

SECTION 31 60 00 PRECAST CONCRETE ELECTRIC VEHICLE CHARGER FOUNDATION UNITS

PART 1 GENERAL

1.1 SUMMARY

- A. This work pertains to furnishing and installing precast concrete electric vehicle (EV) charger foundation units, as special foundations supporting DC fast charger (DCFC) units, in accordance with the Project Drawings and this Specification. Each precast foundation unit shall be installed at the elevation and location shown on the Project Drawings.
- B. Related Sections:
 - 1. Section 31 23 33 Trenching, Backfilling and Compacting
 - 2. Section 31 23 00 Excavation and Fill

1.2 REFERENCES

- A. Design:
 - 1. ACI 318 Building Code Requirements for Structural Concrete and Commentary, American Concrete Institute, as referenced by the applicable edition of the IBC
 - 2. ASCE/SEI 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures, American Society of Civil Engineers / Structural Engineering Institute, as referenced by the applicable edition of the IBC
 - 3. International Building Code, International Code Council, Inc., edition adopted by the Authority Having Jurisdiction
- B. Reference Standards:
 - 1. ANSI/SCTE 77 Specifications for Underground Enclosure Integrity
 - 2. ASTM C31 Practice for Make and Curing Concrete Test Specimens in the Field
 - 3. ASTM C33 Specification for Concrete Aggregates
 - 4. ASTM C39 Test Method for Compressive Strength of Cylindrical Concrete Specimens
 - 5. ASTM C94 Specification for Ready-Mixed Concrete
 - 6. ASTM C125 Standard Terminology Relating to Concrete and Concrete Aggregates
 - 7. ASTM C138 Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
 - 8. ASTM C143 Test Method for Slump of Hydraulic-Cement Concrete
 - 9. ASTM C150 Specification for Portland Cement
 - 10. ASTM C173 Test Method for Density (Unit Weight), Yield and Air Content (Gravimetric) of Concrete
 - 11. ASTM C192 Practice for Making and Curing Concrete Test Specimens in the Laboratory
 - 12. ASTM C231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
 - 13. ASTM C260 Specification for Air-Entraining Admixtures for Concrete
 - 14. ASTM C494 Specification for Chemical Admixtures for Concrete
 - 15. ASTM C989 Specification for Slag Cement for Use in Concrete and Mortars
 - 16. ASTM C1028 Standard Test Method for Determining the Static Coefficient of Friction of Surfaces
 - 17. ASTM C1107 Packaged Dry, Hydraulic Cement Grout (Non-Shrink)
 - 18. ASTM C1610 Test Method for Static Segregation of Self-Consolidating Concrete Using Column Technique
 - 19. ASTM C1611 Test Method for Slump Flow of Self-Consolidating Concrete
 - 20. ASTM C1712 Test Method for Rapid Assessment of Static Segregation of Self-Consolidating Concrete Using Penetration Test
 - 21. ASTM C1758 Practice for Fabricating Test Specimens with Self-Consolidating Concrete
 - 22. ASTM D422 Standard Test Method for Particle-Size Analysis of Soils
 - 23. ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
 - 24. ASTM D1241 Standard Specification for Materials for Soil-Aggregate Subbase, Base and Surface Courses

25. ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
 26. ASTM D2487 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)
 27. ASTM D3080 Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions
 28. ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
 29. ASTM D4767 Test Method for Consolidated-Undrained Triaxial Compression Test for Cohesive Soils
 30. ASTM F593 Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
 31. ASTM A240 Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
- C. Additional References:
1. EV Block Reference Manual – DC Installation – Current Version - www.evblocks.com/us
 2. EV Block DC Product Drawings – www.evblocks.com/us

1.3 DEFINITIONS

- A. EV Charger Foundation: A structural element designed to support and anchor EV charging equipment, sized and configured to meet applicable load, stability, and environmental requirements. The foundation shall accommodate conduit access and anchorage as required for secure installation.
- B. EV Block DC: A precast concrete EV Charger Foundation unit, at least 24 inches in height, consisting of four sides and an upper surface that is generally square or rectangular in shape. At least two sides shall include one or more openings leading to a hollow center. The upper surface shall include a recessed area designed to accept a flush-mounted cover plate, and embedded anchor points that accept either the cover plate or a stainless steel match plate mounted on the upper surface. The unit shall be manufactured by an authorized producer under license by Recon Wall Systems, Inc. dba EV Blocks.
- C. Cover Plate: A composite plate, 18 inches square, with holes near the four corners that allow it to be secured within the recess of the EV Block DC unit. The cover plate provides a protective cover during passive installation, prior to mounting a charger.
- D. Stainless Steel Match Plate: A stainless steel plate, 1/2 inch thick, custom machined to the bolt pattern and cable openings of a specific DC fast charger, with holes that allow it to be secured to the upper surface of the EV Block DC unit.
- E. Cover Plate Securing Hardware: Four, 1/2-inch diameter by 3-inch long, stainless steel, button head and tamper-resistant bolts used for securing the cover plate to the EV Block DC.
- F. Match Plate Securing Hardware: Twelve, 1/2-inch diameter by 2-1/2 inch long, stainless steel, flat head bolts used for securing the stainless steel match plate to the EV Block DC.
- G. Crushed Stone Foundation: Clean, crushed rock located directly beneath the EV Block DC unit to provide adequate drainage and leveling.

1.4 SUBMITTALS

- A. Contractor shall submit to the Owner the EV Block DC product data and installation instructions for approval.
- B. Contractor shall submit to the Owner the EV Block DC Producer's test reports certifying that the EV Block DC units manufactured at their production facility meet the requirements of this Specification and the requirements of the Project Drawings.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Contractor shall inspect all EV Block DC units at delivery to determine that the proper size and type have been delivered and are usable. Damaged material shall not be incorporated into the work.
- B. All EV Block DC units shall be stored in a location and manner that protects against excessive weathering and damage.
- C. During storage, Contractor shall prevent the EV Block DC units from coming in contact with substances which may stain or adhere to the finished visual surfaces of the unit. Provide proper dunnage between the

EV Block DC units as well as the ground surface. EV Block DC units shall not be stacked in direct contact with other units.

- D. For the portions of the EV Block DC units which shall be exposed above grade, the finished surface shall be free of excessive chipping, cracking and stains.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. EV Block DC units furnished to the project shall be produced by a manufacturer that has been authorized and licensed, by the licensor listed below, to produce the EV Block DC units:
 - 1. Recon Wall Systems, Inc. dba EV Blocks
Coon Rapids, MN
(612) 474-0089
www.evblocks.com/us

2.2 DESCRIPTION

- A. The precast concrete EV charger foundation unit shall be manufactured:
 - 1. As a single pour unit that is cast monolithically, containing no cold joints,
 - 2. With a recessed area in the upper surface that allows for the flush mounting of a cover plate,
 - 3. Containing sixteen embedded threaded inserts: twelve in the upper surface for securing a stainless steel match plate, and four located inboard within the recess for securing the cover plate,
 - 4. With at least two openings in the side surfaces of the unit, leading to a central hollow center, that allow for the installation of electrical wiring conduits,
 - 5. With a bullnose, round-over, or chamfer profile around the upper surface.

2.3 MATERIALS

- A. Concrete:
 - 1. All concrete used shall be first-purpose. No returned or waste concrete shall be permitted for use in production.
 - 2. The EV Charger Foundation unit shall consist of concrete with a minimum 28-day compressive strength of 4,000 psi.
 - 3. Air Entrainment: Total air content of the concrete shall conform to ACI 318 for the freezing-and-thawing (F) exposure class applicable to the Project. Where the Project documents do not establish an exposure class, the concrete shall be air-entrained to a total air content of 5.5 to 8.5 percent by volume, or in conformance with ASTM C94 Table 1 and Section 7, latest revision. Air content shall be measured in the plastic state in accordance with ASTM C231 (conventional concrete) or ASTM C173 (self-consolidating concrete).
 - 4. Consistency shall be in accordance with the producer's qualified mix design, measured per ASTM C143 (conventional concrete) or ASTM C1611 (self-consolidating concrete).
- B. Cover Plate:
 - 1. The adapter plate shall meet the requirements of the ANSI/SCTE-77 standard for Tier 15.
 - 2. The top surface of the adapter plate shall have a static coefficient of friction of 0.5 or greater, as described in ASTM C1028, in both wet and dry conditions.
- C. Stainless Steel Match Plate:
 - 1. The stainless steel match plate shall be Type 304 stainless steel conforming to ASTM A240/A240M, 1/2 inch thick.
 - 2. The plate plan dimensions, bolt-hole pattern, and cable-routing openings shall be machined to suit the specified DC fast charger.
 - 3. The match plate shall be secured to the twelve standardized embedded inserts in the upper surface of the EV Charger Foundation unit.
- D. Cover Plate Securing Hardware:

1. Cover plate securing hardware shall be stainless steel, meeting the requirements of ASTM F593, and shall contain a tamper-resistant button head such as hex-pin or torx-pin.
- E. Match Plate Securing Hardware:
 1. Match plate securing hardware shall be stainless steel, meeting the requirements of ASTM F593, with a flat head.
- F. Crushed Stone Foundation:
 1. The foundation material shall consist of clean, 1-inch minus, crushed stone or crushed gravel meeting the following gradation tested in accordance with ASTM D422:

<u>Sieve Size</u>	<u>Percent Passing</u>
1-inch	100
3/4-inch	75 – 100
No. 4	0 – 10
No. 50	0 – 5

2.4 FINISH

- A. The exposed surfaces of the EV charger foundation unit shall have a smooth finish, and the upper surface shall have a profiled edge that is either bullnose, a round-over, or chamfer.

2.5 UNIT BACKFILL

- A. Crushed Stone Backfill: A backfill material consisting of clean, 1-inch minus, crushed stone or crushed gravel, meeting the gradation shown in Section 2.3.D.1, may be used as unit backfill material.
- B. Granular Backfill: Granular soils meeting the following gradation, tested in accordance with ASTM D422, may be used as unit backfill:

<u>Sieve Size</u>	<u>Percent Passing</u>
1-inch	100
No. 4	20 – 100
No. 40	0 – 60
No. 200	0 – 10

The USCS soil types, per ASTM D2487, generally meeting the gradation shown are: well-graded and poorly graded gravels (GW and GP), well-graded and poorly graded sands (SW and SP), as well as poorly graded gravels and sands containing silt (GP-GM and SP-SM). On-site soils meeting the above requirements may be used as unit backfill.

2.6 QUALITY CONTROL

- A. Concrete Finish:
 1. The upper portion of the unit shall have a smooth, hard, uniform texture on the concrete.
 2. Within the upper exposed portion of the unit, any air-voids greater than 3/4-inch and deeper than 1/4-inch shall be filled with patching mortar.
 3. Minor chips, form joint lines and typical concrete color variation are all acceptable.
- B. Cracks:
 1. Cracks that are greater than 6-inches in length and 1/32-inch in width shall not be permitted.

2.7 DESIGN

- A. Prior to furnishing EV Block DC units to the project site, a Registered Professional Engineer shall review all applicable product data and shall consider the actual site soil and EV charger loading conditions that will be present to determine if the EV Block DC unit is suitable for the proposed application.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify locations of utilities and existing structures prior to excavation.
- B. Examine the Project site and evaluate the condition of the locations in which the EV Block DC units will be installed. Notify the proper supervising authority in writing of any conditions that may interfere with the proper installation of the EV Block DC units or delay completion.
- C. Promptly notify the design engineer of site conditions which may affect performance, soil conditions observed other than those assumed, or other conditions that may require a reevaluation.

3.2 EXCAVATION

- A. Contractor shall excavate to the lines and grades shown on the construction drawings. Excavation may be completed using auger drilling or typical open-cut excavation. The contractor shall be careful to minimize over-excavation (unless required) or disturbance of the surrounding soils. Excavation limits around the units shall be 6 to 12-inches beyond the edges of the EV Block DC unit.
- B. The bottom limits of the excavation should extend at least 6-inches beyond the height of the EV Block DC unit or regional frost depth requirement, whichever is greater (over-excavation). The bottom limits should be well compacted and flat to allow for installation of at least a 6-inch-thick crushed stone foundation. Greater amounts of crushed stone will be needed in areas where over-excavation is required. The crushed stone foundation shall be compacted so as to provide a smooth, hard surface on which to place the EV Block DC unit.

3.3 EV BLOCK DC UNIT INSTALLATION

- A. The EV Block DC unit shall be lifted and lowered into the excavated hole using suitably rated lifting equipment in accordance with the project lifting plan. Refer to the DC Foundation Installation Guide for specific lifting hardware requirements and procedures.
- B. Lower the EV Block DC unit into the excavated hole, ensuring that the side openings are properly aligned for the site and installation requirements.
- C. Once the EV Block DC unit is in place, ensure that it is level in both directions and that the upper surface elevation is set to the project requirements within +/- 1/2-inch.
- D. Brace the EV Block DC unit as required to maintain the location and level until the unit can be backfilled.
- E. Once all of the conduit is installed via the foundation openings by the Contractor or the site electrical contractor, backfill the EV Block DC unit using either crushed stone or granular backfill. Either backfill material used shall be placed in maximum 6-inch lifts. If granular backfill is used, the material shall be compacted to 95% Standard Proctor density determined in accordance with ASTM D698. Backfill material shall be placed to an elevation as shown in the Project Plans, accounting for any paving or landscaping material that is to be installed around the unit.
- F. Install the required paving or landscaping material around the EV Block DC unit as shown in the Project Plans.
- G. For additional information on the installation process, refer to the EV Block Reference Manual – DC Installation.

3.4 MOUNTING THE COVER PLATE AND STAINLESS STEEL MATCH PLATE

This step differs by installation case. Follow the procedure for the applicable case.

Passive Installation (Cover Plate):

- A. Where the DC fast charger has not yet been specified or procurement is not finalized, the EV Block DC unit may be installed in a passive state using the cover plate.
- B. Secure the cover plate within the recess in the upper surface using the Cover Plate Securing Hardware threaded into the four cover plate inserts.

- C. When ready to proceed with active installation, remove the Cover Plate Securing Hardware, lift off the cover plate, and follow the Active Installation procedure below.

Active Installation (Stainless Steel Match Plate and Charger):

- A. If the cover plate is installed, remove it as described above.
- B. Position the charger-specific stainless steel match plate on the upper surface of the EV Block DC unit, aligning the match plate holes with the twelve embedded inserts.
- C. Secure the match plate to the unit using the Match Plate Securing Hardware. Torque the fasteners in accordance with the Project specifications or the DC Foundation Installation Guide.
- D. Lower the DC fast charger onto the match plate in accordance with the charger manufacturer's instructions. Depending on the charger model, the match plate may provide studs to receive the charger base or tapped holes to align with the charger base. Short threaded guide rods may be temporarily inserted into anchor positions to guide the charger into position, then removed once the remaining fasteners are inserted and secured.
- E. Complete all required wiring and cabling in accordance with the charger manufacturer's instructions. Cable routing is provided through the foundation openings and the internal hollow center.

3.5 FIELD QUALITY CONTROL

- A. Contractor shall be responsible for proper installation and quality control of all EV Block DC units, the components, and materials.
- B. Owner shall, at their expense, retain a qualified professional to monitor and perform quality assurance checks of the Contractor's work.
- C. Quality Assurance should include soil inspection, frequent backfill compaction testing, verification of geotechnical design parameters and compliance with Project Plans.

3.6 CLEANING AND REPAIRING

- A. After completion of the install of the EV Block DC units, remove construction debris and restore any adjacent finished areas affected by the installation to their pre-construction state.
- B. Wash and remove any soiling and stains from the upper exposed portions of the EV Block DC units. Do not use acid or detergents that may "burn" or discolor face.
- C. Repair any bug holes or chips in the upper exposed portions of the EV Block DC units not meeting this Specification.

END OF SECTION