ADDENDUM TO RFP DOCUMENTS

SOLANO COMMUNITY COLLEGE	ADDENDUM #01
	Project: Solano Community College District Building 100 Generator Project (Project # 18-003)
	Date: October 27, 2017

Addendum # 01 – The following clarifications are provided based on questions received and must be added/considered when completing your submittal: Acknowledgement of receipt of this ***ADDENDUM*** is required in the proposal's cover letter of introduction. Please clearly note the addendum date and number.

ITEM:

ITEM NO. 1 – Revised Section 00 01 10 – Table of Contents
Revision to Section 00 01 10 – Table of Contents to include revised Section 26 32 13a – Emergency Generator and Transfer Switch, Section 26 32 13b – Emergency Generator Attachment and added Section 26 32 35 – Standby Generator Testing and Commissioning. Attached Section 00 01 10 – Table of Contents shall supersede all prior versions.

ITEM NO. 2 – Revised Section 26 32 13 – Emergency Generator and Transfer Switch
Revision to Section 26 32 13 – Emergency Generator and Transfer Switch. Attached Section 26 32 13a – Emergency Generator and Transfer Switch shall supersede all prior versions.

ITEM NO. 3 – Revised Section 26 32 13 – Emergency Generator and Transfer Switch Attachment
Revision to Section 26 32 13 – Emergency Generator and Transfer Switch Attachment. Attached Section 26 32 13b – Emergency Generator and Transfer Switch Attachment shall supersede all prior versions.

ITEM NO. 4 – Added Section 26 32 35 – Standby Generator Testing and Commissioning
Revision to Contract Documents to include Specification Section 26 32 35 – Emergency Generator and Transfer Switch Testing and Commissioning. All bidders shall include in their proposal, onsite testing and commissioning of installed system by the generator manufacturer's factory authorized firm. Scope shall include testing and commissioning of complete system, including automatic transfer switch, generator and all sundry equipment. Onsite testing and commissioning shall be performed before the automatic transfer switch

and generator are connected to Building 100, and Contractor may also be requested to demonstrate proper operation of system, after final connection to building, using a simulated power failure. Contractor to schedule testing and commissioning to be performed between March 31, 2018 and April 3, 2018, while classes are not in session. Contractor to schedule and coordinate all work, including testing, commissioning, splice connections and final terminations, to only require a one-time shutdown for eight (8) consecutive hours on a single day. See added specification section below for additional requirements.

ITEM NO. 5 – Revised Section 00 71 00 – Special Conditions

Revision to Specification Section 00 71 00 – Special Conditions to include requirements for scheduling of testing and commissioning during power shut down. Section to be revised as follows, all other language shall remain unchanged:

1. Power Shut Down.

1.1. If it is determined a power shut down will be required for Building 100 or Substation #4 (currently feeding multiple buildings on campus, including Building 100) to ***test, commission,*** make splice connections and terminations, Contractor shall schedule activities to minimize impact to be a one-time shutdown for ~~six (6)~~ ***eight (8)*** consecutive hours on a single day. Contractor will be expected to have all preparatory work complete, including but not limited to, installation of all underground boxes, pathways and conductors, construction of concrete pad, setting and placement of transfer switch and generator on concrete pad, and shall only have final splice connections, terminations***, and testing and commissioning,*** remaining during the shutdown. Contractor shall schedule power shut down while classes are not in session for Spring Break vacation. Exact dates available for shut down are currently unknown, but Contractor shall assume any day on or between March 31, 2018 through April 3, 2018 will be available. Contractor shall coordinate power shut down with the District well in advance of the actual date, including providing a detailed schedule of activities during the shutdown.

ITEM NO. 6 – Science Building Electrical Drawings

Construction for a new Science Building is currently underway on the Fairfield campus, and included in the scope of work for the Science Building is furnishing and installation of a new switchgear to feed power to the new building and Building 100. Installation of new pad, pull boxes, pathways, switchgear, transformer and distribution panel under the Science Building project is anticipated to be complete prior to the start of construction for the Building 100 Generator project. Included in this addendum are electrical drawings from the Science Building project to be used as a reference. Drawings attached include:

- E000-1 (Electrical Cover Sheet)
- E100-1 (Site Plan – New Utility & Telecom)

- E700-1 (Electrical Details)

DOCUMENT 00 01 10

TABLE OF CONTENTS

END OF DOCUMENT

SECTION 26 32 13a – EMERGENCY GENERATOR AND TRANSFER SWITCH

PART 1 - GENERAL

1.1 SUMMARY

A. See attached Section 26 32 13b Guide Specification for Emergency Generator and Transfer Switch requirements. Specification lists Caterpillar. Equivalents by Kohler and Onan are acceptable.

B. The generator must conform to California codes and Bay Area Air Quality Management requirements.

C. The awarded contractor will be required to provide all required drawings and forms demonstrating that the generator meets state and local codes for submittal to the city for review.

1.2 SUBMITTALS

A. Submittals shall be provided per Section 26 32 13b.

B. Generator submittals that do not meet state and code requirements that are rejected by the city will be corrected at the contractor's expense.

1.3 QUALITY ASSURANCE

A. Per Section 26 32 13b.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Caterpillar.

B. Onan.

C. Kohler.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be per Section 26 32 13b.

END OF SECTION

PAGE LEFT INTENTIONALLY BLANK

Section 26 32 13 Attachment
Solano Community College

Guide Specification

Dealer Information

Name: Peterson Power Systems
Address: 2828 Teagarden St, San Leandro, CA 94577
Phone Number: 707-321-5795
Prepared By: Kevin Kent
Email: kekent@petersonpower.com

Package Generator Set

1.1 GENERAL

1.1.1 References and Standards

The generator set covered by these specifications shall be designed, tested, rated, assembled and installed in strict accordance with all applicable standards below:

- CSA C22.2 No14
- CSA 282
- CSA 100
- EN61000-6
- EN55011
- FCC Part 15 Subpart B
- ISO8528
- IEC61000
- UL508
- UL2200
- UL142
- Designed to allow for installed compliance to NFPA 37, NFPA 70, NFPA 99 and NFPA 110

1.2 RELATED SECTIONS

1.2.1 Division 3 - Concrete

1.3 WORK INCLUDED

1.3.1 Installation

The work includes supplying and installing a complete integrated generator system. The system consists of a diesel generator set with related component accessories and automatic transfer switches specified under a separate section.

1.3.2 Fuel System

The CONTRACTOR shall provide a full tank of diesel fuel for the completion of all testing.

1.3.3 System Test

A complete system load test shall be performed after all equipment is installed per Section 26 32 35.

1.3.4 Requirements, Codes and Regulations

The equipment supplied and installed shall meet the requirements of the NEC and all applicable local codes and regulations. All equipment shall be of new and current production by a MANUFACTURER who has 25 years of experience building this type of equipment. Manufacturer shall be ISO9001 certified.

1.4 SUBSTITUTION

Proposed deviations from the specifications shall be treated as follows:

1.4.1 Substitution Time Requirement

Requests for substitutions shall be made a minimum of ten (10) days prior to bid date. Manufacturers catalog data shall accompany each request and authorized acceptance shall be addenda only.

1.4.2 Substitution Responsibility

The power system has been designed to the specified manufacturer's electrical and physical characteristics. The equipment sizing, spacing, amounts, electrical wiring, ventilation equipment, fuel, and exhaust components have all been sized and designed around CATERPILLAR supplied equipment. Should any substitutions be made, the CONTRACTOR shall bear responsibility for the installation, coordination and operation of the system as well as any engineering and redesign costs, which may result from such substitutions.

1.5 SUBMITTALS

Engine-generator submittals shall include the following information:

A. Factory published specification sheet.

B. Manufacturer's catalog cut sheets of all auxiliary components such as battery charger, control panel, enclosure, etc.

C. Dimensional elevation and layout drawings of the generator set, enclosure and transfer switchgear and related accessories.

D. Weights of all equipment.

E. Concrete pad recommendation, layout and stub-up locations of electrical and fuel systems.

F. Interconnect wiring diagram of complete emergency system, including generator, switchgear, day tank, remote pumps, battery charger, control panel, and remote alarm indications.

G. Engine mechanical data, including heat rejection, exhaust gas flows, combustion air and ventilation air flows, fuel consumption, etc.

H. Generator electrical data including temperature and insulation data, cooling requirements, excitation ratings, voltage regulation, voltage regulator, efficiencies, waveform distortion and telephone influence factor.

I. Generator resistances, reactances and time constants.

J. Generator locked rotor motor starting curves.

K. Manufacturer's documentation showing maximum expected transient voltage and frequency dips, and recovery time during operation of the generator set at the specified site conditions with the specified loads.

L. Manufacturer's and dealer's written warranty.

1.7 SYSTEM RESPONSIBILITY

1.7.1 Generator Set Distributor

The completed engine generator set shall be supplied by the Manufacturer's authorized distributor only.

1.7.2 Requirements, Codes and Regulations

The equipment supplied and installed shall meet the requirements of NEC and all-applicable local codes and regulations. All equipment shall be new, of current production. There shall be one source responsibility for warranty; parts and service through a local representative with factory trained service personnel.

1.7.3 Automatic Transfer Switch

The automatic transfer switch specified section shall be supplied by the generator set manufacturer in order to establish and maintain a single source of system responsibility and coordination.

1.8 WARRANTY

1.8.1 **Two Year Standby** (ISO 8528-1: ESP) **Generator Set Warranty**

The manufacturer's standard warranty shall in no event be for a period of less than two (2) years from date of initial start-up of the system and shall include repair parts, labor, reasonable travel expense necessary for repairs at the job site, and expendables (lubricating oil, filters, antifreeze, and other service items made unusable by the defect) used during the course of repair. Running hours shall be limited to 500 hours annually for the system warranty by both the manufacturer and servicing distributor. Submittals received without written warranties as specified will be rejected in their entirety.

1.9 PARTS AND SERVICE QUALIFICATIONS

1.9.1 Service Facility

The engine-generator supplier shall maintain 24-hour parts and service capability within 100 miles of the project site. The distributor shall stock parts as needed to support the generator set package for this specific project. The supplier must carry sufficient inventory to cover no less than 80% parts service within 24hrs and 95% within 48 hours.

1.9.2 Service Personnel

The dealer shall maintain qualified factory trained service personnel.

1.9.3 Standby Generator Set Extended Service Coverage

Extended Service Coverage shall be provided for a period of 5 years, and shall include no deductible. Extended Service Coverage provides for 100 percent of usual and customary parts and labor costs for failures due to defects in materials and workmanship to the "as shipped consist" from the factory, excluding filters, fluids, vee belts, hoses, power take-offs, paint, batteries and clutches. Platinum Extended Service Coverage provides for a rental power unit due to unscheduled failures causing unexpected downtime to the customer in excess of 48 hours from the time of diagnoses. All repairs will be performed by factory trained dealer service personnel, and allows for repairer travel and mileage for all repairs up to 8 hours and 320 miles per incident.

2 PRODUCT SPECIFICATIONS

2.1 GENERAL REQUIREMENTS

2.1.1 Generator set Requirements

The generator set shall be Standby Duty rated at 500 ekW, 625.0 kVA,
1800 RPM, 0.8 power factor, 480 V, 3-Phase,
60 hertz, including radiator fan and all parasitic loads. Generator set shall be sized to operate at the specified load at a maximum ambient of 77F (25.0C) and altitude of
500.0 feet (152.4 m).
Standby Power Rating:
Power is available for the duration of an emergency outage
Average Power Output = 70% of standby power
Load = Varying
Typical Hours/Year = 200 Hours
Maximum Expected Usage = 500 hours/year
Typical Application = Standby

2.1.2 Material and Parts

All materials and parts comprising the unit shall be new and unused.

2.1.3 Engine

The engine shall be diesel fueled, four (4) cycle, water-cooled, while operating with nominal speed not exceeding 1800 RPM. The engine will utilize in-cylinder combustion technology, as required, to meet applicable EPA non-road mobile regulations and/or the EPA NSPS rule for stationary reciprocating compression ignition engines. Additionally, the engine shall comply with the State Emission regulations at the time of installation/commissioning. Actual engine emissions values must be in compliance with applicable EPA emissions standards per ISO 8178 – D2 Emissions Cycle at specified ekW / bHP rating. Emissions requirements / certifications of this package:
EPA ESE

2.1.3.1 Engine Governing

The engine governor shall be an electronic Engine Control Module (ECM) with 24-volt DC Electric Actuator. The ECM shall be enclosed in an environmentally sealed, die-cast aluminum housing which isolates and protects electronic components from moisture and dirt contamination. Speed droop shall be adjustable from 0 (isochronous) to 10%, from no load to full rated load. Steady state frequency regulation shall be +/- 6 RPM. Speed shall be sensed by a magnetic pickup off the engine flywheel ring gear. A provision for remote speed adjustment shall be included. The ECM shall adjust fuel delivery according to exhaust smoke, altitude and cold mode limits. In the event of a DC power loss, the forward acting actuator will move to the minimum fuel position.

2.2 GENERATOR

2.2.1 Generator Specifications

The synchronous three phase generator shall be a single bearing, self-ventilated, drip-proof design in accordance with NEMA MG 1 and directly connected to the engine flywheel housing with a flex coupling. The generator shall meet performance class G2 of ISO 8528. The excitation system shall enable the alternator to sustain 300% (250% for 50Hz) of rated current based on the 125C (Class H) or 105C (Class F) rise rating for ten seconds during a fault condition and shall improve the immunity of the voltage regulator to non-linear distorting loads. The excitation system shall be of brushless construction and be independent of main stator windings (either permanent magnet or auxiliary windings).

2.2.2.1 Automatic Voltage Regulator

The automatic voltage regulator (AVR) shall maintain generator output voltage within +/- 0.5% for any constant load between no load and full load. The regulator shall be a totally solid state design, which includes electronic voltage buildup, over-excitation protection, shall limit voltage overshoot on startup, and shall be environmentally sealed. Voltage regulation shall be selectable to be either volts per hertz or by load adjustment module.

2.2.2.1 Integrated Voltage Regulator (IVR)

The IVR shall maintain generator output voltage within +/- 0.25% for any constant load between no load and full load. The regulator shall be capable of sensing true RMS in three phases of alternator output voltage, or operating in single phase sensing mode. The IVR shall be cable of configuring knee frequency and voltage regulation configurable up to +/-30% .The voltage regulator shall include a VAR/Pf control feature as standard. The regulator shall provide an adjustable dual slope regulation characteristic in order to optimize voltage and frequency response for site conditions. The IVR shall be capable of setpoint adjustment.

2.2.3 Motor Starting

Provide locked rotor motor starting capability of
1,728.1 skVA at 30% instantaneous voltage dip as defined per NEMA MG 1. Sustained voltage dip data is not acceptable.

2.3 CIRCUIT BREAKER

2.3.1 Circuit Breaker Specifications

Provide a generator mounted 100%
circuit breaker, molded case, Qty. (1) 800 amp trip, 3 pole, NEMA 1/IP22. Breaker shall utilize a solid state trip unit. The breaker shall be UL/CSA Listed and connected to engine/generator safety shutdowns. Breaker shall be housed in an extension terminal box which is isolated from vibrations induced by the generator set. Mechanical type lugs, sized for the circuit breaker feeders shown on drawing, shall be supplied on the load side of breaker.

2.4 CONTROLS – GENERATOR SET MOUNTED (EMCP 4.2)

Provide a fully solid-state, microprocessor based, generator set control. The control panel shall be designed and built by the engine manufacturer. The control shall provide all operating, monitoring, and control functions for the generator set. The control panel shall provide real time digital communications to all engine and regulator controls via SAE J1939.

2.4.1 Environmental

The generator set control shall be tested and certified to the following environmental conditions:

A. –40°C to +70°C Operating Range
B. 100% condensing humidity, 30°C to 60°C
C. IP22 protection for rear of controller; IP55 when installed in control panel
D. 5% salt spray, 48 hours, +38°C, 36.8V system voltage
E. Sinusoidal vibration 4.3G's RMS, 24-1000Hz
F. Electromagnetic Capability (89/336/EEC, 91/368/EEC, 93/44/EEC, 93/68/EEC, BS EN 50081-2, 50082-2)
G. Shock: withstand 15G

2.4.2 Functional Requirements

The following functionality shall be integral to the control panel.

A. The control shall include a minimum 33 x 132 pixel, 24mm x 95mm, positive image, transflective LCD display with text based alarm/event descriptions.
B. The control shall include a minimum of 3-line data display
C. Audible horn for alarm and shutdown with horn silence switch
D. Standard ISO labeling
E. Multiple language capability
F. Remote start/stop control
G. Local run/off/auto control integral to system microprocessor
H. Cooldown timer
I. Speed adjust

J. Lamp test
K. Emergency stop push button
L. Voltage adjust
M. Voltage regulator V/Hz slope - adjustable
N. Password protected system programming

2.4.3 Digital Monitoring Capability

The controls shall provide the following digital readouts for the engine and generator. All readings shall be indicated in either metric or English units.

Engine

A. Engine oil pressure
B. Engine oil temperature
C. Engine coolant temperature
D. Engine RPM
E. Battery volts
F. Engine hours
G. Engine crank attempt counter
H. Engine successful start counter
I. Service maintenance interval
J. Real time clock
K. Engine exhaust stack temperature
L. Engine main bearing temperature

Generator

A. Generator AC volts (Line to Line, Line to Neutral and Average)
B. Generator AC current (Avg and Per Phase)
C. Generator AC Frequency
D. Generator kW (Total and Per Phase)
E. Generator kVA (Total and Per Phase)
F. Generator kVAR (Total and Per Phase)
G. Power Factor (Avg and Per Phase)
H. Total kW-hr
I. Total kVAR-hr
J. % kW
K. % kVA
L. % kVAR
M. Generator bearing temperature
N. Generator stator winding temperature

Voltage Regulation

A. Excitation voltage
B. Excitation current

2.4.4 Alarms and Shutdowns

The control shall monitor and provide alarm indication and subsequent shutdown for the following conditions. All alarms and shutdowns are accompanied by a time, date, and engine hour stamp that are stored by the control panel for first and last occurrence:

Engine Alarm/Shutdown

A. Low oil pressure alarm/shutdown
B. High coolant temperature alarm/shutdown
C. Loss of coolant shutdown
D. Overspeed shutdown
E. Overcrank shutdown
F. Emergency stop shutdown
G. Low coolant temperature alarm
H. Low battery voltage alarm
I. High battery voltage alarm
J. Control switch not in auto position alarm
K. Battery charger failure alarm

Generator Alarm/Shutdown

A. Generator phase sequence
B. Generator over voltage
C. Generator under voltage
D. Generator over frequency
E. Generator under frequency
F. Generator reverse power (real and reactive)
G. Generator overcurrent

Voltage Regulator Alarm/Shutdown

A. Loss of excitation alarm/shutdown
B. Instantaneous over excitation alarm/shutdown
C. Time over excitation alarm/shutdown
D. Rotating diode failure
E. Loss of sensing
F. Loss of PMG

2.4.5 Inputs and Outputs

Programmable Digital Inputs

The Controller shall include the ability to accept programmable digital input signals. The signals may be programmed for either high or low activation using programmable Normally Open or Normally Closed contacts.

Programmable Relay Outputs

The control shall include the ability to operate programmable relay output signals, integral to the controller. The output relays shall be rated for 2A @ 30VDC and consist of six (6) Form A (Normally Open) contacts and two (2) Form C (Normally Open & Normally Closed) contacts.

Programmable Discrete Outputs

The control shall include the ability to operate two (2) discrete outputs, integral to the controller, which are capable of sinking up to 300mA.

2.4.6 Maintenance

All engine, voltage regulator, control panel and accessory units shall be accessible through a single electronic service tool. The following maintenance functionality shall be integral to the generator set control

A. Engine running hours display
B. Service maintenance interval (running hours or calendar days)
C. Engine crank attempt counter
D. Engine successful starts counter
E. 40 events are stored in control panel memory
F. Programmable cycle timer that starts and runs the generator for a predetermined time. The timer shall use 7 user-programmable sequences that are repeated in a 7-day cycle. Each sequence shall have the following programmable set points:

    1. Day of week
    2. Time of day to start
    3. Duration of cycle

2.4.7 Remote Communications

Remote Communications

The control shall include Modbus RTU communications as standard via RS-485 half duplex with configurable baud rates from 2.4k to 57.6k.

Remote Monitoring Software

The control shall provide Monitoring Software with the following functionality

A. Monitor up to eight (8) generator sets, plus ATS and UPS.
B. Provide access to all date and events on generator set communications network
C. Provide remote control capability for the generator set(s)
D. Ability to communicate via Modbus RTU or remote modem

2.4.8 Annunciation

Local Annunciator (NFPA 99/110, CSA 282)

Provide a local, control panel mounted, annunciator to meet the requirements of NFPA 110, Level 1.

A. Annunciators shall be networked directly to the generator set control
B. Local Annunciator shall include a lamp test pushbutton, alarm horn and alarm acknowledge pushbutton
C. Provide the following individual light indications for protection and diagnostics:
    1. Overcrank
    2. Low coolant temperature
    3. High coolant temperature warning
    4. High coolant temperature shutdown
    5. Low oil pressure warning
    6. Low oil pressure shutdown
    7. Overspeed
    8. Low coolant level
    9. EPS supplying load
    10. Control switch not in auto
    11. High battery voltage
    12. Low battery voltage
    13. Battery charger AC failure
    14. Emergency stop
    15. Spare
    16. Spare

Remote Annunciator (NFPA 99/110, CSA 282)

Provide any required connections for a future remote annunciator.

A. The future annunciator shall incorporate ring-back capability so that after silencing the initial alarm, any subsequent alarms will sound the horn.
B. Ability to be located up to 4000 ft from the generator set.
C. The future annunciator shall provide remote annunciation of all points listed below:
    1. Overcrank
    2. Low coolant temperature
    3. High coolant temperature warning
    4. High coolant temperature shutdown
    5. Low oil pressure warning
    6. Low oil pressure shutdown
    7. Overspeed
    8. Low coolant level
    9. EPS supplying load
    10. Control switch not in auto
    11. High battery voltage
    12. Low battery voltage
    13. Battery charger AC failure
    14. Emergency stop
    15. Spare
    16. Spare

2.5 COOLING SYSTEM

The generator set shall be equipped with a rail-mounted, engine-driven radiator with blower fan and all accessories. The cooling system shall be sized to operate at full load conditions and 110 F* ambient air entering the room or enclosure (If an enclosure is specified). The generator set supplier is responsible for providing a properly sized cooling system based on the enclosure static pressure restriction.

2.6 FUEL SYSTEM

2.6.1 Fuel System

The fuel system shall be integral with the engine. In addition to the standard fuel filters provided by the engine manufacturer, there shall also be installed a primary fuel filter/water separator in the fuel inlet line to the engine. All fuel piping shall be black iron or flexible fuel hose rated for this service. No galvanized piping will be permitted. Flexible fuel lines shall be minimally rated for 300 degrees F and 100 psi.

2.6.2 Fuel Sub Base Tank

Provide a double wall sub-base tank constructed to meet all local codes and requirements. A fuel tank base of 24 hour capacity shall be provided as an integral part of the enclosure. It shall be contained in a rupture basin with 110% capacity. The tank shall meet UL142 standards. A locking fill cap, a mechanical reading fuel level gauge, low fuel level alarm contact, and fuel tank rupture alarm contact shall be provided.

2.7 NOT USED

2.8 STARTING SYSTEM

2.8.1 Starting Motor

A DC electric starting system with positive engagement shall be furnished. The motor voltage shall be as recommended by the engine manufacturer.

2.8.2 Jacket Water Heater

Jacket water heater shall be provided and shall be sized to insure that genset will start within the specified time period and ambient conditions.

2.8.3 Batteries

Batteries - A lead-acid storage battery set of the heavy-duty diesel starting type shall be provided. Battery voltage shall be compatible with the starting system.

2.8.4 Battery Charger

A UL listed/CSA certified 10 amp voltage regulated battery charger shall be provided for each engine-generator set. Input AC voltage and DC output voltage shall be as required. Chargers shall be equipped with float and equalize charge settings, with provisions to automatically switch between the two modes. It shall maintain its rated output voltage within ±0.2% with AC input variation of ±10%. Operational monitors shall provide with individual form C contacts rated at 4 amps, 120 VAC, 30VDC for remote indication of battery charger malfunction, low battery voltage, and high battery voltage. Charger shall

include an Analog DC voltmeter and ammeter and fused AC input and DC output, and shall be wall mount type in a NEMA 1 enclosure.

2.9 ENCLOSURE

2.9.1 Sound Attenuated Enclosure

The complete diesel
engine generator set, including generator control panel, engine starting batteries and fuel oil tank, shall be enclosed in a factory assembled, sound attenuated enclosure mounted on the fuel tank base.

A. A weather resistant, sound attenuated enclosure of steel with electrostatically applied powder coated baked polyester paint. The enclosure shall have a resulting sound level of 75dba @ 23ft with the genset running under full load. It shall consist of a roof, side walls, and end walls. Fasteners shall be either zinc plated or stainless steel.
B. Enclosure Sound Attenuation: Acoustical foam shall be provided between all supports and inside doors and sound baffles on air intake and air discharge.

3 EXECUTION

3.1 INSTALLATION

Install equipment in accordance with manufacturer's recommendations, the project drawings and specifications, and all applicable codes.

3.2 START-UP AND TESTING

Coordinate all start-up and testing activities with the Engineer and Owner. After installation is complete and normal power is available, the manufacturer's local dealer shall perform testing per Section 26 32 35.

3.3 OPERATION AND MAINTENANCE MANUALS

Provide two (2) sets of operation and maintenance manuals covering the generator, switchgear, and auxiliary components. Include final as-built wiring interconnect diagrams and recommended preventative maintenance schedules.

3.4 TRAINING

3.4.1 On-Site Training

Provide on-site training to instruct the owner's personnel in the proper operation and maintenance of the equipment. Review operation and maintenance manuals, parts manuals, and emergency service procedures.

Guide Specification

MODEL CTG AUTOMATIC TRANSFER SWITCH

PART 1 – GENERAL

1.1 SCOPE

It is the intent of this specification to secure a transfer switch that has been prototype tested, factory built, production tested and site tested. A transfer switch with the number of poles, voltage and current ratings shown on the plans and specified herein shall be provided.

1.2 CODES AND STANDARDS

The automatic transfer switch shall conform to the requirements of:

A. UL 1008: Underwriters Laboratories standard for automatic transfer switches
B. CSA: C22.2 No. 178 certified at 600 VAC
C. IEC: 947-6-1 certified at 480 VAC
D. NFPA 70: National Electrical Code including use in emergency and standby systems in accordance with Articles 517, 700, 701, 702
E. NFPA 99: Essential electrical systems for health care facilities
F. NFPA 101: Life safety code
G. NFPA 110: Standard for emergency and standby power systems
H. IEEE 241: I.E.E.E. recommended practice for electrical power systems in commercial buildings
I. IEEE 446: I.E.E.E. recommended practice for emergency and standby power systems
J. NEMA ICS10: AC automatic transfer switch equipment (supersedes ICS2-447)
K. UL 50/508: Enclosures
L. ICS 6: Enclosures
M. ANSI C33.76: Enclosures
N. NEMA 250: Enclosures
O. IEEE 472: (ANSI C37.90A): Ringing wave immunity
P. EN55022 (CISPR11): Conducted and radiated emissions (Exceeds EN55011 & MILSTD 461 Class 3)
Q. EN61000-4-2: (Level 4): ESD immunity test Class B:
R. EN61000-4-3: (ENV50140): Radiated RF, electromagnetic field immunity test
S. EN61000-4-4: Electrical fast transient/burst immunity test
T. EN61000-4-5: IEEE C62.41: Surge immunity test (1.2 x 50µs, 5 & 8 kV)
U. EN61000-4-6: (ENV50141): Conducted immunity test
V. EN61000-4-11: Voltage dips and interruption immunity
W. IEE-693-2005: Seismic certified at high level with 2.5 amplification factor
X. IBC-2003: At Ip=1.5 for z/h less than or equal to 1 (in accordance with ICC-ES-AC156)

1.3 APPROVED MANUFACTURERS

The automatic transfer switch shall be Caterpillar Model CTG. Alternate manufactures shall submit a request two weeks prior to bid and include a written list of deviations from this specification to be considered for approval.

PART 2 – PRODUCTS

2.1 PERFORMANCE AND CONSTRUCTION

A. The automatic transfer switch shall be of double throw construction operated by a reliable solenoid driven mechanism. There shall be a direct mechanical coupling to facilitate transfer in 6 cycles or less.

B. The normal and emergency contacts shall be mechanically interlocked such that failure of any coil or disarrangement of any part shall not permit a neutral position.

C. For switches installed in systems having ground fault protective devices, and/or wired so as to be designated a separately derived system by the NEC, a 4th pole shall be provided. This additional pole shall isolate the normal and emergency neutrals. The neutral pole shall have the same withstand and operational ratings as the other poles and shall be arranged to break last and make first to minimize neutral switching transients. Add-on or accessory poles that are not of identical construction and withstand capability will not be considered.

D. The contact structure shall consist of a main current carrying contact, which is a silver alloy with a minimum of 50% silver content. The current carrying contacts shall be protected by silver tungsten arcing contacts on all sizes above 600 Amps.

E. The transfer switch manufacturer shall submit test data for each size switch, showing it can withstand fault currents of the magnitude and the duration necessary to maintain the system integrity. Minimum UL listed withstand and close into fault ratings shall be as follows:

Size (Amps)	Coordinated Breaker	Current Limiting Fuse
40 - 225	30,000	200,000
260 to 600	50,000	200,000
800	65,000	200,000
1000 - 1200	85,000	200,000
1600 - 3000	100,000	200,000

(all values at 480V RMS symmetrical, less than 20% power factor)

F. A dielectric test at the conclusion of the withstand and closing tests shall be performed.

G. The automatic transfer switch manufacturer shall certify sufficient arc interrupting capabilities for 50 cycles of operation between a normal and emergency source that are 120 degrees out of phase at 480 volts, 600% of rated current at .50 power factor. This certification is to ensure that there will be no current flow between the two isolated sources during switching.

H. All relays shall be continuous duty industrial type with wiping contacts. Coils, relays, timers and accessories shall be readily front accessible. The control panel and power section shall be interconnected with a harness and keyed disconnect plugs for maintenance.

I. Main and arcing contacts shall be visible without major disassembly to facilitate inspection and maintenance.

J. A manual handle shall be provided for maintenance purposes with the switch de-energized. An operator disconnect switch shall be provided to defeat automatic operation during maintenance, inspection or manual operation.

K. Switches composed of molded case breakers, lighting contactors or components thereof will not be acceptable.

L. The current rating shall be a continuous rating when the switch is installed in an enclosure, and shall conform to NEMA temperature rise standards.

M. The unit shall be rated based on all classes of loads, i.e., resistive, tungsten, ballast and inductive loads. Switches rated 400 amperes or less shall be UL listed for 100% tungsten lamp load.

N. Temperature rise tests in accordance with UL 1008 shall have been conducted after the overload and endurance tests to confirm the ability of the units to carry their rated currents within the allowable temperature limits.

O. Unless specified otherwise on the drawings, the switch shall be mounted in a NEMA 1 enclosure.

2.2 CONTROL

A. The control panel shall be opto-isolated from electrical noise and provided with the following inherent control functions and capabilities:

1. Easy-to-view 4 x 20 LCD display with long lasting LED indicators.
2. Control panel shall display voltage and frequency of both sources.
3. The user shall be able to view the last 16 recorded events.
4. Capability for external communication and network interface.
5. Adjustments to all settings shall be made from the front of the panel without opening the door.

B. The transfer switch shall be equipped with a microprocessor based control panel. The control panel shall perform the operational and display functions of the transfer switch. The display functions of the control panel shall include ATS position, source availability, sequence indication and diagnostics.

C. All programmable and control functions shall be pass code protected and accessible through the keypad.

D. The control panel shall be provided with a simple user interface for transfer switch monitoring, control and field changeable functions and settings.

E. Touch pad test switch with Fast Test/Load/No Load selection capability to simulate a normal source failure.

F. The controller shall provide digital timer adjustments with 1-second resolution. Voltage and Frequency shall be adjustable to 1% resolution to facilitate accurate transfer.

G. To ensure reliable and consistent user operation the controls must be equipped with nonvolatile memory and allow automatic daylight savings time adjustment.

H. The following optional Exerciser Package shall be included:

1. Additional Auxiliary Contact (A3) - Closed when the transfer switch is in Source 2 position.

I. The following additional accessories shall be included:

1. Heater and Thermostat (HT) – Recommended for NEMA 3R applications.

2. Elevator pre-signal (T3/W3) – Contact Opens 0-60 seconds prior to transfer in either direction, re-closes after transfer.

3. Universal Motor Load Disconnect (UMD) - Auxiliary contacts opens 0 – 5 minutes prior to transfer in either direction, re-closes after transfer. Can be configured for pre-transfer, post transfer or both.

4. Sequential Universal Motor Load Disconnect (A62) – Multiple auxiliary contacts open prior to transfer in either direction, re-closes after transfer. Can be configured for pre-transfer, post transfer or both.

5. Communications interface card – RS-485 Modbus

6. Test Switch (6A) - Maintained

7. Additional Auxiliary Contacts (A3) - Closed when the transfer switch is in Source 2 position.

8. Alarm panel (CTAP) – Alarm on transfer to emergency w/silence button & light

9. Protective Cover (OCVR) - Lockable see-through microprocessor and meters cover for NEMA 3R or 12.

PART 3 – OPERATION

3.1 SEQUENCE OF OPERATION

A. The ATS shall incorporate adjustable three phase under voltage sensing on the normal source (or single phase, as appropriate for a single phase ATS).

B. When the voltage of any phase of the normal source is reduced to 80% (adjustable) of nominal voltage, for a period of 0-10 seconds (programmable) a pilot contact shall close to initiate starting of the engine generator.

C. The ATS shall incorporate adjustable under voltage and under frequency sensing on the emergency source.

D. When the emergency source has reached a voltage value of 90% of nominal and achieved frequency within 95% of the rated value, the load shall be transferred to the emergency source after a programmable time delay.

E. When the normal source has been restored to not less than 90% of rated voltage on all phases, the load shall be retransferred to the normal source after a time delay of 0 to 60 minutes (programmable). The generator shall run unloaded for 5 minutes (programmable) and then automatically shut down. The generator shall be ready for automatic operation upon the next failure of the normal source.

F. If the engine generator should fail while carrying the load, retransfer to the normal source shall be made instantaneously upon restoration of proper voltage (90%) on the normal source.

G. Inspection and operational testing/demonstration of the ATS shall be conducted in the presence of the owner's representative to indicate the ATS satisfies these specifications.

3.2 ATS FEATURES

In addition to the operational elements required to satisfy the sequence of operation and other functions specified herein, the following ATS features shall be provided:

A. Adjustable time delay to override momentary normal source failure prior to engine start. Field programmable 0-10 seconds factory set at 3 seconds.

B. Adjustable time delay on retransfer to normal source, programmable 0-60 minutes factory set at 30 minutes. If the emergency source fails during the retransfer time delay, the transfer switch controls shall automatically bypass the time delay and immediately retransfer to the normal position.

C. A time delay on transfer to emergency, programmable 0-5 minutes, factory set at 1 second.

D. An in-phase monitor shall be provided. The monitor shall compare the phase angle difference between the normal and emergency sources and be programmed to anticipate the zero crossing point to minimize switching transients.

E. An exerciser timer with momentary test pushbutton shall be incorporated within the microprocessor and shall be capable of starting the engine generator set and transferring the load (when selected) for exercise purposes on a daily, weekly or monthly basis. The exerciser shall contain a battery for memory retention during an outage.

F. Provide a momentary pushbutton to bypass the time delays on transfer and retransfer and programmable commit/no commit control logic.

G. The controller shall accept a remote peak shave or test input to signal the transfer switch to the emergency position.

H. A set of customer contacts shall be provided to indicate both emergency and normal source position.

PART 4 – EXECUTION

4.1 GENERAL

The transfer switch shall be installed as shown on the plans, in accordance with the manufacture's recommendations and all applicable codes.

4.2 FACTORY TESTS

The transfer switch manufacturer shall perform a complete functional test on the switch, controller and accessories prior to shipping from the factory. A certified test report shall be available upon request.

4.3 SITE TESTS

A complete system load test shall be performed after all equipment is installed per Section 26 32 35.

4.4 SERVICE

The supplier of the ATS shall be the same as that of the engine generator set and shall maintain a national service organization that is factory trained and certified for transfer switch equipment. In addition, the genset dealer organization shall be available 24 hours per day, 365 days per year.

4.5 WARRANTY

The automatic transfer switch shall be warranted against defective workmanship for a period of two years, - including both parts and labor.

SECTION 26 32 35 – EMERGENCY GENERATOR AND TRANSFER SWITCH TESTING AND COMMISSIONING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Standby generators.
2. Automatic Transfer Switches (ATS).
3. System start-up services.
4. Battery charging system testing.
5. Load bank testing.
6. Integral system testing.
7. System demonstration.

B. All equipment, including load banks, measuring instruments, cables, connectors, etc. required for the site testing of the complete generator installation shall be provided by the generator manufacturer's factory authorized firm. The electrical contractor shall assist and coordinate with the generator manufacturer's factory authorized firm in the administration and performance of the site testing.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 SYSTEM START-UP

A. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

2. Perform generator testing, ATS testing and integral system testing including both generators and ATS.

B. Visual and Mechanical Inspections:

1. Compare equipment nameplate data with drawings and specifications.
2. Inspect physical and mechanical condition.
3. Inspect anchorage, alignment and grounding.
4. Very unit is clean.
5. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding parts (ATS).
6. Verify ATS warnings are attached and visible.
7. Verify tightness of all control connections.

C. Generator Electrical and Mechanical Tests:

1. Perform insulation-resistance tests in accordance with ANSI/IEEE Standard 43.
   a. Machines larger than 200 horsepower (150kW): Test duration shall be ten minutes minimum. Calculate the polarization index.
   b. Machines 200 horsepower (150kW) or less: Test duration shall be one minute minimum. Calculate the dielectric-absorption ratio.

2. Test protective relays and main circuit breakers.
3. System Integrity Tests: Methodically verify proper installation, anchorage, connection, and integrity of each element of engine-generator system before and during system operation. Check for air, exhaust, and fluid leaks.
4. Test phase rotation, phasing and synchronized operation as required by the application.
5. Functionally test engine shutdown for low oil pressure, over-temperature overspeed, and other protective features as applicable.
6. Perform vibration test for each main bearing cap.
7. Verify correct functioning of the governor and regulator.
8. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, single-step full-load pickup test.
9. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.
    a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
    b. Test for contact integrity of all connectors. Perform a battery system integrity load test and a capacity load test.
    c. Verify acceptance of charge for each element of the battery after discharge.
    d. Verify that measurements are within manufacturer's specifications.
10. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
11. Exhaust-System Back-Pressure Test: Use a manometer with a scale exceeding 40-inch wg. Connect to exhaust line close to engine exhaust manifold. Verify that back pressure at full-rated load is within manufacturer's written allowable limits for the engine.
12. Exhaust Emissions Test: Comply with applicable government test criteria.
13. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
14. Harmonic-Content Tests: Measure harmonic content of output voltage under 25 percent and at 100 percent of rated linear load. Verify that harmonic content is within specified limits.
15. Noise Level Tests: Measure A-weighted level of noise emanating from generator-set installation, including engine exhaust and cooling-air intake and discharge, at 4 locations and compare measured levels with required values.

D. ATS Electrical and Mechanical Tests:

1. Inspect bolted electrical connections for high resistance using one of the following methods:
    a. Use of low-resistance ohmmeter.
    b. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer’s published data.
    c. Perform thermographic survey.
2. Perform manual transfer operation.
3. Verify positive mechanical interlocking between normal and alternate sources.
4. Perform insulation-resistance tests on all control wiring with respect to ground. Applied potential shall be 500 volts dc for 300-volt rated cable and 1000 volts dc for 600-volt rated cable. Test duration shall be one minute. For units with solidstate components or for control devices that cannot tolerate the applied voltage, follow manufacturer’s recommendation.
5. Perform a contact/pole-resistance test.
6. Verify settings and operation of control devices.
7. Calibrate and set all relays and timers.
8. Verify phase rotation, phasing, and synchronized operation as required by the application.

9. Perform automatic transfer test:
   a. Simulate loss of normal power.
   b. Return to normal power.
   c. Simulate loss of emergency power.
   d. Simulate all forms of single-phase conditions.
10. Verify correct operation and timing of the following functions:
   a. Normal source voltage-sensing relays.
   b. Engine start sequence.
   c. Time delay upon transfer.
   d. Alternate source voltage-sensing relays.
   e. Automatic transfer operation.
   f. Interlocks and limit switch function.
   g. Time delay and retransfer upon normal power restoration.
   h. Engine cool down and shutdown feature. E. ATS Test Values:

1. Compare bolted connection resistance values to values of similar connections. Investigate values which deviate from those of similar bolted connections by more than 50 percent of the lowest value.
2. Bolt torque levels shall be in accordance with manufacturer's published data.
3. Microhm or dc millivolt drop values shall not exceed the high levels of the normal range as indicated in the manufacturer's published data. If manufacturer's published data is not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
4. Control devices shall operate in accordance with manufacturer's published data.
5. Phase rotation, phasing, and synchronization shall be in accordance with system design specifications.
6. Automatic transfers shall operate in accordance with manufacturer's design.
7. Operation and timing shall be in accordance with manufacturer's and system design requirements.

F. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

G. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

H. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

I. Report results of tests and inspections in writing. Record adjustable relay and breaker settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

3.2 LOAD BANK TESTING

A. Perform load bank testing as recommended by the manufacturer or as a minimum:

1. Four hour burn-in test at 100%. At end of four hour burn-in test perform infrared scanning of elec trical connections.
2. Perform block loading tests of generator system including:
   a. 25% for 30 min b. 50% for 30 min
   c. 75% for 60 min d. 100% for 10 min
   e. 75% for 110 min

B. Report results of load bank tests in writing. Attach a label or tag to equipment indicating satisfactory completion of load bank tests.

3.3 INTEGRAL POWER SYSTEM TEST

A. An integral power system test shall be performed for projects including the installation of an uninterruptible power system (UPS).

B. The integral power system test shall be dictated and performed by the UPS system provider.

C. The generator provider shall provide assistance as required where compatibility issues between the UPS systems and the generator arise including:

1. Compatibility between the UPS system and the generators, i.e. harmonics shall not influence voltage regulation and the UPS input filter shall not affect the generator.
2. Ability of the UPS system to synchronize the generator output.
3. Ability of the UPS system to transfer the load from UPS system to maintenance bypass and back while on generator power.
4. Ability of the UPS to limit battery recharge current while on generator power.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

END OF SECTION

LUMINAIRE SCHEDULE - INC 1

TYPE	MANUFACTURER	MODEL	DESCRIPTION	MOUNTING	LAMP	VOLTS	WATTS	REMARKS
P	RAB LIGHTING	ALED-5T-52W-Y-D10	POST TOP LED POLE LIGHT FIXTURE MOUNTED ON 15' POLE WITH 18" CAST IRON BASE	POLE MOUNT	LED	277V	59	SITE LIGHT FIXTURE MOUNTED ON 15' POLE. PROVIDE WITH INTEGRAL PHOTOCELL AND MOTION SENSOR.
Y	PHILIPS - HADCO	SL43-BK-C-F-N-N	IN GRADE LANDSCAPE LIGHT FIXTURE	GROUND MOUNT	LED	277V	10	SITE LIGHTING FIXTURE HAS FIELD ADJUSTABLE LENS.

NEW

PANEL LI

Location:
Supply Frm: XRFM 'LI'
Mounting: Surface
Enclosure: Type 3R

Volts: 120/208 Wye
Phases: 3
Wires: 4
Sections: 1

A.I.C. Rating: 10k
Mains Type: MCB
Bus Rating: 225.00 A
MCB Rating: 225.00 A

CKT	Circuit Description	Trip	Poles	A	A	B	B	C	C	Poles	Trip	Circuit Description	CKT
1	Spare	40	2	0.00	0.00					1	20	Spare	2
3	--	--	--			0.00	0.00			1	20	Spare	4
5	Spare	40	2					0.00	0.00	1	20	Spare	6
7	--	--	--	0.00	0.00					1	20	Spare	8
9	Spare	40	2			0.00	0.00			1	20	Spare	10
11	--	--	--					0.00	0.00	1	20	Spare	12
13	Space	--	--	0.00	0.00					--	--	Space	14
15	Space	--	--			0.00	0.00			--	--	Space	16
17	Space	--	--					0.00	0.00	--	--	Space	18
19	Space	--	--	0.00	0.00					--	--	Space	20
21	Space	--	--			0.00	0.00			--	--	Space	22
23	Space	--	--					0.00	0.00	--	--	Space	24
25	Space	--	--	0.00	0.00					--	--	Space	26
27	Space	--	--			0.00	0.00			--	--	Space	28
29	Space	--	--					0.00	0.00	--	--	Space	30
31	Space	--	--	0.00	0.00					--	--	Space	32
33	Space	--	--			0.00	0.00			--	--	Space	34
35	Space	--	--					0.00	0.00	--	--	Space	36
37	Space	--	--	0.00	0.00					--	--	Space	38
39	Space	--	--			0.00	0.00			--	--	Space	40
41	Space	--	--					0.00	0.00	--	--	Space	42
			Total Load:	0.00 kVA		0.00 kVA		0.00 kVA					
			Total Amps:	0.00 A		0.00 A		0.00 A					

Load Summary:

Load Classification	Connected Load	Demand Factor	Demand Load	Panel Totals	
				Total Conn. Load kVA:	0.00 kVA
				Total Demand kVA:	0.00 kVA
				Total Conn. Load Amps:	0.00 A
				Total Demand Amps:	0.00 A

Breaker Notes:

Custom Notes:

Switchboard: S4

Location:
Supply Frm:
Mounting: FLOOR
Enclosure: NEMA 3R

Volts: 480/277 Wye
Phases: 3
Wires: 4

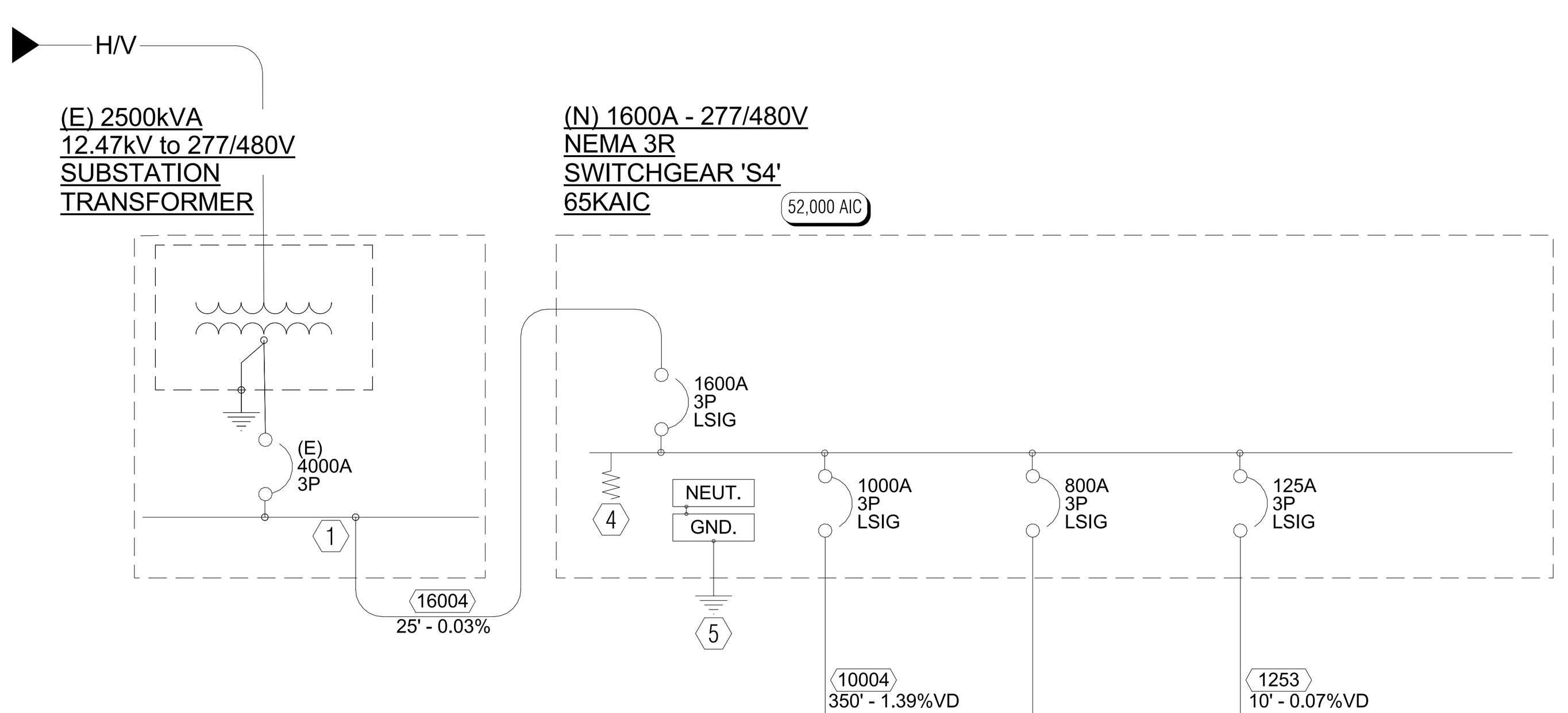
A.I.C. Rating: 65K
Mains Type: MCB
Bus Rating: 1600.00 A
MCB Rating: 1600.00 A

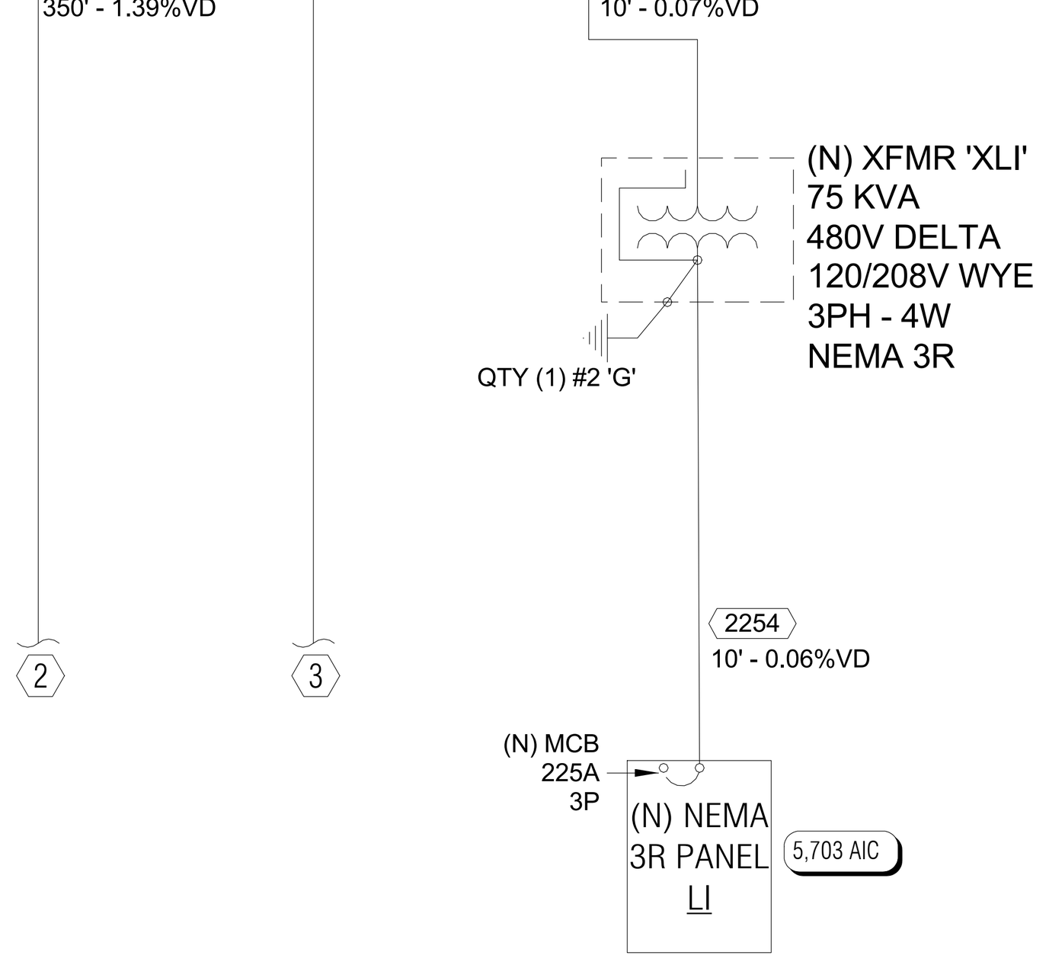
CKT	Circuit Description	# of Poles	Frame Size	Trip Rating	Load	Remarks
1	XRFM 'LI'	3	225.00 A	125.00 A	0.00 kVA	
2	FUTURE LIBRARY ATS	3	800.00 A	800.00 A	0.00 kVA	
3	SCIENCE BUILDING	3	1000.00 A	1000.00 A	0.00 kVA	SEE INC 2 FOR ELECT. LOAD...
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
				Total Conn. Load:	0.00 kVA	
				Total Amps:	0.00 A	

Load Summary:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
				Total Conn. Load:	0.00 kVA
				Total Est. Demand:	0.00 kVA
				Total Conn.:	0.00 A
				Total Est. Demand:	0.00 A

Notes:





NUMBERED NOTES

1. TAP 480V BUS AND EXTEND TO (N) 1600A NEMA 3R SWITCHGEAR LOCATED WITHIN 25 FEET OF SUBSTATION.
2. CONDUIT AND CONDUCTORS PULLED OUT TO LOCATION OF (N) SCIENCE BUILDING MAIN SWITCH BOARD SHOWN IN INCREMENT 2 PLANS.
3. QUANTITY (2) 4" CONDUITS STUBBED OUT 8' SOUTH OF BOARD AS SHOWN ON SITE ELECTRICAL PLANS.
4. PROVIDE SWITCHBOARD INTERIOR HEATER.
5. QTY. (3) 10' GROUND RODS.

1 ONE LINE DIAGRAM - INC 1
NO SCALE

COPPER FEEDER SCHEDULE

FEEDER TAG	FEEDER DESCRIPTION	CONDUIT	CONDUCTORS PHASE/NEUTRAL	CONDUCTORS GROUND	NOTES
2254	225 AMP, 3 PHASE, 4 WIRE	1-2.50"	4 #4/0	1 #2	-
1253	125 AMP, 3 PHASE, 3 WIRE	1-1.50"	3 #1 AWG	1 #6 AWG	-
16004	1600 AMP, 3 PHASE, 4 WIRE	5-3.50"	5 SETS OF 4 #500 KCMIL	1 #4/0 AWG PER SET	-
10004	1000 AMP, 3 PHASE, 4 WIRE	4-3.00"	3 SETS OF 4 #500 KCMIL	1 #2/0 AWG PER SET	-

ONE-LINE DIAGRAM LEGEND

CIRCUIT BREAKER

GROUNDING ELECTRODE

AIC - AVAILABLE INTERRUPTING CURRENT

DRY TYPE TRANSFORMER

1003 FEEDER TAG

XXXXX AIC AVAILABLE INTERRUPTING CURRENT

LSIG 100% RATED ELECTRONIC BREAKER TRIP UNIT WITH LONG TIME, SHORT TIME, INSTANTANEOUS AND GROUND FAULT.

STANDARD ELECTRICAL SYMBOLS

SYMBOL	DESCRIPTION
	POLE LIGHT.
	IN GRADE LIGHT FIXTURE.
	LUMINAIRE SHADING INDICATES LUMINAIRE CONNECTED TO EMERGENCY POWER SOURCE.
B	LUMINAIRE TAG, LETTER INDICATES TYPE, SEE LUMINAIRE SCHEDULE.
	DISTRIBUTION PANEL/MOTOR CONTROL CENTER.
	BRANCH CIRCUIT PANELBOARD, SURFACE MOUNTED.
J	JUNCTION BOX, SIZE AND TYPE AS INDICATED OR REQUIRED.
N.I.E.S.	NOT IN ELECTRICAL SECTION OF THESE PLANS AND SPEC'S.
MT	EMPTY CONDUIT WITH PULL-LINE.
WP	WEATHERPROOF, DAMP OR WET LOCATION AS REQUIRED.
'G'	GREEN INSULATED GROUND WIRE, #12 AWG UNLESS NOTED.
AFF	ABOVE FINISHED FLOOR.
(N)	NEW.
(E)	EXISTING.
(D)	DEMOLISH.
(R)	RELOCATE.
(ER)	EXISTING RELOCATED IN LOCATION SHOWN.
XX	NUMBERED NOTE.
	RACEWAY INSTALLED BELOW FINISHED FLOOR OR GRADE.
	EXISTING CONDUIT RUN TO BE ABANDONED. CONDUIT ABOVE THE FLOOR AND BELOW THE STRUCTURE ABOVE SHALL BE REMOVED.
	EXISTING CONDUIT RUN, VERIFY ROUTING ON THE JOB.
	ARROW AT END OF RACEWAY INDICATES HOME RUN TO RESPECTIVE PANELBOARD OR SWITCHBOARD.
	CONDUIT RACEWAY SLEEVE.
	INDICATES RACEWAY TURNING UP.
	INDICATES RACEWAY TURNING DOWN.
	INDICATES RACEWAY STUB. TERMINATE WITH BUSHING OR CAP IF UNDERGROUND.

SHEET INDEX INCREMENT 1

INCREMENT 1 - SCOPE OF ELECTRICAL WORK

THE SCOPE OF ELECTRICAL WORK IN INCREMENT 1 IS TO PROVIDE ALL (N) UNDERGROUND RACEWAYS / VAULTS / FLOORBOXES FOR THE ROUTING OF POWER AND TELEDATA CABLES SERVING THE NEW SCIENCE BUILDING AS WELL AS THE RELOCATION / REMOVAL / ADDITION OF SITE LIGHT FIXTURES AND THE UNDERGROUND RACEWAYS CONNECTED TO THEM IN ORDER TO ACCOMODATE THE LOCATION OF THE NEW SCIENCE BUILDING. NO ELECTRICAL OR TELEDATA CONNECTIONS WILL BE MADE IN THIS INCREMENT AND ALL CEC ELECTRICAL LOAD CALCULATIONS AND TITLE 24 ENERGY CALCULATIONS FOR SITE LIGHTING WILL BE PROVIDED IN THE INCREMENT 2 SET OF ELECTRICAL DRAWINGS.

ADDITIONAL SCOPE ADDED CCD #2: PROVIDED ADDITIONAL 480V 3 PHASE CIRCUIT BREAKERS IN 1600A SWITCHGEAR 'S4', 75 KVA TRANSFORMER 'XLI', AND 225 A 120/208V 3 PHASE ELECTRICAL PANEL 'LI' TO SUPPORT FUTURE ELECTRICAL EQUIPMENT .

DPR CONSTRUCTION

HGA
1200 R Street, Suite 100
Sacramento, California 95811
Telephone 916.787.5100

CIVIL ENGINEER
BKF ENGINEERS
980 9TH STREET, SUITE 1770
SACRAMENTO , CA 95814
916.556.5800

LANDSCAPE ARCHITECT
QUADRIGA LANDSCAPE ARCHITECTURE AND PLANNING, INC.
1415 21ST STREET, STUDIO A
SACRAMENTO, CA 95811
916.441.2129

INTERIOR ARCHITECT/ STRUCTURAL ENGINEER
HGA ARCHITECTS & ENGINEERS
1200 R STREET, SUITE 100
SACRAMENTO, CA 95811
916-787-5100

MECHANICAL ENGINEER
CAPITAL ENGINEERING CONSULTANTS
11020 SUN CENTER DRIVE
RANCHO CORDOVA, CA 95670
916-851-3500

ELECTRICAL ENGINEER
ECOM ENGINEERING, INC.
1796 TRIBUTE ROAD, SUITE 100
SACRAMENTO, CA 95815
916-641-5600

REGISTERED PROFESSIONAL ENGINEER
ERIC C. JOHNSON
No. E 015404
Exp. 6-30-19
ELECTRICAL
STATE OF CALIFORNIA

ECOM ENGINEERING INC.
1796 TRIBUTE ROAD, SUITE 100
SACRAMENTO, CA. 95815
916.641.5600
916.641.1640 FAX
WWW.ECOMENG.COM

JOB NO. 2016-K207.00 PM. ABD
DESIGNERS ECOM
DRAWN BY ECOM ENGINEERING

SOLANO COMMUNITY COLLEGE DISTRICT

FAIRFIELD SCIENCE BUILDING 2700
4000 SUISUN VALLEY ROAD
FAIRFIELD, CA 94534

SOLANO
COMMUNITY COLLEGE

NO	DESCRIPTION	DATE
2	CCD#2	9/21/17

ISSUANCE HISTORY - THIS SHEET

HGA NO: 3850-002-00

ELECTRICAL COVER SHEET

IDENTIFICATION STAMP
DIVISION OF THE STATE ARCHITECT
02 - 115858

AC ______ FLS ______ SS ______
DATE ______

DATE: July 12, 2017

CONSTRUCTION DOCUMENTS

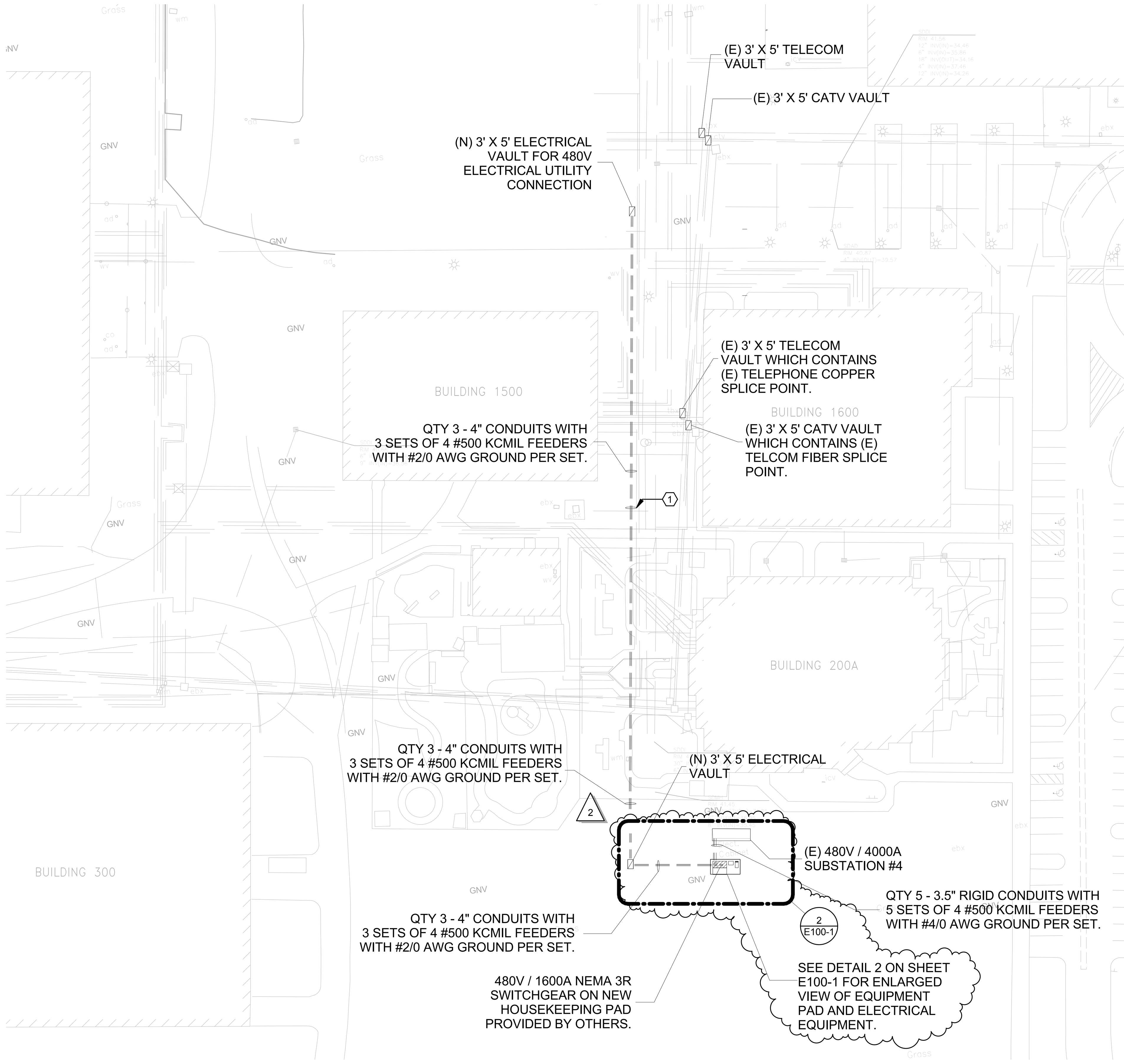
E000-1

INCREMENT 1

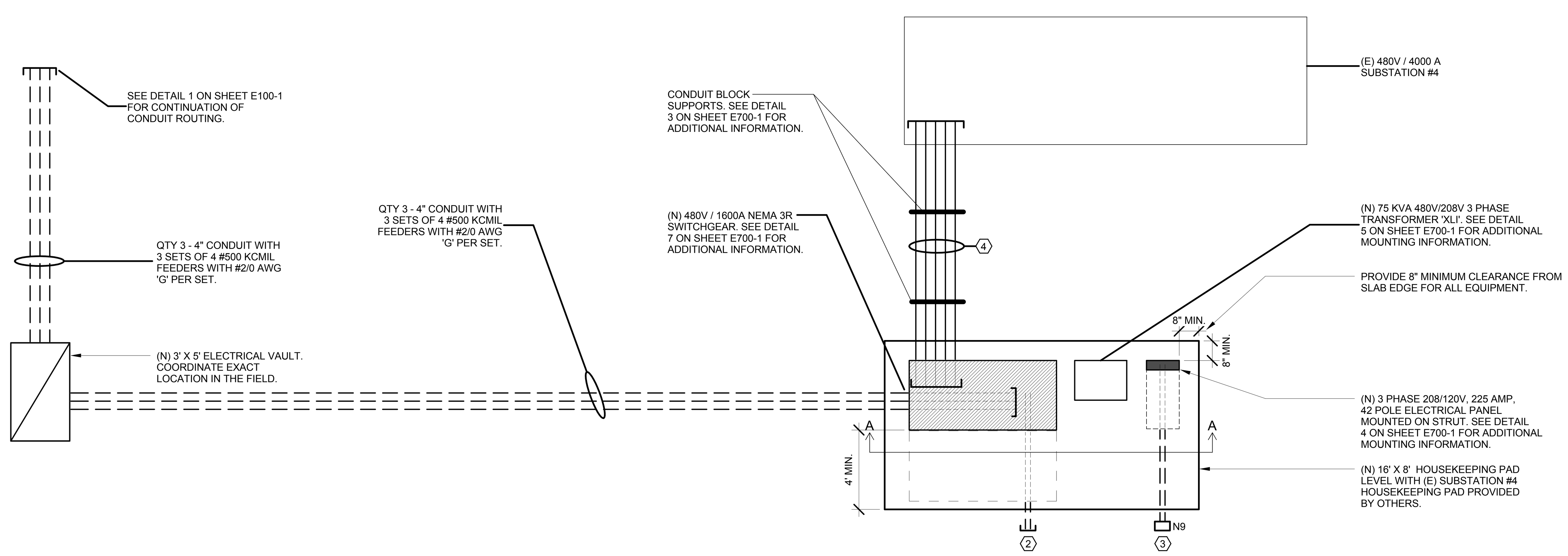
C:\Users\adennis\Documents\E16-385000200_Central_adennis@ecomeng.com.rvt
10/9/2017 1:40:52 PM
Author

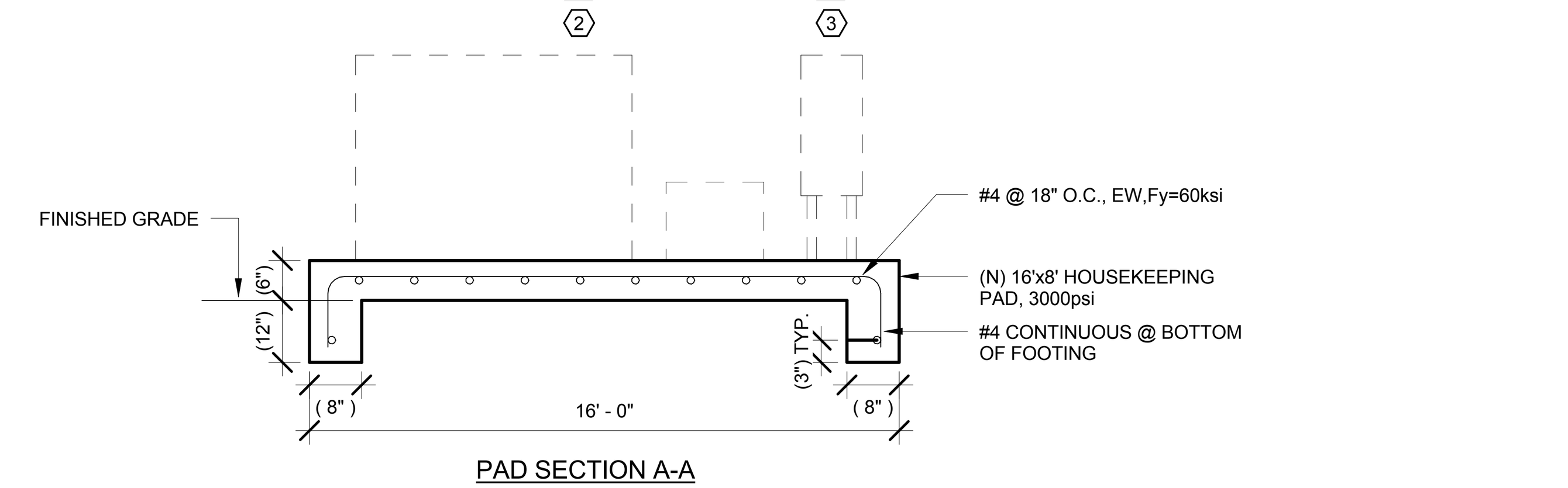
NUMBERED NOTES

1. PROPOSED DIRECTIONAL BORING PATH FOR ROUTING THREE 4" CONDUITS BETWEEN THE TWO NEW 3' X 5' ELECTRICAL VAULTS. NEW CONDUIT PATH TO SWEEP UNDER ALL EXISTING UTILITIES.
2. QTY (2) 4" CONDUITS STUBBED OUT FOR FUTURE LIBRARY BUILDING ATS.
3. QTY (2) 2" CONDUITS STUBBED OUT TO (N) N9 CHRISTY BOX AS SHOWN FOR FUTURE CAR CHARGING STATIONS.
4. QTY (5) - 3.5" CONDUIT WITH 5 SETS OF 4 #500 KCMIL FEEDERS WITH #4/0 AWG 'G' PER SET. CONDUIT TO BE ROUTED ABOVE GROUND ON BLOCK SUPPORTS SPACED EVERY 3 TO 5 FEET AS NEEDED. FIELD COORDINATE EXACT CONDUIT ROUTING.



1 SITE PLAN - NEW ELECTRICAL & TELECOM UTILITY
1" = 40'-0"





PAD SECTION A-A

GENERAL NOTES:

- REMOVAL OF EXISTING FENCING AROUND SUBSTATION 4 BY OTHERS.
- TREE TRIMMING AND/OR REMOVAL BY OTHERS.
- GRADING OF GROUND FOR NEW ELECTRICAL EQUIPMENT BY OTHERS.
- TEMPORARY FENCING AROUND ELECTRICAL EQUIPMENT BY OTHERS.

2 ENLARGED SITE PLAN - NEW ELECTRICAL & TELECOM UTILITY
1/4" = 1'-0"

DPR CONSTRUCTION

HGA
1200 R Street, Suite 100
Sacramento, California 95811
Telephone 916.787.5100

CIVIL ENGINEER
BKF ENGINEERS
980 9TH STREET, SUITE 1770
SACRAMENTO , CA 95814
916.556.5800

LANDSCAPE ARCHITECT
QUADRIGA LANDSCAPE ARCHITECTURE AND PLANNING, INC.
1415 21ST STREET, STUDIO A
SACRAMENTO, CA 95811
916.441.2129

INTERIOR ARCHITECT/ STRUCTURAL ENGINEER
HGA ARCHITECTS & ENGINEERS
1200 R STREET, SUITE 100
SACRAMENTO, CA 95811
916-787-5100

MECHANICAL ENGINEER
CAPITAL ENGINEERING CONSULTANTS
11020 SUN CENTER DRIVE
RANCHO CORDOVA, CA 95670
916-851-3500

ELECTRICAL ENGINEER
ECOM ENGINEERING, INC.
1796 TRIBUTE ROAD, SUITE 100
SACRAMENTO, CA 95815
916-641-5600

ECOM ENGINEERING INC.
1796 TRIBUTE ROAD, SUITE 100
SACRAMENTO, CA 95815
916.641.5600
916.641.1640 FAX
WWW.ECOMENG.COM

SOLANO COMMUNITY COLLEGE DISTRICT

FAIRFIELD SCIENCE BUILDING 2700
4000 SUISUN VALLEY ROAD
FAIRFIELD, CA 94534

SOLANO COMMUNITY COLLEGE

NO	DESCRIPTION	DATE
2	CCD#2	9/21/17

ISSUANCE HISTORY - THIS SHEET

HGA NO: 3850-002-00

SITE PLAN - NEW UTILITY & TELECOM

DATE: July 12, 2017

CONSTRUCTION DOCUMENTS

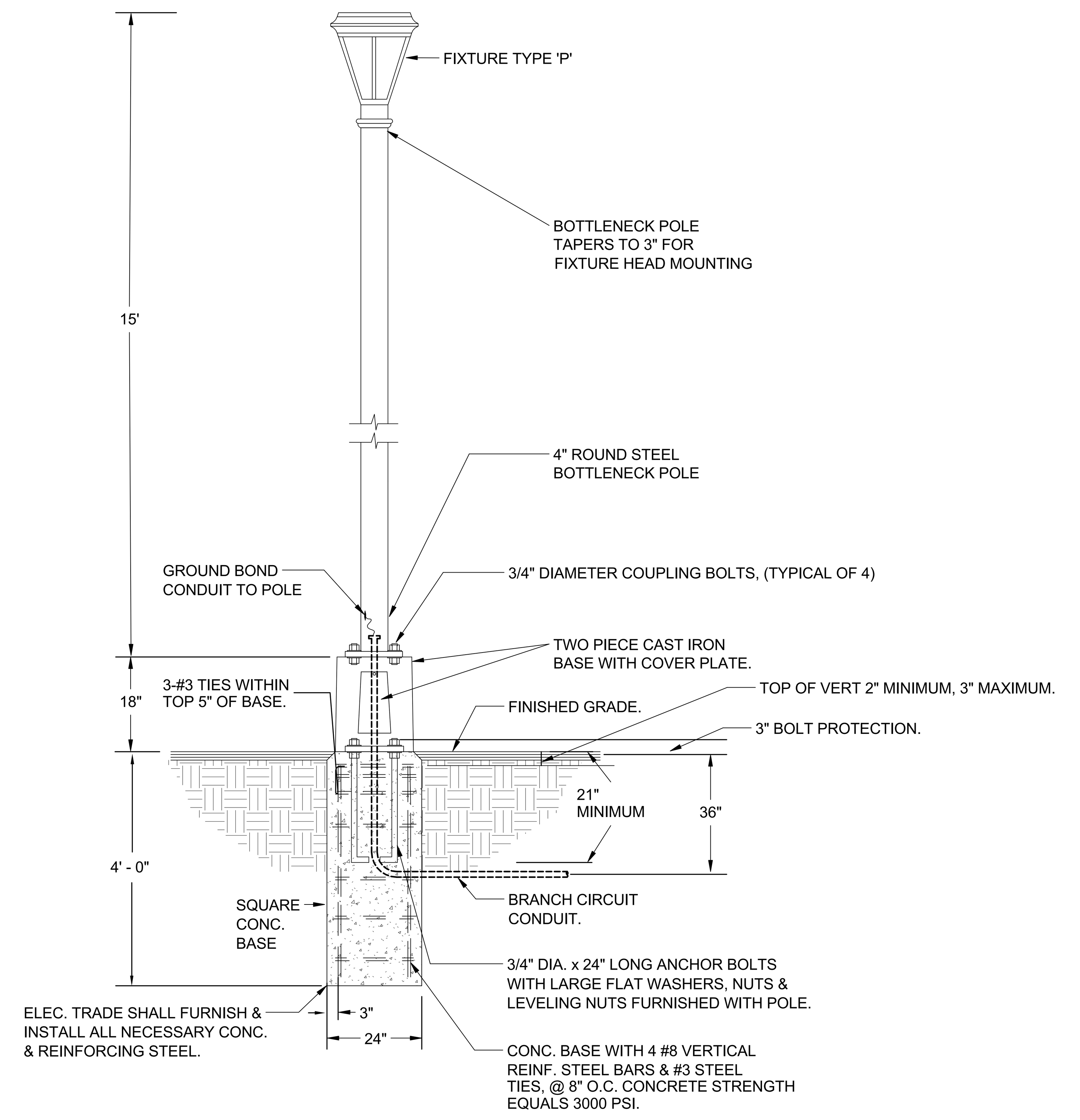
INCREMENT 1

IDENTIFICATION STAMP
DIVISION OF THE STATE ARCHITECT
02 - 115858

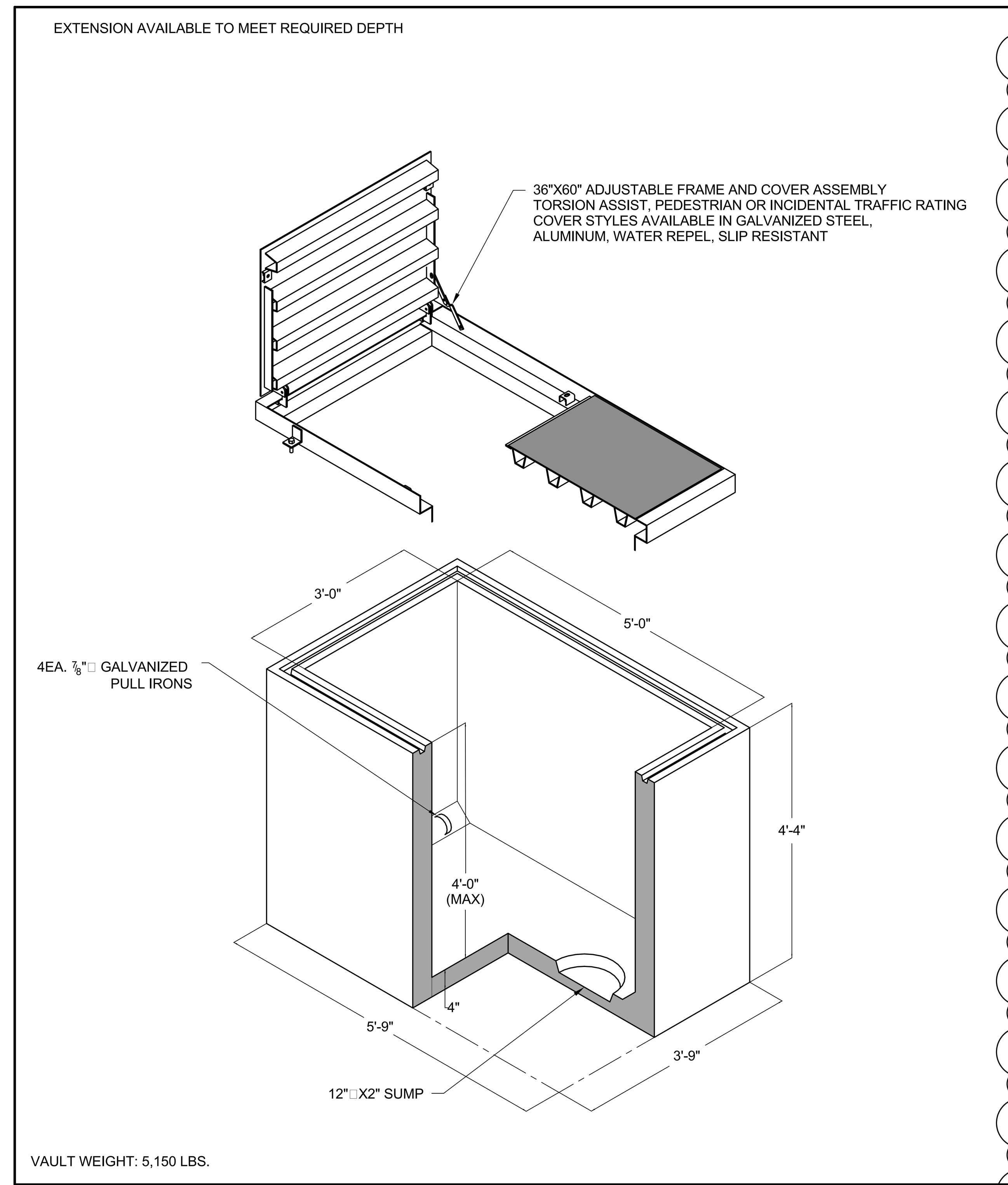
AC ______ FLS ______ SS ______
DATE ______

E100-1

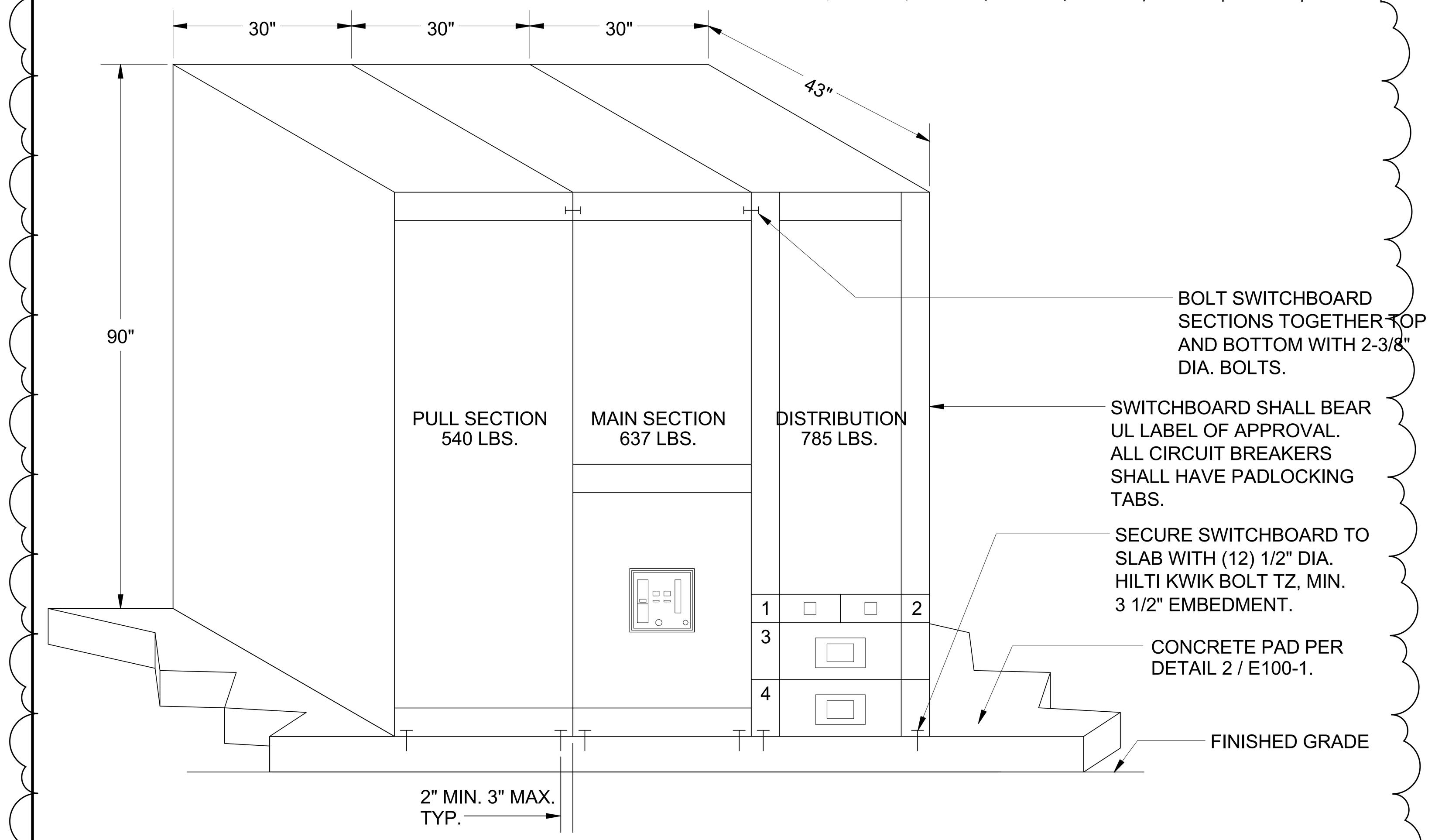
10/9/2017 1:40:54 PM
Author



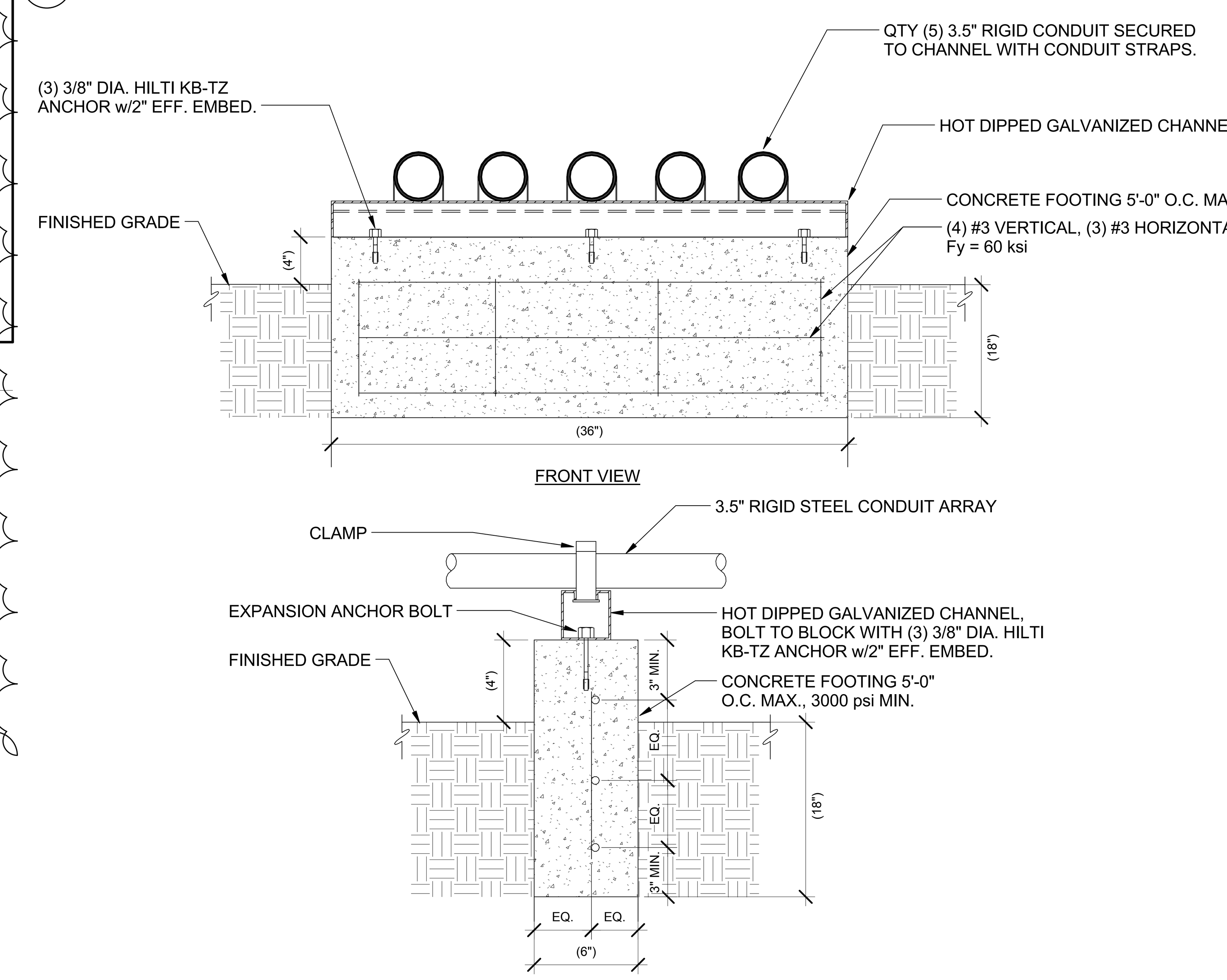
1 POLE LIGHT DETAIL
NO SCALE



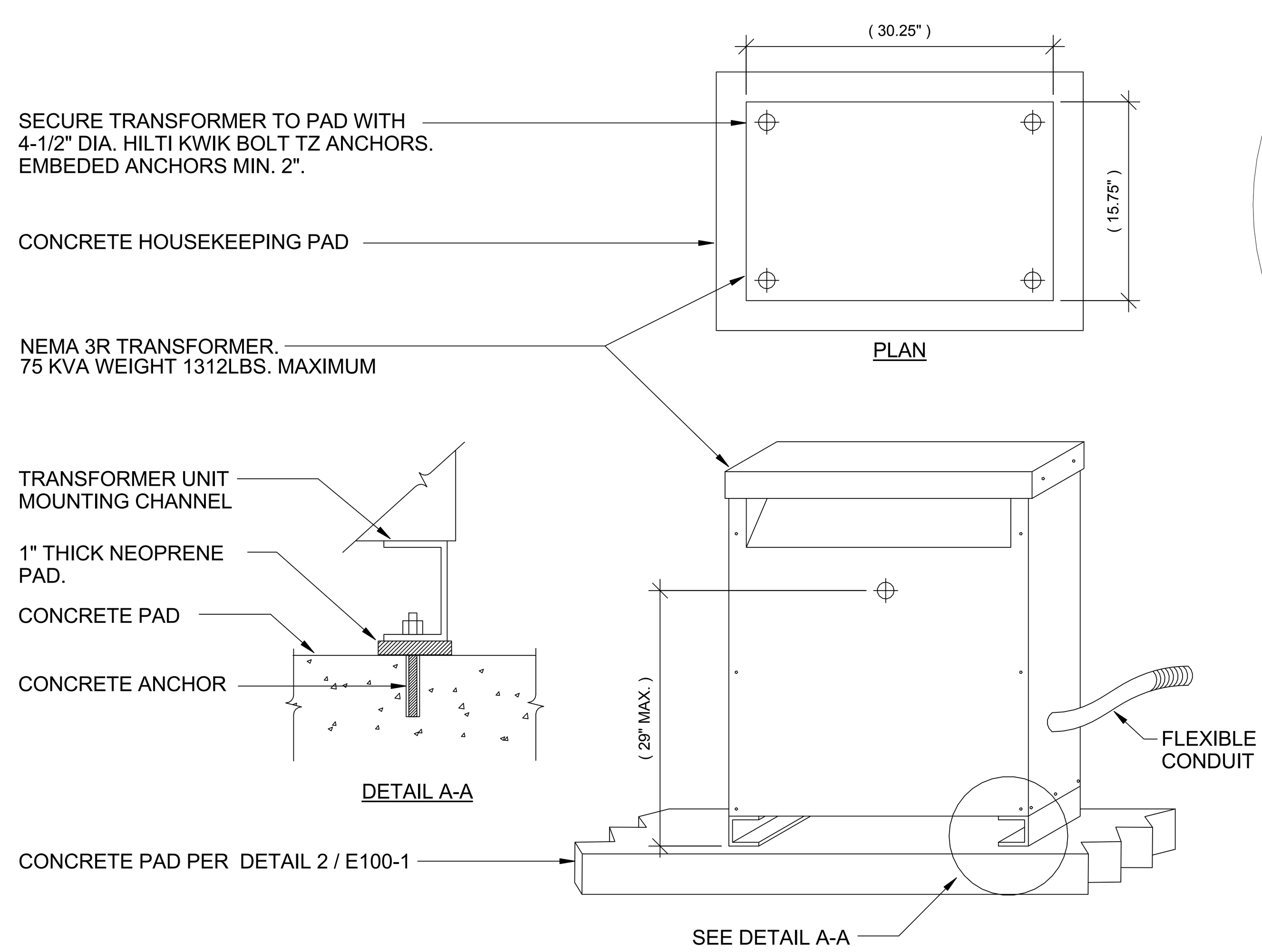
2 3x5 UTILITY VAULT
NO SCALE



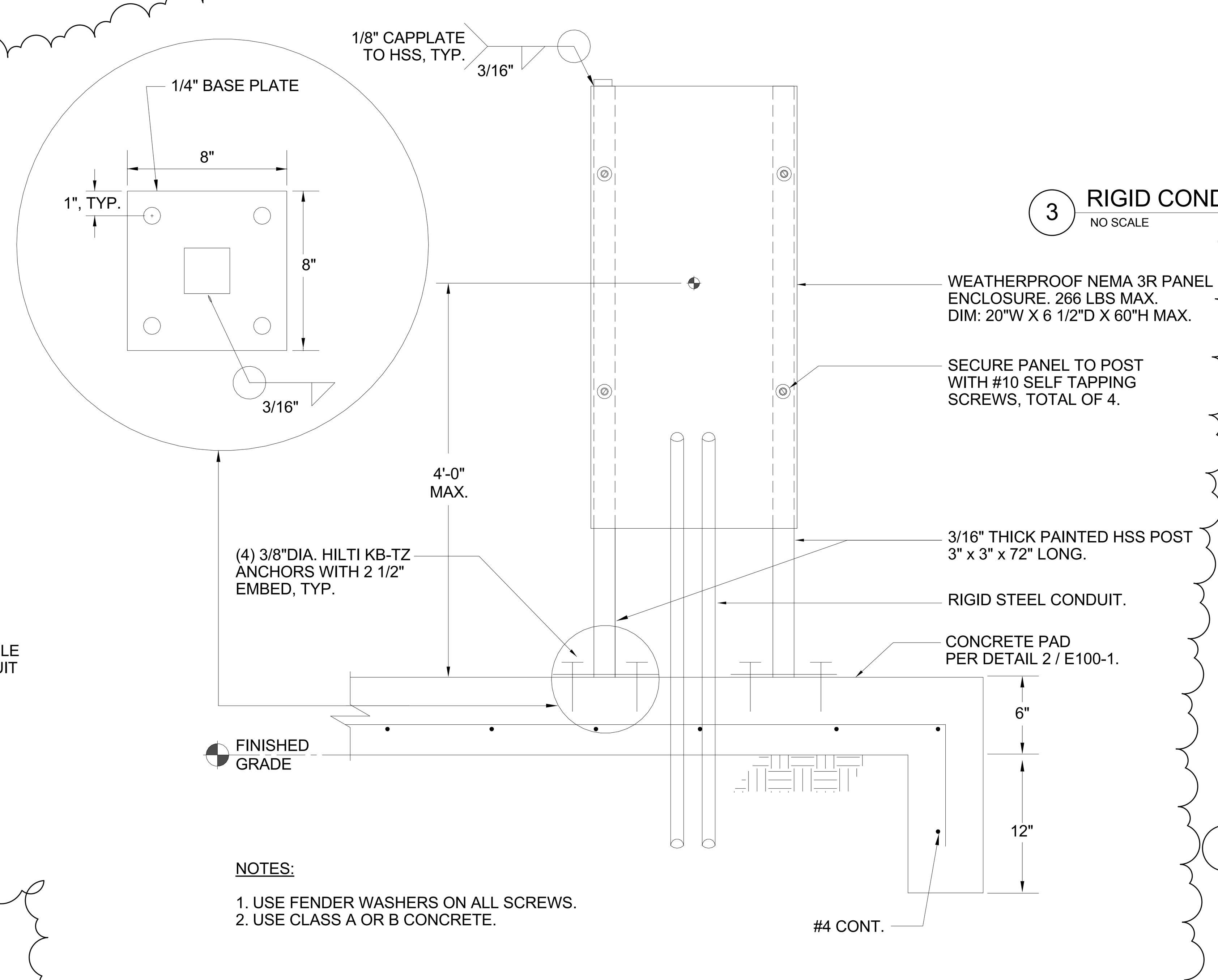
7 SWITCHGEAR 'S4' DETAIL ELEVATION
NO SCALE



3 RIGID CONDUIT SUPPORT DETAIL
NO SCALE



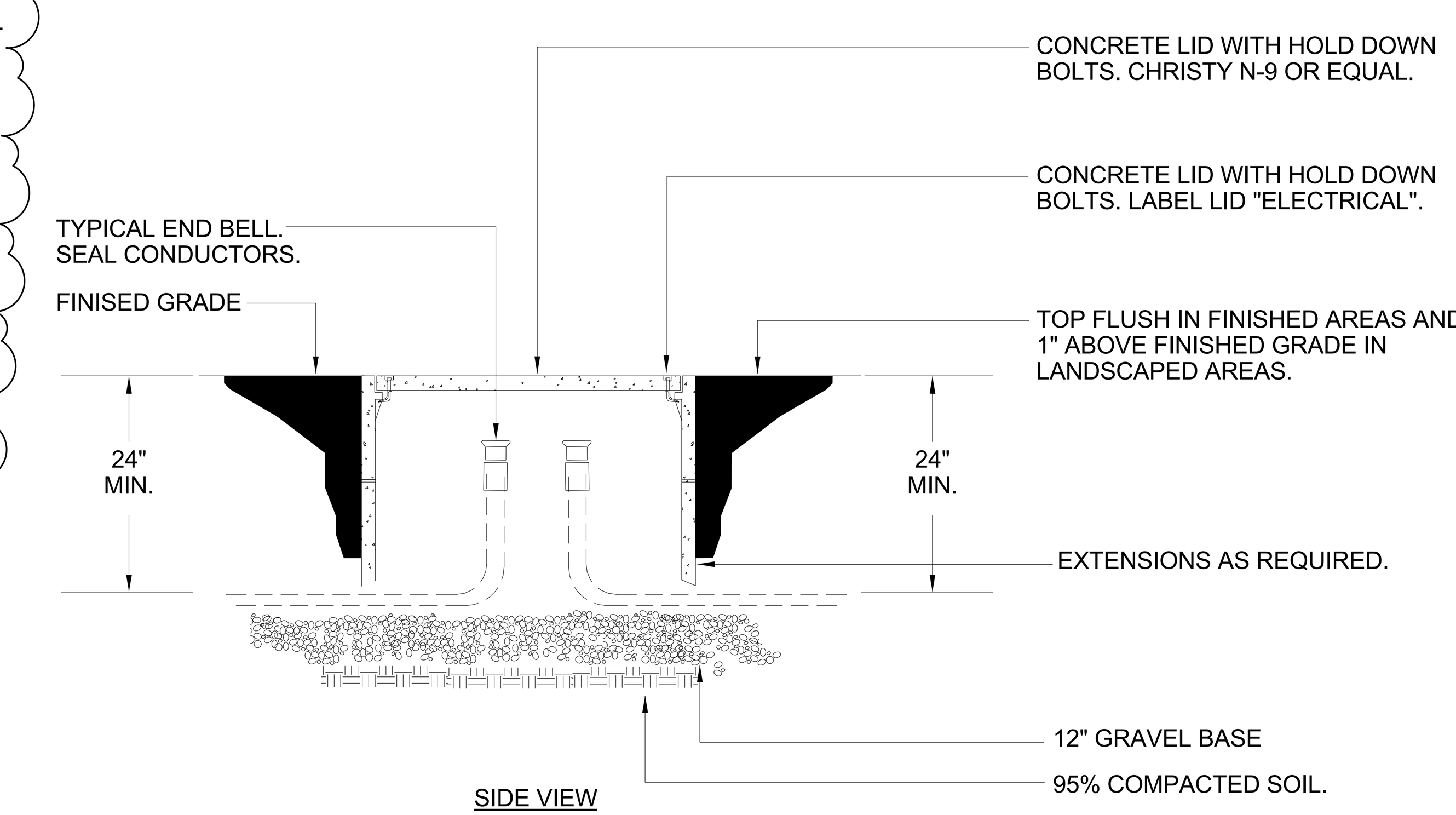
4 TRANSFORMER MOUNTING DETAIL - OUTDOOR
NO SCALE



NOTES:

1. USE FENDER WASHERS ON ALL SCREWS.
2. USE CLASS A OR B CONCRETE.

5 EXTERIOR NEMA 3R PANEL BOARD MOUNTING
NO SCALE



6 CHRISTY BOX
NO SCALE

DPR CONSTRUCTION

HGA
1200 R Street, Suite 100
Sacramento, California 95811
Telephone 916.787.5100

CIVIL ENGINEER
BKF ENGINEERS
980 9TH STREET, SUITE 1770
SACRAMENTO , CA 95814
916.556.5800

LANDSCAPE ARCHITECT
QUADRIGA LANDSCAPE ARCHITECTURE AND PLANNING, INC.
1415 21ST STREET, STUDIO A
SACRAMENTO, CA 95811
916.441.2129

INTERIOR ARCHITECT/ STRUCTURAL ENGINEER
HGA ARCHITECTS & ENGINEERS
1200 R STREET, SUITE 100
SACRAMENTO, CA 95811
916-787-5100

MECHANICAL ENGINEER
CAPITAL ENGINEERING CONSULTANTS
11020 SUN CENTER DRIVE
RANCHO CORDOVA, CA 95670
916-851-3500

ELECTRICAL ENGINEER
ECOM ENGINEERING, INC.
1796 TRIBUTE ROAD, SUITE 100
SACRAMENTO, CA 95815
916-641-5600

ECOM ENGINEERING INC.
1796 TRIBUTE ROAD, SUITE 100
SACRAMENTO, CA 95815
916.641.5600
916.641.1640 FAX

SOLANO COMMUNITY COLLEGE DISTRICT

FAIRFIELD SCIENCE BUILDING 2700
4000 SUISUN VALLEY ROAD
FAIRFIELD, CA 94534

SOLANO COMMUNITY COLLEGE

NO	DESCRIPTION	DATE
2	CCD#2	9/21/17

ISSUANCE HISTORY - THIS SHEET

HGA NO: 3850-002-00

ELECTRICAL DETAILS

IDENTIFICATION STAMP
DIVISION OF THE STATE ARCHITECT
02 - 115858

AC ______ FLS ______ SS ______
DATE ______

DATE: July 12, 2017

CONSTRUCTION DOCUMENTS

E700-1

INCREMENT 1

10/9/2017 1:40:56 PM
Author