edm

architecture
engineering
management

ELECTRIC VEHICLE CHARGING STATION PROGRAM

The City *of*
WORCESTER

Worcester, Ma

issued for: BID SET
date: 04.07.2022
project no. : cow 5790

electrical engineer:

edm
1801 6th Avenue
Suite 200
troy, ny 12180

contact: Jeremy Barnes
(518) 272-0274
(413) 443-6057 fax
jbarnes@edm-ae.com

electrical legend

POWER

- SPECIAL RECEPTACLE (SEE TABLE)
- DUPLEX RECEPTACLE, SUBSCRIPT INDICATES TYPE: Tx
- QUAD RECEPTACLE, SUBSCRIPT INDICATES TYPE: Tx
  - WP = WEATHERPROOF "IN USE" COVER
  - ● = INSTALLED ABOVE COUNTER
  - USB = EQUIPPED WITH USB PORTS
- GROUND FAULT CIRCUIT INTERRUPTER
- JUNCTION BOX (J)
- WALL MOUNTED JUNCTION BOX (J)
- POWER AND LIGHTING PANEL
- DISCONNECT SWITCH
- FUSED DISCONNECT SWITCH
- MOTOR LOCATION
- ABOVE GRADE ELECTICAL LINE
- ELECTRIC VEHICLE CHARGING STATION (EV)

one line legend

- NEW WIRE OR DEVICE
- CIRCUIT BREAKER — XXXAF / XXXAT = SIZE
- LV — LOW VOLTAGE WIRING
- FUSED DISCONNECT SWITCH — XXXAF / XXXAT = SIZE
- PANEL VOLTAGE PHASE WIRE — PANELBOARD, REFER TO SCHEDULES FOR SPECIFICS
- N, E, L — TRANSFER SWITCH
- FUSE
- SWITCH
- COMBINATION MAGNETIC STARTER
- MAGNETIC STARTER
- VFD — VARIABLE FREQUENCY DRIVE
- SPD — SURGE PROTECTIVE DEVICE
- XXX — FEEDER TAG
- TRANSFORMER

key notes

- (D) SHEET SPECIFIC DEMOLITION KEYED NOTES
- (1) SHEET SPECIFIC NEW WORK KEYED NOTES

120V BRANCH CIRCUIT VOLTAGE DROP TABLE	
CIRCUIT LENGTH	120V WIRE SIZE
0'-60'	#12
61'-100'	#10
101'-160'	#8
TABLE IS BASED ON A 120V CIRCUIT LOAD OF 1680 WATTS (14 AMPS)	

VOLTAGE DROP NOTE:

A. WHERE UNGROUNDED CONDUCTORS ARE INCREASED IN SIZE TO COMPENSATE FOR VOLTAGE DROP, THE EQUIPMENT GROUNDING CONDUCTOR NEEDS TO BE INCREASED IN SIZE, PROPORTIONALLY ACCORDING TO THE CIRCULAR MIL AREA OF THE UNGROUNDED CONDUCTORS, PER NEC 250.122(B).

B. CIRCUIT LENGTHS AND ASSOCIATED CONDUCTOR UPSIZING IS SHOWN FOR REFERENCE ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR UPSIZING BRANCH CIRCUITS AND FEEDERS THAT EXCEED LENGTHS IDENTIFIED ON THESE TABLES. PER REQUIREMENTS DEFINES IN THE NATIONAL ELECTRIC CODE.

general notes

G-1 THE FOLLOWING GENERAL NOTES APPLY TO ALL DRAWINGS AND TRADES ASSOCIATED WITH THOSE DRAWINGS.

G-2 THE ENGINEER WAIVES ANY AND ALL RESPONSIBILITY AND LIABILITY FOR PROBLEMS WHICH ARISE FROM FAILURE TO FOLLOW THESE PLANS, SPECIFICATIONS, AND/OR THE DESIGN INTENT THEY CONVEY, OR FOR PROBLEMS WHICH ARISE FROM OTHERS FAILURE TO OBTAIN AND/OR FOLLOW THE GUIDANCE OF THE ENGINEER.

G-3 ALL WORK SHALL CONFORM TO THE 2020 NATIONAL ELECTRIC CODE (NEC), THE NINTH EDITION OF THE MASSACHUSETTS BUILDING CODE WITH AMENDMENTS.

G-4 CONTRACTOR AND ALL SUBCONTRACTORS SHALL PROTECT THE WORK SITE, SURROUNDING AREAS AND OCCUPANTS FROM DAMAGE AND INJURY.

G-5 CONTRACTOR AND ALL SUBCONTRACTORS SHALL FAMILIARIZE THEMSELVES WITH THE CONTRACT DOCUMENTS. ALL DRAWINGS OF ANY PARTICULAR TRADE SHALL BE USED IN CONJUNCTION WITH DRAWINGS OF ALL OTHER TRADES TO COORDINATE ALL CONSTRUCTION. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER AND ARCHITECT BEFORE PROCEEDING WITH THE AFFECTED WORK. ANY PROPOSED CHANGES, VARIATIONS, OR SUBSTITUTIONS MUST BE REVIEWED AND ACCEPTED BY THE ENGINEER AND ARCHITECT PRIOR TO IMPLEMENTATION.

G-6 DETAILS SHOWN ON ANY DRAWING ARE TO BE CONSIDERED TYPICAL FOR ALL SIMILAR CONDITIONS, UNLESS OTHERWISE INDICATED.

G-7 PROVIDE AND ENSURE FIREPROOFING OF ALL CONDUIT, CABLING AND ANY OTHER ELECTRICAL DEVICES THROUGH FIRE RATED ASSEMBLIES.

G-8 PROVIDE EXPANSION FITTINGS IN CONDUIT RISERS FROM ALL EXTERIOR UNDERGROUND CONDUITS TO FIXED EQUIPMENT OR CONDUIT FITTINGS AND PROVIDE FLEXIBLE CONNECTIONS TO ANY EQUIPMENT SUBJECT TO SETTLEMENT OR FROST HEAVES.

G-9 EC SHALL OBTAIN AND PAY FOR ALL PERMITS.

G-10 THE GENERAL CONTRACTOR, AKA THE PRIME CONTRACTOR SHALL BE RESPONSIBLE TO ASSURE THAT ALL WORK BY THE SUBCONTRACTORS IS INSTALLED AND COMPLETED IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS AND THAT ALL ELECTRICAL WORK IS 100% COMPLETE AT THE TIME OF BENEFICIAL OCCUPANCY.

G-11 THE WORK SHALL INCLUDE PROVIDING ALL LABOR, MATERIAL, EQUIPMENT AND SERVICES TO CONSTRUCT AND INSTALL THE EQUIPMENT AND SYSTEMS NECESSARY TO COMPLETE THE WORK INDICATED ON DRAWINGS.

G-12 TEST ALL EQUIPMENT AND SYSTEMS INSTALLED TO CERTIFY COMPLIANCE WITH DRAWINGS, SPECIFICATIONS, CODES, LOCAL AUTHORITIES AND REGULATIONS, INCLUDE LABOR AND COSTS FOR TESTING, REVIEWS, APPROVALS AND CERTIFICATIONS.

G-13 PROVIDE TRAINING TO OWNER ON ALL EQUIPMENT AND SYSTEMS INSTALLED.

G-14 IN GENERAL DRAWINGS ARE DIAGRAMMATIC ONLY. EXACT LOCATION, MOUNTING HEIGHTS OF EQUIPMENT AND ROUTING OF RACEWAYS SHALL BE COORDINATED WITH THE EQUIPMENT REQUIREMENTS AND FIELD CONDITIONS.

G-15 SUPPORT ALL WORK FROM THE BUILDING STRUCTURE, INDEPENDENTLY FROM OTHER TRADES.

G-16 WIRE AND CONDUIT SIZES INDICATED ON HOMERUNS SHALL BE CONTINUOUS THROUGHOUT CIRCUIT, UNLESS NOTED OTHERWISE.

G-17 PROVIDE WEATHER-TIGHT SEAL AT PENETRATIONS ABOVE GRADE. PROVIDE WATERTIGHT AND GASTIGHT SEALS INSIDE AND OUTSIDE OF CONDUITS THAT PENETRATE THE BUILDING BELOW GRADE, O.Z. GEDNEY SEALS OR APPROVED EQUAL.

G-18 PROVIDE NRTL LISTED SMOKE AND FIRE SEALS AT ALL PENETRATIONS THROUGH FLOORS OR FULL HEIGHT (SLAB TO SLAB) WALLS.

G-19 TEMPORARY LIGHTING AND POWER SHALL BE PROVIDED AS REQUIRED BY OSHA, CODES AND LOCAL AUTHORITIES. REMOVE ALL TEMPORARY FACILITIES AT PROJECT COMPLETION.

G-20 ALL CONSTRUCTION PHASING AND, MAINTAINING OF ELECTRICAL POWER TO ALL BUILDING AREAS SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL INSTALLER.

G-21 COORDINATE ANY SHUTDOWN, ANY DISRUPTION OF SERVICE AND ANY WORK OUTSIDE OF RENOVATED AREAS FOR THIS PROJECT WITH OWNER FACILITIES, OWNER PROJECT DELIVERY STANDARDS AND CONSTRUCTION MANAGER.

G-22 THE ELECTRICAL CONTRACTOR SHALL BE CONSIDERED THE PRIME CONTRACTOR.

electrical abbreviations

AFF	ABOVE FINISHED FLOOR	HP	HORSEPOWER
AV	AUDIO/VISUAL	KEC	KITCHEN EQUIPMENT CONTRACTOR
C/B	CIRCUIT BREAKER	MC	MECHANICAL CONTRACTOR
CKT	CIRCUIT	MH	MOUNTING HEIGHT
CLG	CEILING	NL	NIGHT LIGHT
DWG	DRAWING	NTS	NOT TO SCALE
EC	ELECTRICAL CONTRACTOR	PC	PLUMBING CONTRACTOR
EM	EMERGENCY	TYP	TYPICAL
FAC	FIRE ALARM CONTRACTOR	U.G.	UNDERGROUND
FLR	FLOOR	UON	UNLESS OTHERWISE NOTED
GFI	GROUND FAULT INTERRUPTING	WP	WEATHER PROOF
GND	GROUND	XM	EXISTING TO REMAIN

edm
architecture • engineering • management
pittsfield, ma
unionville, ct
troy, ny
(888) 336-6500
team@edm-ae.com

consultants:

COMMONWEALTH OF MASSACHUSETTS — JEREMY BARNES — ELECTRICAL — No. 54997 — REGISTERED PROFESSIONAL ENGINEER

design by: jm | drawn by: jm

checked by: jb

approved by: jb

City of Worcester

INCORPORATED JUNE 14, 1722 — A CITY OF FIRSTS — WORCESTER

ELECTRIC VEHICLE CHARGING STATION PROGRAM
Worcester, Ma

keyplan:

issue / rev.	date:	issued for:	by:
	04/07/2022	BID SET	

general electrical notes and legends

date: 04.07.2022

project number: cow 5790

scale: As indicated

drawing number:

EN-001

DIVISION 26 - GENERAL PROVISIONS FOR ELECTRICAL WORK
GENERAL PROVISIONS FOR ELECTRICAL WORK

1. REFERENCES

- THIS SECTION COVERS THE GENERAL REQUIREMENTS FOR ELECTRICAL WORK; EXAMINE ALL CONTRACT DRAWINGS AND ALL OTHER SECTIONS OF THE SPECIFICATIONS FOR ADDITIONAL WORK RELATED TO THE WORK OF THIS DIVISION.

2. DEFINITIONS

- 'PROVIDE' - TO FURNISH, INSTALL AND CONNECT UP COMPLETE AND READY FOR SAFE AND REGULAR OPERATION OF PARTICULAR WORK REFERRED TO UNLESS, SPECIFICALLY OTHERWISE NOTED.
- 'INSTALL' - TO ERECT, MOUNT AND CONNECT COMPLETE WITH RELATED ACCESSORIES.
- 'WORK' - LABOR, MATERIALS, EQUIPMENT, APPARATUS, CONTROLS, ACCESSORIES AND OTHER ITEMS REQUIRED FOR PROPER AND COMPLETE INSTALLATION.
- 'WIRING' - RACEWAY, FITTINGS, WIRE, BOXES, MOUNTING HARDWARE AND RELATED ITEMS.
- 'CONCEALED' - EMBEDDED IN MASONRY OR OTHER CONSTRUCTION CAVITY, INSTALLED IN FURRED SPACES, WITHIN DOUBLE PARTITIONS OR HUNG CEILINGS.
- 'SIMILAR' OR 'EQUAL' - EQUAL MATERIALS, WEIGHT, SIZE, DESIGN AND EFFICIENCY OF SPECIFIED PRODUCT.
- 'CONTRACTOR' - THE ELECTRICAL CONTRACTOR.
- 'NOTED' - AS INDICATED ON THE DRAWINGS AND/OR SPECIFICATIONS.
- THE WORD "EQUIPMENT", U.O.I. DESIGNATES A GENERAL FORM, INCLUDING FITTINGS, DEVICES, APPLIANCES, LUMINARIES, APPARATUS, MACHINERY AND THE LIKE USED AS A PART OF, OR IN CONNECTION WITH AN ELECTRICAL INSTALLATION.

3. `SCOPE

- THIS WORK SHALL CONSIST OF THE FURNISHINGS OF ALL LABOR, MATERIALS AND SERVICES REQUIRED COMPLETE, READY FOR CORRECT OPERATION FOR ALL ELECTRICAL WORK CALL FOR BY THE ACCOMPANYING DRAWINGS AND SPECIFICATIONS. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, STATE AND LOCAL CODES.
- THE DATA INDICATED IN THESE DRAWINGS AND SPECIFICATIONS ARE AS EXACT AS COULD BE SECURED. BUT THEIR ABSOLUTE ACCURACY IS NOT GUARANTEED. DO NOT SCALE DRAWINGS. EXACT LOCATIONS, DISTANCES, LEVELS AND OTHER CONDITIONS WILL BE GOVERNED BY THE BUILDING. USE THE DRAWINGS AND SPECIFICATIONS FOR GUIDANCE AND SECURE THE ENGINEER'S APPROVAL OF CHANGES IN LOCATIONS. CIRCUITS, WHERE SHOWN ON AN ELECTRICAL DRAWINGS, ARE SO INDICATED PRIMARILY FOR THE PURPOSE OF INDICATING THE GENERAL CIRCUIT PLAN AND DO NOT NECESSARILY INDICATE THE EXACT LOCATION OF ROUTING OF THE RACEWAYS UNLESS SPECIFICALLY INDICATED. CIRCUITS SHALL BE RUN IN SUIT CONDITIONS CONSIDERING STRUCTURAL FEATURES, OTHER TRADES, CONSTRUCTION METHODS AND GOOD INSTALLATION PRACTICE.
- BEFORE SUBMITTING A BID, THE CONTRACTOR SHALL VISIT THE SITE AND BECOME THOROUGHLY FAMILIAR WITH ALL EXISTING CONDITIONS UNDER WHICH THE WORK AND WORK OF OTHER TRADES WILL BE INSTALLED. CONTRACTOR SHALL INCLUDE ANY MODIFICATIONS REQUIRED IN EXISTING ELECTRICAL EQUIPMENT FOR INSTALLATION OF NEW ELECTRICAL EQUIPMENT AND NEW EQUIPMENT OF OTHER TRADES. (LIGHTING FIXTURES, DEVICES, CONDUIT WIRING, ETC.) ALL NEW AND EXISTING EQUIPMENT AND SYSTEMS SHALL BE FULLY OPERATIONAL UNDER THIS CONTRACT BEFORE THE PROJECT IS CONSIDERED COMPLETE. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY ASSUMPTIONS THAT ARE MADE, ANY OMISSIONS OR ERRORS MADE AS A RESULT OF FAILURE TO VISIT THE SITE AND BECOME THOROUGHLY FAMILIAR WITH THE EXISTING CONDITIONS AND THE CONTRACT DOCUMENTS OF ALL TRADES.

4. CODES, REGULATIONS AND STANDARDS

- ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING APPROVED CODES:
  1. STATE DEMOLITION CODE
  2. STATE BUILDING CODE
  3. STATE FIRE SAFETY CODE
  4. LOCAL BUILDING CODE
  5. IBC - INTERNATIONAL BUILDING CODE
  6. NFPA - NATIONAL FIRE PROTECTION CODE
  7. ANSI - AMERICAN NATIONAL STANDARDS INSTITUTE
  8. ASTM - AMERICAN SOCIETY FOR TESTING AND MATERIALS
  9. OSHA - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
  10. U.L. - UNDERWRITERS LABORATORIES
  11. NFPA 101 - LIFE SAFETY CODE
  12. NFPA 99 - HEALTH FACILITIES CODE
  13. NFPA 70 - NATIONAL ELECTRICAL CODE
  14. NFPA 72 - NATIONAL FIRE ALARM CODE
  15. EPA - ENVIRONMENTAL PROTECTION AGENCY
  16. IEEE - INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS
  17. NEMA - NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
  18. IECC - INTERNATIONAL ENERGY CONSERVATION CODE
  19. ICC/ANSI A117.1 ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES

5. PERMITS, FEES AND INSPECTIONS

- THE CONTRACTOR SHALL GIVE ALL NECESSARY NOTICES, OBTAIN ALL PERMITS, PAY FOR ALL GOVERNMENT, STATE SALES TAXES AND APPLICABLE FEES. THE CONTRACTOR SHALL FILE ALL DRAWINGS, COMPLETE ALL DOCUMENTS AND OBTAIN ALL NECESSARY APPROVALS FROM THE PROPER AUTHORITY OR AGENCY HAVING JURISDICTION. OBTAIN ALL REQUIRED CERTIFICATES OF INSPECTION COVERING WORK. THE CONTRACTOR SHALL SEE THAT ALL REQUIRED INSPECTIONS AND TESTS ARE MADE AND SHALL COOPERATE TO MAKE THESE TESTS AS THOROUGH AND AS READILY MADE AS POSSIBLE.

6. MATERIALS AND WORKMANSHIP

- ALL MATERIALS AND APPARATUS REQUIRED FOR THE WORK, EXCEPT AS OTHERWISE SPECIFIED, SHALL BE NEW AND OF FIRST-CLASS QUALITY. IT SHALL BE FURNISHED, DELIVERED, ERECTED, CONNECTED, FINISHED IN EVERY DETAIL AND SO SELECTED AND ARRANGED AS TO FIT PROPERLY INTO THE BUILDING SPACES. WHERE NO SPECIFIC KIND OR QUALITY MATERIAL IS GIVEN, A FIRST-CLASS STANDARD ARTICLE AS ACCEPTED BY THE ENGINEER SHALL BE FURNISHED.
- ALL EQUIPMENT AND MATERIALS SHALL BE SPECIFICATION GRADE AND BEAR THE UNDERWRITER'S LABEL. NO SUBSTITUTE OR ALTERNATE EQUIPMENT, MATERIAL, ETC. WILL BE CONSIDERED FOR THIS PROJECT.
- ALL WORK SHALL BE OF A QUALITY CONSISTENT WITH GOOD TRADE PRACTICE AND SHALL BE INSTALLED IN A NEAT, WORKMANLIKE MANNER. THE ENGINEER/OWNER RESERVES THE RIGHT TO REJECT ANY WORK WHICH, IN HIS OPINION, HAS BEEN INSTALLED IN A SUBSTANDARD, DANGEROUS OR IN A UNSERVICEABLE MANNER. THE CONTRACTOR SHALL REPLACE REJECTED WORK IN A SATISFACTORY MANNER AT NO EXTRA COST TO THE OWNER.

7. GUARANTEES

- ALL WORKMANSHIP AND MATERIALS SHALL BE FULLY GUARANTEED FOR A PERIOD OF ONE YEAR AFTER ACCEPTANCE OF THE ENTIRE INSTALLATION COVERED BY THIS CONTRACT. SHOULD ANY DEFECTS OCCUR DURING THE GUARANTEED PERIOD, THE CONTRACTOR SHALL REPAIR AND/OR REPLACE ALL DEFECTIVE EQUIPMENT, MATERIAL AND/OR WORK AT NO EXTRA CHARGE TO THE OWNER.

8. RECORD DRAWINGS

- MAINTAIN, AT THE JOB SITE, A SET OF ELECTRICAL DRAWINGS INDICATING ALL CHANGES IN LOCATION OF THE EQUIPMENT, PANELS, DEVICES, ETC. FROM THE ORIGINAL LAYOUT. CLEARLY MARK IN RED ALL CHANGES ON THE DRAWINGS. AT THE COMPLETION OF THE PROJECT THE CONTRACTOR SHALL TURN OVER THE RECORD DRAWINGS TO THE ENGINEER/OWNER.

9. COORDINATION

- ALL WORK SHALL BE CARRIED OUT IN CONJUNCTION WITH OTHER TRADES AND FULL COOPERATION SHALL BE GIVEN IN ORDER THAT ALL WORK MAY PROCEED WITH A MINIMUM OF DELAY AND INTERFERENCE.

10. SHOP DRAWINGS

- SUBMIT ELECTRONIC COPIES FOR REVIEW, DETAILED SHOP DRAWINGS OF ALL EQUIPMENT AND MATERIAL SPECIFIED. THE CONTRACTOR SHALL REVIEW ALL SHOP DRAWINGS PRIOR TO SUBMISSION TO THE ENGINEER FOR REVIEW. NO MATERIAL OR EQUIPMENT MAY BE DELIVERED TO THE JOB SITE OR INSTALLED UNTIL CONTRACTOR HAS IN THEIR POSSESSION, APPROVED SHOP DRAWINGS FOR THE PARTICULAR MATERIAL OR EQUIPMENT. SHOP DRAWINGS SHALL BE SPECIFIC WITH ITEMS SUBMITTED FOR APPROVAL CLEARLY IDENTIFIED.
- THE FOLLOWING IS A LIST OF ELECTRICAL ITEMS THAT MUST BE SUBMITTED FOR REVIEW:
  1. CONDUIT, WIRE AND CABLE
  2. DEVICES (RECEPTACLES, TOGGLE SWITCHES, DISCONNECT SWITCHES, PLUGMOLD, ETC.)
  3. SWITCHBOARDS AND PANELBOARDS
  4. CIRCUIT BREAKERS
  5. GROUNDING

11. EQUIPMENT PROTECTION

- PROPERLY AND COMPLETELY PROTECT AGAINST ALL DAMAGE, ALL APPARATUS, EQUIPMENT, ETC., INCLUDED IN THIS CONTRACT. THE CONTRACTOR WILL BE HELD RESPONSIBLE FOR ANY DAMAGE TO FURNISHED APPARATUS, EQUIPMENT, ETC., UNTIL FINAL ACCEPTANCE.

12. PROPERTY PROTECTION

- THE CONTRACTOR SHALL TAKE WHATEVER MEANS NECESSARY AND/OR REQUIRED TO PROTECT OWNER'S PROPERTY WITHIN THE WORKING AREAS FROM DUST, DEBRIS AND OTHER MATTER GENERATED BY THE WORK. NO WORK SHALL COMMENCE IN AREAS WHERE PROTECTION IS REQUIRED UNTIL APPROVAL HAS BEEN GIVEN TO THE CONTRACTOR BY THE OWNER.

13. MANUFACTURER'S INSTRUCTION

- INSTALL ALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS OR REQUIREMENTS FOR PROPER OPERATION AND MAINTENANCE.

14. EQUIPMENT PAINTING AND CLEANING

- THOROUGHLY CLEAN ALL ELECTRICAL EQUIPMENT DEVICES AND ENCLOSURES UPON COMPLETION OF ALL WORK. REPAINT ANY EQUIPMENT WHOSE FINISH IS DAMAGED OR RUSTED. MATCH MANUFACTURER'S ORIGINAL FINISH.

15. PENETRATION SEALANT

- ALL PENETRATIONS SHALL BE SEALED WITH 3M INTUMESCENT FIRE BARRIER PENETRATION SEALANT, APPLIED PER MANUFACTURER'S AND U.L. GUIDELINES.

16. CUTTING, PATCHING, REPAIRING AND PAINTING

- THE GENERAL CONTRACTOR SHALL PERFORM ALL CUTTING, PATCHING, REPAIRING AND PAINTING FOR ALL ELECTRICAL ITEMS AND EQUIPMENT CALLED FOR UNDER THIS CONTRACT.

17. FIRE STOPS AND SEALS

- PENETRATIONS THROUGH FIRE-RATED WALLS, CEILING OR FLOORS IN WHICH CABLES OR CONDUITS PASS SHALL BE FILLED SOLIDLY BY U.L. APPROVED FIRE-STOP MATERIALS, CLASSIFIED FOR AN HOUR RATING EQUAL TO THE FIRE RATING OF THE WALL, CEILING OR FLOOR. PROVIDE TO 3M BRAND FIRE BARRIER CP25WB CAULK OR APPROVED EQUIVALENT.
- SEALING BUSHINGS SHALL BE USED ON CONDUIT AND CABLE ENDS TO EFFECTIVELY PREVENT THE INTRUSION OF WATER, A DAMP OR CORROSIVE ATMOSPHERE, DRAFT OR DUST.

18. ACCESS PANELS

- THE CONTRACTOR SHALL FURNISH AND INSTALL ACCESS PANELS AND DOORS AS REQUIRED FOR ACCESS TO INACCESSIBLE PULLBOXES, JUNCTION BOXES AND OTHER SPECIALTIES.
- THE CONTRACTOR SHALL COORDINATE THE LOCATIONS OF ACCESS PANELS AND DOORS WITH THE GENERAL CONTRACTOR AND OTHER TRADES. FINAL LOCATIONS SHALL BE SUBJECT TO THE APPROVAL OF THE ARCHITECT.

19. TEMPORARY LIGHTING

- FURNISH AND INSTALL TEMPORARY LIGHTING USE BY ALL TRADE CONTRACTORS DURING THE COURSE OF CONSTRUCTION. ALL TEMPORARY WORK SHALL BE DONE IN COMPLIANCE WITH ALL APPLICABLE ARTICLES IN THE NATIONAL ELECTRICAL CODE, O.S.H.A. AND WITH ALL REQUIREMENTS OF ANY AUTHORITY HAVING JURISDICTION OVER THE WORK.

PART 2 – PRODUCTS
PRODUCTS

1. DESCRIPTION

- ALL MATERIALS AND EQUIPMENT PROVIDED UNDER THIS SECTION SHALL BE NEW, FIRST GRADE, BEST OF THEIR RESPECTIVE KINDS AND IN NO WAY SHALL THEY BE LESS THAN THE QUALITY AND INTENT SET FOURTH UNDER THIS SECTION. THEY SHALL MEET THE REQUIREMENTS OF ALL STANDARDS SET UP TO GOVERN THE MANUFACTURER OF ELECTRICAL MATERIALS AND COMPLY WITH ALL APPLICABLE CODES AND STANDARDS.

2. WIRE

- CONDUCTORS SHALL BE U.L. LISTED, 600 VOLTS, 90 DEG. C., SINGLE CONDUCTOR TYPE THWN/THHN. 98% CONDUCTIVITY, ANNEALED UNCOATED COPPER WITH PVC INSULATION COVERED WITH NYLON SHEATH JACKET. TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF UNDERWRITERS LABORATORIES STANDARD 83. WIRE SHALL BE IDENTIFIED BY SURFACE MARKING INDICATING MANUFACTURER'S IDENTIFICATION CONDUCTOR SIZE AND METAL, VOLTAGE RATING, U.L. SYMBOL AND TYPE DESIGNATION. CONDUCTORS SHALL BE STRANDED. MINIMUM SIZE SHALL BE #12 AWG UNLESS OTHERWISE INDICATED. MANUFACTURED BY ROME CABLE, TRIANGLE WIRE & CABLE, GENERAL CABLE OR ESSEX WIRE & CABLE. NONMETALLIC SHEATHED CABLE IS NOT ACCEPTABLE, UNLESS ALLOWED BY CODE.

3. ELECTRIC METALLIC TUBING (EMT)

- ELECTRICAL METALLIC TUBING SHALL BE GALVANIZED THIN WALL STEEL CONDUIT. MANUFACTURED BY TRIANGLE WIRE AND CABLE, ALLIED TUBE AND CONDUIT, REPUBLIC OR STEELDUCT. THE CONNECTORS AND COUPLINGS SHALL BE HEAVY DUTY, STEEL-ZINC PLATED, SET SCREW TYPE.

4. RIGID GALVANIZED STEEL (RGS)

- ELECTRICAL METALLIC TUBING SHALL BE GALVANIZED THICK WALL STEEL CONDUIT. MANUFACTURED BY TRIANGLE WIRE AND CABLE, ALLIED TUBE AND CONDUIT, REPUBLIC OR STEELDUCT. THE CONNECTORS AND COUPLINGS SHALL BE HEAVY DUTY, GALVANIZED STEEL OR STEEL-ZINC PLATED, THREADED TYPE.

5. NON-METALLIC RIGID CONDUIT (PVC)

- NON-METALLIC RIGID CONDUIT SHALL BE POLYVINYL CHLORIDE SCHEDULE 40 OR SCHEDULE 80 THICK WALL CONDUIT. INSTALLLATION DEPENDENT ON NEC REQUIREMENTS. CONDUIT SHALL BE MANUFACTURED BY CANTEX, ALLIED TUBE AND CONDUIT, SOUTHERN PIPE, OR THOMAS AND BETTS. THE CONNECTORS AND COUPLINGS SHALL BE HEAVY DUTY PVC GLUE ON TYPE.

6. LIQUID TIGHT FLEXIBLE METAL CONDUIT(LMFC)

- LIQUID TIGHT FLEXIBLE METAL CONDUIT SHALL BE FORMED FROM A ZINC COATED GALVANIZED LOW CARBON STEEL STRIP HAVING A UNIFORM WIDTH AND THICKNESS. FLEXIBLE STEEL CONDUIT SHALL BE COATED WITH A FLAME AND OIL RESISTANT PVC JACKET AND COMPLY WITH UL 360.. MANUFACTURED BY AFC CABLE SYSTEMS, SOUTHWIRE, ALLIED TUBE AND CONDUIT, OR APPROVED EQUAL.

7. LIQUID TIGHT FLEXIBLE NONMETALIC CONDUIT(LFNC)

- LIQUID TIGHT FLEXIBLE NONMETALIC CONDUIT AND FITTINGS SHALL BE LISTED AND LABELED AS DEFINED IN NFPA 70 AND COMPLY WITH UL 1660.. MARKED FOR INTENDED LOCATION AND APPLICATION.

8. FITTINGS

- CONDUIT BODIES FOR ELECTRICAL METALLIC TUBING (EMT) SHALL BE CAST ALUMINUM-ALUMINUM ENAMEL FINISH WITH SET SCREW HUBS AND ALUMINUM COVER.
- INSULATION BUSHINGS SHALL BE HIGH IMPACT THERMOPLASTIC PHENOLIC WITH 150 DEG. C. UL TEMPERATURE RATING.
- INSULATED GROUNDING BUSHINGS SHALL BE MALLEABLE IRON ZINC PLATED WITH MOLDED ON PHENOLIC INSULATION AND LAY-IN GROUNDING LUG.
- CONDUIT LOCKNUTS SHALL BE HEAVY NUT STOCK STEEL-ZINC PLATED.
- OFFSET NIPPLES SHALL BE MALLEABLE IRON ZINC PLATED WITH RIGID CONDUIT THREADING AND 3/4" OFFSET.
- CONNECTORS AND COUPLINGS FOR ELECTRICAL METALLIC TUBING (EMT) SHALL BE HEAVY STEEL-ZINC PLATED WITH PRE-SET/PRE-SHAKED SET SCREWS.
- CONDUIT STRAPS SHALL BE SNAP-TYPE, DOUBLE RIBBED STEEL-ZINC PLATED.
- METAL CLAD CABLE AND FLEXIBLE METALLIC CONDUIT CONNECTORS SHALL BE MALLEABLE IRON-ZINC PLATED, MALE HUB THREADS WITH LOCKNUT.
- CONDUIT FITTINGS SHALL BE MANUFACTURED BY O/Z GEDNEY, CROUSE-HINDS OR APPLETON.

10. SUPPORT FITTINGS

- SUPPORT CHANNEL SHALL BE ROLL-FORMED #12 GAUGE STEEL, SOLID BASE OR BOLT HOLE BASE - HOT DIP GALVANIZED FINISH. COMPLETE WITH ANGLE FITTINGS, SPRING NUTS, CONDUIT SUPPORTS, 3/8" OR 1/2" THREADED RODS (SIZE REQUIRED FOR LOAD), ETC.

11. CABLE TIES

- CABLE TIES SHALL BE FABRICATED OF ONE-PIECE HALLAR WITH NO METAL PARTS. MANUFACTURED BY BURNDY, T&B, PANDUIT OR BLACKBURN.

12. OUTLET BOXES

- SHALL BE GALVANIZED STEEL, FLUSH OR SURFACE MOUNTED AND OF PROPER TYPE AND SIZE AS REQUIRED FOR THE PARTICULAR APPLICATION. SIZE AND TYPE DICTATED BY THE NUMBER OF DEVICES (2 GANG MINIMUM WITH SINGLE GANG PLASTER RING FOR SINGLE DEVICE LOCATIONS), NUMBER OF CONDUCTORS AND WIRING METHOD UTILIZED. BOXES SHALL BE ADEQUATE SIZE FOR THE INSTALLATION OF CONDUCTORS WITHOUT EXCESSIVE BENDING OR CRIMPING OF THE CONDUCTORS AND DAMAGING OF CONDUCTOR INSULATION. MANUFACTURED BY STEEL CITY OR RACO.
- OUTLET BOXES SHALL BE SECURED FIRMLY IN PLACE TO THE BUILDING STRUCTURE AND SET TRUE AND SQUARE. PROVIDE SUITABLE MEANS TO SUPPORT OUTLET BOX TO TAKE THE WEIGHT OF THE LIGHTING FIXTURE OR DEVICE. OUTLET BOXED OR BOX EXTENSION RINGS SHALL BE SET FLUSH TO THE FINISHED WALL OR CEILING. BOXES MUST BE ATTACHED THAT THEY WILL NOT 'ROCK', 'SHIFT' OR 'MOVE IN AND OUT' WHEN DEVICES ARE USED. IN NO CASE SHALL BOXES BE INSTALLED BACK-TO-BACK IN A COMMON WALL DIVIDING TWO SPACES.
- WHERE MORE THAN ONE OUTLET IS SHOWN OR SPECIFIED TO BE THE SAME ELEVATION OR ONE ABOVE THE OTHER, ALIGN THEM EXACTLY ON CENTER LINES HORIZONTALLY OR VERTICALLY.
- MULTIPLE SWITCHES SHOWN AT ONE LOCATION SHALL BE INSTALLED GANGED TOGETHER UNDER ONE WALL PLATE. SWITCHES SHALL BE ARRANGED IN AN ORDER APPROPRIATE TO THE LOCATIONS OF LIGHTING FIXTURE BEING CONTROLLED.

13. PANELBOARDS AND SWITCH BOARDS

- FURNISH AND INSTALL ALL PANELBOARDS AS INDICATED AND AS SCHEDULED ON THE DRAWINGS.
- PANELBOARDS SHALL BE PROVIDED WITH TYPEWRITTEN DIRECTORIES INDICATING CIRCUIT NUMBERS, EQUIPMENT SERVED AND AREA SERVED.
- PANELBOARDS SHALL BE OF DEAD FRONT CONSTRUCTION WITH THERMAL MAGNETIC CIRCUIT BREAKERS AND SHALL CONFORM TO THE REQUIREMENTS OF NEMA AND NEC. ALL PANELBOARDS SHALL BE UL APPROVED AND LABELED.
- PANELS AND CIRCUIT BREAKERS SHALL HAVE NOT LESS THAN THE SHORT CIRCUIT RATINGS AVAILABLE FROM THE POWER SOURCES. ALL CIRCUIT BREAKERS SHALL BE FULLY RATED FOR THE AVAILABLE FAULT CURRENT. SERIES RATING SHALL NOT BE PERMISSABLE
- PANELBOARDS SHALL CONSIST OF CIRCUIT BREAKERS, CODE GAUGE STEEL CABINET OR BACKBOX, BUS ASSEMBLY, TRIM WITH CODE GAUGE GALVANIZED STEEL DOORS. GUTTER SPACE SHALL BE A MINIMUM OF 4".
- BOXES SHALL BE MINIMUM 20" WIDE AND 5-3/4" DEEP.
- CIRCUIT BREAKERS SHALL BE OF THE QUICK-MAKE, QUICK-BREAK TRIP FREE THERMAL MAGNETIC TYPE WITH CHARACTERISTICS AS SCHEDULED. AUTOMATIC TRIPPING SHALL BE CLEARLY INDICATED BY THE OPERATION HANDLE ASSUMING A MID-POSITION BETWEEN "ON" AND "OFF". TWO-AND 3-POLE BREAKERS SHALL HAVE COMMONTRIP. ALL BREAKERS SHALL BE 100A FRAME MINIMUM.
- ALL PANELBOARDS SHALL BE PROVIDED WITH SOLID NEUTRALS. IN ADDITION, GROUNDING BUS WITH LUGS SHALL BE PROVIDED ON ALL PANELBOARDS MEETING UL AND NEMA STANDARDS. OTHER SPECIAL FEATURES SHALL BE PROVIDED AS REQUIRED AND AS INDICATED.
- TWO (2) MILLED TYPE KEYS SHALL BE PROVIDED WITH EACH PANEL AND ALL PANEL LOCKS SHALL BE KEYED ALIKE.
- BUS ARRANGEMENTS SHALL BE SEQUENCE PHASED SUCH THAT ADJACENT SINGLE POLE BREAKERS SHALL BE CONNECTED TO OPPOSITE PHASES IN A MANNER SUCH THAT ANY 2- OR 3-POLE BREAKERS CAN BE INSTALLED ANYWHERE IN THE PANELBOARD.
- BUSES SHALL BE COPPER ONLY. ALUMINUM BUSSES WILL NOT BE ACCEPTED

14. CIRCUIT BREAKERS

- BRANCH CIRCUIT BREAKERS SHALL BE QUICK-MAKE, QUICK-BREAK, BOLT-IN THERMAL MAGNETIC TYPE WITH VISIBLE CURRENT RATING AND TRIP POSITION. NEW CIRCUIT BREAKERS TO MATCH PANEL BOARD MANUFACTURER. IN EXISTING PANELS, PROVIDE NEW CIRCUIT BREAKERS WITH AIC RATINGS EQUAL TO OR GREATER THAN THE LOWEST RATED EXISTING BREAKER IN THE PANEL.
- PROVIDE FULLY RATED CIRCUIT BREAKERS. SERIES RATED ARE NOT ACCEPTABLE.

15. JUNCTION BOXES, PULLBOXES AND WIREWAYS

- JUNCTION BOXES, PULLBOXES AND WIREWAYS SHALL BE OF PROPER TYPE AND SIZES AS REQUIRED. CODE GAUGE, GALVANIZED STEEL WITH KNOCKOUTS AND FLANGES TO RECEIVE THE COVERS. COVERS SHALL BE FLAT, OF THE SAME MATERIAL AS THE BOX AND FASTENED TO THE BOX WITH MACHINE SCREWS. MANUFACTURED BY HOFFMAN, SQUARE 'D', OR LEE PRODUCTS.

16. WIRING DEVICES

- ALL DEVICES SHALL BE COMMERCIAL SPECIFICATION GRADE, U.L. LISTED, SELF-GROUNDING, GROUND LUG, SIDE/BACK WIRED. COLOR SHALL BE SELECTED BY ARCHITECT OR OWNER UNLESS OTHERWISE INDICATED. MANUFACTURED BY LEGRAND, HUBBELL, LEVITON, OR PASS & SEYMOUR.
- RECEPTACLES THAT HAVE A POWER FEED THRU (FEED IN - FEED OUT) ARRANGEMENT SHALL BE PIGTAILED. FEED THRU FEATURE ON DUPLEX RECEPTACLES USE IS NOT ACCEPTABLE.
- WALL PLATES FOR SWITCHES AND RECEPTACLES SHALL BE SMOOTH THERMOPLASTIC OR NYLON IN FINISHED AREAS. COLOR TO MATCH DEVICES. MANUFACTURED BY LEVITON OR MULEBERRY.
- WALL PLATES FOR SWITCHES AND RECEPTACLES SHALL BE STAMPED STEEL FOR BACK OF HOUSE AND AREAS AND WHERE WIRING IS EXPOSED. MANUFACTURED BY MULBERRY.
- WALL PLATES FOR SWITCHES AND RECEPTACLES SHALL HAVE PANELBOARD AND CIRCUIT DESIGNATION
- RECEPTACLES LOCATED IN WET LOCATIONS SHALL BE INSTALLED WITH AN OUTLET ENCLOSURE CLEARLY MARKED 'SUITABLE FOR WET LOCATIONS WHILE IN USE'. THERE MUST BE A GASKET BETWEEN THE COVER AND THE BASE TO ASSURE A PROPER SEAL. THE ENCLOSURE MUST EMPLOY STAINLESS STEEL MOUNTING HARDWARE AND BE CONSTRUCTED OF IMPACT RESISTANT POLYCARBONATE. THE OUTLET ENCLOSURE SHALL BE U.L. LISTED. MANUFACTURED BY TAYMAC, CARLON, OR APPROVED EQUAL.
- ALL SPACES CONTAINING OCCUPANCY/VACANCY SENSORS SHALL BE PROVIDED WITH MOMENTARY TYPE LIGHT SWITCHES, UON.

17. ENCLOSED SWITCHES

- FURNISH AND INSTALL FUSIBLE / NON-FUSIBLE SAFETY SWITCHES AS INDICATED ON THE DRAWINGS. PROVIDE TYPE HD, HEAVY-DUTY, SINGLE THROW, 240VAC, UL 98 LISTED, HORSEPOWER RATED, WITH CLIPS, BOLTS TO ACCOMMODATE FUSES (WHERE INDICATED), LOCKABLE HANDLE WITH CAPABILITY TO ACCEPT PADLOCK, AND INTERLOCKED WITH COVER IN CLOSED POSITION.
- PROVIDE EQUIPMENT GROUNDING KIT, NEUTRAL GROUNDING KIT AND OTHER ACCESSORIES NECESSARY TO MEET INFORMATION FOUND IN DRAWINGS.
- PROVIDE NEMA 1 ENCLOSURES FOR INDOOR SWITCHES.
- PROVIDE NEMA 3R ENCLOSURES FOR OUTDOOR SWITCHES.

PART 3 - EXECUTION
EXECUTION

1. INSTALLATION

- ALL WORK, MATERIALS AND MANNER OF INSTALLATION SHALL BE IN STRICT ACCORDANCE WITH THE LATEST REQUIREMENTS OF THE NATIONAL ELECTRIC CODE.

2. RACEWAYS

- RACEWAYS, ENCLOSURES AND BOXES SHALL BE MECHANICALLY JOINED TO FORM A CONTINUOUS ELECTRICAL PATH.
- THE CONTRACTOR SHALL PROVIDE APPROVED TYPE PULL BOXES AS REQUIRED.
- MINIMUM SIZE CONDUIT SHALL BE 3/4" UNLESS OTHERWISE NOTED.
- FURNISH NYLON PULL STRINGS IN ALL EMPTY CONDUIT RUNS.
- FURNISH LOCKNUTS AND BUSHINGS FOR ALL CONDUIT TERMINATIONS IN ALL OUTLET BOXES, PANELS, PULL BOXES, CONDUIT STUBS, ETC.
- ALL CONDUIT SHALL BE INSTALLED IN PARALLEL AND PERPENDICULAR TO THE BUILDING LINES.
- ALL CONDUIT SHALL BE SUPPORTED USING CADMIUM PLATED CONDUIT STRAPS AND HANGERS.

3. WIRING

- PROVIDE WIRING TO ALL OUTLETS, EQUIPMENT, APPARATUS AND OTHER SPECIALTIES UNDER THIS DIVISION THAT WHICH FURNISHED OR PROVIDED UNDER OTHER DIVISIONS OR BY THE OWNER.
- ALL WIRING ON DRAWINGS IS SIZED FOR TYPE THWN/THHN COPPER CONDUCTORS.
- EXERCISE CAUTION IN PULLING CONDUCTORS INTO RACEWAYS SO AS NOT TO DAMAGE THE INSULATION. CABLE PULLING LUBRICANT SHALL BE USED TO ASSIST IN PULLING.
- CONDUCTOR WITHIN PANELBOARDS, JUNCTION BOXES, TROUGHS AND OTHER EQUIPMENT WHERE CONCENTRATIONS OF CONDUCTORS ARE ENCLOSED, SHALL BE NEATLY ARRANGED AND TIED WITH CABLE TIES.
- COMMON NEUTRAL FOR MULTIPLE BRANCH CIRCUITS IS NOT ACCEPTABLE. PROVIDE SEPARATE NEUTRAL FOR EACH BRANCH CIRCUIT.
- WIRING IN OUTLET BOXES, JUNCTION BOXES, CABINET PANELBOARDS OR EQUIPMENT SHALL HAVE A MINIMUM OF EIGHT (8") INCHES LENGTH LEADS FOR CONNECTING WIRING DEVICES TO MAKE UP CIRCUIT SPLICES.
- INSTALL COPPER GREEN INSULATED GROUNDING CONDUCTOR IN ALL CONDUITS AND RACEWAYS.

4. SPLICING

- SPLICING SHALL BE DONE WITH INSULATED OR NON-INSULATED CONNECTORS OF APPROPRIATE TYPES AND CURRENT-CARRYING CAPACITY. NON-INSULATED CONNECTORS SHALL BE WRAPPED WITH INSULATING TAPE TO THE THICKNESS OF THE INSULATION OF THE CONDUCTORS BEING SPLICED. ELECTRICAL TAPE SHALL BE 3M OR SUPER 88 SCOTCH VINYL FLAME-RETARDANT , COLD AND WEATHER RESISTANT.
- SPLICES FOR CONDUCTORS, SIZES #10 AWG OR SMALLER SHALL BE MADE WITH U.L. LISTED SPRING-TYPE CONNECTORS OR APPROPRIATE CURRENT CARRYING CAPACITY.
- SPLICES, TAPS AND TERMINALS FOR CONDUCTORS #8 AWG OR LARGER SHALL BE MADE WITH U.L. LISTED BOLTED PRESSURE CONNECTORS OF BRONZE OR COPPER CONSTRUCTION, OF APPROPRIATE CURRENT CARRYING CAPACITY. EQUAL TO O/Z GEDENY, BURNDY OR BLACKBURN.

5. CONDUCTOR IDENTIFICATION

- CONDUCTORS #8 AWG AND SMALLER SHALL HAVE A COLOR-CODED INSULATION.
- CONDUCTORS #6 AWG AND LARGER SHALL BE IDENTIFIED WITH TAPES APPLIED NEAR THE ENDS OF THE CONDUCTORS.
- FEEDERS AND BRANCH CIRCUIT CONDUCTORS SHALL BE IDENTIFIED FOR PHASE ROTATION.
- ALL FEEDERS, MAINS AND BRANCH CIRCUIT CONDUCTORS SHALL BE TAGGED AT BOTH ENDS WITH WIRE MARKERS IN ALL PANELS, JUNCTION BOXES, OUTLET BOXES AND DEVICE BOXES.

6. IDENTIFICATION

- FURNISH AND INSTALL NAMEPLATES FOR ALL ELECTRICAL EQUIPMENT, IDENTIFYING ITEMS BY NAME, FUNCTION AND/OR CONTROL.
- IDENTIFYING NAMEPLATES SHALL BE LAMINATED, PLASTIC TYPE, CONSISTING OF TWO BLACK PLASTIC SHEETS WITH ONE WHITE PLASTIC SHEET BONDED TO AND BETWEEN THE TWO OUTER BLACK SHEETS AND HAVING THE LETTERS ENGRAVED IN ONE BLACK TO THE DEPTH OF THE WHITE PLASTIC. FASTEN NAMEPLATES TO EQUIPMENT WITH SUITABLE ADHESIVES OR STAINLESS STEEL SCREWS. IN ADDITION TO THE PANELBOARD IDENTIFYING NAMEPLATE.
- ALL PANELS SHALL HAVE TYPEWRITTEN CIRCUIT DIRECTORIES IDENTIFYING ALL BRANCH CIRCUITS. PROVIDE ADDITIONAL COPY OF COMPLETE UPDATED PANEL DIRECTORY TO FACILITY ENGINEERING.
- USE PLASTIC-COATED WIRE MARKERS OF THE SELF-ADHESIVE. WRAPAROUND TYPE WITH PERMANENT FACTORY-PRINTED NUMBER, LETTERS AND SYMBOLS.
- WIRE MARKERS SHALL BE SECURELY ATTACHED AT BOTH ENDS, IDENTIFYING PANEL AND CIRCUIT BREAKER NUMBERS.
- ALL CONDUCTORS SHALL BE PERMANENTLY TAGGED AT TIME OF INSTALLATION. LABELS SHALL BE EQUAL TO T&B, PANDUIT OR IDEAL.

7. GROUNDING

- ALL ELECTRICAL WORK SHALL BE GROUNDED AND BONDED IN FULL CONFORMANCE WITH THE LATEST APPROVED EDITION OF THE NATIONAL ELECTRICAL CODE AND LOCAL REQUIREMENTS.
- ALL ELECTRICAL EQUIPMENT, SAFETY SWITCHES, METAL ENCLOSURES, ELECTRICAL DEVICE ENCLOSURES AND ALL OTHER EQUIPMENT SHALL BE MADE TO FORM A CONTINUOUS CONDUCTING, GROUND PATH OF LOW IMPEDANCE FOR GROUND FAULT CIRCUITS AND OPERATION OF THE CIRCUIT PROTECTIVE DEVICES WITHIN EACH CIRCUIT.
- PROVIDE GROUNDING CONDUCTOR IN ALL RACEWAYS.
- GROUND CONNECTIONS WITH THE GROUNDING CONDUCTORS SHALL BE MADE AT EACH OUTLET BOX, AND OTHER EQUIPMENT COMPONENTS BY MEANS OF A POSITIVELY SECURED GROUNDING CLAMP, SCREW OR CLIP. CONNECTIONS TO GROUNDING RODS, OTHER GROUNDING ELECTRODE CONDUCTORS SHALL BE MADE WITH CADWELL TYPE, EXOTHEMIC WELD PROCESS UNLESS OTHERWISE NOTED. CONNECTIONS TO PIPES SHALL BE MADE WITH APPROVED BRONZE OR BRASS CLAMPS.
- BONDING SHALL BE PROVIDED TO ASSURE ELECTRICAL CONTINUITY AND THE CAPACITY TO SAFELY CONDUCT ANY FAULT CURRENT LIKELY TO BE IMPOSED.
- ALL DEVICES (SWITCHES, RECEPTACLES, ETC.), SHALL BE GROUNDED TO CONDUIT SYSTEM WITH SIX (6") INCH SOLID COPPER #12 AWG INSULATED WIRE (GREEN) CONNECTED TO GROUND SCREW IN DEVICE AND FASTENED TO BACKBOX WITH 10-32x3/8" SLOTTED HEXAGON HEAD WASHER FACE GROUND WITH GREEN DYE FINISH.

END OF ELECTRICAL SPECIFICATIONS

edm

architecture
•
engineering
•
management

pittsfield, ma
unionville, ct
troy, ny

(888) 336-6500
team@edm-ae.com

consultants:

COMMONWEALTH OF MASSACHUSETTS
JEREMY BARNES
ELECTRICAL
No. 54997
REGISTERED
PROFESSIONAL ENGINEER

design by:	drawn by:
jm	jm

checked by: jb

approved by: jb

City of Worcester

WORCESTER
A TOWN JUNE 14, 1722 A CITY FEBY. 29, 1848

ELECTRIC VEHICLE CHARGING STATION PROGRAM
Worcester, Ma

keyplan:

N

issue / rev.:	date:	issued for:	by:
	04/07/2022	BID SET	

electrical specifications

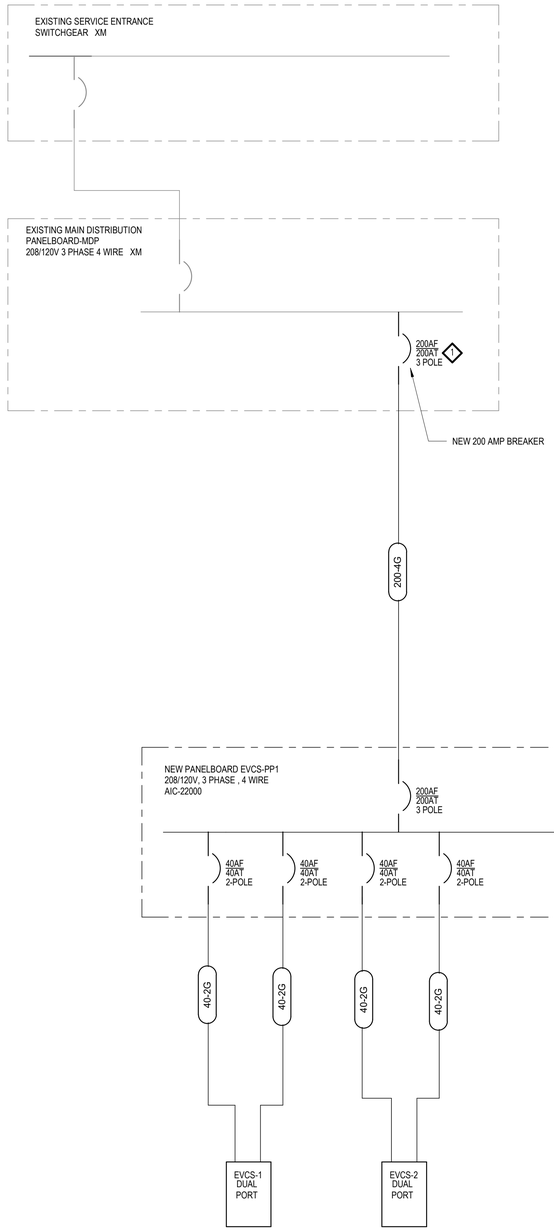
date: 04.07.2022

project number: cow 5790

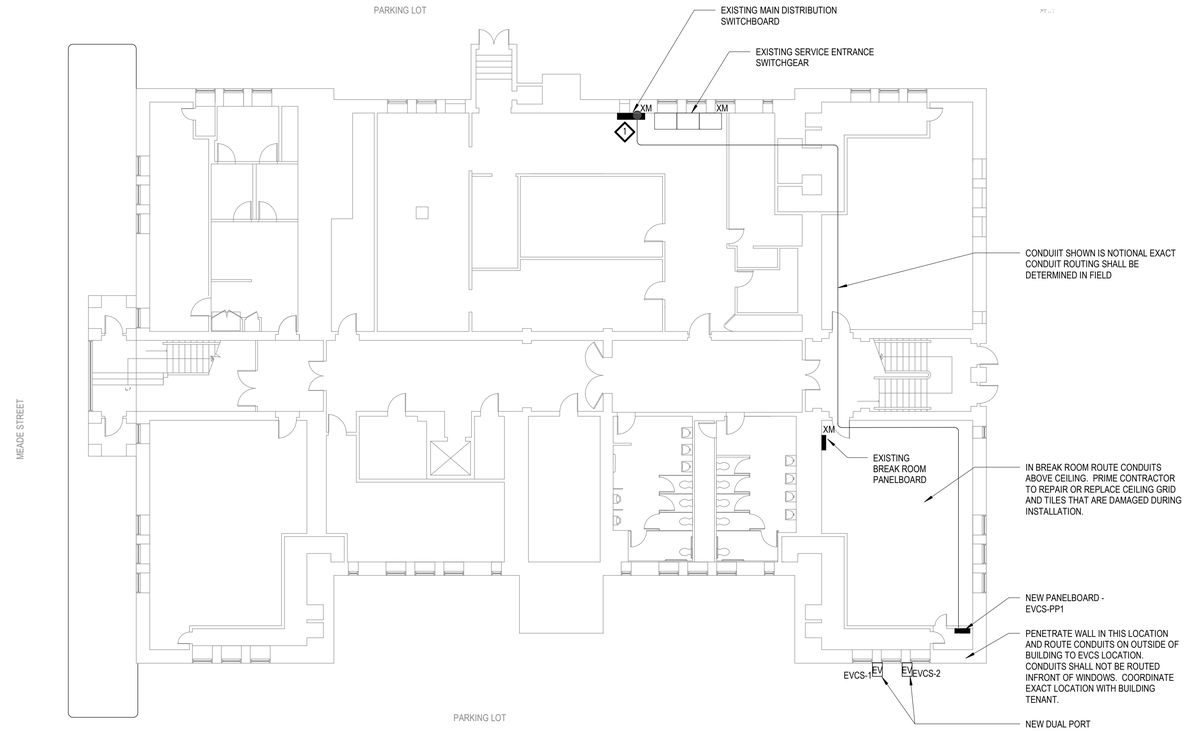
scale: 12" = 1'-0"

drawing number:

EN-002



2 meade st one-line diagram
N.T.S



1 meade street
1/8" = 1'-0"

general notes:

A. PROVIDE POWER TO (2) NEW DUAL PORT ELECTRIC VEHICLE CHARGING STATION. CHARGING STATION TO BE FURNISHED BY OWNER AND INSTALLED BY ELECTRICAL CONTRACTOR. PROVIDE (2) 208V, 40A, SINGLE PHASE CIRCUITS TO EACH CHARGING STATION. EACH CIRCUIT SHALL CONSIST OF (1) 250V,40A 2POLE CIRCUIT BREAKER, AND (2)#8 AND (1)#10 GND CONDUCTORS IN 1" CONDUIT. INTERIOR CONDUIT SHALL BE EMT. EXTERIOR CONDUIT SHALL BE GALVANIZED RIGID STEEL WITH THREADED FITTINGS. COORDINATE ANY ADDITIONAL OWNER REQUIREMENTS WITH ELECTRIC VEHICLE CHARGING STATION MANUFACTURER.

B. ROUTE CONDUIT FROM SWITCHBOARD MDP TO PANELBOARD EVCS-PP1 IN A MANNER CONSISTENT WITH EXISTING PIPE AND CONDUITS. ROUTE CONDUIT ABOVE CEILING WHEREVER POSSIBLE. CONDUIT THAT IS INSTALLED EXPOSED SHALL BE FREE FROM MARRING, SCRATCHES , CREASES OR DENTS. PRIME CONTRACTOR TO REPAIR OR REPLACE ANY DAMAGE CAUSED TO EXISTING CEILINGS, WALLS, CEILING TILES OR GRID SECTIONS AS A RESULT OF INSTALLATION

C. COORDINATE INSTALLATION OF CHARGING STATIONS AND POWER CONNECTIONS WITH CHARGING STATION MANUFACTURER PRIOR TO THE START OF WORK.

D. THE ELECTRICAL PLANS INDICATE GENERAL INTENT AND ARE NOT INTENDED TO SHOW ALL COMPONENTS OR HARDWARE REQUIRED TO INSTALL A COMPLETE AND WORKING CHARGING STATION. THE ELECTRICAL CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMISSION OF THEIR BID TO BECOME FAMILIAR WITH THE ACTUAL WORKING CONDITIONS AND EXTENT OF WORK. THE ELECTRICAL CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNERS REPRESENTATIVE AND ARCHITECT OF ANY UNANTICIPATED OR HIDDEN CONDITIONS ENCOUNTERED DURING WALK THRU.

E. THERE SHALL BE NO INTERRUPTION OF SERVICE TO ANY AREA OUTSIDE THE SCOPE LIMITS WITHOUT WRITTEN APPROVAL FROM THE OWNERS REPRESENTATIVE.

keyed notes:

1 PROVIDE (1) NEW 200A 3 POLE CIRCUIT BREAKER IN EXISTING MDP TO SERVE NEW PANELBOARD EVCS-PP1. CONTRACTOR TO VERIFY POLE SPACE. BREAKER SHALL MATCH THE MAKE , MODEL AND AIC RATING OF EXISTING BREAKERS LOCATED IN THE SAME PANELBOARD

edm
architecture
•
engineering
•
management
pittsfield, ma
unionville, ct
troy, ny
(888) 336-6500
team@edm-ae.com

consultants:

COMMONWEALTH OF MASSACHUSETTS
JEREMY BARNES
ELECTRICAL
No. 54997
REGISTERED
PROFESSIONAL ENGINEER

design by: jm
drawn by: jm
checked by: jb
approved by: jb

City of Worcester

ELECTRIC VEHICLE CHARGING STATION PROGRAM
Worcester, Ma

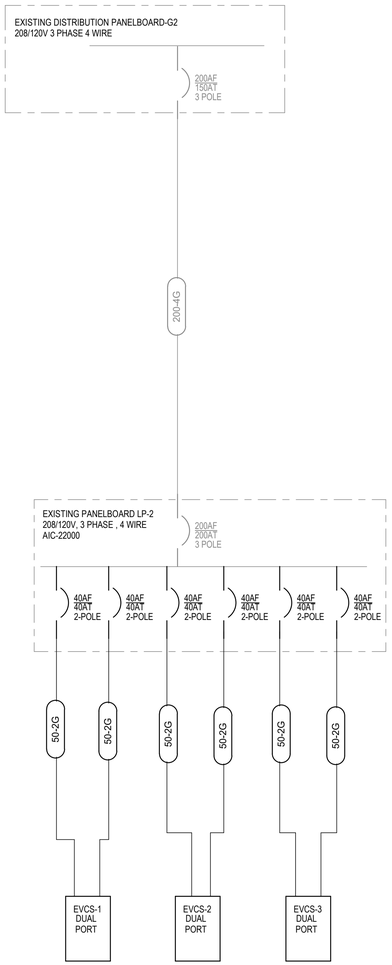
keyplan:

issue / rev.:	date:	issued for:	by:
	04/07/2022	BID SET	

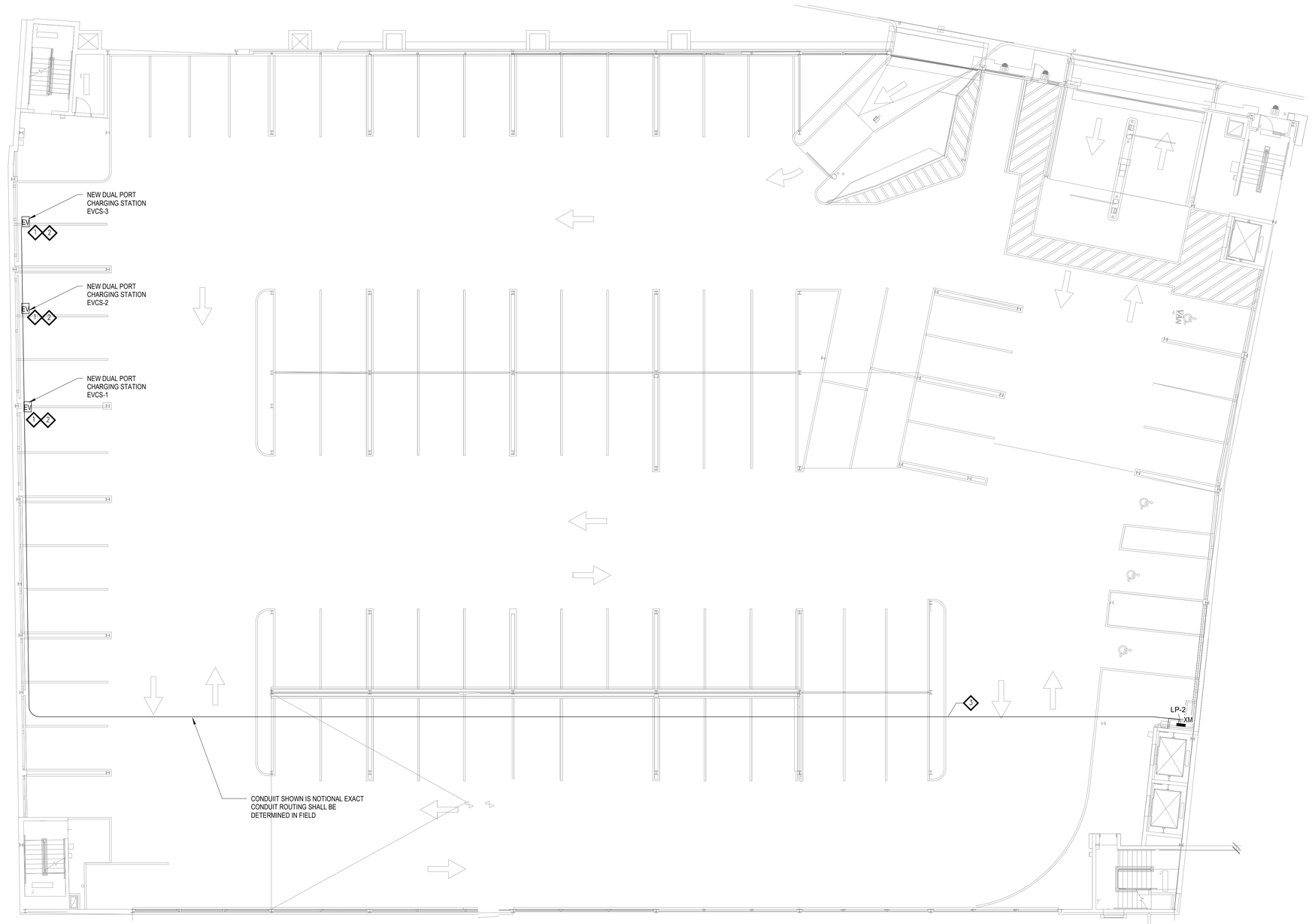
25 meade st power plan

date: 04.07.2022
project number: cow 5790
scale: As indicated
drawing number:

EP-101



2 pearl st one-line
N.T.S



1 pearl st.
3/32" = 1'-0"

general notes:

A. THE ELECTRICAL PLANS INDICATE GENERAL INTENT AND ARE NOT INTENDED TO SHOW ALL COMPONENTS OR HARDWARE REQUIRED TO INSTALL A COMPLETE AND WORKING CHARGING STATION. THE ELECTRICAL CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMISSION OF THEIR BID TO BECOME FAMILIAR WITH THE ACTUAL WORKING CONDITIONS AND EXTENT OF WORK. THE ELECTRICAL CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNERS REPRESENTATIVE AND ARCHITECT OF ANY UNANTICIPATED OR HIDDEN CONDITIONS ENCOUNTERED DURING WALK THRU.

B. THERE SHALL BE NO INTERRUPTION OF SERVICE TO ANY AREA OUTSIDE THE SCOPE LIMITS WITHOUT WRITTEN APPROVAL FROM THE OWNERS REPRESENTATIVE.

C. COORDINATE INSTALLATION OF CHARGING STATIONS AND POWER CONNECTIONS WITH CHARGING STATION MANUFACTURER PRIOR TO THE START OF WORK.

keyed notes:

1. PROVIDE POWER TO A NEW DUAL PORT ELECTRIC VEHICLE CHARGING STATION. B.O.D IS THE CHARGEPOINT CT 4021 WITH BOLLARD MOUNTING KIT. CHARGING STATION TO BE FURNISHED BY OWNER, INSTALLED BY ELECTRICAL CONTRACTOR. PROVIDE (2) 208V, 40A, SINGLE PHASE CIRCUITS. EACH CIRCUIT SHALL CONSIST OF (1) 250V,40A 2POLE CIRCUIT BREAKER, AND (2)#6 AND (1)#8 GND CONDUCTORS IN 1" CONDUIT. CONDUIT AND THREADED FITTINGS SHALL BE GALVANIZED RIGID STEEL. ROUTE CONDUIT IN A MANNER CONSISTENT WITH EXISTING CONDUIT AND PIPE ROUTING LINES.
2. CIRCUITS FOR NEW CHARGING STATIONS SHALL ORIGINATE FROM PANELBOARD LP-2 BY THE LEVEL 2 SOUTH WEST ELEVATORS.
3. (3) 1" GALVANIZED RIGID STEEL CONDUITS WITH THREADED FITTINGS(ONE CONDUIT FOR EACH STATION) ROUTED FROM PANELBOARD LP-2 TO EACH CHARGING STATION. EXACT ROUTE SHALL BE DETERMINED IN FIELD. CARE SHOULD BE TAKEN TO ROUTE CONDUITS SO THEY FOLLOW EXISTING CONDUIT AND PIPING LINES.

edm
architecture
•
engineering
•
management
pittsfield, ma
unionville, ct
troy, ny
(888) 336-6500
team@edm-ae.com
consultants:

COMMONWEALTH OF MASSACHUSETTS
JEREMY BARNES
ELECTRICAL
No. 54997
REGISTERED
PROFESSIONAL ENGINEER

design by: jm | drawn by: jm
checked by: jb
approved by: jb

City of Worcester

ELECTRIC VEHICLE CHARGING STATION PROGRAM
Worcester, Ma

keyplan:

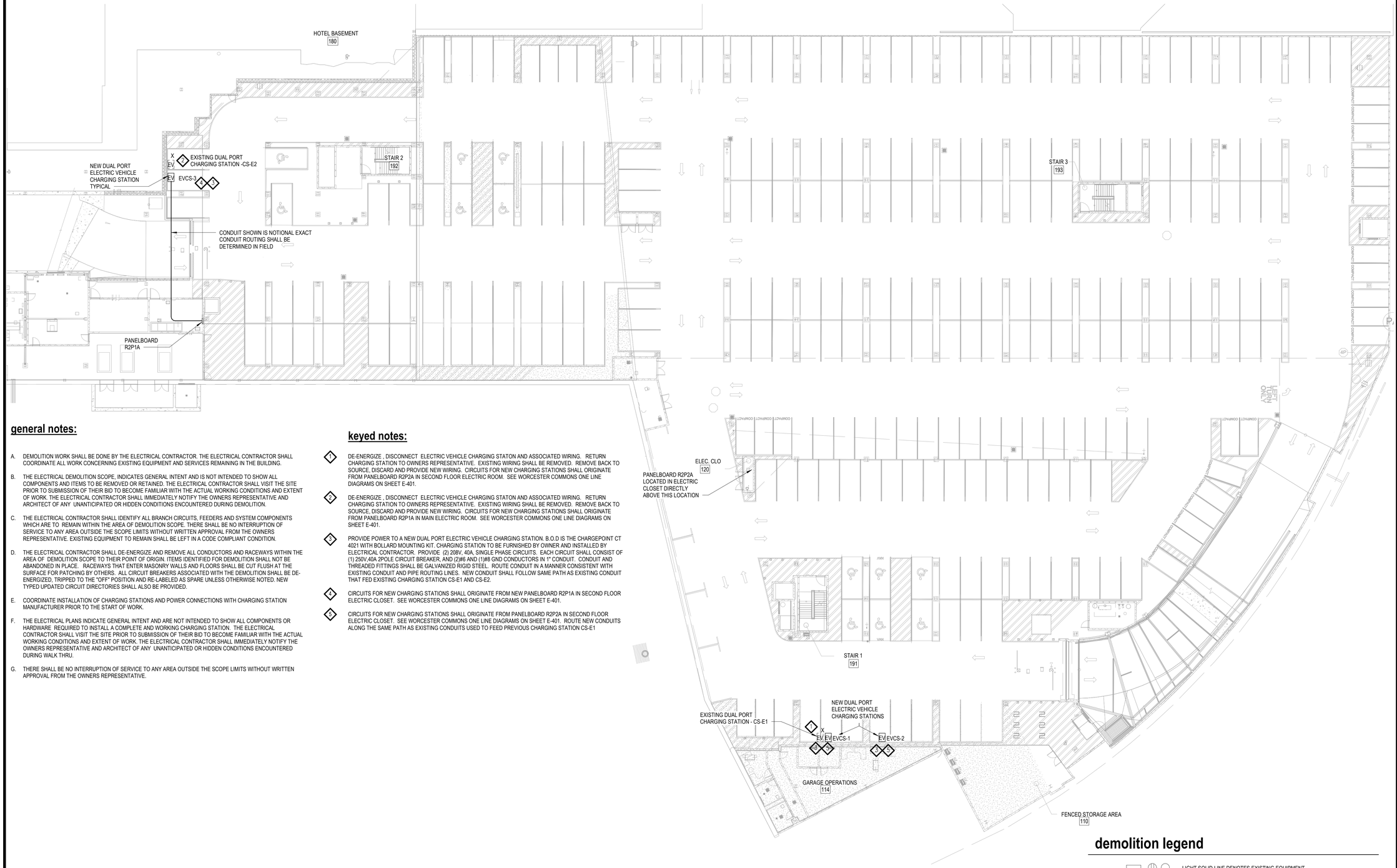
N

issue / rev.	date:	issued for:	by:
	04/07/2022	BID SET	

pearl street power plan

date: 04.07.2022
project number: cow 5790
scale: As indicated
drawing number:

EP-102



general notes:

A. DEMOLITION WORK SHALL BE DONE BY THE ELECTRICAL CONTRACTOR. THE ELECTRICAL CONTRACTOR SHALL COORDINATE ALL WORK CONCERNING EXISTING EQUIPMENT AND SERVICES REMAINING IN THE BUILDING.

B. THE ELECTRICAL DEMOLITION SCOPE, INDICATES GENERAL INTENT AND IS NOT INTENDED TO SHOW ALL COMPONENTS AND ITEMS TO BE REMOVED OR RETAINED. THE ELECTRICAL CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMISSION OF THEIR BID TO BECOME FAMILIAR WITH THE ACTUAL WORKING CONDITIONS AND EXTENT OF WORK. THE ELECTRICAL CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNERS REPRESENTATIVE AND ARCHITECT OF ANY UNANTICIPATED OR HIDDEN CONDITIONS ENCOUNTERED DURING DEMOLITION.

C. THE ELECTRICAL CONTRACTOR SHALL IDENTIFY ALL BRANCH CIRCUITS, FEEDERS AND SYSTEM COMPONENTS WHICH ARE TO REMAIN WITHIN THE AREA OF DEMOLITION SCOPE. THERE SHALL BE NO INTERRUPTION OF SERVICE TO ANY AREA OUTSIDE THE SCOPE LIMITS WITHOUT WRITTEN APPROVAL FROM THE OWNERS REPRESENTATIVE. EXISTING EQUIPMENT TO REMAIN SHALL BE LEFT IN A CODE COMPLIANT CONDITION.

D. THE ELECTRICAL CONTRACTOR SHALL DE-ENERGIZE AND REMOVE ALL CONDUCTORS AND RACEWAYS WITHIN THE AREA OF DEMOLITION SCOPE TO THEIR POINT OF ORIGIN. ITEMS IDENTIFIED FOR DEMOLITION SHALL NOT BE ABANDONED IN PLACE. RACEWAYS THAT ENTER MASONRY WALLS AND FLOORS SHALL BE CUT FLUSH AT THE SURFACE FOR PATCHING BY OTHERS. ALL CIRCUIT BREAKERS ASSOCIATED WITH THE DEMOLITION SHALL BE DE-ENERGIZED, TRIPPED TO THE "OFF" POSITION AND RE-LABELED AS SPARE UNLESS OTHERWISE NOTED. NEW TYPED UPDATED CIRCUIT DIRECTORIES SHALL ALSO BE PROVIDED.

E. COORDINATE INSTALLATION OF CHARGING STATIONS AND POWER CONNECTIONS WITH CHARGING STATION MANUFACTURER PRIOR TO THE START OF WORK.

F. THE ELECTRICAL PLANS INDICATE GENERAL INTENT AND ARE NOT INTENDED TO SHOW ALL COMPONENTS OR HARDWARE REQUIRED TO INSTALL A COMPLETE AND WORKING CHARGING STATION. THE ELECTRICAL CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMISSION OF THEIR BID TO BECOME FAMILIAR WITH THE ACTUAL WORKING CONDITIONS AND EXTENT OF WORK. THE ELECTRICAL CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNERS REPRESENTATIVE AND ARCHITECT OF ANY UNANTICIPATED OR HIDDEN CONDITIONS ENCOUNTERED DURING WALK THRU.

G. THERE SHALL BE NO INTERRUPTION OF SERVICE TO ANY AREA OUTSIDE THE SCOPE LIMITS WITHOUT WRITTEN APPROVAL FROM THE OWNERS REPRESENTATIVE.

keyed notes:

1. DE-ENERGIZE , DISCONNECT ELECTRIC VEHICLE CHARGING STATON AND ASSOCIATED WIRING. RETURN CHARGING STATION TO OWNERS REPRESENTATIVE. EXISTING WIRING SHALL BE REMOVED. REMOVE BACK TO SOURCE, DISCARD AND PROVIDE NEW WIRING. CIRCUITS FOR NEW CHARGING STATIONS SHALL ORIGINATE FROM PANELBOARD R2P2A IN SECOND FLOOR ELECTRIC ROOM. SEE WORCESTER COMMONS ONE LINE DIAGRAMS ON SHEET E-401.

2. DE-ENERGIZE , DISCONNECT ELECTRIC VEHICLE CHARGING STATON AND ASSOCIATED WIRING. RETURN CHARGING STATION TO OWNERS REPRESENTATIVE. EXISTING WIRING SHALL BE REMOVED. REMOVE BACK TO SOURCE, DISCARD AND PROVIDE NEW WIRING. CIRCUITS FOR NEW CHARGING STATIONS SHALL ORIGINATE FROM PANELBOARD R2P1A IN MAIN ELECTRIC ROOM. SEE WORCESTER COMMONS ONE LINE DIAGRAMS ON SHEET E-401.

3. PROVIDE POWER TO A NEW DUAL PORT ELECTRIC VEHICLE CHARGING STATION. B.O.D IS THE CHARGEPOINT CT 4021 WITH BOLLARD MOUNTING KIT. CHARGING STATION TO BE FURNISHED BY OWNER AND INSTALLED BY ELECTRICAL CONTRACTOR. PROVIDE (2) 208V, 40A, SINGLE PHASE CIRCUITS. EACH CIRCUIT SHALL CONSIST OF (1) 250V,40A 2POLE CIRCUIT BREAKER, AND (2)#6 AND (1)#8 GND CONDUCTORS IN 1" CONDUIT. CONDUIT AND THREADED FITTINGS SHALL BE GALVANIZED RIGID STEEL. ROUTE CONDUIT IN A MANNER CONSISTENT WITH EXISTING CONDUIT AND PIPE ROUTING LINES. NEW CONDUIT SHALL FOLLOW SAME PATH AS EXISTING CONDUIT THAT FED EXISTING CHARGING STATION CS-E1 AND CS-E2.

4. CIRCUITS FOR NEW CHARGING STATIONS SHALL ORIGINATE FROM NEW PANELBOARD R2P1A IN SECOND FLOOR ELECTRIC CLOSET. SEE WORCESTER COMMONS ONE LINE DIAGRAMS ON SHEET E-401.

5. CIRCUITS FOR NEW CHARGING STATIONS SHALL ORIGINATE FROM PANELBOARD R2P2A IN SECOND FLOOR ELECTRIC CLOSET. SEE WORCESTER COMMONS ONE LINE DIAGRAMS ON SHEET E-401. ROUTE NEW CONDUITS ALONG THE SAME PATH AS EXISTING CONDUITS USED TO FEED PREVIOUS CHARGING STATION CS-E1

demolition legend

LIGHT SOLID LINE DENOTES EXISTING EQUIPMENT.

DARK DASHED LINE DENOTES DEMOLITION EQUIPMENT.

X. EXISTING EQUIPMENT TO BE REMOVED AND DELIVERED TO OWNER. CIRCUIT SHALL BE PULLED BACK FROM NEXT ACTIVE OUTLET/BACK TO PANEL. REMOVE JUNCTION BOXES, AND PATCH WALL. BLANK PLATES NOT PERMITTED.

1 worcester commons power plan
NTS

edm
architecture • engineering • management
pittsfield, ma
unionville, ct
troy, ny
(888) 336-6500
team@edm-ae.com

consultants:

COMMONWEALTH OF MASSACHUSETTS
JEREMY BARNES
ELECTRICAL
No. 54997
REGISTERED PROFESSIONAL ENGINEER

design by:	drawn by:
jm	jm

checked by: jb

approved by: jb

City of Worcester

ELECTRIC VEHICLE CHARGING STATION PROGRAM
Worcester, Ma

keyplan:

N

issue / rev.	date:	issued for:	by:
	04/07/2022	BID SET	

worcester commons power plan

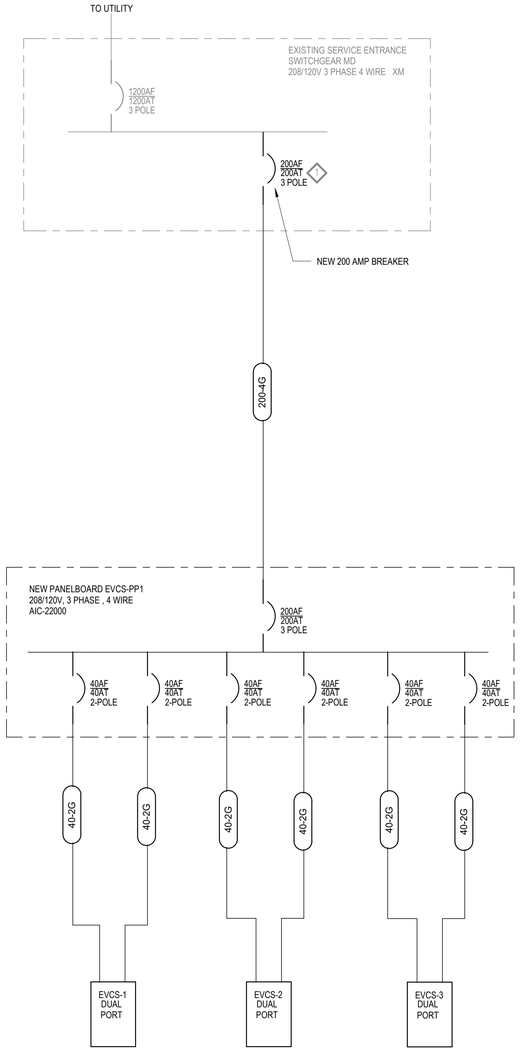
date: 04.07.2022

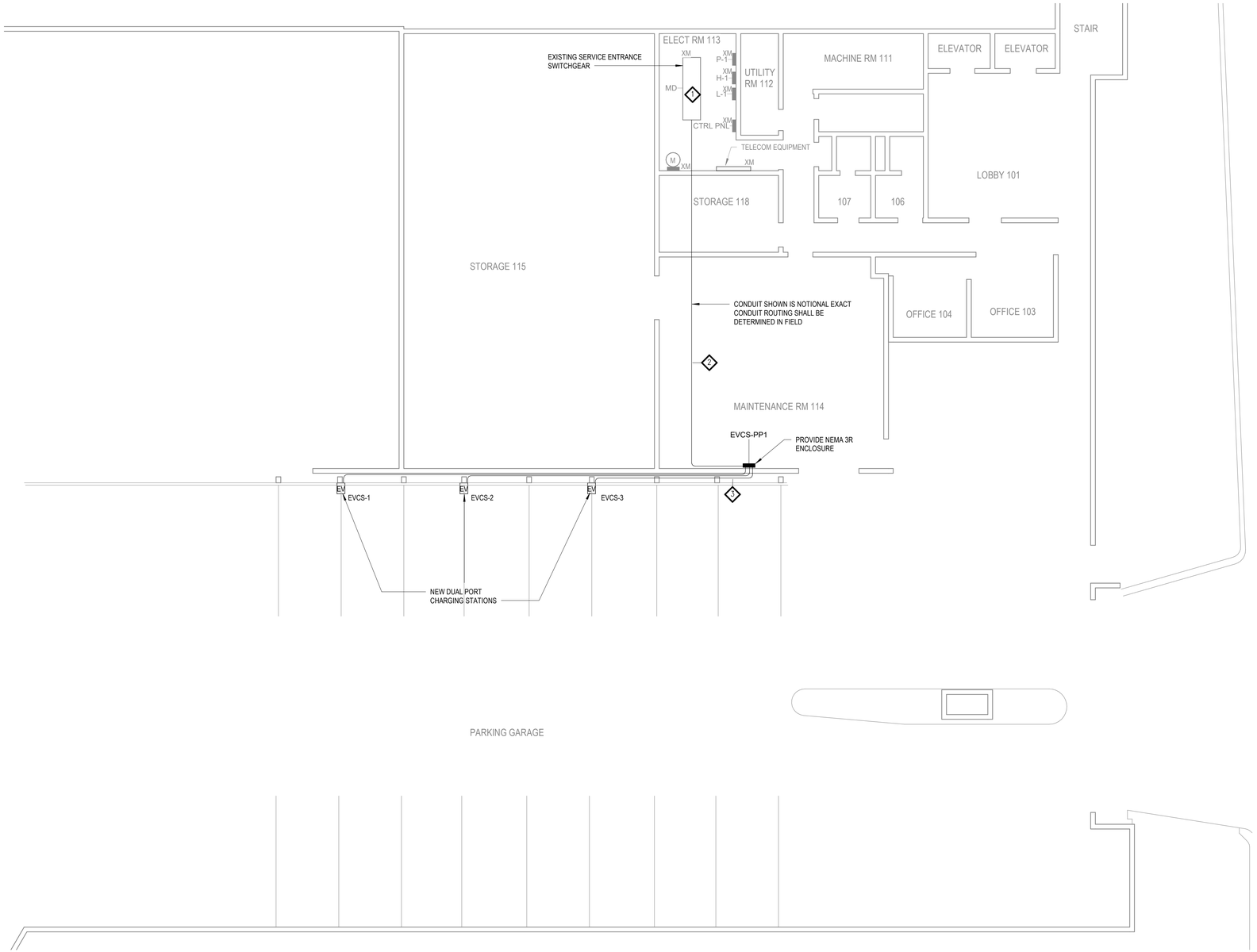
project number: cow 5790

scale: As indicated

drawing number:

EP-103





1

2 federal plaza one-line diagram
N.T.S

1 federal plaza garage
1/8" = 1'-0"

general notes:

A. PROVIDE POWER TO (3) NEW DUAL PORT ELECTRIC VEHICLE CHARGING STATIONS. B.O.D IS THE CHARGEPOINT CT 4021 WITH BOLLARD MOUNTING KIT. CHARGING STATIONS TO BE FURNISHED BY OWNER AND INSTALLED BY ELECTRICAL CONTRACTOR. PROVIDE (2) 208V, 40A, SINGLE PHASE CIRCUITS TO EACH CHARGING STATION. EACH CIRCUIT SHALL CONSIST OF (1) 250V,40A 2POLE CIRCUIT BREAKER, AND (2)#6 AND (1)#8 GND CONDUCTORS IN 1" CONDUIT. COORDINATE ANY ADDITIONAL OWNER REQUIREMENTS WITH ELECTRIC VEHICLE CHARGING STATION MANUFACTURER.

B. ROUTE CONDUIT FROM SWITCHBOARD MD TO PANELBOARD EVCS-PP1 IN A MANNER CONSISTENT WITH EXISTING PIPE AND CONDUITS. ROUTE CONDUIT ABOVE CEILING WHEREVER POSSIBLE. CONDUIT THAT IS INSTALLED EXPOSED SHALL BE FREE FROM MARRING, SCRATCHES , CREASES OR DENTS. PRIME CONTRACTOR TO REPAIR OR REPLACE ANY DAMAGE CAUSED TO EXISTING CEILINGS, WALLS, CEILING TILES OR GRID SECTIONS AS A RESULT OF INSTALLATION

C. COORDINATE INSTALLATION OF CHARGING STATIONS AND POWER CONNECTIONS WITH CHARGING STATION MANUFACTURER PRIOR TO THE START OF WORK.

D. THE ELECTRICAL PLANS INDICATE GENERAL INTENT AND ARE NOT INTENDED TO SHOW ALL COMPONENTS OR HARDWARE REQUIRED TO INSTALL A COMPLETE AND WORKING CHARGING STATION. THE ELECTRICAL CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMISSION OF THEIR BID TO BECOME FAMILIAR WITH THE ACTUAL WORKING CONDITIONS AND EXTENT OF WORK. THE ELECTRICAL CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNERS REPRESENTATIVE AND ARCHITECT OF ANY UNANTICIPATED OR HIDDEN CONDITIONS ENCOUNTERED DURING WALK THRU.

keyed notes: ◇

1 PROVIDE (1) NEW 250V, 200A 3 POLE CIRCUIT BREAKER IN EXISTING MDP TO SERVE NEW PANELBOARD EVCS-PP1. CONTRACTOR TO VERIFY POLE SPACE AND THAT A 200A FRAME WILL FIT. BREAKERS MAY NEED TO BE RESORTED AND SPARE BREAKER REMOVED TO ALLOW FOR THE SIZE OF A 200A CIRCUIT BREAKER. CIRCUIT BREAKER SHALL MATCH THE MAKE, MODEL AND AIC RATING OF EXISTING CIRCUIT BREAKERS LOCATED IN THE SAME PANELBOARD.

INTERIOR CONDUIT, LOCATED INSIDE ELECTRIC ROOM AND MAINTENANCE RM 114 MAY BE EMT.

2

3 CONDUIT AND THREADED FITTINGS ROUTED FROM PANELBOARD EVCS-PP1 TO CHARGING STATIONS IN PARKING GARAGE SHALL BE GALVANIZED RIGID STEEL.

edm
architecture • engineering • management
pittsfield, ma
unionville, ct
troy, ny
(888) 336-6500
team@edm-ae.com

consultants:

COMMONWEALTH OF MASSACHUSETTS
JEREMY BARNES
ELECTRICAL
No. 54997
REGISTERED
PROFESSIONAL ENGINEER

design by:	drawn by:
jm	jm

checked by: jb

approved by: jb

City of Worcester

ELECTRIC VEHICLE CHARGING STATION PROGRAM
Worcester, Ma

keyplan:

N

issue / rev.	date:	issued for:	by:
	04/07/2022	BID SET	

federal plaza parking garage

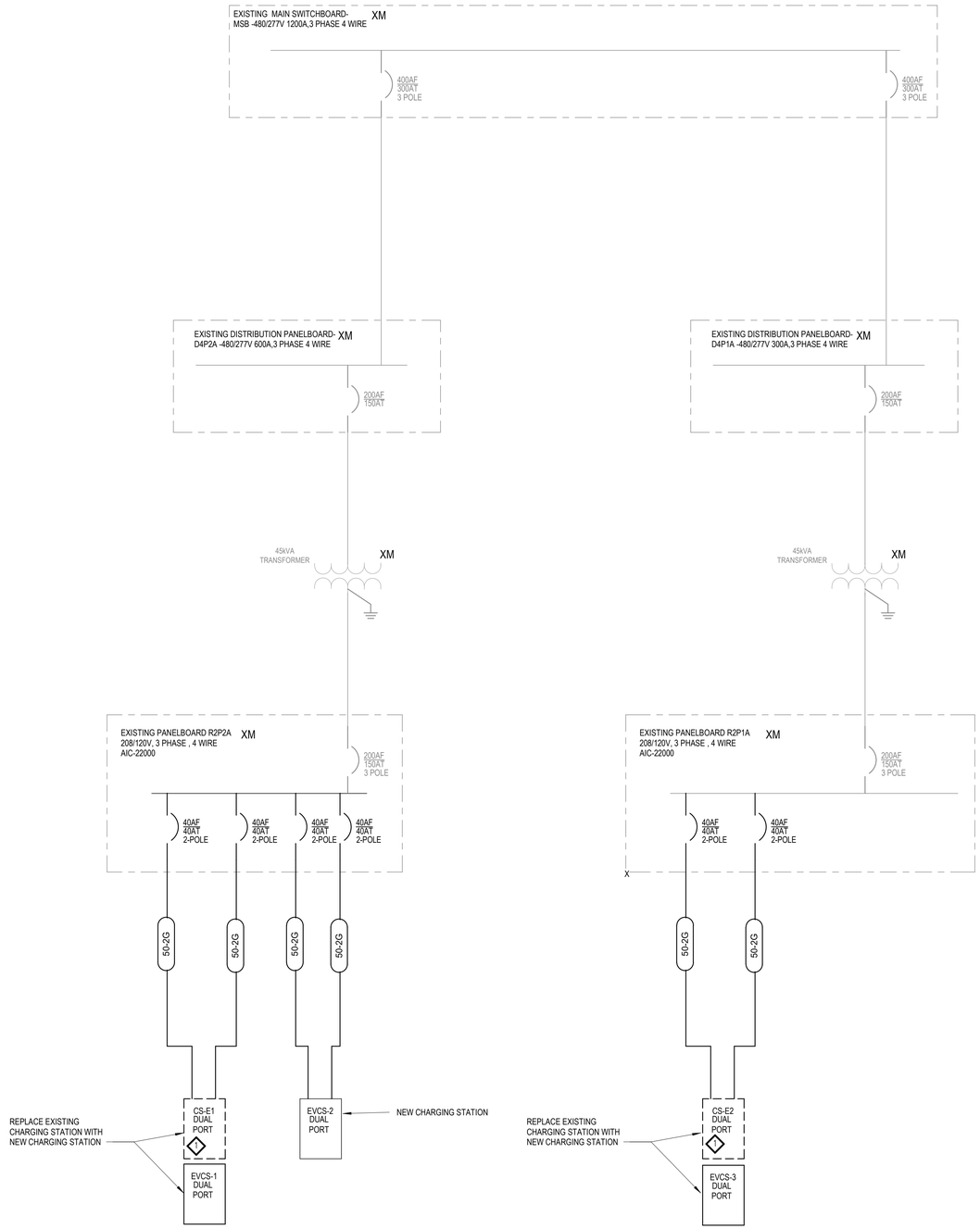
date: 04.07.2022

project number: cow 5790

scale: As indicated

drawing number:

EP-105



keyed notes:

1 DE-ENERGIZE , DISCONNECT ELECTRIC VEHICLE CHARGING STATON AND ASSOCIATED WIRING. RETURN CHARGING STATION TO OWNERS REPRESENTATIVE. EXISTING WIRING SHALL BE REMOVED. REMOVE BACK TO SOURCE AND DISCARD. PROVIDE NEW BRANCH CIRCUITS AS INDICATED.

edm

architecture
•
engineering
•
management

pittsfield, ma
unionville, ct
troy, ny

(888) 336-6500
team@edm-ae.com

consultants:

COMMONWEALTH OF MASSACHUSETTS
JEREMY BARNES
ELECTRICAL
No. 54997
REGISTERED
PROFESSIONAL ENGINEER

design by:	drawn by:
jm	jm

checked by: jb

approved by: jb

City of Worcester

ELECTRIC VEHICLE CHARGING STATION PROGRAM
Worcester, Ma

keyplan:

issue / rev.	date:	issued for:	by:
	04/07/2022	BID SET	

worcester commons one line diagrams

date: 04.07.2022

project number: cow 5790

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

drawing number:

E-401

AC FEEDER SCHEDULE - COPPER CONDUCTORS

TAG	COPPER CONDUCTORS	SETS	RACEWAY SIZE	NOMINAL AMPACITY RATING
20-2G	2#12 & 1#12 GND. (SINGLE PHASE.)	1	3/4"	20
20-3G	3#12 & 1#12 GND.	1	3/4"	20
30-2G	2#10 & 1#10 GND. (SINGLE PHASE.)	1	3/4"	30
30-3G	3#10 & 1#10 GND.	1	3/4"	30
40-2G	2#8 & 1#10 GND. (SINGLE PHASE.)	1	3/4"	40
40-3G	3#8 & 1#10 GND.	1	3/4"	40
50-2G	2#6 & 1#8 GND. (SINGLE PHASE.)	1	1"	55
50-3G	3#6 & 1#10 GND.	1	3/4"	55
60-3G	3#4 & 1#10 GND.	1	1"	70
70-3G	3#4 & 1#8 GND.	1	1"	70
70-4G	4#4 & 1#8 GND.	1	1 1/4"	70
80-3G	3#3 & 1#8 GND.	1	1 1/4"	85
90-3G	3#2 & 1#8 GND.	1	1 1/4"	95
100-3G	3#1 & 1#8 GND.	1	1 1/2"	110
100-4G	4#1 & 1#8 GND. (3 PHASE, 4 WIRE)	1	1 1/2"	110
125-3G	3#1 & 1#6 GND.	1	1 1/2"	130
125-4G	4#1 & 1#6 GND. (3 PHASE, 4 WIRE)	1	1 1/2"	130
150-3G	3#1/0 & 1#6 GND.	1	1 1/2"	150
150-4G	4#1/0 & 1#6 GND. (3 PHASE, 4 WIRE)	1	2"	150
175-3G	3#2/0 & 1#6 GND.	1	2"	175
200-3G	3#3/0 & 1#6 GND.	1	2"	200
200-4G	4#3/0 & 1#6 GND. (3 PHASE, 4 WIRE)	1	2"	200
225-3G	3#4/0 & 1#4 GND.	1	2 1/2"	230
225-4G	4#4/0 & 1#4 GND. (3 PHASE, 4 WIRE)	1	2 1/2"	230
250-3G	3#250 KCMIL & 1#4 GND.	1	2 1/2"	255
250-4G	4#250 KCMIL & 1#4 GND. (3 PHASE, 4 WIRE)	1	3"	255
300-3G	3#350 KCMIL & 1#4 GND.	1	3"	310
300-SG	4#350 KCMIL (3 PHASE, 4 WIRE)	1	3"	310
375-3G	3#500 KCMIL & 1#3 GND.	1	3"	380
400-3G	3#600 KCMIL & 1#3 GND.	1	3 1/2"	420
400-4G	4#600 KCMIL & 1#3 GND. (3 PHASE, 4 WIRE)	1	4"	420
500-3G	3#250 KCMIL & 1#2 GND.	2	2 1/2"	510
500-4G	4#250 KCMIL & 1#2 GND. (3 PHASE, 4 WIRE)	2	3"	510
600-3G	3#350 KCMIL & 1#1 GND.	2	3"	620
600-4G	4#350 KCMIL & 1#1 GND. (3 PHASE, 4 WIRE)	2	3"	620

NOTES:

1. COPPER CONDUCTOR AMPACITY BASED ON 2020 NEC TABLE 310.15 (B)(16); 60° C FOR <= 100A AND 75° C FOR > 100A.
2. COPPER EQUIPMENT GROUND CONDUCTOR SIZED BASED ON 2020 NEC TABLE 250.122.
3. CONDUIT SIZES INDICATED ARE NEC MINIMUM. CONTRACTOR SHALL INCREASE CONDUIT SIZE AS REQUIRED BASED ON ACTUAL INSTALLATION CONDITIONS INCLUDING LENGTH OF CIRCUIT, NUMBER OF OFFSETS AND ELBOWS, AND CABLE PULLING TENSION LIMITATIONS.
4. CONTRACTOR MAY SUBSTITUTE THE SCHEDULED FEEDER WITH AN ALTERNATE SELECTION OF EQUAL OR GREATER AMPACITY WITH THE PRIOR WRITTEN APPROVAL OF THE ENGINEER.

edm
architecture • engineering • management
pittsfield, ma
unionville, ct
troy, ny
(888) 336-6500
team@edm-ae.com

consultants:

COMMONWEALTH OF MASSACHUSETTS
JEREMY BARNES
ELECTRICAL
No. 54997
REGISTERED PROFESSIONAL ENGINEER

design by: jm | drawn by: jm
checked by: jb
approved by: jb

City of Worcester

ELECTRIC VEHICLE CHARGING STATION PROGRAM
Worcester, Ma

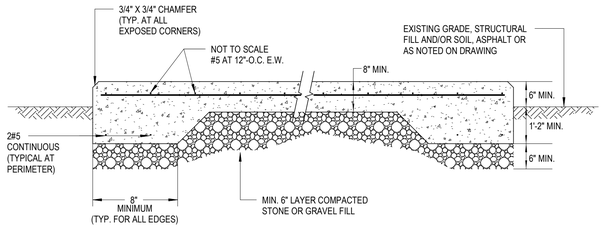
keyplan:

issue / rev. :	date:	issued for:	by:
	04/07/2022	BID SET	

schedules

date: 04.07.2022
project number: cow 5790
scale: 12" = 1'-0"
drawing number:

E-501



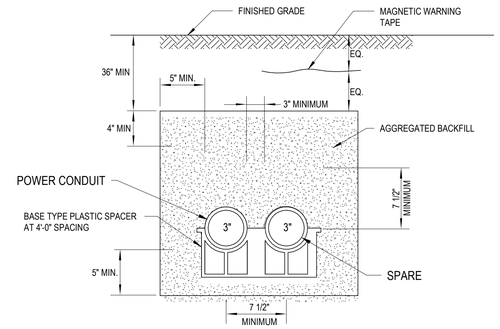
CONCRETE NOTES:

1. CONCRETE SHALL BE OF NATURAL AGGREGATES CONFORMING TO ATSM C33 WITH A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS.

2. AS SOON AS POSSIBLE AFTER FINISHING OPERATIONS, TOP SURFACE OF CONCRETE SHALL BE SPAYED WITH AN APPROVED CURING COMPOUND. REBARS SHALL BE BONDED TO EQUIPMENT GROUND RING AND TO THE EXISTING BUILDING GROUND RING.

3. INSTALL JOINT FILLET BETWEEN EXISTING AND NEW CONCRETE SLABS AND FOUNDATIONS. (TYPICAL)

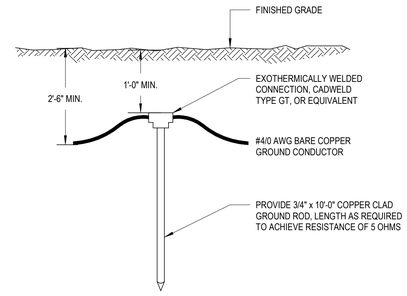
1 outdoor electrical equipment pad detail
nts



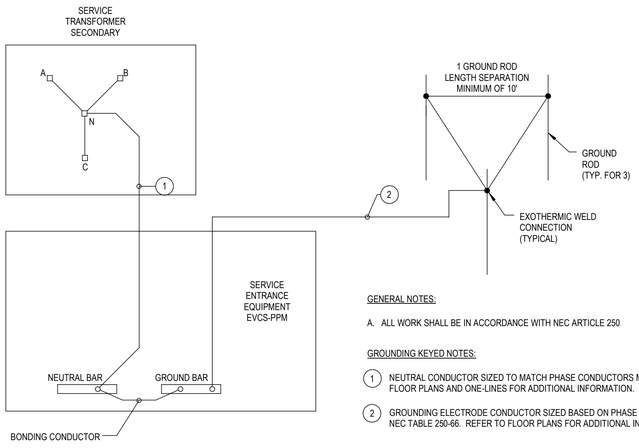
NOTES:

1. BACKFILL DUCT BANK IN LAYERS. PROVIDE YELLOW DUCT BANK MARKER TAPES, READING: "CAUTION - ELECTRICAL LINES BELOW", OVER ENTIRE LENGTH OF DUCTLINE. LOCATE TAPES 12 INCHES BELOW GRADE. PROVIDE A TAPE FOR EVERY 12 INCHES OF WIDTH OF DUCTLINE.
2. CONDUIT SIZE IS FOR REFERENCE. SIZE CONDUITS AND QUANTITIES PER PLAN.

2 electrical service duct bank detial
nts



3 ground rod installation
nts



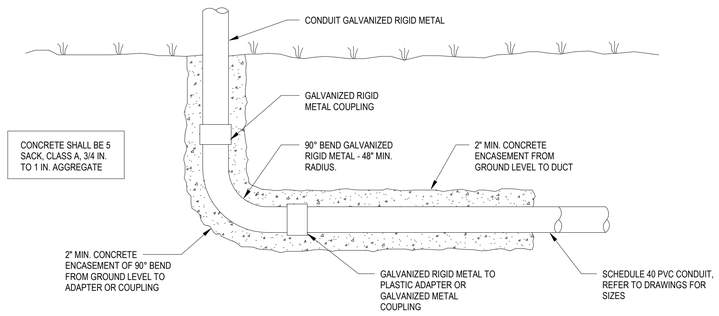
GENERAL NOTES:

A. ALL WORK SHALL BE IN ACCORDANCE WITH NEC ARTICLE 250

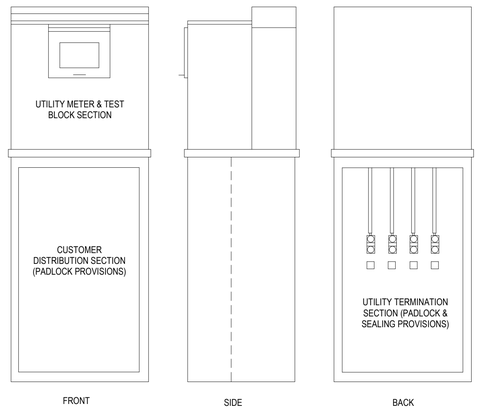
GROUNDING KEYED NOTES:

1. NEUTRAL CONDUCTOR SIZED TO MATCH PHASE CONDUCTORS MINIMUM. REFER TO FLOOR PLANS AND ONE-LINES FOR ADDITIONAL INFORMATION.
2. GROUNDING ELECTRODE CONDUCTOR SIZED BASED ON PHASE CONDUCTORS PER NEC TABLE 250-66. REFER TO FLOOR PLANS FOR ADDITIONAL INFORMATION.

4 evcs-ppm service entrance grounding detail
nts



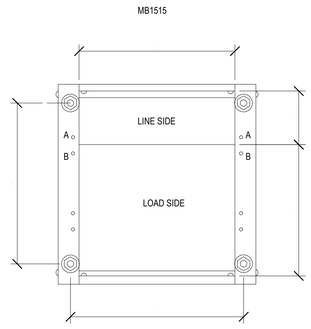
5 site conduit stub up detail
12" = 1'-0"



NOTES:

1. COORDINATE APPROVAL OF METER, METER SOCKET, AND SEQUENCING WITH THE UTILITY COMPANY PRIOR TO START OF WORK.
2. REFER TO UTILITY COMPANY GUIDELINES FOR APPROVED METERING EQUIPMENT MANUFACTURERS AND MODEL NUMBERS.

6 commercial meter pedestal detail
nts



NOTES:

METHOD 1: USE PREFABRICATED MOUNTING BASE ASSEMBLY SUITABLE FOR PEDESTAL MODEL MANUFACTURERS INSTRUCTIONS. INSTALL MOUNTING BASE ASSEMBLY FLUSH WITH TOP SURFACE OF CONCRETE PAD ALLOWING MOUNTING STUDS TO REACH ABOVE PAD. LOCATE LINE AND LOAD CONDUITS IN THE DESIGNATED AREAS AS SHOWN IN DETAIL.

METHOD 2: USE ANCHOR BOLTS (5/8" DIA) PRECAST IN CONCRETE PAD. MOUNTING HOLE DIMENSIONS SPER MANUFACTURERS REQUIREMENTS.

7 pad mouted meter pedestal base detail
nts

edm
architecture
•
engineering
•
management
pittsfield, ma
unionville, ct
troy, ny
(888) 336-6500
team@edm-ae.com

consultants:

COMMONWEALTH OF MASSACHUSETTS
JEREMY BARNES
ELECTRICAL
No. 54997
REGISTERED
PROFESSIONAL ENGINEER

design by:	drawn by:
jm	jm

checked by: jb

approved by: jb

City of Worcester

ELECTRIC VEHICLE CHARGING STATION PROGRAM
Worcester, Ma

keyplan:

N

issue / rev.	date:	issued for:	by:
	04/07/2022	BID SET	

electrical details

date: 04.07.2022

project number: cow 5790

scale: As indicated

drawing number:

E-601