

CONSTRUCT BATTERY ROOM TRENTON FIELD MAINTENANCE SHOP TRENTON, MISSOURI

SHEET INDEX

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CASCO + R5

12 SUNNEN DR. SUITE 100
ST. LOUIS, MO 63143
ARCHITECTS / ENGINEERS
314-821-1100

CASCO DIVERSIFIED CORPORATION
STATE OF MISSOURI
CERTIFICATE OF AUTHORITY #000329
CERTIFICATE OF AUTHORITY #000613

APPLICABLE CODES

2018 INTERNATIONAL BUILDING CODE
2017 NATIONAL ELECTRIC CODE

OWNER: STATE OF MISSOURI
MICHAEL L. PARSON,
GOVERNOR

DEPARTMENT OF PUBLIC SAFETY
OFFICE OF THE ADJUTANT GENERAL
MISSOURI NATIONAL GUARD
FACILITIES DIVISION

PROJECT
MANAGEMENT: OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT,
DESIGN AND CONSTRUCTION

DESIGNER: CASCO DIVERSIFIED CORPORATION

PROJECT NUMBER: T2026-01

SITE NUMBER: 6256
ASSET NUMBER: 8136256006



AREA OF WORK
TRENTON FIELD MAINTENANCE SHOP
901 INDUSTRIAL DRIVE
TRENTON, MO 64683

VICINITY MAP



MICHAEL S. SUNDERMEYER
EXP. DATE: 12/31/20
LIC. #2014026855

REVISION : _____
DATE: _____
REVISION : _____
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ISSUE DATE: 01/14/2020

SHEET NUMBER:

G-001

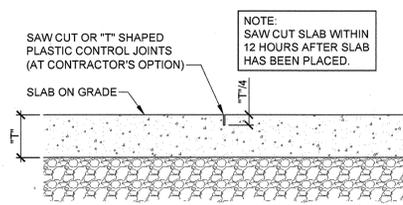
1 OF 6 SHEETS
JANUARY 14, 2020

SYMBOLS		
XX TITLE	TITLE BUBBLE	
XX SCALE: FULL	DETAIL NUMBER	
	SHEET NUMBER	
S SECTION CUT	SECTION DETAIL	
AX.X	SHEET NUMBER	
# ELEVATION REFERENCE	ELEVATION VIEW (OUTSIDE)	
#	DETAIL NUMBER	
#	SHEET NUMBER	
☁ REVISION CLOUD		
X DETAIL CLOUD	DETAIL NUMBER	
XXX	SHEET NUMBER	

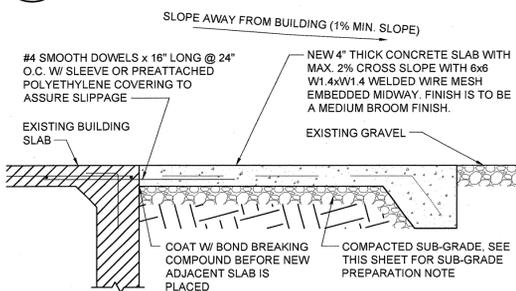
ABBREVIATIONS	
B.O.	AT BOTTOM OF CONCRETE CONTIGUOUS
CONC.	CONCRETE
CONT.	CONTIGUOUS
DTL.	DETAIL
Ø	DIAMETER
EA.	EACH
FRT.	FIRE RETARDANT TREATED
FR.	FRONT
N.I.C.	NOT IN CONTRACT
O.C.	ON CENTER (S)
TYP.	TYPICAL
W/	WITH
U.N.O.	UNLESS NOTED OTHERWISE

GENERAL NOTES

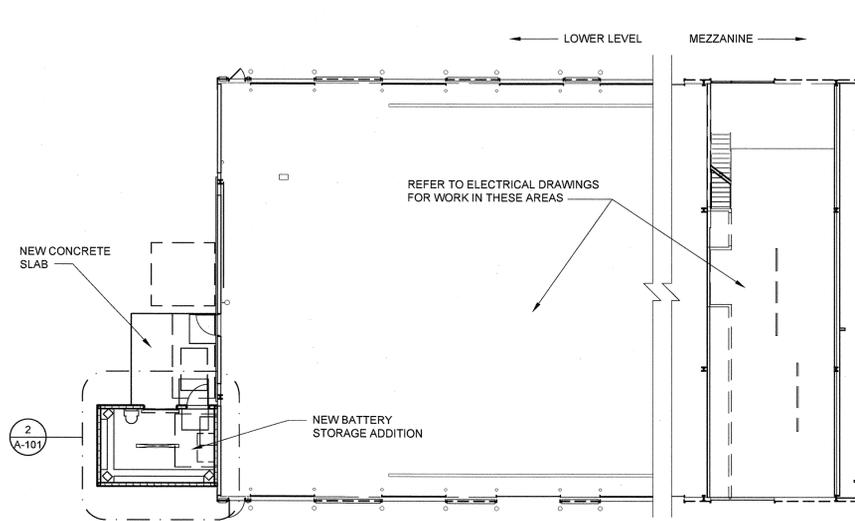
- REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- REFER TO ELECTRICAL DRAWINGS FOR ADDITIONAL REQUIREMENTS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFICATION OF THE CONTRACT DOCUMENTS. THE ARCHITECT AND OWNER SHALL BE NOTIFIED OF ANY UNFORESEEN CONDITIONS WHICH MAY AFFECT PROGRESS OR COST OF WORK PERFORMED.
- GENERAL CONTRACTOR MUST COORDINATE WITH EXISTING ADJACENT CONSTRUCTION FOR THE BATTERY ROOM INSTALLATION.
- THE CONTRACT WORK SHALL INCLUDE FURNISHING ALL MATERIAL, EQUIPMENT, TOOLS, LABOR, AND SERVICES NECESSARY FOR COMPLETION OF THE PROJECT.
- THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE QUALITY OF WORKMANSHIP AND FOR COMPLIANCE WITH THE DESIGN. THE GENERAL CONTRACTOR SHALL CORRECT ALL ERRORS AND DEVIATIONS AS REQUESTED BY THE OWNER.
- ALL PLYWOOD TO BE FIRE RETARDANT.
- THE GENERAL CONTRACTOR SHALL CONTACT THE OWNER/ARCHITECT IMMEDIATELY IF ANY WORKER ENCOUNTERS HAZARDOUS MATERIALS.
- THE GENERAL CONTRACTOR SHALL COORDINATE ARCHITECTURAL DRAWINGS WITH THE ELECTRICAL DRAWINGS AND SPECIFICATIONS BEFORE PROCEEDING WITH THE WORK AND SHALL NOTIFY THE ARCHITECT OF ANY DISCREPANCIES OR CONFLICTS IMMEDIATELY. ALL DISCREPANCIES SHALL BE RESOLVED PRIOR TO THE CONTRACTOR PROCEEDING WITH WORK.
- A MATERIAL STAGING AREA WILL BE DETERMINED BY THE OWNER AND DISCUSSED DURING THE PRE-BID MEETING.
- CONTRACTOR SHALL LOCATE ALL EXISTING UNDERGROUND SERVICES AND UTILITIES IN THE AREA OF EXCAVATION FOR NEW FOOTINGS AND FOUNDATION. ALL PRECAUTIONS SHALL BE TAKEN NOT TO DISTURB EXISTING SERVICES AND UTILITIES.



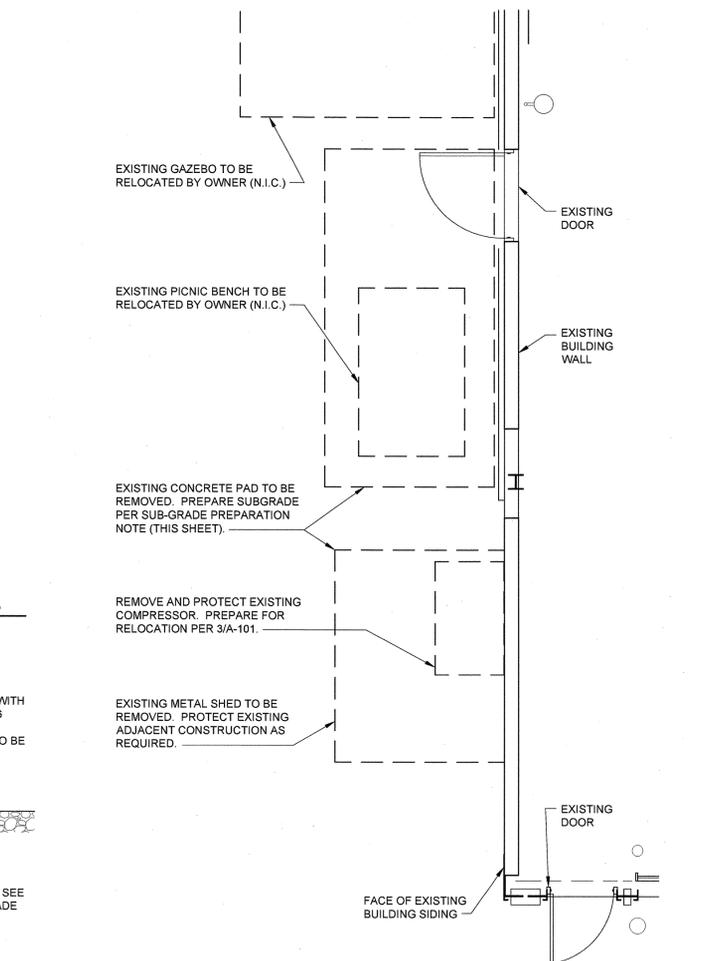
5 TYPICAL SLAB JOINT DETAIL
SCALE: 1 1/2" = 1'-0"



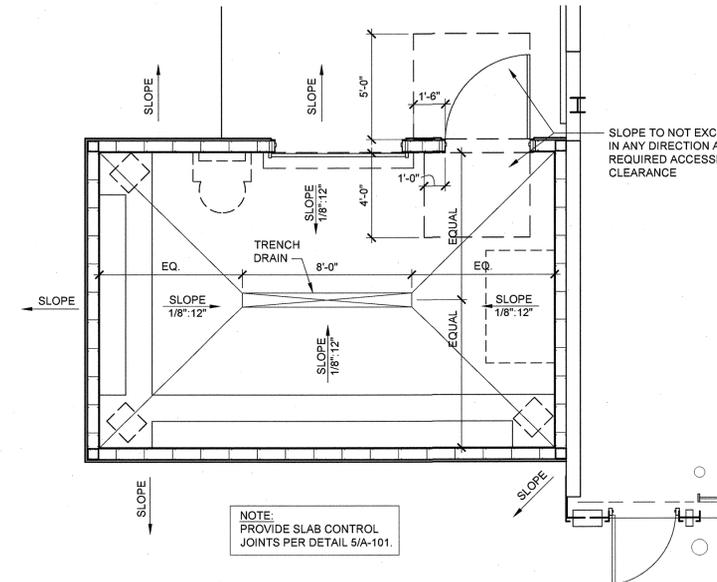
6 EXISTING SLAB TO NEW SLAB ATTACHMENT
SCALE: 3/4" = 1'-0"



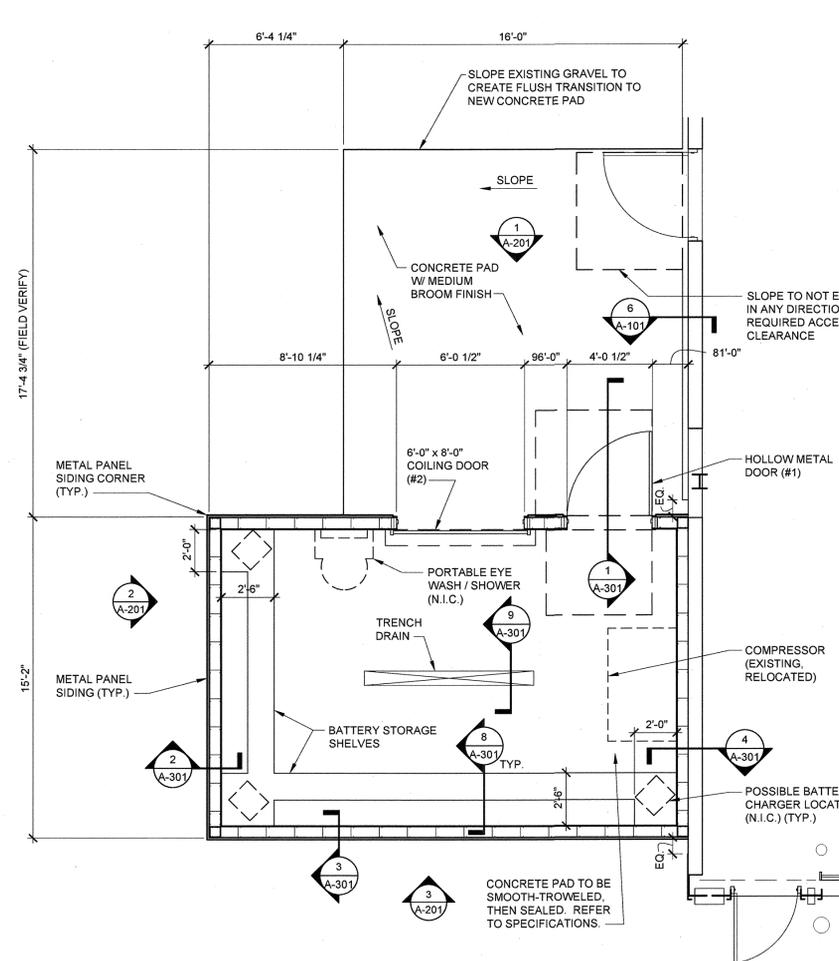
1 OVERALL PLAN
SCALE: 1/16" = 1'-0"



2 DEMOLITION PLAN
SCALE: 1/4" = 1'-0"



3 BATTERY STORAGE SLAB PLAN
SCALE: 1/4" = 1'-0"



4 BATTERY STORAGE FLOOR PLAN
SCALE: 1/4" = 1'-0"

SUB-GRADE PREPARATION

ALL EXPOSED AND/OR DISTURBED GRANULAR BASE AREAS SHALL BE COMPACTED TO A MINIMUM OF 95% OF OPTIMUM DENSITY IN ACCORDANCE WITH ASTM D 1557 AT OPTIMUM MOISTURE CONTENT AND TO A MINIMUM DEPTH OF 8".

ALL SUBGRADE SOIL AREAS EXPOSED BY EXCAVATIONS AND GRADING SHALL BE COMPACTED TO A MINIMUM OF 95% OF OPTIMUM DENSITY IN ACCORDANCE WITH ASTM D 1557 AT OPTIMUM MOISTURE CONTENT AND TO A MINIMUM DEPTH OF 12".

FILL, WHERE REQUIRED, SHALL BE PLACED IN LIFTS NOT TO EXCEED 8" LOOSE MEASURE AND SHALL BE COMPACTED AS OUTLINED ABOVE - THE ON SITE TESTING COMPANY SHALL PROVIDE TESTING AND INSPECTION OF THE SOIL WORK PRIOR TO PLACING CONCRETE.

DOOR HARDWARE SCHEDULE

- DOOR #1**
4'-0" x 7'-0" HOLLOW METAL DOOR (18 GA.), 2" FULLY WELDED FRAME (14 GA.), PAINT TO MATCH ADJACENT METAL PANELS.
DOOR HARDWARE TO HAVE US260 FINISH.
(1) SET NRP HINGES
(1) EXIT DEVICE
(1) STRIKE
(1) LATCH GUARD
(1) KEY CYLINDER
(1) THRESHOLD
(1) WEATHER STRIP SET
(1) CLOSER W/ HOLD OPEN
(1) ASTRAGAL
(1) SET PERIMETER GASKETS
(1) SWEEP
- DOOR #2**
6'-0" x 8'-0" COILING DOOR SYSTEM.
DOOR TO BE FACTORY-FINISHED, COLOR TO BE APPROVED BY ARCHITECT.
REQUIRED HARDWARE FURNISHED WITH OVERHEAD DOOR SYSTEM (LOCKING FROM INSIDE ONLY).



Know what's below
Call before you dig.



MICHAEL S. SUNDERMEYER
LICENSE NO. A-2014028855
EXP. 12/31/2020

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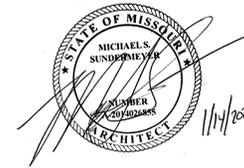
CAD DWG FILE: _____
DRAWN BY: ALH
CHECKED BY: MSS
DESIGNED BY: MSS

SHEET TITLE:
KEY PLAN AND FLOOR PLAN

SHEET NUMBER:

A-101

2 OF 6 SHEETS
01/14/2020



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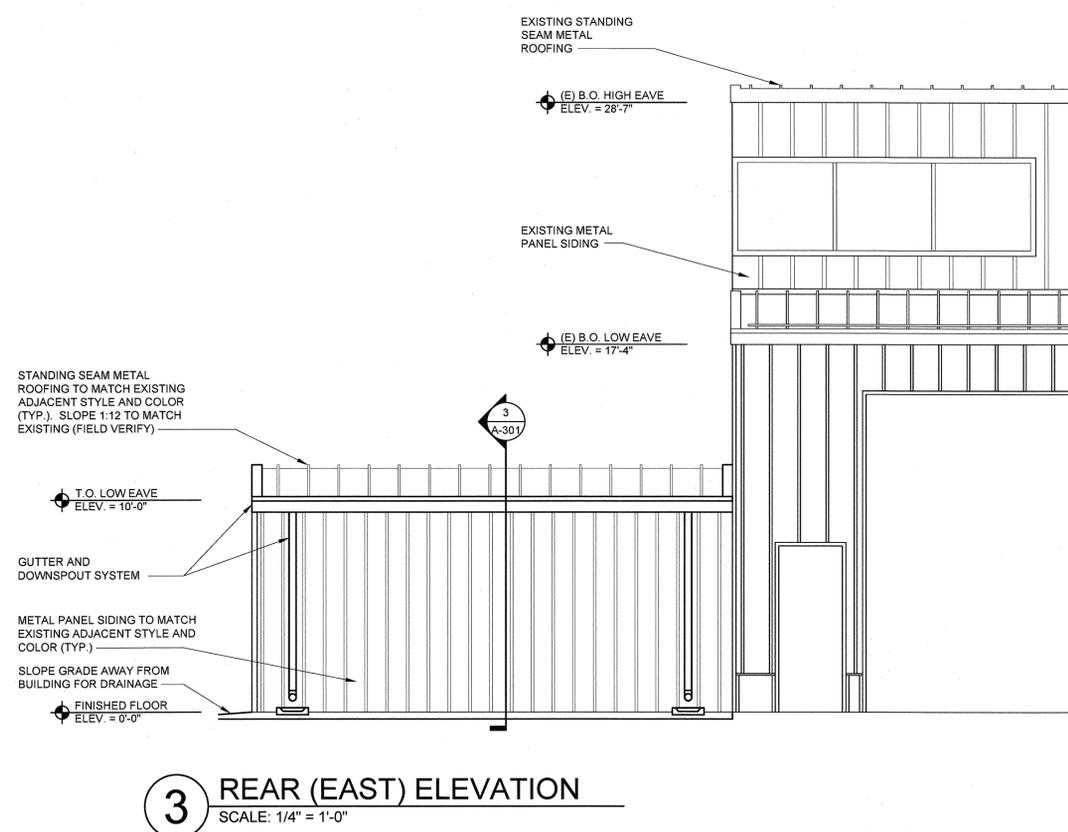
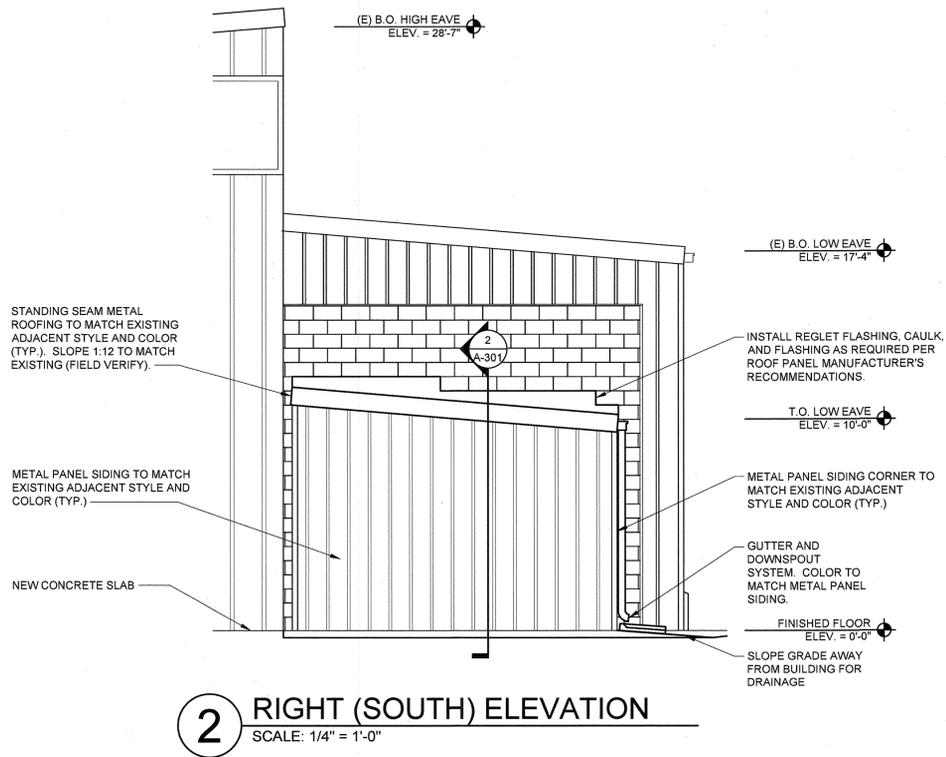
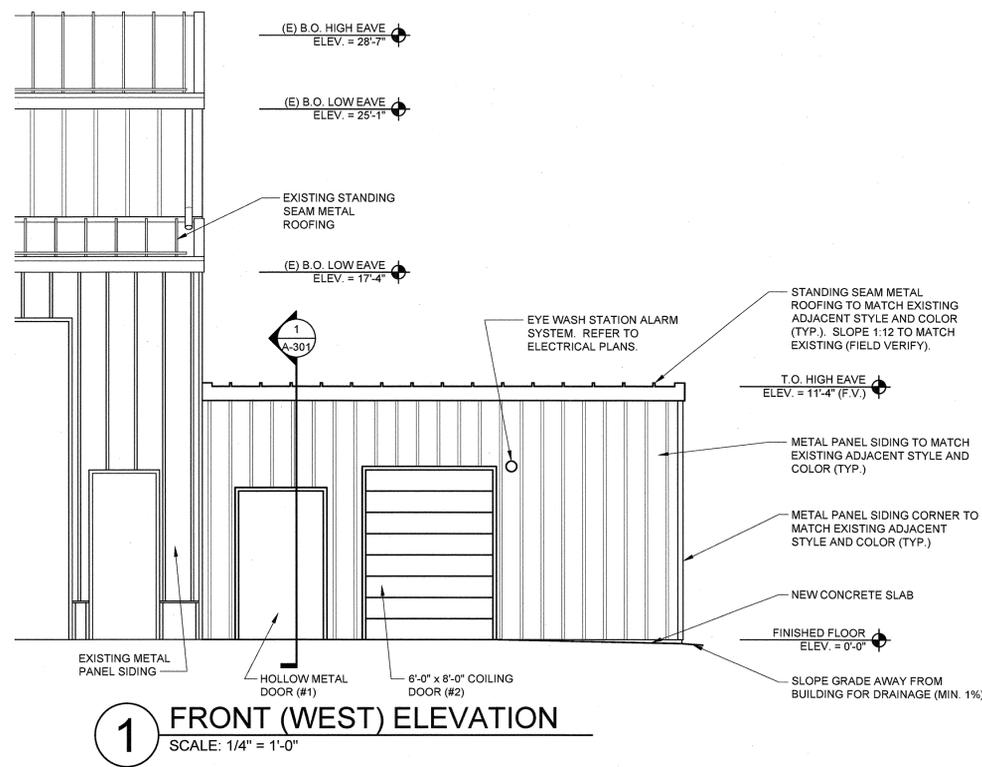
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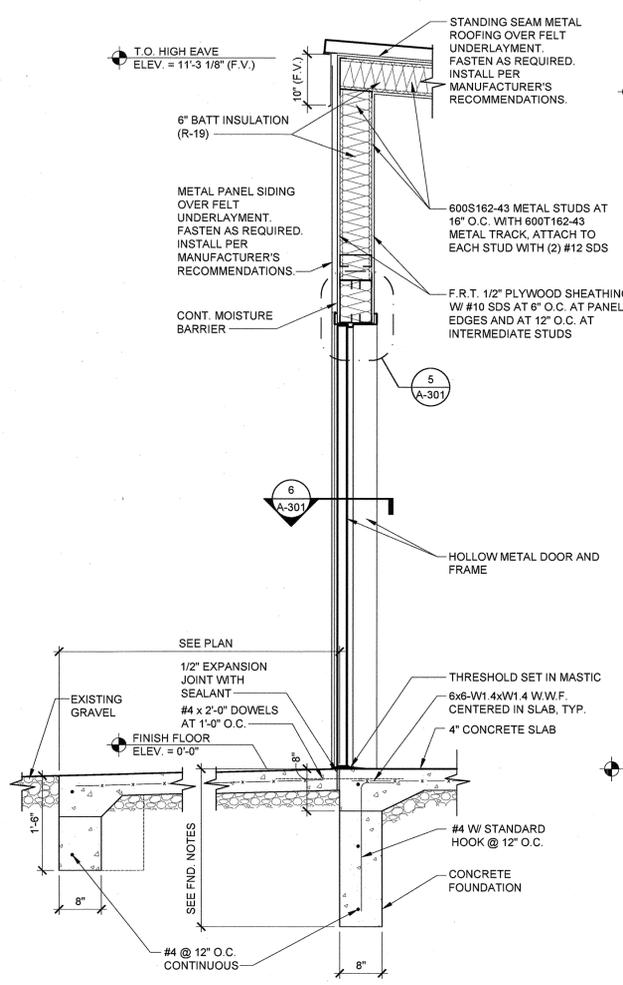
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ELEVATIONS

SHEET NUMBER:

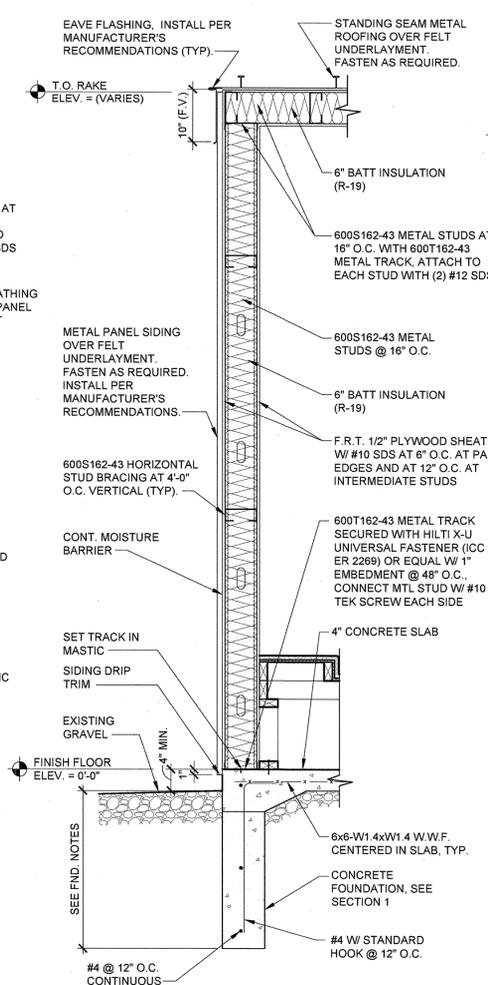
A-201

3 OF 6 SHEETS
01/14/2020

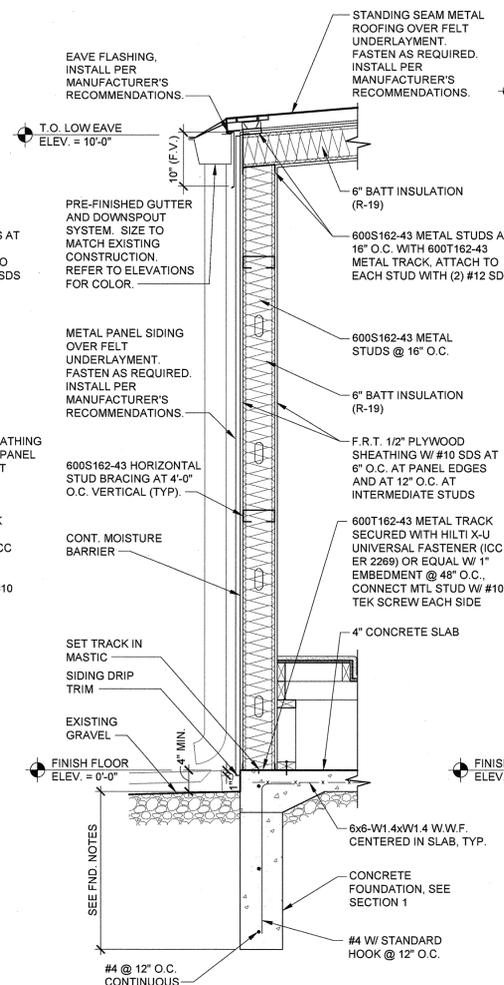




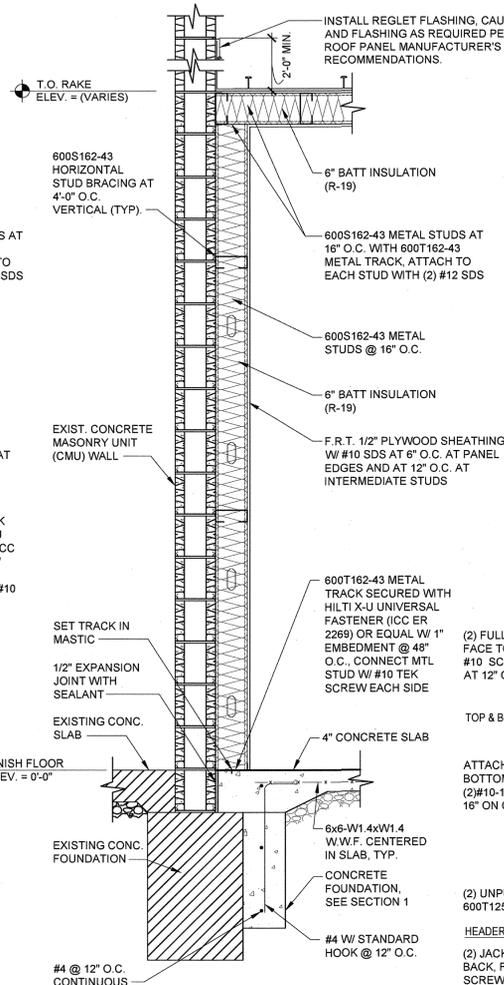
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SCALE: 3/4" = 1'-0"



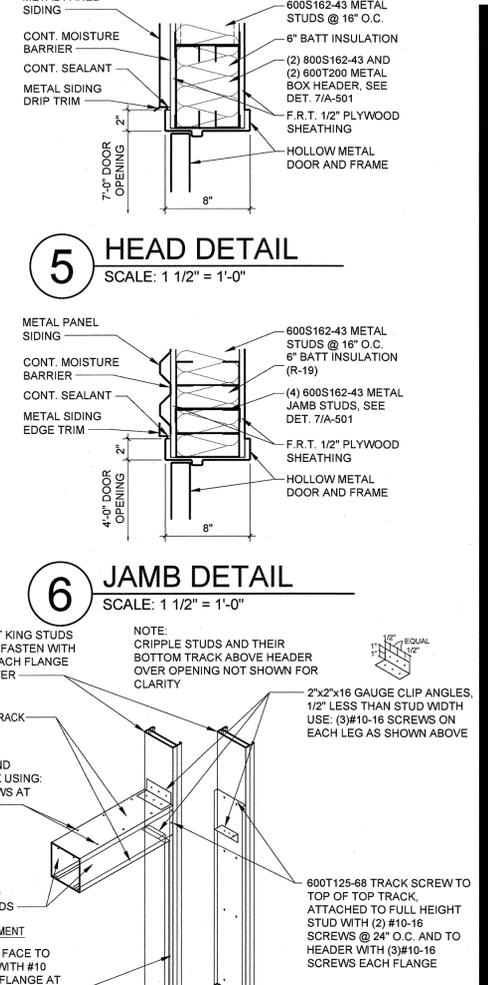
2 SECTION
SCALE: 3/4" = 1'-0"



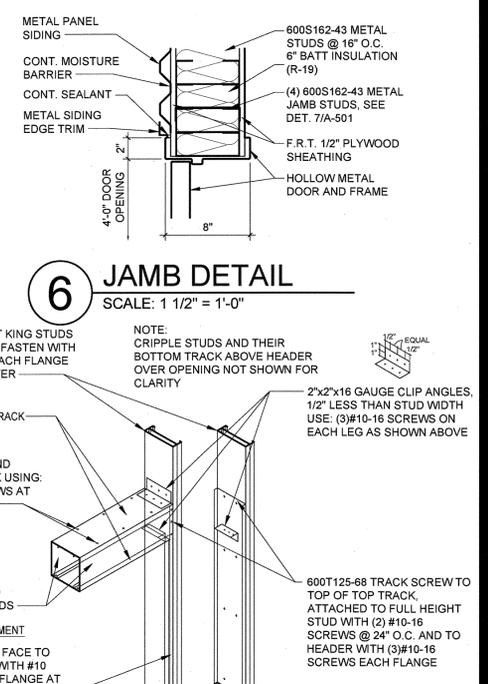
3 SECTION
SCALE: 3/4" = 1'-0"



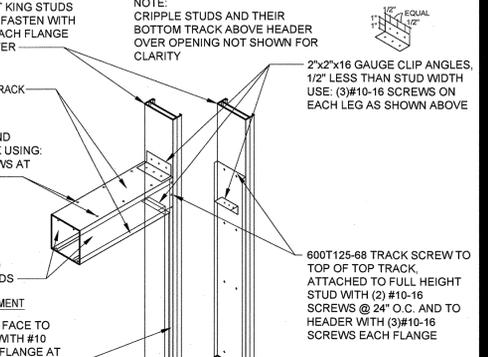
4 SECTION
SCALE: 3/4" = 1'-0"



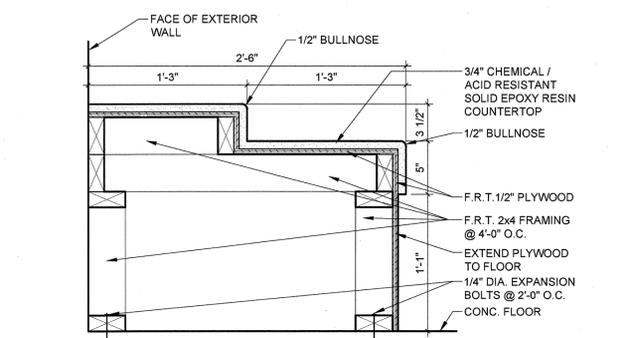
5 HEAD DETAIL
SCALE: 1 1/2" = 1'-0"



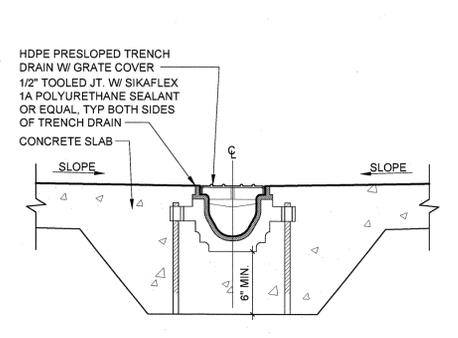
6 JAMB DETAIL
SCALE: 1 1/2" = 1'-0"



7 HEADER DETAIL
SCALE: 1/2" = 1'-0"



8 SHELF SECTION
SCALE: 1 1/2" = 1'-0"



9 TRENCH DRAIN DETAIL
SCALE: 1 1/2" = 1'-0"

FOUNDATION NOTES:

- THE BUILDING FOUNDATION AND SLAB ON GRADE HAVE BEEN DESIGNED AND DETAILED BASED ON THE FOLLOWING CRITERIA:
 - MAXIMUM TOTAL DESIGN UNIFORM WALL FOOTING LOAD = 1.0 KLF
 - MINIMUM NET ALLOWABLE SOIL BEARING PRESSURE = 1.5 KSF
 - MAXIMUM TOTAL SETTLEMENT = 1 INCH
 - MAXIMUM DIFFERENTIAL SETTLEMENT OVER A HORIZONTAL DISTANCE OF 50 FEET = 1/2 INCH
 - SUBGRADE MODULUS = 100 PCI
- THE BOTTOM OF EXTERIOR FOUNDATION SHALL BEAR A MINIMUM OF 30" BELOW LOWEST FINAL ADJACENT EXTERIOR GRADE.

CONCRETE:

- ALL CONCRETE SHALL BE NORMAL-WEIGHT (DENSITY=145 PCF) AND SHALL HAVE A 28-DAY COMPRESSIVE STRENGTH IN ACCORDANCE WITH THE FOLLOWING:

ALL FOUNDATIONS, INTERIOR SLAB	4000psi
ALL OTHER CONCRETE (U.N.O.)	3000psi
- THE SLUMP OF ALL CONCRETE SHALL NOT EXCEED 4" UNLESS A TYPE A MIDRANGE WATER-REDUCING ADMIXTURE IS USED. THE SLUMP OF CONCRETE PRIOR TO ADDITION OF A TYPE A MIDRANGE WATER-REDUCING ADMIXTURE SHALL NOT EXCEED 4".
- ALL EXTERIOR CONCRETE SHALL BE AIR-ENTRAINED WITH BETWEEN 4% AND 8%, AIR CONTENT.
- THE COARSE AGGREGATE SIZE SHALL BE #57 OR LARGER.
- THE MINIMUM PORTLAND CEMENT CONTENT (ASTM C150 TYPE I OR II) OF ALL CONCRETE SHALL CONFORM TO THE FOLLOWING TABLE (FLY ASH NOT PERMITTED).

SPECIFIED COMPRESSIVE STRENGTH (psi)	NON AIR-ENTRAINED CONCRETE (lbs.)	AIR-ENTRAINED CONCRETE (lbs.)
3000	470	517
4000	564	611

- THE CONTRACTOR SHALL SUBMIT CONCRETE MIX DESIGNS FOR REVIEW A MINIMUM OF 15 CALENDAR DAYS PRIOR TO THE PLACEMENT OF ANY CONCRETE. THE CONCRETE MIX DESIGNS SHALL INCLUDE ALL STRENGTH DATA NECESSARY TO SHOW COMPLIANCE WITH THE PROJECT SPECIFICATIONS FOR EITHER THE TRIAL BATCH OR FIELD EXPERIENCE METHOD.
- CONCRETE REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60, UNLESS NOTED OTHERWISE.
- CONCRETE REINFORCING STEEL TO BE WELDED SHALL CONFORM TO ASTM A706.
- WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185.
- ALL REINFORCING SHALL BE DETAILED, FABRICATED, AND PLACED IN ACCORDANCE WITH THE LATEST EDITION OF THE AMERICAN CONCRETE INSTITUTE DETAILING MANUAL.
- ALL REINFORCING SHALL BE SUPPORTED IN FORMS, SPACED WITH NECESSARY ACCESSORIES AND SHALL BE SECURELY WIRED TOGETHER, IN ACCORDANCE WITH THE LATEST EDITION OF THE CRSI "MANUAL OF STANDARD PRACTICE".
- THE MINIMUM CONCRETE CLEAR COVER OVER REINFORCING STEEL, UNLESS NOTED OTHERWISE, SHALL BE:

UNFORMED SURFACE IN CONTACT WITH THE GROUND	3 IN.
FORMED SURFACES EXPOSED TO EARTH OR WEATHER:	
#5 BARS AND SMALLER	1 1/2 IN.
SLABS, WALLS, AND JOISTS:	
#11 BARS AND SMALLER	3/4 IN.
- ALL BASE PLATES, ANCHOR BOLTS, SUPPORT ANGLES, ETC., WHICH ARE BELOW GRADE SHALL BE COVERED WITH A MINIMUM OF 3" OF CONCRETE.
- ALL LAP SPLICES SHALL BE IN ACCORDANCE WITH THAT SHOWN ON THE DRAWINGS.

STATE OF MISSOURI
MICHAEL L. PARSON,
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CHECKED BY: MSS
DESIGNED BY: MSS

SHEET TITLE:
**SECTIONS
& DETAILS**

SHEET NUMBER:
A-301
4 OF 6 SHEETS
01/14/2020

ELECTRICAL SYMBOLS (NOT ALL SYMBOLS ARE USED)

LIGHTING	CONDUIT	SWITCHES
<p>QTY. CKT. (1) ? LP-1a FIXT. TYPE SWITCH</p> <p>2' x 4' LIGHT FIXTURE</p> <p>1' x 4' LIGHT FIXTURE</p> <p>DOWN LIGHT</p> <p>PENDANT LIGHT</p> <p>90 MIN BATTERY BACK-UP EMERGENCY SIGN WITH LIGHT HEADS</p> <p>90 MIN BATTERY BACK-UP EXIT SIGN</p> <p>90 MIN BATTERY BACK-UP EXIT LIGHT WITH HEADS</p> <p>EXTERIOR 90 MIN BATTERY BACK-UP EMERGENCY HEADS FED FROM INTERIOR EXIT LIGHT</p>	<p>CONDUIT CONCEALED IN WALLS OR CEILING</p> <p>CONDUIT UNDER GROUND</p> <p>HOME RUN</p> <p>GROUND</p>	<p>§ a SINGLE POLE SWITCH, 48" AFF TO CENTER UNO, LOWER CASE LETTERING INDICATES SWITCH LEG</p> <p>OS a OCCUPANCY SENSOR HUBBELL # OMNI-US SERIES WITH UV-PP POWER PACK, CEILING MOUNTED. LOWER CASE LETTERING INDICATES SWITCH LEG. WHEN PROVIDED IN COMBINATION WITH WALL SWITCHES, OCCUPANCY SENSOR SHALL BE CIRCUITED ON LINE-SIDE</p> <p>§ OS a OCCUPANCY SENSOR WALL MOUNTED HUBBELL # LHDT SERIES, LOWER CASE LETTERING INDICATES SWITCH LEG.</p> <p>§ OS 3 a OCCUPANCY SENSOR 3 WAY WALL MOUNTED # WS2000W LOWER CASE LETTERING INDICATES SWITCH LEG</p> <p>V VOLUME CONTROL MOUNTED ON WALL AT 48" AFF</p>
	POWER AND CONTROLS	GENERAL
	<p>PANELBOARD</p> <p>TRANSFORMER</p> <p>DISCONNECT SWITCH</p>	<p>RTU 1 EQUIPMENT CALL OUT</p> <p>#ELECT KEYED NOTE DESIGNATION</p> <p>! REVISION SYMBOL</p>
MISCELLANEOUS	RECEPTACLES	
<p>JUNCTION BOX MOUNT ON WALL AT 18" AFF UNO</p> <p>TELEPHONE WALL BOX 18" AFF UNO STUB 3/4" CONDUIT UP INTO ACCESSIBLE CEILING AREA WITH INSULATED BUSHING, PROVIDE PULL WIRE</p> <p>PHONE/DATA WALL BOX 18" AFF UNO STUB 3/4" CONDUIT UP INTO ACCESSIBLE CEILING AREA WITH INSULATED BUSHING, PROVIDE PULL WIRE</p> <p>DATA WALL BOX 18" AFF UNO STUB 3/4" CONDUIT UP INTO ACCESSIBLE CEILING AREA WITH INSULATED BUSHING, PROVIDE PULL WIRE</p> <p>FLOOR MOUNTED PHONE BOX</p> <p>MOTOR</p> <p>PUSH BUTTON MOUNTED ON WALL AT 48" AFF</p> <p>DOOR BUZZER OR BELL</p> <p>PHOTOCELL</p> <p>CEILING PADDLE FAN</p>	<p>DUPLEX RECEPTACLE 18" AFF TO CENTER, UNO.</p> <p>QUAD RECEPTACLE 18" AFF TO CENTER, UNO.</p> <p>GFIC DUPLEX RECEPTACLE 18" AFF TO CENTER, UNO</p> <p>GFIC QUAD RECEPTACLE 18" AFF TO CENTER, UNO.</p> <p>FLUSH FLOOR MOUNTED RECEPTACLE</p> <p>SINGLE RECEPTACLE 18" AFF TO CENTER, (CLOCK) UNO.</p> <p>SPECIAL RECEPTACLE</p>	

ABBREVIATIONS (NOTE: NOT ALL ABBREVIATIONS ARE USED)			
AFF	ABOVE FINISHED FLOOR	EWC	ELECTRIC WATER COOLER
AL	ALUMINUM	EXIST'G	EXISTING
AMP	AMPERE	GFCT OR GFI	GROUND FAULT CURRENT INTERRUPTER
ATS	AUTO-TRANSFER-SWITCH	GRS	GALVANIZED RIGID STEEL CONDUIT
BFG	BELOW FINISHED GRADE	FL	FLOOR
BLDG	BUILDING	FLUOR	FLUORESCENT
CB	CIRCUIT BREAKER	GND OR (G)	GROUND
CKT	CIRCUIT	IG	ISOLATED GROUND
CLG	CEILING	JB	JUNCTION BOX
COND OR "C"	CONDUIT	MCB	MAIN CIRCUIT BREAKER
CONN	CONNECT	MDP	MAIN DISTRIBUTION PANEL
CONT	CONTRACTOR	MLO	MAIN LUG ONLY
CU	COPPER	MTD HT	MOUNTING HEIGHT
C/T	CURRENT TRANSFORMER	NF	NON FUSED
DIM	DIMMER	NIC	NOT IN CONTRACT
DISCSW	DISCONNECT SWITCH	RTU	ROOF TOP UNIT
DP	DOUBLE POLE	SW	SWITCH
DT	DOUBLE THROW	UG	UNDER GROUND
DPP	DISTRIBUTION POWER PANEL	UNO	UNLESS NOTED OTHERWISE
EC	ELECTRICAL CONTRACTOR	VIF	VERIFY IN FIELD
EF	EXHAUST FAN	W/P	WEATHER-PROOF
EM	EMERGENCY	XFMR	TRANSFORMER

ELECTRICAL SPECIFICATIONS

1. GENERAL
 - A. CONTRACTOR SHALL OBTAIN ALL PERMITS AND PAY ALL FEES REQUIRED FOR THE EXECUTION OF THE WORK.
 - B. THE WORK SHALL INCLUDE FURNISHING ALL LABOR, MATERIAL, EQUIPMENT AND SERVICES TO CONSTRUCT AND INSTALL THE EQUIPMENT AND SYSTEMS NECESSARY TO COMPLETE THE WORK INDICATED ON DRAWINGS.
 - C. IT IS THE INTENT OF THESE PLANS AND SPECIFICATIONS TO PROVIDE A WORKING INSTALLATION IN EVERY DETAIL AND ALL ITEMS REQUIRED FOR SUCH AN INSTALLATION SHALL BE FURNISHED WHETHER OR NOT SPECIFICALLY SHOWN OR MENTIONED.
 - D. THE INSTALLATION SHALL COMPLY WITH THE APPLICABLE ORDINANCES OF THE LOCAL AUTHORITIES, ALL STATE REQUIREMENTS, THE REGULATIONS OF THE NATIONAL BOARD OF FIRE UNDERWRITERS AND THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE.
 - E. BEFORE SUBMITTING THE BID, THE CONTRACTOR SHALL VISIT THE SITE AND BE SATISFIED AS TO THE NATURE AND LOCATION OF THE WORK AND THE GENERAL CONDITIONS. CONTRACTOR SHALL HAVE FULL KNOWLEDGE AS TO TRANSPORTATION, DISPOSAL, HANDLING AND STORAGE OF MATERIALS, AVAILABILITY OF WATER, ELECTRIC POWER AND ALL OTHER FACILITIES IN THE AREA WHICH WILL HAVE A BEARING ON THE PERFORMANCE OF THE WORK AND THE CONTRACT FOR WHICH THE BID IS SUBMITTED. FAILURE BY THE CONTRACTOR TO BE ACQUAINTED WITH ALL AVAILABLE INFORMATION SHALL NOT RELIEVE THE CONTRACTOR OF ANY RESPONSIBILITY FOR PERFORMING THE WORK PROPERLY. ADDITIONAL COMPENSATION SHALL NOT BE ALLOWED FOR CONDITIONS INCREASING THE CONTRACTOR'S COST, WHERE THE CONDITION WAS OBVIOUS AND COULD HAVE BEEN DISCOVERED DURING THE SITE VISIT.
 - F. "NIC" MEANS NOT IN CONTRACT. NO NEW WORK.
2. WIRING
 - A. ALL BUILDING WIRE SHALL BE 600 VOLTS COPPER, TYPE THWN OR THW, UNLESS SPECIFIED OTHERWISE ON THE DRAWINGS. THE MINIMUM SIZE CONDUCTOR FOR LIGHTING, POWER AND CONTROL SHALL BE NUMBER 12 AWG.
3. CONDUIT
 - A. CONDUITS MUST BE RIGID OR INTERMEDIATE METAL CONDUIT (IMC) FROM FINISH FLOOR TO A POINT 5'-0" ABOVE FINISH FLOOR IF EXPOSED, OTHERWISE CONDUIT MAY BE GALVANIZED THIN WALL CONDUIT OR ELECTRO-METALLIC TUBING (EMT). CONDUIT BELOW FLOOR MAY BE PVC. PVC CONDUIT MUST BE COUPLED TO RIGID STEEL BEFORE RISING THRU SLAB. PVC NOT PERMITTED ABOVE SLAB.
 - B. CONDUIT IS TO BE RUN EITHER PARALLEL OR PERPENDICULAR TO ONE SIDE OF BUILDING, AND AS HIGH AS POSSIBLE, CONCEALED ABOVE THE CEILING. WHERE CONDUIT CANNOT BE CONCEALED ABOVE THE CEILING, CONTRACTOR SHALL NOTIFY OWNER FOR DIRECTION. CONDUIT SHALL NOT BE ROUTED EXPOSED ABOVE THE ROOF DECK.
 - C. COMMERCIAL METAL DEVICES THAT WILL HOLD PERMANENTLY SHALL BE USED IN ANCHORING CONDUIT TO MASONRY OR CONCRETE. WOODEN PLUGS WILL NOT BE PERMITTED, AND THE ROOF DECK SHALL NOT BE PENETRATED.
 - D. ALL CONDUIT SHALL BE MINIMUM 1/2", UNLESS OTHERWISE NOTED, AND AS REQUIRED BY THE NEC CONDUIT FILL TABLES.
 - E. THE USE OF ROMEX SHALL NOT BE PERMITTED.
 - F. FINAL CONNECTION TO ROOF TOP EQUIPMENT MAY BE MADE WITH FLEXIBLE CONDUIT PER CODE
 - G. IF ROOF PENETRATIONS ARE REQUIRED TO SERVICE THE RTU'S, THE CONTRACTOR SHALL EMPLOY A ROOFING CONTRACTOR. PROVIDE WEATHER TIGHT PITCH POCKETS AND EXTEND GRS CONDUIT AND SEAL TIGHT TO RTU DISCONNECTS ETC..
4. POWER EQUIPMENT
 - A. ALL NEW POWER EQUIPMENT SHALL BE COMPATIBLE WITH EXISTING EQUIPMENT.
 - B. NEW PANEL BOARD SHALL BE SQUARE "D" I-LINE SERIES, EATON, GE, OR SIEMENS.
 - C. SAFETY SWITCHES SHALL BE NEMA 3R, HEAVY DUTY, AS MANUFACTURED BY SQUARE "D", EATON, GE, OR SIEMENS.
5. POWER
 - A. THE CONTRACTOR SHALL PROVIDE ALL POWER DEVICES AS SHOWN ON THE DRAWINGS, IN COMPLIANCE WITH ALL OTHER NOTES SHOWN ON THE DRAWINGS, AND CONNECT AS SHOWN ON THE DRAWINGS.

GENERAL NOTES

- A. CONTRACTOR SHALL COORDINATE WITH ALL OTHER TRADES AND VERIFY REQUIREMENTS OF MECHANICAL EQUIPMENT WITH MECHANICAL DRAWINGS AND SHALL PROVIDE ALL ITEMS REQUIRED BY THESE TRADES FOR A COMPLETE INSTALLATION. IF CONFLICT OCCURS DUE TO THIS CONTRACTOR'S LACK OF COORDINATION WITH OTHER TRADES, ALL WORK INVOLVED IN RESOLVING THE CONFLICT WILL BE AT THE EXPENSE OF THIS CONTRACTOR.
- B. OVER-CURRENT PROTECTION AND DISCONNECT MEANS SHALL BE INSTALLED ON ALL MOTORS TO COMPLY WITH CODE.
- C. ALL DISCONNECT SWITCHES SHALL BE HORSEPOWER RATED FOR THE MOTOR CONNECTED.
- D. FLUORESCENT AND HID BALLASTS, AND LED DRIVERS SHALL COMPLY WITH ALL APPLICABLE STANDARDS AND CODES.
- E. ELECTRICAL WORK AND MATERIALS SHALL COMPLY WITH LATEST NEC AND ALL LOCAL CODES AND ORDINANCES. IN CASE OF CONFLICT AMONG REQUIREMENTS, THE MORE RESTRICTIVE SHALL APPLY.
- F. LIGHTING FIXTURES AND ELECTRICAL DEVICES FOR USE OUTSIDE THE BUILDING SHALL BE WEATHERPROOF.
- G. GROUND ELECTRICAL EQUIPMENT PER NEC AND LOCAL CODE REQUIREMENTS.
- H. ALL CONDUCTORS SHALL BE # 12 AWG MINIMUM. EXCEPT AS OTHERWISE NOTED OR AS REQUIRED FOR VOLTAGE DROP. ALL CONDUIT TO BE ONE-HALF INCH (1/2") MINIMUM EXCEPT AS OTHERWISE NOTED.
- I. MEMBRANE PENETRATIONS OF ONE (1) HOUR FIRE BARRIER WALL BY STEEL ELECTRICAL BOXES ARE NOT TO EXCEED SIXTEEN (16) SQUARE INCHES IN AREA, PROVIDED THE AGGREGATE AREA OF THE OPENING THROUGH THE MEMBRANE DOES NOT EXCEED ONE-HUNDRED (100) SQUARE FEET OF WALL AREA. THE ANNULAR SPACE BETWEEN THE WALL MEMBRANE AND THE BOX SHALL NOT EXCEED ONE-EIGHTH (1/8") OF AN INCH. BOXES ON OPPOSING SIDES OF A PARTITION SHALL BE SEPARATED BY A HORIZONTAL DISTANCE OF NOT LESS THAN TWENTY-FOUR (24") INCHES.
- J. CONTRACTOR TO PROVIDE WARNING CABLE ON ALL ELECTRICAL EQUIPMENT (SWITCH BOARDS, PANEL BOARDS, INDUSTRIAL CONTROL PANELS, METER SOCKET ENCLOSURES, AND MOTOR CONTROL CENTERS) TO NOTIFY QUALIFIED PERSONS OF POTENTIAL ELECTRIC ARC FLASH HAZARDS PER NEC 110.16.
- K. ALL CIRCUITRY IN EXPOSED OPEN CEILING SHALL BE IN METAL CONDUIT PAINTED TO MATCH CEILING, ABSOLUTELY NO ROMEX OR FLEX CONDUIT ALLOWED.

**STATE OF MISSOURI
MICHAEL L. PARSON,
GOVERNOR**



Auman, Harry J.
License No. E16827
Expiration Date 12/31/20

**OFFICE OF ADMINISTRATION
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DESIGN AND CONSTRUCTION**

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**CONSTRUCT
BATTERY ROOM**

TRENTON FIELD
MAINTENANCE SHOP
901 INDUSTRIAL DRIVE
TRENTON, MO 64683

PROJECT # T2026-01
SITE # 6256
FACILITY # 8136256006

REVISION: _____
DATE: _____
REVISION: _____
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DATE: _____
ISSUE DATE: 01/14/2020

CAD DWG FILE: T2026 01
DRAWN BY: DAW
CHECKED BY: HJA
DESIGNED BY: HJA

SHEET TITLE:
**SYMBOLS AND
NOTES PLAN**

SHEET NUMBER:

E-001

5 OF 6 SHEETS
01/14/2020



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CAD DWG FILE:
DRAWN BY: DAW
CHECKED BY: HJA
DESIGNED BY: HJA

SHEET TITLE:
ELECTRICAL PLAN

SHEET NUMBER:

E-101

6 OF 6 SHEETS
01/14/2020

VOLTAGE DROP CALCULATIONS

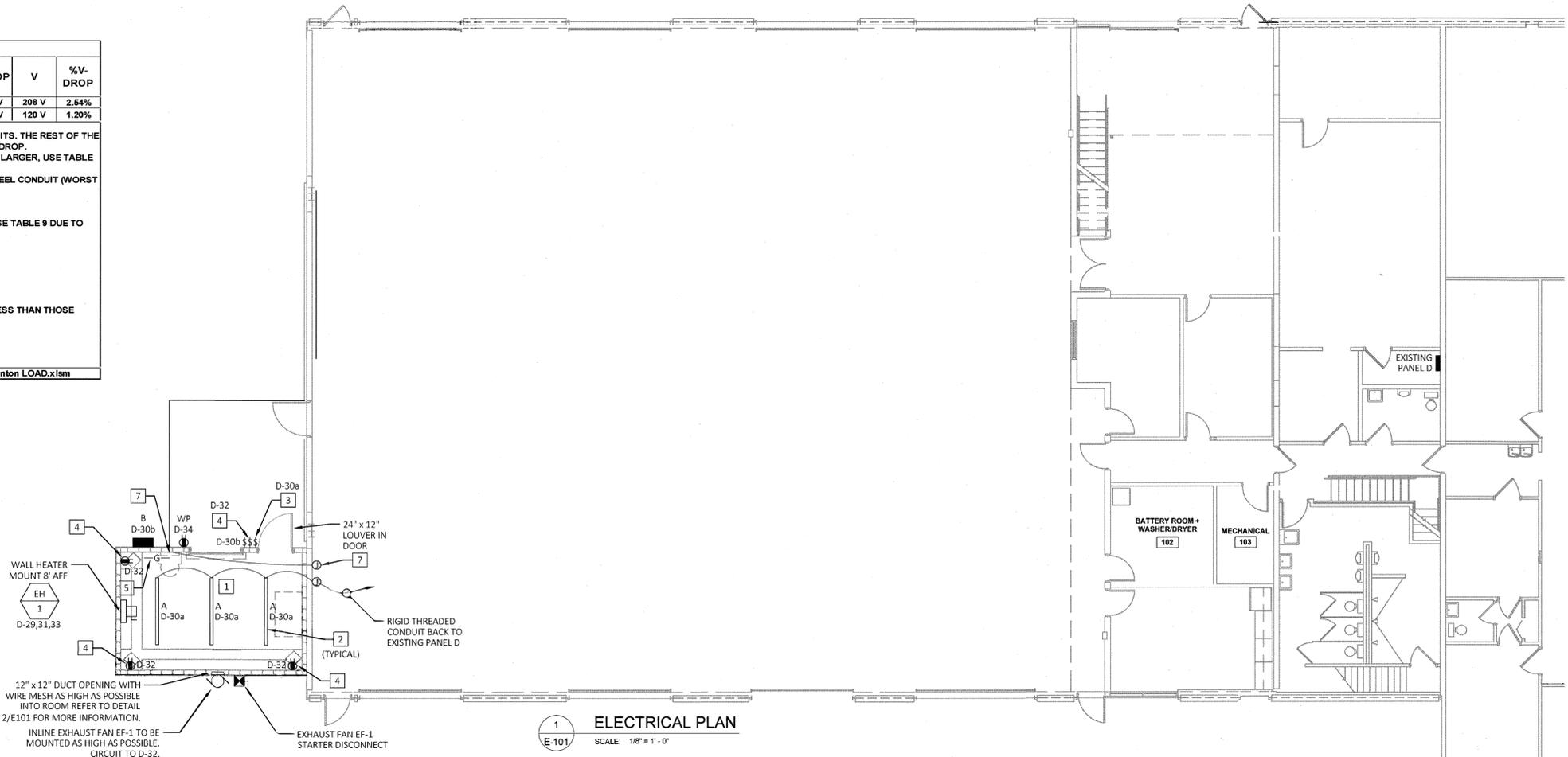
PANEL/ LOAD	FEEDER			OHMS/K-FT NEC TABLES	LENGTH	Z	LOAD	V-DROP	V	%V- DROP
	AWG	SETS	CU/AL PH							
D-29,31,33	#8	1	CU 3	0.700 OHM/K-FT	210 FT	0.1470 OHM	36 A	5.29 V	208 V	2.54%
D-36	#6	1	CU 1	0.491 OHM/K-FT	220 FT	0.2160 OHM	7 A	1.44 V	120 V	1.20%

NOTES:
LOADS D-29, 31, 33 (LARGEST LOAD) AND D-36 (LONGEST) REPRESENT WORST CASE BRANCH CIRCUITS. THE REST OF THE DISTRIBUTION SYSTEM IS EXISTING TO REMAIN AND IS ASSUMED TO BE LESS THAN 2% VOLTAGE DROP.
1-PHASE V-DROP CALC IS BASED ON NEC TABLE 8, DC RESISTANCE, UNCOATED WIRES. IF #10 OR LARGER, USE TABLE 9 DUE TO SKIN EFFECT.
3-PHASE V-DROP CALC IS BASED ON NEC TABLE 9, EFFECTIVE Z AT 0.85 PF, UNCOATED WIRES, STEEL CONDUIT (WORST CASE).

EQUATIONS:
Z (1-PH) = (TABLE 8 OHMS/K-FT) * (K-FT/1000) * (LENGTH) * (2) / (SETS) - NOTE: IF #10 OR LARGER, USE TABLE 9 DUE TO SKIN EFFECT
Z (3-PH) = (TABLE 9 OHMS/K-FT) * (K-FT/1000) * (LENGTH) / (SETS)
V-DROP = Z * LOAD

VOLTAGE DROPS:
2% MAXIMUM FOR FEEDERS
UP TO 3% MAXIMUM FOR BRANCH CIRCUITS
MINIMUM WIRE SIZE SHALL BE #12. FOR ALL 20A BRANCH CIRCUITS, WIRE SIZES SHALL BE NOT LESS THAN THOSE SPECIFIED BELOW:
A. UP TO 60' : #12
B. 61' TO 95' : #10
C. 96' TO 150' : #8
D. 151' TO 230' : #6

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

ELECTRIC HEATER SCHEDULE (BASIS OF DESIGN)

SYMBOL	AREA	MFGR	MODEL NO.	INPUT	MBH	MOTOR RPM	VOLTS	PHASE	AMPS	CFM
EH-1	BATTERY ROOM	Q-MARK	MUH-07-8	7.5 KW	25.6	1600	208	3Ø	36.0	650

OPTIONS:
1. BTD: WALL MOUNTING BRACKET
2. MFD525: DISCONNECT SWITCH
3. UHMT1: THERMOSTAT

INLINE EXHAUST FAN SCHEDULE (BASIS OF DESIGN)

EF	MANUFACTURER	MODEL	CFM	ESP	FAN RPM	DRIVE	MOTOR		WEIGHT (LBS)
							HP	VOLTS/PHASE	
1	GREENHECK	BSQ-80-4	350	0.3	1228	BELT	1/2	115/1	97

NOTES:
1. FAN SUSPENDED FROM THE STRUCTURE ABOVE
2. FACTORY PROVIDED DISCONNECT SWITCH
3. GRAVITY DAMPER, INLINE, NOT COATED
4. ALUMINUM FAN HOUSING
5. ALUMINUM MOTOR COVER
6. VIBRATION ISOLATORS AND BRACKETS
7. MOTOR ENCLOSURE TO BE TOTALLY ENCLOSED FAN COOLED (TEFC)
8. MOTOR TO BE EXTERNAL TO AIR STREAM
9. FAN SHALL BE ON WHEN LIGHT SWITCH IS ON OR THE BATTERY CHARGING STATION IS ACTIVE

LOUVER SCHEDULE (BASIS OF DESIGN)

UNIT DESIGNATION	L-1
SERVICE	EXHAUST
MANUFACTURER	GREENHECK
MODEL NO.	ESD-435
FINISH	KYNAR 70%
BLADE ORIENTATION	HORIZONTAL
BLADE MATERIAL	ALUMINUM
BLADE THICKNESS-IN.	0.081"
FRAME TYPE	CHANNEL
FRAME MATERIAL	ALUMINUM
NOMINAL SIZE (W X H)-IN	14X14
CFM	350
FREE AREA (FT^2)	0.43
FREE AREA VELOCITY (FPM)	813
MAX. PRESSURE DROP-IN. WG	0.09

REMARKS:
1. COORDINATE ALL FINISH COLORS WITH ARCHITECT PRIOR TO ORDERING.
2. ALUMINUM BIRDSCREEN.
3. ALUMINUM INSECT SCREEN

LIGHTING FIXTURE SCHEDULE

PLAN MARK	MANUFACTURER	CATALOG NO.	LAMP DATA	REMARKS AND MOUNTING HEIGHT TO BOTTOM OF LIGHT FIXTURE	FIXTURE WATTAGE	FIXTURE QUANTITY
A	METALUX (BASIS OF DESIGN)	FIXTURE: 4V12-LD4-B-DR-WJUNV4EL10W-L840-CD1-WL-U-CHAIN-VT2-CHAINSET-U	LED FURNISHED WITH FIXTURE	8' x 7" x 6" H CHAIN MOUNTED STRIP LIGHT, WET LOCATION LISTED, 8000 LUMENS, 4000K COLOR TEMPERATURE, 10W EMERGENCY BATTERY	105	3
A	LSI (APPROVED EQUAL)	FIXTURE: EG3-8-LED-11L-DA-S-UNV-DIM40-80-EM-EGC	LED FURNISHED WITH FIXTURE	8' x 7" x 5" H CHAIN MOUNTED STRIP LIGHT, WET LOCATION LISTED, 10650 LUMENS, 4000K COLOR TEMPERATURE, 1400 LUMEN EMERGENCY BATTERY	75	3
A	RAB (APPROVED EQUAL)	FIXTURE: SHARK-8-70W-W4-D10-E2-CHAIN-MOUNTING-BRACKET-VHOOKSHARK8	LED FURNISHED WITH FIXTURE	8' x 6" x 5" H CHAIN MOUNTED STRIP LIGHT, DAMP LOCATION LISTED, 10162 LUMENS, 4000K COLOR TEMPERATURE, EMERGENCY BATTERY BACKUP	74	3
B	METALUX (BASIS OF DESIGN)	IST-AF-450-LED-E1-T4FT-BZ-P(120V)	LED FURNISHED WITH FIXTURE	17" x 9" x 7" H WALL PACK, WET LOCATION LISTED, 3250 LUMENS, 4000K COLOR TEMPERATURE, PHOTOCELL	26	1
B	LSI (APPROVED EQUAL)	MCOWP-27W-45K-BZ-PC120	LED FURNISHED WITH FIXTURE	9" x 10" x 8" H WALL PACK, WET LOCATION LISTED, 3411 LUMENS, 4500K COLOR TEMPERATURE, PHOTOCELL	27	1
B	LITHONIA (APPROVED EQUAL)	WDGE2 LED-P3SW-40K-80CRI-VF-AMOLT-SRM-BBW-PE-DOBXD	LED FURNISHED WITH FIXTURE	12" x 7" x 9" H WALL PACK, WET LOCATION LISTED, 3132 LUMENS, 4000K COLOR TEMPERATURE, PHOTOCELL	23	1

**** LAMPS: LED; I - INCANDESCENT; F - FLUORESCENT; CF - COMPACT FLUORESCENT; MH - METAL HALIDE**

NOTE:
A. LIGHT FIXTURE QUANTITIES ARE APPROXIMATE CONTRACTOR IS RESPONSIBLE FOR VERIFYING FIXTURE COUNT PER PLANS
B. CONTRACTOR SHALL INCLUDE ALL HARDWARE, BOXES, WIRING, AND CONDUIT EXTENSIONS NECESSARY FOR A COMPLETE INSTALLATION.
C. CONTRACTOR SHALL PROVIDE ALL INCIDENTAL WIRING REQUIRED FOR CONTROL. THIS SHALL INCLUDE LOW VOLTAGE WIRING SENSORS, POWER PACKS, ETC. DIMMING OF FIXTURES IS NOT REQUIRED UNO.

CONTROL	MOUNT: SURFACE		120/208	3-PHASE, 4W	PANEL D	CAPACITY: 400A	INT CAP: EXISTING					
	LOCATION: BACK OF BLDG.	DEMAND LOAD: 34A						AV. FAULT: EXISTING				
CKT	LTG	REC	HVAC	MISC	NP	DESCRIPTION	LTG	REC	HVAC	MISC	NP	CKT
1						EXHAUST FAN						2
3						OVERHEAD CRANE						4
5												6
7						WELDER RECCP						8
9												10
11												12
13						SPARE						14
15						SPARE						16
17						SPARE						18
19						SPARE						20
21						PROVISION						22
23						PROVISION						24
25						SPARE						26
27						HAZARD MAT BUILD						28
29						EH 1						30
31												32
33												34
35						PROVISION						36
37						PROVISION						38
39						PROVISION						40
41						PROVISION						42
						POWER WASHER						44
												46
												48

PHASE BALANCE	LOAD	%	LOAD TYPE	CONNECTED	DEMAND	DEMAND FORMULA	TOTAL LOAD	
							CONNECTED	DEMAND
	4.0 KVA	33%	HVAC	13.8 KVA	11.0 KVA	LOAD X 125% NEC 210.19 CONTINUOUS	14.8 KVA	12.1 KVA
	3.6 KVA	30%	MISC	0.0 KVA	0.0 KVA	LOAD X 80% (USED MCA IN CALCULATION)	41.1A	33.6A
	4.5 KVA	37%	NP	0.0 KVA	0.0 KVA	LOAD X 100% NEC 210.19 NON-CONT.		
						0 NONCOINCIDENTAL LOADS NEC 220.60	919469 Trenton LOAD.xlsm	

NOTES:
A. THIS IS AN EXISTING PANEL. NEW WORK IS REPRESENTED IN "BOLD".
B. PROVIDE STARTER. SEE CONTROL SCHEMATIC DETAIL 2/E101.
C. ADDITIONAL DEMAND LOAD: 33.6A

EQUIPMENT SCHEDULE

PLAN MARK	EQUIPMENT SERVED	LOAD	VOLT/ PHASE	FED BY	DISC BY	MCA	MCCPD	FEEDER	REMARKS
EH 1	ELECTRICAL WALL HEATER	12.97KVA	208/3	PNL D	EC	36.0A	40A	(3)#8,#10G 3/4" C	

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