ITEM NO. 809

Reinforced Concrete Vaults for Metered Fireline Services

809.1 DESCRIPTION: This item shall govern the construction of Reinforced Concrete Vaults, cast-in-place or pre-cast, for Metered Fireline Services in accordance with these specifications and as directed by the Engineer. Reinforced concrete vaults shall be cast-in -place with reinforcing steel and shall include all work required to provide a complete and functional structure.

809.2 REFERENCED STANDARDS: Reference standards cited in this Specification Item No. 809 refer to the current reference standard published at the time of the latest revision date.

1. San Antonio Water System (SAWS):
   a. Specifications for Water and Sanitary Sewer Construction
   b. SAWS Materials Specifications
2. City of San Antonio (COSA) Standard Specifications for Construction
3. American Concrete Institute
   a. ACI 117 – Standard Tolerances for Concrete Construction and Materials.
   b. ACI 211.1 – Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
   c. ACI 302.1R – Guide for Concrete Floor and Slab Construction.
   d. ACI 304R – Guide for Measuring, Mixing, Transporting, and Placing Concrete.
   e. ACI 308 – Standard Practice for Curing Concrete.
   f. ACI 309R – Guide for Consolidation of Concrete.
   g. ACI 311 – Guide for Concrete Plant Inspection and Field Testing of Ready Mix Concrete.
   h. ACI 315 – Details and Detailing of Concrete Reinforcement
   i. ACI 318 – Building Code Requirements for Reinforced Concrete and Commentary.
   j. ACI 544 – Guide for Specifying, Mixing, Placing, and Finishing Steel Fiber Reinforced Concrete.
4. American Society for Testing and Materials (ASTM) International:
   a. ASTM A 82 – Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
   b. ASTM A 185 – Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
   c. ASTM A 615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
   d. ASTM A 767 – Standard Specifications for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
   e. ASTM A 775 – Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

f. ASTM A 820 – Standard Specification for Steel Fibers for Fiber-Reinforced Concrete.
g. ASTM A 884 – Specification for Epoxy-Coated Steel Wire and Welding Wire Fabric for Reinforcement.
h. ASTM C 31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
i. ASTM C 33 – Standard Specification for Concrete Aggregates.
j. ASTM C 39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
k. ASTM C 42 – Standard Test Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
l. ASTM C 94 – Standard Specification for Ready-Mixed Concrete.
m. ASTM C 138 – Standard Test Method for Unit Weight Yield and Air Content (Gravimetric)
n. ASTM C 143 – Standard Test Method for Slump of Hydraulic Cement Concrete.
o. ASTM C 150 – Standard Specification for Portland Cement.
p. ASTM C 172 – Standard Practice for Sampling Freshly Mixed Concrete.
q. ASTM C 173 – Standard Test Method for Air Content of Freshly Mixed Concrete by Volumetric Method.
r. ASTM C 231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
s. ASTM C 260 – Standard Specification for Air-Entraining Admixtures for Concrete.
t. ASTM C 309 – Standard Specifications for Liquid Membrane-Forming Compounds for Curing Concrete.
u. ASTM C 494 – Standard Specification for Chemical Admixtures for Concrete.
v. ASTM C 595 – Standard Specification for Blended Hydraulic Cements.
w. ASTM C 685 – Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.
x. ASTM C 1064 – Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete.
y. ASTM C 1077 – Standard Practice for Laboratory Testing of Concrete and Concrete Aggregate for Use in Construction and Criteria for Laboratory Evaluation.
z. ASTM A 82 – Standard Specification for Steel Wire, Plain, for Concrete Reinforcement

5. American Association of State Highway and Transportation Official (AASHTO)
   a. AASHTO M306 Standard Specification for Drainage, Sewer Utility and Related Castings
   b. AASHTO M105: Gray Iron Castings

809.3 SUBMITTALS: Contractor shall submit manufacturer's product data, instructions, recommendations, signed and sealed shop drawings and certifications. All submittals shall be in accordance with Engineer's requirements and submittals shall be approved prior to

delivery. Submit the following 30 days prior to performing any work.

1. Certifications:
   a. Per General Conditions section 5.12.2 all Contractor submittals for all materials furnished under this specification shall be marked as reviewed and approved by Contractor for compliance with Contract Documents and the referenced standards.
   b. Submit proposed mix design and test date for each type and strength of concrete in Work.
   c. Submit laboratory reports prepared by independent testing laboratory stating that materials used comply with requirements of this Section.
   d. Submit manufacturer's mill certificates for reinforcing steel. Provide specimens for testing when required by Project Manager.
   e. Submit certification from concrete supplier that materials and equipment used to produce and deliver concrete comply with this Specification.
2. When required on Drawings, submit shop drawings showing reinforcement type, quantity, size, length, location, spacing, bending, splicing, support, fabrication details, and pertinent information.
3. For waterstops, submit product information sufficient to indicate compliance with this Section, including manufacturer's descriptive literature and specifications.

809.4 MATERIALS: All pre-cast concrete vaults shall be accurately formed and finished as shown in the contract documents.

1. Precast vaults conforming to the Standard Drawings and Specifications shall be acceptable as a substitute to the cast-in-place vaults or as approved by the Engineer.
2. Contractor will give 24 hour notification to the Inspector assigned to the project before setting a metered fire line vault.
3. Concrete used shall be transit mix and shall have a 28 day compressive strength of 3,000 psi with a maximum slump of 6 inches and a minimum slump of 3 inches.
4. The use of admixtures shall not be permitted unless approved by the Engineer.
5. Cement shall be Type I or Type III and shall conform to the general requirements contained in the Materials Specifications Item 100-10 and the latest provision of ASTM Specifications C150 and C156 or most applicable approved equal provision.
6. Vault Covers Casting shall meet AASHTO M306 proof load criterion.

809.5 CONSTRUCTION:

1. Concrete work shall be as per Specification Item No. 808 Reinforced Concrete Vaults.
2. Painting: All exposed metallic surfaces such as the cover plates, hinges, handles, and other exposed hardware shall be primed and painted with one coat of primer and one coat of aluminum paint of approved and compatible quality.
3. Backfill: The Contractor shall cover the openings at each end of the vault with grout placed around the pipe penetration inside and outside of the vault.

a. Selected backfill (consisting of job excavated materials, finely divided and free from debris, organic material and stones larger than two inches in greatest dimension) shall be placed in uniform layers not exceeding eight inches in un-compacted thickness and shall be carefully compacted around the sides of the vault until level with the surrounding ground.

4. Concrete repair work shall be performed in a manner that will not interfere with thorough curing of surrounding concrete. Repair work shall be adequately cured.

809.6 TESTING: The following minimum testing of concrete is required.

1. Testing shall be performed by qualified individuals employed by approved independent testing agency, and conform to requirements of ASTM C 1077.
2. Take concrete samples in accordance with ASTM C 172.
3. Make one set of four compression test specimens for each mix design at least once per day and for each 150 cubic yards or fraction thereof.
4. Make, cure, and test specimens in accordance with ASTM C 31 and ASTM C 39.
5. When taking compression test specimens, test each sample for slump according to ASTM C143, for temperature according to ASTM C 1064, for air content according to ASTM C231, and for unit weight according to ASTM C 138.
6. Inspect, sample and test concrete in accordance with ASTM C 94, Section 13, 14, and 15, and ACI 311-5R.
7. Test Cores: Conform to ASTM C 42.
8. Testing High Early Strength Concrete: When Type III cement is used in concrete, specified 7 day and 28 day compressive strengths shall be applicable at 3 and 7 days, respectively.
9. If 7-day or 3-day test strength (as applicable for type of cement being used) fail to meet established strength requirements, extended curing or resumed curing on those portions of structure represented by test specimens may be required.
10. When additional curing fails to produce requires strength, strengthening or replacement of portions of structure which fail to develop required strength may be required by Inspector, at no additional cost to SAWS.

809.7 MEASUREMENT: Reinforced concrete vaults, cast-in-place or pre-cast, shall be measured by the unit of the various sizes.

809.8 PAYMENT: Payment for reinforced concrete vaults, cast-in-place or pre-cast, for metered fire line services will be made at the unit price for each size vault installed.

-End of Specification-