Regional Connector Transit Corridor Project

ADVANCED UTILITY RELOCATIONS

SPECIFICATION SECTION 05120

STRUCTURAL STEEL

ADDENDUM 1

C0981

February 13, 2013

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PART 1 - GENERAL

1.1 DESCRIPTION

The Work of this Section consists of furnishing, fabricating and erecting structural steel for the 2nd Street power vault support and elsewhere as indicated. Structural steel to consist of those items defined in the AISC Code of Standard Practice for Steel Building and Bridges. The entire structural steel drawings fabrication and erection shall conform to AISC Code of Standard Practice.

1.2 QUALITY CONTROL

A. Comply with Section 01432, Quality Assurance.

B. Comply with inspection requirements of Los Angeles City Building Code (LACBC) or applicable local jurisdiction.

C. Allowable deviations in accordance with AISC.

D. Identify structural steel by name and location of mill and heat number. Provide records of mill analysis.
   1. If steel cannot be identified by heat number and manufacturer’s name, provide results of one tension and one chemical analysis for each 10 tons, or fraction thereof, from each supplier.
   2. Test specimens – Provided by steel fabricator as required, under the direction of the testing laboratory.

E. Welding Operations – In accordance with AWS D1.1.

F. Shop and Field Tests and Inspections – Testing laboratory inspection and testing is required for shop and field fabrication and assembly of structural steel comply with requirements of Section 05055, Basic Welding Requirements.

1. Visual Inspection 100% Welds per AWS D1.1.

2. Magnetic Particle Inspection: 10 percent of welds per AWS D1.1.

3. Ultrasonic Inspection: 10 percent of full penetration welds at least 3/8 inch thick per AWS D1.1.
4. If a failure occurs in the first 10 percent sample, select a second 10 percent sample and test. If no failure occurs in second 10 percent sample, represented welds will be acceptable, rework failed sample in initial 10 percent sample. If a failure occurs in second 10 percent sample, test 100 percent welds.

5. Testing High Strength Bolts – Test high strength bolt connections as required by AISC S335 for using ASTM A325 bolts.

G. Reference Standards

1. American Institute of Steel Construction, Inc. (AISC)
   - AISC M011 Manual of Steel Construction
   - AISC S335 Specification for Structural Steel Buildings Allowable Load Design and Plastic Design with Commentary

2. American National Standards Institute (ANSI)
   - ANSI B1.1 Unified Inch Screw Threads
   - ANSI B18.2.1 Square and Hex Bolts and Screws Inch Series Including Hex Cap Screws and Lag Screws

3. American Society for Testing and Materials (ASTM)
   - ASTM A36 Structural Steel
   - ASTM A108 Steel Bars, Carbon, Cold Finished, Standard Quality
   - ASTM A283 Low and Intermediate Tensile Strength Carbon Steel Plates
   - ASTM A307 Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
   - ASTM A325 Structure Bolts, Steel, Heat-Treated, 120/105 ksi Minimum Tensile Strength
   - ASTM A563 Carbon and Alloy Steel Nuts
   - ASTM A572 High-Strength Low Alloy Columbium-Vanadium Steels of Structural Quality
   - ASTM A992 Standard Specification for Structural Steel Shapes
   - ASTM A1023 Stranded Carbon Steel Wire Ropes for General Purposes
   - ASTM F436 Hardened Steel Washers
   - ASTM F959 Compressible Washer-Type Direct Tension Indicators for use with Structural Fasteners
   - ASTM F1554 Anchor Bolts, Steel, 36, 55, and 105
   - ASTM F 1582 “Twist Off” Tension Control Structural Bolts/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 Ksi Minimum Tensile Strength
4. American Welding Society, Inc. (AWS)
   AWS D1.1 Structural Welding Code Steel

5. Federal Specifications (FS)
   FS TT-P-641 Primer Coating, Zinc Dust – Zinc Oxide for Galvanized Surfaces
   FS QQ-F-461 Checkered Steel Floor Plate

6. Steel Structures Painting Council (SSPC)
   SSPC SP 1 Solvent Cleaning
   SSPC SP 6 Commercial Blast
   SSPC SP 10 Near-White Blast Cleaning

1.3 SUBMITTALS – Refer to Section 01300, Submittals.
   A. Shop and Erection Drawings – Submit detailed shop drawings of all structural steel works showing sizes, details of fabrication and construction, methods of assembly. Locations of hardware, anchors, and accessories, and erection sequence and details. Shop drawings shall include member identity, cuts, copes, gussets, connections, holes, fasteners, camber, fabrication and erection tolerances, weights of members and critical clearances. Indicate fabrication and assembly details and torquing order for each bolted assembly, direction and sequence for welding for each welded assembly and direction and magnitude of load transfer incumbent in these operations. Use AWS symbols for defining type, size and length of welds. Indicate which welds are to be performed in shop and which welds are to be performed in field.

   B. Bill of materials, and producer’s or manufacturer’s specifications and installation instructions – Include laboratory test reports for following items:
      1. Threaded fasteners.
      2. Washers.

   C. Certified copy of mill analysis for each heat of steel in each delivery. Mill analysis – Identify name and location of the manufacturer.

   D. Laboratory report of results of one tension for each heat of steel in each delivery.

   E. Welder certifications and qualified welding procedures for review and acceptance Metro.

   F. Manufacturer’s product data.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING
A. Load, transport, unload and store structural steel consistent with design of members, assemblies, packaging and order of need in erection procedure.

B. Mark each member with a number indicating its location in assembly sequence, its weight and its match marks to identify adjacent member and fit.

C. Store structural steel above grade. Protect steel from weather, damage and corrosion.

D. Provide setting drawings, templates and directions for installation of anchor bolts and other devices that are to be embedded in concrete or masonry in time for them to be installed before start of concrete or masonry operations.

E. Provide storage for welding electrodes in accordance with AWS D1.1.

F. Ship, handle, and store to prevent bending, twisting, and otherwise distorting the individual members; remove and repaint damaged primer coat to Metro’s satisfaction.

PART 2 - PRODUCTS

2.1 STRUCTURAL STEEL FOR STRUCTURES

A. Structural Steel Shapes – ASTM A992 or ASTM A572 Grade 50.

B. All Other Carbon Steel – ASTM A36, unless indicated otherwise.

C. Intermediate Tensile Strength Steel Plates, Shapes and Bars – ASTM A283, Grade C.

D. Checkered Plate – ASTM A283 and flat back, Class 2, Pattern 7 per FS QQ-F-461, galvanized

E. Washers - Hardened Steel, Circular/Flat and Rectangular/Tapered – ASTM F436.

F. Steel Cables - Steel cables shall comply with ASTM A1023.

2.2 WELDING ELECTRODES – E7OXX.

2.3 PROTECTIVE COATINGS

A. Powercrete J Epoxy as manufactured by Berry Plastics Corporation for all steel in contact with soil or Metro approved equal.

B. For all steel not in contact with soil:
   1. Prime Coat - Tnemec 90-97 Zinc Rich, 3.0 mils DFT Minimum, or Metro
approved equal.

2. Intermediate Coat - Tnemec 69 Epoxy, 3.0 mils DFT Minimum, or Metro approved equal.

3. Top Coat - Tnemec Endura Shield Polyurethane, 3.0 mils DFT Minimum, or Metro approved equal.

2.4 UNFINISHED FASTENERS

A. Hex Head, ¼ Inch-through Four Inch-Diameter Bolts – ASTM A307, Grade A.


C. Anchor Bolt – Unless otherwise indicated anchor bolts shall be ASTM A36. Where indicated anchor bolts shall be ASTM A307 or F1554.

D. Hex configuration Nuts Anchor Bolts – ASTM A563.

2.5 GROUT – As specified in Section 03600, Grout.

2.6 WELDED STUD SHEAR CONNECTIONS


B. Same as above, except body of stud in accordance with ANSI B18.2.1, and threads in accordance with ANSI B1.1

C. Hex configuration nuts for threaded stud shear connectors – ASTM A563.

2.7 FABRICATION - Prefabricate and preassemble steel members and metal fabrications in the shop/factory as far as possible. Shop fabricate structural steel assembly in conformance with AISC S335 in largest units consistent with handling and transportation of such prefabricated units. Weld shop connections prior to shipping. Bolts, for bolted field connectors – ASTM A325, unless indicated otherwise.

PART 3 - EXECUTION

3.1 DESIGN - Design falsework to resist dead and live loads during erection and indicate sequence of erection and removal of such falsework.

3.2 FABRICATION
A. Perform shearing, flame cutting, and chipping carefully and accurately so as not to induce residual stresses in the metal being cut. Radii of re-entrant gas-cut fillets should be not less than ¾ inches. Flame cutting shall be performed in such a manner that the metal being cut is not carrying stress. For cut edges exposed in the finished work, machine cut, shear, or flame cut, and grind flush.

B. Gas Cutting: Do not use gas-cutting in the field for correcting fabrication errors on any major member. Use gas-cutting torch only on minor members, when the member is not under stress. Obtain approval from METRO prior to any gas cutting to correct fabrication errors.

3.3 WELDING – As specified in Section 05500, Basic Welding Requirements and AWS D1.1.

3.4 COATING

A. Apply coating to steel. Primer shall be compatible with the finish coating. Do not paint members or portions of member to be embedded in concrete or mortar, except for initial two inches of embedded areas of steel otherwise exposed.

B. Do not paint within six inches of surfaces to be welded or contact surfaces of high strength bolted connections.

3.5 INSPECTION – Examine areas and conditions under which Work is to be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

3.6 ERECTION

A. Survey – Establish permanent bench marks necessary for erection of structural steel. Check elevations of concrete surfaces and locations of anchor bolts and similar items before erection proceeds.

B. Assembly
1. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly.
2. Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before fastening. Splice only where indicated.
3. Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads.
4. Provide temporary guy lines to achieve alignment of structures as erection proceeds.
5. Level and plumb individual members of structure within AISC tolerances.
6. Perform adjustments to compensate for discrepancies in elevations and alignment. Immediately report any errors in fabrication and deformation.
resulting from handling or transportation that prevents proper erection and fitting of parts to METRO.

7. Establish required leveling and plumbing measurements at mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature applicable to structure when completed and in service.

8. Comply with AISC S335 for bearing, adequacy of temporary connections and alignment.

9. tighten anchor bolts after supporting members have been positioned and plumbed. Do not remove wedges or shims; if wedges or shims protrude, cut off flush with edge of base or bearing plate before grouting. Nuts on anchor bolts under base plates may be used instead of wedges or shims.

C. Except as modified herein, erect steel in accordance with AISC MO11. Where parts cannot be assembled or fitted properly as result of errors in fabrication, or deformation due to handling or transportation, report such condition immediately to Metro and obtain review and acceptance for methods of correction before proceeding with correction. Straighten plates, angles and other shapes by acceptable methods. Do not heat-treat parts for straightening. When calibrated wrenches are used for tightening of bolts, calibrate wrenches at least once each working day, using not less than three typical bolts of each diameter. Do not use impact torque wrenches to tighten anchor bolts set in concrete.

D. Connections – Provide anchor bolts and other connections between structural steel and foundations and properly build into connection work. Design connections, for details not indicated, in accordance with AISC MO11.

E. Base Plates and Bearing Plates – Provide column base plates for columns and bearing plates for beams, girders, and similar members. Provide base plates and bearing plates with full bearing after supported members have been plumbed and properly positioned. Dry pack area under plate solidly with non-shrinking grout mortar. Grouting – In accordance with printed instruction of grouting mortar manufacturer and as specified in Section 03600, Grout.

F. Tolerances – In accordance with Code of Standard Practice of AISC MO11.

G. Temporary Welds Run-Off Plates and Backing Strips – Need not be removed unless:

1. Weld is to remain exposed.

2. At beam-column flange complete penetration welds resisting seismic loads.

Where run-off plates and backing strips are removed exposed weld shall be air-arc'd to sound material and reinforced with a minimum 5/16” fillet weld.

H. Tolerance Survey – Employ licensed Land Surveyor or Civil Engineer, registered in State of California to perform tolerance survey and monitor structural steel erection process for conformance. Prepare reproducible drawings indicating As-Built location of steel members. Drawings – Signed and sealed by licensed Land Surveyor or Civil Engineer registered in State of California; note conditions that exceed AISC S335 for tolerances. Show non-
conforming conditions of plumbness, level, camber, sweep, alignment, and centerline displacement and immediately bring to Contractor’s attention for correction. Corrections that deviate from details on design drawings – Subject to review and acceptance by Metro.

3.7 THREAD FASTENERS

A. Assemble high strength bolted structural joints with finished fasteners. Tension of bolt in finished joint – As stated in Table 3, Fastener Tension, of AISC MO11 for ASTM A325 unless otherwise noted.

B. High Strength Bolts and Washers – Clean free of rust, and other foreign matter. Lubricate threads before installing.

C. Install hardened round washer and nut on threaded end of bolt. Observe Special washer requirements, such as those related to slotted and oversize holes.

D. Tighten nuts in each joint uniformly to bring connected members into moderate contact. Torque each nut in joint uniformly.

E. Tightening – Progress systematically from most rigid part of joint to free edges. Complete closure of gap is not required.

F. Assemble secondary joints with unfinished fasteners and lock washers. Torque in conformance with Table 1-A, Bolts and Rivets, Part 4, AISC MO11.

G. Remove temporary connections and members when permanent members are in place and final connections are made.

H. Bolt holes – Do not flame cut; no irregularities.

3.8 NON-SHRINK GROUT

A. Install forms for non-shrink grout about columns and spaces to be grouted. Set tops of forms one inch above surfaces to be grouted.

B. Mix pourable, non-metallic, non-shrink grout in conformance with manufacturer’s directions and per Section 03600, Grout.

C. Placement – Place grout in conformance with manufacturer’s instructions and per Section 03600, Grout. Pour grout from one side until grout rises at least one inch about plate on opposite side. Strapping may be used to encourage grout to flow under entire area. Do not vibrate grout. After initial set, cut grout back and rake flush with edge of base plate. Protect grout with cement-sand mortar or, if not cut back, protect with minimum ¾ inch mortar cover.

3.9 TOUCH-UP
A. After erection, clean chips, skips and abrasions where coating has been removed, damaged or burned; clean field welds and coat as specified under Coating above.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT - The Work of this Section will not be measured separately for payment.

4.2 PAYMENT - The Work of this Section will be paid under each relocated utility.

END OF SECTION