

DIVISION 01600

PRESSURE REDUCING VALVE, ALTITUDE VALVE AND METER BUILDING

PART I - GENERAL

1.0 GENERAL

- 1.1 The work under this section covers construction of the building used to house the pressure reducing valve assembly, altitude valve or meter. Construction details shown in the Commission's Std. Drawing are a part of these specifications.

PART II - PRODUCTS

- 2.0 MATERIALS:** Cement, lime and other cementitious materials shall be delivered to the site and stored in unbroken bags, barrels, or other approved containers, plainly marked and labeled with the manufacturer's names and brands. Such materials shall be stored in dry, weathertight sheds or enclosures, and shall be stored and handled in a manner which will prevent the inclusion of foreign materials and damage by water or dampness. Masonry units shall be handled with care to avoid chipping and breakage. Materials stored on newly constructed floors shall be stacked in such a manner that the uniformly distributed loading does not exceed 50 psf. Masonry materials shall be properly protected from contact with the earth and exposure to the weather, and shall be kept dry until used. Materials containing frost or ice, and cement and lime which have been wetted by rain or other water prior to incorporation in mortar, shall not be used.

2.1 Walls Materials

- 2.1.1 Cement Masonry Units: shall be of modular dimensions, and shall be either air, water or steam cured. Units shall be stored before use a minimum of 28 days for air cured units; 10 days for steam or water cured units; and 3 days for units cured with steam at a pressure of 120 to 150 psi and at a temperature of 350 to 365 degrees F for a least 5 hours. Surfaces of units which are to be left exposed in the finished work, or which are to be painted, shall be relatively smooth with a uniform texture. Surfaces of units to receive plaster or stucco shall be sufficiently rough to provide a suitable bond.
- 2.1.2 Hollow Load-Bearing Units: Units shall be made with normal weight aggregates and shall conform to ASTM C90. Grade N-I units shall be provided for exterior and foundation walls.
- 2.1.3 Portland Cement Mortar: Portland Cement Mortar shall consist of portland cement, fine aggregate and water.
- 2.1.3.1.1 Ingredients: All materials for mortar shall conform to requirements of the SCDHPT Standard Specifications where applicable and the following specifications:
- 2.1.3.1.2 Portland Cement: ASTM Designation C150; SCDHPT Standard Specifications Section 501, Concrete Materials.

- 2.1.3.1.3 Sand: SCDHPT Standard Specifications Section 501 ASTM Designation C144, 501.04 Fine Aggregate; Section 501, Concrete Materials.
- 2.1.3.1.4 Water: SCDOT Standard Specifications Section 501.06 Water; Section 501, Concrete Materials.
- 2.1.3.2 All equipment, tools and machinery used to mixing and handling mortar shall be approved by the Engineer.
- 2.1.3.3 Composition: The proportions of portland cement, fine aggregate and water shall be such as to produce a plastic mortar. The workability shall be consistent with the type of work for which it is used in order to secure the best results.
 - 2.1.3.3.1 The mortar as specified for the several types of work, shall be proportioned one part cement and three parts fine aggregate.
 - 2.1.3.3.2 Proportioning of batches shall be by volume unless otherwise shown on the plans or specified in the Special Provisions. On sack of cement weighing ninety-four (94) pounds shall be considered one (1) cubic foot. Correction for bulking of the fine aggregate shall be made as directed by the Engineer.
- 2.1.3.4 Admixture
 - 2.1.3.4.1 Lime: Lime which has been thoroughly air slaked may be added in quantities up to ten (10) percent of the cement content of the mix to increase the workability of the mortar, upon approval of or at the direction of the Engineer. Lime shall conform to ASTM Specifications, Designated C 141.
 - 2.1.3.4.2 Commercial Admixtures: Commercial admixtures increase the workability of mortar or concrete will not be used unless specifically approved in writing by the Engineer.
- 2.2 Portland Cement Concrete: Portland cement concrete for structures shall conform to Section 701 of the SCDOT Standard Specifications for Highway Construction, latest edition.
 - 2.2.1 The 28-day compressive strength of concrete shall be not less than 3000 psi which shall be demonstrated by standard compressive tests. Each test shall consist of duplicate cylinders and not less than one test shall be made for each 50 cubic yards. One cylinder of each pair shall be tested after seven days and shall have a compressive strength of not less than 2000 psi.
 - 2.2.2 Concrete shall contain not less than six sacks of cement per cubic yard and not more than six gallons of water per sack of cement, including water

contained in aggregate.

- 2.3 Reinforcing Steel: Reinforcing steel shall be of a new billet steel, intermediate grade, made by the open hearth process, conforming to the requirements of the "Standard Specifications for Billet Steel Concrete Reinforcement Bars", Serial Designation C15-33 of the ASTM Designation A615-80. In addition to the reinforcing indicated on the plans, the Contractor shall furnish all necessary support bars, tie bars, etc., required for properly supporting and spacing the bars in the forms. The reinforcement will be subject to field inspection for rust, shape and dimensions.
- 2.3.1 Wire mesh used as reinforcement shall be of the size and spacing shown on the plans. The wire mesh shall comply with ASTM-A-185.
- 2.4 Horizontal Joint Reinforcement: Joint reinforcement shall be fabricated from cold drawn steel wire conforming to ASTM Specification A 82. The wire shall be either copper-clad steel or zinc-coated after fabrication. Reinforcement shall consist of two or more parallel longitudinal wires, not less than 0.1620 inch in diameter, weld connected with cross wires not less than 0.1483 inch diameter. The out-to-out spacing of the longitudinal wires shall be 1-1/2 to 1-3/4 inches less than the actual width of the wall. The distance between welded contacts of the cross wires with each longitudinal wire shall not exceed 6 inches for smooth wire and 16 inches for deformed wire. Joint reinforcement shall be provided in flat sections not less than 10 feet in length, except that corner reinforcements and other special shapes may be less in length.
- 2.5 Anchors and Ties shall be of approved designs and shall be of zinc coated steel, or of non-corrodible metal having the equivalent total strength of steel types. Zinc-coated materials shall be coated by the hot-dip process after fabrication.
- 2.6 Fastenings: Suitable galvanized bolts or other approved metal fastenings shall be provided as necessary.
- 2.7 Mortar and Grout Mixing: Materials shall be measured in approved containers, which will insure that the specified proportions of materials will be controlled and accurately maintained during the progress of the work. Measuring materials with shovels will not be permitted. Unless specified otherwise, mortar and grout shall be mixed in proportions by volume. The aggregates shall be introduced and mixed in such a manner that the materials will be distributed uniformly throughout the mass. A sufficient amount of water shall be added gradually and the mass further mixed, not less than 3 minutes, nor more than 5 minutes, until a mix of the plasticity necessary for the purposes intended is obtained. The materials shall be machine-mixed in approved mixers, of the type in which the quantity of water can be controlled accurately and uniformly. Hand mixing may be used only when specifically approved. Mortar boxes, pans and/or mix shall be used before the initial setting of the cement has taken place; retempering of mortar or grout in which cement has started to set will not be permitted. Anti-freezing compounds, salts, or any other substance used to lower the freezing point of the mix will not be permitted. Mortar joints shall be 3/8 inch.
- 2.7.1 Mortar for Block Work: The color of cement and sand used in mortar for exposed work shall produce, without the admixture of any coloring matter, a mortar of uniform shade.

PART III – EXECUTION

3.0 BUILDING EXCAVATION AND FILL

- 3.1 The extent of Building Excavation and Fill shall extend a minimum of two (2) feet beyond the building perimeter.
- 3.2 Site Preparation and Excavation
 - 3.2.1 Site preparation will include the removal of all surface vegetation, organic laden topsoils, existing fill, and any other unsuitable surface materials. After stripping, the exposed subgrade will be evaluated by the Engineer to confirm that all unsuitable materials have been removed.
- 3.3 Grading
 - 3.3.1 Grading shall cover the building site and its surrounds.
- 3.4 Placement and Compaction:
 - 3.4.1 Place backfill materials in layers not more than 8" in loose depth for materials compacted by heavy compaction equipment and not more than 4" in loose depth for material compacted by hand-operated tampers.
 - 3.4.2 Before compaction, moisten or aerate layer as necessary to provide the optimum moisture content of the soil material. Compact each layer to the required percentage of maximum dry density of relative dry for each area classification. Do not place backfill material in surfaces that are muddy.
 - 3.4.3 Place backfill materials evenly adjacent to structures, to the required elevations. Take care to prevent, wedging action of the backfill against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift.
- 3.5 Compaction Requirements
 - 3.5.1 Compact soil to not less than 95 percent of a soils maximum dry density as compared to the Standard Proctor Compaction Test (ASTM D698-70). The Contractor will be responsible for all testing required to assure the above compaction requirements are met.
- 3.6 Floor: Site shall be graded and leveled; floor shall be a concrete slab reinforced with wire mesh cast on a layer of crushed stone bedding. A vapor barrier shall be installed under the concrete slab.
- 3.7 Masonry Work: The work includes furnishing all materials and equipment and performing all labor necessary to construct the masonry work indicated or specified herein. Masonry work shall be coordinated with the work of other trades.
- 3.8 Erection Conditions: Masonry shall not be laid when the air temperature is below 40° F. on a falling thermometer or when it appears probable that temperatures

below 40° F will be encountered before the mortar has set unless adequate means are provided for protecting the work from freezing. Work will not be permitted with, or on, frozen materials. Scaffolding shall be inspected regularly and shall be amply strong, well braced and securely tied in position. Overloading of scaffolding will not be permitted. Tops of exposed walls and partitions shall be covered with a waterproof membrane, well secured in place, when not being worked on.

- 3.8.1 Workmanship: Masonry walls shall be carried up level and plumb all around. On section of the walls shall not be carried up in advance of the others unless specifically approved. Unfinished work shall be stepped back for joining with new work; tothing will not be permitted except where specified or specifically approved by the Engineer. Heights of masonry shall be checked with an instrument at each floor, and at sills and heads of openings, to maintain the level of the walls. Masonry units shall be handled with care to avoid chipping, cracking and spalling of faces and edges. Drilling, cutting, fitting and patching, to accommodate the work of others, shall be performed by masonry mechanics. Masonry shall be cut with masonry saws in exposed work, where directed. Chases of approved dimensions for pipes and other purposes shall be provided where indicated or necessary.
- 3.8.2 Openings and Accessories: Door and window frames, louvered openings, anchors, pipes, ducts and conduits shall be built in carefully and neatly as the masonry work progresses. Ties and anchors shall be placed accurately as shown or herein specified as the work progresses. Grouting of ties or anchors into hardened mortar or grout will not be permitted. Spaces around metal door frames shall be filled solidly with mortar. Structural steelwork, bolts, anchors, inserts, plugs, ties, lintels and miscellaneous metal work specified elsewhere shall be placed in position as the work progresses.
- 3.8.3 Cleaning: During construction, care shall be taken continuously to keep the exposed faces clean of mortar and other stains. When mortar joints reach thumbprint hardness and are tooled, the exposed work shall be brushed with a soft fiber brush to remove adhering mortar, and a wood paddle shall be used to remove more tenacious material. Bases of walls shall be protected from splash stains by covering the adjacent ground with sand, sawdust, or polyethylene. At the completion of the masonry work, holes in exposed masonry shall be pointed, and defective joints shall be cut out and tuck pointed solidly with mortar which has been retempered one to two hours after original mixing.
- 3.8.4 Caulking: All exterior joints where masonry abuts other construction shall be raked approximately ½ inch and filled with an approved non-staining caulking compound.
- 3.9 Metal Doors and Frames: All doors and frames shall be the standard products of manufacturers regularly engaged in the production of metal doors and frames.
 - 3.9.1 Metal Louvers for Doors: Where louvers are indicated they shall be of the inverted "V" or "Y" shaped type, about 1-1/2 inches wide across the open ends of the members, visionproof, and fixed. Louvers shall be made of furniture steel; the slats shall be installed on 1 inch centers providing a clear

space of ½ inch between slats, shall prevent drafts, afford maximum air delivery, and shall admit light. Frames shall be steel channels of suitable size. The top and bottom members of all louvers shall be designed to prevent the collection of dust. They shall be secured to the doors in accordance with the manufacturer's standard practice. A re-wireable type of metal frame, screened with 18 x 12 mesh copper screen cloth, shall be fastened to the back of each louver.

3.9.2 Rustproofing: The door and frames may be given a rust-resisting treatment and metallic primer in accordance with the manufacturer's standard practice, in lieu of paint. Upon completion of the shop work, all marred surfaces shall be re-coated thoroughly.

3.10 Finish Hardware: The work includes furnishing and installing a finish hardware necessary for the complete finish of the buildings. All hardware shall, as far as practicable, be of one manufacturer's make. Hardware for application on metal shall be made to standard templates, and the templates shall be furnished to the metal door and frame manufacturer.

3.10.1 Location: Hardware on hinged doors shall be located as follows, unless indicated or specified otherwise.

3.10.1.1 Locks: knobs shall be installed on doors at the same height from the floor throughout the buildings. The center of door knobs shall be approximately 37 inches above the finished floor.

3.10.1.2 Hinges shall be located as follows:

Top Hinge: Not over 9 ¾ inches from the inside of frame rabbet at head to center of hinge.

Bottom Hinge: Not over 10-3/8 inches from finished floor to center of hinge.

Center Hinge: Midway between top and bottom hinges.

3.10.2 Keys: Two tagged keys shall be furnished for each lock. All entrance doors to the building shall be keyed alike.

3.11 Miscellaneous Metal Work: The work includes furnishing all materials, labor, tools, etc, to provide the miscellaneous metal work as indicated or specified complete.

3.11.1 General Requirements: Steel and iron shall be standard, well finished, structural shapes, or commercial grade, bar steel or bar iron. Steel pipe shall be standard weight. Welding shall conform to applicable requirements of D1.0-63 of the American Welding Society. All finished and/or machined faces shall be true to line and level. Structural steel shall conform to ASTM A 36-67. Rolled shapes shall conform to the dimensions and weights of Regular Series Shapes of the AISC.

3.11.2 Workmanship and Finish: shall be equal to the best practice of modern shops for the respective work. Exposed surfaces shall have smooth finish

and sharp, well defined lines and arises. Sections shall be well formed to shape and size with sharp lines and angles; curved work shall be sprung evenly to curves. All necessary rabbets, lugs and brackets shall be provided so that the work can be assembled in a neat and substantial manner. Holes for bolts and screws shall be drilled. Fastenings shall be concealed where practicable. Thickness of metal details of assembly and supports shall provide ample strength and stiffness. Joints exposed to the weather shall be formed to exclude water.

Metal work shall be countersunk properly to receive hardware and provided with the proper bevels and clearance. Work shall be fabricated and installed in a manner that will insure rigidity and will provide close fittings of sections. Cutting shall be done by shearing, sawing or flame cuttings; if flame cut, the metal shall be ground back to smooth sound material.

3.11.3 Anchors, Bolts and Miscellaneous Fastenings: shall be provided where indicated, where necessary for securing work in the place, and for anchoring machines and other mechanical and electrical equipment in place. Sizes and spacing of anchors and bolts not specified or otherwise indicated shall be as required for their purpose. All anchor bolts shall be cadmium plated steel.

3.11.4 Inserts and Sleeves: Inserts of suitable and approved type shall be provided where necessary for the support of piping, mechanical equipment or apparatus, or other work.

3.12 Painting: The work includes providing all labor, material and equipment for field painting doors and vents. Painting of an item which has a factory finish will not be required, unless the finish has been damaged. Painting shall be done at such times as the Contractor and Commission may agree upon in order that dust-free and neat work be obtained. All painting shall be done strictly in accordance with the manufacturer's instructions and shall be performed in a manner satisfactory to the Commission.

3.12.1 Preparation of Surface: All surfaces to be painted shall be prepared in a workmanship like manner with the objective of obtaining a smooth, clean and dry surface. No painting shall be done before the prepared surfaces are approved by the Commission.

3.12.1.1 Metal: Rust, dust and scale, as well as all other loose or foreign substances, shall be removed by cleaning, wire-brushing, chipping or sand-blasting. Cleaned metal shall be primed or painted, as specified, immediately after cleaning to prevent new rusting.

3.12.2 Quality of Paint: The paint products shall be approved by the Engineer.

3.12.2.1 Colors where not specified shall be as selected by the Commission. All materials shall be brought to the job site in the original sealed and labeled containers of the paint manufacturer, and shall be subject to inspection by the Commission.

3.12.3 Application of Paint: The painter shall apply each coating at the rate

specified for brush application by the manufacturer. If material has thickened or must be diluted for application by spraygun, the coating shall be built up to the same film thickness achieved with undiluted material. In other words, one gallon of paint as originally furnished by the manufacturer must not cover a greater square foot area when applied by spraygun than when applied unthinned by brush.

3.12.4 Thinners: Where thinning is necessary, only the products of the manufacturer furnishing the paint, and for the particular purpose, shall be allowed, and all such thinning shall be done strictly in accordance with the manufacturer's instructions, as well as with the full knowledge and approval of the Engineer.

3.12.5 Painting Schedule: All surfaces to be painted shall be finished in accordance with the following schedule:

3.12.5.1 All exposed ferrous metals, including doors, vents, etc., shall be painted as follows:

3.12.5.1.1 Shop Priming: All steel and iron shall receive a priming coat of approved quality.

3.12.5.1.2 Field Priming: Whenever the priming coat is damaged, the metal shall be cleaned and touched up, using same material as shop prime.

3.12.5.1.3 Finish Coats: Two coats of approved Metal Paint.

END OF SECTION