINGLE-RATIO RELAYING
ACCURACY CLASS C400 TRF 2.0
CT: 4,5,6 800:5

BUSHING CURRENT TRANSFORMER
SINGLE-RATIO HOT SPOT CT
ACCURACY CLASS C100 TRF 2.0
CT: CTA 800:5

APPROXIMATE WEIGHTS	LBS.
CORE AND COIL - UNTANKING	57255
TANK AND FITTINGS	31295
FR3 (TANK) 4460 GAL.	33450
FR3 (RADIATORS) 280 GAL.	2100
FR3 TOTAL 4740 GAL.	35550
TOTAL WEIGHT	124100

BUSHING CURRENT TRANSFORMER
SINGLE-RATIO HOT SPOT CT
ACCURACY CLASS C100 TRF 2.0
CT: CTB 1260:5

ALL WINDINGS COPPER.
FILLED WITH FR3.
OIL LEVEL BELOW TOP SURFACE OF MANHOLE AT 25°C IS 15.4 INCHES.
OIL LEVEL CHANGES 0.7 INCHES PER 10°C CHANGE IN OIL TEMPERATURE.
OPERATING PRESSURE OF OIL PRESERVATION SYSTEM IS 5 LBF/IN^2 POSITIVE TO 0.5 LBF/IN^2 POSITIVE.
TANK DESIGNED FOR 10 LBF/IN^2 POSITIVE AND FULL VACUUM FILLING
ALTITUDE 3300 FEET ABOVE SEA LEVEL.
CONTAINS NO PCB AT TIME OF SHIPMENT.

INSTALLATION MANUAL DOCUMENT 2.4.06, REV. 1, MAY 2007.

PLATE NO. 0034-080020-426 REV.2

HOWARD INDUSTRIES, INC. ELLISVILLE, MS

[1] If this drawing number is for CWPCTG-6-EMV60-XFMR-300 nameplate, then ALL OTHER drawing numbers (for each nameplate) should be distinct/unique. (TYP)

[2] Drawing numbers for WPCCTG-7-EMV60-XFMR-201 nameplates (i.e., the two other nameplates) are NOT unique/distinct. Correct this. (TYP)

Hasn't this information been provided already?

CUSTOMER: SEWERAGE & WATER BOARD OF NEW ORLEANS
P.O. NUMBER: 22-225-TP-5890
LOCATION: NEW ORLEANS, LA

MATERIAL: 0.018" THK. 304 STAINLESS STEEL

CUSTOMER, PO#, AND LOCATION WILL BE FILLED IN WHEN CUSTOMER BOOKS ARE PRINTED.

2	03/23/23	Revised per customer's marked-up.	VT	ZTK
1	03/15/23	Added equipment name and tag number Added hotspot CTA on H2 bushing.	VT	ZTK
REV.	DATE	DESCRIPTION	BY	APP.

APPROVED ☐
APPROVED AS NOTED ☒
REVISE AND RESUBMIT ☐
REJECTED ☐
NOT SUBJECT TO REVIEW ☐

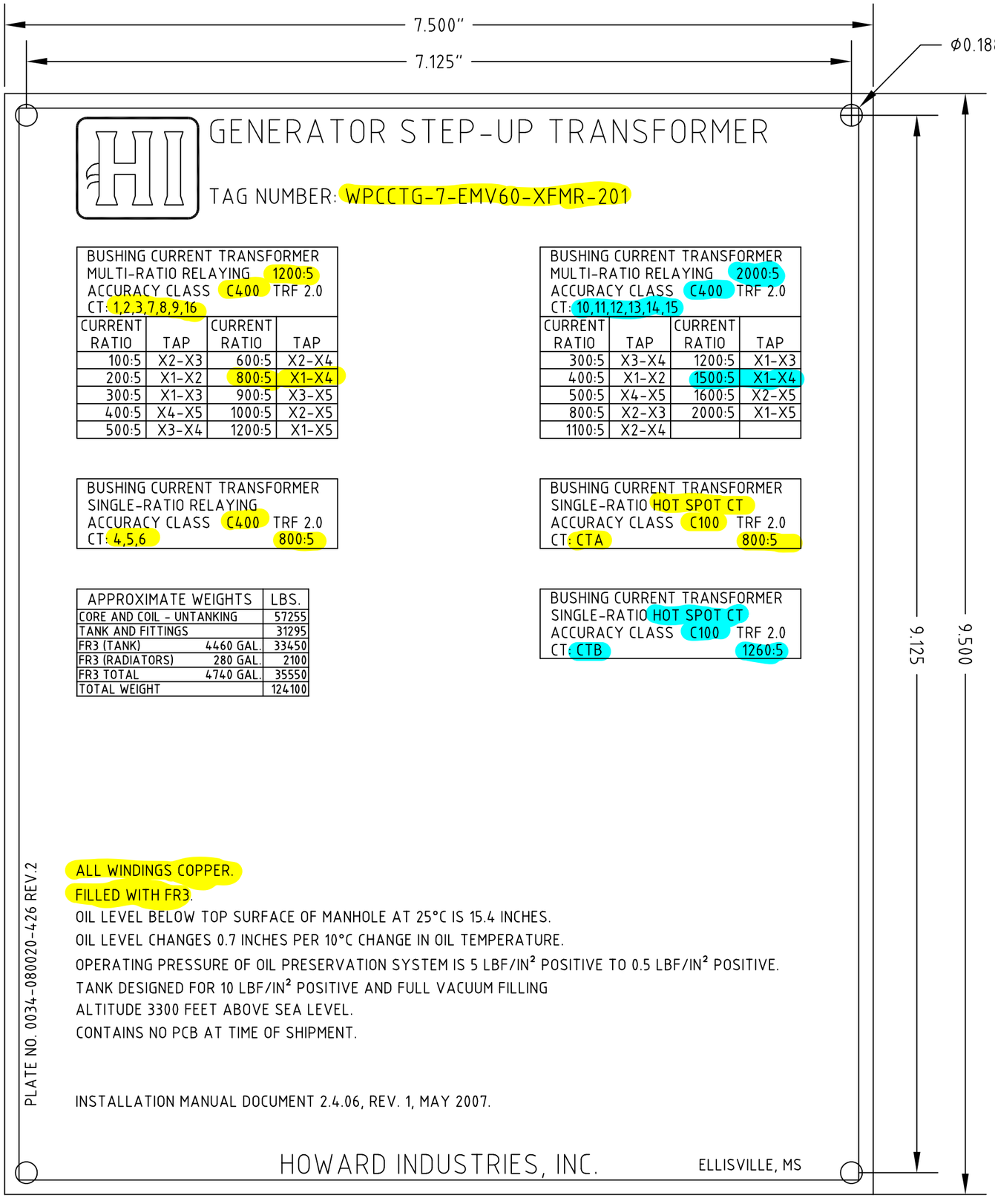
Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/16/2023
JACOBS Date

HOWARD INDUSTRIES INC.
LAUREL, MISS. USA 39440
MFG. OF TRANSFORMERS

NAME	NAMEPLATE			C.C.	0018
DESC.	18/24/30 MVA				
CAT.	3418-000426-000				
SCALE	FULL	DWG. BY	VT	CHK. BY	VT	DATE	02/13/23

DWG. NO. 0034-080020-426



GENERATOR STEP-UP TRANSFORMER

TAG NUMBER: WPCCTG-7-EMV60-XFMR-201

BUSHING CURRENT TRANSFORMER
MULTI-RATIO RELAYING 1200:5
ACCURACY CLASS C400 TRF 2.0
CT: 1,2,3,7,8,9,16

CURRENT RATIO	TAP	CURRENT RATIO	TAP
100:5	X2-X3	600:5	X2-X4
200:5	X1-X2	800:5	X1-X4
300:5	X1-X3	900:5	X3-X5
400:5	X4-X5	1000:5	X2-X5
500:5	X3-X4	1200:5	X1-X5

BUSHING CURRENT TRANSFORMER
MULTI-RATIO RELAYING 2000:5
ACCURACY CLASS C400 TRF 2.0
CT: 10,11,12,13,14,15

CURRENT RATIO	TAP	CURRENT RATIO	TAP
300:5	X3-X4	1200:5	X1-X3
400:5	X1-X2	1500:5	X1-X4
500:5	X4-X5	1600:5	X2-X5
800:5	X2-X3	2000:5	X1-X5
1100:5	X2-X4		

BUSHING CURRENT TRANSFORMER
SINGLE-RATIO RELAYING
ACCURACY CLASS C400 TRF 2.0
CT: 4,5,6 800:5

BUSHING CURRENT TRANSFORMER
SINGLE-RATIO HOT SPOT CT
ACCURACY CLASS C100 TRF 2.0
CT: CTA 800:5

APPROXIMATE WEIGHTS	LBS.
CORE AND COIL - UNTANKING	57255
TANK AND FITTINGS	31295
FR3 (TANK) 4460 GAL.	33450
FR3 (RADIATORS) 280 GAL.	2100
FR3 TOTAL 4740 GAL.	35550
TOTAL WEIGHT	124100

BUSHING CURRENT TRANSFORMER
SINGLE-RATIO HOT SPOT CT
ACCURACY CLASS C100 TRF 2.0
CT: CTB 1260:5

ALL WINDINGS COPPER.
FILLED WITH FR3.
OIL LEVEL BELOW TOP SURFACE OF MANHOLE AT 25°C IS 15.4 INCHES.
OIL LEVEL CHANGES 0.7 INCHES PER 10°C CHANGE IN OIL TEMPERATURE.
OPERATING PRESSURE OF OIL PRESERVATION SYSTEM IS 5 LBF/IN^2 POSITIVE TO 0.5 LBF/IN^2 POSITIVE.
TANK DESIGNED FOR 10 LBF/IN^2 POSITIVE AND FULL VACUUM FILLING
ALTITUDE 3300 FEET ABOVE SEA LEVEL.
CONTAINS NO PCB AT TIME OF SHIPMENT.

INSTALLATION MANUAL DOCUMENT 2.4.06, REV. 1, MAY 2007.

HOWARD INDUSTRIES, INC. ELLISVILLE, MS

PLATE NO. 0034-080020-426 REV.2

[1] If this drawing number is for WPCCTG-7-EMV60-XFMR-201 nameplate, then ALL OTHER drawing numbers (for each nameplate) should be distinct/unique. (TYP)

[2] Drawing numbers for CWPCTG-6-EMV60-XFMR-300 nameplates (i.e., the two other nameplates) are NOT unique/distinct. Correct this. (TYP)

Hasn't this information been provided already?

CUSTOMER: SEWERAGE & WATER BOARD OF NEW ORLEANS
P.O. NUMBER: 22-225-TP-5890
LOCATION: NEW ORLEANS, LA

MATERIAL: 0.018" THK. 304 STAINLESS STEEL

CUSTOMER, PO#, AND LOCATION WILL BE FILLED IN WHEN CUSTOMER BOOKS ARE PRINTED.

2	03/23/23	Revised per customer's marked-up.	VT	ZTK
1	03/15/23	Added equipment name and tag number Added hotspot CTA on H2 bushing.	VT	ZTK
REV.	DATE	DESCRIPTION	BY	APP.

APPROVED ☐
APPROVED AS NOTED ☒
REVISE AND RESUBMIT ☐
REJECTED ☐
NOT SUBJECT TO REVIEW ☐

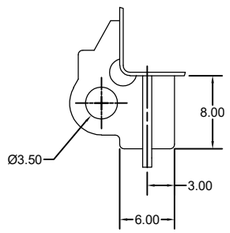
Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/16/2023
JACOBS Date

HOWARD INDUSTRIES INC.
LAUREL, MISS. USA 39440
MFG. OF TRANSFORMERS

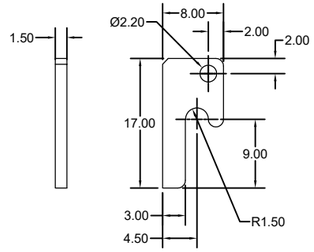
NAME	NAMEPLATE	C.C.	0018
DESC.	18/24/30 MVA		
CAT.	3418-000426-000		
SCALE	FULL	DWG. BY VT	CHK. BY VT	DATE 02/13/23

JACKING LUG DETAIL

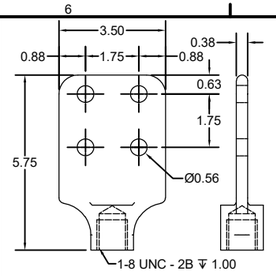


DETAIL ITEM 104

LIFTING LUG DETAIL



DETAIL ITEM 106

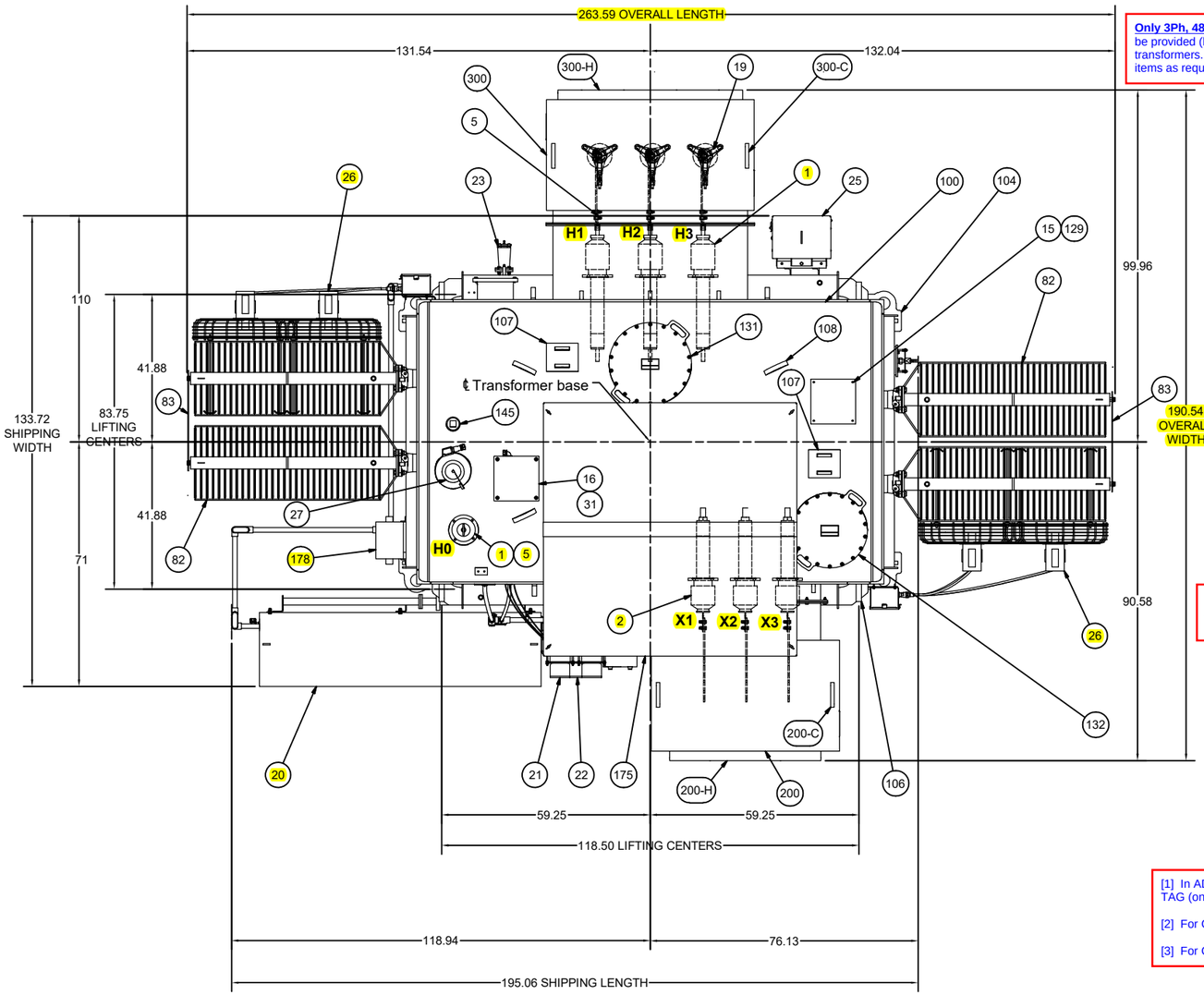


DETAIL ITEM 5

[1] Show Detail ITEM 2 (XV Termination Spade)

[2] XV spades should be sufficiently large to accommodate multiple MV conductors (per phase) for a secondary FLA of 1256A (minimum). (TYP)

Confirm dimensions against overall control cabinet dimensions. Make corrections as required. (TYP)



Only 3Ph, 480V auxiliary service power will be provided (by SWBNO) to GSU transformers. Make corrections to these items as required. (TYP)

Parts List

R/S	ITEM	QTY	DESCRIPTION
	1	3	HV bushing (H-J AS1667-015, bottom connected)
X	2	3	XV bushing (H-J AS1725-010, bottom connected)
	4	1	H0 bushing (H-J AS1667-015, bottom connected)
X	5	3	HV bushing terminal (H-J SP3026-007)
	15	1	Core ground enclosure
	16	3	Current transformer junction block enclosure
X	19	3	HV arrester (HUBBELL 98 kV rms EVP001900-3001)
	20	1	Control cabinet NEMA 4X (60w x 80h x 18 d; 32.375 x 12 openings w/cover plate
	21	1	Liquid temperature gauge 4 switch (Qualitrol TR6000-00024878)
	22	2	Winding temperature gauge 4 switch (Qualitrol TR6000-00024876)
	23	1	Fault pressure relay (Qualitrol 900-14-02) mounted on a 2" NPT ball valve
	24	1	Thermal plate for liquid temperature, winding temperature (Qualitrol 2WTL-1027-1)
	25	1	Inert gas system cabinet with 3 stage regulation (Howard Industries # 0061-197956-218)
X	26	8	Fan 1/6hp 208-230V, single phase (KRENZ F26-A8678)
	27	1	Pressure relief device (main unit) (Qualitrol 208-60E)
	31	3	Current transformer junction block
	43	1	Liquid level gauge (main tank) (Qualitrol LLG032-00043904)
	61	1	2" NPT Drain/Filter valve with brass plug and 3/8" sampler (main tank)
	62	1	1" NPT Upper filter press valve with brass plug (main tank)
	78	2	Nameplates
X	82	4	Radiator (bolt on) with 1" brass plug top and bottom (Howard Industries 32 panel)
X	83	REF	Radiator seismic bracing
	100	1	Main domed cover (welded) with anti-skid paint
	101	1	Transformer tank
	103	1	Transformer flat base
	104	4	Jacking lug
	105	6	Stainless steel Ground pad 2-hole NEMA spacing
	106	4	Lifting lug
	107	2	Fall protection base
	108	4	Main cover lifting lug
	110	8	Radiator isolating valve
	129	1	Main unit core ground bushing (Auburn F-630) grounded to transformer tank
	131	1	Inspection opening 20"
	132	1	Inspection opening 18"
	145	1	Vacuum connection 3" NPT coupling and brass plug (main tank)
	170	1	De-energized tapchanger operating handle (padlockable)
	175	1	NGR, 24000V,400A,10s,3R
	178	1	Aux. Trans. 240V x 480V-120V / 240V, 10KVA
X	200	1	XV terminal chamber, 52w x 72h x 30d Inside
X	200-A	1	Bottom plate .125 tk, opening size 39 x 16.5
X	200-B	2	Front access plate .25 tk, opening size 34.5 x 25.5
X	200-C	2	Lift hooks (chamber only)
X	200-G	2	Protected vents
X	200-H	2	Drip egde
	222	1	Hydran 2011i sensor mounted on 2" ball valve
	223	1	Hydran 201Ci Monitor
X	300	1	HV terminal chamber, 57.5w x 90h x 30d Inside
X	300-A	1	Bottom plate .125 tk, opening size 39 x 16.5
X	300-B	6	Front access plate .25 tk, opening size 20 x 20
X	300-C	2	Lift hooks (chamber only)
X	300-G	2	Protected vents
X	300-H	3	Drip egde
X	300-K	2	4" Infared windows

Is this a NEMA 3R enclosure designation? If so, is this sufficient as other transformer enclosures (i.e., the control cabinet) is NEMA 4X)? Make corrections as required. (TYP)

Reference Jacobs reply to RFI-001 (Hydran 201R Gas Monitor) dated (on or about) 12/21/2022. (TYP)

Approximate weights and oil quantities

Description	FR3 Oil Quantity (Gallons)	Weights (lbs)
Active part		57255
Tank and fittings		31295
FR3 Oil (Tank)	4460	33450
FR3 Oil (Radiators)	280	2100
Total FR3 Oil	4740	35550
Total Weight		124100
Shipping Weight (with oil)		115120
Sewerage & Water Board of New Orleans		
HI Catalog Number	3418-000426-000	

Drawing notes:

All dimensions in inches.
All rigid conduit is 1" or 2" galvanised steel and painted
R/S = Removed for shipment.
Transformer may be rolled fully dressed along either axis.
External finish: ANSI #70 Gray per 0034-080180-426
Main cover painted with anti-skid paint.

ANSI 61 Gray required per Section 26 05 75 (Basic Electrical Materials and Methods), subsection 2.23.C. (TYP)

SHEET 1 of 3

[1] In ADDITION to this titleblock text description, provide the EQUIPMENT TAG (on EACH drawing) for EACH GSU transformer. (TYP)

[2] For CTG-6 GSU Transformer: CWPCTG-6-EMV60-XFMR-300

[3] For CTG-7 GSU Transformer: WPCCTG-7-EMV60-XFMR-201

APPROVED	
APPROVED AS NOTED	X
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/10/2023
JACOBS Date

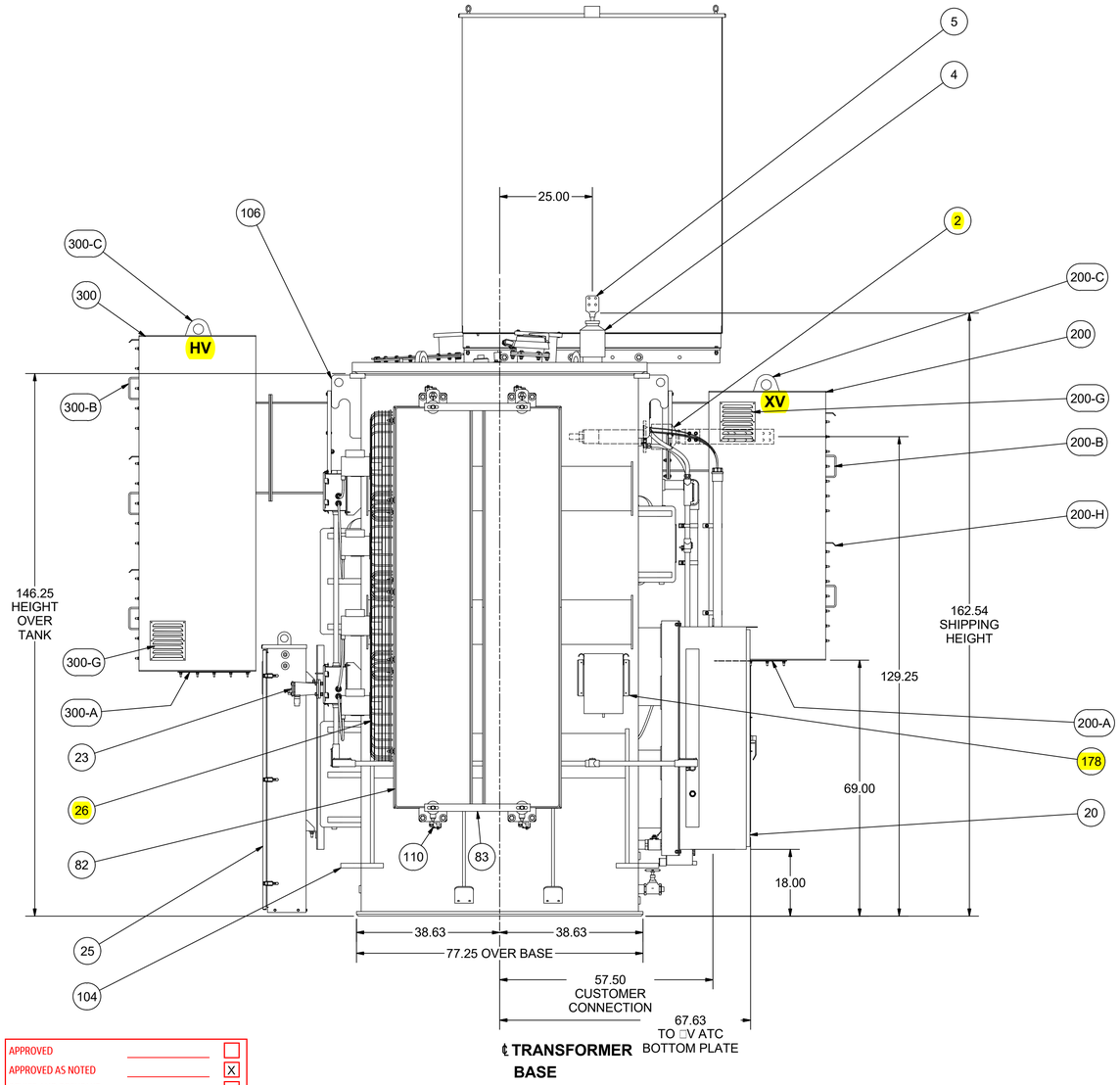
REV	DESCRIPTION	DATE	APPROVED
1			

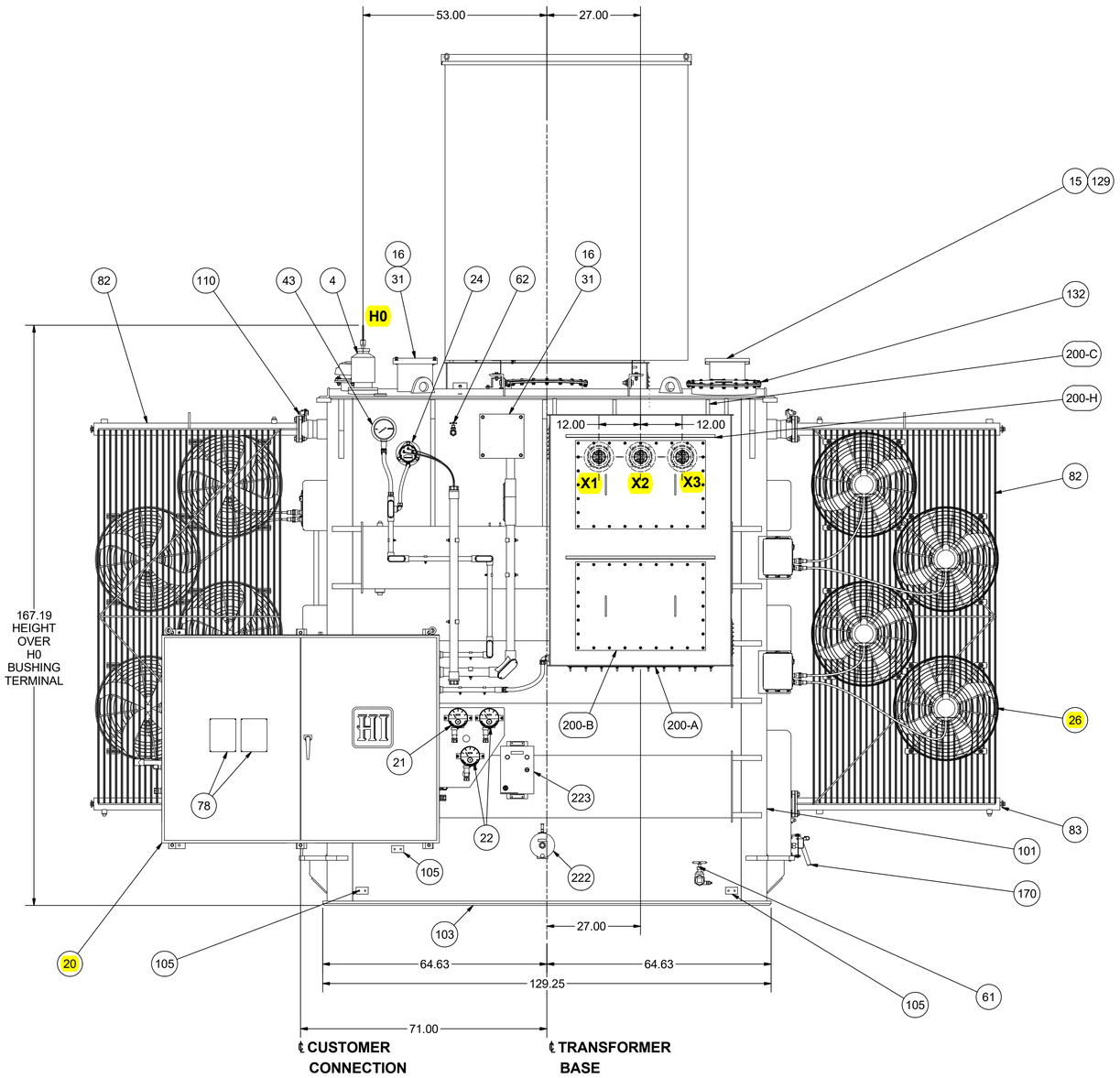
REVISION HISTORY

HOWARD INDUSTRIES INC.
ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

NAME:	Customer Outline	CC:	0745
DESCRIPTION:	18/24//30 MVA 65°C 24 kV Y - 13.8 kV D GSU		
ID:	3418-000426-000	P.N.	0034-080030-426

SCALE	SIZE	DWG. BY	CHK. BY	DATE:
	D	BSword	VT	5/6/2023





APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/10/2023
JACOBS Date

Apply edits and/or comments made on SHEET 1 to other sheets in this submittal. (TYP)

[1] In ADDITION to this titleblock text description, provide the EQUIPMENT TAG (on EACH drawing) for EACH GSU transformer. (TYP)

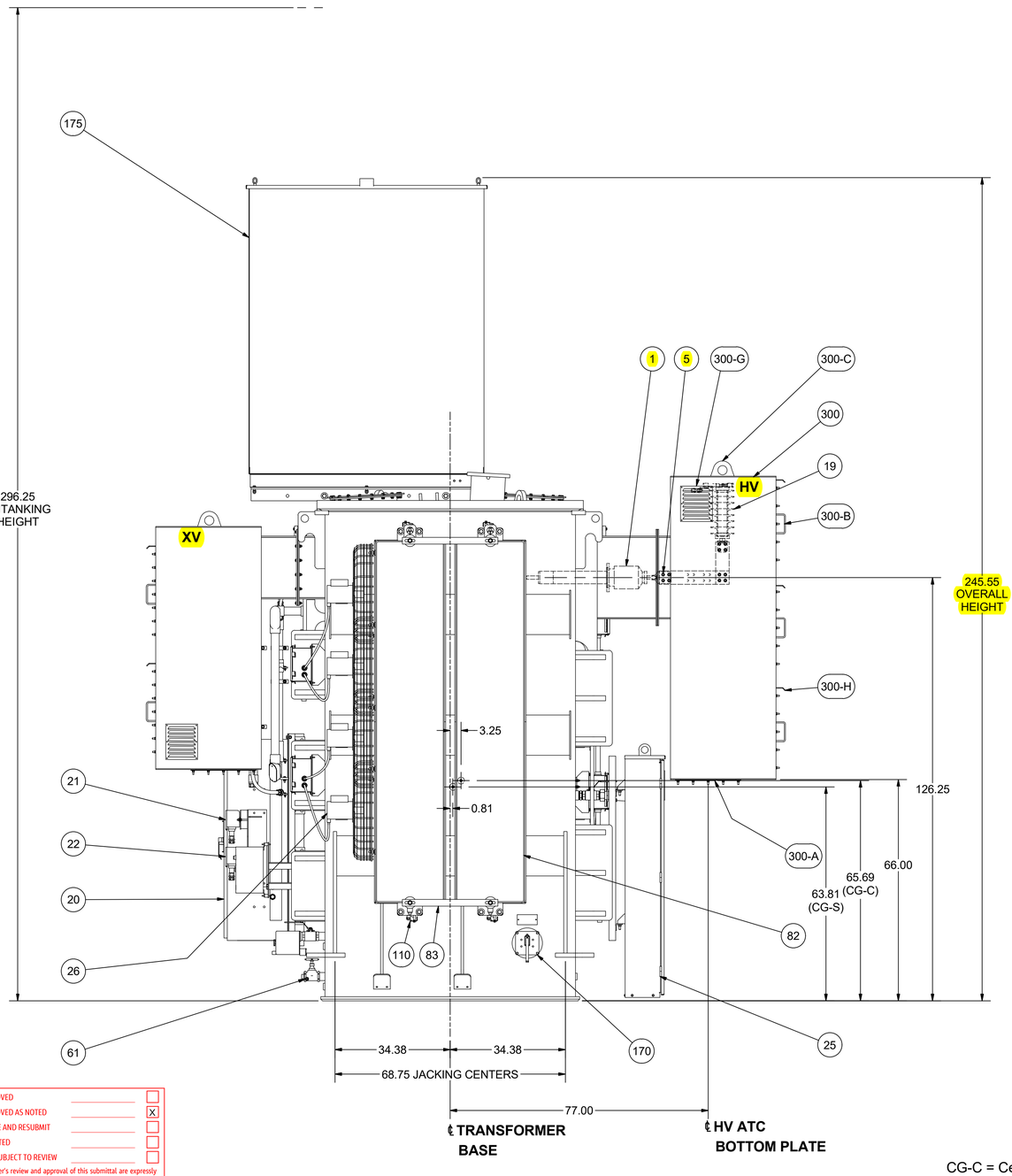
[2] For CTG-6 GSU Transformer: CWPCTG-6-EMV60-XFMR-300

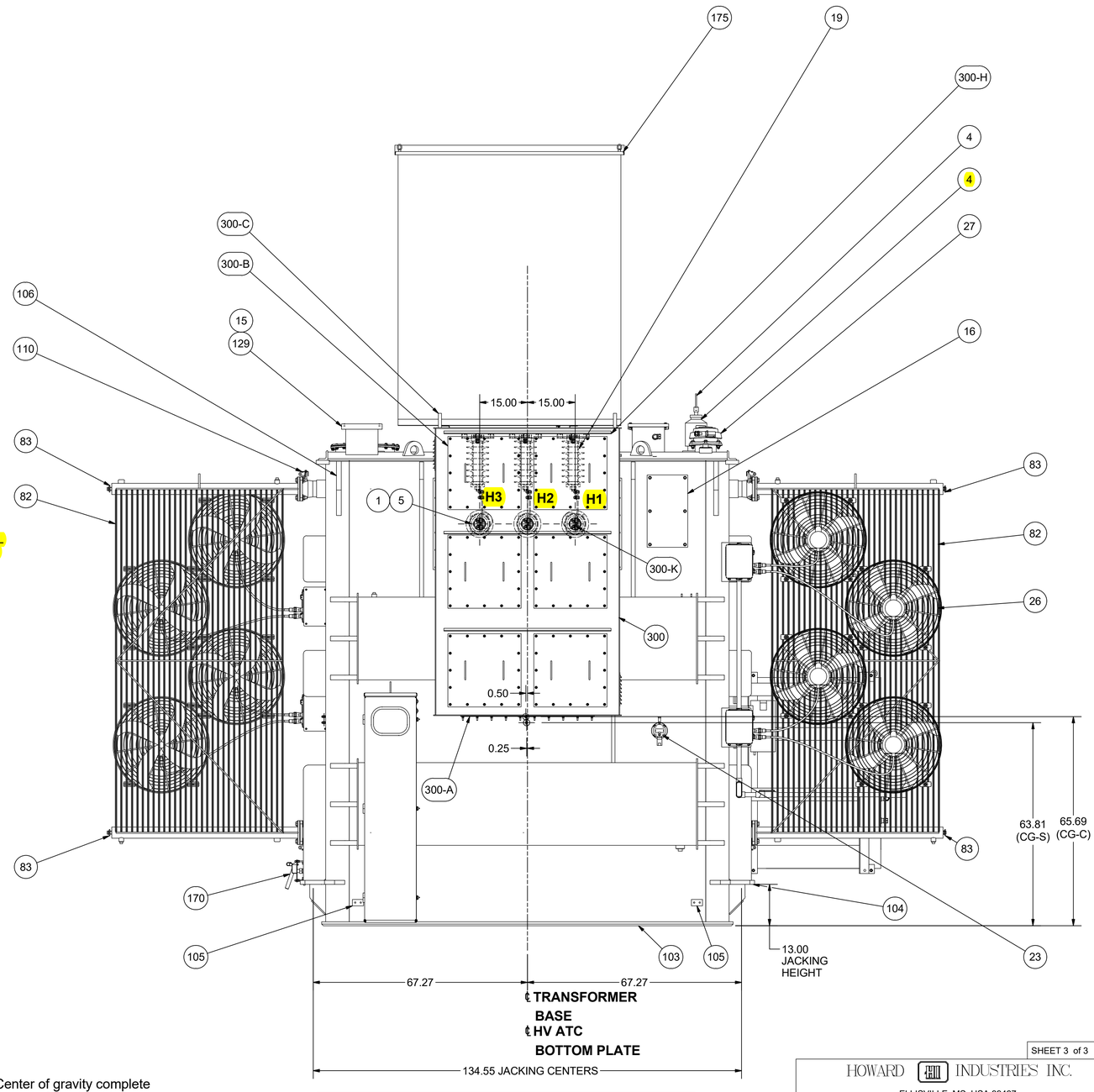
[3] For CTG-7 GSU Transformer: WPCCTG-7-EMV60-XFMR-201

SHEET 2 of 3

HOWARD INDUSTRIES INC.
ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

NAME:	Customer Outline	CC	0745
DESCRIPTION:	18/24//30 MVA 65°C 24 kV Y - 13.8 kV D GSU		
ID: 3418-000426-000	P.N.	0034-080030-426	
SCALE	D SIZE	BSword DWG. BY	VT CHK. BY	5/6/2023 DATE:





CG-C = Center of gravity complete
CG-S = Center of gravity shipping

Apply edits and/or comments made on SHEET 1 to other sheets in this submittal. (TYP)

[1] In ADDITION to this titleblock text description, provide the EQUIPMENT TAG (on EACH drawing) for EACH GSU transformer. (TYP)

[2] For CTG-6 GSU Transformer: CWPCTG-6-EMV60-XFMR-300

[3] For CTG-7 GSU Transformer: WPCCTG-7-EMV60-XFMR-201

APPROVED
APPROVED AS NOTED X
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/10/2023
JACOBS Date

SHEET 3 of 3

HOWARD INDUSTRIES INC.
ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

NAME:	Customer Outline	CC	0745
DESCRIPTION:	18/24//30 MVA 65°C 24 kV Y - 13.8 kV D GSU		
ID: 3418-000426-000	P.N. 0034-080030-426		
SCALE	D SIZE	BSword DWG. BY	VT CHK. BY	5/6/2023 DATE:

REVIEW COVERSHEET FOR
C1440 GSU TRANSFORMER PROCUREMENT
SN-006 GSU TRANSFORMER CONTROL DRAWINGS

APPROVED		☐
APPROVED AS NOTED		X
REVISE AND RESUBMIT		☐
REJECTED		☐
NOT SUBJECT TO REVIEW		☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

JACOBS ENGINEERING	7/5/23
ENGINEER	Date

LEGEND	MAIN CONTROL CABINET/TANK
A1, A2, 13, A25, A37, F1-F3, F5, F7-F9, FTM1, GM1, GM2, HHT, M1, S1, S1A, S2	TERMINAL BOARDS, MAIN CABINET
CBA1, CBA2	CURRENT BALANCING AUTOTRANSFORMERS
CBF1, CBF2, CBF3	CIRCUIT BREAKERS, 10A, SINGLE POLE
CBF4	CIRCUIT BREAKER, 20A, SINGLE POLE
CBF5, CBF6, CBS1, CBS2	CIRCUIT BREAKERS, 15A, DOUBLE POLE
CBFM1	CIRCUIT BREAKER, 40A, DOUBLE POLE
CHF1	CABINET HEATER, 200W, 120V
CHF2	CABINET HEATER, 375W, 240V
CLAF1, CLAF2	CABINET LIGHT ASSEMBLIES
COF1	CONVENIENCE OUTLET
CPTF1	CONTROL POWER TRANSFORMER, 240V X 480V - 120V X 240V, 10KVA
CT1-CT16	CURRENT TRANSFORMERS AND/OR SHORTING BOARDS
CTA, CTB	HOT SPOT CURRENT TRANSFORMERS AND/OR SHORTING BOARDS
FAM01, FAOM2	FAN AUTO/OFF/MAN SWITCHES
FC1, FC2	FAN CONTACTORS
FM	FAN MOTOR
FSS	FAN GROUPNG SWITCH
FUF1, FUF2	FUSES, 20A
G	GROUND POINT
GMC	HYDRAN #201Ci-1, GAS MONITOR CONTROLLER
GMS	HYDRAN #201Ti, GAS MONITOR SENSOR
HSH1, HSH2	HOT SPOT HEATER ELEMENTS
J, K, L, N	CURRENT TRANSFORMER FEEDTHROUGHS
LLM1	LIQUID LEVEL GAUGE
LTM1	LIQUID TEMPERATURE GAUGE
PRM1	PRESSURE RELIEF DEVICE
SIRM1	SUDDEN PRESSURE RELAYS, SEAL-IN RELAY
SPRM1	SUDDEN PRESSURE RELAY
TS1, TS2, TSH1, TSH2	TEST SWITCHES
WTA, WTB	WINDING TEMPERATURE GAUGES
787	TRANSFORMER PROTECTION RELAY, SCHWEITZER ENGINEERING #07872EE1A1A1A7985A610

LEGEND	INERT AIR CABINET
CHG1	CABINET HEATER, 250W, 240V
CHSG	CABINET HEATER SWITCH
IA1, IA2	TERMINAL BOARDS
IAG	GROUND POINT
NGBPG	INERT GAS BOTTLE PRESSURE GAUGE
NGBPS	INERT GAS BOTTLE PRESSURE SWITCH
NSHPS	INERT GAS SUPPLY HIGH PRESSURE SWITCH
NSLPS	INERT GAS SUPPLY LOW PRESSURE SWITCH
NSPVG	INERT GAS SUPPLY PRESSURE/VACUUM GAUGE

LEGEND	HV AIR TERMINAL CHAMBER
HAHS1	CHAMBER HYGROTHERM SWITCH
HA1	TERMINAL BOARD
HVAH1, HVAH2	CHAMBER HEATERS, 375W, 240V
HATCG	GROUND POINT

LEGEND	LV AIR TERMINAL CHAMBER
LAHS1	CHAMBER HYGROTHERM SWITCH
LA1	TERMINAL BOARD
LVAH1, LVAH2	CHAMBER HEATERS, 375W, 240V
LATCG	GROUND POINT

NOTES:

1) ALWAYS WIRE CONTROLS IN ACCORDANCE WITH LOCAL ELECTRICAL CODES.
2) DO NOT USE THIS PRINT TO DETERMINE EXACT LOCATION OF EQUIPMENT OR WIRING.
3) ALL HOWARD INDUSTRIES SUPPLIED WIRING IS BLACK IN COLOR UNLESS STATED OTHERWISE.
4) ALL HOWARD INDUSTRIES SUPPLIED WIRING IS #12AWG TYPE "FEP". UNLESS STATED OTHERWISE.
5) EQUIPMENT ITEMS SHOWN WITH DASHED LINES ARE SUPPLIED BY CUSTOMER OR THEY ARE HIDDEN LINES.
6) JUMPERS (F41) AND (F42) MAY BE REMOVED FOR THE INSERTION OF CUSTOMER SUPPLIED "LOCKOUT" CONTACTS.
7) THE SIZE OF WIRES USED ON ACCESSORIES MAY VARY. REFER TO INDIVIDUAL INSTRUCTION OR CATALOG SHEETS FOR DETAILS, IF AVAILABLE.
8) CURRENT AND POTENTIAL TRANSFORMER CIRCUITS REQUIRE GROUNDING WHEN THE MAIN OR PARALLELED UNIT(S) IS/ARE IN SERVICE. ALWAYS VERIFY THE GROUNDING OF THESE CIRCUITS WHETHER MODIFICATIONS TO THESE CIRCUITS ARE REQUIRED OR NOT. NEVER RECONNECT CURRENT OR POTENTIAL TRANSFORMER LEADS WHILE MAIN OR PARALLELED UNIT(S) IS/ARE IN SERVICE. NEVER LEAVE CURRENT TRANSFORMERS WITHOUT BURDEN OR BEING SHORTED AND TAKEN TO GROUND WHEN MAIN OR PARALLELED UNIT(S) IS/ARE IN SERVICE. IF CURRENT TRANSFORMERS ARE LEFT OPEN, DANGEROUSLY HIGH VOLTAGE WILL RESULT WHICH CAN CAUSE DEATH, SEVERE INJURY OR EQUIPMENT DAMAGE.
   ALL BUSHING/STRUCTURE CURRENT TRANSFORMERS ARE SHORTED OUT FOR SHIPMENT USING SHORTING PINS AS INDICATED ON THE WIRING DIAGRAM(S). CHANGE SHORTING PINS FOR PROPER OPERATION WHEN REQUIRED AS SHOWN ON THE SCHEMATIC DIAGRAM(S) FOR THE CT CIRCUITS.
   ⊗ INDICATES SHORTING SCREW OR SHORTING PIN.
9) ALL CURRENT TRANSFORMER WIRING FROM THE CT'S TO THE SHORTING BOARDS, SHORTING JUMPERS AND, SHORTING BOARD GROUNDS ARE #10AWG TYPE "FEP". CT WIRING FROM CT FEEDTHROUGHS TO THE SHORTING BOARDS ARE YELLOW IN COLOR AND, ARE IDENTIFIED VIA THE LETTER "Y" NEXT TO THAT WIRE ON THE WIRING DIAGRAM.
10) WIRE NUMBERS (AX8)-(AX10), (AX7G), (F13)-(F17), (F18G) ARE #10AWG TYPE "FEP".
11) WIRE TERMINAL LUGS TO BE FULL CIRCLE, UNINSULATED.
12) WIRE FERRULES TO BE UNSULATED.
13) ○/□ INDICATES TERMINAL BOARD POINTS IN MAIN CABINET, SCHEMATIC.
    ⊠ TERMINAL BOARD POINTS IN THE INERT AIR CABINET, SCHEMATIC
14) ◎ INDICATES GAUGE WIRING THAT TERMINATES DIRECTLY ON TO TERMINAL BOARDS AND DOES NOT CONTINUE TO ANY OTHER CIRCUITRY.
    ▽ INDICATES TERMINAL BOARD POINTS IN THE HV ATC, SCHEMATIC.
    △ INDICATES TERMINAL BOARD POINTS IN THE LV ATC, SCHEMATIC.

[1] Refer to Section 26 05 19 (Low Voltage Wire and Cable), subsection 2.02 (Cable Construction). (TYP)

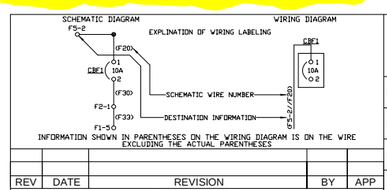
[2] Fluorinated Ethylene Propylene (FEP) wire/cable is NON-compliant. Please fix per aforementioned specification. (TYP)

APPROVED		☐
APPROVED AS NOTED		☒
REVISE AND RESUBMIT		☐
REJECTED		☐
NOT SUBJECT TO REVIEW		☐

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/26/2023
JACOBS Date

TAG NUMBER: CWPCTG-6-EMV60-XFMR-300
TAG NUMBER: WPCCTG-7-EMV60-XFMR-201



REV	DATE	REVISION	BY	APP
		REVISION HISTORY		

1/6

HOWARD INDUSTRIES INC.
ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

NAME:	LEGEND	CC	0371
DESCRIPTION:	POWER TRANSFORMER CONTROLS		
ID: 3418-000426-000	P.N.	0034-070250-426-1	
DWG. BY: JMT	CHK. BY: JMT	DATE: 06/12/23	

120V ??

240V ??

Identify voltage supply for CPT secondary. (TYP)

CUSTOMER SUPPLIED 480V 3PH 60HZ SUPPLY

CPT1 240V - 480V / 120V - 240V

CUSTOMER SUPPLIED REMOTE COOLING STARTING CONTACTS

FAOM1

FAOM2

FSS

GROUP #1

GROUP #2

CHF1 200W 120V

CHF2 375W 240V

CHG1 250W 240V

HVAH1 375W 240V

HVAH2 375W 240V

LVAH1 375W 240V

LVAH2 375W 240V

CLAF1

CLAF2

CBF1

CBF2

CBF3

CBF4

CBF5

CBF6

GROUP 1 4 FAN MOTORS

GROUP 2 4 FAN MOTORS

HASS1

LASS1

CHSS

FC1

FC2

GMC

APPROVED

APPROVED AS NOTED

REVISE AND RESUBMIT

REJECTED

NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/26/2023

JACOBS Date

TAG NUMBER: CWPCTG-6-EMV60-XFMR-300

TAG NUMBER: WPCCTG-7-EMV60-XFMR-201

REV	DATE	REVISION	BY	APP
		REVISION HISTORY		

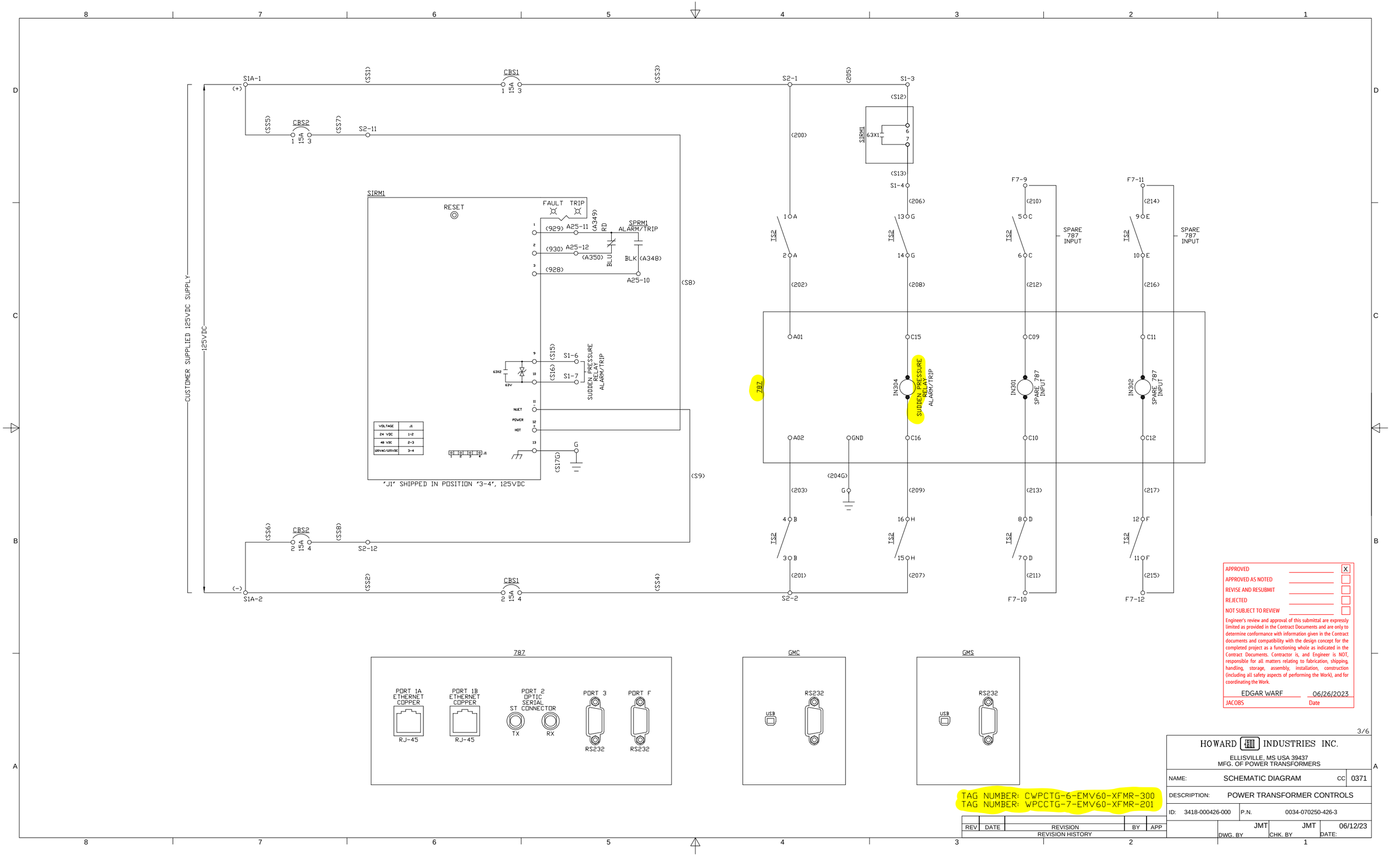
2/6

HOWARD INDUSTRIES INC.

ELLISVILLE, MS USA 39437

MFG. OF POWER TRANSFORMERS

NAME:	SCHEMATIC DIAGRAM	CC	0371
DESCRIPTION:	POWER TRANSFORMER CONTROLS		
ID: 3418-000426-000	P.N.	0034-070250-426-2	
DWG. BY: JMT	CHK. BY: JMT	DATE:	06/12/23



APPROVED _____ X

APPROVED AS NOTED _____

REVISE AND RESUBMIT _____

REJECTED _____

NOT SUBJECT TO REVIEW _____

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/26/2023

JACOBS Date

3/6

HOWARD INDUSTRIES INC.

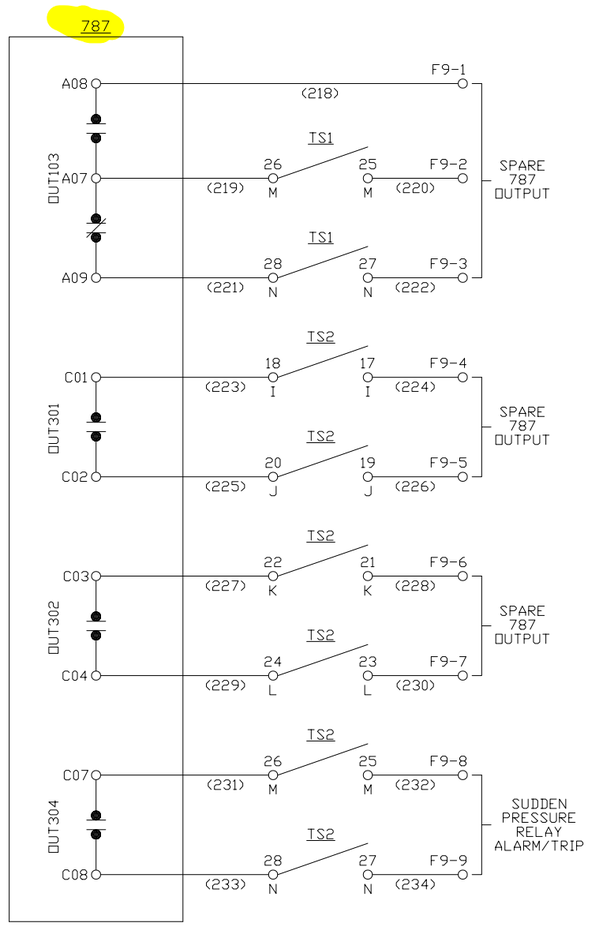
ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

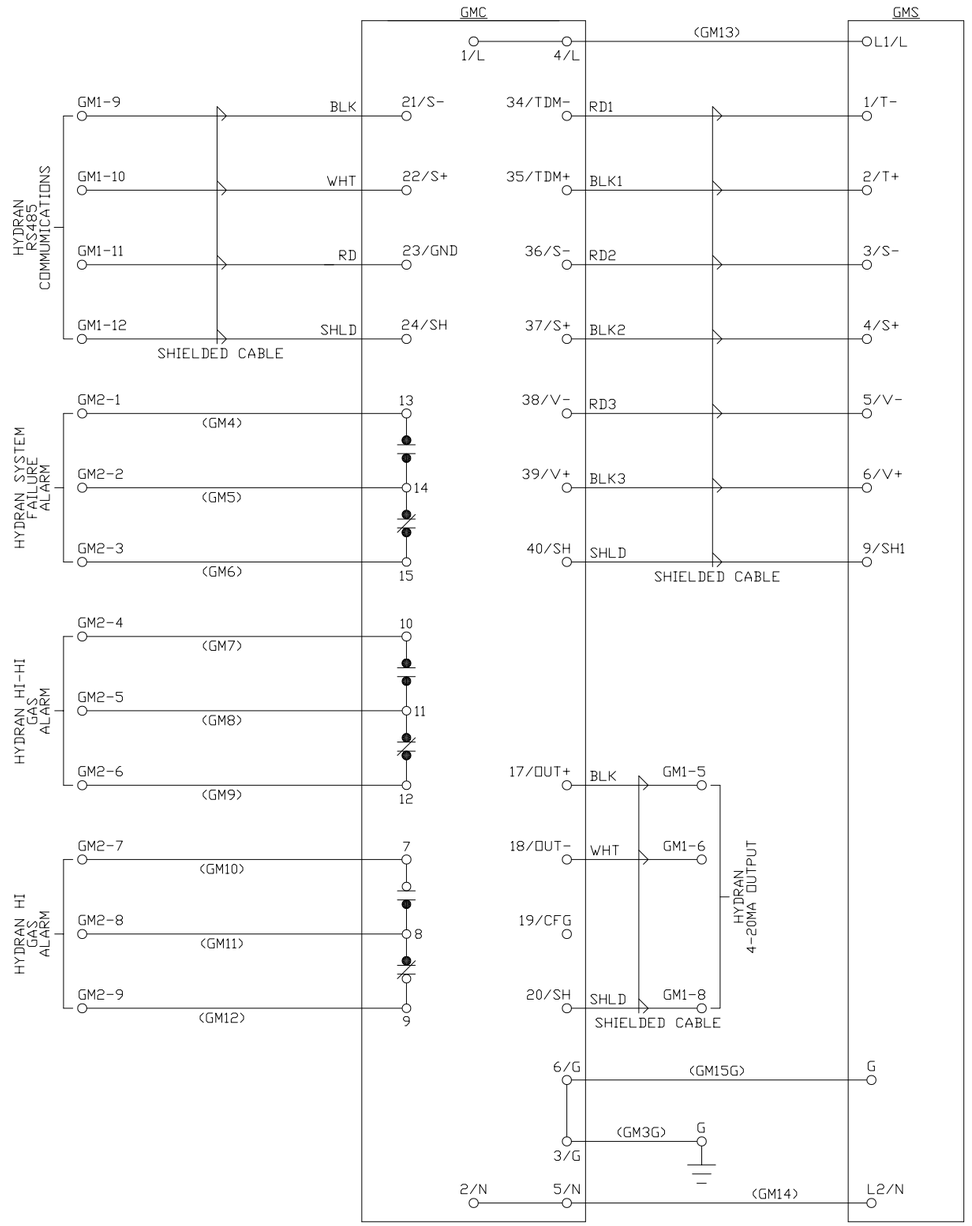
NAME:	SCHEMATIC DIAGRAM	CC	0371
DESCRIPTION:	POWER TRANSFORMER CONTROLS		
ID: 3418-000426-000	P.N.	0034-070250-426-3	
DWG. BY: JMT	CHK. BY: JMT	DATE: 06/12/23	

TAG NUMBER: CWPCTG-6-EMV60-XFMR-300
TAG NUMBER: WPCCTG-7-EMV60-XFMR-201

REV	DATE	REVISION	BY	APP

REVISION HISTORY





TAG NUMBER: CWPCTG-6-EMV60-XFMR-300
TAG NUMBER: WPCCTG-7-EMV60-XFMR-201

REV	DATE	REVISION	BY	APP
		REVISION HISTORY		

APPROVED [X]
APPROVED AS NOTED [ ]
REVISE AND RESUBMIT [ ]
REJECTED [ ]
NOT SUBJECT TO REVIEW [ ]

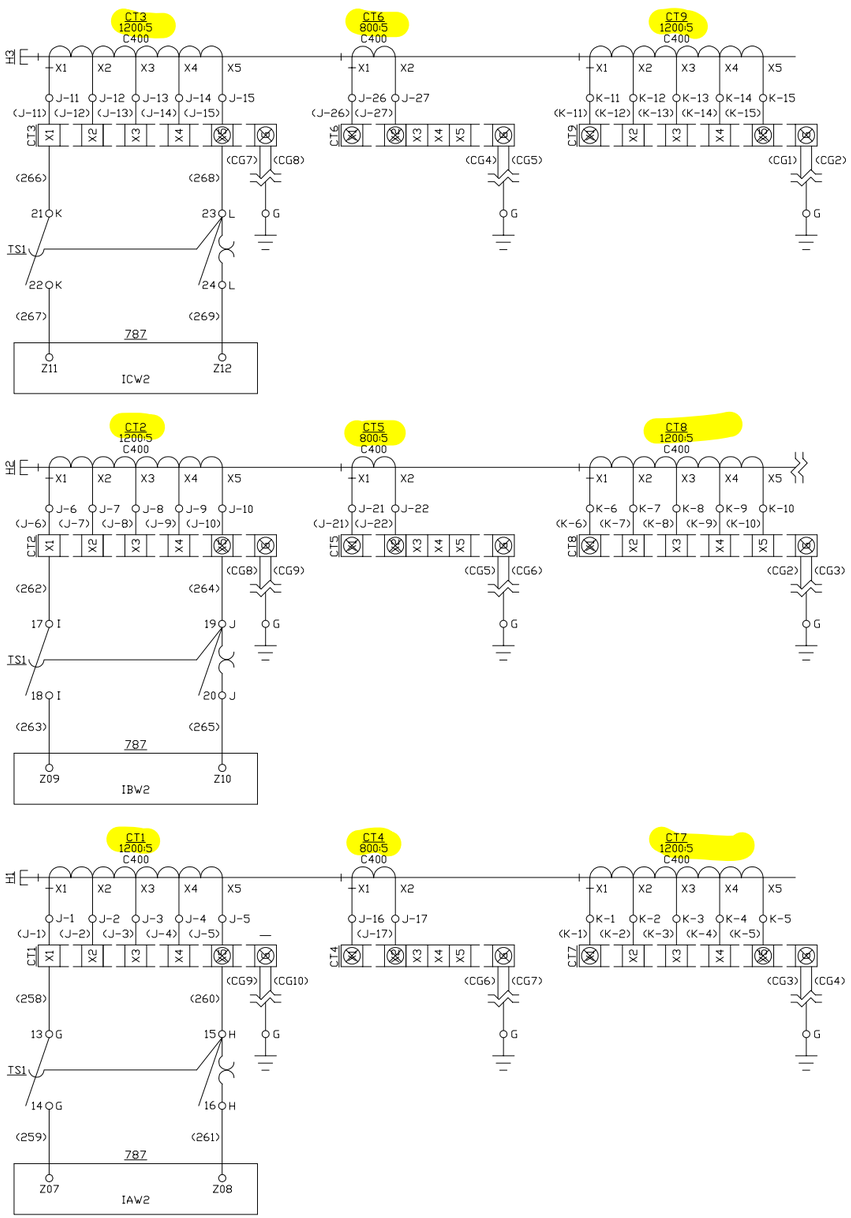
Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/26/2023
JACOBS Date

4/6

HOWARD INDUSTRIES INC.
ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

NAME:	SCHEMATIC DIAGRAM	CC	0371
DESCRIPTION:	POWER TRANSFORMER CONTROLS		
ID: 3418-000426-000	P.N. 0034-070250-426-4		
DWG. BY: JMT	CHK. BY: JMT	DATE:	06/12/23



APPROVED X
APPROVED AS NOTED
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/26/2023
JACOBS Date

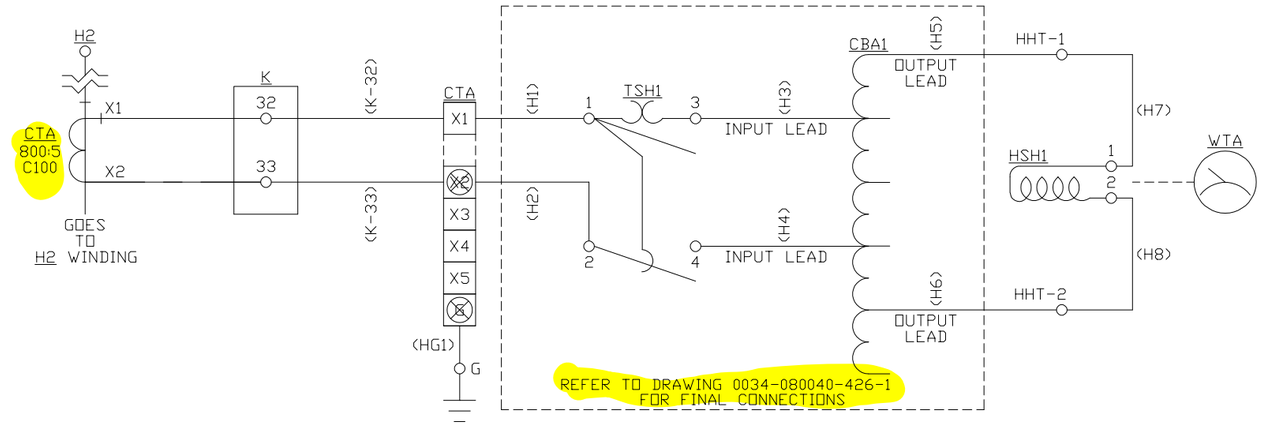
TAG NUMBER: CWPCTG-6-EMV60-XFMR-300
TAG NUMBER: WPCCTG-7-EMV60-XFMR-201

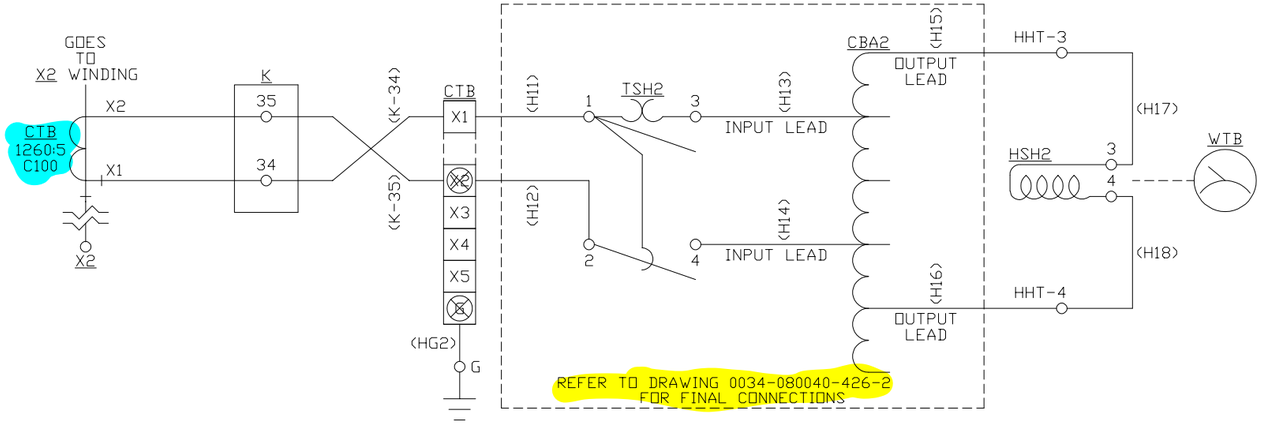
REV	DATE	REVISION	BY	APP
		REVISION HISTORY		

5/6

HOWARD INDUSTRIES INC.
ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

NAME:	SCHEMATIC DIAGRAM	CC	0371
DESCRIPTION:	POWER TRANSFORMER CONTROLS		
ID: 3418-000426-000	P.N.	0034-070250-426-5	
DWG. BY: JMT	CHK. BY: JMT	DATE: 06/12/23	





APPROVED	X
APPROVED AS NOTED	
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF — 06/26/2023

JACOBS — Date

6/6

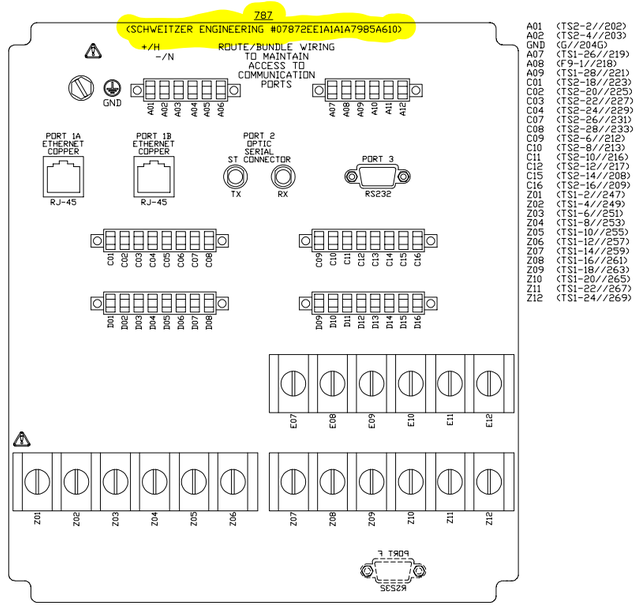
HOWARD INDUSTRIES INC.

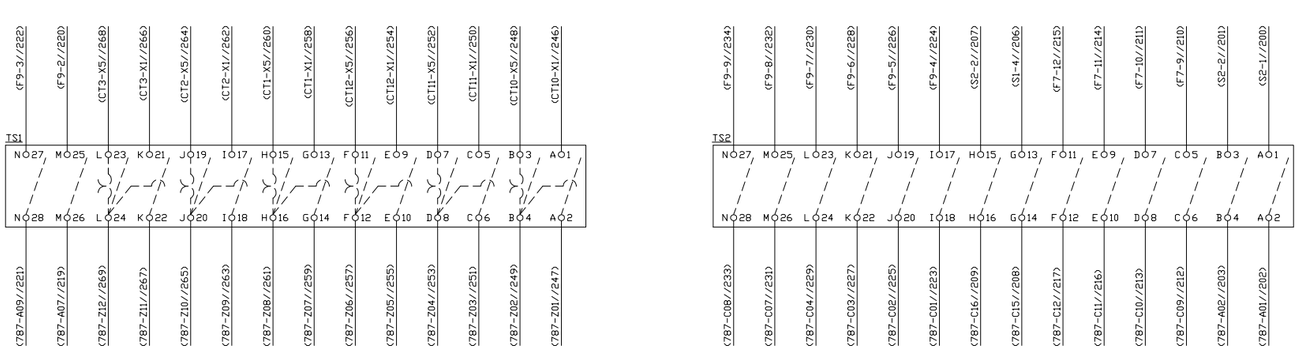
ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

NAME:	SCHEMATIC DIAGRAM	CC	0371
DESCRIPTION:	POWER TRANSFORMER CONTROLS		
ID: 3418-000426-000	P.N.	0034-070250-426-6	
DWG. BY: JMT	CHK. BY: JMT	DATE: 06/12/23	

TAG NUMBER: CWPCTG-6-EMV60-XFMR-300
TAG NUMBER: WPCCTG-7-EMV60-XFMR-201

REV	DATE	REVISION	BY	APP
		REVISION HISTORY		





APPROVED X
APPROVED AS NOTED
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/26/2023
JACOBS Date

1/7

HOWARD INDUSTRIES INC.
ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

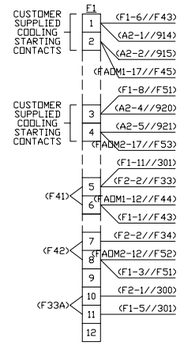
NAME: WIRING DIAGRAM CC 0371
DESCRIPTION: POWER TRANSFORMER CONTROLS
ID: 3418-000426-000 P.N. 0034-070260-426-1
DWG. BY JMT CHK. BY JMT DATE: 06/12/23

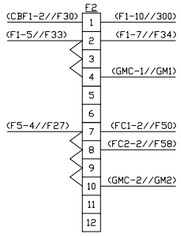
TAG NUMBER: CWPCTG-6-EMV60-XFMR-300
TAG NUMBER: WPCCTG-7-EMV60-XFMR-201

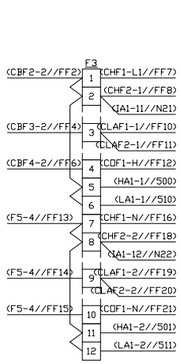
REV	DATE	REVISION	BY	APP

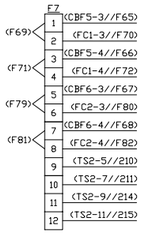
REVISION HISTORY

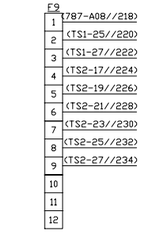
MAIN CONTROL CABINET, SWING PANEL, LEFT SIDE, REAR VIEW

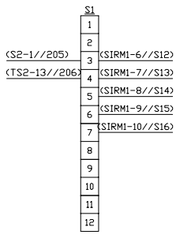


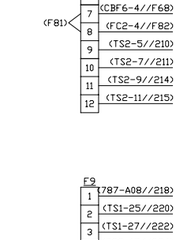


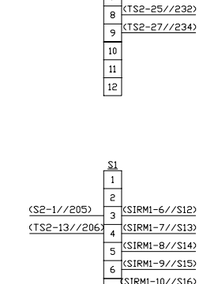


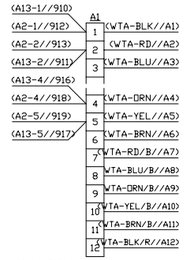


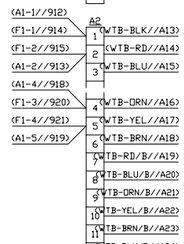


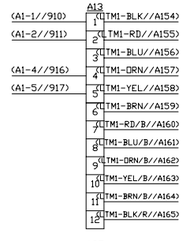


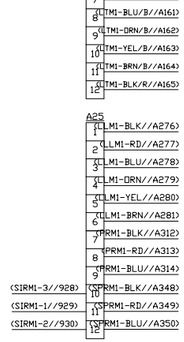


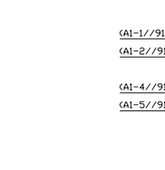


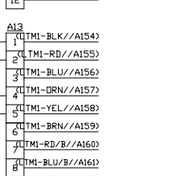


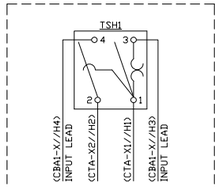


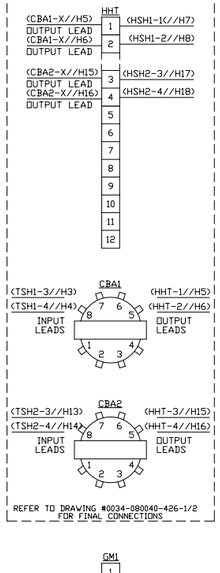


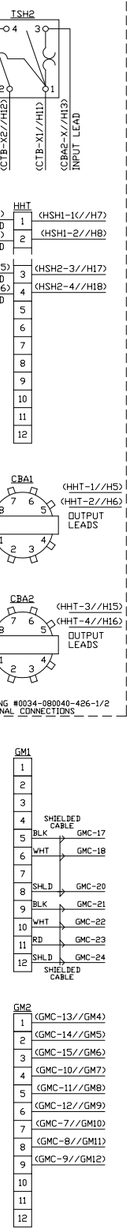


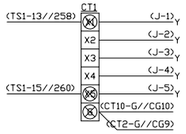


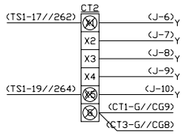


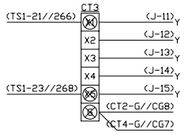


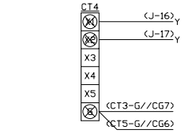


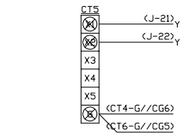


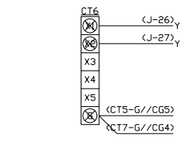


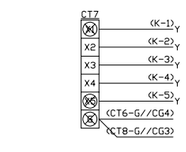


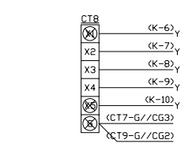


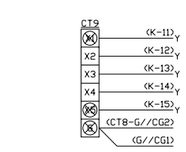


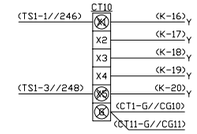


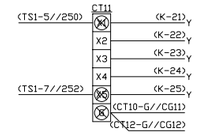


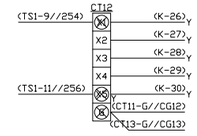


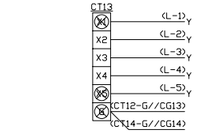


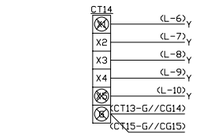


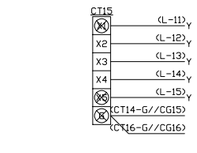


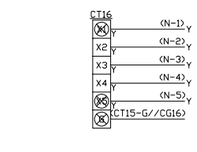


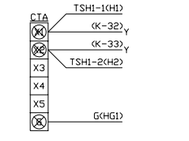


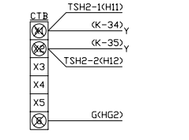


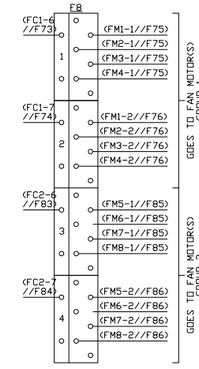


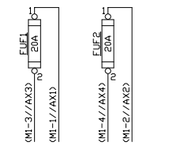


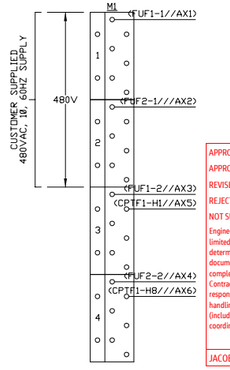












APPROVED [X]
APPROVED AS NOTED [ ]
REVISE AND RESUBMIT [ ]
REJECTED [ ]
NOT SUBJECT TO REVIEW [ ]

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/26/2023
JACOBS Date

2/7

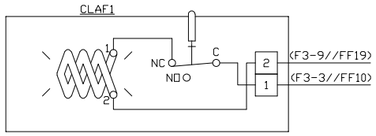
TAG NUMBER: CWPCTG-6-EMV60-XFMR-300
TAG NUMBER: WPCCTG-7-EMV60-XFMR-201

REV	DATE	REVISION	BY	APP
		REVISION HISTORY		

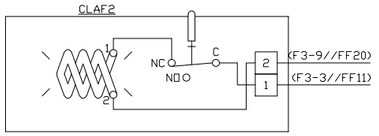
HOWARD HOWARD INDUSTRIES INC.
ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

NAME:	WIRING DIAGRAM	CC	0371
DESCRIPTION:	POWER TRANSFORMER CONTROLS		
ID: 3418-000426-000	P.N. 0034-070260-426-2		
DWG. BY JMT	CHK. BY JMT	DATE: 06/12/23	

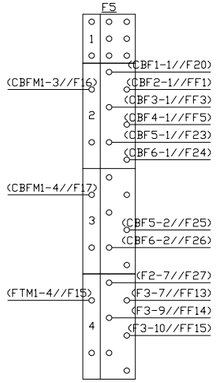
MAIN CONTROL CABINET, SWING PANEL, LEFT SIDE, REAR VIEW

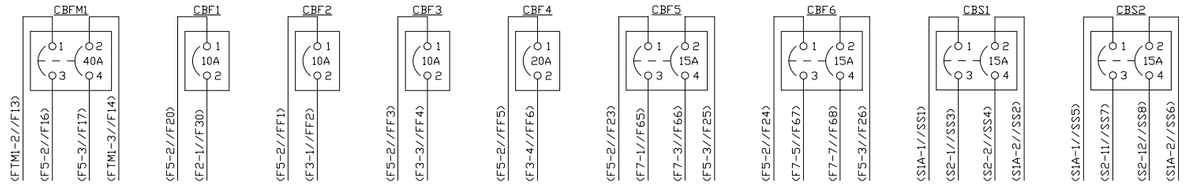


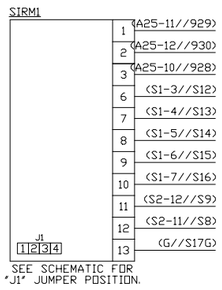
MAIN CONTROL CABINET, CENTER COMPARTMENT, LEFT SIDE

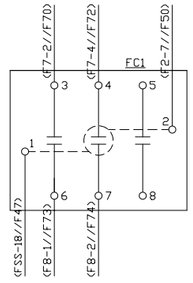


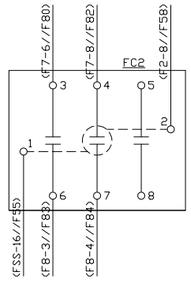
MAIN CONTROL CABINET, CENTER COMPARTMENT, RIGHT SIDE

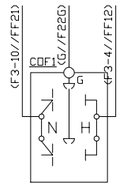


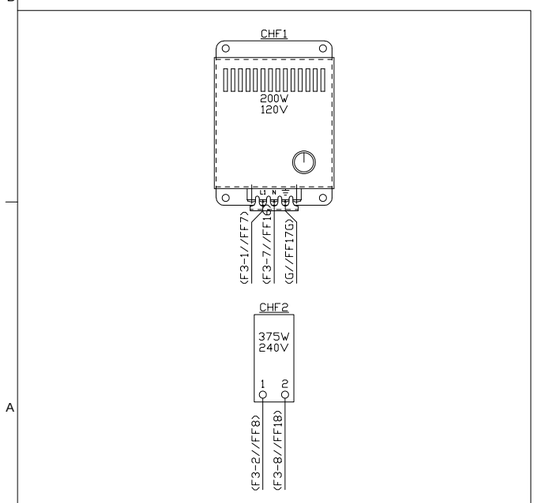




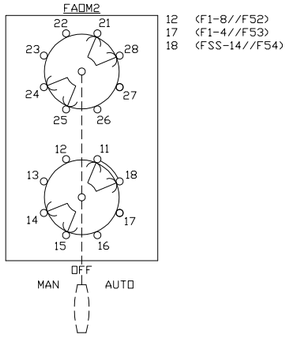


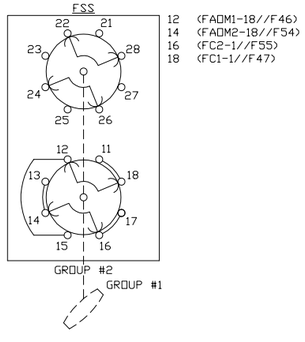


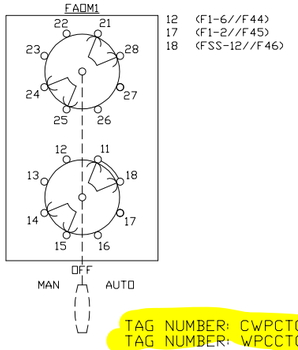




MAIN CONTROL CABINET, SWING PANEL HASP POST, REAR VIEW







MAIN CONTROL CABINET, SWING PANEL, LEFT SIDE, REAR VIEW

TAG NUMBER: CWPCTG-6-EMV60-XFMR-300
TAG NUMBER: WPCCTG-7-EMV60-XFMR-201

REV	DATE	REVISION	BY	APP
		REVISION HISTORY		

APPROVED		X	
APPROVED AS NOTED			
REVISE AND RESUBMIT			
REJECTED			
NOT SUBJECT TO REVIEW			

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/26/2023

JACOBS Date

3/7

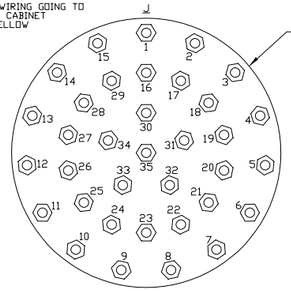
HOWARD INDUSTRIES INC.

ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

NAME:	WIRING DIAGRAM	CC	0371
DESCRIPTION:	POWER TRANSFORMER CONTROLS		
ID: 3418-000426-000	P.N.	0034-070260-426-3	
DWG. BY: JMT	CHK. BY: JMT	DATE:	06/12/23

ALL CT BLOCK WIRING GOING TO CONTROL CABINET IS YELLOW

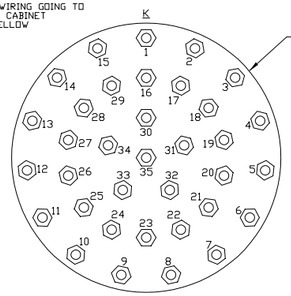
J



VIEW FROM OUTSIDE OF TANK
SIDEWALL MOUNTED

ALL CT BLOCK WIRING GOING TO CONTROL CABINET IS YELLOW

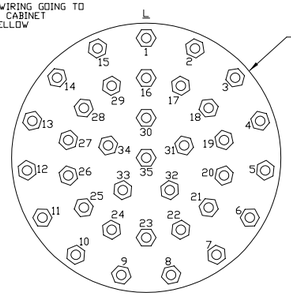
K



VIEW FROM OUTSIDE OF TANK
SIDEWALL MOUNTED

ALL CT BLOCK WIRING GOING TO CONTROL CABINET IS YELLOW

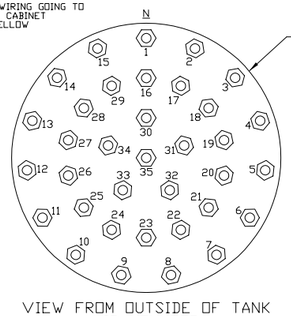
L



VIEW FROM OUTSIDE OF TANK
SIDEWALL MOUNTED

ALL CT BLOCK WIRING GOING TO CONTROL CABINET IS YELLOW

N



VIEW FROM OUTSIDE OF TANK
LID MOUNTED

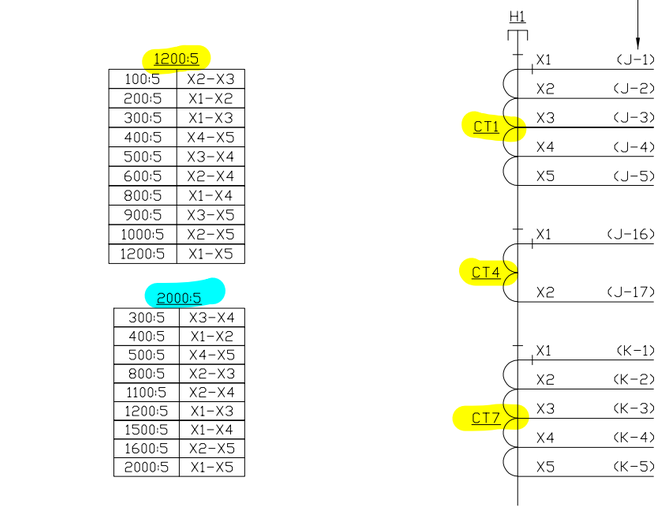
CT DESTINATION NUMBERS, FEEDTHROUGH NUMBERS AND SHORTING BOARD WIRE NUMBERS ARE THE SAME

1200:5

100:5	X2-X3
200:5	X1-X2
300:5	X1-X3
400:5	X4-X5
500:5	X3-X4
600:5	X2-X4
800:5	X1-X4
900:5	X3-X5
1000:5	X2-X5
1200:5	X1-X5

2000:5

300:5	X3-X4
400:5	X1-X2
500:5	X4-X5
800:5	X2-X3
1100:5	X2-X4
1200:5	X1-X3
1500:5	X1-X4
1600:5	X2-X5
2000:5	X1-X5



APPROVED		X
APPROVED AS NOTED		
REVISE AND RESUBMIT		
REJECTED		
NOT SUBJECT TO REVIEW		

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/26/2023

JACOBS Date

TAG NUMBER: CWPCTG-6-EMV60-XFMR-300
TAG NUMBER: WPCCTG-7-EMV60-XFMR-201

REV	DATE	REVISION	BY	APP
		REVISION HISTORY		

CURRENT TRANSFORMERS IN UNIT

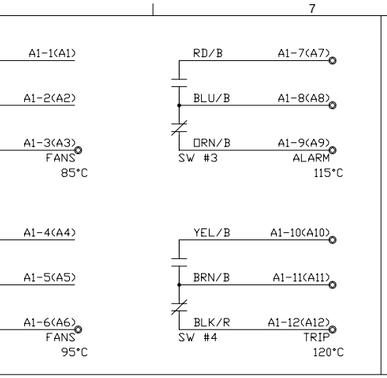
REFER TO NAMEPLATE FOR DETAILS

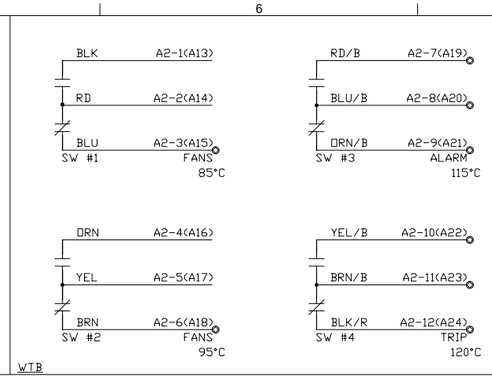
4/7

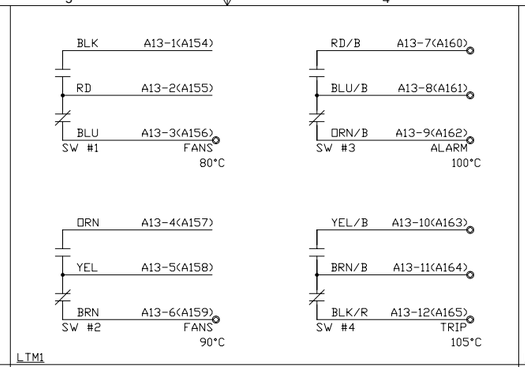
HOWARD INDUSTRIES INC.

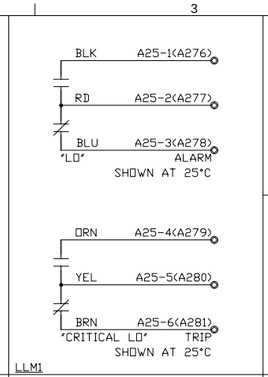
ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

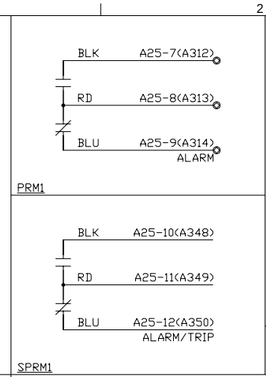
NAME:	WIRING DIAGRAM	CC	0371
DESCRIPTION:	POWER TRANSFORMER CONTROLS		
ID: 3418-000426-000	P.N. 0034-070260-426-4		
DWG. BY: JMT	CHK. BY: JMT	DATE:	06/12/23

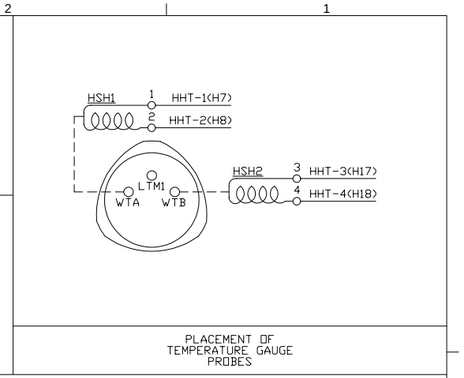


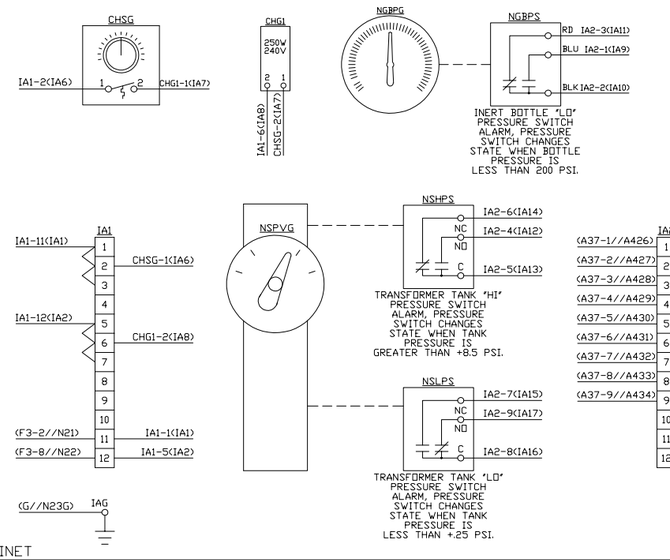


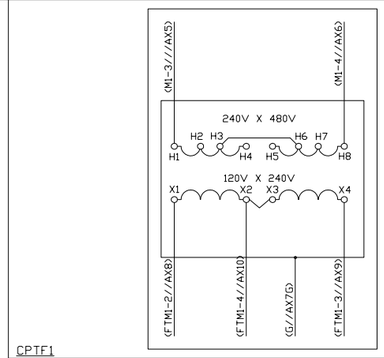


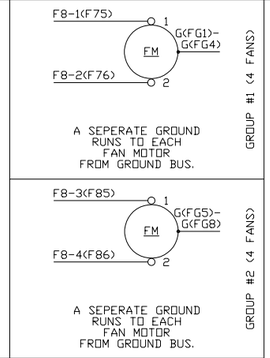


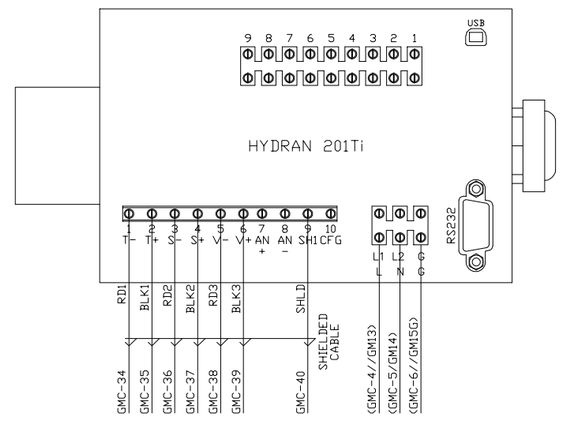


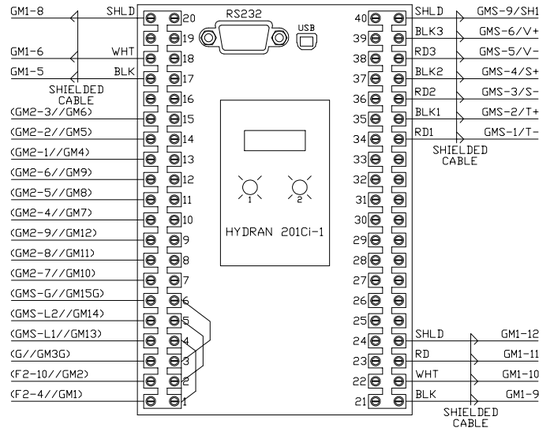


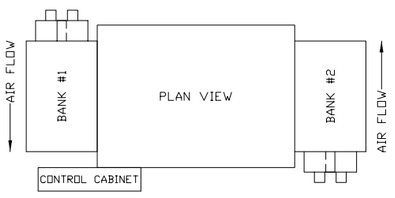


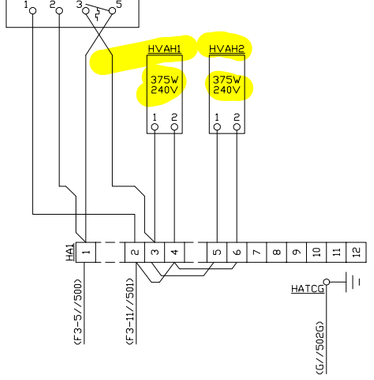


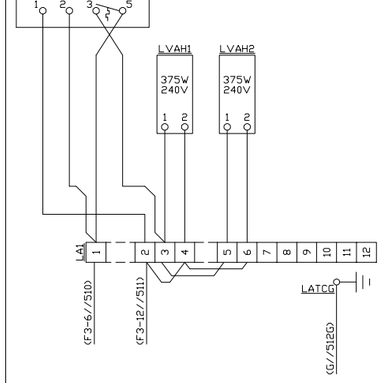












APPROVED
APPROVED AS NOTED
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

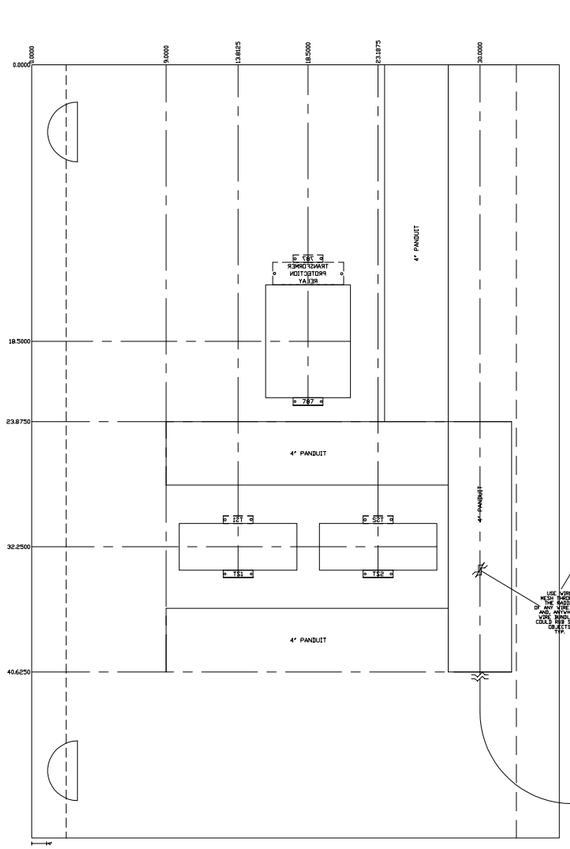
EDGAR WARF 06/26/2023
JACOBS Date

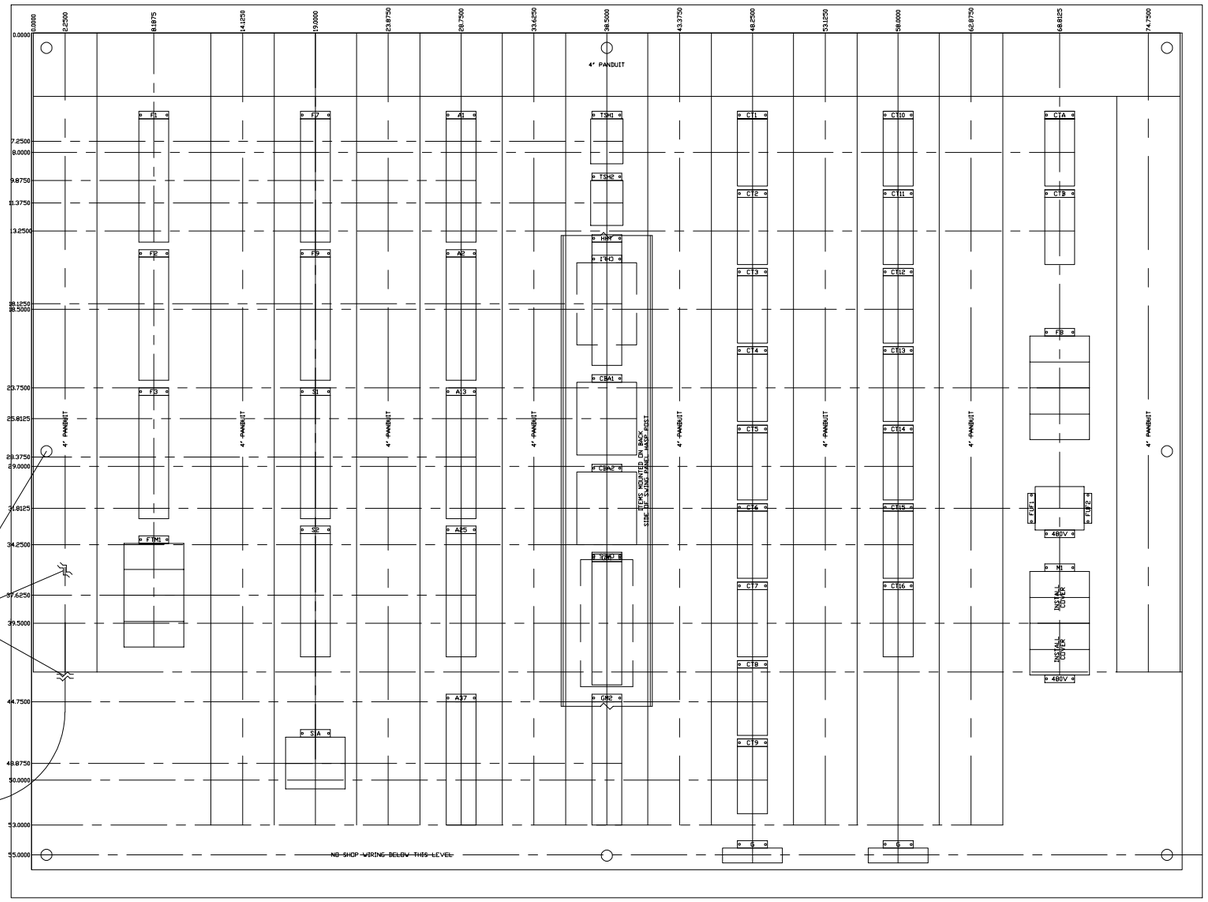
TAG NUMBER: CWPCTG-6-EMV60-XFMR-300
TAG NUMBER: WPCCTG-7-EMV60-XFMR-201

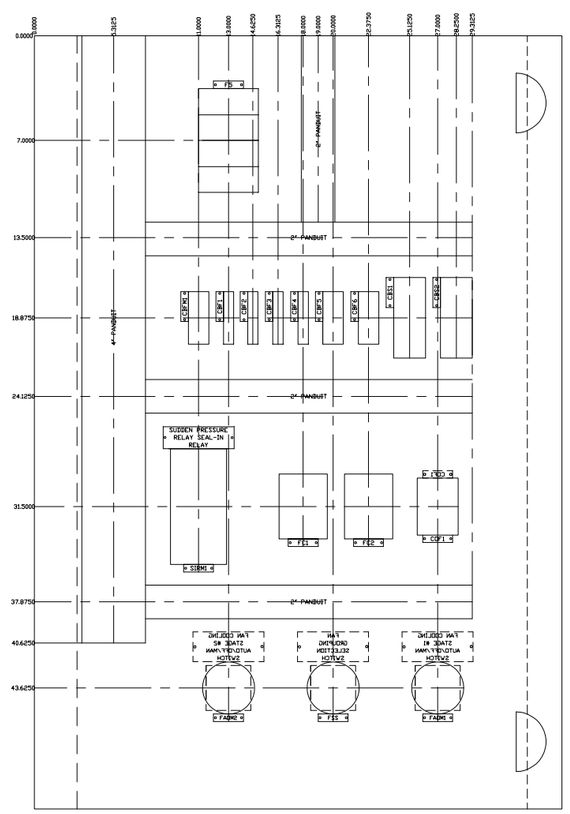
REV	DATE	REVISION	BY	APP
		REVISION HISTORY		

HOWARD INDUSTRIES INC.
ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

NAME:	WIRING DIAGRAM	CC	0371
DESCRIPTION:	POWER TRANSFORMER CONTROLS		
ID: 3418-000426-000	P.N. 0034-070260-426-5		
DWG. BY: JMT	CHK. BY: JMT	DATE:	06/12/23







APPROVED X
APPROVED AS NOTED
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/26/2023
JACOBS Date

TAG NUMBER: CWPCTG-6-EMV60-XFMR-300
TAG NUMBER: WPCCTG-7-EMV60-XFMR-201

REV	DATE	REVISION	BY	APP
		REVISION HISTORY		

6/7

HOWARD INDUSTRIES INC.
ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

NAME:	CONTROL CABINET PANEL LAYOUT	CC	0371
DESCRIPTION:	POWER TRANSFORMER CONTROLS		
ID: 3418-000426-000	P.N. 0034-070260-426-6		
DWG. BY: JMT	CHK. BY: JMT	DATE:	06/12/23

1) ALL MOUNTING HARDWARE, SCREWS, BOLTS, NUTS, FLAT WASHERS AND LOCK WASHERS TO BE STAINLESS STEEL UNLESS INDICATED OTHERWISE.

2) WIRE BUNDLE LOOP BETWEEN ANY SWING PANELS AND BACK PANEL MUST BE A MINIMUM OF 2" ABOVE THE BOTTOM OF THE SWING PANELS AT THEIR LOWEST POINT.

3) ALL CONTROL CABINET WIRING TO BE ROUTED ALONG THE SIDES AND OVER THE TOP OF THE CONTROL CABINET WITH NO SHOP WIRING ROUTED IN THE IN THE BOTTOM OF THE CONTROL CABINET.

4) CLAF1 AND CLAF2 LAMICOID NAMEPLATES TO BE SECURED IN UNISTRUT RAIL ON THE CEILING OF MAIN CONTROL CABINET AS CLOSE AS POSSIBLE TO THE MAIN CONTROL CABINET LIGHT. USE SCREW, LOCK WASHER, FLAT WASHER (IF IT DOES NOT COVER THE MARKINGS OF THE LAMICOID NAMEPLATE), LAMICOID NAMEPLATE AND UNISTRUT NUT. IN THAT ORDER. THE SCREW LENGTH TO BE AS SHORT AS POSSIBLE AND STILL ACCOMMODATE INDICATED HARDWARE.

5) AFTER MOUNTING OF ALL EQUIPMENT, ADJUST SWING PANELS AND CENTER POST PLUMB AND SQUARE TO HAVE EVEN SPACING AROUND ALL GAPS. ADJUST SWING PANEL SUPPORT PLATE AS REQUIRED TO HELP IN THIS ALIGNMENT.

6) VERIFY THAT ALL CONTROL CABINET MOUNTING BOLTS ARE SECURED AND TIGHT. ADD WASHER SHIMS AS REQUIRED TO ACQUIRE A CONTROL CABINET THAT IS PLUMB AND SQUARE AND ADJUSTED FOR NO BINDING OR MISALIGNMENT OF CONTROL CABINET SWING PANELS OR DOORS.

7) DUE TO MINIMUM QUANTITIES, ANY HARDWARE ITEMS NOT IN THIS KIT MAY BE ACQUIRED FROM ELLISVILLE R&D.

8) ADD/REMOVE JUMPERS/EQUIPMENT AS INDICATED ON HI SUPPLIED DRAWINGS.

9) WRAP THE WIRE PROTECTING MESH AROUND THE WIRE LOOPS THAT GO FROM ANY SWING PANEL TO THE MAIN PANEL. WRAP THE WIRE MESH AROUND THE WIRE ANYWHERE THE LOOP COULD POSSIBLY RUB ON ANY SURFACE OR CORNER. USE WIRE TY'S TO HOLD THE MESH IN PLACE.

10) CONDUIT GLANDS TO BE MOUNTED ON THE OUTSIDE OF THE CONTROL CABINET BEFORE TRANSFORMER IS PAINTED.

11) SHIELDED CABLE WIRING EXTERNAL TO A CONTROL CABINET NEEDS ROUTED IN CONDUIT THAT ONLY HOUSES SHIELDED CABLE. DO NOT MIX WITH ANY OTHER TYPE OF WIRING.

12) WIRING THAT IS SIMILAR IN RATING NEEDS GROUPED TOGETHER AND SEGREGATED FROM OTHER DIFFERENTLY RATED WIRING. THE GROUPING WILL CONSIST OF SIMILAR RATED WIRES BEING WIRE "TYED" TOGETHER EVERY 15" IN FREE SPACE AND IN PANDUIT CHANNELS (BUT NO WIRE "TY'S" IN THE CONDUIT RUNS). THE WIRING GROUPINGS THAT REQUIRE THIS SEGREGATED GROUPINGS ARE:
   A) 120/240VAC
   B) 125VDC
   C) 480VAC (THIS ALSO REQUIRES SEPARATE CONDUIT RUNS TO THE PRIMARY 480V AND THE SECONDARY 120/240VAC CPTF1 TRANSFORMER'S CONNECTIONS).
   D) YELLOW CURRENT TRANSFORMER WIRING
   E) SHIELDED CABLE

13) ADD SUPPLIED/INDICATED MARKING STRIPS TO THE RIGHT SIDE OF THE CT SHORTING BOARDS. USE TWO OF THE FOUR SUPPLIED SHORTING PINS TO HOLD THESE MARKING STRIPS IN PLACE. USE THE REMAINING TWO SHORTING PINS TO SHORT OUT THE CT'S AS SHOWN ON DRAWINGS.

14) REPLACE THE GE SUPPLIED MARKING STRIPS ON THE 12 PT TERMINAL BOARDS WITH THE SUPPLIED MARKING STRIPS THAT ARE BLACK LETTERING WITH WHITE BACKGROUND.

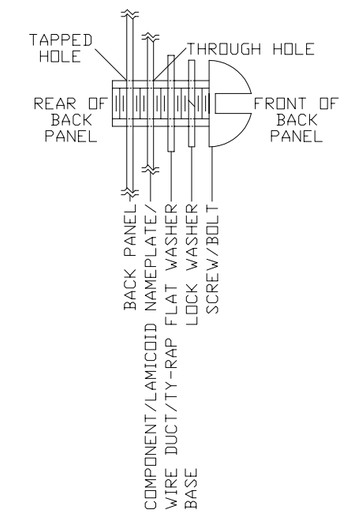
15) INSERT VENT LOUVERS THROUGH THE SIDES OF THE CONTROL CABINET AFTER CONDUIT RUNS ARE COMPLETE. PLACE THEM NEAR THE TOP LEFT AND BOTTOM RIGHT AS CLOSE AS POSSIBLE TO THE CENTERLINE OF CABINET SIDES. KEEP THE EDGE OF THE LOUVERS' FRAME AT LEAST 1.5" FROM ANY CONTROL CABINET EDGE.

16) USE SUPPLIED WIRE NUTS TO ACHIEVE THE HOLDING AND ELECTRICAL CONNECTIONS OF THE CORRECT CPTF1'S TAP LEADS. USE ELECTRICAL TAPE WRAPPED UNDERNEATH THE BASE OF THE WIRE NUT TO HOLD AND INSULATE THE WIRE LEADS. CONTINUE WITH THIS WRAPPING MOVING UP AND OVER THE WIRE NUT TO ABOUT A 1/4" FROM THE TOP OF THE WIRE NUT.

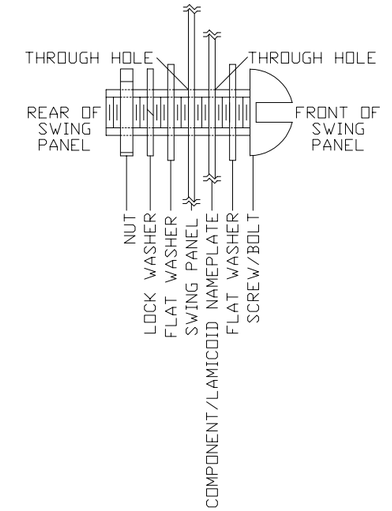
IN ALL MOUNTING CASES, SCREW/BOLT LENGTH TO BE AS SHORT AS POSSIBLE AND STILL ACCOMMODATE INDICATED HARDWARE

IN ALL MOUNTING CASES, ELIMINATE FLAT WASHER IF IT COVERS LAMICOID NAMEPLATE MARKINGS OR DOES NOT ALLOW PROPER MOUNTING OF COMPONENTS

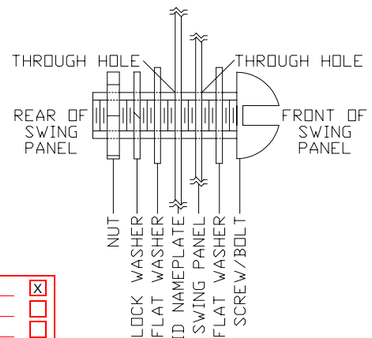
BACK PANEL MOUNTING HARDWARE ARRANGEMENT, COMPONENT/LAMICOID NAMEPLATE/WIRE DUCT, TY-RAP BASE



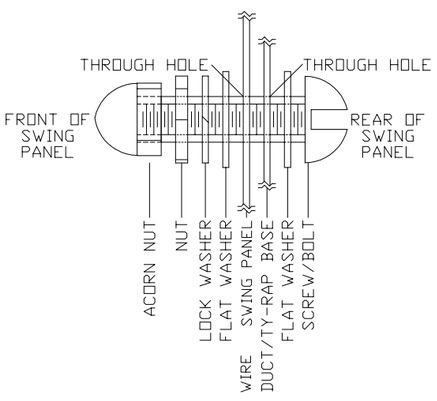
FRONT OF SWING PANEL MOUNTING ARRANGEMENT, COMPONENT/LAMICOID NAMEPLATE



REAR OF SWING PANEL MOUNTING ARRANGEMENT, COMPONENT/LAMICOID NAMPLATE



REAR OF SWING PANEL MOUNTING ARRANGEMENT, WIRE DUCT, TY-RAP BASE



APPROVED	_____	X
APPROVED AS NOTED	_____	
REVISE AND RESUBMIT	_____	
REJECTED	_____	
NOT SUBJECT TO REVIEW	_____	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/26/2023

JACOBS Date

TAG NUMBER: CWPCTG-6-EMV60-XFMR-300
TAG NUMBER: WPCCTG-7-EMV60-XFMR-201

REV	DATE	REVISION	BY	APP

REVISION HISTORY

7/7

HOWARD INDUSTRIES INC.
ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

NAME:	CONTROL CABINET SHOP NOTES	CC	0371
DESCRIPTION:	POWER TRANSFORMER CONTROLS		
ID: 3418-000426-000	P.N. 0034-070260-426-7		
DWG. BY: JMT	CHK. BY: JMT	DATE:	06/12/23

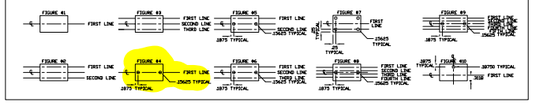
HOWARD INDUSTRIES INC.
1520 HIGHWAY 11 SOUTH
ELLISVILLE MS 39437
PHONE: 601-399-3000
FAX: 601-399-3031

LAMICOID SHEET

PAGE: 1/6 DATE ISSUED: 06/12/23
CUSTOMER: HOWARD INDUSTRIES
JOB NUMBER: 3418-000426-000

EACH LAMICOID SHALL BE BLACK LETTERING ON WHITE BACKGROUND WITH BEVELED EDGES. LETTER WIDTH TO BE 70% OF HEIGHT.

NUM-BER	QUANTITY REQUIRED	FIRST LINE	SECOND LINE	THIRD LINE	FIGURE NUMBER	SIZE OF LAMICOID HEIGHT X WIDTH	LETTER HEIGHT
1	2	787			4	.5 X 2	.25
2	2	TS1			4	.5 X 2	.25
3	2	TS2			4	.5 X 2	.25
4	1	F1			4	.5 X 2	.25
5	1	F2			4	.5 X 2	.25
6	1	F3			4	.5 X 2	.25
7	1	FTM1			4	.5 X 2	.25
8	1	F7			4	.5 X 2	.25
9	1	F9			4	.5 X 2	.25
10	1	S1			4	.5 X 2	.25
11	1	S2			4	.5 X 2	.25
12	1	S1A			4	.5 X 2	.25
13	1	A1			4	.5 X 2	.25
14	1	A2			4	.5 X 2	.25
15	1	A13			4	.5 X 2	.25
16	1	A37			4	.5 X 2	.25
17	1	TSH1			4	.5 X 2	.25
18	1	TSH2			4	.5 X 2	.25
19	1	HHT			4	.5 X 2	.25
20	1	CBA1			4	.5 X 2	.25
21	1	CBA2			4	.5 X 2	.25
22	1	GM1			4	.5 X 2	.25
23	1	GM2			4	.5 X 2	.25
24	1	CHF1			4	.5 X 2	.25
25	1	CHF2			4	.5 X 2	.25



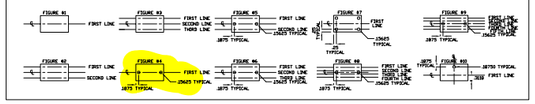
HOWARD INDUSTRIES INC.
1520 HIGHWAY 11 SOUTH
ELLISVILLE MS 39437
PHONE: 601-399-3000
FAX: 601-399-3031

LAMICOID SHEET

PAGE: 2/6 DATE ISSUED: 06/12/23
CUSTOMER: HOWARD INDUSTRIES
JOB NUMBER: 3418-000426-000

EACH LAMICOID SHALL BE BLACK LETTERING ON WHITE BACKGROUND WITH BEVELED EDGES. LETTER WIDTH TO BE 70% OF HEIGHT.

NUM-BER	QUANTITY REQUIRED	FIRST LINE	SECOND LINE	THIRD LINE	FIGURE NUMBER	SIZE OF LAMICOID HEIGHT X WIDTH	LETTER HEIGHT
1	1	CT1			4	.5 X 2	.25
2	1	CT2			4	.5 X 2	.25
3	1	CT3			4	.5 X 2	.25
4	1	CT4			4	.5 X 2	.25
5	1	CT5			4	.5 X 2	.25
6	1	CT6			4	.5 X 2	.25
7	1	CT7			4	.5 X 2	.25
8	1	CT8			4	.5 X 2	.25
9	1	CT9			4	.5 X 2	.25
10	1	CT10			4	.5 X 2	.25
11	1	CT11			4	.5 X 2	.25
12	1	CT12			4	.5 X 2	.25
13	1	CT13			4	.5 X 2	.25
14	1	CT14			4	.5 X 2	.25
15	1	CT15			4	.5 X 2	.25
16	1	CT16			4	.5 X 2	.25
17	1	CTA			4	.5 X 2	.25
18	1	CTB			4	.5 X 2	.25
19	1	F8			4	.5 X 2	.25
20	1	FUF1			4	.5 X 2	.25
21	1	FUF2			4	.5 X 2	.25
22	1	M1			4	.5 X 2	.25
23	2	480V			4	.5 X 2	.25
24	1	A25			4	.5 X 2	.25
25							



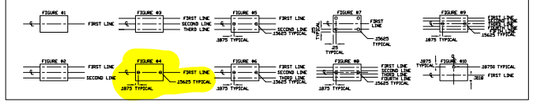
HOWARD INDUSTRIES INC.
1520 HIGHWAY 11 SOUTH
ELLISVILLE MS 39437
PHONE: 601-399-3000
FAX: 601-399-3031

LAMICOID SHEET

PAGE: 3/6 DATE ISSUED: 06/12/23
CUSTOMER: HOWARD INDUSTRIES
JOB NUMBER: 3418-000426-000

EACH LAMICOID SHALL BE BLACK LETTERING ON WHITE BACKGROUND WITH BEVELED EDGES. LETTER WIDTH TO BE 70% OF HEIGHT.

NUM-BER	QUANTITY REQUIRED	FIRST LINE	SECOND LINE	THIRD LINE	FIGURE NUMBER	SIZE OF LAMICOID HEIGHT X WIDTH	LETTER HEIGHT
1	1	F5			4	.5 X 2	.25
2	1	CBFM1			4	.5 X 2	.25
3	1	CBF1			4	.5 X 2	.25
4	1	CBF2			4	.5 X 2	.25
5	1	CBF3			4	.5 X 2	.25
6	1	CBF4			4	.5 X 2	.25
7	1	CBF5			4	.5 X 2	.25
8	1	CBF6			4	.5 X 2	.25
9	1	CBS1			4	.5 X 2	.25
10	1	CBS2			4	.5 X 2	.25
11	1	SIRM1			4	.5 X 2	.25
12	1	FC1			4	.5 X 2	.25
13	1	FC2			4	.5 X 2	.25
14	1	FAUM1			4	.5 X 2	.25
15	1	FSS			4	.5 X 2	.25
16	1	FAUM2			4	.5 X 2	.25
17	2	CDF1			4	.5 X 2	.25
18	2	G			4	.5 X 2	.25
19							
20							
21							
22							
23							
24							
25							



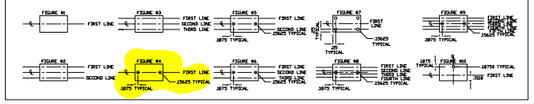
HOWARD INDUSTRIES INC.
1520 HIGHWAY 11 SOUTH
ELLISVILLE MS 39437
PHONE: 601-399-3000
FAX: 601-399-3031

LAMICOID SHEET

PAGE: 4/6 DATE ISSUED: 06/12/23
CUSTOMER: HOWARD INDUSTRIES
JOB NUMBER: 3418-000426-000

EACH LAMICOID SHALL BE BLACK LETTERING ON WHITE BACKGROUND WITH BEVELED EDGES. LETTER WIDTH TO BE 70% OF HEIGHT.

NUM-BER	QUANTITY REQUIRED	FIRST LINE	SECOND LINE	THIRD LINE	FIGURE NUMBER	SIZE OF LAMICOID HEIGHT X WIDTH	LETTER HEIGHT
1	1	HA1			4	.5 X 2	.25
2	1	LA1			4	.5 X 2	.25
3	1	HAHS1			4	.5 X 2	.25
4	1	LAHS1			4	.5 X 2	.25
5	1	HVAH1			4	.5 X 2	.25
6	1	HVAH2			4	.5 X 2	.25
7	1	LVAH1			4	.5 X 2	.25
8	1	LVAH2			4	.5 X 2	.25
9	1	HATCG			4	.5 X 2	.25
10	1	LATCG			4	.5 X 2	.25
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							



HOWARD INDUSTRIES INC.
1520 HIGHWAY 11 SOUTH
ELLISVILLE MS 39437
PHONE: 601-399-3000
FAX: 601-399-3031

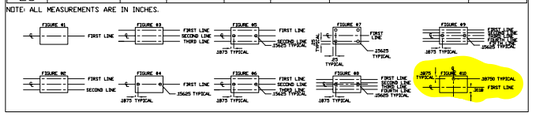
LAMICOID SHEET

PAGE: 5/6 DATE ISSUED: 06/12/23
CUSTOMER: HOWARD INDUSTRIES
JOB NUMBER: 3418-000426-000

EACH LAMICOID SHALL BE BLACK LETTERING ON WHITE BACKGROUND WITH BEVELED EDGES. LETTER WIDTH TO BE 70% OF HEIGHT.

NUM-BER	QUANTITY REQUIRED	FIRST LINE	SECOND LINE	THIRD LINE	FIGURE NUMBER	SIZE OF LAMICOID HEIGHT X WIDTH	LETTER HEIGHT
1	1	CLAF1			10	1 X 2	.25
2	1	CLAF2			10	1 X 2	.25
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

NOTE: ALL MEASUREMENTS ARE IN INCHES.



HOWARD INDUSTRIES INC.
1520 HIGHWAY 11 SOUTH
ELLISVILLE MS 39437
PHONE: 601-399-3000
FAX: 601-399-3031

LAMICOID SHEET

PAGE: 6/6 DATE ISSUED: 06/12/23
CUSTOMER: HOWARD INDUSTRIES
JOB NUMBER: 3418-000426-000

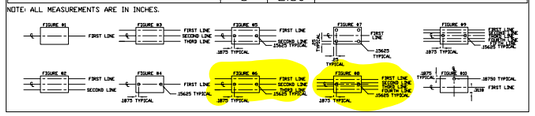
EACH LAMICOID SHALL BE BLACK LETTERING ON WHITE BACKGROUND WITH BEVELED EDGES. LETTER WIDTH TO BE 70% OF HEIGHT.

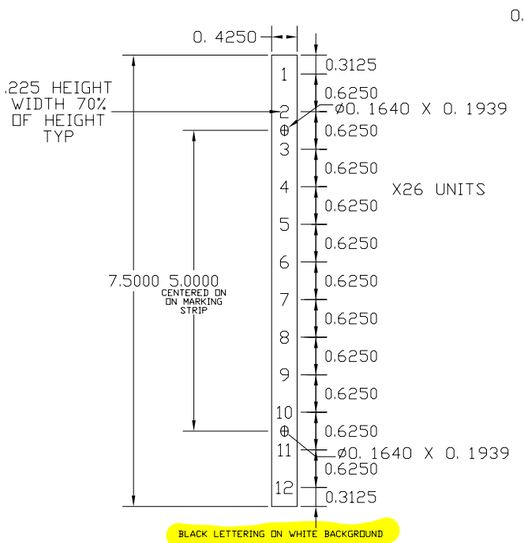
NUM-BER	REQD	1ST LINE	2ND LINE	3RD LINE	4TH LINE	5TH LINE	FIG NUM	SIZE OF LAMICOID HEIGHT X WIDTH	LETTER HEIGHT
1	1	TRANSFORMER	PROTECTION	RELAY			6	1.50 X 4.75	.25
2	1	RANK PRESURE	RELAY 90&-IN	RELAY			6	1.50 X 4.75	.25
3	1	FAN COOLING	STAGE #2	AUTO/OFF/MAN	SWITCH		8	2.00 X 4.75	.25
4	1	FAN COOLING	STAGE #1	AUTO/OFF/MAN	SWITCH		8	2.00 X 4.75	.25
5	1	FAN	GROUPING	SELECTOR	SWITCH		8	2.00 X 4.75	.25
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									

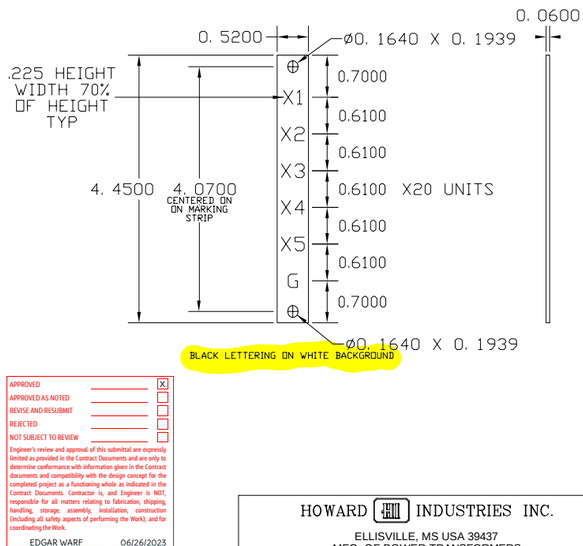
HEIGHT OF LAMICOID TO NUMBER OF LINES

IN-HOUSE REFERENCE	LINES	HT
	1	.50
	2	1.00
	3	1.50
	4	2.00
	5	2.50

NOTE: ALL MEASUREMENTS ARE IN INCHES.







APPROVED
APPROVED AS NOTED
REVISE AND RESUBMIT
REJECTED
NOT SUBJECT TO REVIEW

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/26/2023
JACOBS Date

1/1

TAG NUMBER: CWPCTG-6-EMV60-XFMR-300
TAG NUMBER: WPCCTG-7-EMV60-XFMR-201

REV	DATE	REVISION	BY	APP

REVISION HISTORY

HOWARD INDUSTRIES INC.
ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

NAME: LAMICOID NAMEPLATES CC 0371
DESCRIPTION: POWER TRANSFORMER CONTROLS
ID: 3418-000426-000 P.N. 0034-070280-426-1
DWG. BY JMT CHK. BY JMT DATE: 06/12/23

	CONTROLS BOM FOR CATALOG NUMBER	3418-000426-000	DESIGNER: JMT			
#	COMPONENT IDENTIFICATION	HOWARD INDUSTRIES PART NUMBER	OEM PART NUMBER	QUANTITY REQUIRED	ORDERING WITH THE KIT	ORDERING DIRECTLY FROM THE VENDOR
1	SCHEMATIC DIAGRAM	0034-070250-426		1		
2	WIRING DIAGRAM	0034-070260-426		1		
3	CONTROL CABINET	0061-200003-945	COXLINE #4X0018-HOWARD	1		X
4	#12 CONTROL WIRE BLACK	0061-198254-560	CESCO #0413SPC	1700'		X
5	#10 CONTROL WIRE BLACK	0061-198254-561	CESCO #0410SPC	200'		X
6	#10 CONTROL WIRE YELLOW	0061-198254-686	CESCO #0410SPC4	200'		X
7	787	0034-070100-426	SEL #07872EE1A1A1A7985A610	1		X
8	HOT SPOT WORK SHEET	0034-080040-426		1		
9	G	0061-198389-180	HI #0061-198389-180	2		X
10	2 COND SHIELDED CABLE	0061-198389-070	BELDEN #8719	300'		X
11	3 COND SHIELDED CABLE	0061-198389-161	BELDN #88770	300'		X
12						
13	CONTROL POWER KIT	0034-070270-426		1	X	
14	A1,A2, A13,A25,A37,F1-F3,F7,F9,GM1,GM2,HHT,S1,S2,HA1,LA1	0061-126202-134	GE #EB25B12	20	X	
15	F5,F8,FTM1,M1,S1A,	0061-126202-116	MARATHON #1432555	9	X	
16	COVER FOR M1	0061-126202-144	MARATHON #CC1432	6	X	
17	CT1-CT16, CTA, CTB	0061-126202-126	GE #EB27B06S	18	X	
18	CBA1,CBA2	0061-220000-101	QUALITROL #TRA-001-1	2	X	
19	CBF1-CBF3	0061-001848-101	SQUARE D #QOU110	3	X	
20	CBF4	0061-001848-102	SQUARE D #QOU120	1	X	
21	CBF5,CBF6	0061-001848-106	SQUARE D #QOU215	2	X	
22	CBS1,CBS2	0061-198254-569	SQUARE D #BDL26015	2	X	
23	CBFM1	0061-001848-115	SQUARE D #QOU240	1	X	
24	CHF1	0061-198254-301	HOFFMAN #D-AH2001	1	X	
25	CHF2	0061-198254-302	VULCAN #E-TUB-375B	1	X	
26	CLAF1,CLAF2	0061-198389-095	#0061-198389-095	2	X	
27	COF1	0061-198254-611	COOPER #SGF20W	1	X	
28	FAOM1	0061-198254-582	SHALLCO #13938-6	1	X	
29	FAOM2	0061-198254-583	SHALLCO #13938-7	1	X	
30	FC1,FC2	0061-198254-580	SQUARE D #8502 SCO2 V02	2	X	
31	FSS	0061-198254-576	SHALLCO #13938-8	1	X	
32	FUF1,FUF2	0061-198389-218	BUSSMAN #KTK 20	6	X	
33	FUSE HOLDER FOR FUF1, FUF2	0061-198389-024	BUSSMAN #CHCC2DIU	1	X	
34	TS1	0061-198389-220	ABB #FT4A14T02BN4098	1	X	
35	TS2	0061-198389-221	ABB #FT4A14T14CN4001	1	X	
36	TSH1,TSH2	0061-198254-531	TESTSWITCH #W3TS-02-C	2	X	
37	SIRM1	0061-210000-926	QUALITROL #909-300-01	1	X	
38	LAMICOIDS	0034-070280-426	#0034-070280-426	1	X	
39	CABINET VENTS	0061-198254-855	SCE #AVK44SS	2	X	
40	FILTERS FOR CABINET VENTS	0061-198254-593	SCE #FLT44	2	X	
41	DIN RAIL	0061-002658-100	SD #9080MH379	2-78.74" PIECES	X	
42	WIRE LABELS	0061-198389-213	BRADY #MC-250-342	4 ROLLS	X	
43	PANEL TY-WRAP MOUNTS	0061-198254-873	T&B #TC142X	1 BAG OF 100	X	
44	WIRE BUNDLE MESH	0061-198389-001	CABLEORGANIZER.COM #BSF6FR-150-25FT	1 25FT SPOOL	X	
45	CABLE TIES	0061-198389-106	T&B #L-8-18-0-M	100	X	
46	2" PANDUIT	0061-198254-524	PANDUIT #G2X3LG6	36'	X	
47	2" PANDUIT COVER	0061-198254-525	PANDUIT #C2LG6	36'	X	
48	4" PANDUIT	0061-198254-594	PANDUIT #G4X3LG6	78'	X	
49	4" PANDUIT COVER	0061-198254-595	PANDUIT #C4LG6	78'	X	
50	#10/12AWG UNINS WIRE LUGS #8/#10	0061-198254-550	BURNDY #YAV10-L36	750	X	
51	#14-20AWG UNINS WIRE LUGS #8/#10	0061-198254-549	BURNDY #YAV14-L36	200	X	
52	#14-20AWG UNINS WIRE LUGS #4/#6	0061-198389-108	BURNDY #YAV14-L33	100	X	
53	#6AWG UNINS WIRE FERRULES	0061-198254-820	BURNDY #YF0612UI	10	X	
54	#10AWG UNINS WIRE FERRULES	0061-198254-818	BURNDY #YF1012UI	200	X	
55	#12AWG UNINS WIRE FERRULES	0061-198254-817	BURNDY #YF1212UI	100	X	
56	#16AWG UNINS WIRE FERRULES	0061-198389-092	BURNDY #YF1608UI	100	X	
57	#18AWG UNINS WIRE FERRULES	0061-198389-091	BURNDY #YF1808UI	100	X	
58	DIN RAIL STOPS	0061-198389-066	SQUARE D #NSYTRAABV35	100	X	
59	WIRE NUTS FOR CPTF1 CONNECTIONS	0061-198389-090	3M #H-35	10	X	
60	HVAH1,HVAH2,LVAH1,LVAH2	0061-198389-211	TEMPO #EHT0024	4	X	
61	HAHS1,LAHS1	0061-198254-747	STEGO #01230.9-00	2	X	

TAG NUMBER: CWPCTG-6-EMV60-XFMR-300
TAG NUMBER: WPCCTG-7-EMV60-XFMR-201

REV	DATE	REVISION	BY	APP

REVISION HISTORY

APPROVED	X
APPROVED AS NOTED	
REVISE AND RESUBMIT	
REJECTED	
NOT SUBJECT TO REVIEW	

Engineer's review and approval of this submittal are expressly limited as provided in the Contract Documents and are only to determine conformance with information given in the Contract documents and compatibility with the design concept for the completed project as a functioning whole as indicated in the Contract Documents. Contractor is, and Engineer is NOT, responsible for all matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including all safety aspects of performing the Work), and for coordinating the Work.

EDGAR WARF 06/26/2023
JACOBS Date

1/1

HOWARD INDUSTRIES INC.
ELLISVILLE, MS USA 39437
MFG. OF POWER TRANSFORMERS

NAME:	CONTROL CABINET ASSEMBLY	CC	1814
DESCRIPTION:	POWER TRANSFORMER CONTROLS		
ID: 3418-000426-000	P.N. 0034-070020-426-1		
DWG. BY: JMT	CHK. BY: JMT	DATE:	06/12/23

NON PCB

Westinghouse

13800/23900Y/13800-4160Y/2400 VOLTS 60 HERTZ	THREE PHASE TYPE SL TRANSFORMER CLASS 9A INSULOUR INSULATION	FULL LOAD CONTINUOUSLY 3750 KVA–65 C. RISE SERIAL SFV 09 72-05

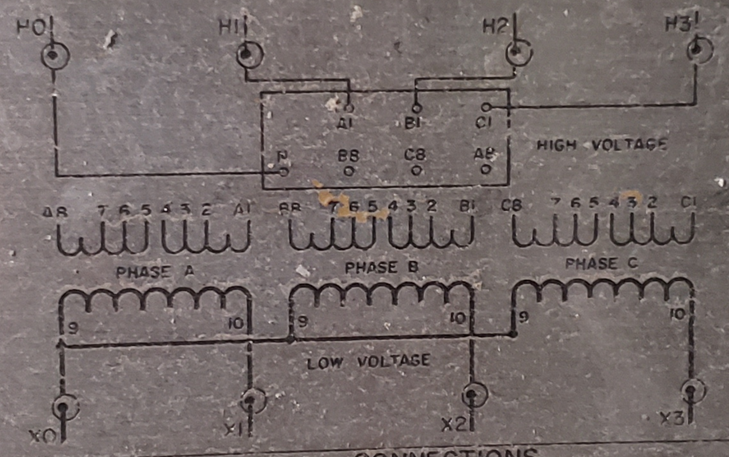
INSTRUCTION BOOK PS-1001 GALLONS OIL 641

FULL WAVE IMPULSE TEST LEVEL: HIGH VOLTAGE 150 KV., LOW VOLTAGE 60 KV.

IMPEDANCE 5.49 % AT 3750 KVA 23900Y TO 4160Y VOLTS

APPROX. WEIGHT IN LBS. CORE AND COILS 10824 CASE 4619 OIL 4803 TOTAL 20251

MADE IN U.S.A. WESTINGHOUSE ELECTRIC CORPORATION 6330A05



CONNECTIONS

	WINDING	VOLTS	3750 KVA AMPERES	TAP CHANGER POS.	TAP CHANGER CONNECTS	TERMINAL BOARD CONNECT
HV-AL	HIGH VOLTAGE WYE	24940	86.81	1	4 TO 5	A8 TO C8
		24420	88.68	2	3 TO 5	
		23900	90.59	3	3 TO 6	C8 TO B8
		23380	92.60	4	2 TO 6	
		22860	94.71	5	2 TO 7	B8 TO N
HV-AL	HIGH VOLTAGE DELTA	14400	150.4	1	4 TO 5	A8 TO C1
		14100	153.5	2	3 TO 5	
		13800	156.9	3	3 TO 6	C8 TO B1
		13500	160.3	4	2 TO 6	
		13200	164.1	5	2 TO 7	B8 TO A1
LV-AL	LOW VOLTAGE WYE	4160	520.5			

THIS TRANSFORMER WILL CARRY 9687 KVA WITHOUT EXCEEDING 65 C AVERAGE TEMPERATURE RISE WHEN ADEQUATE COOLING EQUIPMENT IS ADDED.

THE 25 C. LIQUID LEVEL IS 15.00 INCHES BELOW TOP OF HIGHEST MANHOLE FLANGE.

LIQUID LEVEL CHANGES 0.44 INCHES FOR EACH 10 C. CHANGE IN AVERAGE LIQUID TEMPERATURE.

THE TRANSFORMER IS DESIGNED FOR OPERATION BETWEEN PRESSURE LIMITS OF 65 LBS PER SQUARE INCH POSITIVE AND 6.5 LBS PER SQUARE INCH NEGATIVE.

THE TRANSFORMER MUST NOT BE ENERGIZED FROM ANY VOLTAGE SOURCE WHEN TAP CHANGERS ARE OPERATED.

THE TRANSFORMER TANK IS DESIGNED TO WITHSTAND AN EXTERNAL PRESSURE OF 8 LBS PER SQUARE INCH

BRUSH ELECTRICAL MACHINES LTD

BRUSH
BRUSH ELECTRICAL MACHINES LTD

ELECTRICAL DATA SHEET

P O Box 18, Falcon Works, Loughborough, Leics. LE11 1HJ, England
Telephone: +44 (0) 1509 611511 Telefax: +44 (0) 1509 612345 E-mail: Sales@bem.fki-eng.com

1. RATING DETAILS

1.1	Frame size	BDAX 62-170R
1.2	Terminal voltage	13.80 kV
1.3	Frequency	60 Hz
1.4	Speed	3600 RPM
1.5	Altitude	up to 1000 m
1.6	Applicable national standard	ANSI C50.14
1.7	Rated air inlet temperature	15.0 °C
1.8	Rated output	27.400 MW, 32.235 MVA
1.9	Power factor	0.850
1.10	Rated stator line current	1348 Amps
1.11	Generator air flow	10.0 m^3/sec

2. PERFORMANCE CURVES

2.1	Output vs air inlet temperature	H.E.P. 16058
2.2	Reactive capability diagram	H.E.P. 16059
2.3	Efficiency vs output	H.E.P. 16060
2.4	Open and Short circuit curves	H.E.P. 16061
2.5	Permitted duration of negative sequence current	H.E.P. 1216
2.6	Exciter Saturation	H.E.P. 8180

3. NEGATIVE SEQUENCE CAPABILITY

3.1	Max short time negative sequence I^2_2t	30
3.2	Max continuous I_2 unbalance	15

The electrical details provided are calculated values. Unless otherwise stated, all values are subject to tolerances as given in the relevant national standards.
The rotor inertia value may vary slightly with generator/turbine interface. In the event of conflict, the figure quoted on the rotor geometry drawing takes precedence

BRUSH ELECTRICAL MACHINES LTD

ELECTRICAL DATA SHEET - CONTINUATION

BDAX 62-170R , 27.400 MW, 0.850 pf, 13.80 kV, 60 Hz

4. REACTANCE AND SEQUENCE RESISTANCES

A) Direct Axis Reactances:

4.1	Unsaturated Synchronous reactance, $X_{d(i)}$	257 %
4.2	Saturated transient reactance, $X'_{d(v)}$	24.8 %
4.3	Unsaturated transient reactance, $X'_{d(i)}$	28.7 %
4.4	Saturated subtransient reactance, $X''_{d(v)}$	17.2 %
4.5	Unsaturated subtransient reactance, $X''_{d(i)}$	21.0 %
4.7	Saturated negative sequence reactance, $X_{2(v)}$	16.8 %
4.7	Unsaturated negative sequence reactance, $X_{2(i)}$	20.5 %
4.8	Zero sequence reactance, X_0	10.5 %
4.9	Potier reactance, X_P	24.4 %
4.10	Saturated stator leakage, $X_{sl(v)}$	11.0 %
4.11	Unsaturated stator leakage, $X_{sl(i)}$	16.1 %

B) Quadrature Axis Reactances:

4.12	Saturated Synchronous reactance, $X_{q(v)}$	180 %
4.13	Unsaturated Synchronous reactance, $X_{q(i)}$	235 %
4.14	Saturated transient reactance, $X'_{q(v)}$	29.7 %
4.15	Unsaturated transient reactance, $X'_{q(i)}$	41.0 %
4.16	Saturated subtransient reactance, $X''_{q(v)}$	20.8 %
4.17	Unsaturated subtransient reactance, $X''_{q(i)}$	25.0 %

C) Sequence resistances:

4.18	Positive sequence resistance, R_1	0.0082 p.u at 75 °C
4.19	Negative sequence resistance, R_2	0.0371 p.u at 75 °C
4.20	Zero sequence resistance, R_O	0.0123 p.u at 75 °C

The electrical details provided are calculated values. Unless otherwise stated, all values are subject to tolerances as given in the relevant national standards.
The rotor inertia value may vary slightly with generator/turbine interface. In the event of conflict, the figure quoted on the rotor geometry drawing takes precedence.

584401

BRUSH ELECTRICAL MACHINES LTD

ELECTRICAL DATA SHEET - CONTINUATION

BDAX 62-170R , 27.400 MW, 0.850pf, 13.80 kV, 60 Hz

5. TIME CONSTANTS AT 20°C

A) Direct Axis:

5.1	Transient O.C time constant, T'_{do}	7.64 seconds
5.2	Transient S.C time constant, 3 ph, T'_{d3}	0.59 seconds
5.3	Transient S.C time constant, L-L, T'_{d2}	1.16 seconds
5.4	Transient S.C time constant, L-N, T'_{d1}	1.40 seconds
5.5	Subtransient O.C time constant, T''_{do}	0.05 seconds
5.6	Subtransient S.C time constant, 3 ph, T''_{d3}	0.04 seconds
5.7	Subtransient S.C time constant, L-L, T''_{d2}	0.04 seconds
5.8	Subtransient S.C time constant, L-N, T''_{d1}	0.04 seconds

B) Quadrature Axis:

5.9	Transient O.C time constant, T'_{qo}	2.33 seconds
5.10	Transient S.C time constant, 3 ph, T'_{q3}	0.29 seconds
5.11	Transient S.C time constant, L-L, T'_{q2}	0.43 seconds
5.12	Transient S.C time constant, L-N, T'_{q1}	0.51 seconds
5.13	Subtransient O.C time constant, T''_{qo}	0.05 seconds
5.14	Subtransient S.C time constant, 3 ph, T''_{q3}	0.04 seconds
5.15	Subtransient S.C time constant, L-L, T''_{q2}	0.04 seconds
5.16	Subtransient S.C time constant, L-N, T''_{q1}	0.04 seconds

C) Miscellaneous:

5.17	D.C Armature time constant, 3 ph, T_{a3}	0.18 seconds
5.18	D.C Armature time constant, L-L, T_{a2}	0.18 seconds
5.19	D.C Armature time constant, L-N, T_{a1}	0.16 seconds

The electrical details provided are calculated values. Unless otherwise stated, all values are subject to tolerances as given in the relevant national standards.
The rotor inertia value may vary slightly with generator/turbine interface. In the event of conflict, the figure quoted on the rotor geometry drawing takes precedence.

584401

ELECTRICAL DATA SHEET - CONTINUATION

BDAX 62-170R , 27.400 MW, 0.850 pf, 13.80 kV, 60 Hz

6. SHORT CIRCUIT RATIO

6.1	Short circuit ratio	0.44
6.2	Saturation factor	1.84

7. INERTIA

7.1	Moment of inertia, WR^2	340 $kg.m^2$
7.2	Inertia constant, H	0.75 kWsecs/KVA

8. EXCITATION

A) No load (cold):

8.1	Excitation current at no load, rated voltage	283 amps
8.2	Excitation voltage at no load, rated voltage	28 volts
8.3	Exciter field current at no load	2.0 amps
8.4	Exciter field voltage at no load	8 volts

B) Rated load (hot):

8.5	Excitation current at rated load and P.F	889 amps
8.6	Excitation voltage at rated load and P.F	126 volts
8.7	Exciter field current at rated load and P.F	6.0 amps
8.8	Exciter field voltage at rated load and P.F	34 volts

C) Short circuit clearance of 2.5 p.u rated line amps (hot):

8.9	Excitation current on clearance	1601 amps
8.10	Excitation voltage on clearance	228 volts
8.11	Exciter field current on clearance	13.5 amps
8.12	Exciter field voltage on clearance	78 volts

The electrical details provided are calculated values. Unless otherwise stated, all values are subject to tolerances as given in the relevant national standards.
The rotor inertia value may vary slightly with generator/turbine interface. In the event of conflict, the figure quoted on the rotor geometry drawing takes precedence.

BRUSH ELECTRICAL MACHINES LTD

ELECTRICAL DATA SHEET - CONTINUATION

BDAX 62-170R , 27.400 MW, 0.850 pf, 13.80 kV, 60 Hz

9. INHERENT VOLTAGE REGULATION

9.1	F.L to N.L rated pf, constant excitation	44 %
9.2	F.L to N.L unity pf, constant excitation	31 %
9.3	F.L to N.L steady state under full AVR control	± 0.5 %

10. EFFICIENCY AND LOSSES

These losses below are calculated values. The total loss and the resulting efficiencies are subject to a tolerance in accordance with IEC 34-1.

MW output	27.400	27.400
Power factor	0.850	Unity
Friction & windage loss(kW)	119	119
Stator core iron loss(kW)	67	67
Stator copper loss at 95°C(kW)	102	74
Stray load loss at 95°C(kW)	188	135
Rotor copper loss at 95°C(kW)	103	50
Exciter loss(kW)	7	3
Total loss(kW)	588	450

Efficiencies:

% load	100	75	50	25
0.850 power factor	97.90 %	97.99 %	97.85 %	96.79 %
Unity power factor	98.38 %	98.37 %	98.13 %	96.98 %

11. CAPACITANCE AND SURGE IMPEDANCE

11.1	Capacitance per phase of stator winding to earth	0.10 Microfarad
11.2	Surge impedance per phase	324 Ohms

The electrical details provided are calculated values. Unless otherwise stated, all values are subject to tolerances as given in the relevant national standards.
The rotor inertia value may vary slightly with generator/turbine interface. In the event of conflict, the figure quoted on the rotor geometry drawing takes precedence.

BRUSH ELECTRICAL MACHINES LTD

ELECTRICAL DATA SHEET - CONTINUATION

BDAX 62-170R , 27.400 MW, 0.850 pf, 13.80 kV, 60 Hz

12. RESISTANCES AT 20°C

12.1	Stator resistance per phase	0.0144 ohms
12.2	Rotor resistance	0.101 ohms
12.3	Exciter armature resistance per phase	0.00114 ohms
12.4	Exciter field resistance	4.17 ohms
12.5	Pilot exciter resistance	0.088 ohms

13. EXCITER

13.1	Exciter frame size	BX 10.13
13.2	Voltage rating	139 Volts D.C
13.3	Current rating	978 Amps D.C
13.4	Output	136 kW
13.5	Frequency	180 Hz
13.6	AC voltage at full load	130 Volts RMS
13.7	AC current at full load	672 Amps RMS
13.8	Power factor	0.74
13.9	Number of phases	3
13.10	Response ratio	2.9 $Secs^{-1}$

14. ROTATING RECTIFIER

14.1	Number of diodes	12
14.2	Arrangement	3 ph full wave bridge; 6 arms; 2 fused diodes in parallel per arm.
14.3	Diode Repetitive peak reverse voltage	2000 Volts
14.4	Diode rated mean forward current	330 Amps
14.5	Diode mean forward current at rated load	148 Amps
14.6	Diode reverse voltage at rated load	126 Volts
14.7	Fuse rating	450 Amps

The electrical details provided are calculated values. Unless otherwise stated, all values are subject to tolerances as given in the relevant national standards.
The rotor inertia value may vary slightly with generator/turbine interface. In the event of conflict, the figure quoted on the rotor geometry drawing takes precedence.

BRUSH ELECTRICAL MACHINES LTD

ELECTRICAL DATA SHEET - CONTINUATION

BDAX 62-170R , 27.400 MW, 0.850 pf, 13.80 kV, 60 Hz

15. PERMANENT MAGNET PILOT EXCITER

15.1	Pilot exciter frame size	MXI 44.07
15.2	Open circuit volts	270 Volts
15.3	Full load voltage	264 Volts
15.4	Full load current	3.0 Amps
15.5	Power factor	0.26
15.6	Rated frequency	480 Hz
15.7	Number of phases	1

16. INSTANTANEOUS INITIAL FAULT CURRENTS

16.1	3 ph symmetrical fault from no load	7850 Amps RMS
16.2	L-L symmetrical fault from no load	6900 Amps RMS
16.3	L-N symmetrical fault from no load	9150 Amps RMS

17. MISCELLANEOUS GENERATOR DATA

17.1	X/R ratio	58
17.2	Synchronising coefficient	38 MW/radian
17.3	No load synchronising power	13 MW/radian
17.4	Full load synchronising power	30 MW/radian
17.5	Damping torque coefficient	15
17.6	Magnetic centering force for an axial displacement of 20mm	826 kg
17.7	Motoring power	197 kW
17.8	Anti-condensation space heaters approximate power rating	4 kW
17.9	Generator air outlet temperature	64 °C

The electrical details provided are calculated values. Unless otherwise stated, all values are subject to tolerances as given in the relevant national standards.
The rotor inertia value may vary slightly with generator/turbine interface. In the event of conflict, the figure quoted on the rotor geometry drawing takes precedence.

BRUSH

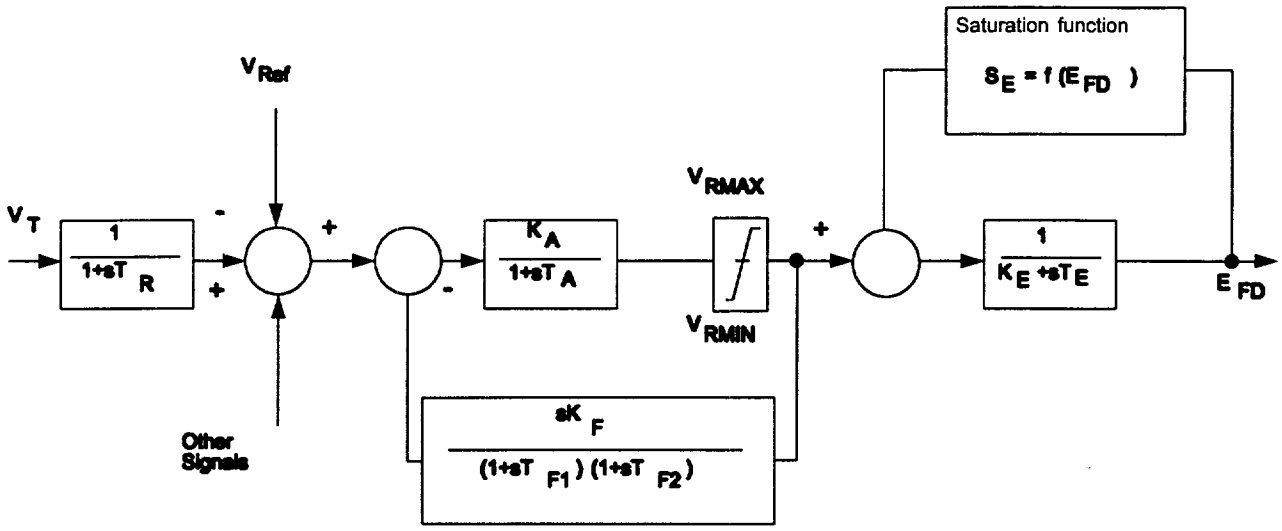
BRUSH ELECTRICAL MACHINES LTD

TYPE 2 BRUSHLESS EXCITATION SYSTEM INCORPORATING AN AUTOMATIC VOLTAGE REGULATOR

Reference no	03680	Rating	27.4 MW, 0.85 pf	Supply	13.80 kV, 60Hz		
Frame sizes	Generator	BDAX 62-170R	Exciter	BX 10.13	Pilot Exciter	MXI 44.07	

The brushless excitation system is a type 2 system as defined in "Computer Representation of Excitation Systems", IEEE PAS 87, June 1968 (paper number 31-TP-67-424).

Transfer Function Diagram



Generator / Exciter Parameters

V_R	1 per unit exciter field voltage (hot)	3.1	volts
R_F	Exciter field resistance	5.5	ohms
V_{PMG}	Open circuit pilot exciter output voltage at rated speed	270	volts
T_E	Exciter time constant	1.0	sec
K_E	Exciter constant	1.0	
S_{E75}	Exciter saturation function	2.08	
S_{E100}	Exciter saturation function	6.58	

Automatic Voltage Regulator Parameters

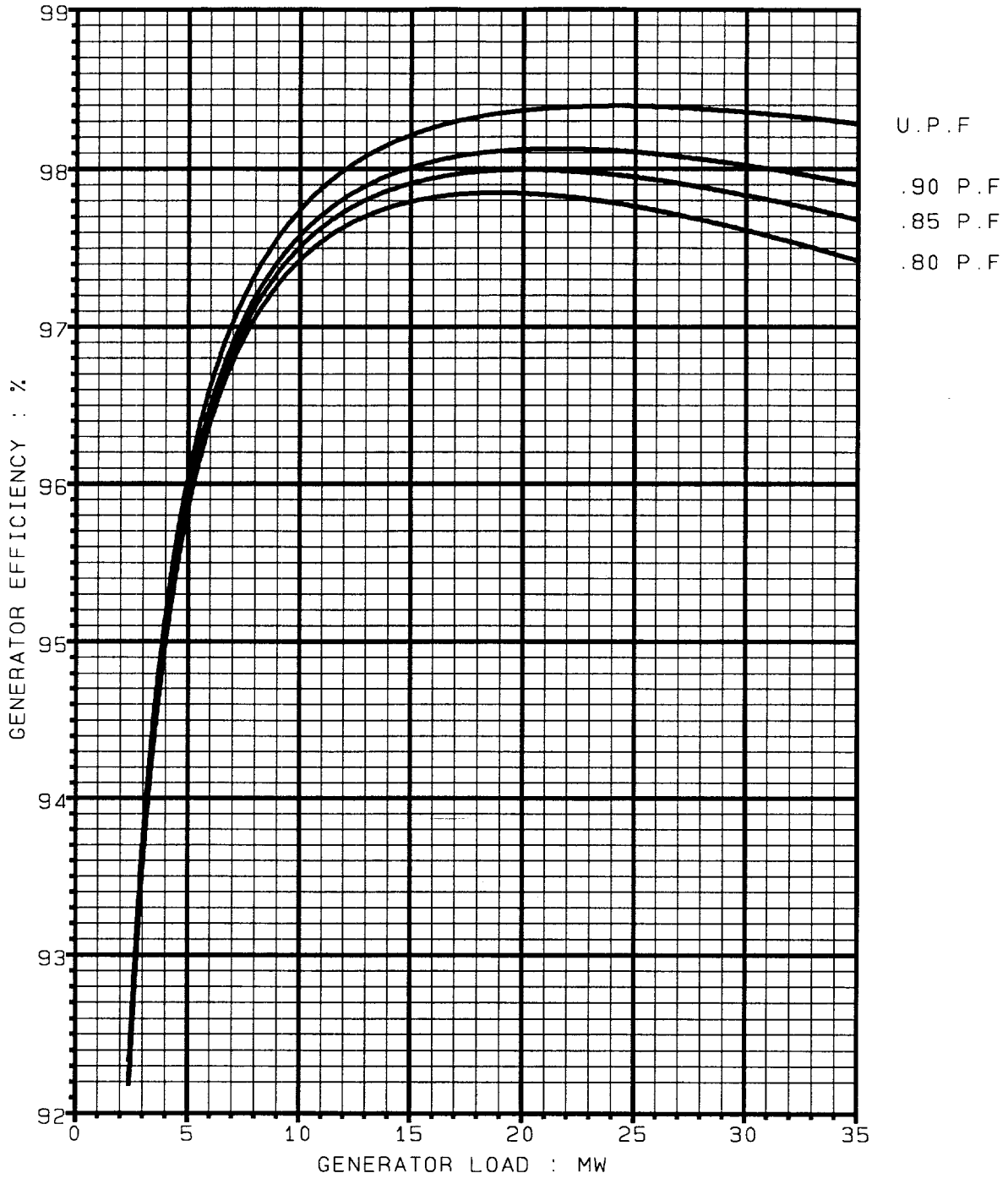
K_A	Regulator gain ($11.6 \times 10^3 / V_R$)	3751	
T_A	Regulator time constant	0.1	sec
T_R	Regulator time constant	0.022	sec
T_{F1}	Feedback time constant (adjustable in the range 0.05 to 1.0 sec)	0.6	sec*
T_{F2}	Feedback time constant (equal to T_E)	1.0	sec
V_{RMIN}	Minimum regulator output voltage	0.0	per unit
V_{RMAX}	Maximum regulator output voltage ($0.7V_{PMG} / V_R$)	61	per unit
K_F	Feedback gain (adjustable in the range 0 to $0.06\ V_R / R_F$, typically $0.03\ V_R / R_F$)	0.017	*

* Typical settings

BRUSH ELECTRICAL MACHINES LTD.
(A Hawker Siddeley Company)

H.E.P 16060

VARIATION OF GENERATOR EFFICIENCY WITH LOAD



BDAX 62-170R
13.80KV, 3Ph, 60.Hz.

584401

Efficiencies shown are calculated and subject to tolerance as I.E.C 34.1

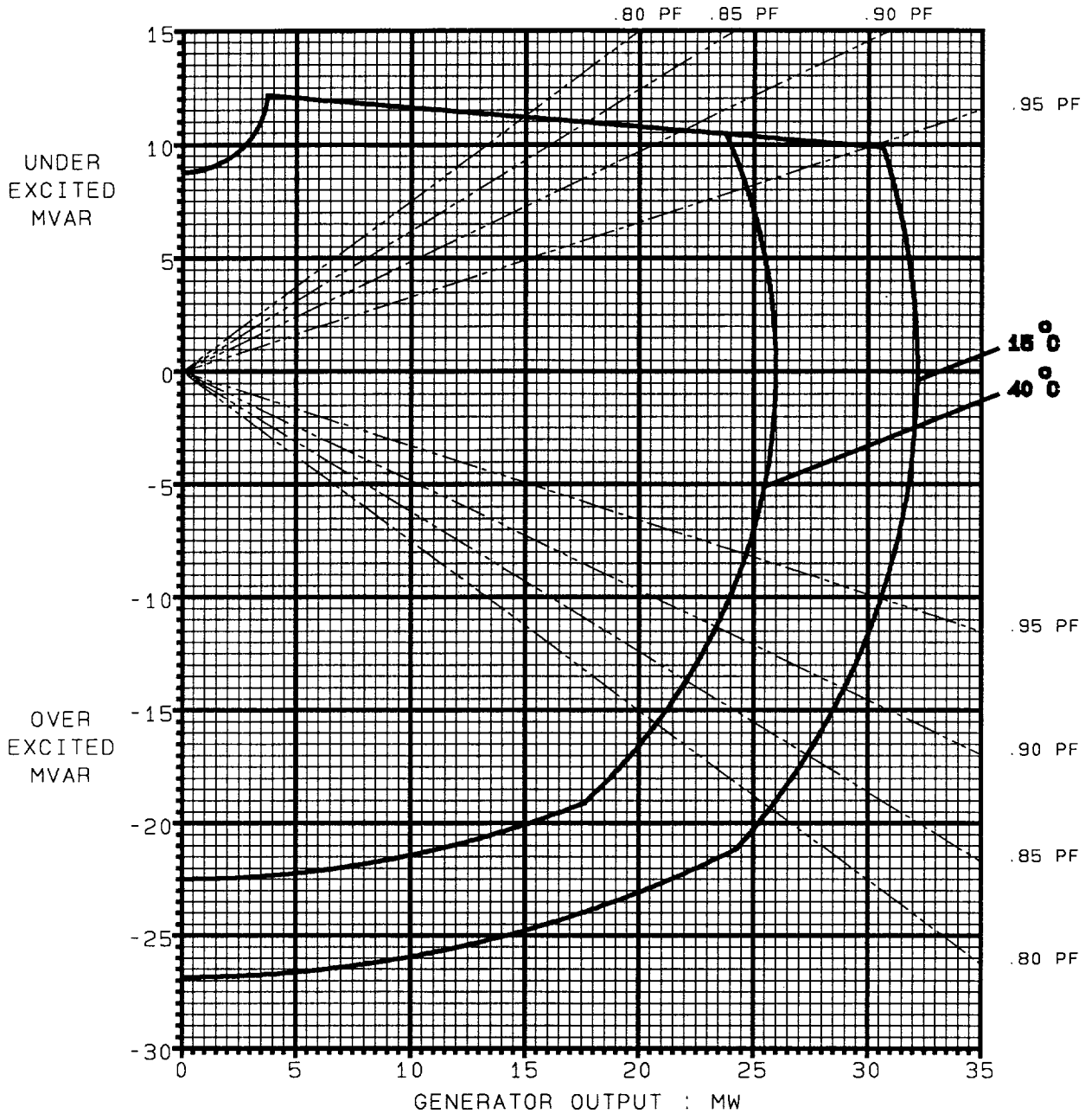
Minimum efficiencies are 0.1(100-calculated efficiency)% lower.

Issue No. 1: 16-Mar-1998

BRUSH ELECTRICAL MACHINES LTD.
(A Hawker Siddeley Company)

H.E.P 16059

GENERATOR CAPABILITY DIAGRAM



BDAX 62-170R
13.80KV, 3Ph, 60.Hz.

Up to 1000. meters ASL

IN ACCORDANCE WITH
ANSI C50.14.
Class B temperatures.
Total temperatures Stator 110 Deg C
Rotor 125 Deg C

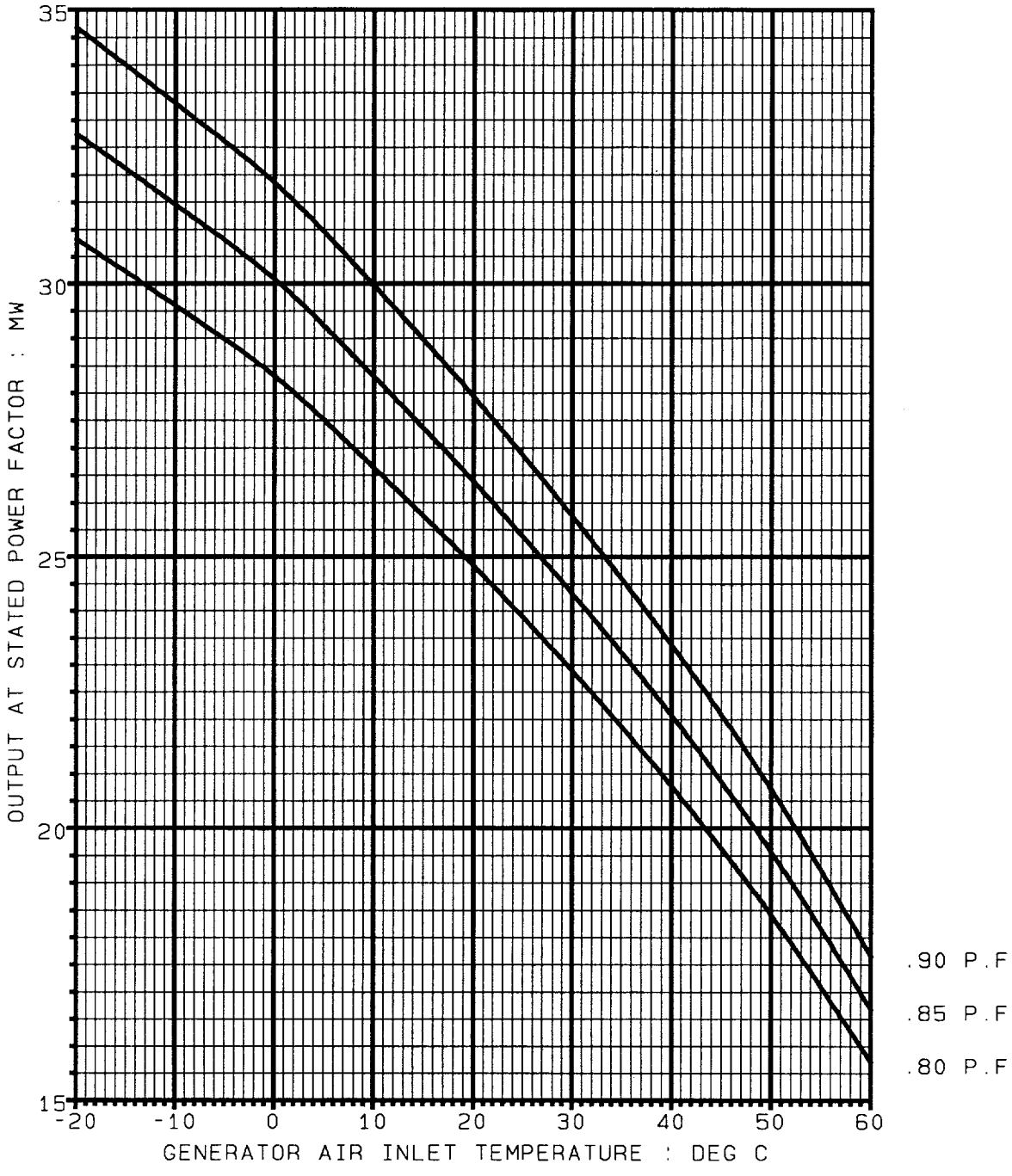
584401 c

Issue No. 1: 16-Mar-1998

BRUSH ELECTRICAL MACHINES LTD.
(A Hawker Siddeley Company)

H.E.P 16058

VARIATION OF GENERATOR OUTPUT WITH AIR INLET TEMP



BDAX 62-170R
13.80KV, 3Ph, 60.Hz.

Up to 1000. meters ASL

IN ACCORDANCE WITH
ANSI C50.14.
Class B temperatures.
Total temperatures Stator 110 Deg C
Rotor 125 Deg C

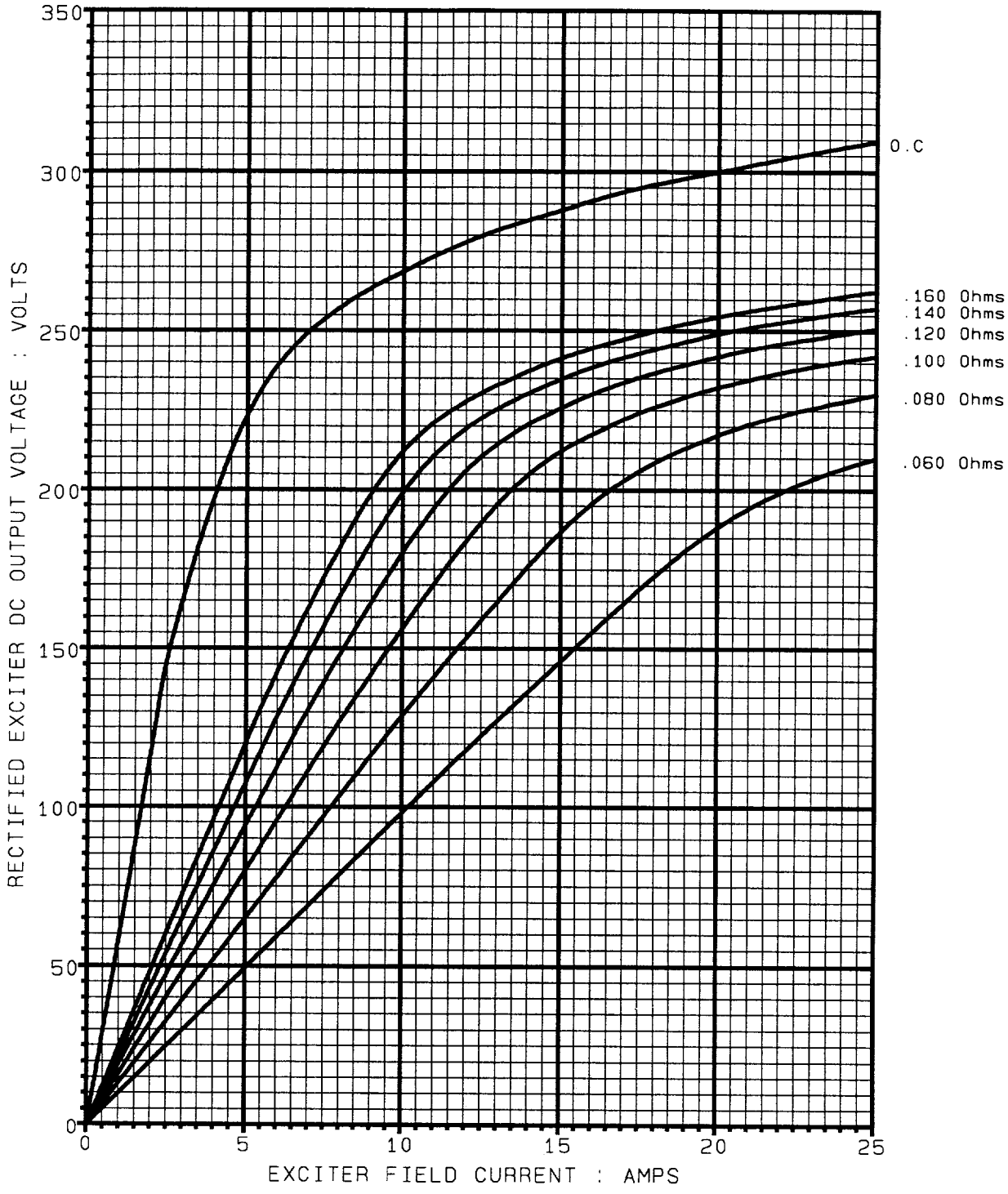
584401 2

Issue No. 1: 16-Mar-1998

BRUSH ELECTRICAL MACHINES LTD.
(A Hawker Siddeley Company)

H.E.P B180

EXCITER OPEN CIRCUIT AND LOADED CHARACTERISTIC

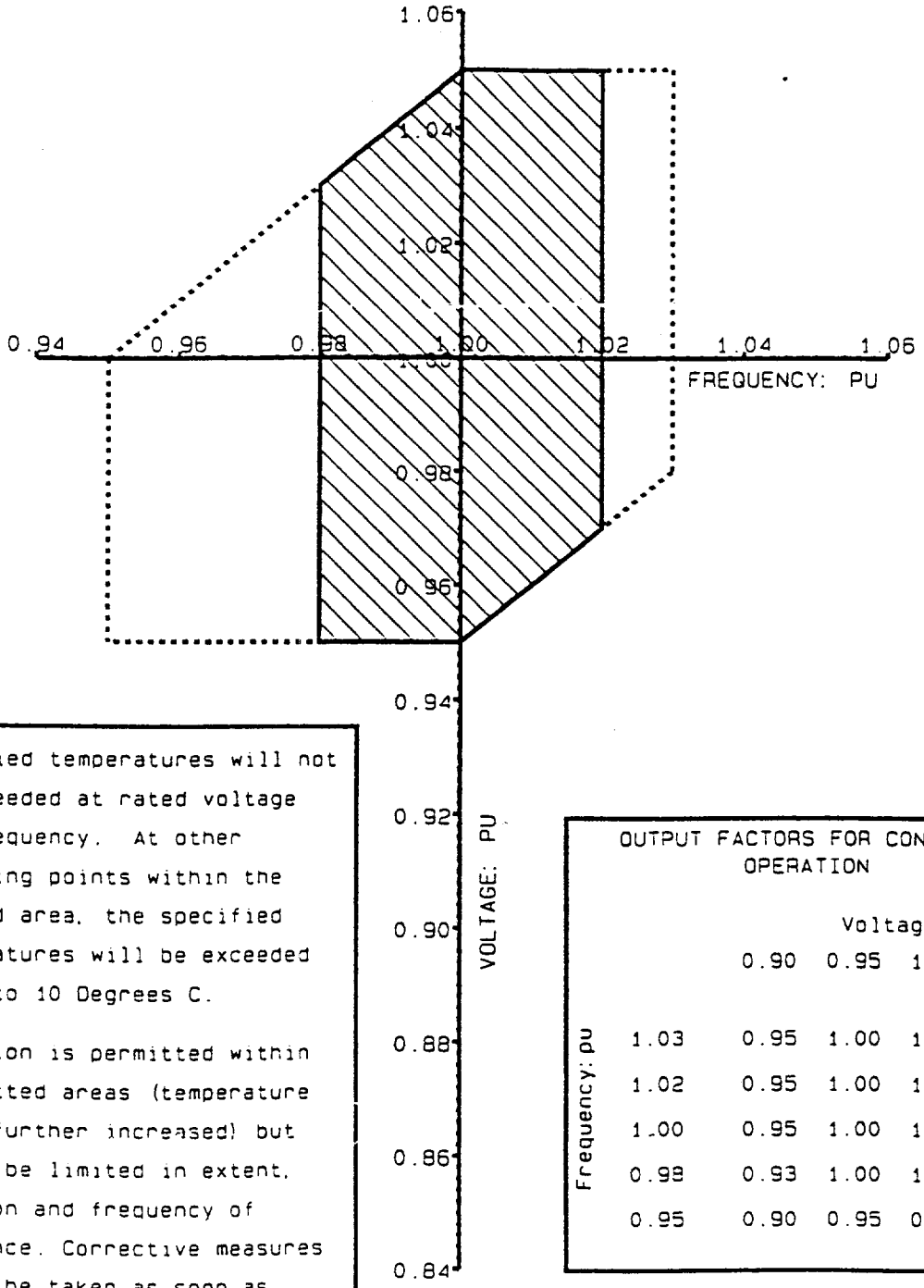


BX 10.13
3600 RPM, 6 Poles, 180 Hz

584401

Issue No. 4: 24-Mar-1993

PERMITTED VOLTAGE AND FREQUENCY VARIATION



Specified temperatures will not be exceeded at rated voltage and frequency. At other operating points within the hatched area, the specified temperatures will be exceeded by up to 10 Degrees C.

Operation is permitted within the dotted areas (temperature rises further increased) but should be limited in extent, duration and frequency of occurence. Corrective measures should be taken as soon as possible.

OUTPUT FACTORS FOR CONTINUOUS OPERATION

Frequency: pu	Voltage: pu 0.90	0.95	1.00	1.05
1.03	0.95	1.00	1.00	1.00
1.02	0.95	1.00	1.00	1.00
1.00	0.95	1.00	1.00	1.00
0.98	0.93	1.00	1.00	0.98
0.95	0.90	0.95	0.97	-

This curve applies to all "DAX" Generators.

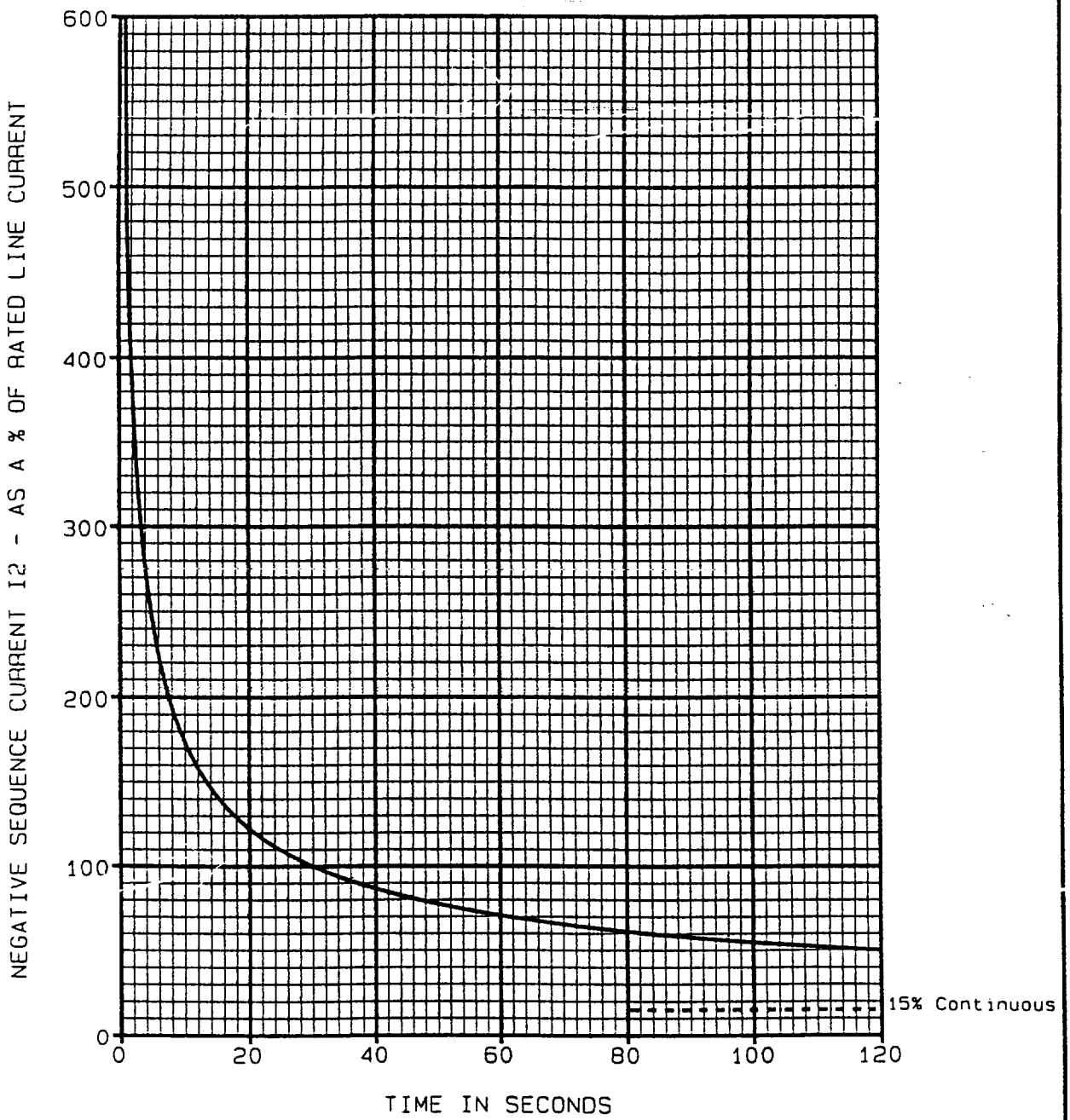
584401

BRUSH ELECTRICAL MACHINES LTD.
(A Hawker Siddeley Company)

H.E.P 1216

PERMISSIBLE DURATION OF NEGATIVE SEQUENCE CURRENT

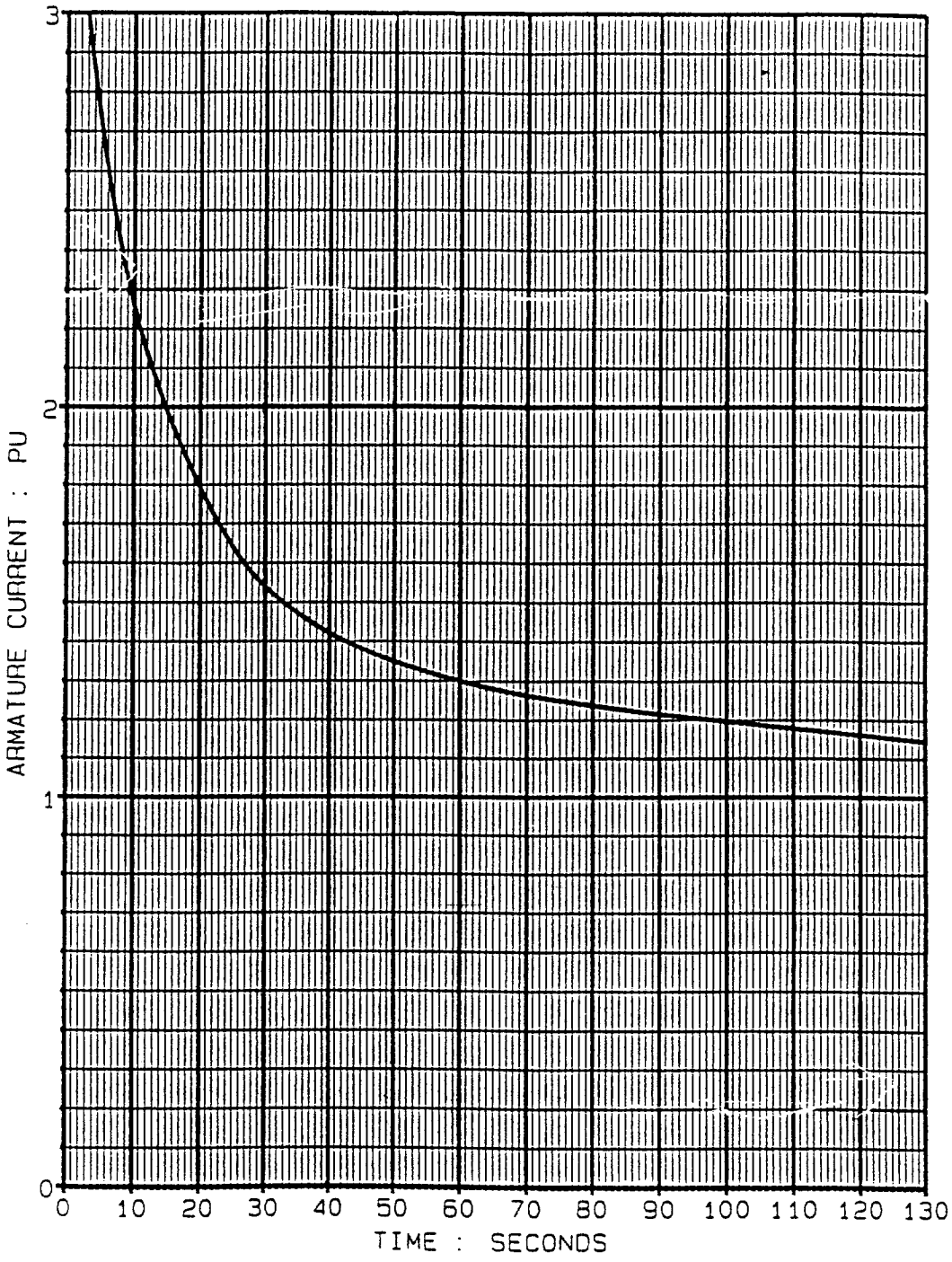
$$I_2^2 t = 30$$



NOTE: For continuous operation rated current must not be exceeded in any one phase.

584401

PERMITTED DURATION OF GENERATOR ARMATURE CURRENT



All DAX Generators

For continuous operation, rated current should not be exceeded in any one phase.

584401

"H" Constant – TM2500 60 Hz Generator Set Using BDAX-170 ER

Moment of Inertia	**kg-m^2**	**lb-ft^2**
LM2500 Power Turbine Shaft	71.12	1692
Coupling	11.89	282.87
Brush 170-ER Generator	340	8089
Total WR^2	**423 kg-m^2**	**10,064 lb-ft^2**

"H" Constant:

$$H = \frac{(2.31 * 10^{-10}) * WR^2 * RPM^2}{\text{MVA Rating}} = \frac{(2.31 * 10^{-10}) * 10{,}064 * 3600^2}{32.235 \text{ Rating}} = \textbf{0.935 kW-sec/kVA}$$

584401

BRUSH

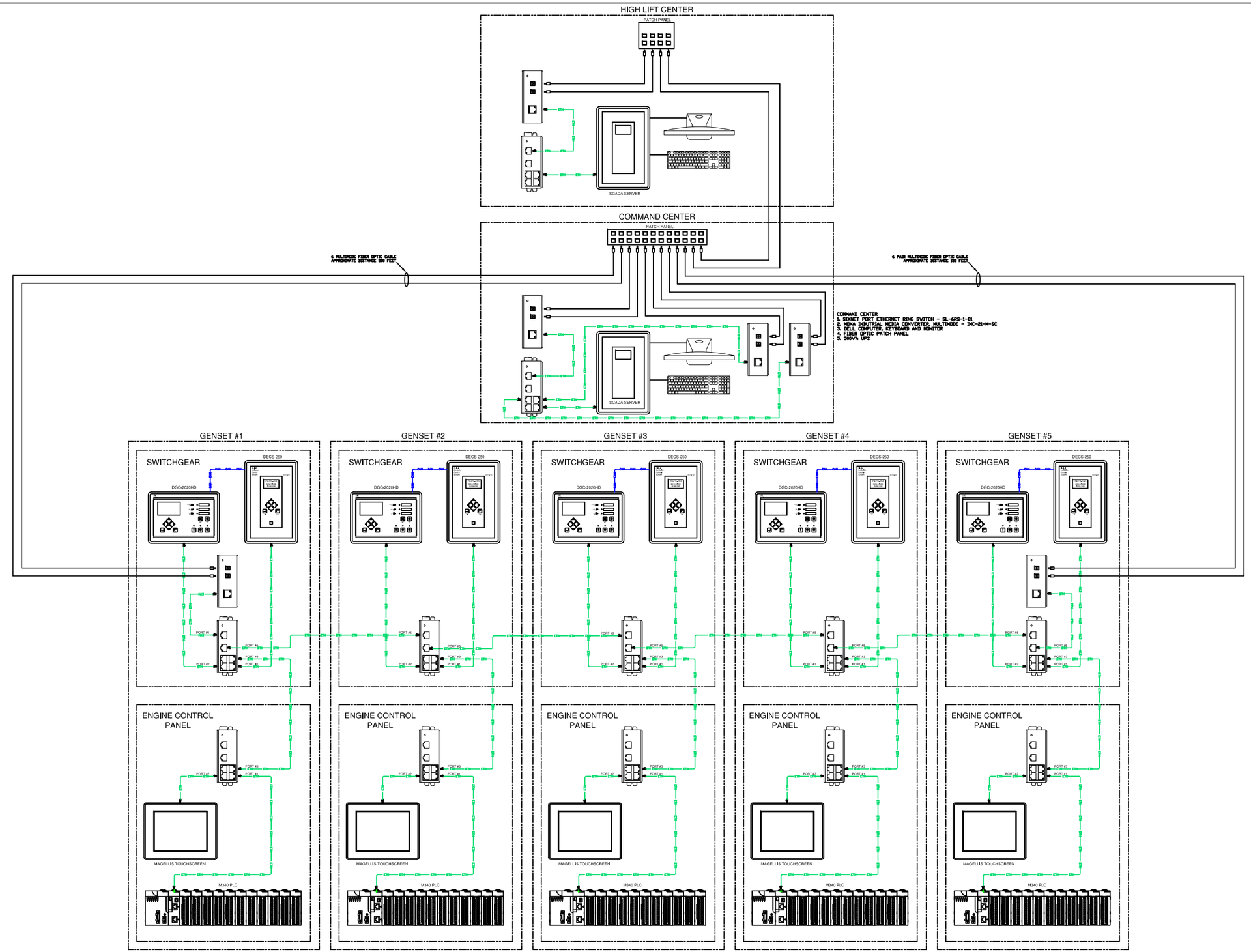
SYNCHRONOUS MACHINE

OUTPUT 48941 kVA	TURBOGENERATOR TYPE
REV/MIN. 3600	BDAX 7-193ER FRAME
VOLTS 13800	919485.010 MACHINE NO.
AMPS 2048	CONTINUOUS RATING
P.F. 0.85	ANSI C50.14 SPEC.
PHASES/Hz 3/60	15°C AMB. TEMP
PHASE CONN. STAR	Up to 1000m ALTITUDE
EXC. VOLTS 133	AIR at 15°C COOLANT
EXC. AMPS 997	CLASS F ROTOR INSULN.
DATE 2010	CLASS F STATOR INSULN.
	IP54 PROTECTION
WT. OF M/C. WITHOUT AIR TREATMENT 57000 kg	
	T1-T2-T3 PHASE SEQUENCE

MADE IN EUROPE

BRUSH ELECTRICAL MACHINES LIMITED
LOUGHBOROUGH, ENGLAND

www.brush.eu



DATE	REVISION	BY	CH'D
9/17/2017	ADDED COMMAND CENTER AND G5 SWITCHGEAR TO NETWORK.	DCB	
9/18/2017	REMOVED G-5 MAIN SWITCHGEAR	DCB	
10/23/2017	ADDED MEDIA CONVERTER TO COMMAND CENTER & ADDED HIGH LIFT CENTER.	DCB	

ENGINUITY PORTABLE GRID

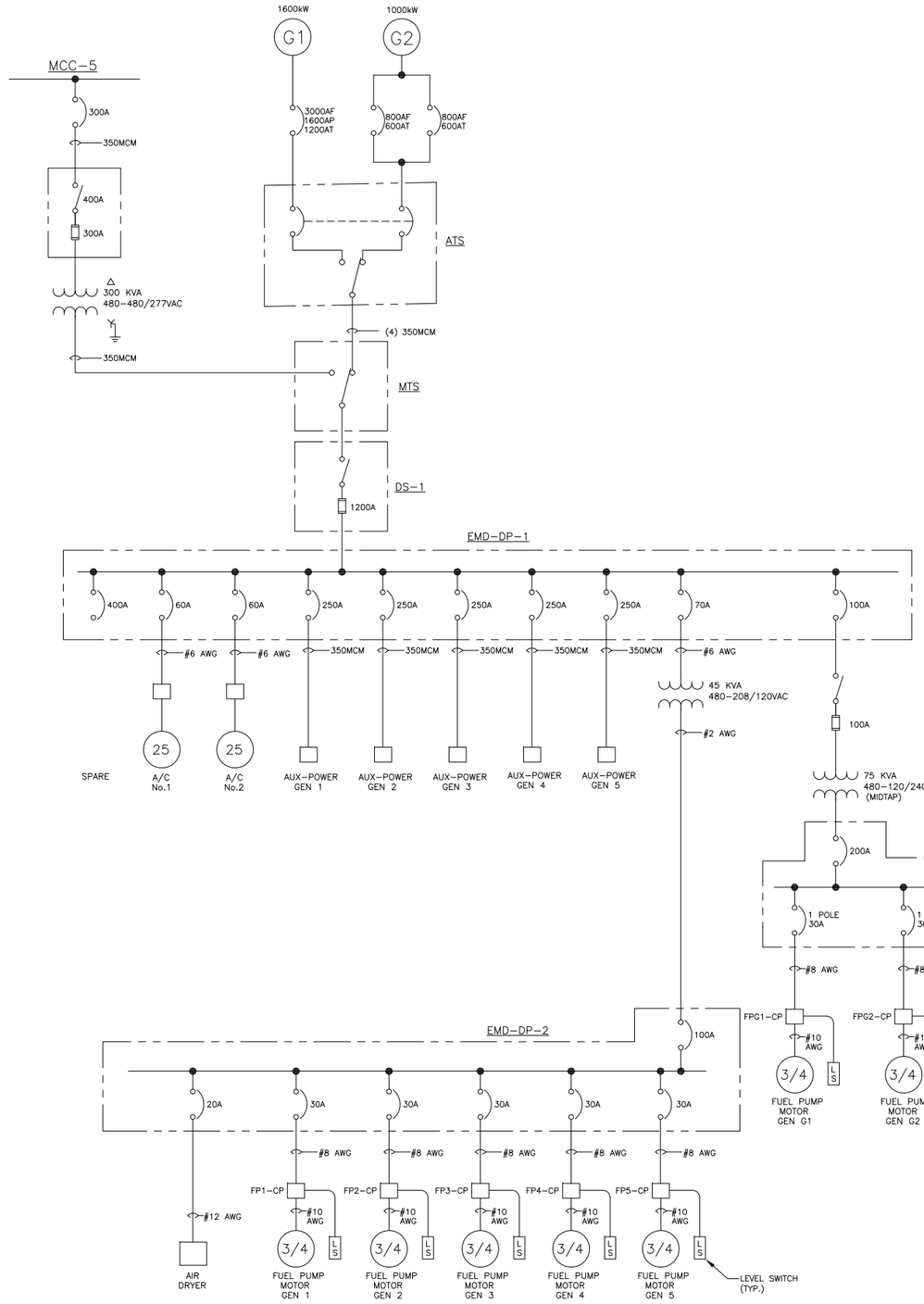
TOLERANCES (UNLESS OTHERWISE SPECIFIED)

CUSTOMER: CITY OF NEW ORLEANS

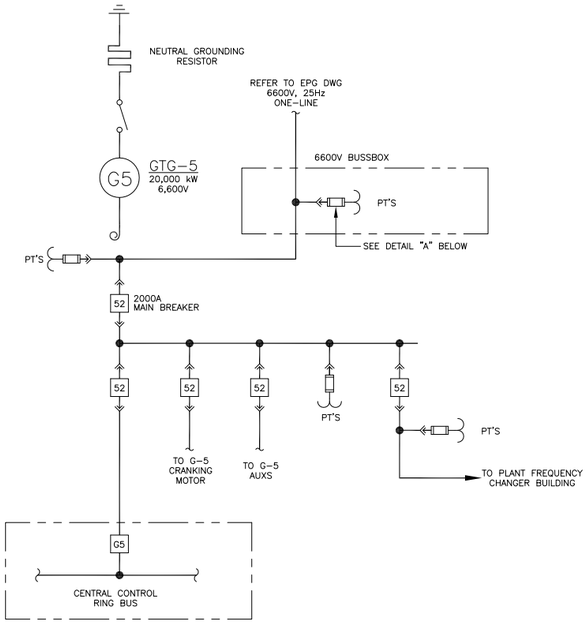
TITLE: CARROLLTON WATER PLANT
PLANT NETWORK LAYOUT

SCALE:	DRAWN BY:	CHECKED BY:	APP'D BY:
	DCB		

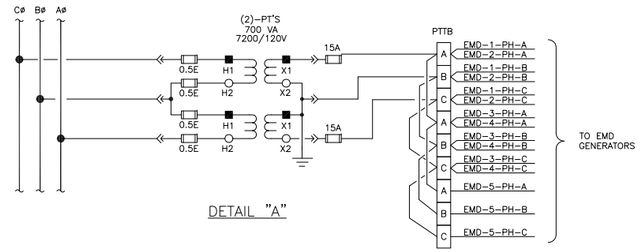
DATE:	SHEET	OF SHEETS	DRAWING NO.
9/7/2017	1	1	10960-NT-001-01



EMD 480V AUXILIARIES



EMD 6600V DISTRIBUTION



DETAIL "A"

STATE OF LOUISIANA
9/22/17
SIDNEY A. GAUDET IV
License No. 36308
PROFESSIONAL ENGINEER
IN
ELECTRICAL ENGINEERING

ISSUED BY:
Waldemar S. Nelson & Co.
FOR APPROVAL
9/22/17
NOT FOR CONSTRUCTION

REV.	DATE	DESCRIPTION	BY
A	9/22/17	ISSUED FOR APPROVAL	SAG

SEWERAGE AND WATER BOARD OF NEW ORLEANS

–

EMD ADDITION

480V AUXILIARY SYSTEM
ONE-LINE DIAGRAM

WALDEMAR S. NELSON AND COMPANY
INCORPORATED
ENGINEERS AND ARCHITECTS
1200 ST. CHARLES AVE. NEW ORLEANS, LA.

DATE	SCALE	JOB NO.	DRAWING NO.
9/12/17	NONE	20170065-00	SKETCH E-01

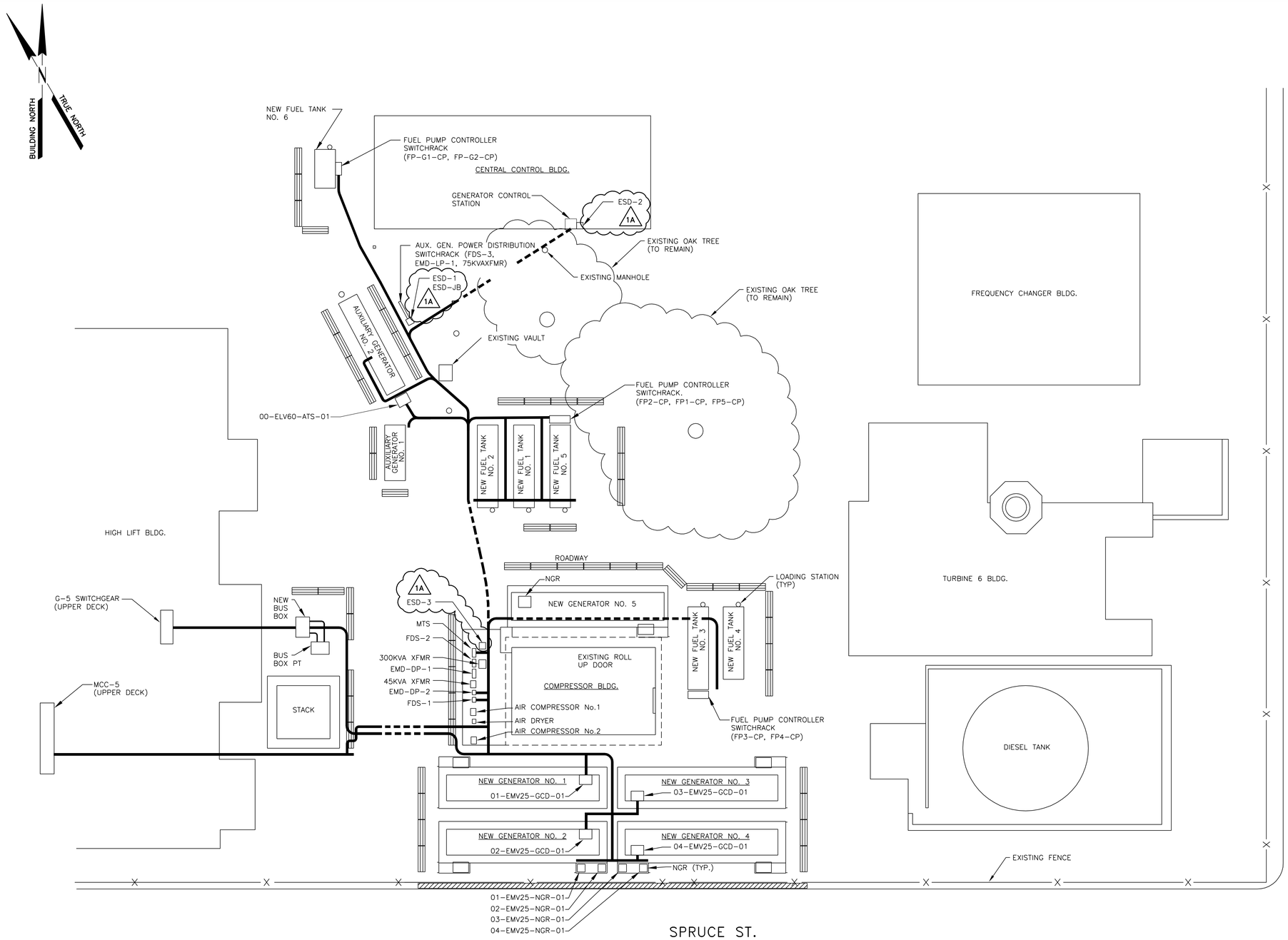
DESIGNED BY: SIDNEY A. GAUDET IV REGISTRATION NO. 36308 STATE: LA
ACAD FILE NO. E-800.dwg PLOT: 9/22/2017 8:29 AM

DR.	SP
TRC.	
CK.	SAG
AP.	
SCALE:	NONE
DATE:	9/16/17

GENERAL SUPERINTENDENT

DWG. No. E-800

SET NO. | SHEET NO. – OF –



ELECTRICAL SITE PLAN

SCALE: 1" = 20'

NOTES:

1. 6.6kV MCHL CABLE SHALL BE ROUTED WITH A MINIMUM SPACING OF 3" BETWEEN EACH CABLE.
2. ALL CABLES SHALL BE FIELD ROUTED IN ALUMINUM CABLE TRAY EXCEPT WHERE INDICATED. ALL CABLE ROUTING IN TRAY OR CONDUIT SHALL MEET THE TRAY AND CONDUIT FILL REQUIREMENTS OF THE LATEST NATIONAL ELECTRICAL CODE.
3. ALL CABLE TRAY AND CONDUIT LOCATIONS SHALL BE DETERMINED BY THE CONTRACTOR. LOCATIONS DEPICTED ON THIS DRAWING ARE ESTIMATED ONLY.

LEGEND:

CABLE TRAY

BURIED CABLE/CONDUIT

REV.	DATE	DESCRIPTION	BY
1A	11/21/17	ESD ADDITION – IFA	SAG
0	10/13/17	APPROVED FOR CONSTRUCTION	SAG
A	10/3/17	ISSUED FOR APPROVAL	SAG

STATE OF LOUISIANA
SIDNEY A. GAUDET IV
License No. 36308
PROFESSIONAL ENGINEER
IN
ELECTRICAL ENGINEERING
For Rev 1A only

ISSUED BY:
Waldemar S. Nelson & Co.
FOR APPROVAL
11/21/17
NOT FOR CONSTRUCTION

SEWERAGE AND WATER BOARD OF NEW ORLEANS

EMERGENCY GENERATOR

ELECTRICAL SITE PLAN

WALDEMAR S. NELSON AND COMPANY
INCORPORATED
ENGINEERS AND ARCHITECTS
1200 ST. CHARLES AVE. NEW ORLEANS, LA.

DATE	SCALE	JOB NO.	DRAWING NO.
9/12/17	NONE	20170065-00	E-801

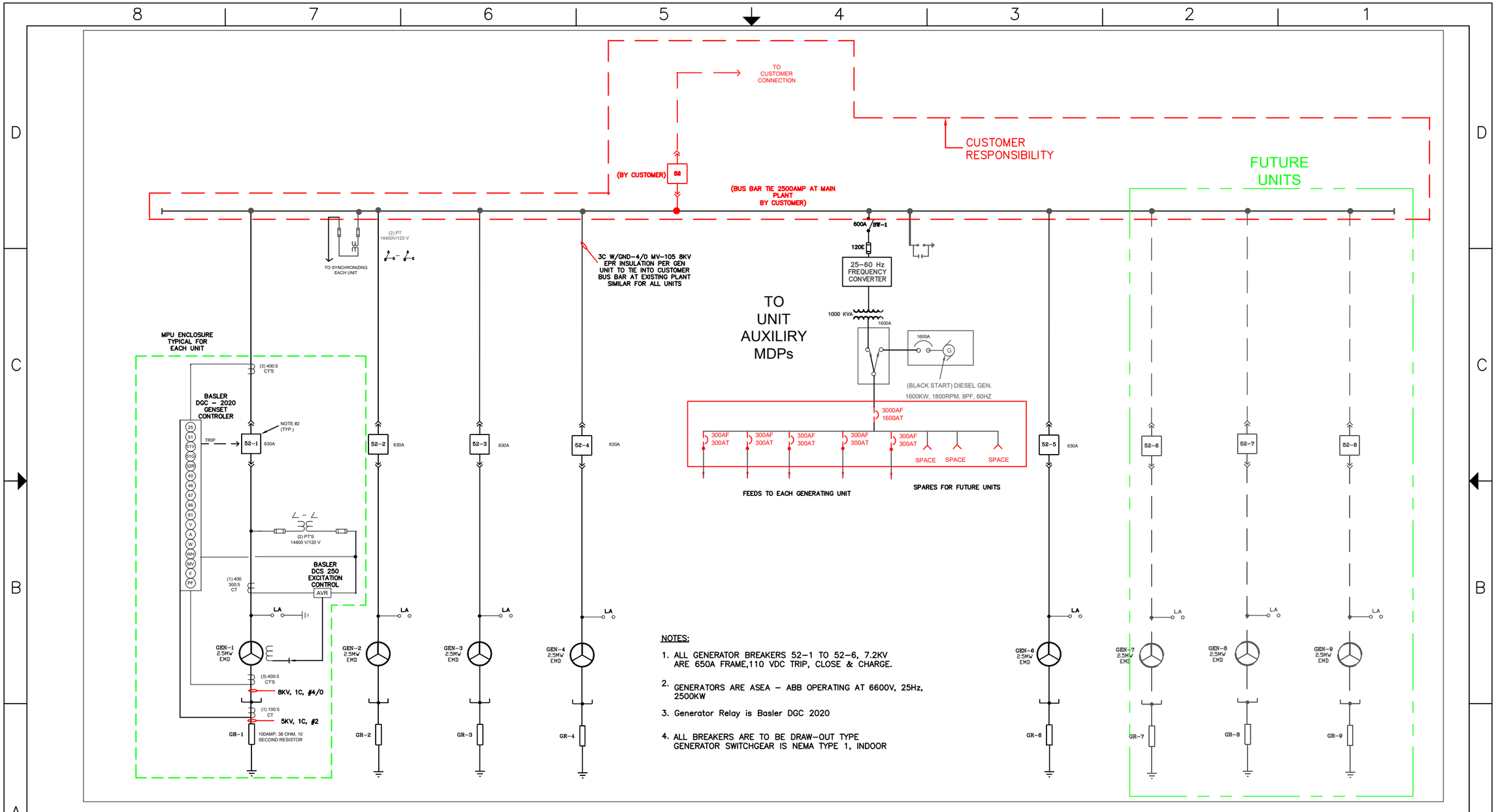
DESIGNED BY: SIDNEY A. GAUDET IV REGISTRATION NO. 36308 STATE: LA
ACAD FILE NO. E-801.dwg PLOT: 11/21/2017 11:16 AM

DR. SP
TRC.
CK. SAG
AP.
SCALE: NONE
DATE: 10/3/17

GENERAL SUPERINTENDENT

DWG. No. E-801

SET NO. SHEET NO. – OF –



NOTES:

1. ALL GENERATOR BREAKERS 52-1 TO 52-6, 7.2KV ARE 650A FRAME,110 VDC TRIP, CLOSE & CHARGE.
2. GENERATORS ARE ASEA - ABB OPERATING AT 6600V, 25Hz, 2500KW
3. Generator Relay is Basler DGC 2020
4. ALL BREAKERS ARE TO BE DRAW-OUT TYPE GENERATOR SWITCHGEAR IS NEMA TYPE 1, INDOOR

REV.	DATE	REVISION	BY	CHK'D
2	08/29/17	RECONFIGURED SYSTEM	RGS	
1	08/23/17	ADDED 4 UNITS	RGS	

ENGINUITY PORTABLE GRID

CUSTOMER	NEW ORLEANS SEWERAGE & WATER BOARD		
TITLE:	6600V 25 Hz ONE LINE		
SCALE: NTS	DRAWN BY: RGS	CHECKED BY:	APPROVED BY:
DATE: 08/16/17	SHEET: 1	OF SHEETS:	DRAWING NO.: REV. 2

McGRAW-EDISON
POWER SYSTEMS DIVISION

CANONSBURG, PENNSYLVANIA, U.S.A.

CLASS OA — SINGLE PHASE TRANSFORMER — 60 CYCLES

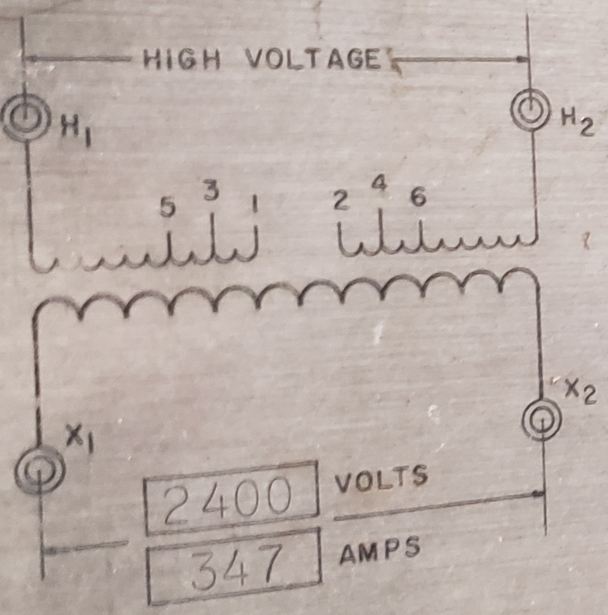
VOLTAGE RATING 13800/23900GRD.Y-2400/4160Y

SERIAL C-42760-1-1 — KVA 833

CAT. NO. NONE — 77 — SPEC. NO. 12346-01-02

IMP. 5.8 % AT 833 KVA — TEMP RISE 65 °C — KV-BIL FULL-WAVE H.V. 125 L.V. 60

PLAN VIEW FACING LOW VOLTAGE — POLARITY - SUBTRACTIVE — INSTR. BK. IDENT. BY SERIAL NO.



ACCESSORY DWG. NONE

HIGH VOLTAGE		TAP CHANGER	
VOLTS	AMPERES	POS.	CONN.
14400	57.9	A	1 TO 2
14100	59.1	B	2 TO 3
13800	60.4	C	3 TO 4
13500	61.7	D	4 TO 5
13200	63.1	E	5 TO 6

TAP CHANGER INDEX PLATE

CAUTION

TAP CHANGER FOR DE-ENERGIZED OPERATION MUST NOT BE OPERATED WHEN TRANSFORMER IS EXCITED.

LIQUID LEVEL BELOW TOP SURFACE OF HIGHEST POINT OF HANDHOLE FLANGE AT 25°C. 11.5 IN. ± 0.3"

LIQUID LEVEL CHANGE PER 10°C. LIQUID TEMP. CHANGE .360 IN.

MAXIMUM OPERATING PRESSURE OF OIL PRESERVATION SYSTEM 6.5 PSI POSITIVE TO 6.5 PSI NEGATIVE

MAIN TANK DESIGNED FOR 6.5 PSI VACUUM FILLING - SEE INSTRUCTIONS FOR RATINGS OF OTHER PARTS

TRANSFORMER IS FILLED WITH MINERAL OIL.

APPROXIMATE WEIGHTS IN POUNDS

TO BE LIFTED WHEN UNTANKING	2330
TANK AND FITTINGS	1600
OIL — 216 GALS	1620
TOTAL WEIGHT	5550

249790-B

SEWERAGE AND WATER BOARD OF NEW ORLEANS

ELECTRICAL ENGINEERING

25HZ & 60HZ POWER DISTRIBUTION

DR. B. JOSHI		
TRC		
CK. CELSO ANTUNEZ		
AP.	DWG. No.	
SCALE-N.T.S.		
DATE: 8/3/2007	SET NO.	SHEET NO. 1 OF 1

REV.	DATE	DESCRIPTION	BY
7	8/27/2024	EMD MAIN BREAKER DELETED	C.M.A.
6	1/18/2024	ADDED DPS13	C.M.A.
5	1/5/2024	UPDATES	C.M.A.
4	12/27/2023	2023 END OF YEAR AS-BUILD UPDATES	C.M.A.
3	10/31/2023	REMOVED FEEDER 20	C.M.A.
2	6/7/2023	UPDATES	C.M.A.
1	9/26/2022	MULTIPLE AS-BUILD CONTRACTS	C.M.A.

OAK ST. RIVER STATION
POWER HOUSE 2
J. BOX
OUTSIDE CUBICLE
HIGHLIFT
LOWLIFT
EFWS
TURBINE GEN. 6
CONTRACT 1370A 60HZ OUTSIDE YARD SWITCHGEAR
OUTDOOR SWITCH UNIT
PLANT-F.C.-BLDG
BOILER ROOM
SUBSTATION AT BOILER ROOM
KVA ROOM
CENTRAL CONTROL
MCC No.3 , 25Hz BOILER RM.
PANOLA STA.
CLAIBORNE STATION
CARROLLTON STATION
STATION 12
STATION 6
STATION 7
STATION 5
STATION 5 60 HERTZ
STATION D
STATION 19
STATION 13
STATION 11
STATION 4
STATION A
STATION 2
STA. 2 60 HERTZ (HOUSE)
STATION C
WESTBANK POWER CONTROL
DIESEL GEN
STATION 1
STA 1 60 HERTZ
D PUMP HOUSE
STATION 3
STA. 3 60 HERTZ (HOUSE)
STA. 3 60 HERTZ CORP. OF ENGR. (SCADA)
RIVER CROSSING

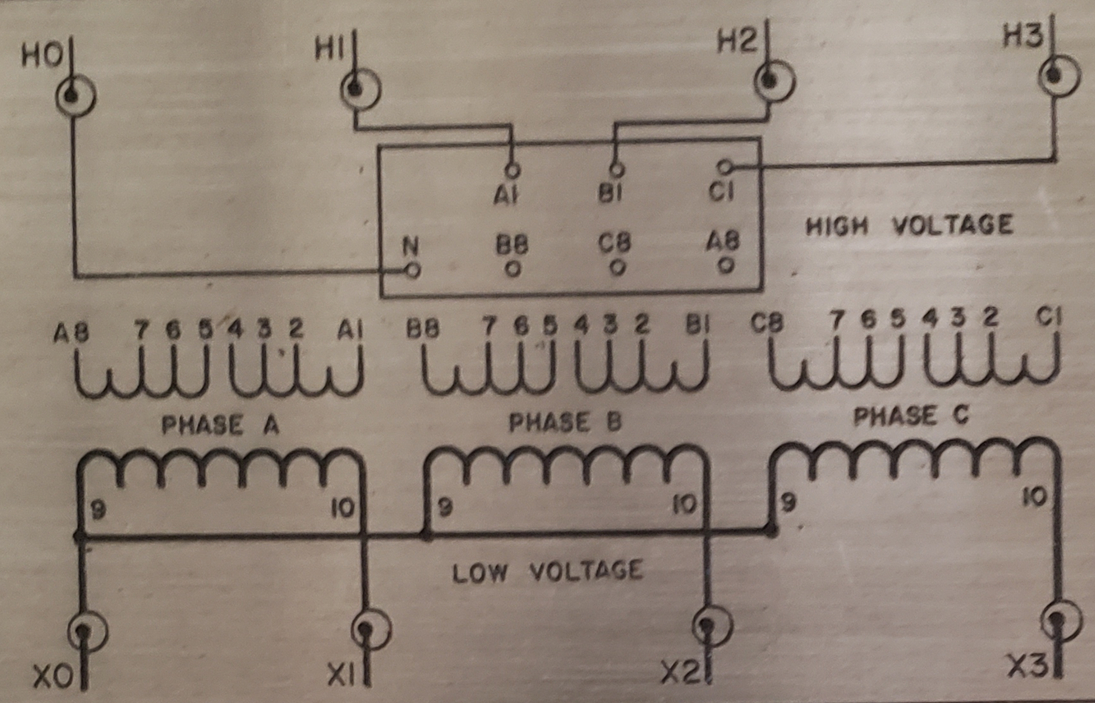
INSTRUCTION BOOK PS-1001 GALLONS OIL [illegible]

FULL WAVE IMPULSE TEST LEVEL: HIGH VOLTAGE 150 KV., LOW VOLTAGE 60 KV.

IMPEDANCE [illegible] % AT 3750 KVA 23900Y TO 4160Y VOLTS

APPROX. WEIGHT IN LBS. CORE AND COILS [illegible] CASE [illegible] OIL [illegible] TOTAL [illegible]

DE IN U.S.A. [illegible] WESTINGHOUSE ELECTRIC CORPORATION 6330A05



	CONNECTIONS					
	WINDING	VOLTS	3750 KVA AMPERES	TAP CHANGER POS.	TAP CHANGER CONNECTS	TERMINAL BOARD CONNECT
HV-AL	HIGH VOLTAGE WYE	24940	86.81	1	4 TO 5	A8 TO C8
		24420	88.68	2	3 TO 5	
		23900	90.59	3	3 TO 6	C8 TO B8
		23380	92.60	4	2 TO 6	
		22860	94.71	5	2 TO 7	B8 TO N
HV-AL	HIGH VOLTAGE DELTA	14400	150.4	1	4 TO 5	A8 TO C1
		14100	153.5	2	3 TO 5	
		13800	156.9	3	3 TO 6	C8 TO B1
		13500	160.3	4	2 TO 6	
		13200	164.1	5	2 TO 7	B8 TO A1
LV-AL	LOW VOLTAGE WYE	4160	520.5	———		———

THIS TRANSFORMER WILL CARRY 4687 KVA WITHOUT EXCEEDING 65 °C. AVERAGE TEMPERATURE RISE WHEN ADEQUATE COOLING EQUIPMENT IS ADDED.

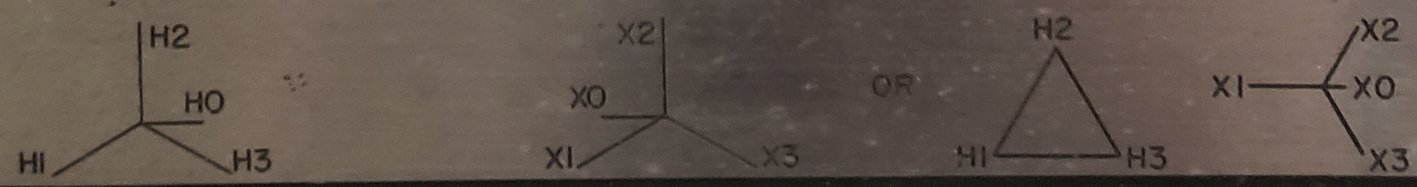
THE 25°C. LIQUID LEVEL IS 15.00 INCHES BELOW TOP OF HIGHEST MANHOLE FLANGE.

LIQUID LEVEL CHANGES 0.44 INCHES FOR EACH 10°C. CHANGE IN AVERAGE LIQUID TEMPERATURE.

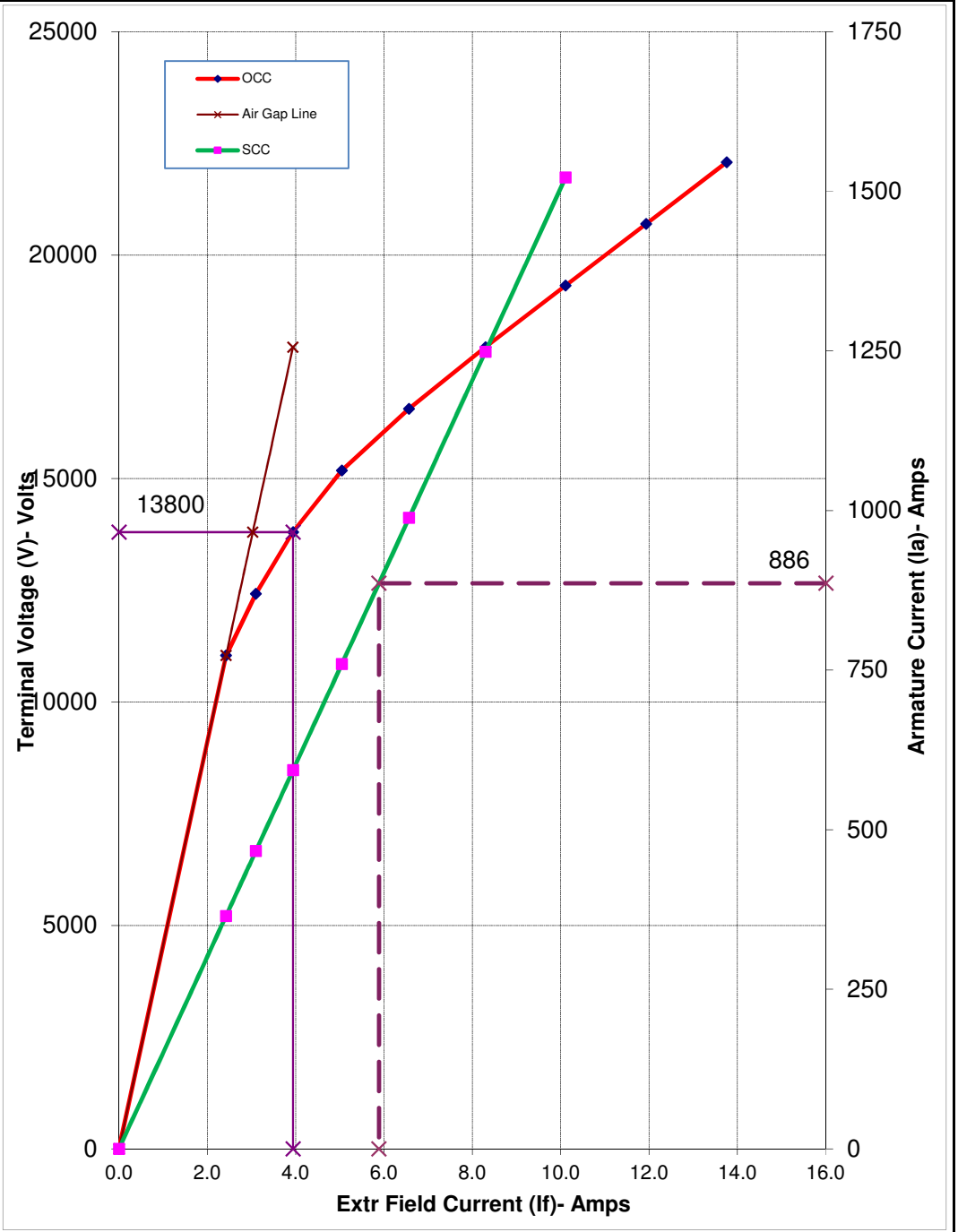
THE TRANSFORMER IS DESIGNED FOR OPERATION BETWEEN PRESSURE LIMITS OF 6.5 LBS. PER SQUARE INCH POSITIVE AND 6.5 LBS. PER SQUARE INCH NEGATIVE.

THE TRANSFORMER MUST NOT BE ENERGIZED FROM ANY VOLTAGE SOURCE WHEN TAP CHANGERS ARE OPERATED.

THE TRANSFORMER TANK IS DESIGNED TO WITHSTAND AN EXTERNAL PRESSURE OF 8 LBS. PER SQUARE INCH.



OPEN CIRCUIT AND SHORT CIRCUIT CHARACTERISTICS OF AC GENERATOR
TC195, 21176.5 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.85pf

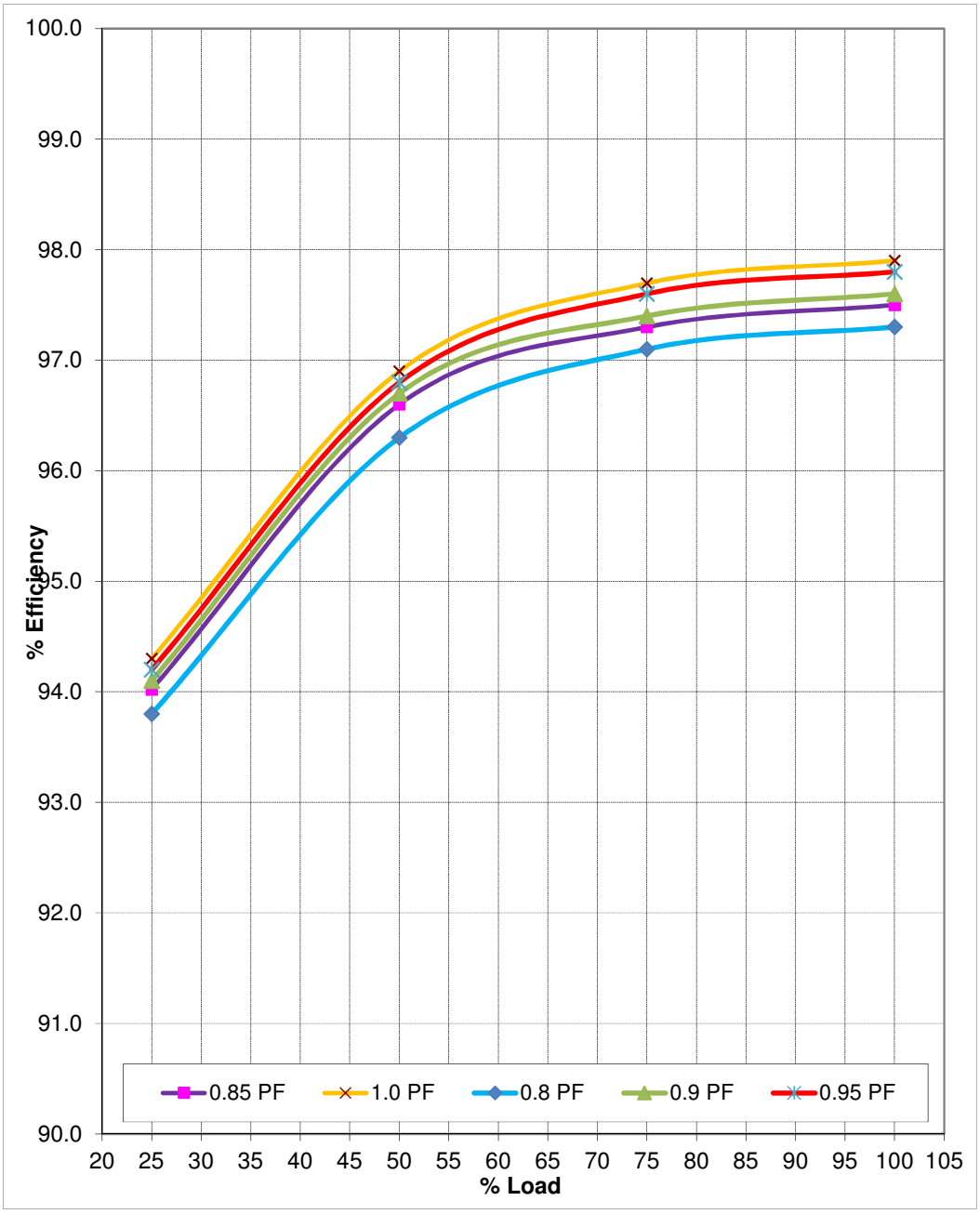


$$S.C.R = \frac{\text{Ex Fld Amps - OCC}}{\text{Ex Fld Amps - SCC}} = \frac{3.9}{5.9} = 0.67$$

Prepared	Checked	Approved	Sheet No	1 of 6	TDM-14-9084	R1
DR	AHJ	AHJ	Date :	26-Aug-22		

TD Power Systems Limited.

LOAD V/s EFFICIENCY CURVE OF AC GENERATOR
TC195, 21176.5 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.85pf



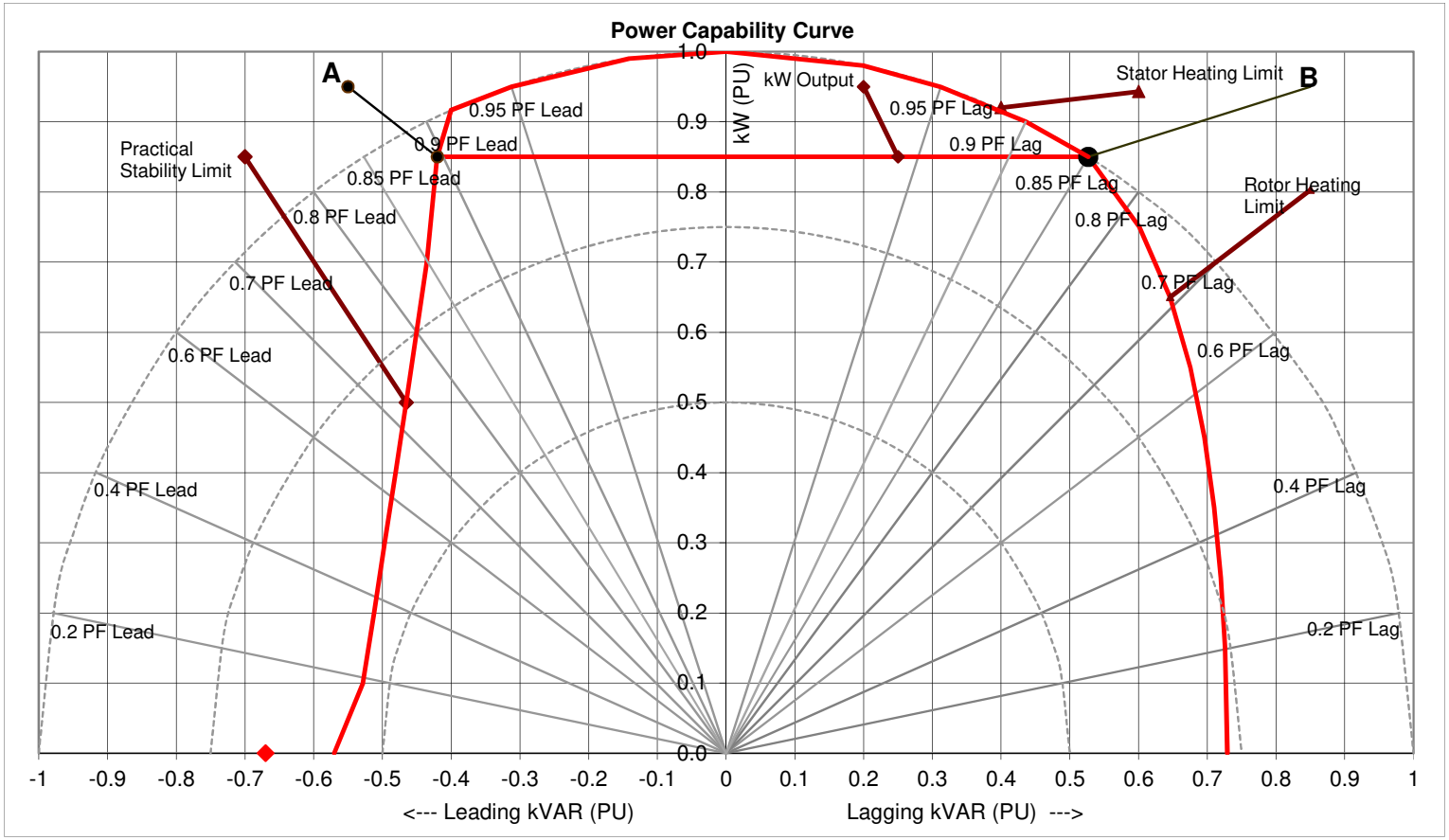
Load at	Efficiencies at				
	0.8 PF	0.85 PF	0.9 PF	0.95 PF	UPF
100%	97.30	97.50	97.60	97.80	97.90
75%	97.10	97.30	97.40	97.60	97.70
50%	96.30	96.60	96.70	96.80	96.90
25%	93.80	94.02	94.10	94.20	94.30

Prepared	Checked	Approved	Sheet No	2 of 6	TDM-14-9084	R1
DR	AHJ	AHJ	Date :	26-Aug-22		

TD Power Systems Limited.

FORM NO. T60016 R2: 30/04/14

POWER CAPABILITY DIAGRAM OF AC GENERATOR
TC195, 21176.5 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.85pf



SCALE: X-AXIS: 1 Division = 2118 kVAR Y-AXIS: 1 Division = 2118 kW

0.9 PF Leading (POINT 'A')

Real Power - 18000 kW — 20079 kVA

Reactive Power = 8897 kVAR

Maximum permissible cap. Loading (Zpf lead) (kVAR) 12071

0.85 PF Lagging (POINT 'B')

Real Power - 18000.0 kW — 21176 kVA

Reactive Power = 11155 kVAR

Maximum permissible ind. Loading (Zpf lag) (kVAR) 15459

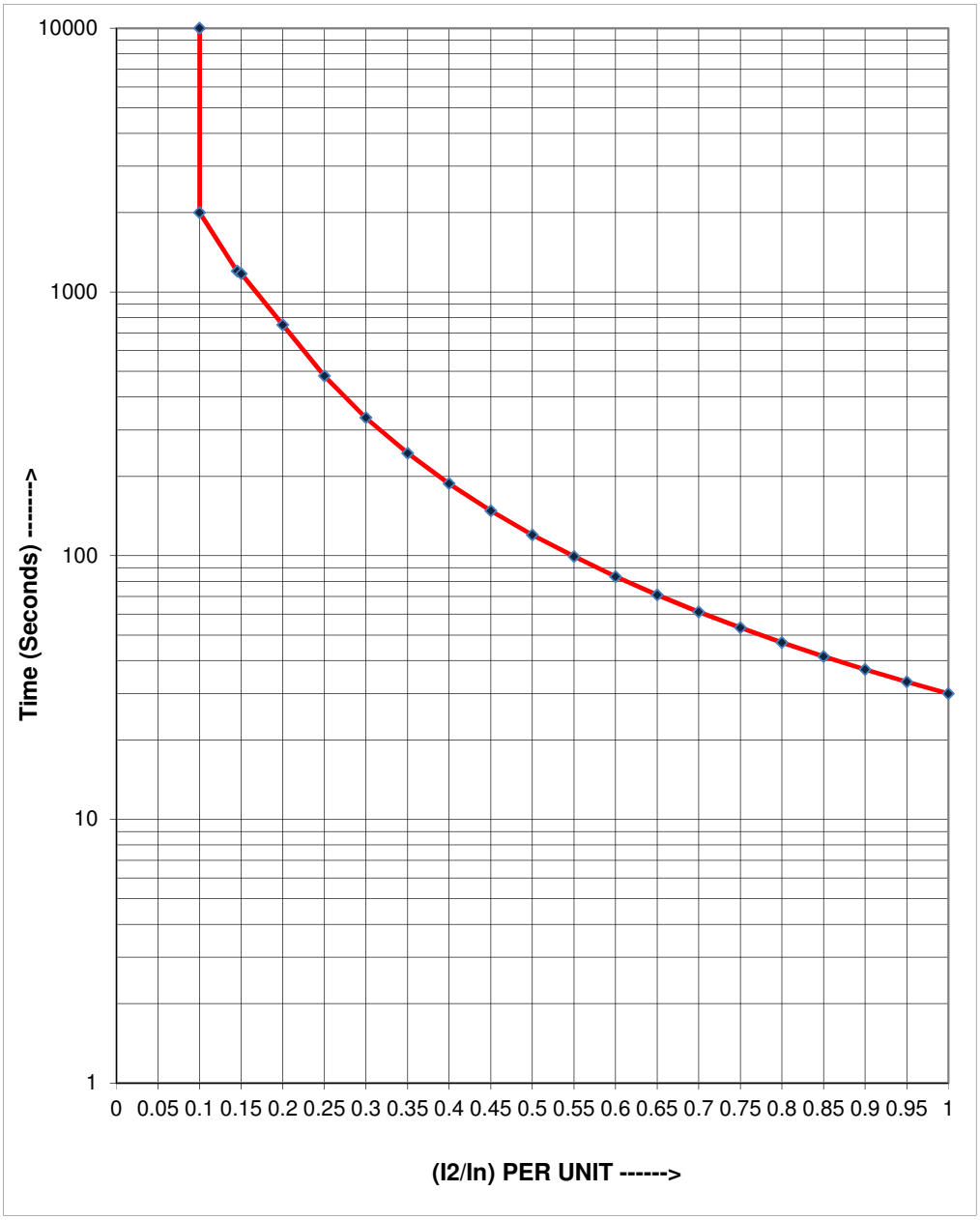
Prepared	Checked	Approved	Sheet No.	Date
DR	AHJ	AHJ	3 of 6	26-Aug-22

R1

TDM-14-9084

TD Power Systems Limited.

NEGATIVE SEQUENCE CURRENT CAPABILITY CURVE OF AC GENERATOR



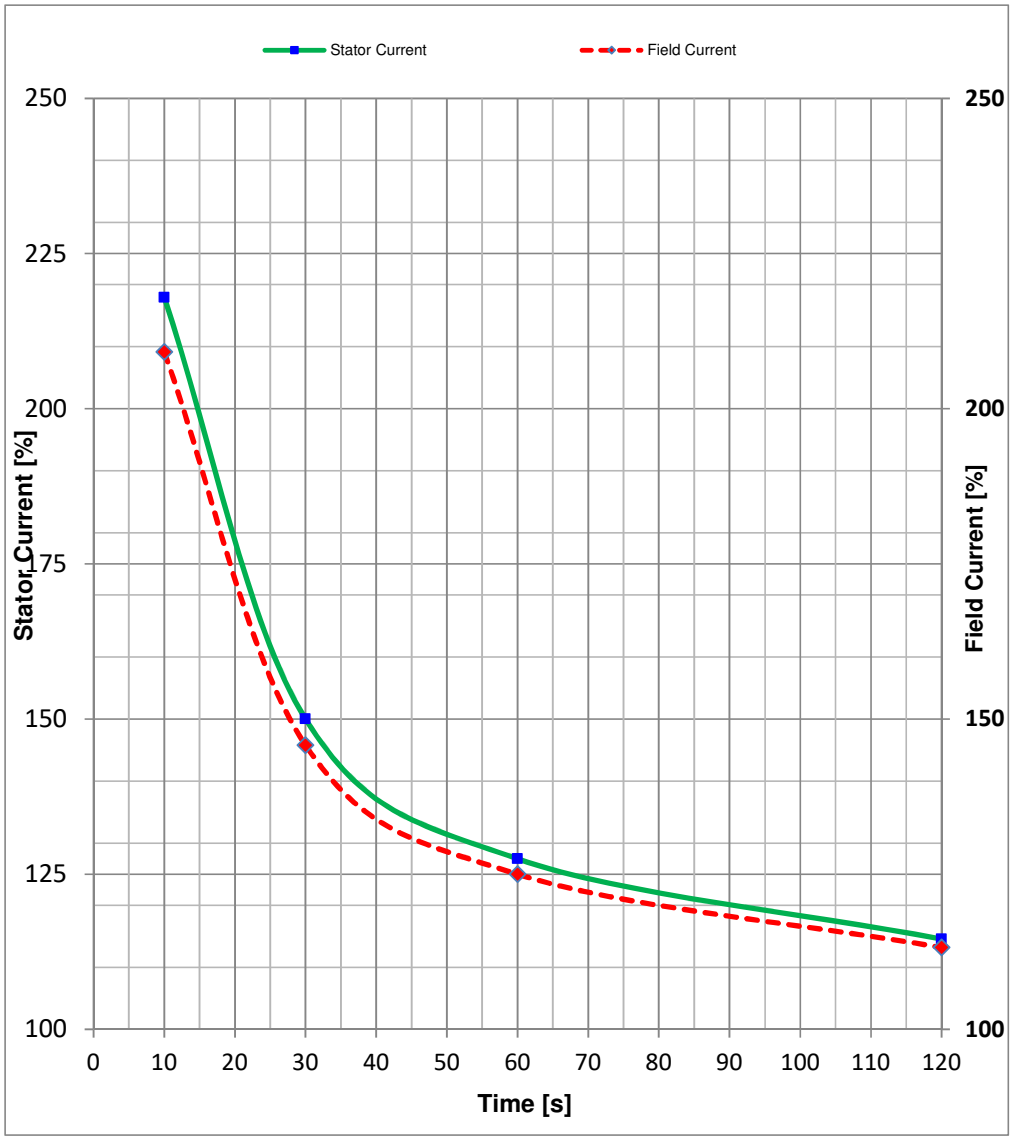
NEGATIVE SEQUENCE CAPABILITY CURVE AT I2 = 10%, I2^2 x t = 30

Prepared	Checked	Approved	Sheet No	4 of 6	TDM-14-9084	R1
DR	AHJ	AHJ	Date :	26-Aug-22		

TD Power Systems Limited.

OVER CURRENT CAPABILITY CURVE OF AC GENERATOR

Time [s]	10	30	60	120
Stator Current I/IN [%]	218	150	127	115
Field Current If/IfN [%]	209	146	125	113

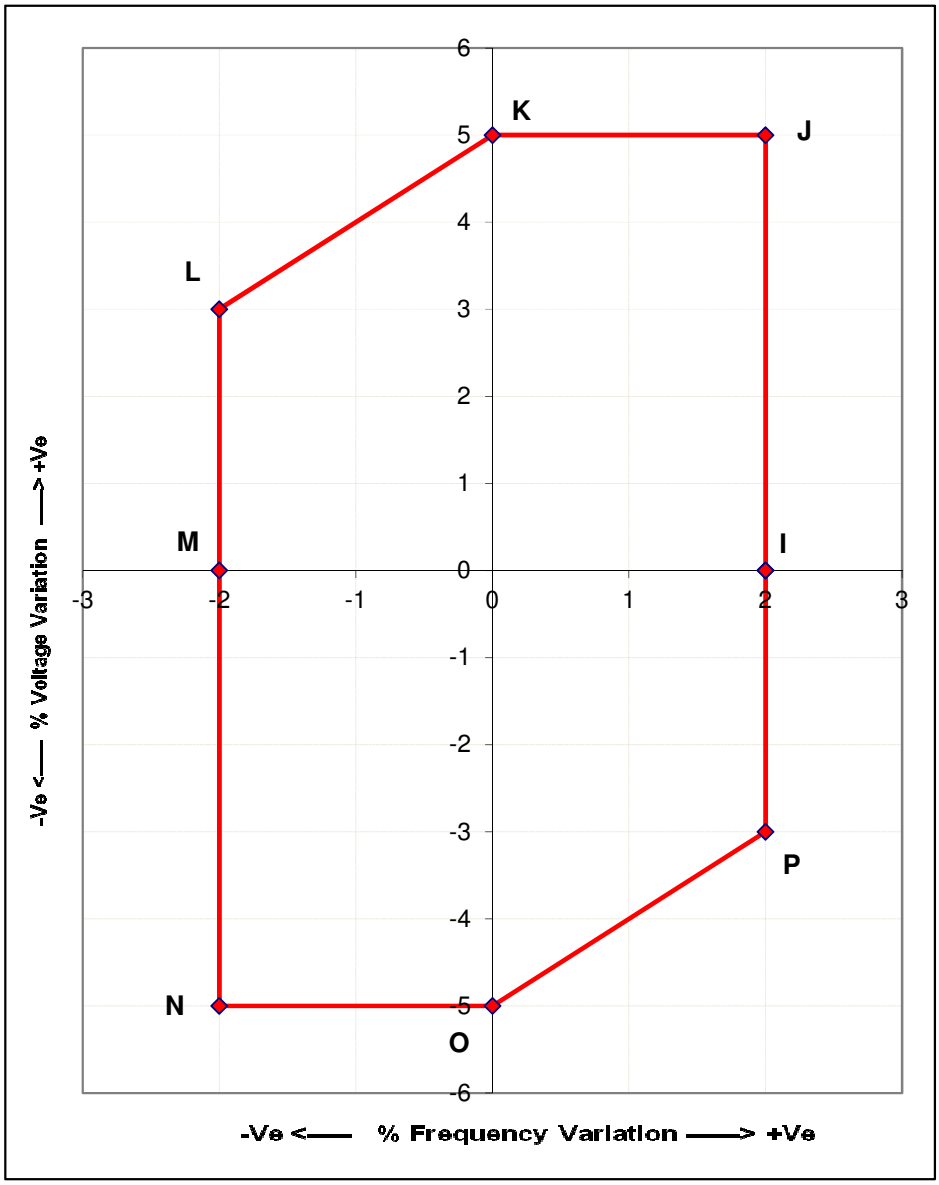


The generator is capable of operating at 150 percent of rated stator current for 30 sec.
The generator field winding is capable of operating at 125 percent of rated load field current for 1 min.
Both requirements are fullfilled starting from stabilized temperatures at rated conditions.
It is recognized that winding temperatures under these conditiones will exceed rated-load values.

Prepared	Checked	Approved	Sheet No	5 of 6	TDM-14-9084	R1
DR	AHJ	AHJ	Date :	26-Aug-22		

TD Power Systems Limited.

COMBINED VOLTAGE & FREQUENCY OPERATING RANGES OF AC GENERATOR
FOR CONTINUOUS RATED OUTPUT



Prepared	Checked	Approved	Sheet No	6 of 6	TDM-14-9084	R1
DR	AHJ	AHJ	Date :	26-Aug-22		

TD Power Systems Limited.

Manufacturer Data

Model	Cylindrical rotor Synchronous Generator
Frame Number	Titan T250
Serial Number	--
Air Flow	Double Flow

Generator Rating

KW	18000		KVA	21176		P.F.	0.85
Voltage (Line)	13800		Voltage (Phase)	7968		Connection	Star
Amps (Line)	886		Amps (Phase)	886		Pitch (P.U)	0.66
Phase	3		Poles	4	**R3**	Ambient at rated condition	40 Deg.C
Hertz	60		RPM	1800			
Insulation Class(ST/RT)	F/H				**R3**	RH in %	95
Temperature Rise	80	°C (Stator by RTD)					
	105	°C (Field by Resistance)					

Exciter Rating

KW	144		Volts, AC	180	Amps, AC	488
Field Resistance	5.4	Ohms @ 25 °C	**R2**		Phase	3
Temperature Rise	80	°C (Armature)				
	80	°C (Field)				
Number of Poles	12					

Excitation Requirements

Exciter Field	**Volts**		**Amps**	
Generator No Load	25	**R2**	3.9	**R2**
Generator Full Load	66	**R2**	10.3	**R2**
300% Fault Current Forcing	140	**R2**	21.9	**R2**

PMG Rating

KVA	5		Volts	200	Amps	14.4
Hertz	180		Phase	3		
Temperature Raise	80	°C				

Generator Operating Characteristics

Efficiency (%)

Load	**0.85 P.F.**	**1.0 P.F.**
100%	97.5 (Min)	97.9
75%	97.3	97.7
50%	96.6	96.9
25%	94.0	94.3

Losses (KW)

	Full Load	**No Load**
Core	91	91
Friction & Windage	140	140
Stray Load	20	0
Stator I2R loss	78	0
Rotor I2R loss	124	17.3
Exciter	7.7	3.3
Total	461	251.6

Base values

Voltage	13.8	KV	**R3**
Current	886	A	**R3**
KVA	21176	KVA	**R3**
Impedance	8.99	Ohms	**R3**

Reatances (per unit at KVA rating)

		Saturated	Unsaturated
Direct Axis Synchronous	Xd	1.493	1.696
Direct Axis Transient	X'd	0.271	0.308
Direct Axis Subtransient	X"d	0.210	0.210
Quadrature Axis Synchronous	Xq	1.449	1.647
Quadrature Axis Transient	X'q	1.449	1.647
Quadrature Axis Subtransient	X"q	0.337	0.337
Negative Sequence	X2	0.274	0.274

Zero Sequence	X0	0.051		0.058
Leakage	Xl	0.158		0.18
X/R		57	**R3**	

Time Constants

Direct Axis O.C. Transient	T'do	3.062	Secs
Direct Axis S.C. Transient	T'd	0.556	Secs
Direct Axis O.C. Subtransient	T"do	0.045	Secs
Direct Axis S.C. Subtransient	T"d	0.035	Secs
Quadrature-axis Transient open-circuit	T'qo	0.573	Secs
Quadrature-axis Subtransient open-circuit	T"qo	0.028	Secs
Quadrature-axis Transient short-circuit	T'q	0.104	Secs
Quadrature-axis Subtransient short-circuit	T"q	0.022	Secs
Armature Short Circuit	Ta	0.196	Secs
Exciter Field	Te	0.65	Secs

Resistance at 95°C

DC Armature	Ra/Ph	0.0037	p.u.
DC Field	Rf	0.0478	p.u.
Positive Sequence	R1	0.0050	p.u.
Negative Sequence	R2	0.0043	p.u.
Zero Sequence	R0	0.0017	p.u.

Short Curcuit Ratio	SCR	0.67	
Inertia Constant Multiplier	ICM	0.000076972	
Inertia constant (Generator Only)	H	1.63	kW-sec/kVA

TIF (1960 weighting)

Balanced	100
Residual	75

Waveform Deviation Factor <10 % at no load

Harmonic Content

% Individual	<3
% Total	<3

Allowable Negative Sequence Current

% Continuous	10
Short Time K=	30

Guaranteed Noise Level (dBA @ 1 meter) average 90dB(A)

Initial Temperature Detector Settings	**Alarm**	**Shutdown**
Windings	125 °C	130 °C
Bearings	105 °C	110 °C

Heat Rejection at Rated Load

Exterior Surfaces of Generator	0.605	(kW)
Generator Exhaust	461	(kW)

Transient Torques

Max Torque	**(Lb-Ft)**		**(Per Unit)**
3-Phase Short Circuit	366463	**R2**	5.2
L-L Short Circuit	359415	**R2**	5.1
3-Phase Out of Phase With and Infinite Bus	1057104	**R2**	15.0
1-Phase Out of Phase With and Infinite Bus	986631	**R2**	14.0

L-L Short Circuit Torque Equation (per unit of rated torque) Refer drawing 31168022

Short Circuit Current	**RMS Symmetrical**	**Peak Asymmetrical**
3-Phase	4.64 kA	13.13 kA
L-L	3.49 kA	9.87 kA
L-N	5.47 kA	15.46 kA

Voltage Dip

Motor Starting (0.0 P.F.)	**Voltage Dip**	**Inrush(SKVA)**	**Motor HP (Code F)**
	10%	9794	-
	15%	15544	-
	20%	22024	-
	25%	29361	-
	30%	37758	-

Step Loads (0.85 P.F.)	**Applied Load**	**Applied Load(KVA)**	**Voltage Dip**
	25%	5294.1	3.2%
	50%	10588.2	6.4%
	100%	21176.5	12.7%

Voltage Regulator System Recommendations

Manufacturer NA Model NA

Electrical Data

RTDs	**Ohms @ 0°C**	**Material**	**Quantity**	**T.Coef.**
Stator/Phase	100	Platinum	2	0.00385
Per Bearing	100	Platinum	2	0.00385

Auxiliary Power Reqirements

	Watts	**Volts/PH**
Main Space Heaters(Stator)	4x950	120V,1PH, 60Hz
Exciter Space Heaters(Stator)	1x250	120V,1PH, 60Hz
Cooling Fans(if Supplied)	NA	NA
CT Ratio	1500 A/5 A	7
PT Ratio	NA	NA NA

Operating setpoints		**Alarm**		**Shutdown**	
Vibration					
DE	Housing	7.1	mm/sec	11	mm/sec
NDE	Housing	7.1	mm/sec	11	mm/sec
Stator temperature		125	°C	130	°C
Bearing temperature		105	°C	110	°C

Mechanical Data

Enclosure Type	WPII			
Cooling Air Flow	23.3	m^3/sec		
Max allowable air pressure drop in duct		NA	Pa	
Weight Total	105821	lbs	48000	kgs
Weight Rotor	34171	lbs	15500	kgs
Weight Stator	71650	lbs	32500	kgs

Bearings

Manufacturer			NDE	RENK	DE	RENK
Model No.			NDE	EMZLQ	DE	EMZLB
Type			NDE	Q 28-335	DE	B 28-335
Maximum axial play towards drive end				5	mm	
Maximum axial play towards non-drive end				5	mm	
Diametral clearance between shaft and bearing				0.490~0.583	mm	
Stiffness Coefficient and Damping Coefficient				refer Sheet 1 & 2		N/mm
ibs-sec./in based on						
	A function of speed (600 RPM above and below nominal)					refer Sheet 1 & 2
	Minimum & maximum lube oil temps					62.8 & 82 degC
	Minimum & maximum diametral clearances					0.490~0.583
Bearing length	**NDE**	234	mm	**DE**	250	mm
Calculated Stiffness	**NDE**	refer Sheet2		**DE**	refer Sheet1	

Lube Oil

Viscosity grade		ISO VG46				
Flow req'd/bearing	**NDE**	25	lpm	**DE**	25	lpm
Supply pressure		35	psig			
Orifice diameter	**NDE**	5	mm	**DE**	5	mm
Oil inlet temperaure		62.8	°C			
Sump Capacity	**NDE**	45	L	**DE**	45	L
Heat load		27.3	kW			

Rotor

Direction of Rotation		CW	facing drive end
Maximum permissible over speed and duration		1950rpm for 2min	
O.D. of journal plus tolerances		335H7/335H7	mm
Full load (air gap) Torque		95549.4	Nm
Rotor breakaway torque	without jacking	545	kg-m
	with Jacking	45.7	kg-m

Thermal growth of shaft/housing from cold position to full load hot

Vertically	NDE	refer Sheet 3 Alignment Data	mm refer Sheet 3	DE	refer Sheet	mm
Heat rejection of generator		0.605	kW			
Generator Exhaust		461.0	kW			
Nominal torque		95549.4	Nm			
Inertia		1950	kg-m2			
Residual unbalance		54680	g.mm			

Rotordynamic Analysis - Bearing information

	NDE		DE	
Journal diameter	335	mm	335	mm
Length	218.5	mm	218.5	mm
Maximum diametral bearing clearance	0.583	mm	0.583	mm
Minimum diametral bearing clearance	0.490	mm	0.490	mm
Bracket mass	860	kg	860	kg

Measured bearing pedestal stiffness

Vertical	4800	kN/mm	4800	kN/mm
Horizantal	3800	kN/mm	3800	kN/mm

Bearing Style (Select one)

Plain journal bearing	Yes	yes/no	
Partial arc bearing	No	yes/no	
Arc angle		°	
Lobed bearing	No	yes/no	
Lobe arc angle		°	
Number of lobes			
Load direction		lop/lbp	
Pre-loaded		yes/no	
If yes:			
Min. Diametral pad clearance			mm
Max. Diametral pad clearance			mm
Tilt pad bearing	No	yes/no	
Pad arc angle		°	
Number of pads			
Load direction		lop/lbp	
Pre-loaded		yes/no	
If yes:			
Min. Diametral pad clearance			mm
Max. Diametral pad clearance			mm

Core Stiffness Multiplier
Multiply this factor by the shaft diameter to get an equivalent diameter — Solar to Provide

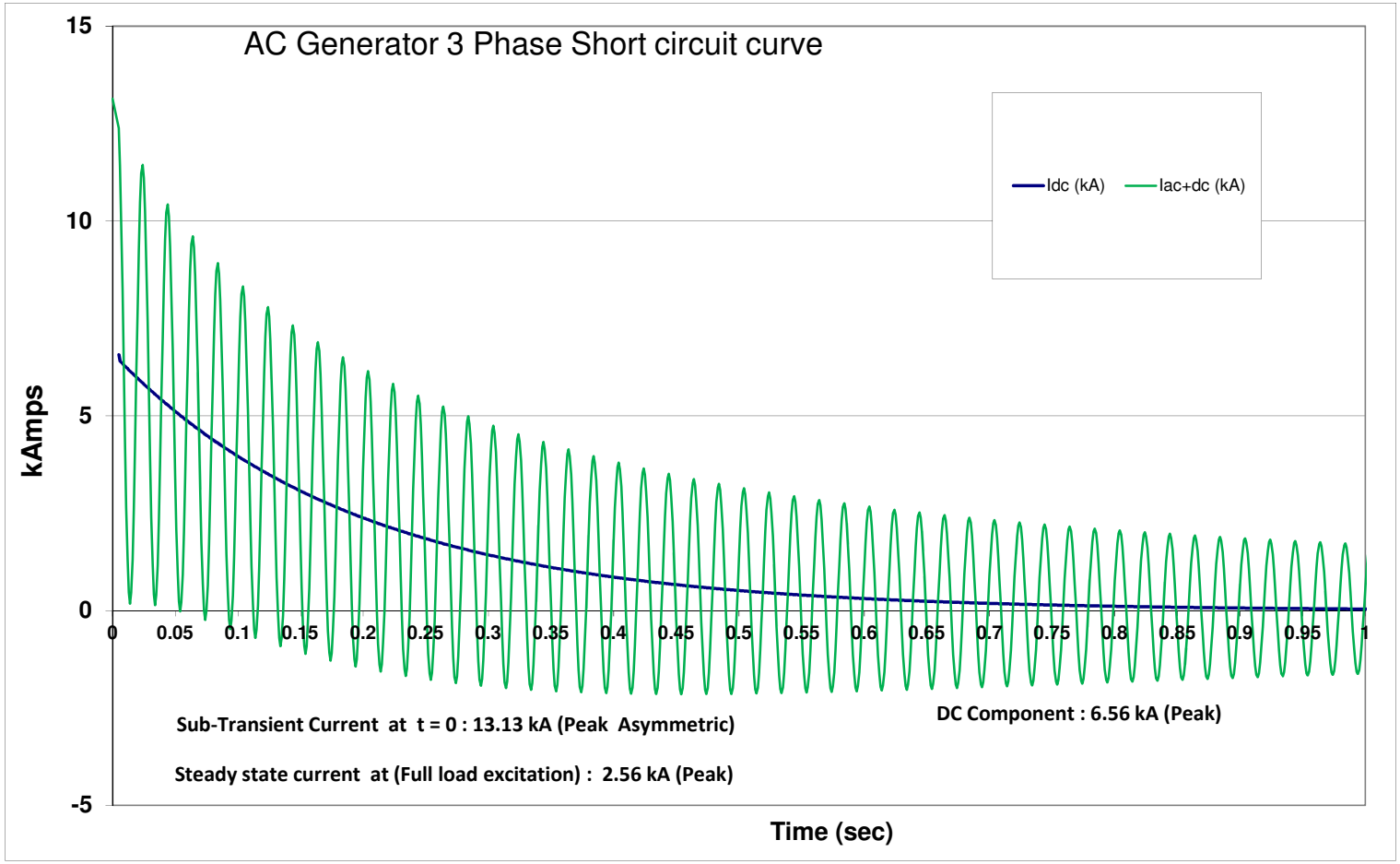
Short Circuit Loading

kW	18000	
RPM	1800	
Bolt Center	2500	mm
Efficiency	97.5	%
Static Load	48000	kg
S.C. Torque	500200	Nm

Facing Diven End	**Static Load**		**Full Load Torque**		**Short Circuit Torque**	
Left side	24000	kg	1948	kg	10198	kg
Right Side	24000	kg	1948	kg	10198	kg

Amb. Temp, Max	-3.9 to +40	**Standard**	IEC/NEMA
Amb. Temp, Design	-20 to +50		
Altitude, Meter	<1000 MSL		
Haz-loc area	Non-hazardous (safe area, non-classified)	**Option**	--

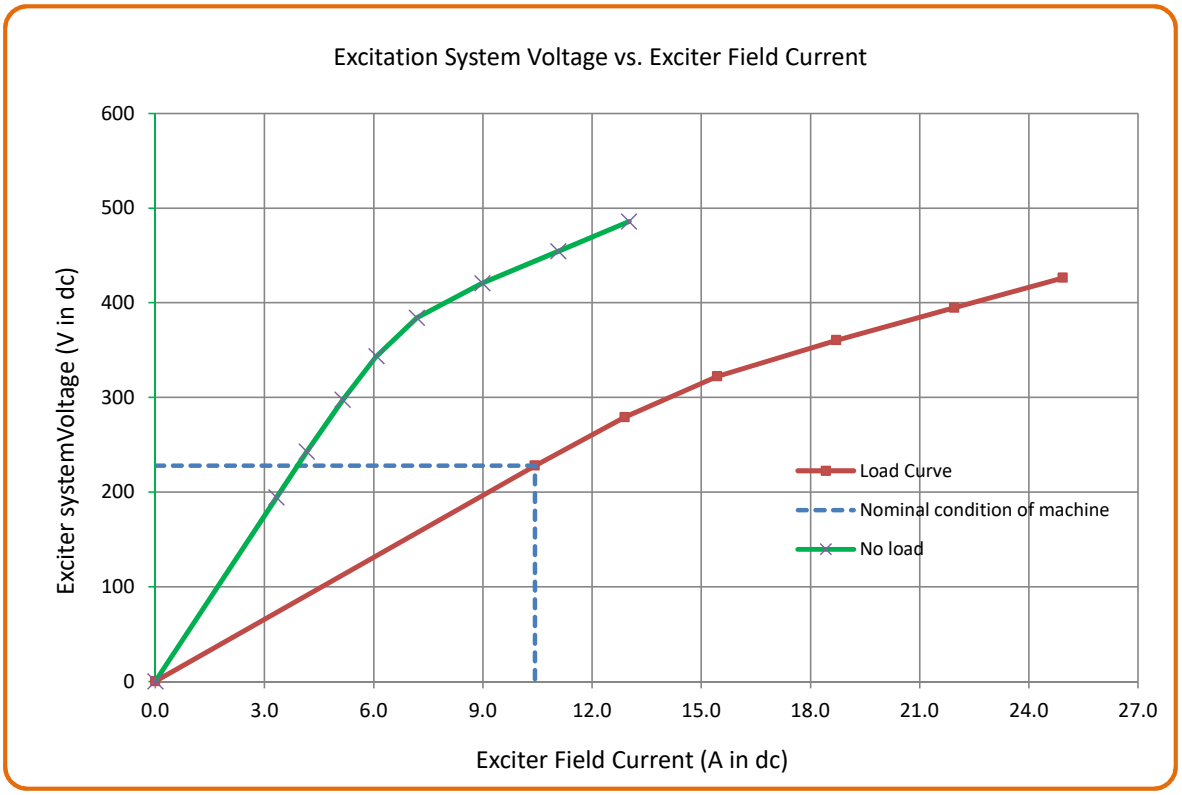
3 PHASE SHORT CIRCUIT CURRENT CURVE



			tdps
			R0
			TDM-14-9087
		Sheet No.	1 of 1
		Date	09-Jun-22
Prepared	DR	Approved	AHJ
Checked	AHJ		

T D Power Systems Limited.

EXCITATION SYSTEM VOLTAGE V/S EXCITER FIELD CURRENT
TC195, 21176.5 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.85pf

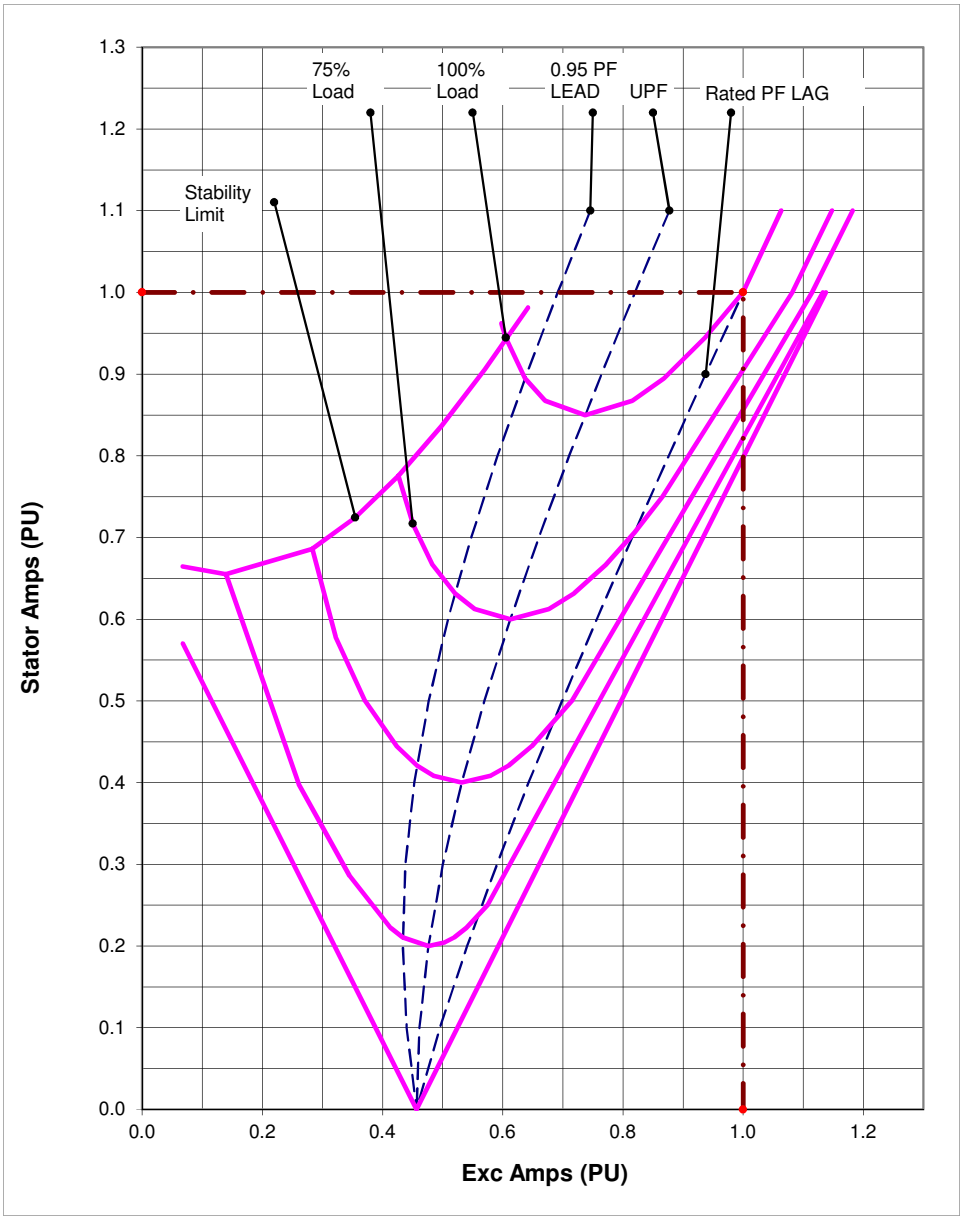


Prepared	Checked	Approved	Sheet No	1 of 1	TDM-14-9088	R0
DR	AHJ	AHJ	Date	09-Jun-22		

T D Power Systems Limited.

V - CURVE OF AC GENERATOR
TC195, 13800 Volts, 21176 kVA, 60 Hz, 4 Pole, 0.85 PF

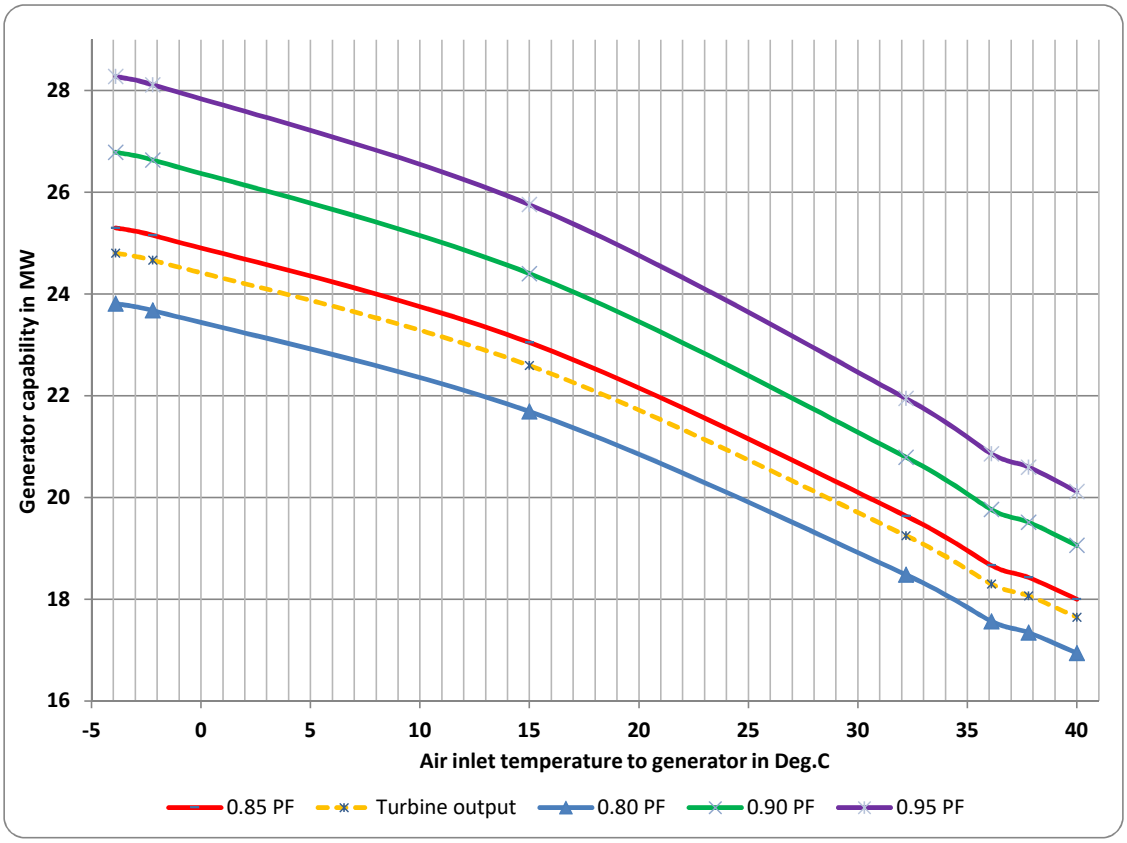
V CURVES



Prepared	Checked	Approved	Sheet No	1 of 1	TDM-14-9089	R0
DR	AHJ	AHJ	Date :	09-Jun-22		

T D Power Systems Limited

LOAD CURVE (MW v/s COOLANT)
TC195, 13800 Volts, 18000kW, 60 Hz, 4 Pole, 0.85 PF



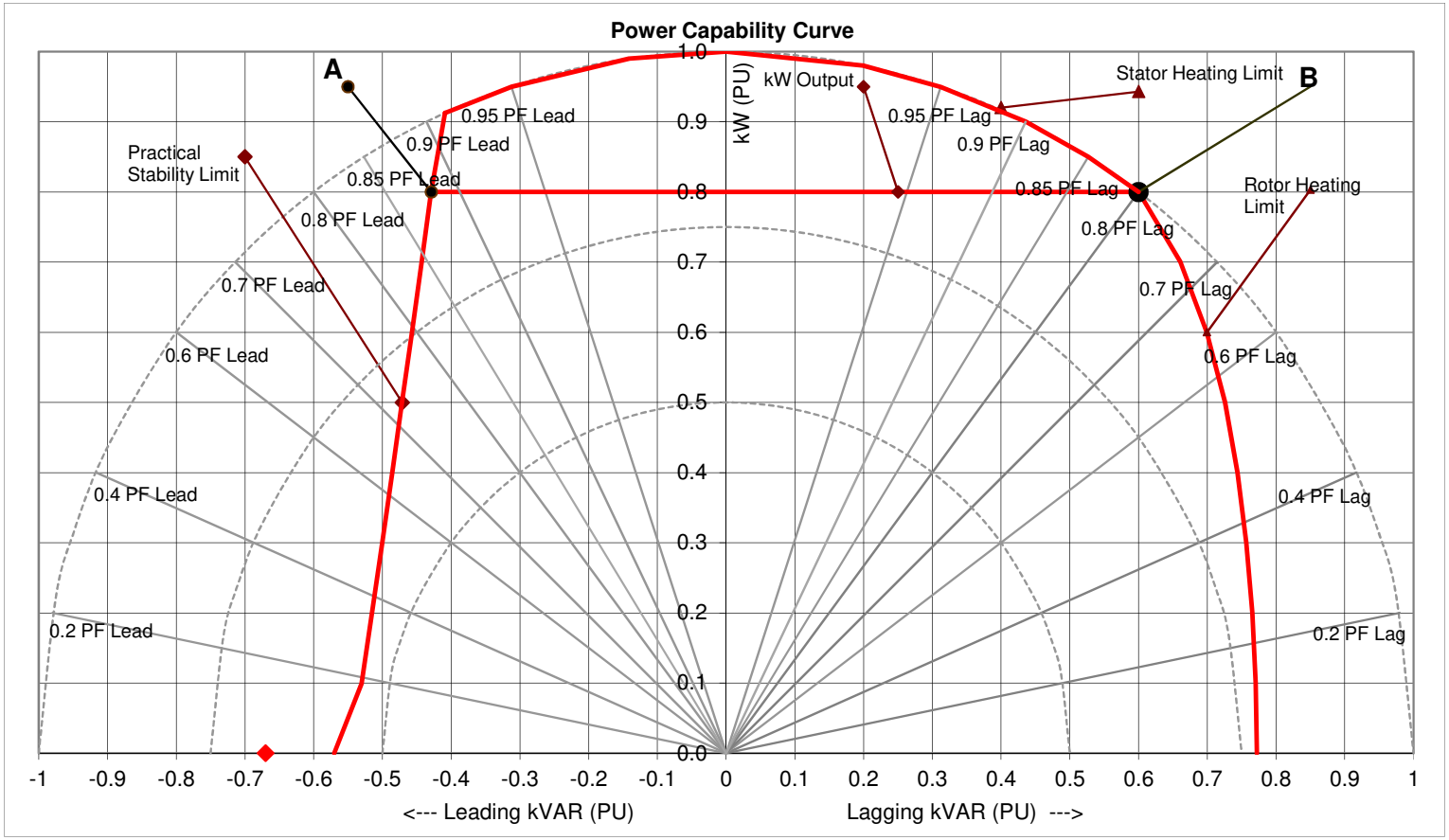
Air inlet temp to Turbine & Generator	Turbine output in MW	Generator output MW at 0.8 PF	Generator output MW at 0.85 PF	Generator output MW at 0.9 PF	Generator output MW at 0.95 PF
-3.9	24.80	23.81	25.30	26.79	28.28
-2.2	24.66	23.68	25.16	26.63	28.11
15.0	22.59	21.69	23.05	24.40	25.76
32.2	19.25	21.69	19.64	20.79	21.95
36.1	18.30	17.57	18.66	19.76	20.86
37.8	18.07	17.34	18.43	19.51	20.60
40.0	17.65	16.94	18.00	19.06	20.12

Prepared	Checked	Approved	Sheet No	1 of 1	TDM-14-9090	R1
DR	AHJ	AHJ	Date	26-Aug-22		

T D Power Systems Limited.

FORM NO. T60016 R2: 30/04/14

POWER CAPABILITY DIAGRAM OF AC GENERATOR
TC195, 21176.5 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.80pf at 40 Deg.C



SCALE: X-AXIS: 1 Division = 2118 kVAR Y-AXIS: 1 Division = 2118 kW

0.88 PF Leading (POINT 'A')

Real Power - 16941 kW — 19223 kVA

Reactive Power = 9083 kVAR

Maximum permissible cap. Loading (Zpf lead) (kVAR) 12071

0.8 PF Lagging (POINT 'B')

Real Power - 16941.2 kW — 21176 kVA

Reactive Power = 12706 kVAR

Maximum permissible ind. Loading (Zpf lag) (kVAR) 16306

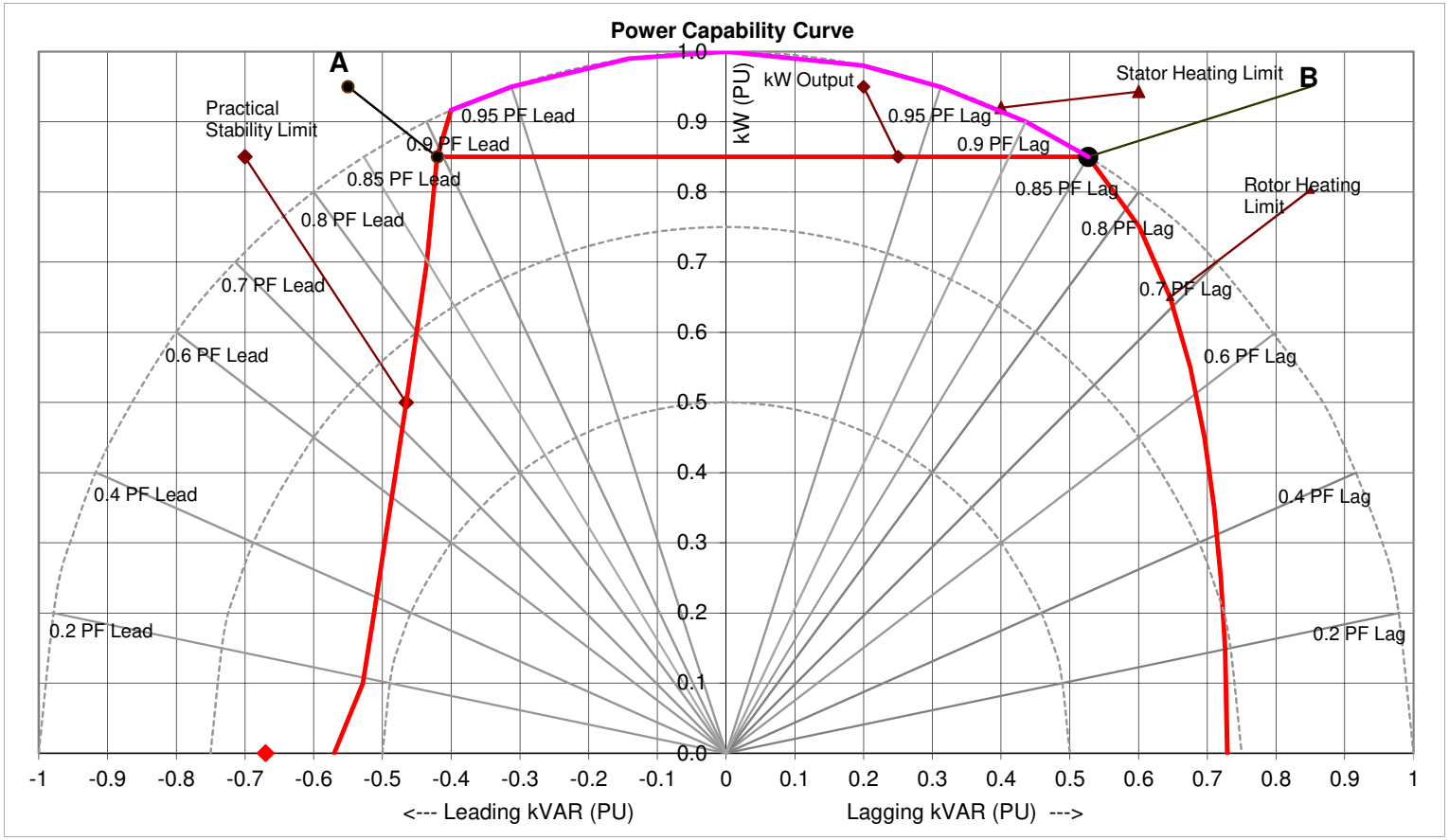
Prepared	Checked	Approved	Date	Sheet No.	
DR	AHJ	AHJ	25-Aug-22	1 of 4	R0

TDM-14-9298

TD Power Systems Limited.

FORM NO. T60016 R2: 30/04/14

POWER CAPABILITY DIAGRAM OF AC GENERATOR
TC195, 21176.5 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.85pf at 40 Deg.C



SCALE: X-AXIS: 1 Division = 2118 kVAR Y-AXIS: 1 Division = 2118 kW

0.9 PF Leading (POINT 'A')

Real Power - 18000 kW — 20079 kVA

Reactive Power = 8897 kVAR

Maximum permissible cap. Loading (Zpf lead) (kVAR) 12071

0.85 PF Lagging (POINT 'B')

Real Power - 18000.0 kW — 21176 kVA

Reactive Power = 11155 kVAR

Maximum permissible ind. Loading (Zpf lag) (kVAR) 15459

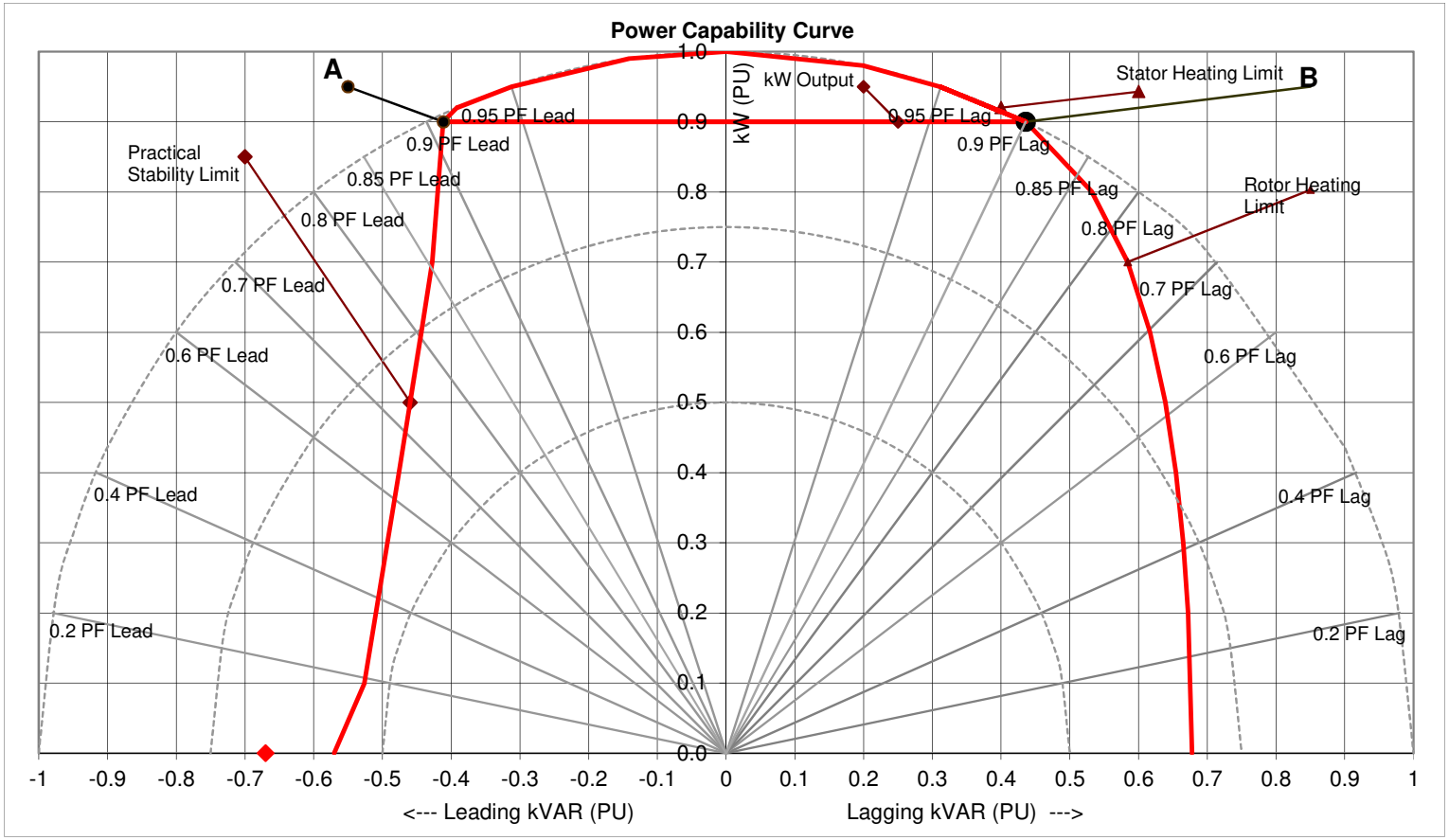
Prepared	Checked	Approved	Date	Sheet No.	
DR	AHJ	AHJ	25-Aug-22	2 of 4	R0

TDM-14-9298

TD Power Systems Limited.

FORM NO. T60016 R2: 30/04/14

POWER CAPABILITY DIAGRAM OF AC GENERATOR
TC195, 21176.5 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.90pf at 40 Deg.C



SCALE: X-AXIS: 1 Division = 2118 kVAR Y-AXIS: 1 Division = 2118 kW

0.91 PF Leading (POINT 'A')

Real Power - 19059 kW — 20955 kVA

Reactive Power = 8710 kVAR

Maximum permissible cap. Loading (Zpf lead) (kVAR) 12071

0.9 PF Lagging (POINT 'B')

Real Power - 19058.8 kW — 21176 kVA

Reactive Power = 9231 kVAR

Maximum permissible ind. Loading (Zpf lag) (kVAR) 14400

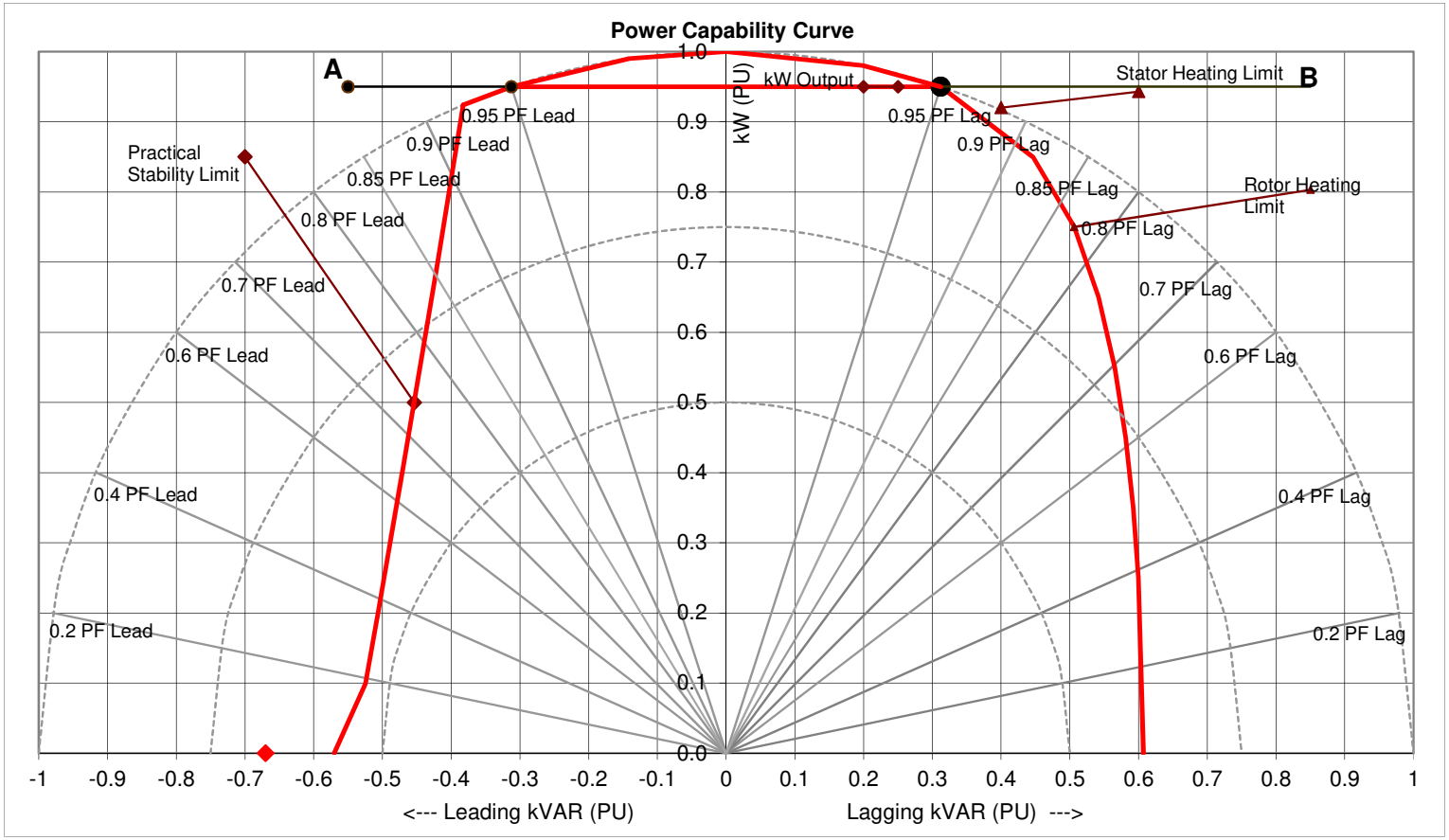
Prepared	DR
Checked	AHJ
Approved	AHJ
Date	25-Aug-22
Sheet No.	3 of 4
	R0

TDM-14-9298

TD Power Systems Limited.

FORM NO. T60016 R2: 30/04/14

POWER CAPABILITY DIAGRAM OF AC GENERATOR
TC195, 21176.5 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.95pf at 40 Deg.C



SCALE: X-AXIS: 1 Division = 2118 kVAR Y-AXIS: 1 Division = 2118 kW

0.95 PF Leading (POINT 'A')

Real Power - 20118 kW — 21176 kVA

Reactive Power = 6612 kVAR

Maximum permissible cap. Loading (Zpf lead) (kVAR) 12071

0.95 PF Lagging (POINT 'B')

Real Power - 20117.6 kW — 21176 kVA

Reactive Power = 6612 kVAR

Maximum permissible ind. Loading (Zpf lag) (kVAR) 12918

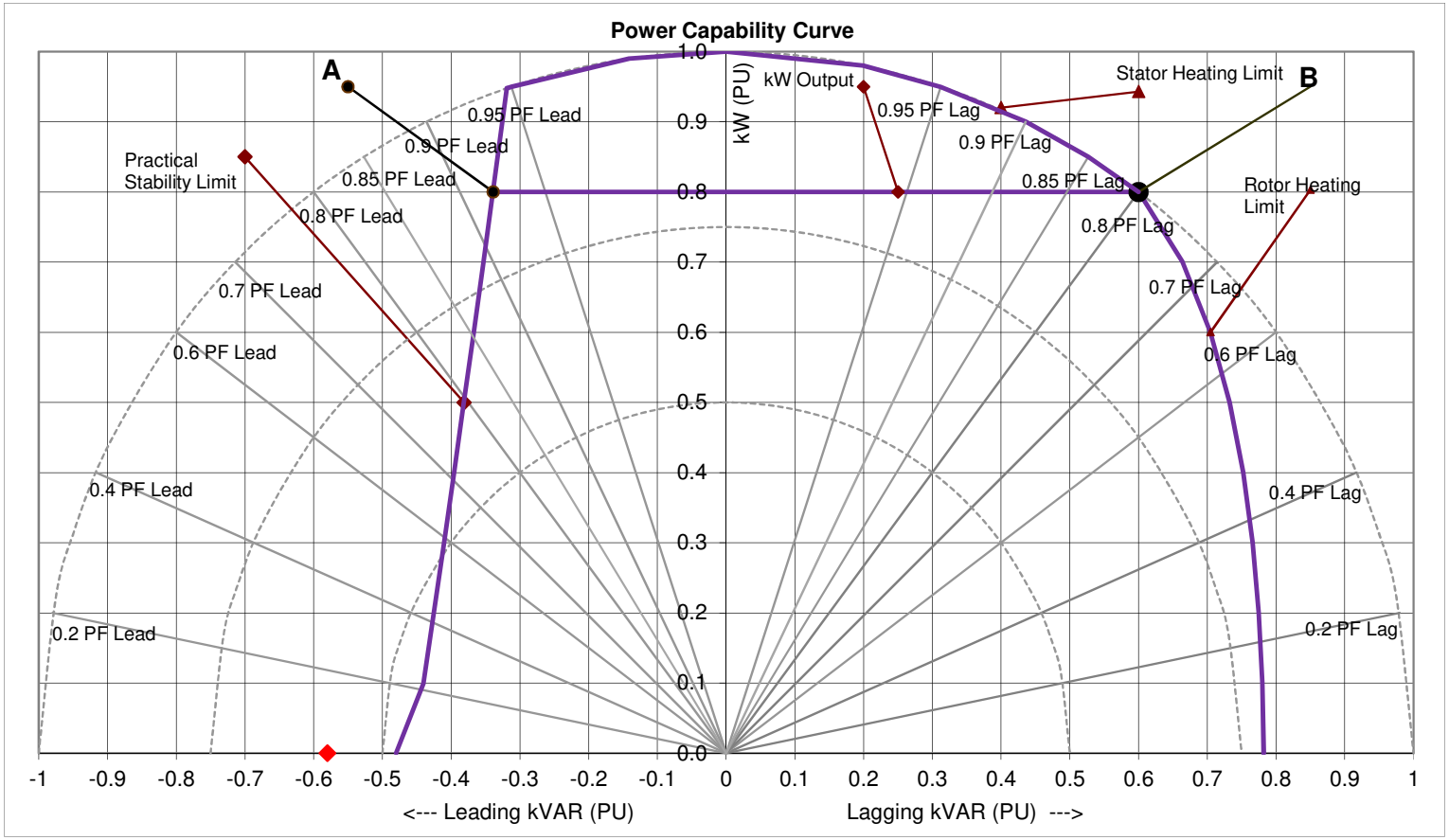
Prepared	Checked	Approved	Date	Sheet No.	
DR	AHJ	AHJ	25-Aug-22	4 of 4	R0

TDM-14-9298

TD Power Systems Limited.

FORM NO. T60016 R2: 30/04/14

POWER CAPABILITY DIAGRAM OF AC GENERATOR
TC195, 24294.1 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.8pf at 25 Deg.C



SCALE: X-AXIS: 1 Division = 2429 kVAR Y-AXIS: 1 Division = 2429 kW

0.92 PF Leading (POINT 'A')

Real Power - 19435 kW ——— 21108 kVA

Reactive Power = 8234 kVAR

Maximum permissible cap. Loading (Zpf lead) (kVAR) 11661

0.8 PF Lagging (POINT 'B')

Real Power - 19435 kW ——— 24294 kVA

Reactive Power = 14576 kVAR

Maximum permissible ind. Loading (Zpf lag) (kVAR) 18949

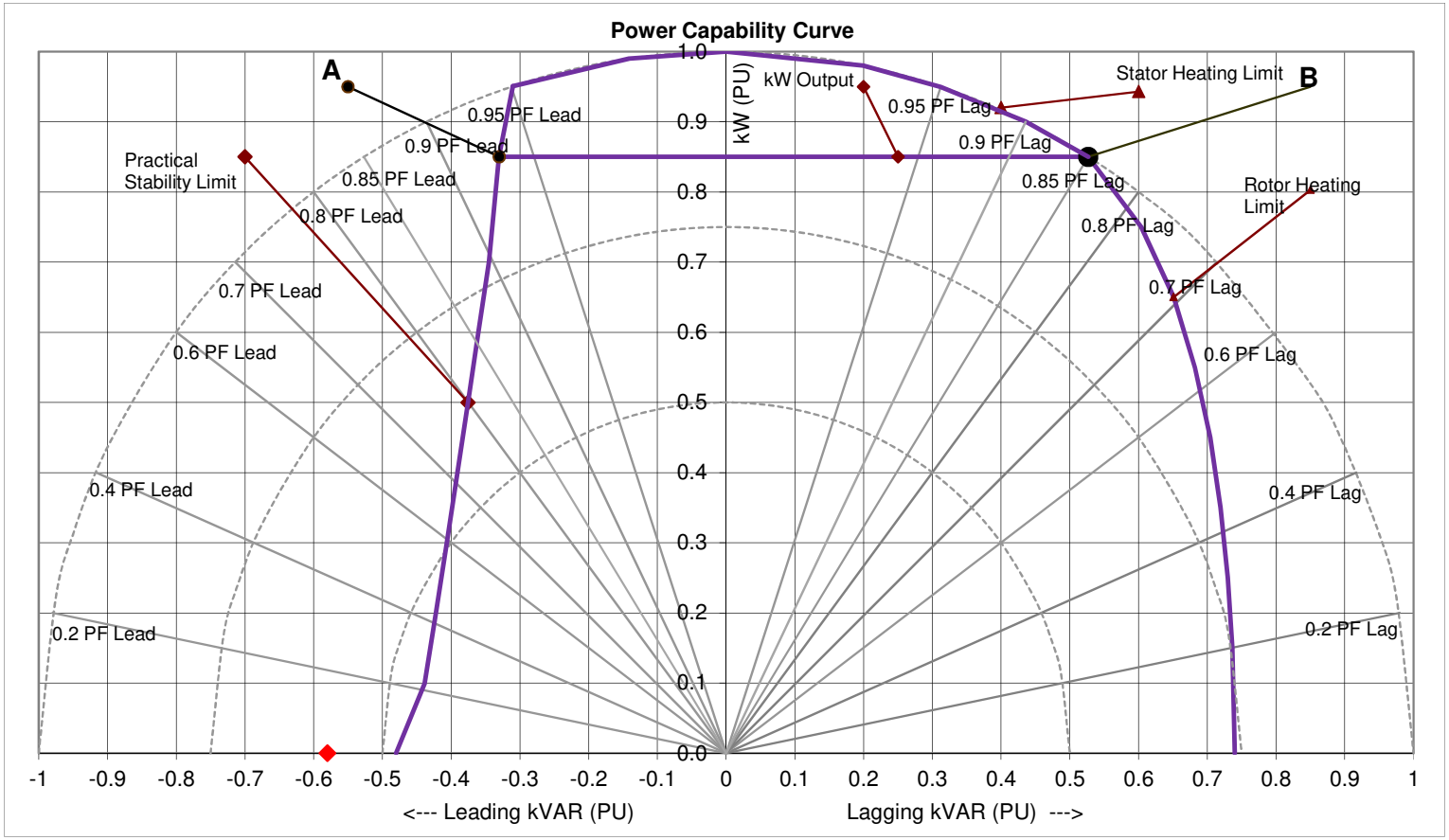
Prepared	Checked	Approved	Sheet No.	Date	
DR	AHJ	AHJ	1 of 4	25-Aug-22	R0

TDM-14-9299

TD Power Systems Limited.

FORM NO. T60016 R2: 30/04/14

POWER CAPABILITY DIAGRAM OF AC GENERATOR
TC195, 24294.1 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.85pf at 25 Deg.C



SCALE: X-AXIS: 1 Division = 2429 kVAR Y-AXIS: 1 Division = 2429 kW

0.93 PF Leading (POINT 'A')

Real Power - 20650 kW — 22153 kVA

Reactive Power = 8020 kVAR

Maximum permissible cap. Loading (Zpf lead) (kVAR) 11661

0.85 PF Lagging (POINT 'B')

Real Power - 20650 kW — 24294 kVA

Reactive Power = 12798 kVAR

Maximum permissible ind. Loading (Zpf lag) (kVAR) 16763

Prepared	Checked	Approved	Sheet No.	Date
DR	AHJ	AHJ	3 of 4	25-Aug-22

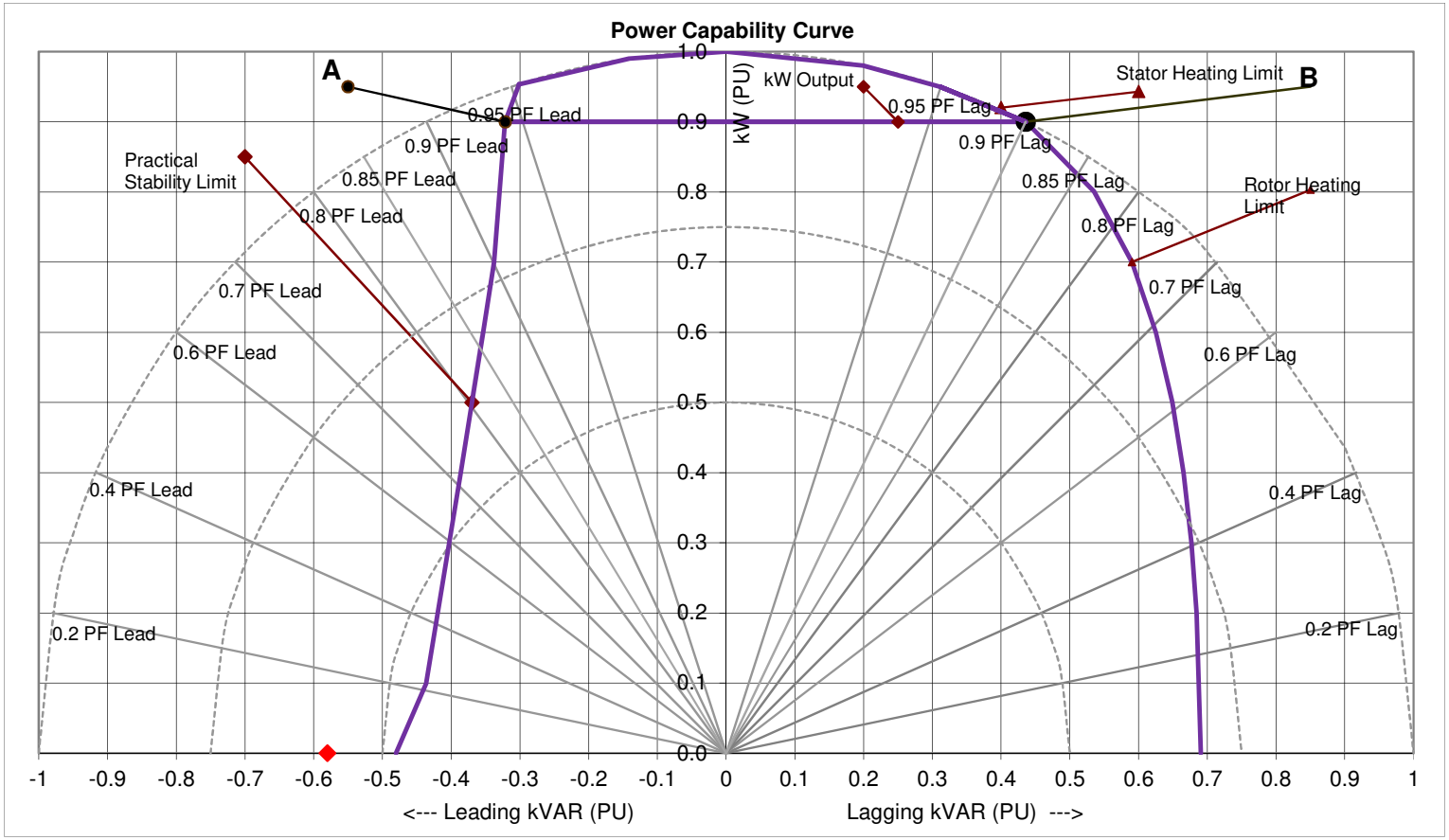
R0

TDM-14-9299

TD Power Systems Limited.

FORM NO. T60016 R2: 30/04/14

POWER CAPABILITY DIAGRAM OF AC GENERATOR
TC195, 24294.1 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.9pf at 25 Deg.C



SCALE: X-AXIS: 1 Division = 2429 kVAR Y-AXIS: 1 Division = 2429 kW

0.94 PF Leading (POINT 'A')

Real Power - 21865 kW — 23216 kVA

Reactive Power = 7806 kVAR

Maximum permissible cap. Loading (Zpf lead) (kVAR) 11661

0.9 PF Lagging (POINT 'B')

Real Power - 21865 kW — 24294 kVA

Reactive Power = 10590 kVAR

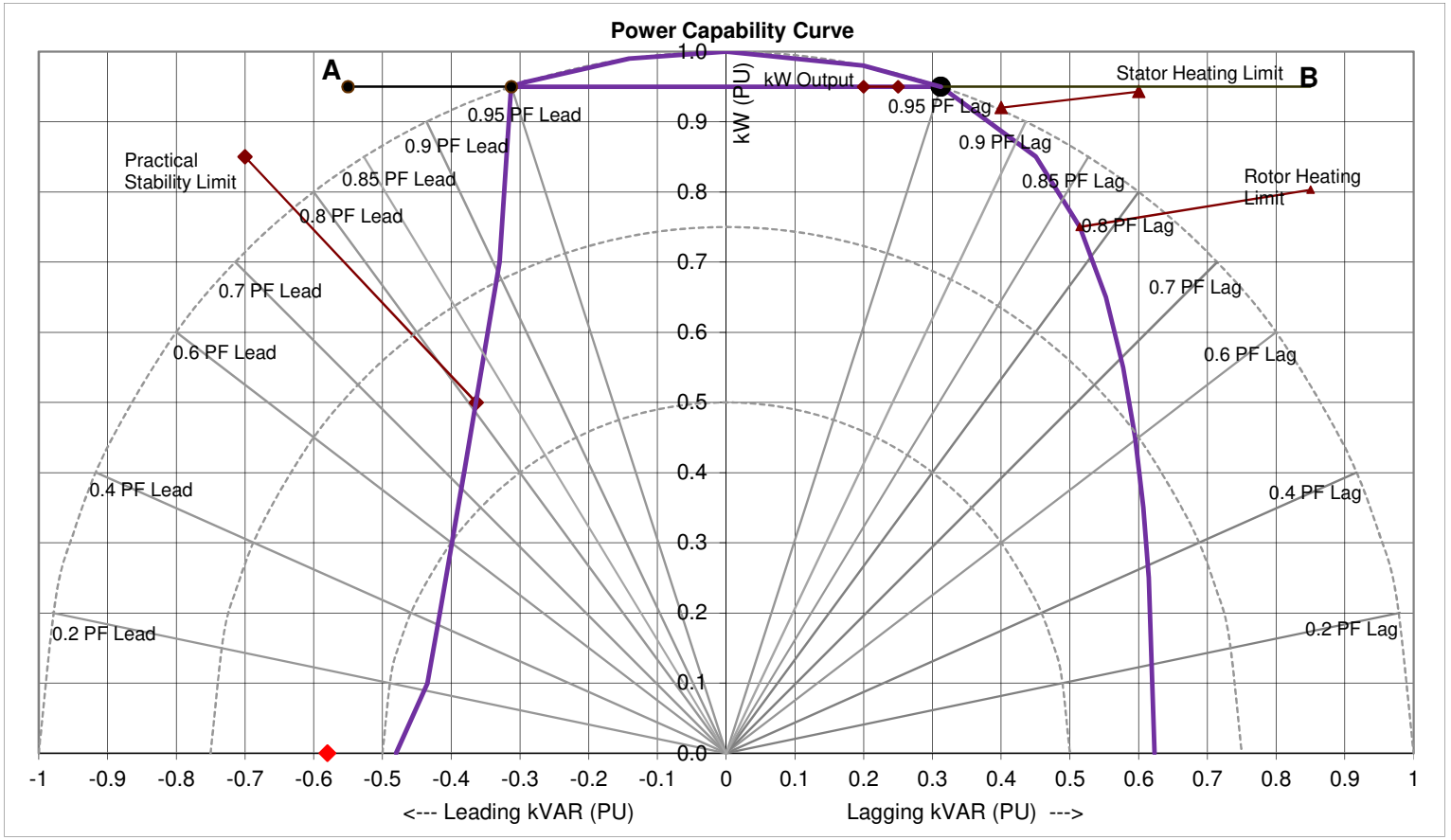
Maximum permissible ind. Loading (Zpf lag) (kVAR) 16763

Prepared	DR
Checked	AHJ
Approved	AHJ
Sheet No.	3 of 4
Date	25-Aug-22
R0	

TDM-14-9299

TD Power Systems Limited.

POWER CAPABILITY DIAGRAM OF AC GENERATOR
TC195, 24294.1 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.95pf at 25 Deg.C



SCALE: X-AXIS: 1 Division = 2429 kVAR Y-AXIS: 1 Division = 2429 kW

0.95 PF Leading (POINT 'A')

Real Power - 23079 kW — 24296 kVA

Reactive Power = 7592 kVAR

Maximum permissible cap. Loading (Zpf lead) (kVAR) 11661

0.95 PF Lagging (POINT 'B')

Real Power - 23079 kW — 24294 kVA

Reactive Power = 7586 kVAR

Maximum permissible ind. Loading (Zpf lag) (kVAR) 15062

Prepared	Checked	Approved	Sheet No.	Date
DR	AHJ	AHJ	4 of 4	26-Aug-22

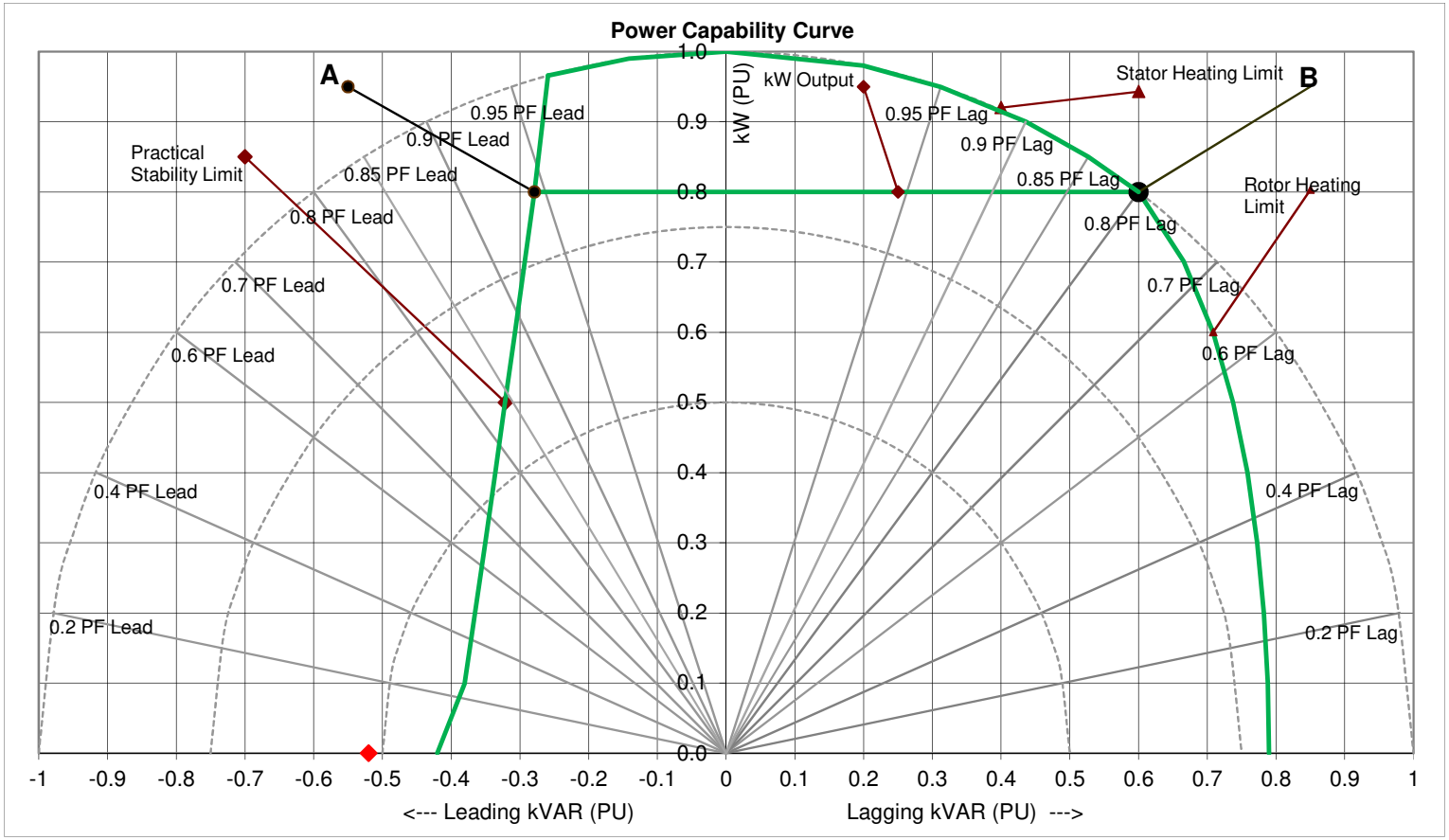
R0

TDM-14-9299

TD Power Systems Limited.

FORM NO. T60016 R2: 30/04/14

POWER CAPABILITY DIAGRAM OF AC GENERATOR
TC195, 27112.9 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.8pf at 15 Deg.C



SCALE: X-AXIS: 1 Division = 2711 kVAR Y-AXIS: 1 Division = 2711 kW

0.94 PF Leading (POINT 'A')

Real Power - 21690 kW — 22971 kVA

Reactive Power = 7563 kVAR

Maximum permissible cap. Loading (Zpf lead) (kVAR) 11464

0.8 PF Lagging (POINT 'B')

Real Power - 21690.4 kW — 27113 kVA

Reactive Power = 16268 kVAR

Maximum permissible ind. Loading (Zpf lag) (kVAR) 21416

Prepared	Checked	Approved	Sheet No.	Date
DR	AHJ	AHJ	1 of 4	25-Aug-22

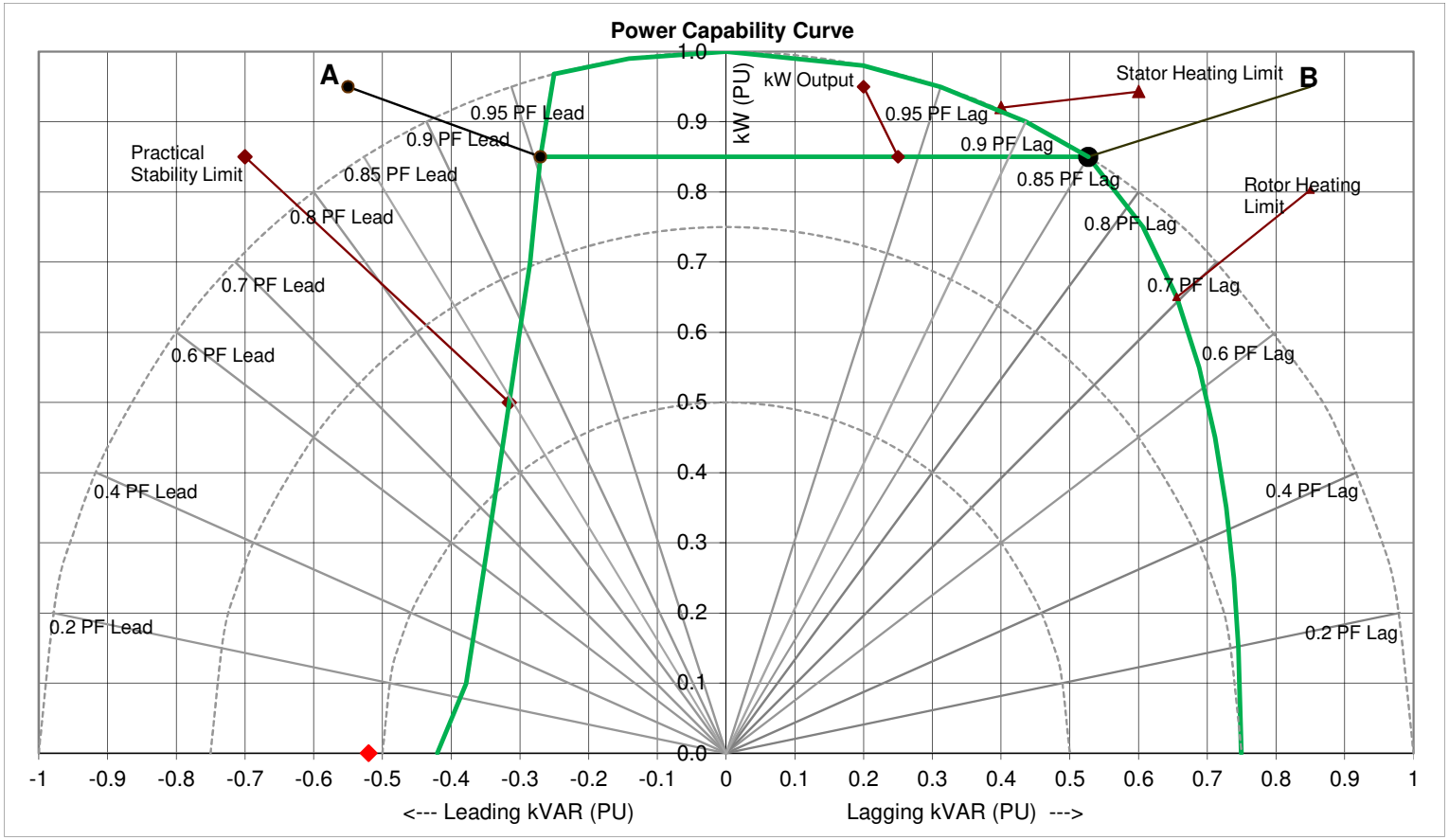
R0

TDM-14-9300

TD Power Systems Limited.

FORM NO. T60016 R2: 30/04/14

POWER CAPABILITY DIAGRAM OF AC GENERATOR
TC195, 27112.9 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.85pf at 15 Deg.C



SCALE: X-AXIS: 1 Division = 2711 kVAR Y-AXIS: 1 Division = 2711 kW

0.95 PF Leading (POINT 'A')

Real Power - 23046 kW — 24182 kVA

Reactive Power = 7324 kVAR

Maximum permissible cap. Loading (Zpf lead) (kVAR) 11387

0.85 PF Lagging (POINT 'B')

Real Power - 23046.0 kW — 27113 kVA

Reactive Power = 14283 kVAR

Maximum permissible ind. Loading (Zpf lag) (kVAR) 20335

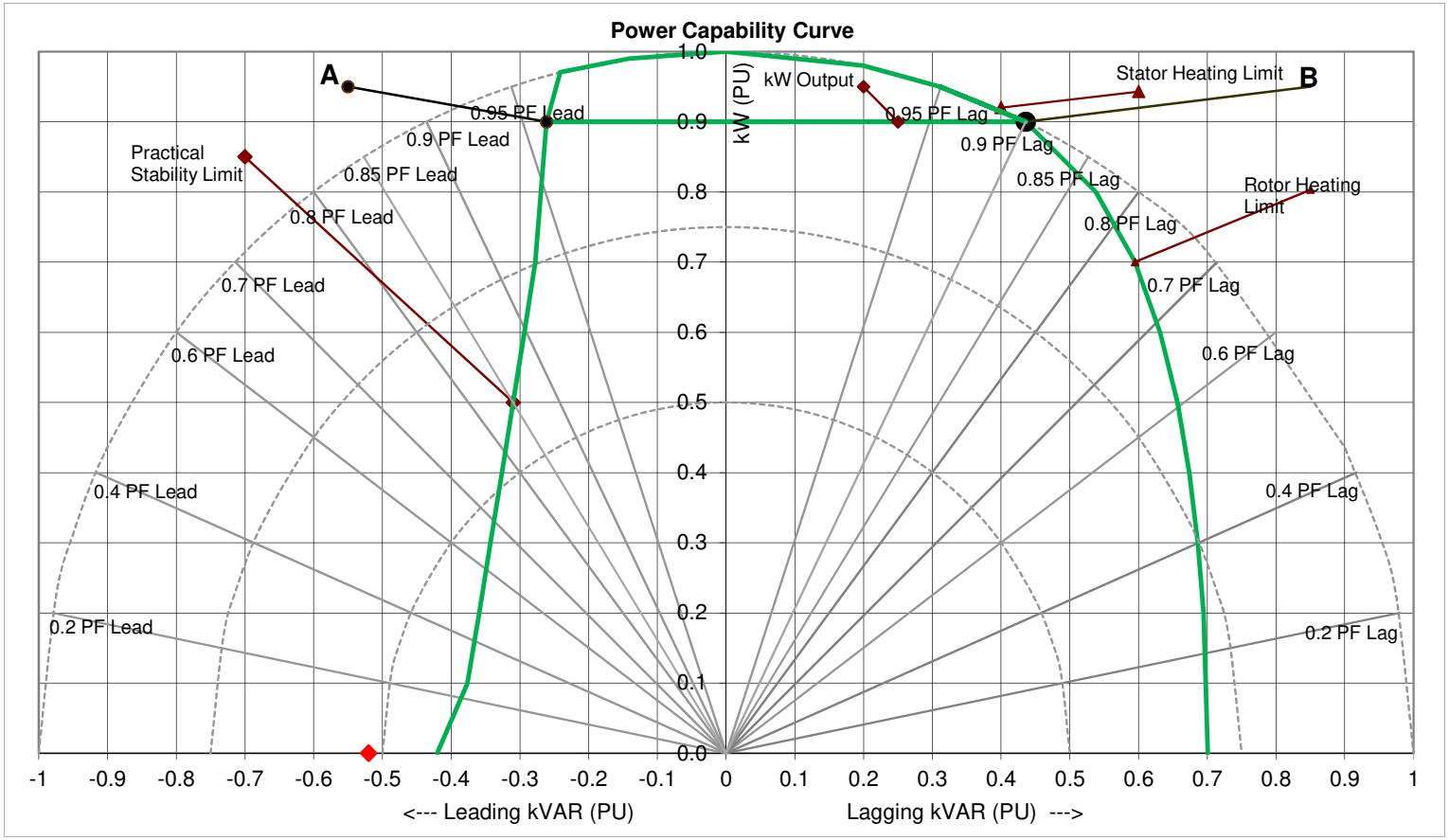
Prepared	Checked	Approved	Sheet No.	Date
DR	AHJ	AHJ	2 of 4	25-Aug-22

TDM-14-9300 R0

TD Power Systems Limited.

FORM NO. T60016 R2: 30/04/14

POWER CAPABILITY DIAGRAM OF AC GENERATOR
TC195, 27112.9 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.9pf at 15 Deg.C



SCALE: X-AXIS: 1 Division = 2711 kVAR Y-AXIS: 1 Division = 2711 kW

0.96 PF Leading (POINT 'A')

Real Power - 24402 kW — 25409 kVA

Reactive Power = 7085 kVAR

Maximum permissible cap. Loading (Zpf lead) (kVAR) 11387

0.9 PF Lagging (POINT 'B')

Real Power - 24401.6 kW — 27113 kVA

Reactive Power = 11818 kVAR

Maximum permissible ind. Loading (Zpf lag) (kVAR) 18979

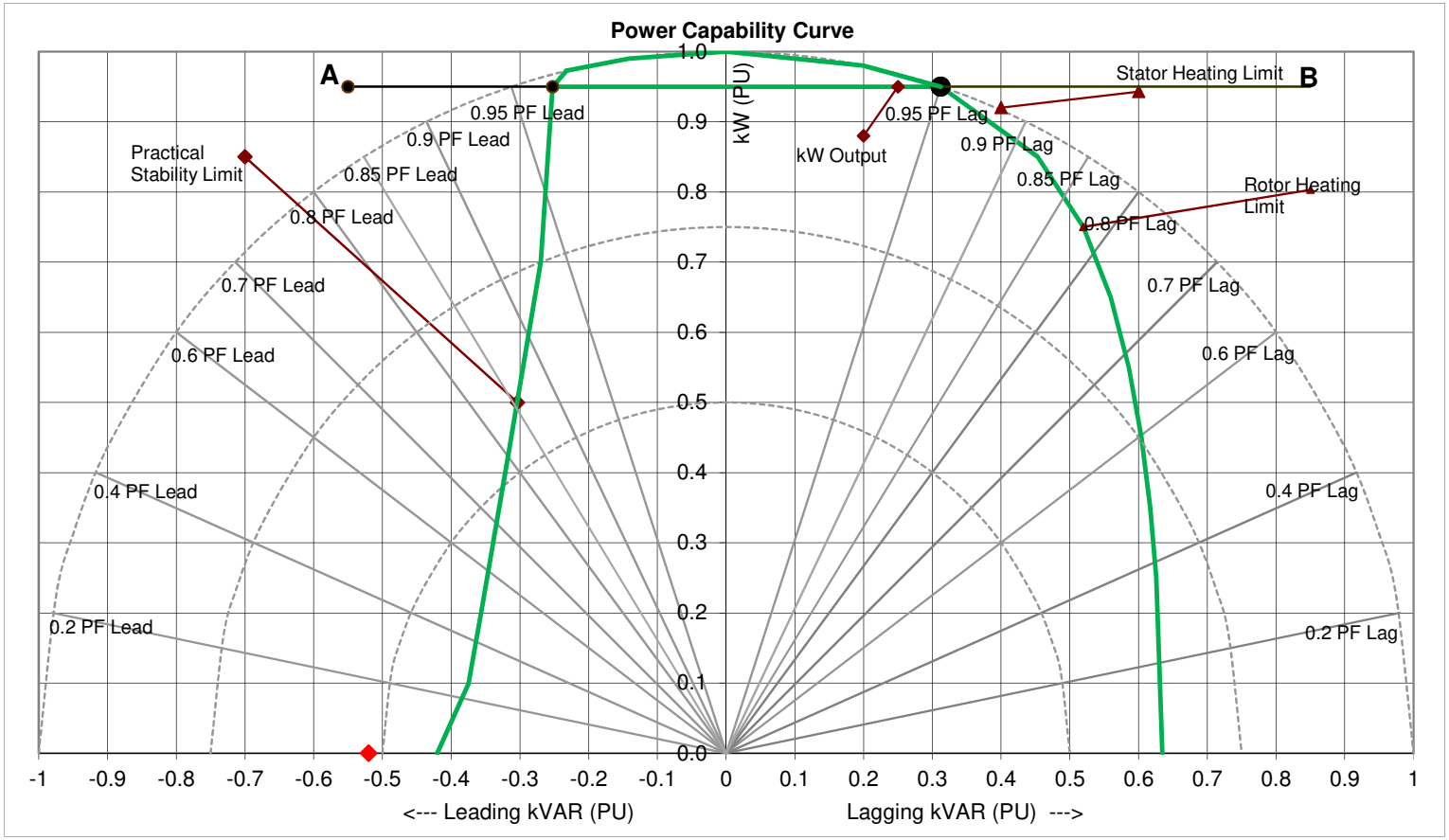
Prepared	Checked	Approved	Sheet No.	Date
DR	AHJ	AHJ	3 of 4	25-Aug-22

TDM-14-9300 R0

TD Power Systems Limited.

FORM NO. T60016 R2: 30/04/14

POWER CAPABILITY DIAGRAM OF AC GENERATOR
TC195, 27112.9 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.95 pf at 15 Deg.C



SCALE: X-AXIS: 1 Division = 2711 kVAR Y-AXIS: 1 Division = 2711 kW

0.97 PF Leading (POINT 'A')

Real Power - 25757 kW — 26651 kVA

Reactive Power = 6846 kVAR

Maximum permissible cap. Loading (Zpf lead) (kVAR) 11387

0.95 PF Lagging (POINT 'B')

Real Power - 25757.3 kW — 27113 kVA

Reactive Power = 8466 kVAR

Maximum permissible ind. Loading (Zpf lag) (kVAR) 17081

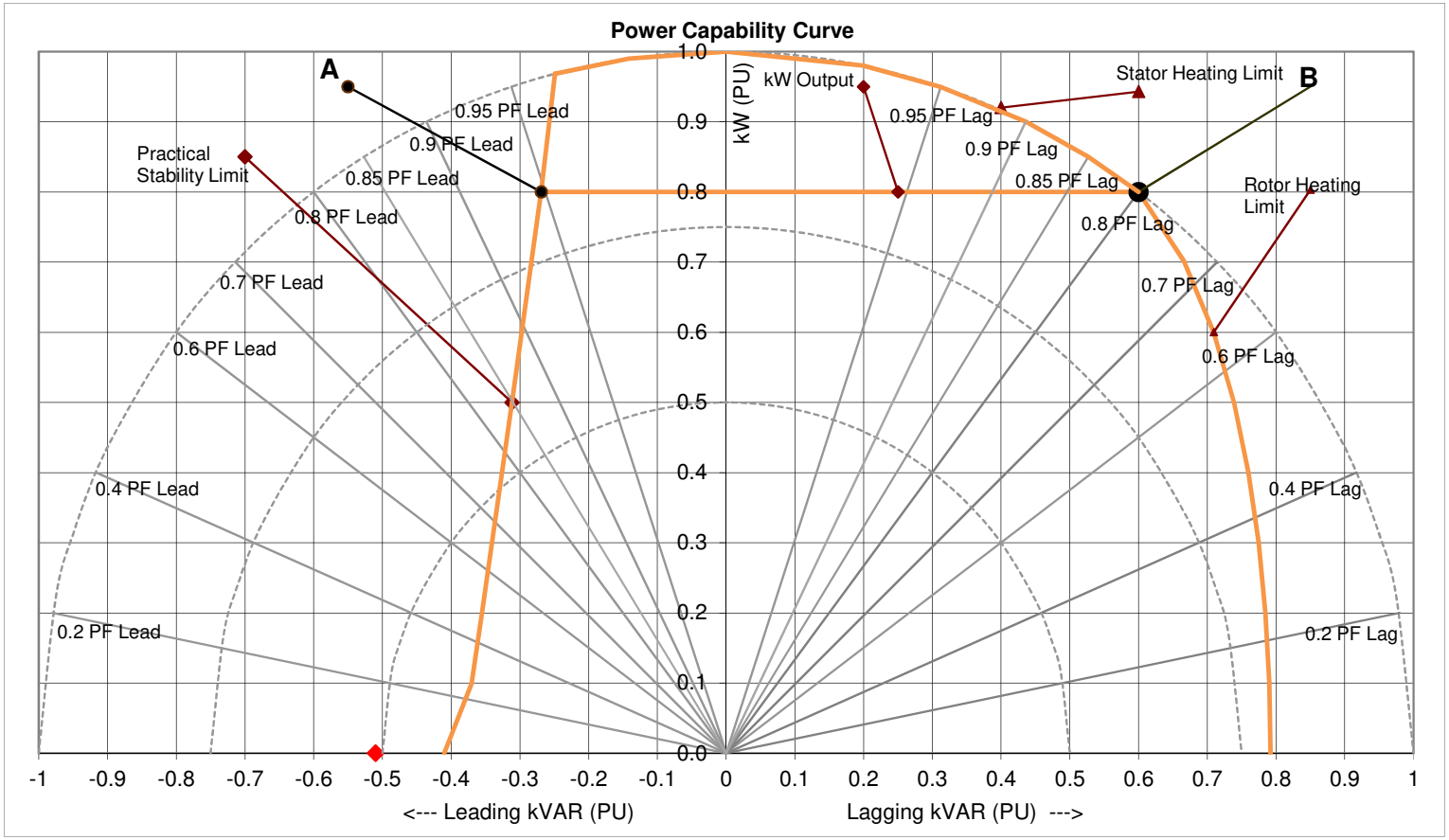
Prepared	DR	Checked	AHJ	Approved	AHJ
Sheet No.	4 of 4	Date	26-Aug-22		

TDM-14-9300 R0

TD Power Systems Limited.

FORM NO. T60016 R2: 30/04/14

POWER CAPABILITY DIAGRAM OF AC GENERATOR
TC195, 28000 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.8pf at 5 Deg.C



SCALE: X-AXIS: 1 Division = 2800 kVAR Y-AXIS: 1 Division = 2800 kW

0.95 PF Leading (POINT 'A')

Real Power - 22400 kW — 23632 kVA

Reactive Power = 7530 kVAR

Maximum permissible cap. Loading (Zpf lead) (kVAR) 11480

0.8 PF Lagging (POINT 'B')

Real Power - 22400.0 kW — 28000 kVA

Reactive Power = 16800 kVAR

Maximum permissible ind. Loading (Zpf lag) (kVAR) 22120

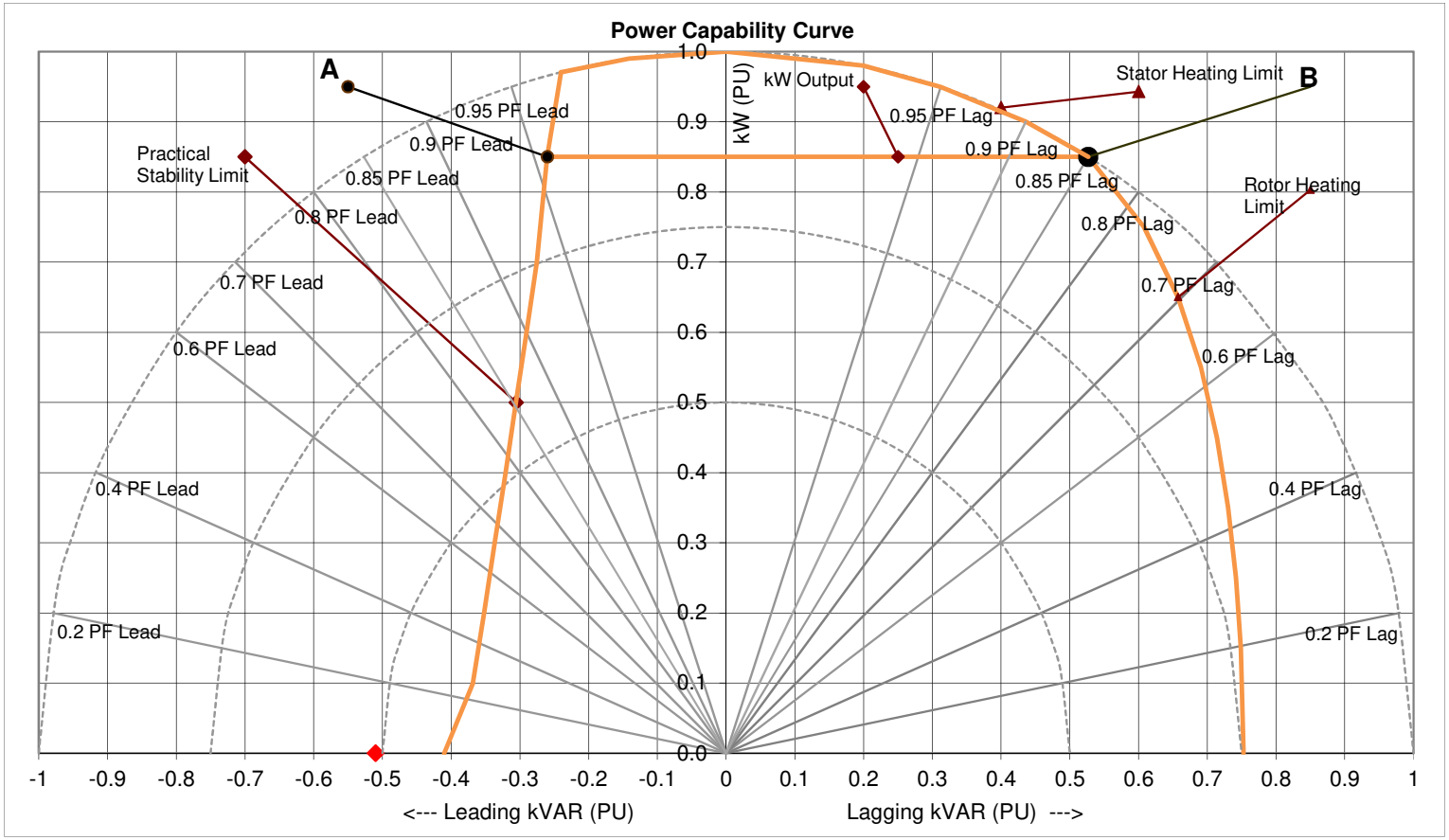
Prepared	Checked	Approved	Sheet No.	Date
DR	AHJ	AHJ	1 of 4	25-Aug-22

TDM-14-9302 R0

TD Power Systems Limited.

FORM NO. T60016 R2: 30/04/14

POWER CAPABILITY DIAGRAM OF AC GENERATOR
TC195, 28000 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.85pf at 5 Deg.C



SCALE: X-AXIS: 1 Division = 2800 kVAR Y-AXIS: 1 Division = 2800 kW

0.96 PF Leading (POINT 'A')

Real Power - 23800 kW — 24890 kVA

Reactive Power = 7283 kVAR

Maximum permissible cap. Loading (Zpf lead) (kVAR) 11480

0.85 PF Lagging (POINT 'B')

Real Power - 23800.0 kW — 28000 kVA

Reactive Power = 14750 kVAR

Maximum permissible ind. Loading (Zpf lag) (kVAR) 21000

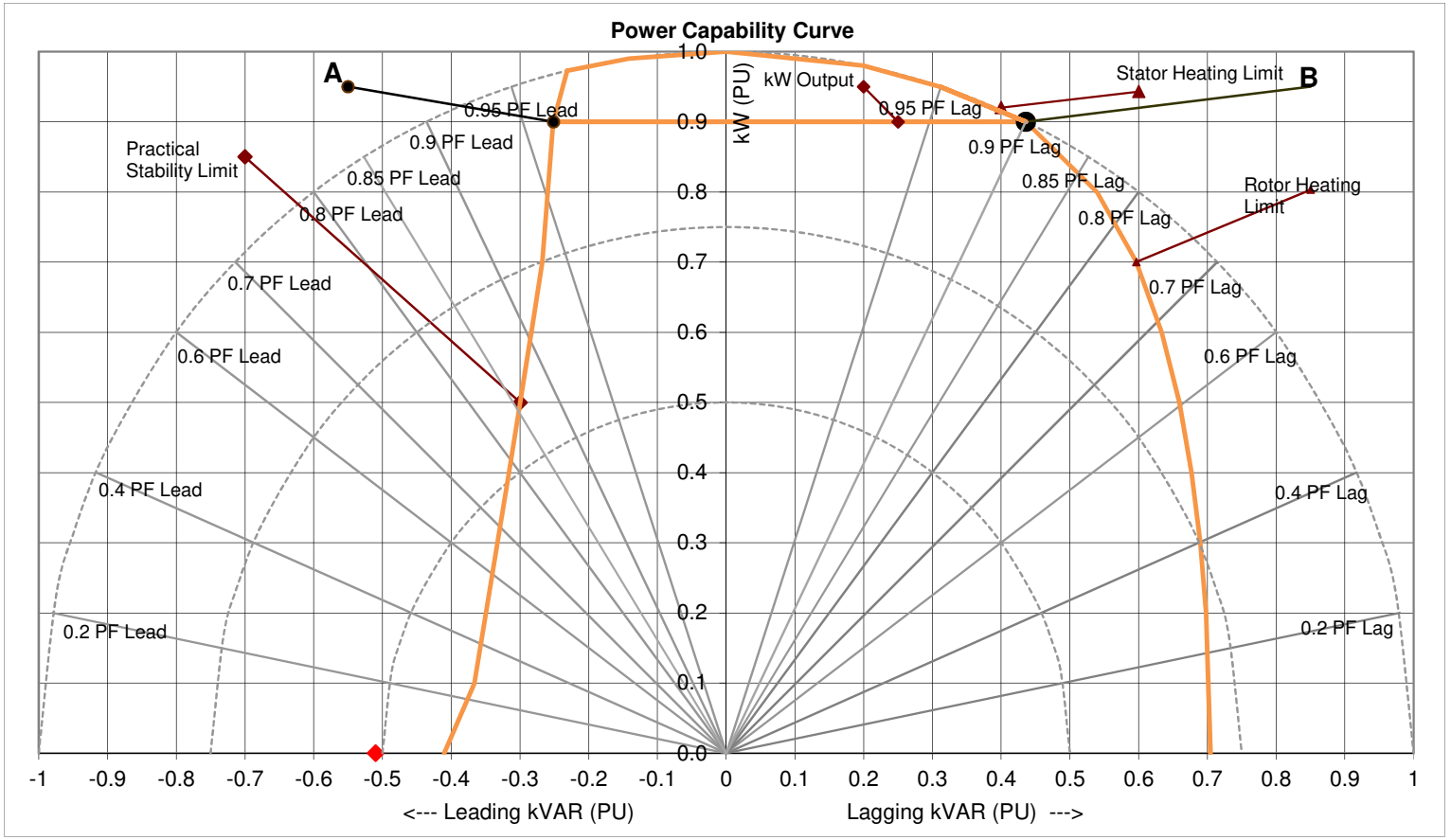
Prepared	Checked	Approved	Sheet No.	Date
DR	AHJ	AHJ	2 of 4	25-Aug-22

TDM-14-9302 R0

TD Power Systems Limited.

FORM NO. T60016 R2: 30/04/14

POWER CAPABILITY DIAGRAM OF AC GENERATOR
TC195, 28000 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.9pf at 5 Deg.C



SCALE: X-AXIS: 1 Division = 2800 kVAR Y-AXIS: 1 Division = 2800 kW

0.96 PF Leading (POINT 'A')

Real Power - 25200 kW — 26164 kVA

Reactive Power = 7037 kVAR

Maximum permissible cap. Loading (Zpf lead) (kVAR) 11480

0.9 PF Lagging (POINT 'B')

Real Power - 25200 kW — 28000 kVA

Reactive Power = 12205 kVAR

Maximum permissible ind. Loading (Zpf lag) (kVAR) 19600

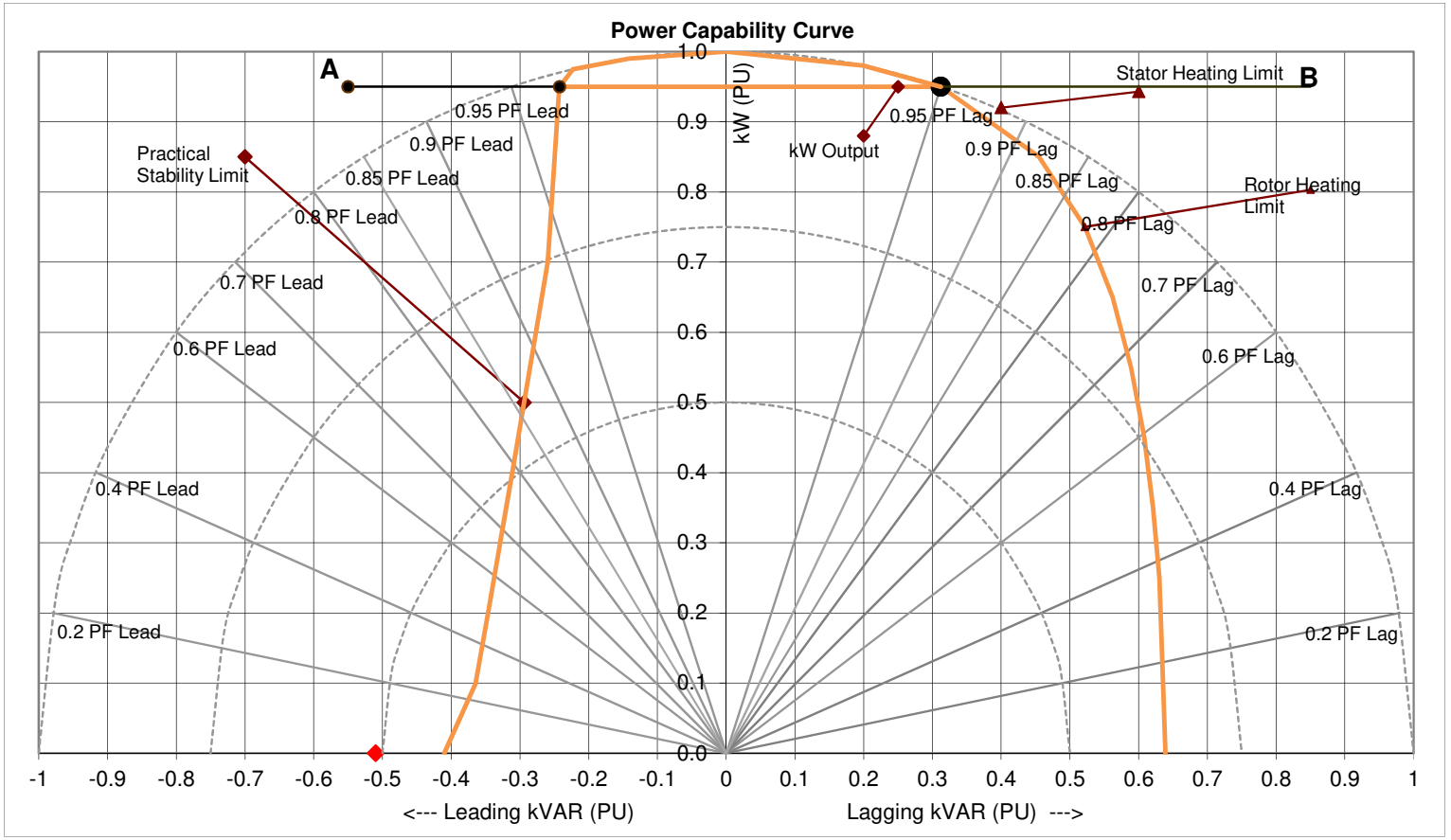
Prepared	Checked	Approved	Sheet No.	Date
DR	AHJ	AHJ	3 of 4	26-Aug-22

R0

TDM-14-9302

TD Power Systems Limited.

POWER CAPABILITY DIAGRAM OF AC GENERATOR
TC195, 28000 kVA, 13800 Volts, 60 Hz, 4 Pole, 0.95pf at 5 Deg.C



SCALE: X-AXIS: 1 Division = 2800 kVAR Y-AXIS: 1 Division = 2800 kW

0.97 PF Leading (POINT 'A')

Real Power - 26600 kW — 27453 kVA

Reactive Power = 6790 kVAR

Maximum permissible cap. Loading (Zpf lead) (kVAR) 11480

0.95 PF Lagging (POINT 'B')

Real Power - 26600.0 kW — 28000 kVA

Reactive Power = 8743 kVAR

Maximum permissible ind. Loading (Zpf lag) (kVAR) 17920

Prepared	DR	Checked	AHJ	Approved	AHJ
Sheet No.	4 of 4	Date	26-Aug-22		

TDM-14-9302 R0

TD Power Systems Limited.