PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Design of monopole and foundation site grounding and lightning protection.
B. Fabrication of structural steel.
C. Construction of foundation.
D. Erection of the monopole.
E. Welding of the monopole.
F. Installation of site grounding and lightning protection and all tower appurtenances.
G. Safety Systems.

1.02 RELATED SECTIONS

A. Section 33 83 03, Radio Network/Antenna System

1.03 MEASUREMENT AND PAYMENT

All work required under this Section will be measured separately for payment as part of the Contract lump-sum price, as part of the related item of work, as indicated on the Bid Schedule of the Bid Form.

1.04 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A36/A36M Specification for Carbon Structural Steel
2. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
4. ASTM A394 Standard Specification for Steel Transmission Tower Bolts, Zinc-Coated and Bare
5. ASTM A563 Standard Specification for Carbon and Alloy Steel Nuts
6. ASTM A572/A572M Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Steel

7. ASTM B695 Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel

8. ASTM C33/C33M Standard Specification for Concrete Aggregates


11. ASTM F3125/F125M Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions

12. ASTM A615/A615M Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

B. American Concrete Institute (ACI):
   1. ACI 318 Building Code Requirements for Structural Concrete and Commentary

C. American Institute of Steel Construction (AISC):
   1. AISC 360 Specification for Structural Steel Buildings

D. American National Standards Institute (ANSI):
   1. ANSI/ASSE Z359 Fall Protection Code
   2. ANSI/EIA/TIA-222G Structural Standard for Antenna Supporting Structures and Antennas

E. American Welding Society (AWS):
   1. AWS D1.1/D1.1M Structural Welding Code, Steel

F. California Building Code (CBC)

G. MACOM Incorporated:
   1. Document AE/LZT 123 4618/1, Site Grounding and Lightning Protection

H. National Fire Protection Association (NFPA), National Electric Code (NEC):
   1. NFPA 70NEC Article 392 Cable Trays
I. National Electrical Manufacturers Association (NEMA):
   1. NEMA VE 1 Metallic Cable Tray Systems

J. Occupational Safety and Health Administration (OSHA):
   1. OSHA Worker Fall Protection Codes

1.05 SUBMITTALS

A. General: Refer to Contract Specifications Section 01 33 00, Submittal Procedures, and Contract Specifications Section 01 33 23, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.

B. Product Data: Submit manufacturer’s specifications for materials.

C. Shop Drawings and calculations shall be submitted within 20 Days of the effective date of the Notice to Proceed. Shop Drawings and calculations submitted that come under the jurisdiction of the California Professional Engineers Act shall conform to the Act and bear the seal and signature of a California Civil or Structural Engineer. The following items shall be submitted for approval:

   1. Monopole summary loading conditions, elevations of tower, and the maximum number and types of components, with heights, that will be attached to the tower and platforms.

   2. Monopole structural detail drawings showing plate sizes, required welds and detail of splices.

   3. Foundation design drawings showing details of anchor bolts, reinforcing bars and other embedded items.

   4. Plot plan showing monopole foundation location.

   5. Erection plan.


   7. Site geotechnical report.

   8. Site grounding and lightning protection design and details.

1.06 WARRANTY

A. Tower structures shall have a warranty of 5 years after the date of Acceptance.
PART 2 – PRODUCTS

2.01 DESIGN

A. Monopole:

1. The design of the pole, platform, and antenna support shall meet ANSI/EIA/TIA-222G and the California Building Code. Steel members, lightning rod, platform, and climbing facilities shall be galvanized.

2. Monopole shall be galvanized structural steel 150-foot or as otherwise specified in design documents, high self-supporting pole with multiple sided cross section in plan.

3. A manufactured triangular platform shall be provided at the top of the monopole. Height shall be manufacturer standard. Platform shall be equipped with structural members to support and mount the equipment shown in Table 1 or equipment required by the Radio Frequency (RF) coverage design.

4. Monopole shall be equipped with manufacturer standard lightning rod at the top and shall be attached so as to extend a minimum of 18 inches above the highest point of the monopole including all attachments.

5. Monopole shall be equipped with protective grounding and climbing facilities that conform to ANSI/EIA/TIA-222G.

6. Monopole shall be equipped with support for cable ladder tray.

7. Cable ladder tray shall be provided between monopole and existing station building.

8. Wind loading shall be designed in accordance with the provisions of CBC, design for basic wind speed of 80 mph, Iw=1.15 and Exposure D.

9. For seismic loading, use Importance Factor of 1.25.

10. Radial ice shall be 0 inches.

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11. Maximum monopole twist and sway due to design wind loading shall be less than two (2) degrees.

12. The tower and foundation shall be installed with site grounding and lightning protection that conforms to Industry Standard “Site Grounding and Lightning Protection” from MACOM, Document AE/LZT 123 4618/1.

B. Foundation Requirements:

1. Contractor shall design tower with safety features, such as climbing pegs, ladders, safe to climb devices, platforms, and crow’s nest as appropriate.

2. Contractor shall obtain a geotechnical report on the site. A copy of the report shall be provided to the District. There is no guarantee expressed or implied that the conditions indicated in the report are representative of those existing throughout the job site or that unforeseen developments may not occur. If at the time of excavation, the Contractor finds soil conditions that are significantly different than stated in the report, notify the Engineer immediately.

2.02 MATERIALS

A. Steel:

1. Structural steel shall conform to ASTM A36/A36M for medium steel and ASTM A572/A572M, Grade 65 for high-strength steel.

2. Structural steel pipes and antenna mounts shall conform to ASTM A53/A53M, Grade B.

3. Assembly bolts shall conform to ASTM F3125/3125M or ASTM A394 (Type 1 or 2). Nuts shall conform to ASTM A563 and be of grade and style suitable for use with bolts supplied. Nuts for F3125/3125M bolts shall be heavy hex nuts.

4. Monopole and supports shall be hot-dipped galvanized per ASTM A123/A123M. Monopole and other tubular members shall be galvanized both inside and outside. Fasteners shall be mechanically galvanized per ASTM B695.

5. Welding rods shall conform to AWS D1.1/D1.1M.

B. Reinforced Concrete:

1. Concrete shall be Class 3000 with maximum aggregate size of 1 1/2 inches per Contract Specifications Section 03 05 15, Portland Cement Concrete. Slump shall be as low as practicable to produce a dense, well-consolidated concrete, and not exceed 4 inches unless otherwise authorized by the Engineer.

2. Reinforcing bars shall be deformed billet steel, Grade 60, conforming to ASTM A615/A615M, except that the maximum yield strength shall be 78,000 psi, and the tensile strength shall not be less than 1.25 times the actual yield strength.
C. Site Grounding and Lightning Protection:

1. As required by MACOM Document AE/LZT 123 4618/1 R3A.

PART 3 –EXECUTION

3.01 INSTALLATION

A. The Contractor shall notify the Engineer at least one week before the start of field work. Locations of underground utilities are shown on the Contract Drawings. Contractor must receive approval from the Engineer prior to excavation of foundation.

B. Forms shall be constructed true to the lines and dimensions shown on the Contract Drawings.

C. Reinforcing bars and tower anchor bolts shall be accurately placed and securely held in place during placing of concrete. Ties shall be drawn up tight.

D. Top of footing shall be given a steel trowel finish.

E. Monopole shall not be erected on concrete that has been in place less than 28 calendar days. Erection may proceed only when the concrete has acquired enough strength to support the steel and has been authorized by the Engineer.

F. Installation of portions of monopole shall be accurately plumbed, aligned, leveled and shall be braced as required for safety, for accuracy of placement and carry loads to which they may be subjected. Maximum deviation from a straight line between any two points shall not exceed 1 part in 1000.

3.02 PERIODIC INSPECTIONS AND TOWER MAINTENANCE DURING WARRANTY PERIOD

A. Tower structures in the California Bay Area are subject to harsh conditions, of sea air, mists, winds, and sun. Tower structures shall be inspected by qualified engineers every 3 years, with a maximum interval of 5 years during the warranty period.

B. Logs of tower maintenance required from these inspections shall be kept, with severity and the inspecting engineer shall recommend a timeline that these identified repairs shall be completed by. Tower maintenance identified repairs shall be completed before the end of warranty period.

END OF SECTION 33 83 02