SECTION 05 90 00: SOLAR PV MOUNTING SPECIFICATION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. The RFP and all Attachments.

B. Division 1 of the Specifications

C. Section 26 00 00: General Electrical Specifications

D. Section 26 60 00: Photovoltaic System Specifications

E. SDUSD Guide Specifications for Division 5

NOTE: Where this specification and SDUSD Standard Specifications are in conflict, the more stringent shall apply. Contractor shall identify conflicts and confirm recommended equipment or procedures with the District.

1.02 GENERAL

A. This is a design/build project, which includes the design and construction of canopies and ground mount photovoltaic systems. The design and installation shall conform to all requirements as defined by the applicable codes, laws, rules, regulations and standards as specified in the RFP.

B. The Contractor shall include all items and all work reasonable inferred by these specifications and the RFP for compliance with all applicable structural codes. If the Contractor is in doubt as to the intent of any portion of these specifications and the RFP, or necessary information is omitted, the Contractor shall notify the Owner in writing for clarifications or corrections to be provided by addendum.

C. All design documents, cut sheets, and technical specifications shall be submitted, reviewed and accepted by the Owner per the guidelines specified in RFP Attachment A3 – Submittals and Project Acceptance and as noted in Division 1 of the specifications.

D. General Specifications as described in Section 26 00 00: General Electrical Specifications, are referred to herein and shall apply to this specification. Section 26 00 00 shall be deemed to supersede this specification in the case of conflicts.

1.03 WORK INCLUDED

A. The work shall include the design and construction of the structural systems, in conformity with applicable codes and professionally recognized standards.

B. All required construction documents and compliance documentation. The structural design shall be fully developed, including descriptions and calculations for all structural components. The site, plans, elevations, schedules and detail drawings must be sufficiently developed to reflect the overall design.

C. Contractor shall provide all materials, labor, equipment, services, and incidentals necessary to install the structures at each Site as shown on the design drawings and as specified hereinafter. Temporary power and lighting as required for construction.

D. Include any other structural work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the drawings.

E. Contractor shall be responsible for prompt removal and disposal of spoils from all construction activities.

1.04 COATINGS AND CORROSION CONTROL

A. Each racking system and associated components must be designed and selected to withstand the environmental conditions of the site (e.g., temperatures, winds, rain, flooding, etc.) to which they will be exposed. Design life should be a minimum of 30-years.

B. All racking installed outdoors shall be hot dipped galvanized steel, stainless steel or aluminum.

1. All galvanized materials cut during construction shall be field coated with a long lasting rust inhibiting coating, color matched and intended for coating galvanized metal.

2. All galvanized materials shall be in compliance with ASTM 123 Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.

3. All purlin framing members shall be G90 galvanized steel.

C. Particular attention shall be given to the prevention of corrosion at the connections between dissimilar metals.

1.05 GEOTECHNICAL STUDY AND ANALYSIS

A. Initial geotechnical reports are included in Attachment C of the RFP.

B. The Criteria Architect will be submitting these reports in January 2016 to CGS in order to expedite the schedule.

C. The Contractor shall be responsible for obtaining CGS approval for their proposed project including engaging the services of a qualified geotechnical engineer, modifying the reports as necessary, having their Architect or Engineer of Record take responsibility for the reports and CGS processing by completing DSA Form 108, and any other steps necessary to obtain approval from CGS and DSA.

D. Contractor shall ensure that sufficient geotechnical reports are prepared as needed for design of structures and for all DSA, CGS or other AHJ requirements. Contractor is responsible for receiving approval from CGS, DSA and all other AHJs.

PART 2 – PRODUCTS

2.01 SOLAR CANOPY STRUCTURES

A. All structural system components shall be designed and constructed to withstand the environmental conditions of the site to which they will be exposed. The mounting systems shall be designed and installed to resist dead load, live load, corrosion UV degradation, wind loads, and seismic loads appropriate to the geographic area over the expected life of the PV system, a minimum 30-years.

B. Canopies installed at sites under the control of the California Division of the State Architect (DSA) shall be Pre-Check Approved Structures and follow the guidelines outlined in DSA PL 07-02: Over-The-Counter Review of Pre-Check Approved Designs. If additional permitting is required based on final design it will be the DBE's responsibility to coordinate.

C. Canopies shall have a minimum clear height of 12 foot at the lowest point of any structure. Clear heights shall be verified by the Contractor with the Owner and increased as needed.

D. Canopies placed in parking lots shall be clearly labeled with max clearance for vehicles at the low points. Labels shall be rated for long-term UV exposure with lifetime to match warranties specified for PV panels in Section 26 60 00. Minimum labeling of one every 50 feet of canopy on the long axis and one at every exterior corner of each array within a parking lot. Label should be easily visible from a vehicle.

E. Foundations for canopies in parking lots shall extend a minimum height of 30 inches above grade. Columns shall be located to maintain the existing number of parking spaces and minimize the impact to the size of parking spaces.

F. Electrical conduits extending from the canopy to grade are to be encased in the foundations, not mounted on the outside of finished piers.

G. For canopies located in parking lots, a minimum of one canopy (or more if listed in the Site Details) shall include spare conduit sized at a minimum of 2" or sufficient for up to five (5) future Level 2 EV charging stations. Conduits shall originate at the main service cabinet and follow the PV AC homerun conduits to the point designated on the Site Detail Sheets. In the absence of a designated termination point at the canopies, conduit shall terminate at the first column of a designated canopy. The spare conduit shall terminate in a Christy box (hand hole). Spare conduit shall include have a minimum of two sufficiently rated pull strings or wires inside conduit for future wire pull. Additional spare conduits may be required as specified in the Site Detail sheet.

H. All framing material shall be drained or have provisions to prevent water pooling on or within the framing member (weep holes).

I. All canopies to be co-planer and in alignment horizontally and vertically with adjacent arrays.

J. All anchor bolts shall be double nutted or 'staked' (threading irreversibly altered) to protect from structural compromise and vandalism.

K. All structural connections at the flanged base of columns and/or top of caisson to be outfitted with pole skirts, grout, or other Owner approved means of coverage of attachment hardware.

L. Lighting Systems

1. Canopy lighting systems shall be designed to meet the Illuminating Engineering Society of North America (IESNA) requirements for parking lot areas, to meet or exceed minimum values and maximum uniformity ratios as listed in the IESNA criteria.

2. All lighting sources shall be LED type.

3. Lighting control system shall be connected to the existing lighting controls in each area, if existing, and shall meet Title 24 requirements for new lighting systems. Provide dual level control as required by CA Title 24, including new control zones as needed.

4. Lighting design on canopies shall insure cut-off light control to limit spill light or glare to adjoining areas as-needed. Design and install custom shielding or other mitigation measures to avoid light pollution and glare to neighbors.

5. Existing pole mounted lighting in areas of new carport canopies shall be removed. Modify other existing lighting to coordinate with the new work and design, including reconnection

of any existing downstream circuiting and controls to remain. Foundations of existing pole mount lighting are to be completely removed a minimum of 6-inchs below grade, with grade restored to surrounding condition.

6. New design shall cover all areas of the parking lots (in the area of the work) to leave no dark spots and meet IESNA requirements for all areas previously covered by light standards removed under this contract. Contractor shall install new pole mounted luminaires if canopy lighting does not provide sufficient lighting in all areas previously covered by removed or altered light standards. Existing fixtures may remain, if not in direct conflict with canopies or causing shading of new canopies.
7. Lighting is not required for canopies where lighting has not been removed or altered, unless called out on the Site Plans/Detail sheets.

2.02 GROUND MOUNT SOLAR RACKING

A. Ground mounting systems shall be designed and installed such that the PV modules may be fixed or tracking with reliable components proven in similar projects, and shall be designed to resist dead load, live load, corrosion UV degradation, wind loads, and seismic loads appropriate to the geographic area over the expected project life, a minimum of 30 years.

B. Fixed tilt racking system shall include the racking structure and all module mounting hardware. The racking vendor may supply the supports if desired, or the supports may be provided by a third party. The rack's azimuth and tilt angle shall be specified on the engineering drawings.

C. The racking structures, support attachments, module mounting brackets, fastening hardware, and supports (if applicable) shall have a 30- year design lifetime. Equipment shall have corrosion protection coatings as discussed in section 1.05, Coatings and Corrosion Protection.

D. All foundations and supports must be designed using the calculated environmental loads and soil properties provided in the geotechnical report or code minimum values per section 1.05. Foundations and supports shall meet the recommendations found in the geotechnical report. Foundations and supports shall be designed for a minimum 30-year lifetime, including all environmental factors and corrosion. Foundations and supports should be designed to withstand the impacts and contact pressure from the installation method (such as a vibratory hammer). Any damage to corrosion protection coatings during installation should be repaired in a manner that does not invalidate the manufacturer's warranty. Foundations and supports, including any field-applied modifications (such as holes drilled), shall meet the requirements in the Corrosion Control section 1.07

E. A Corrosion control plan must be submitted by Design-Builder during the Design Review process for Owner approval which will include at a minimum the analysis of the corrosion risk and mitigation measures.

F. Ground mount systems must also meet the following requirements at a minimum:

1. All structural components, including array structures, shall be designed in a manner commensurate with attaining a minimum 25-year design life. Particular attention shall be given to the prevention of corrosion at the connections between dissimilar metals.
2. A minimum of height of 3 feet above grade at lowest edge of modules and maximum height of 8 feet shall apply to all ground mount systems.

3. Thermal loads caused by fluctuations of component and ambient temperatures shall be accounted for in the design and selection of mounting systems such that neither the mounting system nor the surface on which it is mounted shall degrade or be damaged over time.
4. Each PV module mounting system must be certified by the module manufacturer as (1) an acceptable mounting system that shall not void the module warranty, and as (2) a conforming mounting system per the module manufacturer's mounting parameters.
5. Final coating and paint colors shall be reviewed and approved by the site or system owner during Design Review.
6. Painting or other coatings must not interfere with the grounding and bonding of the array.

G. Ground Mount Infrastructure - Contractor will be responsible for incorporating the following elements in the design and construction of the system:

1. Fencing: Each array shall be surrounded by a fence to prevent public access. The fence shall be eight (8) foot high chain link fence, high security fence fabric (no climb 1" mesh) per District standards.
2. At least two gates shall be installed at each fence enclosure to enable site access for trucks and/or landscape maintenance equipment.
3. A pathway a minimum of ten (10) feet wide passable by a maintenance truck shall be provided within the array fence to allow for access to all equipment enclosed within the fence area.
4. Provision of low voltage (120V) AC power to power maintenance equipment and miscellaneous equipment.
5. Installation of an acceptable surface cover material per District standards under and around the modules and at other areas disturbed to provide weed control, erosion and dust management.
6. Vehicle access to any ground mount system for maintenance and fire access purposes. The access shall be passable under all weather conditions.
7. Inclusion of safety equipment (electrical equipment, signage, etc)
8. The final system shall not block off access to other existing campus facilities/areas.

PART 3 - EXECUTION

3.02 SITE PREPARATION AND INSPECTION:

A. Contractor shall direct, oversee and inspect all site work related to the ground mount structure installation. Site preparation shall be in accordance with final drawings and specifications provided by manufacturer.

B. Installer shall inspect site and notify general contractor in writing of any condition(s) that may inhibit the proper and timely construction of the ground mount structures. Installer shall be under no obligation to proceed until conditions have been sufficiently corrected.

3.01 INSTALLATION

A. Erect structural steel with proper equipment and qualified riggers.

B. Actively cooperate with other trades and provide incidental welding, connections, etc. for securement of work of others to structural steel framing.

C. Erect temporary flooring, planking, and scaffolding necessary in connection with erection of structural steel or support of erection machinery. Use of temporary floors shall be as required by municipal or state laws and governing safety regulations. Hoist metal deck onto structural frame.

D. After erection, clean connections and abrasions to shop coat and spot paint with same primer used in shop.

E. Installation of the structural system and all components shall be in strict accordance with manufacturer's recommendations.

3.02 ERECTION TOLERANCES

A. Erection tolerances for structural steel work shall be in accordance with latest AISC "Code of Standard Practice for Steel Buildings and Bridges".

3.03 BOLTING

A. High strength steel bolts shall be used where indicated. Fabrication and erection shall be in strict accordance with the latest edition of "Specifications for Assembly of Structural Joints Using High-Strength Steel Bolts", as approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation. Load indicator washer shall be used. Use beveled washers on sloping surfaces.

3.04 WELDING

A. Welding and welded joints shall be in accordance with AWS standards. Work shall be performed by operators who have been qualified by test in accordance with AWS D1.1, "Structural Welding Code – Steel", to perform type of work required for this project.

B. All methods, sequence, qualifications and procedures, including preheating, postheating, etc. shall be detailed in writing and submitted to Architect for review by the testing laboratory. Provisions shall be made in detailing of lengths of members for dimensional changes as a result of shrinkage stresses so as to provide specified finished dimensions.

C. Remove all runoff tabs, and bottom backing bars. Top backup bars to be removed or have continuous fillet weld to column.

3.05 ANCHOR BOLTS

A. Provide at site, for others to install, all anchor bolts, bearing plates, and templates to be embedded in concrete.

B. Provide necessary steel or wood templates and diagrams for setting and securing of such anchor bolts in concrete forms.

C. Be jointly responsible with others for proper locating and installing, and make good any deficiencies and errors.

D. Setting of anchor bolts in hardened concrete necessitates drilled holes solidly grouted in place with epoxy grout. Submit materials and methods for review and approval.

END OF SECTION