

SECTION 28

BUILDINGS

28.01 Scope

- (a) The work covered by this item shall consist of furnishing all materials, plant and labor for the construction of the Control Building above the elevations and within the limits shown on the plans as being included in this item. The work shall consist of the complete construction of the building as shown on the plans and specified herein, including heating, cooling and ventilation systems, and all necessary miscellaneous items and appurtenances required to provide finished structures, except as hereinafter specifically noted.
- (b) All excavation, grading, and backfill for footing, wall and floors of buildings as shown on the building plans shall be performed in accordance with applicable provisions. Grading of the plant site shall be performed in accordance with the plans.
- (c) All concrete and steel reinforcement required for the construction of the building above the elevations and within the limits shown on the plans as being included in this item, shall be furnished and placed in accordance with the applicable provisions.
- (d) All electrical work required in the construction of the building shall be performed in accordance with those applicable plans and specifications.

28.02 Vapor Barrier

- (a) The floor slab on grade in the Service Building shall be protected with a vapor barrier equal to Sisalkraft "Moistop" or 4 mil thickness Polyethylene applied immediately under the slabs over the porous or earth fills. Lap six inches and seal all laps and around all pipe, etc. passing through same.

28.03 Concrete Work

- (a) All concrete work, including forms, reinforcement, mix, etc., shall be in accordance with Concrete Specifications except as specifically specified hereinafter.
- (b) Floor Slabs
Troweled floors shall be finished with the following type finishes as shown in Finish Schedule and specified herein. All floors shall be free of waves or high and low spots that are visible or can be felt underfoot.

Type "A": Plain cement finish without hardener or color. Trowel with steel trowel to smooth, even finish. No dusting on of cement will be allowed.

Type "F": Cement finish same as Type "A", except that final or second troweling shall be done after surface produces a ringing sound and a liquid hardener equal to Sonneborn Building Products, Inc., "Lapidolith" shall be applied in three applications in strict accordance with the manufacturer's detailed instructions. Surfaces shall be free of dirt, dust, oils and grease before application. Take care to prevent the solution coming in contact with metal or painted surfaces. Any such contact shall be cleaned with water, rinsed and wiped dry.

Application by factory trained personnel and in accordance with Lapidolith Guarantee Surety Bond. Furnish such guarantee bond covering a period of not less than three years from date of acceptance, from dusting and undue wearing.

28.04 Masonry Materials

(a) Concrete Block: Standard, 8"x16" (nominal face size), Slag and Portland cement conforming to ASTM specification C-90, Grade "A" for all load bearing and exterior non-load bearing walls, and ASTM C 129 Grade "B" for interior non-load bearing walls and partitions. All of uniform texture and light color. Block to be well cured and dry upon delivery to the job. Stack and keep dry. Block found not in conformity to ASTM Specifications shall be immediately removed from the job site. Face of block in exposed surfaces shall be free of chips more than 1/4"x1/2" holes.

(b) Cement - Portland: ASTM C 150 Type I.

(c) Cement - Mason: ASTM C 91, Type II.

(d) Sand: Clean, sharp, natural sand, well graded from No. 4 to No. 100 per ASTM C 144.

(e) Lime - Hydrated: ASTM 207, Type S.

(f) Water Repellent: Master Builders Company "Omicron" mortar proofing, or approved equal, integral additive.

(g) Water: Potable.

(h) Anchors, Ties and Wall Reinforcement:

(1) General: All of approved design, hot dipped galvanized after forming, ferrous metal. Job conditions and details govern type to be used.

(2) Wall Reinforcement: Generally, wall reinforcement shall also be used as ties for veneer and shall be Hohmann & Barnard "Wal-Mesh-Lok" or equal. S4, S6, S8 and S12, respectively, for 4", 6", 8" and 12" walls or partitions; #9 gauge side and cross wires.

(3) Ties: For miscellaneous tying of masonry units use 22-gauge corrugated and crimped ties. For tying masonry to concrete use slots and dovetail anchors.

28.05 Mortar

(a) General: Mortar may be job or plant mixed. No retempering will be allowed. Care shall be taken that all mortar in the walls of each building unit is the same color. Masonry shall be removed where color difference is apparent to the eye.

(b) Mortar may be one of the following:

(1) For General Use above Grade: Type "N", ASTM C 270, of one (1) part Portland Cement; one (1) part lime and six (6) parts sand, by volume, or one (1) part Mason's cement and three (3) parts sand, by volume.

(2) For General Use Below Grade: Type "S", ASTM C 270, of one (1) part Portland cement; 1/2 part lime and 4-1/2 parts sand, by volume.

(c) Water Repellent: Add integrally to the mortar mix in exact proportion directed by the manufacturer for the type mortar used. Use for exterior mortar in walls above floor level.

28.07 Masonry Workmanship

(a) General:

(1) All masonry shall be laid plumb, level and true to lines. Fill all contact surfaces at head and bed joints of units solidly with mortar. Do not lay units in freezing weather. Any work showing signs of frosting shall be removed. Protect tops of walls from rain until coping or other permanent cover is installed. Keep work as clean as possible. Remove mortar droppings from walls and floors daily.

(2) All units shall be laid in common running bond except where shown otherwise. Walls have been coursed vertically and care shall be taken to follow the coursing which is: 1 course of concrete block equals 8"; 3 courses of brick equals 8" and 3 courses of structural glazed tile equals 16". All coursing starts at top of floor slabs.

- (3) Joints to be approximately 3/8" thick. All exposed to be struck and tooled with round tool to form compacted concave joint; unexposed to be struck only. Keep bed joints of uniform thickness as units will permit. Keep head joints plumb, one above the other although some may be slightly less or greater than 3/8"; keeping horizontal coursing as indicated by dimensions.
- (4) All walls and partitions shall be reinforced at alternate courses of concrete block and equivalent spacing in inches for other masonry units. Reinforcement to be as specified herein before and shall be used as ties for veneer. Lap at corners and 6" at end splices. Brick veneer on concrete shall be tied with dovetail ties when such veneer is more than 2'-6" high.
- (5) Install piping, conduit, flashings, anchors and other equipment in walls, and provide holes; sleeves, chases, etc., as work progresses. No cutting for chases, etc., will be allowed. Provide weep holes 4'-0" on centers at wall flashing near floor line.
- (6) Perimeter bearing beams shall be provided at top of all bearing walls and as may be shown elsewhere. Beams formed with concrete "U" block filled with concrete and reinforced as shown. Door and window lintels, where so shown, are to be same as bearing beams. See details for lintels of structural glazed tile.
- (7) Fill heads and jambs of steel door frames with mortar. Note certain heads are to be reinforced. Have all door frame heads strutted before laying masonry above.
- (8) Cut all block and tile with masonry saw.
- (9) Termination of all sills, copings, soldier course, etc., shall be solid brick.
- (10) Certain window stools as detailed shall be bullnose concrete block.
- (11) Structural glazed tile shall be used in spaces so scheduled, using soaps or full thickness walls or partitions as shown. No double faced units shall be used. Double faced walls shall be of two 2-inch; one 4-inch and one 2-inch; or two 4-inch units as required for the wall thickness. Lay in common running bond with log cabin internal corners at doors and windows in the blower room shall be square to match square concrete block above. All window stools in glazed tile walls to be bullnose. Cap all low portions with bullnose units. Base for glazed tile shall be coved, non-recessed type in spaces having vinyl-asbestos tile floor and recessed type where ceramic tile floor is scheduled. Recessed type shall be laid exactly level and with cove to the finished floor elevation. Note certain

lintels are to be concrete filled and reinforced units. Broken and chipped units will not be permitted in finished surfaces.

(12) Pointing: Points all masonry units as required to fill and seal joints and unnecessary holes. Point at flashings, windows, doors, etc., if caulking not specified to fill such voids.

(13) Cleaning: Clean all finished masonry of all loose mortar and stains. Brick to be further cleaned with a solution of not more than 5% muriatic acid and water; or an approved cleaning solution, being careful to keep any solution off surfaces that it may stain or otherwise damage (except any brick noted by manufacturer not be cleaned with acid). Glazed tile shall be cleaned with solution of oxalic acid as recommended by the manufacturer. After cleaning, all surfaces shall be thoroughly washed down with clean water. All interior cleaning to be done prior to finish work of any kind. Wire brushes shall not be used to clean concrete block in finished areas.

(14) Warranty: The contractor, by acceptance of this contract, guarantees the masonry work for two years from date of acceptance, against leakage due to improperly laid units, mortar mix, pointing, and other defects in workmanship. All corrections of the masonry and other damage within the period shall be made at his expense.

28.08 Structural Steel

(a) Steel lintels, columns, beams, beam and joist bearing plates, and door frames of structural members shall be furnished and installed where shown on the plans. The Contractor shall submit, for approval, erection and shop drawings, in quadruplicate, for all items of structural steel.

(b) Structural beams and columns shall conform to ASTM A 36 specifications; all other items may be ASTM A 7. Turned bolts to be ASTM 307; high strength bolts ASTM 325.

(c) Lintels shall be 16 inches longer than opening spanned, except in interior non-bearing partitions they may be 8 inches longer.

(d) All items of steel to be prepared for, and shop primed, and touched up as specified in Item XI of these specifications.

(e) Erect steel in accordance with AISC Code of Standard Practice. All weld, shop and field, to be made in accordance with Specifications and recommendations of the American Welding Society and by certified welders. High strength bolts to be used at all shear connections. Grout up under all column base plates with 1:3 Portland cement

mortar. All beam bearing on masonry bedded level in same mortar.

28.09 Miscellaneous Iron and Ornamental Metals

- (a) Provide all items of miscellaneous iron and steel and ornamental metals such as pipe rails, stairs, nosings, shelf angles, guards, gratings, aluminum tablets, etc., specified herein and/or shown on drawings as part of this Item X.
- (b) Furnish shop drawings of all such items in quadruplicate for the Engineer's approval. Make any corrections and re-submit in same quantity of copies.
- (c) All uncoated ferrous metal items, except cast iron, shall be prepared for, and shop primed, and touched up as specified in Item XI of these specifications.
- (d) Pipe rails in buildings to be of size shown and specifications for similar items in Item VII. Where galvanized items are welded in field the welds shall be cleaned of flux and carbon and coated with ZRC liquid galvanized coating as manufactured by the Sealube Company, or equal.
- (e) Provide pipe bumper guards at garage doors in Service Building as shown and detailed. Black iron pipe set in and filled with concrete. Provide standard cap at top.
- (f) Tablet: Furnish and install an aluminum tablet in the Service Building, where directed. Tablet shall be approximately 30" X 30" wit stock edge mould as selected; sand blasted background and contrasting smooth satin finish raised letters. Tablet to contain approximately 500 letters. Secure to wall with vandal proof fasteners. Details and inscription furnished later.

28.10 Roofing

- (a) Pitched roofs: All pitched roof areas shall be roofed with Barrett's 285 pound Bar-fire shingles or approved equal.
- (b) Felt under shingles to be 2-ply 15# asphalt.
- (c) Roofing shall be installed in accordance wit manufacturer's recommendations.

28.11 Metal Windows and Screens

- (a) All windows shall be Miami Window Corporation's or equal; aluminum Series 93 awning type as shown in schedules, and in accordance with Architectural Aluminum Manufacturing Associations' Specifications. All complete with operating hardware of

type shown on drawings, anchors, mullions and covers. Standard etched finish with coat of clear lacquer. All for putty glazing.

(b) Erect windows plumb and true to line before glazing and leave in smooth operating condition.

(c) Provide manufacturer's standard screens for all windows in the Service Building.

28.12 Hinged Steel Doors and Frames

(a) Frames shall be 14 gauge for exterior doors cold rolled steel of profile shown, except where structural steel frames are shown. None shall be less than 5-1/2" in depth and for thickness door shown. Each jamb to have not less than three anchors and floor clip. Angles, returns, and miters neatly and fully welded and ground smooth on finish surfaces. All to be bonderized and have shop coat of semi-gloss rust inhibitive paint. Remove rust and touch up abrasions before setting frames. Punch stops of frames for three (3) GJ-64 door mutes. Reinforce for hinges and other items of hardware, and mortise as required from templates to be furnished. Note that head of frames are 4" deep to correspond with masonry coursing.

(b) All hinged doors shown as steel are to be hollow metal, flush panel type, 18-gauge sheet steel face surface; 14-gauge side channels; and 16-gauge top and bottom channels. Mortise, reinforce and otherwise prepare for hardware from templates to be furnished. Furnish metal glazing beads. All doors to be bonderized and given shop coat of rust inhibitive paint.

(c) All doors shall be left in perfect condition and operation. Damaged doors and frames will be rejected.

10.13 Carpentry

(a) Furnish and install, complete, all rough and finished carpentry, wood doors and millwork items as shown in or implied by the drawings and specified herein.

(b) All materials graded in accordance with the applicable Rules of the Association or Bureau under which the respective species are produced. All well seasoned and kiln dried with moisture content not more allowed under the Rules for kiln dried material.

(c) All framing lumber including blocking, nailers, plates, etc., shall be treated against rot by pressure treatment - "Osmos" or approved equal that would permit painting over without bleeding through or staining the paint finish. Treatment shall be throughout the cross section of the member.

(d) Grades of framing and other items as follows:

Rafters: No. 1 Common Southern Yellow Pine or Construction Grade Douglas Fir; S4S.
Concealed framing, such as studs, joists, nailers, blocking, etc.: No. 2 Common Southern Yellow Pine or Standard Grade Douglas Fir; S4S.

Sheathing or roof decking: Fir; 5/8" thick, standard/C-D INT. DFPA with exterior glue; or C-E EXT. DFPA.

Exterior Trim: "C" and better grade, kiln dried Southern Yellow Pine for fascias, etc. Exterior ceilings and cornice soffits to be A-C EXT. DFPA Fir.

Interior Trim and Finish: B and better grade, kiln dried Southern Yellow Pine or equivalent approved soft wood; mill sanded, except where as trim in connection with cabinet work of other material it shall match cabinets.

(e) Erect all framing in neat manner as shown or required by conditions. Securely nail and anchor as required by conditions. Securely nail and anchor as required, directed or indicated on drawings. All nailers, plates, beams, etc., on masonry shall be secured with bolts, clip angles and bolts as required. Countersink bolts as required for covering materials. Bracing and supports for roof construction shall be substantial as shown - job conditions may require variation to accomplish the support desired. Nailing plates on steel joists shall be bolted to same.

(f) Furr with 1" X 4" wood strips, 24" on centers for gypsum board on walls where so scheduled.

(g) Exterior running trim shall be erected in straight, level and plumb lines; mitered at running joints and external corners. Plywood ceilings and soffits to be erected in panels as directed which will be to use as large pieces as possible. All but edges shall be "eased to produce slight "V" joint. Do not use common nails.

(h) Interior trim and finish shall be erected in neat manner. Internal corners of running trim coped; external and running joints mitered. All nails set for putty stopping. Raised grain, hammer marks and other defects not acceptable.

28.14 Finish Hardware

(a) The Contractor shall furnish all hardware necessary for the completion of the building in every detail.

(b) General Requirements: Construct hardware to fit details. Hardware for metal doors

and frames to be made to template and templates furnished door and frame supplier after approval of hardware.

(c) Schedule: Furnish complete schedule, in quadruplicate, of all items of hardware for approval of Engineers. Schedule shall indicate type, manufacturer, number, finish and location of each item. The Contractor shall be responsible for quantities.

(d) Padlocks: Padlocks for gates will be furnished by Owner.

28.15 Thermal Insulation

All ceilings shall be insulated with 6 inch thick paper backed insulation laid in tight as ceilings are installed.

28.16 Acoustic Blanket

(a) The ceiling of the Service Building shall be as specified on the plans.

(b) Insulation shall be installed where shown on the plans in accordance with the manufacturer's recommendations. The material furnished shall be 1 inch thick "Ultra Fine 20" as manufactured by Gustin-Bacon or approved equal. The material shall be installed in accordance with the manufacturer's recommendations. Coordinate with Electrical and Heating contractors for proper placement of their equipment and provide such additional supports as may be required.

28.17 Caulking

(a) Caulking compound shall be such that will not harden, crack or flow between minimums of 10 degrees and 150 degrees Fahrenheit; gun consistency, light color suitable for painting over, except aluminum at aluminum colored items. Equal to "Pecora".

(b) Caulk at exposed open joints around interior and exterior door frames and windows in masonry walls; expansion joints, and wherever else required to seal openings and joints to make tight job. All joints and surfaces shall be dry and clean of grease and dirt. Fill joints full and leave surface neat and clean.

28.18 Painting

(a) The preparation of surfaces to be painted, and the painting of such surfaces, on the exterior and interior of the building shall be in accordance with the specifications and the painting schedule for building on the drawing.

(b) All colors will be selected later.

2819 Payment

No separate payment will be made for Building constructed under these specifications, but this work shall be included in the lump sum payments for the Control Building.

SECTION 200 FENCING

A 6-foot high woven wire fence with three (3) strands of barbed wire with a 10-foot double leaf gate shall be provided as shown on the drawings. Woven wire fabric shall be 11 Ga. 1.2 ounce galvanized (ASTM A392). End and corner posts shall be 2-7/8-inch O.D. pipe, 5.79 #/ft. Line posts at 10-foot maximum spacing shall be 2-3/8-inch O.D. pipe, 3.65 #/ft. Top rail shall be 1.660 O.D. 2.27 #/ft. pipe. A 7 Ga. galvanized tension wire shall be installed. Posts are to be set in concrete. Wire ties and hog rings shall be 9 Ga. aluminum or 11 Ga. galvanized steel. The gate shall include locking hardware and shall use same fabric as the fence. Barbed wire shall be aluminum-coated double strand 12-1/2 Ga. twisted wire with 14 Ga. 4-point barbs at 5-inch centers and shall conform to ASTM A585.

Fencing will be paid by the lump sum price bid of the contractor.

SECTION 15261

FLUORIDATION EQUIPMENT & ACCESSORIES

PART 1 – GENERAL

1-01 GENERAL

- A. CONTRACTOR shall furnish and install a complete fluoride feed systems, including water softening as necessary, and related project components as specified herein, and as shown on the project drawings.
- B. The Plans are generally diagrammatic and represent the intent of the project improvements. The location of items on the drawings do not indicate that such items shall be placed at the exact location scaled on the drawings, but shall be located to function best, unless specifically dimensioned on the drawings.
- C. The drawings and specifications shall be considered as cooperative, such that work and/or materials included in either, though not mentioned in both, shall be a part of the project to be accomplished, and shall be carried out completely.

1-02 SUBITTALS

- A. Submittals shall include the following information:
 - 1. Manufacturer's Certificate of Compliance certifying compliance with the referenced specifications and standards.
 - 2. Certification of Manufacturer's Certified Service Contractor.
 - 3. Certified copies of reports of factory tests specified in this Section and required by the referenced standards.
 - 4. Shop drawings with performance data and physical characteristics.
 - 5. Manufacturer's installation instructions.
 - 6. Manufacturer's operation and maintenance material and manuals.

1-03 QUALITY ASSURANCE

- A. The equipment and materials to be furnished under this Contract shall be new and of first quality.

1-04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. The CONTRACTOR shall be responsible for the delivery, storage, and handling of products.
- B. Safety and care are of utmost importance.

1-05 ELECTRICAL

A. CONDUIT AND FITTINGS

1. Conduit and installation shall conform to the following: All wiring shall be in NEC approved raceways sized as shown on the drawings, or if not sized on the drawings, in accordance with the latest edition of the National Electric Code.
2. All above ground Wiring is to be run in Galvanized Rigid Steel.
3. Rigid steel conduit to be hot dipped galvanized U.L. approved and meet U.L. Standard #6. Galvanizing shall be Zinc Hot Dipped Galvanized in accordance with ASTM Standard A-a53, and the galvanizing shall be after fabrication. All galvanizing shall be uniform in density, free from all fractures and dirt pockets, and shall present a neat appearance.
4. Flexible conduit shall be "Greenfield" type in dry locations with squeeze type connectors. In all wet, oily or other adverse environments, PVC jacketed "Sealtite" flex is to be used with proper connectors.
5. Plastic conduit may be used only where shown on the drawings. All plastic conduit to be PVC Schedule 40 Heavy Wall type bearing the U.L. seal. Conduit shall meet the requirements of NEMA Standards Publication No. TC-2-1970 and U.L. publication No. 651. Installation of plastic conduit shall be done by experienced personnel using approved methods.

B. GENERAL WIRING METHODS

1. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring.
2. Use 10 AWG conductors for 20 ampere, 120 volt branch circuit home runs longer than 75 feet, and for 20 ampere, 240 volt branch circuit home runs longer than 200 feet.
3. Place an equal number of conductors for each phase of a circuit in same raceway or cable.

4. Splice only in junction or outlet boxes.
5. Neatly train and lace wiring inside boxes, equipment and panelboards.
6. Make conductor lengths for parallel circuits equal.

C. FUSES

1. All fuses shall be of the same manufacture as produced by Chase-Shawmut, Bussman or equal.
2. Fuses for all circuits shall be of type recommended by the manufacturer and sized in accordance with the latest edition of the National Electric Code to provide a coordinated system of overcurrent protection.

D. BREAKERS

1. Breakers shall be of size and type as shown on drawings and schedules by Square D, General Electric, ITE or equal. Breakers shall, in general, be quick-make, quick-break; have toggle mechanism, insuring full contact pressure until time of opening whether manually or automatically operated; have inverse time tripping characteristics with fixed thermal and magnetic trip element which trips free; allow the thermal trip action to hold on harmless momentary overload; on short circuit or heavy overload, the magnetic trip element shall instantly trip without damage or injury; have non-welding, non-corroding contacts; mechanism enclosed in molded bakelite case, sealed to prevent tampering or unauthorized changes in calibration; be U.L. listed and meet NEMA standards.
2. All multiple pole breakers shall have common trip. Wires, pins, etc. between single pole breakers to form common trip will not be acceptable. In general, all 120 volt lighting and receptacle circuits shall be run from 20 ampere single pole breakers. Where panel spaces are called for, they shall be complete with bus for future breaker installation. All breakers shall give a visual indication as to whether it is "ON", "OFF" or "TRIPPED".

E. DISCONNECTS

1. Furnish and install, where noted on drawings or required heavy duty front operated, enclosed safety switches as manufactured by Square D, General Electric, ITE, or equal.
2. Switches shall be in proper NEMA enclosures as required by location or as noted on drawings; quick-make and quick-break type; horsepower rated; capable of interrupting the locked rotor current of the motor served.

F. WIRE AND CABLE

1. All wire and cable shall comply with the latest specifications and requirements of the NFPA and/or the Insulated Power Cable Engineers Association, and shall be of the quality as manufactured by Triangle, Crescent, General Cable, or equal.
2. Wire and cable shall conform to this specification, unless otherwise specified, noted on the plans, or required.
3. All conductors for wire and cable shall be copper based on 98% conductivity according to Matteisen's Standard, and shall be tinned or untinned in accordance with established standards for the type of insulation. Standing and materials of conductors shall be in accordance with ASTM Designation B8 and B33. All wire and cable shall be stamped approximately every two feet to indicate voltage, type, temperature rating, etc.
4. Conductors #10 AWG and smaller shall be solid, and those #8 AWG and larger shall be stranded.

G. APPLICATION OF WIRE AND CABLE

1. Insulation for all wire or cable to be as follows:

General Use Areas	THW, THHN, RHW
Wet or Moist Locations	THWN, RHW
Panel Feeders	THW, THWN, XHHW

2. All insulated wiring or cables to be rated 600 volts unless otherwise specified.

H. OUTLET BOXES

1. All boxes shall be Appleton, Steel City, Raco or equal, stamped, one piece, weatherproof.

I. WIRING DEVICES

1. Wiring devices, switches, convenience outlets, etc. shall be of "Specification Grade" quality as manufactured by Pass & Seymour, Bryant, Hubbell or equal.
2. All power receptacles shall be of the ground type.

J. HINGED COVER ENCLOSURES

1. Construction: NEMA 250; Type 1, 3R.
2. Finish: Manufacturer's standard enamel finish, prior to installation of electrical components.
3. Covers: Continuous hinge, held closed by flush latch operable by screwdriver, key or hasp and staple for padlock.

1-06 PIPING

A. GENERAL

1. All piping installed on this project shall be new and of full weight and size shown and of proper specification for service intended. Only domestic pipe may be used. When piping is cut, it shall be reamed with pipe reamer and all burrs, scale, trash and foreign matter removed.
2. All piping is to cut square at joints or connections.
3. All piping shall be buried a minimum of two (2) feet.

B. BACKFILL

1. Backfill over piping system shall include no rock in the first foot of backfill. Backfill shall be tamped compactly to assure a stable surface.

PART 2 – PRODUCTS

2-01 WATER TREATMENT COMPONENTS

A. FLUORIDATION EQUIPMENT

1. Metering Pump shall be a Wallace and Tiernan Premia 75 Mega Series metering pump or engineer approved equal. Fluoride Saturator shall be Wallace and Tiernan upflow saturator series 47-050, or approved equal, with solenoid controlled water level.
2. The metering pump shall not exceed 8 gallons/hour.

3. The electric plug for the metering pump shall be wired in such a manner that it will be activated only when the water well motor is running. There shall be no manual override switch for this connection.
4. The metering pumps shall be capable of both manual operation and automatic (4.20 ma, pulse input, etc.) operation.
5. Metering pumps shall be equipped with a siphon breaker.
6. Each pump shall be labeled indicating the well number and location as shown in A. above. The label shall be attached to the meter in such a way that it shall be a permanent part of the meter
7. A test kit shall be provided to measure the level of fluoride residual in the system. The test kit shall be as manufactured by HACH DR/890 or engineer approved equal.
8. The following test equipment shall be supplied with the test kit.
 - i. HACH DR/890, Hach Part #4847000, or equal test equipment
 - ii. 500 fluoride AccuVac ampoules, Hach Part #2506025, or equal
 - iii. Two (2) 4 Liter bottles deionized water, Hach Part #27256, or equal
 - iv. One non-mercury thermometer, Hach Part #2676400, or equal
 - v. One hard sided carrying case, Hach Part #4942500, or equal
 - vi. Two (2) 50 ml polypropylene beakers, Hach Part #108041, or equal
 - vii. 500 ml bottle 1.0 mg/l Fluoride Standard solution, Hach Part #29149, or equal

B. WATER SOFTENER EQUIPMENT – NOT APPLICABLE FOR THIS CONTRACT

1. Contractor shall provide as indicated a vertical pressure type water softener system complete with pressure vessel, softening resin, control valve, brine maker and electronic controller. The system will be of an approved design as fabricated by a manufacturer regularly engaged in the production of water treatment equipment. All equipment and material will be supplied in compliance with the specifications as intended for a complete and operational system.

2. The water softening equipment shall be of the type manufactured by Culligan International Company, Medallist Series, or the Engineer's approved equal.
3. The purpose of the automatic water softener will be to remove mineral hardness from a known water supply to a level not to exceed 5.0 mg/l, as determined by an accepted ASTM or EDTA test method.
4. P-chem water analysis for each well is attached at the end of this specification. These analyses shall be used in designing each water softener.

C. SINGLE SOURCE SYSTEM SUPPLIER

1. The water treatment equipment shall be supplied by a single-source supplier.
2. The water treatment equipment shall be installed by a Manufacturer's Certified Service Contractor of the manufacturer supplying the water treatment equipment.
 - i. Treatment equipment, to include fluoridation equipment and, if necessary, water softening equipment shall be installed by the fluoridation equipment manufacturers certified factory technician to assure proper installation and operation of the fluoride saturator, metering pump, associated piping and electrical facilities.
 - ii. The Contractor shall provide a certification by the Certified Service Contractor. The certification shall state that the installation in accordance with the manufacturer's installation recommendations.

2-02 FLUORIDE BUILDING

- A. Where indicated on the plans, the Contractor shall provide an enclosure to house the fluoride equipment and fluoride storage with the following requirements:
 1. The Manufacturer shall furnish a one piece molded fiberglass reinforced polyester insulated building as manufactured by Jacobs Manufacturing Corp or Engineer approved equal.
 2. Fiberglass reinforced plastic buildings shall be of one piece molded construction with composite walls and roof. Exterior surface shall be gel-coat beige color with a smooth finish and free from fiber patterns, roughness or other irregularities.

3. Exterior laminate which is chemically bonded to the gel-coat shall be a minimum of 1/8" thick... The Laminate consisting of polyester resin and chopped strand fiberglass shall have a minimum glass content of 30%.
4. A minimum of 1" thick insulation shall be used for the core material and shall have an R-6.06 value.
5. The core material shall be rigid closed cell, self extinguishing polyisocyanurate foam with a density of 2 pounds per cubic foot.
6. The molding shall be continuous forming a one piece molded composite shelter with an integral 4" wide internal mounting flange around the perimeter. The flange shall be pre-drilled on 12" centers with a 5/8" diameter hole for bolting to a structural fiberglass floor or a concrete pad.
7. A one piece molded fiberglass composite door shall be 1-3/4" thick and typical to materials of construction of the walls. The door shall be mounted using a continuous stainless steel hinge. The door shall be provided with a one point keyed stainless steel latch. Size and quantity of door may vary due to application.
8. A minimum of two cadmium plated lifting eyes shall be provided for lifting the building. Lifting eyes may be removable after installation.
9. Building shall be shipped pre-wired in accordance with the electrical requirements shown on the plans. Contractor shall coordinate with building supplier on all necessary wall penetrations and shall seal wall penetrations with prefabricated bulk head connections.
10. Wood shall not be permitted for use in reinforcement or structural support. FRP building shall be a wood free structure.

Laminate Properties	Value	Test Method
Tensile Strength	19,900 PSI	ASTM D638
Flexural Strength	32,100 PSI	ASTM D790
Shear Strength	12,000 PSI	ASTM D732
Barcol Hardness	60	ASTM 2583
Impact	12 ft lbs/inch	ASTM D256
Heat Distortion Point	175 deg F	ASTM D384
Density/Specific Gravity	93.6 PCF/1.5	ASTM D792
Burning Characteristics	<150 Flame Spread <1000 Smoke Density	ASTM D792

2-03 FLUORIDE HANDLING AND SAFETY EQUIPMENT

- A. Neoprene Latex Gauntlet type gloves, unlined size 10-11", Wallace & Tiernan Part Number U13628 or Engineer approved equal.
- B. Black Neoprene, black, bib style 33" x 45", Wallace & Tiernan apron Part Number U119265, or Engineer approved equal.
- C. Goggles, Wallace & Tiernan Part Number U19264, or Engineer approved equal.
- D. Dust Respirator, Wallace & Tiernan Part Number U13200, or Engineer approved equal.

PART 3 – EXECUTION

3-01 INSTALLATION

- A. CONTRACTOR shall be responsible for the complete installation of the fluoridation equipment and other components as shown on the contract drawings and details, manufacturers shop drawings and in accordance with the specifications.

3-02 START-UP AND TRAINING SERVICES

- A. A Manufacturer's Certified Service Contractor shall be required to start-up the fluoridation system, observe the operation of the well, or water treatment plant, and document that the fluoridation system is operating properly. The Certified Service Contractor shall also train the operating personnel in the proper operation of the fluoridation system. In addition, the Certified Service Contractor shall make adjustments to the fluoridation system to maintain the correct fluoride residual in the water system. An official Star-Up inspection report of the complete installation shall be submitted to the Engineer. The inspection report should address all treatment components and sub-components of the system and shall certify that the equipment is functioning properly and producing a residual fluoride concentration in the water supply at the site of between 0.8 mg/l and 1.2 mg/l fluoride. The inspection report shall also specify dates of the preventive maintenance inspections as discussed in Part 5 of these specifications

3-03 SPARE PARTS AND CHEMICAL SUPPLY

- A. Contractor shall provide the following spare parts:

1. One Preventive Maintenance Kit for each capacity metering pump in the system (total of four). The kit shall include spare parts for the liquid end including diaphragm, suction and discharge check valve assemblies, and a set of o-rings for the pump liquid end.
2. One spare part for saturator system including Tygon Suction and discharge tubing intake strainer #U23564, or Engineer approved equal.

B. Contractor shall supply the following chemicals:

1. Contractor shall supply sufficient quantity of sodium fluoride to fully saturate the fluoride saturators at each site.
2. Contractor shall supply 2,000 pounds of sodium fluoride for continuing operation after start-up. The Contractor shall coordinate with the system operator for a storage location.
3. If water softeners are included in the project, the Contractor shall supply sufficient quantity of salt to start up the water softeners. Contractor shall also supply 240 pounds for continuing operation after start-up.

PART 4 WARRENTY

- 4-01 Contractor shall provide a one (1) year written warranty for all work associated with the PROJECT covering all labor, workmanship, and materials.
- 4-02 In addition to the manufacturer's standard warranties, the Manufacturer's Certified Service Contractor shall provide a two (2) year written warranty for all work and equipment associated with the water treatment components specified herein. Said warranty shall cover replacement of broken or defective parts and shall include labor to install, travel labor, and all miscellaneous expenses associated with providing services covered under the warranty.

PART 5 OPERATION AND MAINTENANCE MANUALS

- 5-01 Three (3) Operation and Maintenance Manuals shall be supplied for water treatment components.
- 5-02 As a minimum, Operation and Maintenance Manuals shall include:
- A. Principle of operation
 - B. Installation instructions