3.4 PLACEMENT OF ASPHALTIC CONCRETE PAVING

A. Trench Resurfacing: Shall be utilized as the permanent resurfacing.
   1. Remove temporary pavement, square up edges and prepare base course as specified herein.
   2. Edges of the trench shall be cut back in a neat true line, twelve (12) inches outside all limits of the excavation with a water cooled abrasive saw.
   3. Edges of the existing pavement and castings shall be brushed clean and the specified tack coat applied.
   4. Binder course resurfacing shall be installed to a pavement compacted thickness as identified on the Drawings.
   5. Top course resurfacing shall immediately follow to a pavement compacted thickness identified on the Drawings.
   6. Compaction shall be accomplished with a self-propelled roller, with a weight of approximately 285 lbs. per inch of roller width.
   7. Compaction shall be accomplished with a self-propelled roller with a weight of approximately 285 lbs. per inch of roller width.

B. Sand Seal
   1. The butt edges of all permanent resurfacing shall be sealed with a six (6) inch wide continuous strip of RS-1 completely covered with sand.

3.5 CASTING ADJUSTMENTS

A. In roadway areas, where permanent resurfacing is to be applied, gate valve boxes are to be adjusted to the grade of the new pavement.
   1. A neat line shall be cut in the pavement around the existing frames.
   2. The material: gravel, pavement shall be removed down to six (6) inches below the frame.
   3. The box is then to be set into a full bed of grout and a concrete collar placed around the box, up to within two (2) inches of the existing pavement.
   4. The box shall be protected from damage from traffic until the concrete has taken a firm set.

END OF SECTION

SECTION 02611

SERVICE TUBING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Furnish and install service tubing as required by the Contract Documents.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 02221 Trenching, Backfilling and Compaction

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this Section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 20 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section.
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 SERVICE TUBING

A. Underground tubing shall be polyethylene pressure tubing shall be 1-inch high tensile piping with a 250 psi rating, PE 4710, copper tubing size, blue in color meeting the requirements of ANSI C901-04 or latest revision. Tubing to be equal to Silverline UltraPur
   1. Fittings shall be compression joint type on inlet and outlet.
   2. Provide steel insert for conenctions to valevs and fittings.

B. Interior service tubing, vault and building see Section 15400.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FIELD MEASUREMENTS

A. Make necessary measurements in the field to assure precise fit of items.

3.3 INSTALLATION

A. Excavation, backfill, and compaction for the work of this Section in strict accordance with pertinent provisions of Section 02221.

3.4 PIPE LAYING

A. Service Tubing Open Cut Construction
   1. The tubing shall be connected to the building plumbing system and the vault corporation.
   2. Tubing shall be carefully laid in bottom of trench, backfill with sand placed and compaction completed. Care shall be taken to insure against kinks or crushed areas.
   3. Tubing shall be connected to the threaded copper adaptor, and compression joints tightened.

END OF SECTION

SECTION 02640

VALVES AND SERVICE BRASS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Furnish and install valves and service brass on the water distribution piping system as specified in this Section and as shown on the Contract Drawings.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workers who are trained and experienced in the crafts and who are familiar with the specified requirements and the methods needed for performance of the work.

B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 20 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Materials list of items proposed to be provided under this Section;
   2. Manufacturer's specifications and other data needed to provide compliance with the specified requirements.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610

PART 2 - PRODUCTS

2.1 MATERIALS

A. Corporation Stops
   1. Service corporation stops shall be 1-inch in size, constructed of "no-lead" or "lead free" alloy brass and meeting or exceeding the latest requirements of ANSI/AWWA C800-01 or latest revisions thereto. For CTS polyethylene service tubing, valve shall be ball-type. Inlet AWWA Taper "CC" thread, outlet CTS compression type. Corporation shall be as manufactured by Cambridge Brass, Federalloy, Mueller

Co., Red Hed Manufacturing Co., or approved equal.

2. Service saddles for use on ductile iron with dual flattened coated steel straps shall be used on all corporations installed on Class 52 ductile iron pipe. Saddle shall be ductile iron with hot dipped zinc galvanized body, CC (AWWA) threads with Buna-N rubber gasket. Saddles shall be as manufactured by Mueller Co., or approved equal.
3. All corporation stops shall have the manufacturer's name or trademark integrally stamped or cast on it. Anchor marking identifying the "no lead" brass alloy shall be cast or stamped on the corporation.

B. Curb Stops

1. Curb stops shall be 1-inch in size, constructed of "no-lead" or "lead free" alloy brass and meeting or exceeding the latest requirements of ANSI/AWWA C800-01 or latest revisions thereto. For CTS polyethylene service joints, valve shall be ball-type design. Joints shall be CTS compression type. Curb stops shall be as manufactured by Cambridge Brass, Federalloy, Mueller, Red Hed, or approved equal.
2. All curb stops shall have the manufacturer's name or trademark integrally stamped or cast on it. Anchor marking identifying the "no lead" brass alloy shall be cast or stamped on the curb stop.

C. Fittings

1. 1-inch fittings shall be constructed of "no-lead", "lead free" alloy brass with compression joints. Reducer bushings shall be compression by thread style.
2. Shall meet or exceed the requirements of AWWA C800-01, or latest revision thereto.

D. Curb Boxes

1. Shall be Buffalo type-recessed lid with pentagon bolt, adjustable sliding type for 5-foot bury, and of USA manufacture.
2. Service box shall include a rod and a centering rod guide or ring.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FIELD MEASUREMENTS

A. Make necessary measurements in the field to assure precise fit of items.

3.3 INSTALLATION

A. Excavation, backfill, and compaction for the work of this Section in strict accordance with pertinent provisions of these Specifications.

END OF SECTION

SECTION 02668

WATER PIPING VALVES, FITTINGS AND APPURTENANCES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide exterior water piping, fittings, connections to existing water mains, other exterior piping, required by the Contract Documents.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 02221 Trenching Backfilling and Compaction
3. Section 03300 Cast-In-Place Concrete

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. All castings shall be of domestic manufacture.

C. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this Section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Materials list of items proposed to be provided under this Section.
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

B. Unloading: Unload pipe in accordance with the manufacturer's printed instructions.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Ductile Iron Pipe (Buried Service)
1. Shall be class 52 with push on joint (unless shown otherwise on the Drawing) meeting the requirements of ANSI/AWWA C151/A21.51.
2. Shall be cement lined, with an asphaltic seal coat meeting the requirements of ANSI/AWWA C104/A21.4.

B. Ductile Iron Fittings (Buried Service)
1. Fittings shall be manufactured of ductile iron mechanical joint, all bell, compact design rated for 350 psi.
2. Fittings shall meet or exceed the requirements of ANSI/AWWA C153/A21.53.
3. Fittings that are not presently manufactured to the compact design, but are manufactured to meet or exceed the requirements of ANSI/AWWA C110/A21.10 may be utilized.
4. Mechanical joint shall meet or exceed the requirements of ANSI/AWWA C111/A21.11.

C. Special Fittings
1. Retainer glands shall be manufactured of ductile iron conforming to ASTM A536-80. The gland shall be such that it can replace the standardized mechanical joint gland and can be used with the standardized mechanical joint bell confirming to ANSI/AWWA A21.11/C111 and ANSI/AWWA A21.53/C153 or latest revision.
2. Retainer glands shall be cast fitted with ductile iron wedging devices and twist off pressure nuts, 6 each for 6-inch pipe, 6 each for 8-inch pipe and 8 each for 10-inch pipe.
3. Solid sleeve for connection to existing water main to be ductile iron with mechanical joint, long body style meeting or exceeding the requirements of ANSI/AWWA C110/A21.10 or latest revision thereto.
4. Plugs and caps shall be ductile iron with mechanical joint retainer feature.

2.2 GATE VALVES FOR BURIED SERVICE

A. Gate valves on all water mains 12-inches in diameter and smaller and hydrant branches shall be of the resilient seated wedge type with cast iron body.
1. Shall meet or exceed the requirements of ANSI/AWWA C515.
2. Ends shall be mechanical joint conforming to ANSI/AWWA C111/A21.11.
3. Valve shall be of the non-rising stem type with O-ring stem seals.
4. Shall be a two (2) inch square operating nut and shall turn clockwise (right) to open.
5. Valves shall be rated for 200 psi and tested to 400 psi.
6. Shall be fully coated on interior and exterior surfaces in accordance with AWWA C550, with a minimum dry film thickness of 3.5 mils.
7. Tapping valve and sleeve specified in Section 02610 Ductile Iron Pipe, Fittings and Appurtenances.

8. Valves shall be as manufactured by Mueller 2300 Series, as required by Natick Water Department.

2.3 VALVES

A. Butterfly Valves were shown on Drawing exterior of valve vault:
   1. Shall be open right designed specifically for underground service meeting or Exceeding the latest requirements of ANSI/AWWA C504, Class 150B, and shall be Mueller lineseal III as required by Town of Natick Water Department.
   2. Shall have mechanical joint ends.
   3. Shaft seal shall be O-Ring type.
   4. Body shall be cast iron meeting or exceeding the requirements of ASTM A126, Class B.
   5. Shafts shall be 304 stainless steel.
   6. Manual operator with stop limiting devices for both opened and closed positions. All components between the input and the stops capable of withstanding 300-ft-lb torque.
   7. Shall have bubble tight closure.
   8. Shall open right.
   9. Shall have stainless steel disc.

2.4 CONCRETE

A. Provide 2500 psi concrete in accordance with pertinent provisions of Section 03300 of these Specifications, for thrust blocking.

2.5 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and condition under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FIELD MEASUREMENTS

A. Make necessary measurements in the field to assure precise fit of items.

3.3 INSTALLATION

A. Trench, backfill, and compact for the work of this Section in strict accordance with pertinent provisions of Section 02221 of these Specifications.

B. Protect pipe and fittings during handling against shocks and free fall. Remove extraneous material from the pipe and fitting interior.

C. Valves: Shall be set and aligned plumb, supported by a flat stone or solid concrete block, with mechanical joint tightened. Backfill shall be carefully placed and compacted to prevent movement of valve.

1. Valve box shall be set plumb and centered over operating nut, and supported in this position during backfilling and compaction.
2. Box shall be set initially flush with the surface and again adjusted prior to placement of the final top course of asphaltic concrete.
3. Prior to placement of the final top course of asphaltic concrete, the box shall be cleaned of all debris and checked for plumb and centering over operating nut.

3.4 PIPE LAYING

A. Ductile Iron Pipe and Fittings

1. Lay ductile iron pipe and fittings in accordance with the requirements of ANSI/AWWA C600-93 except as may be otherwise provided in this Specification.
2. Pipe cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe and the cement lining shall be undamaged.
3. All bends, tees, caps, plugs and hydrants shall be provided with reaction or thrust blocking as shown on the Contract Drawings.
4. When pipe laying is not in progress the open end of the pipe(s) shall be closed by a suitable pipe cap or plug to prevent the entry of dirt, stones or ground water in to the line.
5. The cut end of a pipe which is being made-up into a push-on-joint shall have its cut end beveled to prevent damage to the gasket during assembly of the joint.
6. Install retainer glands where specified in this Section and where shown on the Contract Drawings in accordance with the manufacturer's recommended installation instructions.

B. Connections at Existing Water Mains

1. The exact location and size of the existing water mains shall be determined by test pit excavations as directed by the Engineer.
2. Once uncovered, the Contractor shall prepare the pipe for the proposed connection. Care shall be taken in alignment of the new piping and fittings, to keep deflection within the manufacturer's allowable tolerances.

3.5 HYDROSTATIC TESTING

A. Pressure Test: After the pipe has been laid all newly laid pipe or any valved section thereof shall be subject to a hydrostatic pressure of at least 1.5 times the working pressure or 150 psi, whichever is greater, at the point of testing.

1. Pressure shall not be less than 1.25 times the working pressure at the highest point along the test section.
2. Test shall not be made until all reaction and thrust blocking has achieved their strength, a minimum of seven (7) days after they were cast.
3. Duration of test shall be two (2) hours.
4. Test pressure shall not vary by more than $\pm$ 5 psi.
5. Each section of pipeline shall be slowly filled with water, with the specified test pressure, measured at the point of lowest elevation, applied by means of a pump connection to the pipe in a manner satisfactory to the Engineer. The pump, pipe connection, gauges, and all necessary apparatus shall be furnished by the Contractor.
6. During the filling of the pipe and before applying the specified test pressure, all air shall be expelled from the pipeline. At all points of high elevation, the Contractor shall install corporation cocks so that air can be expelled as the pipe is filled with water. After all air has been expelled, the corporation cocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation cocks shall be removed and plugged or left in place at the discretion of the Engineer.

B. Leakage Test: Leakage shall be defined as the quantity of water that must be supplied into the pipe to maintain pressure within 5 psi of the specified test pressure after the air has been expelled and the pipe filled with water. Leakage shall not be measured by a drop in pressure in a test section over a period of time.

1. No pipe installation shall be accepted if the leakage is greater than that determined by the following formula:

$$L = (S * D * P^{0.5})/148{,}000$$

where: L = allowable leakage, in gallons per hour.
S = the length of pipe tested, in feet.
D = the nominal diameter of the pipe, in inches.
P = the average test pressure during the leakage test in psi.

2. Should any test of a section of pipe line disclose leakage greater than permitted, the Contractor shall at his own expense locate and repair the defects until repeated pressure test yields a leakage value within the allowable limit.
3. The Contractor shall provide the Engineer with a written report on the pressure test, to include the date, time, location, stations, pressure, quantity of water applied during test, size of pipe, etc.

C. Notification: The Engineer and the Owner shall be notified, in writing, at least forty-eight (48) hours prior to the hydrostatic testing of the pipeline.

3.6 DISINFECTION

A. After completion of pressure tests, the pipelines shall be disinfected by application of chlorine either as calcium hypochlorite or liquid sodium hypochlorite in an amount to produce a solution of 50 p.p.m., for a contact period of 24 hours, and afterward, flushed until the chlorine residual is reduced to less than 1.5 p.p.m. Chlorine dosage shall be applied by pumping into the line to be treated, a sufficient amount of chlorine solution, which, when mixed with water in the pipeline, will meet the required concentration. The mixture shall be pumped through the section being treated and shall be discharged and monitored at a point farthest from the point of introduction of the chlorine. When the solution reaches the required concentration of 50 p.p.m., the pump and discharge valve shall be closed and the liquid left in the section being chlorinated for 24 hours.

1. The chlorine solution used for disinfecting the new water line shall be discharged from the water main while being neutralized to a residual of 0 ppm.
2. If a hydrant connection is not available to be used for discharging the chlorine solution from the new line, a temporary blow-off connection shall be installed for that purpose. Upon completion of the disinfection process, the blow-off connection shall be removed.
3. The Contractor shall furnish all materials and equipment for the sterilization of the mains, but the Water Department will furnish necessary assistance in flushing and the operation of gate valves.
4. The Contractor shall obtain two (2) water samples from the disinfected line, the first twenty-four hours after the removal of chlorine, and the second twenty-four (24) hours later without flushing between samples, once the chlorine concentration reaches zero (0) mg/l, to be analyzed for coliform bacteria.
   a. Sample bottles shall be obtained from the Town.
   b. Collected samples are to be immediately delivered to the Town for their delivery to the laboratory for analysis.
   c. If the analysis indicates the presence of any coliform bacteria, the water main shall be disinfected again and the analysis repeated. The process shall be repeated until the analysis indicates no coliform bacteria.
   d. Repeat bacteria analysis due to failure of the initial and twenty-four (24) hour bacteria samples shall be at the cost of the Contractor.
   e. If the analysis indicated the presence of Heterotrophic Plate Count (HPC) above 500 count per ml, the main shall be flushed and analysis repeated for HPC and total coliform.

END OF SECTION

SECTION 02701

DECOMMISSIONING WELLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: The Contractor shall provide all equipment, labor and materials necessary to decommission the existing 18-inch diameter gravel packed well and 2.5-inch observation well, including but not limited to excavation, cutting of casing, dismantling and disposal of placement of clean sand and gravel within screen and casing, placement of concrete seal, backfill, compaction, assembly of records and preparation of decommission report for filing with DEP, all in accordance with the Contract Documents and Drawings, as reasonably implied.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Codes and regulations:
   1. In addition to complying with the specified requirements, comply with pertinent regulations of governmental agencies having jurisdiction.
   2. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirement will govern.

C. Contractor shall be Massachusetts's registered well driller with a minimum of 5 years experience in the construction and decommissioning of naturally developed and gravel packed drinking water wells.

D. Within 20 days after decommissioning of well is complete, submit a well decommissioning report for submittal to DEP.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Neat cement shall be a mixture of powdered cement and water, with no sand or aggregate.

B. Bentonite shall be a clean montmorillonite clay which will expand 10 to 12 times in size upon hydration.

PART 3 - EXECUTION

3.1 EXPOSING CASING

A. The Contractor shall remove motor, pump, column, shafting, discharge pipe and well seal to expose the existing well.
B. See record drawing of the existing well in the Appendix.
C. Well depth is approximately 70-feet from well seal and screen is 20-feet long 200 slot.
D. Pump discharge is a cellar discharge.

3.2 DECOMMISSIONING WELL

A. The Contractor remove and dispose of motor, pump, discharge head, column pipe, column shafting, pump, bubbler tube and a portion of the discharge pipe.
   1. The Contractor shall remove and dispose of existing well seal and associated piping.
   2. The Contractor shall fill the well screen and casing with clean sand and gravel to an elevation of ten (10) feet below top of well casing.
   3. A slurry of neat cement and 6% bentonite by weight shall be prepared.
   4. The slurry shall be placed in the well by tremi pipe method, starting at the top of the gravel/sand fill, raising pipe as well voids are filled.
   5. The slurry shall be carried to the top of the well casing, spilling over until level across entire casing.
   6. Contractor to install a concrete cap after the bentonite slurry has set-up.

3.3 REPORT

A. The Contractor shall provide a standard DEP Well Completion Report indicating that the well has been de-commissioned or submittal and approval by DEP.

END OF SECTION

SECTION 02704

CUTTING, CORING AND PATCHING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Cutting and coring openings in concrete and block structures, and patching opening.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Materials list of items proposed to be provided under this Section to include; manufacturer's specifications and other data needed to prove compliance with the specified requirements and manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.
   2. Provide a two-week lead-time to Owner prior to planned execution of cutting.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete and grout for rough patching shall be as specified in Division 3.

B. Materials for finish patching shall be equal to those of adjacent construction.

PART 3 - EXECUTION

3.1 GENERAL

A. All cutting and coring shall be performed in such a manner as to limit the extent of patching

B. All holes cut through concrete, brick and masonry walls, slab or arches shall be core drilled unless otherwise approved. No structural members shall be cut without approval of the Engineer and all such cutting shall be done in a manner directed by him/her. No holes may be drilled in beams or other structural members without obtaining prior approval. All work shall be performed by mechanics skilled in this type of work.

C. If holes are cored through floor slabs they shall be drilled from below.

D. Rough patching shall be such as to bring the cut or cored area flush with existing construction unless otherwise shown. Finish patching shall match existing surfaces as approved.

3.2 CORING

A. Coring shall be performed with an approved non-impact rotary tool with diamond core drills. Size of holes shall be suitable for pipe, conduit, sleeves, equipment or mechanical seals to be installed.

B. All equipment shall conform to OSHA standards and specifications pertaining to plugs, noise and fume pollution, wiring and maintenance.

C. Provide protection for existing equipment, utilities and critical areas against water or other damage caused drilling operation.

3.3 CUTTING

A. Cutting shall be performed with a concrete wall saw and diamond saw blades of proper size.

B. Provide for control of slurry generated by swing operation on both sides of wall.

C. When cutting a reinforced concrete wall, the cutting shall be done so as not to damage the bond between the concrete and reinforcing steel left in structure. Cut shall be made so that steel neither protrudes nor is recessed from face of the cut.

D. Adequate bracing of area to be cut shall be installed prior to start of cutting. Check area during sawing operations for partial cracking and provide additional bracing as required to prevent a partial release of cut area during sawing operations.

END OF SECTION

SECTION 02726

FRAMES AND COVERS/GRATES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide frames and cover/grates as required by the Contract Documents.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 02605 Precast Concrete Sanitary Sewer Manholes
3. Section 03400 Precast Concrete

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this Section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 20 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section.
2. Manufacturer's specifications, catalog cuts, and other data to demonstrate compliance with the specified requirements.
3. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 FRAMES AND GRATES

A. Frames and grates shall be Massachusetts Standard, Catalog No. 00125845 as manufactured by East Jordan Iron Works.
   1. Twenty-four (24) inch square grate
   2. Frame shall have four (4) flanges and be eight (8) inches high
   3. Frame and grate weight shall not be less than 500 lbs.

2.2 FRAMES AND COVERS

A. Frames and covers shall be a 1258A1/00125811 as manufactured by East Jordan Iron works.
   1. Clear opening shall be a minimum of 24-inches.
   2. Diamond surface design with three (3) inch lettering reading "SEWER".
   3. Height: 8-inches
   4. H20 wheel loading – heavy duty
   5. ASTM A48 certified
   6. Country of Origin - USA

PART 3 - INSTALLATION

3.1 FRAMES AND COVERS/GRATES

A. Shall be installed under Section 02605 and 03400.

END OF SECTION

SECTION 02730

NEW SANITARY SEWER PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Provide sanitary sewer system as required by the Contract Documents.

B. Related Work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 01340 Submittals and Substitutions
3. Section 01610 Product Handling
4. Section 02221 Trenching, Backfilling and Compacting
5. Section 02605 Precast Concrete Sanitary Sewer Manholes
6. Section 03300 Cast-in-Place Concrete

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workers who are trained and experienced in the necessary crafts and who are familiar with the specified requirements and the methods needed for proper performance of the work.

B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 20 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Materials list of items proposed to be provided under this Section.
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 GRAVITY SEWER PIPE AND FITTINGS

A. Polyethylene (PVC) Pipe (Gravity Sewer) shall be C900 water pipe
   1. Shall meet or exceed the requirements of ANSI/AWWA C900.
   2. Integral bell gasketed joint. Gasket material and joint shall meet or exceed C900 standard joint shall meet ASTM D3212.
   3. Shall be manufactured from Class 12454A or B material furnished in cast iron pipe equivalent outside diameters.

2.2 MANHOLES

A. See Section 02605 of these Specifications.

2.3 CONCRETE

A. Provide 2500 psi concrete in accordance with pertinent provisions of Section 03300 of the Specifications for thrust blocking and if shown on the Drawings pipe encasement.

2.4 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and condition under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FIELD MEASUREMENTS

A. Make necessary measurements in the field to assure precise fit of items in accordance with the approved design.

3.3 INSTALLATION

A. Trench, backfill, and compact for the work of this Section in strict accordance with pertinent provisions of Section 02221 of these Specifications.

B. Pipe laying:
   1. Protect pipe during handling against shocks and free fall. Remove extraneous material from the pipe interior.
   2. Lay pipe by proceeding upgrade with the spigot ends of bell-and-spigot pipe pointing in direction of flow.
   3. Lay each pipe accurately to the indicated line and grade by using laser beam alignment equipment.
   4. Continually clear interior of the pipe free from foreign material.
   5. Before making pipe joints, clean and dry all surfaces of the pipe to be joined.
   6. Use lubricants, primers, and adhesives recommended for the purpose by the pipe manufacturer.
   7. Place, fit, joint and adjust the joints to obtain the degree of water tightness required.
   8. No pipe shall be laid in water.
   9. Install temporary pipe plugs in open end of pipe to preclude entry of extraneous materials.

3.4 MANHOLES AND APPURTENANCES

A. See Section 02605 of these Specifications.

3.5 TESTING AND INSPECTING

A. Do not allow or cause any of the work of this Section to be covered up or enclosed until after it has been inspected and tested, and has been approved by the Engineer.

B. Leakage Test
   1. Test shall be a hydrostatic test as specified in AWWA C600.

3.6 CLEANING

A. Clean the interior of the pipelines:
   1. Flush with clear water to remove any foreign matter with bulkheads placed at strategic locations to prevent wash of foreign matter to other sections of the pipeline.

   2. All gravity lines shall be lamped by the Contractor under observation by the Engineer with a report submitted on same to the Engineer.

END OF SECTION

INDEX

DIVISION 3 - CONCRETE

SECTION 03100

CONCRETE FORMWORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide formwork in accordance with provisions of this Section for cast-in-place concrete as required by the Contract Documents.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 03200 Concrete Reinforcement
3. Section 03300 Cast-In-Place Concrete
4. Section 13205 Reuse Water Storage Tank

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Design, construction and safety of formwork is the Contractor's responsibility.

C. Standards: In addition to complying with pertinent regulations of governmental agencies having jurisdiction, comply with pertinent provisions of ACI 347.

D. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 20 calendar days after the Contractor has received the Owner's Notice to Proceed, submit manufacturers' data and installation instructions for proprietary materials including form coatings, ties, and accessories, and manufactured form systems if used.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Except for metal forms, use new materials. Materials may be reused during progress of the Work, provided they are completely cleaned and reconditioned, recoated for each use, and capable of producing formwork of the required quality.

B. For footing and foundations, use Douglas Fir boards or planks secured to wood or steel stakes, substantially constructed to shapes indicated and to support the required loads.

C. For studs, wales, and supports, use Standard grade or better Douglas Fir, dimensions as required to support the loads but not less than 2" x 4".

D. Forms:
   1. Exposed exterior and interior concrete surfaces:
      a. Use 3/4" minimum thickness Douglas Fir plywood, grade B/B, class I, exterior, sanded both sides, complying with PS-1.
      b. Seal edges and coat both faces with colorless coating which will not affect application of applied finishes.
   2. Unexposed concrete surfaces:
      a. Use 1" x 6" shiplap Douglas Fir boards, surfaced one side and two edges, or 3/4-inch minimum thickness Douglas Fir plywood, grade B/B plyform class I or II, sanded both sides, mill-oiled.

E. Column forms, if required:
   1. For square or rectangular columns, use 2-inch thick Douglas Fir planks or joists, surfaced one side and two edges, or use metal forms.
   2. For round columns, use metal forms or patented paper tube forms approved by the Engineer.
   3. Construct column forms with tight joints and securely clamped together with steel clamps.

2.2 FORM TIES

A. The following types of form ties shall be used in the Work:
   1. Below grade: Snap-tie with water stop
   2. Above grade: Screw-tie with cones
   3. All concrete tanks and chambers shall have ties with water stops.

2.3 DESIGN OF FORMWORK

A. General:
   1. Design, erect, support, brace, and maintain formwork so that it will safely support vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure.

2. Carry vertical and lateral loads to ground by formwork system and in-place construction that has attained adequate strength for that purpose.
3. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position.
4. Design forms and false work to include assumed values of live load, dead load, weight of moving equipment operated on the formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of the structure during construction.
5. Provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof.
6. Provide trussed supports when adequate foundations for shores and struts cannot be secured.
7. Support form materials by structural members spaced sufficiently close to prevent objectionable deflection.
8. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities, and within the allowable tolerances.
9. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints, and provide backup material at joints as required to prevent leakage and prevent fins.
10. Provide camber in formwork as required for anticipated deflections due to weight and pressures of fresh concrete and construction loads.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FORM CONSTRUCTION

A. General:
1. Construct forms complying with the pertinent Sections of ACI 347 to the exact sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, grades, and level and plumb work in the finished structure.
2. Tolerances as stated in the pertinent Section of ACI 117.
3. Provide for openings, offsets, keyways, recesses, sleeves, moldings, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features as required.

B. Fabrication:
1. Fabricate forms for easy removal without hammering or prying against concrete surfaces.

2. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
3. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.
4. Provide top forms for inclined surfaces.

C. Forms for exposed concrete:
1. Drill forms to suit ties being used, and to prevent leakage of cement paste around tie holes. Do not splinter forms by driving ties through improperly prepared holes.
2. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back the joints with extra studs or girts to maintain true, square intersections.
3. Use extra studs, wales, and bracing to prevent bowing of forms between studs, and to avoid bowed appearance in concrete. Do not use narrow strips of form material which will produce bow.

D. Corner treatment:
1. Unless shown otherwise, form chamfers with 3/4" x 3/4" strips, accurately formed and surfaced to produce uniformly straight lines and tight edges.
2. Extend terminal edges to required limit, and miter the chamfer strips at changes in direction.

E. Locate control joints as indicated on the Drawings and, where required but not shown on the Drawings, as approved by the Engineer.

F. Provisions for other trades:
1. Provide openings in concrete formwork to accommodate work of other trades.
2. Verify size and location of openings, recesses, and chases with the trade requiring such items.
3. Accurately place and securely support items to be built into the concrete.

3.3 FORM COATINGS

A. Coat form contact surfaces with form coating compound before reinforcement is placed.
1. Do not allow excess form coating material to accumulate in the forms or to come in contact with surfaces which will bond to fresh concrete.
2. Apply the form coating material in strict accordance with its manufacturer's recommendations.
3. Insure that no form coatings get on the reinforcement.

3.4 REMOVAL OF FORMS

A. General:
1. Forms shall not be removed until the concrete has attained a strength of at least 30 percent of its ultimate strength, prescribed by the design and not before reaching the following number of day-degrees, whichever is longer:

FORMS	DAY-DEGREE*
Walls and Vertical Surfaces	120
Beams and Slabs	500

* Day-degree: The total number of days, times - their average daily air temperature at the surface of the concrete.

Example: 4 days an average daily air temperature of 55°F equal 220 day-degrees. Temperatures below 50°F shall not be included.

B. Finished surfaces:

1. Exercise care in removing forms from finished concrete surfaces so that surfaces are not marred or gouged.
2. Release sleeve nuts or clamps, and pull the form ties neatly.
3. Do not permit steel spreaders, form ties, or other metal to project from, or be visible on, any concrete surface.
4. Solidly pack form tie holes, rod holes, and similar holes in the concrete. For packing, use the cement grout specified in Section 03300 of these Specifications, flushing the holes with water before packing, screeding off flush, and finishing to match adjacent surfaces.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide concrete reinforcement as required by the Contract Documents.
   1. Seismic reinforcing to be furnished under this Specification.

B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   2. Section 03300 Cast-In-place concrete
   3. Section 04220 Concrete Unit Masonry

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Comply with pertinent provisions of the following, except as may be modified herein:
   1. ACI 318 Details of Reinforcement
   2. CRSI "Manual of Standard Practice." (ACI-315)

C. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Materials list of items proposed to be provided under this Section;
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
   3. Shop Drawings showing details of bars, anchors, and other items, if any, provided under this Section.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

B. Delivery and storage:
1. Use necessary precautions to maintain identification after bundles are broken.
2. Store in a manner to prevent excessive rusting and fouling with dirt, grease, and other bond-breaking coatings.
3. Bundles shall be stored off the ground and protected from injurious contaminants.

PART 2 - PRODUCTS

2.1 REINFORCEMENT MATERIALS AND ACCESSORIES

A. Bars:
1. Provide deformed billet steel bars complying with ASTM A615, using grades shown on the Drawings.
2. Where grades are not shown on the Drawings, use grade 60.

B. Steel wire:
1. For tie wire, comply with Fed Spec QQ-W-461, annealed steel, black, 16 gage minimum.

C. Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place:
1. Use wire bar type supports complying with CRSI recommendations, unless otherwise shown on the Drawings.
2. Do not use wood, brick, or other noncomplying material.
3. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
4. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with plastic-protected legs.

2.2 FABRICATION

A. General:
1. Fabricate reinforcing bars to conform to the required shapes and dimensions, with fabrication tolerances complying with the CRSI Manual.
2. In case of fabricating errors, do not straighten or rebend reinforcement in a manner that will weaken or injure the material.
3. Reinforcement with any of the following defects will not be acceptable.
   a. Bar lengths, depths, and/or bends exceeding the specified fabrication tolerances;
   b. Bends or kinks not shown on the Drawings;
   c. Bars with reduced cross-section due to excessive rusting or other causes.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. General:
   1. Comply with the specified standards for detail and method of placing reinforcement and supports, except as may be modified herein.
   2. Clean reinforcement to remove loose rust and mill scale, earth, and other materials which reduce or destroy bond with concrete.
   3. Position, support, and secure reinforcement against displacement by formwork, construction, and concrete placing operations.
   4. Locate and support reinforcement by metal chairs, runners, bolsters, spacers, and hangers, as required.
   5. Place reinforcement to obtain minimum coverages for concrete protection.
   6. Arrange, space, and securely tie bars and bar supports together with the specified wire.
   7. Set tie wires so twisted ends are directed away from exposed concrete surfaces.
   8. Place additional reinforcement around all openings.

B. Provide sufficient numbers of supports, and of strength to carry the reinforcement.

C. Do not place reinforcing bars more than 2" beyond last leg of any continuous bar support.

D. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

E. Except as otherwise indicated on the Drawings, the minimum concrete cover of reinforcement shall be as follows:
   1. Concrete cast against and permanently exposed to earth; 3-in.
   2. Concrete surfaces in contact with soil, water, sewage, sludge or exposed to the weather; 2-in.
   3. Concrete surfaces not in contact with soil, water, sewage, sludge or exposed to the weather.
      a. Beams, girders, columns: principal reinforcement, ties, stirrups or spirals; 1-1/2-inch
      b. Walls and bottom steel of slabs; 3\4-inch
      c. Shells and top steel of slabs; 3\4-inch

3.3 SPLICES

A. Lap splices:
   1. Tie securely with the specified wire to prevent displacement of splices during placement of concrete.
   2. Except as otherwise indicated on the Drawings, compression embedment and lap splices shall be 36 diameters, but not less than 12-inches.

B. Splice devices:
   1. Obtain the Engineer's approval prior to using splice devices.
   2. Install in accordance with manufacturer's written instructions.
   3. Splice in a manner developing at least 125% of the yielding strength of the bar.

C. Welding: No reinforcing bars shall be welded either during fabrication or erection.

D. Do not splice bars except at locations shown on the Approved Shop Drawings, except as otherwise specifically approved by the Engineer.

3.4 IN PLACE INSERTION

A. Notify the Engineer at least 24 hours in advance of any concrete placement so that he may inspect the arrangement of reinforcing steel. Place no concrete until the inspection has been made or waived by the Engineer.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide cast-in-place concrete for floor, walls and ceiling repairs, motor control center pad, floor opening sealing and other miscellaneous concrete work as required by the Contract Documents.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 02704 Cutting, Coring and Patching
3. Section 03345 Concrete Finishing

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Comply with the appurtenant sections of the following:
1. ACI 301 Specifications for Structural Concrete for Buildings.
2. ACI 318 - Building Code Requirements for Reinforced Concrete.

C. Quality control:
1. Do not commence placement of concrete until mix designs have been reviewed and approved by the Engineer.
2. Also see other requirements for testing stated in Part 3 of this Section.

D. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;

2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 CEMENT

A. Provide a standard brand of Portland cement complying with ASTM C150, type II, low alkali. Do not change the brand of cement during progress of the Work except as approved in writing by the Engineer.

2.2 AGGREGATES

A. General:
1. Provide hard rock aggregate complying with ASTM C33, with additional attributes as specified herein.

B. Fine aggregate:
1. Fine aggregate shall consist of washed inert natural sand conforming to the requirements of ASTM Specification C-33, and the following detailed requirements:

Sieve	Retained
----	--------
No. 4	0-5%
16	25-40
50	70-87
100	93-97
----	--------

C. Coarse aggregates:
1. Provide coarse aggregate consisting of clean, hard, fine grained, sound crushed rock or washed gravel, conforming to the requirements of ASTM Specification C-33.
2. Use coarse aggregate of the largest practicable size for each condition of placement, subject to the following maximum size limitations:
a. 2-inch for plain concrete
1-inch for reinforced sections 10-inches and over in thickness
3\4-inch for reinforced sections less than10-inch thickness
3. Grade combined aggregates within the following limits:

Sieve size or size in inches:	Percentage by weight passing sieve: 1-1/2" aggregate: Min:	Max:	1" aggregate: Min:	Max:	3/4" aggregate: Min:	Max:
1-1/2"	95	---	---	---	---	---
1"	75	90	90	100	---	---
3/4"	55	77	70	90	90	100
3/8"	40	55	45	65	60	80
No. 4	30	40	31	47	40	60
No. 8	22	35	23	40	30	45
No. 16	16	30	17	35	20	35
No. 30	10	20	10	23	13	23
No. 50	2	8	2	10	5	15
No. 100	0	3	0	3	0	5

D. Lightweight aggregate, coarse and fine: Provide rounded, sealed, expanded shale or clay conforming to ASTM C330.

2.3 WATER

A. Use only water which is clean and free from deleterious amounts of acid, alkali, salt, and organic matter.

2.4 ADMIXTURES

A. Use only a standard brand of admixture for concrete, approved by the Engineer, meeting or exceeding ASTM Specification C494.
   1. A separate approved air-entraining agent may be used in addition to the water-reducing admixture, provided the combination of the two admixtures does not entrain air in excess of 5%.
   2. Admixtures causing accelerated setting of cement in concrete shall not be used.
   3. If an air-entraining agent is used, run air content determinations periodically during the placement to make certain the volume of air entrained is not less than 5%.

B. Coloring Admixture
   1. Shall not affect the physical properties of the mixture.
   2. Pigment addition shall not exceed ten (10) percent by weight of the cement.
   3. Color fastness to sunlight.
   4. Color stability.
   5. Pigments shall comply with ASTM C979.
   6. Color shall assimilate slate red.

2.5 CONCRETE MIXES

A. Provide a mix design based on strengths of the approved materials, and meeting the requirements stated on the Drawings and in this Specification Section.
   1. Secure the Engineer's approval of each mix design, including new mix designs required to be prepared should there occur a change in materials being used.

2.6 EPOXY RESIN-BONDING AGENTS

A. Shall be Sika Armatec 110 EpoCem as manufactured by the Sika Corporation.

B. Epoxy resin/Portland cement adhesive shall be as follows:
   1. Component "A" shall be an epoxy resin/water emulsion containing suitable viscosity control agents. Shall not contain butyl glycidyl ether.
   2. Component "B" shall be primarily a water solution of polyamine.
   3. Component "C" shall be a blend of selected Portland cements and sand.
   4. The material shall not contain asbestos.

C. Material must be proven to prevent corrosion of reinforcing steel where tested under the procedures as set forth by the Federal Highway Administration Program Report No. FHWA/RD 86/193.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 CONCRETE MIXING

A. Concrete consistency:
   1. Use the amount of water established by the approved mix design.
      a. Do not exceed the maximum quantity specified for the grade of concrete.
      b. Use the minimum amount of water necessary to produce concrete of the workability required.
      c. Do not supplement the predetermined amount of water with additional water for any reason.
   2. Measure concrete consistency by ASTM C143 method.
      a. As part of the routine testing and inspecting, test twice each day or partial day's run of the mixer.
      b. Maintain a complete and accurate record of tests.
   3. Provide maximum slumps of concrete as:

		Slump (inches)	
	Portion of Structure	Recommended	Range
a.	Pavement and slabs on ground	2	1-3
b.	Plain footings, gravity walls, slabs and beams	2-3	1-4
c.	Heavy reinforced foundation walls and footings	3-4	2-5
d.	Thin reinforced wall and columns	4	3-5

B. Modified concrete mix:
   1. Where modified concrete mix is directed, provide the same composition as regular concrete mix; except omit 50% of the coarse aggregate.
   2. Do not exceed the water/cement ratio specified for the grade of concrete.

C. Cement grout and dry-pack grout:
   1. Mix at the site, in composition of one volume of Portland cement to 2-1/2 volumes of fine aggregate.
   2. Mix the materials dry; then add sufficient water to make the mixture flow under its own weight.
   3. When grout is used as a dry-pack concrete, add sufficient water to make a stiff mixture which can be molded into a sphere.

D. Floor, ceiling and wall repair
   1. Concrete surfaces shall be abrasive blasted to remove all surface contaminants and laitance.
   2. Temperature throughout the application process, substrate temperature should be 50°F – 90°F. Substrate temperature must be at least 5°F above the dew point. Applications on concrete substrate should occur while temperature is falling to lessen off gassing. The material should not be applied in direct sunlight, if possible.
   3. Standard mix shall be per manufacturer's instructions.

E. Epoxy resin-bonding agents
   1. Mixing the epoxy resin: Shake components "A" and component "B". Completely empty both components into a clean, dry mixing pail. Mix thoroughly for 30 seconds at 400 – 600 rpm. Slowly add the entire contents of component "C" while continuing to mix for 3 minutes until uniform with no lumps.
   2. Remove all corrosion from rebar.
      a. Apply to prepared surface with a stiff-bristle brush or "hopper type" spray equipment.
      b. For hand-applied mortars, place fresh, plastic concrete/mortar while the bonding bridge adhesive is wet.
      c. For machine applied mortars, apply while the bonding bridge adhesive is wet.
   3. Apply at a thickness of 20 mils.
      a. Allow coating to dry 2 – 3 hours and apply another coat of 20 mils.
      b. Total thickness of coating to be 40 mils.

F. Miscellaneous provisions:
1. Provide strengths of concrete as shown on the Drawings.
2. Provide concrete dense and free from honeycomb and other defects.
3. Place and finish members to conform to the shapes and dimensions indicated.
4. Tolerances for cast-in-place concrete per ACI 117
   a. Linear outline
      i. in any 20 ft. of length $\pm$ 1/2"
      ii. in any 40 ft. of length $\pm$ 3/4"
   b. Plumb
      i. in 10 ft. of height $\pm$ 1/2"
   c. Level
      i. in 10 ft. of length $\pm$ 3/16"

3.3 CONVEYING AND PLACING CONCRETE

A. Before placing concrete, thoroughly clean forms, wash out with water, and make tight.

B. Time of placing:
1. Do not place concrete until reinforcement, conduits, outlet boxes, anchors, sleeves, hangers, bolts, and other embedded materials are securely and properly fastened in the correct positions.
2. Secure the Engineer's approval of reinforcement before commencing placement of concrete.

C. Preparation:
1. Before new concrete is deposited upon or against concrete that has taken its initial set or has hardened, remove all incrustations from forms and reinforcement.
2. Remove all laitenance, oil, and loose particles from concrete and concrete surfaces, and thoroughly clean the forms with water under high pressure.
3. Remove laitenance after concrete has hardened partially (not less than two hours nor more than four hours after placing) by brushing with stiff bristles, or by directing a stream of water from a 1/4-inch nozzle, or by other method approved by the Engineer, to expose the clean top surface of the coarse aggregate.
4. Where cleaning is not satisfactory, sandblast the surface and then wash again.

D. Modified concrete mix:
1. Before proceeding with placing the regular specified mix of concrete, cover existing horizontal surface with modified concrete mix.
   a. Use the mix design specified in Paragraph 3.2-D of this Section.
   b. In walls, provide not less than 3" thickness of modified mix.
   c. Place the modified mix immediately ahead of regular concrete.
   d. Do not permit modified concrete mix to dry out prior to placing the regular mix.
2. Use modified concrete mix where conditions make compaction difficult, and where reinforcement is congested.

3. After placing modified concrete mix, carry on the placing of regular mix at such a rate that concrete is plastic at all times and flows readily into the forms and the spaces between reinforcement.

E. Method of placing:
1. Place concrete only under the degree of inspection described elsewhere in these Specifications, and as required by governmental agencies having jurisdiction.
2. Do not place concrete outside of regular working hours unless required inspection authorities have been notified properly and are present.
3. Chutes for conveying concrete shall be of U-Shaped design. Flat (coal) chutes shall not be used.
4. Do not permit concrete to free drop more than 5'-0".
5. Deposit concrete direct into conveyances, and direct from conveyances to final points of repose, except where troughs, buckets, or the like are used, in which case dump concrete into hoppers and then into the conveyances.
6. Where tremies are used, or where the free drop is 5'-0" or more, and through reinforcement, use a dumping box or board, moving the concrete there from by shovels or hoes.
7. Deposit concrete so that the surface is kept level throughout, a minimum being permitted to flow from one position to another, and place as rapidly as practicable after mixing.
8. Do not use in this Work any concrete not placed within 30 minutes after leaving the mixer.

F. Consolidation and Conveying of Cement
1. Thoroughly work concrete around reinforcement and embedded fixtures, and into corners of forms, during placing operations.
2. Consolidate concrete by mechanical vibration in compliance with the pertinent section of ACI 309.
3. Exercise care to consolidate concrete vigorously and thoroughly to obtain maximum density.
4. Use mechanical vibrators.
   a. Exercise care to direct the quick handling of vibrators from one position to another.
   b. Do not over-vibrate concrete.
   c. Do not move concrete by use of vibrator.

G. Stoppages:
1. Maintain flow surface of freshly placed concrete as level whenever a pour is stopped, providing tight dams to accomplish this.
2. Make construction joints only where unavoidable, and then only at points acceptable to the Engineer.
3. Make horizontal construction joints only where shown on the Drawings or specifically approved by the Engineer.
4. Provide keys and dowels at construction joints where indicated on the Drawings, and where placement is interrupted.

3.4 DEFECTIVE CONCRETE

A. The following concrete will be deemed to be defective, and shall be removed promptly from the job site.
   1. Concrete which is not formed as indicated, is not true to intended alignment, is not plumb or level where so intended, is not true to intended grades and levels;
   2. Has voids or honeycomb that have been cut, resurfaced, or filled, except with the approval of the Engineer;
   3. Has sawdust, shavings, wood, or embedded debris;
   4. Does not conform fully to provisions of the Contract Documents.

B. Repairs and replacements:
   1. Defective concrete may be cut out and repaired with shotcrete, or other approved methods, when and as directed by the Engineer.
   2. Where defective concrete is found after removal of the forms, cut out the defective concrete, if necessary, and make the surfaces match adjacent surfaces.
   3. Work uneven surfaces and angles of concrete to a surface matching adjacent concrete surfaces.

END OF SECTION

SECTION 03305

CONCRETE ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Furnish and install Concrete Accessories, (water stop, joint material, joint fillers, vapor barriers) as required by the Contract Documents.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 03100 Concrete Formwork
3. Section 03200 Concrete Reinforcement
4. Section 03300 Cast-In-Place Concrete

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 20 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 WATERSTOP

A. Waterstop:
1. All waterstop shall be manufactured from virgin polyvinyl chloride plastic compound and shall contain no reprocessed materials.
2. Ribbed type water stops shall be six inches (6") by 3/16-inch with a center bulb. The waterstop shall be No. 779 by Greenstreak or equal.
3. Labyrinth type waterstop shall be 3/4-inches wide by 1 5/8-inches high. The water stop shall be No. 789 by Greenstreak or an approved equal.

B. Preformed Joint Filler:
1. Cork joint filler shall conform to ASTM 1752, Type II as manufactured by W.R. Meadows Inc.

C. Vapor Barrier membrane:
1. Provide polyethylene sheet of the thickness shown on the Drawings, complying with ASTM D2103.
2. If vapor barrier is shown on the Drawings, but thickness is not indicated, provide 6 mil thickness.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Waterstop:
1. Waterstops shall be installed in strict accordance with the manufacturer's instructions.
2. All splices and connections shall be made with a thermostatically controlled electric splicer.
3. The finished splice and connections shall have a tensile strength of not less than 80 percent of the unspliced section.
4. Ensure that the waterstop is securely held in place and restrained from moving during concrete placement.

B. Preformed Joint Filler
1. Attach to surfaces with a bonding agent compatible with the joint sealant and joint filler. All butt splices shall be taped to prevent the intrusion of the second placement of concrete into the joint.

C. Vapor Barrier
1. Place on prepared base, as shown on the Drawings. All seams to be lapped a minimum of six inches (6"). All tears and punctures to be repaired.

END OF SECTION

SECTION 03345

CONCRETE FINISHING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide finishes on cast-in-place concrete as required by the Contract Documents.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 03300 Cast-In-Place Concrete

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Except as may be modified herein or otherwise directed by the Engineer, comply with ACI 301, "Specifications for Structural Concrete for Buildings."

C. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 20 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:
1. Carefully review the Contract Documents, and determine the location, extent, and type of required concrete finishes.
2. As required for the Work, provide the following materials, or equals approved in advance by the Engineer.

B. Concrete materials: Comply with pertinent provisions of Section 03300 and 03305, except as may be modified herein.

C. Liquid bonding agent: "Everbond," manufactured by L&M Construction Chemicals Inc.

D. Curing and protection paper:
1. Products: To comply with ASTM C171.
a. "Sisalkraft, Orange Label"
b. Equal products complying with ASTM C171.

2. Where concrete will be exposed and will be subjected to abrasion, such as floor slabs, use non-staining paper such as "Sisalkraft, Seekure 896," or equal paper faced with polyethylene film.

E. Liquid curing agents:
1. Where application of specified finish materials will be inhibited by use of curing agents, cure the surface by water only; do not use chemical cure.
2. For curing other areas, use "L & M Cure R" manufactured by L&M Construction Chemicals Inc.

F. Floor Hardener:
1. Ashford formula by Concrete Distribution, Inc., Springville Utah.
a. Floor hardener shall be water based, chemically reactive penetrating sealer and hardener that densifies concrete to seal against water molecules.

2.2 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FINISHING OF FORMED SURFACES

A. General:
   1. After removal of forms, give the concrete surface one or more of the finishes specified below.

B. As-cast finish:
   1. Rough form finish:
      a. Leave the surfaces with the texture imparted by forms, except patch tie holes and defects.
      b. Remove fins exceeding 1/4-inch in height.
   2. Smooth form finish:
      a. Coordinate as necessary to secure form construction using smooth, hard, uniform surfaces, with number of seams kept to a practical minimum and in a uniform and orderly pattern.
      b. Patch tie holes and defects.
      c. Remove fins completely.

C. Rubbed finishes:
   1. Provide these finishes only where specifically called for, and then only on a "smooth form finish" base as described above.
   2. Grout cleaned finish:
      a. Do not start cleaning operations until all contiguous surfaces to be cleaned are completed and accessible.
      b. Do not permit cleaning as the work progresses.
      c. Mix one part Portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having the consistency of thick paint.
      d. Substitute white Portland cement for part of the gray Portland cement as required to produce a color matching the color of surrounding concrete, as determined by a trial patch.
      e. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout, and apply the grout uniformly with brushes.
      f. Immediately after applying the grout, scrub the surface vigorously with a carborundum stone to coat the surface and fill all air bubbles and holes.
      g. While the grout is still plastic, remove all excess grout by working the surface with a rubber float, sack, or other means.
      h. After the surface whites from drying (about 30 minutes at normal temperatures), rub vigorously with clean burlap.
      i. Keep the surface damp for at least 36 hours after final rubbing.

D. Unspecified finish: If the finish of formed surfaces is not specifically called out elsewhere in the Contract Documents, provide the following finishes as applicable.
   1. Rough form finish:
      a. For all concrete surfaces not exposed to public view.
   2. Smooth form finish:
      a. For all concrete surfaces exposed to public view.

3.3 FINISHING SLABS

A. Finishing tolerance:
   1. "Class B:" True plane within 1/4-inch in ten feet as determined by a ten foot straightedge placed anywhere on the slab in any direction.

B. Floated finish:
   1. After the concrete has been placed, consolidated, struck off, and leveled, do not work the concrete further until ready for floating.
   2. Begin floating when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation.
   3. During or after the first floating, check the planeness of the surface with a ten foot straightedge applied at not less than two different angles.
   4. Cut down high spots and fill low spots, and produce a surface with a Class B tolerance throughout.
   5. Re-float the slab immediately to a uniform sandy texture.

C. Troweled finish:
   1. Provide a floated finish as described above, followed by a power troweling.
      a. Produce initial surface relatively free from defects, but which still may show some trowel marks.
      b. Provide hand troweling where necessary when a ringing sound is produced as the trowel is moved over the surface.
      c. Thoroughly consolidate surface by power troweling.

   2. Provide a finished surface free from trowel marks, uniform in texture and appearance, and in a plane of Class B tolerance.
      a. Concrete to receive vinyl tile - once over steel troweled finish.
      b. On surfaces intended to support floor coverings, use grinding or other means as necessary and remove all defects of such magnitude as would show through the floor covering.

D. Unspecified finish: If the finish of slab surfaces is not specifically called for elsewhere in the Contract Documents, provide the following finishes as applicable:
   1. Scratched finish:
      a. For surfaces scheduled to receive bond-applied cementitious applications.
   2. Floated finish:
      a. For surfaces intended to receive roofing.
   3. Troweled finish:
      a. For floors intended as walking surfaces;
      b. Floors scheduled to receive floor coverings;
      c. Parking areas.
   4. Non-slip finish:
      a. Exterior platforms, steps, and landings;

3.4 FLOOR HARDENING

A. Apply floor hardener as recommended by manufacturer prior to floor curing period being completed.

B. Collect and dispose of floor hardener run-off onto ground during application process, as building is located in a well field.

3.5 CURING AND PROTECTION

A. Beginning immediately after placement, protect concrete from premature drying, excessively hot and cold temperatures, and mechanical injury.

B. Preservation of moisture:

1. Unless otherwise directed by the Engineer, apply one of the following procedures to concrete not in contact with forms, immediately after completion of placement and finishing:
   a. Application of absorptive mats or fabric kept continuously wet;
   b. Application of waterproof sheet materials specified in Part 2 of this Section;
   c. Application of other moisture-retaining covering as approved by the Engineer;
   d. Application of the curing agent specified in Part 2 of this Section or elsewhere in the Contract Documents.
2. Where forms are exposed to the sun, minimize moisture loss by keeping the forms wet until they can be removed safely.
3. Cure concrete by preserving moisture as specified above for at least seven days.

C. Temperature, wind, and humidity:

1. Cold weather:
   a. When mixing, transporting, placing, finishing and curing concrete in cold weather, conform to ACI Standard 306, Cold Weather Concreting.
   b. Definition. For the purpose of this Specification, "cold-weather" is defined as any combination of low air temperature and high wind velocity which may result in damage to freshly placed concrete from freezing and thawing at an early age. Concrete mixed or placed when the air temperature is below, or expected to fall below 40 degrees F for more than one consecutive day will be considered cold weather concrete, and will require special treatment.
   c. When necessary, provide proper and adequate heating system capable of maintaining the required heat without injury due to concentration of heat.
   d. Do not use combustion heaters during the first 24 hours unless precautions are taken to prevent exposure of the concrete to exhaust gases which contain carbon dioxide.

2. Hot weather:
   a. When mixing, transporting, placing, finishing, and curing concrete in hot weather, comply with ACI 305, Hot Weather Concreting.

b. Definition. For the purpose of this specification, "hot weather" is defined as any combination of high air temperature, low relative humidity, and high wind velocity tending to impair the quality of fresh or hardened concrete or otherwise resulting in abnormal properties.

c. When necessary, provide windbreaks, fog spraying, shading, sprinkling, ponding, or wet covering with a light colored material, applying as quickly as concrete hardening and finishing operations will allow.

3. Rate of temperature change: Keep the temperature of the air immediately adjacent to the concrete during and immediately following the curing period as uniform as possible and not exceeding a change of 5 degrees F in any one hour period, or 50 degrees F in any 24 hour period.

D. Protection from mechanical injury:

1. During the curing period, protect the concrete from damaging mechanical disturbances such as heavy shock, load stresses, and excessive vibration.
2. Protect finished concrete surfaces from damage from construction equipment, materials, and methods by application of curing procedures.
3. Do not load self-supporting structures in such a way as to overstress the concrete.

END OF SECTION

SECTION 03400

PRECAST CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide precast concrete vaults as required by the Contract Documents.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division l of these Specifications.
2. Section 02726 Frames and Covers/Grates
3. Section 03300 Cast-In-Place Concrete
4. Section 08306 Aluminum Hatches
5. Section 15100 Valves and Appurtenances
6. Division 16 Electrical

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Fabricated by a firm regularly engaged in the manufacture of precast units for similar and comparable work.

C. Design in accordance with pertinent recommendations contained in:

1. ACI 304
2. ACI 309
3. ACI 311
4. ACI 318
5. ACI 347
6. CRSI "manual of Standard Practice"
7. PCI 116
8. ASTM A615, Grade 60

D. Comply with requirements of governmental agencies having jurisdiction.

E. In the event of conflict between or among standards, the more stringent provision shall govern.

F. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Shop drawings showing details of construction reinforcing, joints, piping sleeves, vent and hatch locations.

C. Drawings shall be stamped by a professional engineer registered in the state of Massachusetts accompanied by design calculations.

1.4 COORDINATION

A. The provider of the precast concrete items shall coordinate his work with suppliers of imbed items and items to be installed inside the chambers to insure that all required dimensions, locations and clearances are met.

1.5 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

B. Delivery, storage, and handling:
   1. Deliver the work of this Section to the job site at such times as to assure the continuity of construction.
   2. Store units at the job site in a manner to prevent physical damage.
   3. Lift and support the units only at designated lifting points or supporting points as shown on the approved Shop Drawings.

1.6 FABRICATION

A. General:
   1. Fabricate the work of this Section to the sizes and shapes indicated.
   2. Provided finished units which are straight, true to size and shape, and within the specified casting tolerances.
   3. Make exposed edges sharp, straight, and square.
   4. Warped, cracked, broken, spalled, stained, and otherwise defective units will not be acceptable.
   5. Place and secure in the forms all anchors, clips, stud bolts, inserts, lifting devices, shear ties, and other devices required for handling and installing the precast units and for attachment of subsequent items as indicated or specified.

B. Curing:
   1. Cure the work of this Section in compliance with the pertinent section of ACI 308.

C. Casting tolerances:
   1. Place pipe sleeves within plus or minus 1/4-inch in each direction.
   2. Hatches to be square with the structure.
      a. Hatches shall be provided under Section 08306 and installed under this Section.

D. Design loading:
   1. Structures shall be designed to support their own weight plus the following superimposed loads.
      a. Top slabs shall be able to sustain a H-20 loading in accordance with AASHO specifications.
      b. Chamber sidewalls shall be designed for 82 lbs. per vertical foot of fluid pressure caused by saturated earth pressure. Assume pressure diagram to originate at finished grade. Figure an additional uniform of 110 lbs. per square foot.

   2. The bottom section of the chambers shall have a monolithically placed wall. The manufacturer shall limit the modules to the least amount possible to reduce the number of joints.

E. Concrete
   1. All precast concrete shall have a minimum compressive strength of 5000 psi at 28 days in accordance with ASTM C39.

PART 2 - PRODUCTS

2.1 PRECAST STRUCTURES

A. Valve Vault Pit
   1. Interior dimensions shall be as shown on the Drawings.

B. Sludge Drain
   1. Outside dimensions:
      a. Diameter 48-inches
      b. Height 60-inches
   2. Twenty-four (24) inch square opening in the top

2.2 JOINT SEALANT

A. Sealant shall consist of partially vulcanized butyl rubber, compressed between the joint sections.

B. Shall meet Fed. Spec. SS-S-00210.

2.3 PIPE SLEEVES

A. Wall sleeves shall be sized for modular mechanical type seals equal to Link-Seal as manufactured by Thunderline Corporation.

B. Wall sleeves shall be fabricated from Schedule 40, galvanized steel pipe with a water stop welded around their periphery.

2.4 VALVE VAULT STEPS

A. Provide standard fiberglass ladder in accordance to OSHA Standards. Provide brackets and associated hardware to anchor lander to concrete wall.

2.5 VALVE CEILING INSULATION PANELS

A. Provide two inch (2") thick foam board insulation panels.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 COORDINATION

A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

3.3 INSTALLATION

A. Install the work of this Section in strict accordance with the original design, the approved Shop Drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturers recommended installation procedures.

3.4 CLEANING

A. The Valve Vault and Leaching Pit shall be thoroughly cleaned of all silt, debris and foreign matter of any kind, prior to final inspection.

END OF SECTION

SECTION 03402

ARCHITECTURAL PRECAST CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Furnish architectural precast concrete sills as required by the Contract Drawings.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division l of these Specifications.
2. Section 04220 Concrete Unit Masonry

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. One (1) 12-inch (12") long sample of the precast concrete sill unit using the production mix and required reinforcing showing color, finish and workmanship.
2. Engineer's review of samples will be for color, texture, and general condition only. Compliance with all other requirements is the exclusive responsibility of the Contractor.
3. Shop drawings showing dimensions, reinforcing anchorages and any other necessary details of the precast concrete sills. Shop drawings shall show unit markings to indicate locations on the structure. Fabrication of the precast sills shall not be started until shop drawings have been approved by the Engineer.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

B. Delivery, storage, and handling:
1. Deliver the work of this Section to the job site at such times as to assure the continuity of construction.
2. Store units at the job site in a manner to prevent cracking, distortion, warping, staining, and other physical damage, and in a manner to keep markings visible.
3. Lift and support the units only at designated lifting points or supporting points.
4. The Contractor shall assume responsibility for all damage to precast concrete work until the building is finally accepted by the Owner. Damaged, cracked, chipped or soiled units shall be replaced at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:
1. The precast concrete sills shall be natural cement in color. The cement shall be blended to assimilate the color of the concrete block building.

B. Concrete Materials
1. Cement shall be a domestic Portland cement meeting ASTM C150, Type I; free alkalies not to exceed 0.6 percent. Submit notarized mill certificates showing exact composition and cube strengths of cement used.
2. Aggregates shall meet the applicable requirements specified in Section 03300.
3. Air entraining agent shall comply with ASTM C260. Entrained air shall be not less than 4.0 and not more than 6.0 percent by weight.
4. Reinforcing shall be as specified in Section 03200 except that finished units shall assure coverage of not less than one inch (1") over any reinforcing steel and the reinforcing shall be hot-dip galvanized.

2.2 FABRICATION

A. General:
1. Fabricate the work of this Section to the sizes and shapes indicated, and of texture matching the approved samples.
2. Provide finished units which are straight, true to size and shape, and within the specified casting tolerances.
3. Make exposed edges sharp, straight, and square. Make flat surfaces into a true plane.
4. Warped, cracked, broken, spalled, stained and otherwise defective units will not be acceptable.
5. Place and secure in the forms all anchors, clips, stud bolts, inserts, lifting devices, shear ties, and other devices required for handling and installing the precast units and for attachment of subsequent items as indicated or specified.

B. Curing:
1. Form cure the work of this Section for a minimum of 20 hours.

2. Keep wet continuously for not less than six days after being removed from the forms.
3. Following the curing period, allow the units to air dry for at least four days before being erected.

C. Finish:
1. Exposed surfaces shall be hard, close grained, uniform in color and completely smooth in texture. Finish shall be subject to the approval of the Engineer.

D. Design Strength: Unless otherwise indicated on the Drawings or approved by the Engineer, design the mix and proportion the concrete to attain a minimum compressive strength of 3000 psi when cured and tested at 28 days in accordance with ASTM C39.

E. Standards:
1. The manufacturer shall comply with the following:
a. Pre-stressed concrete Institute Design Manual
b. Manual for Quality Control for Plants and for Production of Architectural Precast Concrete Products

F. Inspection and Testing: The Contractor shall submit a certificate signed by the manufacturer of the units that the sills have been manufactured in accordance with these Specifications.

PART 3 - EXECUTION

3.1 INSTALLATION AND CLEANING

A. Installation and cleaning of the precast concrete sill units is included in Section 04220.

END OF SECTION

SECTION 03410

PRECAST CONCRETE HEADWALL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide precast concrete wing wall as required by the Contract Documents.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division l of these Specifications and the following:
a. Section 02221 Trenching, Backfilling and Compacting
b. Section 02490 Loam and Seed

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Fabricated by a firm regularly engaged in the manufacture of precast units for similar and comparable work.

C. Design in accordance with pertinent recommendations contained in:
1. ACI 304
2. ACI 309
3. ACI 311
4. ACI 318
5. ACI 347
6. CRSI "Manual of Standard Practice"
7. PCI 116
8. ASTM A615, Grade 60

D. Comply with requirements of governmental agencies having jurisdiction.

E. In the event of conflict between or among standards, the more stringent provision shall govern.

F. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Shop drawings showing details of construction reinforcing, joints, and indicating opening size to meet manufacturer's recommended opening profile to accommodate ductile iron pipe submitted in Section 02610.

1.4 COORDINATION

A. The provider of the precast concrete items shall coordinate his work with suppliers of imbed items and items to be installed through the structure to ensure that all required dimensions, locations and clearances are met.

1.5 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

B. Delivery, storage, and handling:
   1. Deliver the work of this Section to the job site at such times as to assure the continuity of construction.
   2. Store units at the job site in a manner to prevent physical damage.
   3. Lift and support the units only at designated lifting points or supporting points as shown on the approved Shop Drawings.

1.6 FABRICATION

A. General:
   1. Fabricate the work of this Section to the sizes and shapes indicated on the Drawings.
   2. Provided finished units which are straight, true to size and shape, and within the specified casting tolerances.
   3. Make exposed edges beveled, straight, and square.
   4. Warped, cracked, broken, spalled, stained, and otherwise defective units will not be acceptable.
   5. Place and secure in the forms all anchors, clips, stud bolts, inserts, lifting devices, shear ties, and other devices required for handling and installing the precast units and for attachment of subsequent items as indicated or specified.

B. Curing:
   1. Cure the work of this Section in compliance with the pertinent section of ACI 308.

C. Casting tolerances:
   1. Cast pipe opening to accommodate manufacturer's recommended opening profile for pipe and waterstop type structure connection.

D. Design loading:
   1. Structures shall be designed to support their own weight plus the following superimposed loads.
      a. Top slabs shall be able to sustain a H-20 loading in accordance with AASTHO specifications.
      b. Vertical walls shall be designed for 82 lbs. per vertical foot of fluid pressure caused by saturated earth pressure. Assume pressure diagram to originate at finished grade. Figure an additional uniform of 110 lbs. per square foot.

   2. The headwall shall be installed at subgrade as indicated on the Contract Drawings.

E. Concrete
   1. All precast concrete shall have a minimum compressive strength of 4000 psi at 28 days in accordance with ASTM C39.

PART 2 - PRODUCTS

2.1 PRECAST WING WALLS

A. Concrete Wing Wall
   1. Shall be sized as shown on the Drawings.
   2. Pipe opening shall be sized to receive a waterstop type seal.
   3. Exposed concrete shall have a steel trowel finish.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 COORDINATION

A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

3.3 INSTALLATION

A. Install the work of this Section in strict accordance with the original design, the approved Shop Drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturers recommended installation procedures.

END OF SECTION

SECTION 03415

PRECAST PRESTRESSED CONCRETE PLANKS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide precast prestressed concrete planks for the roof of the building as required by the Contract Documents.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 03200 Concrete Reinforcement
3. Section 03300 Cast-In-Place Concrete
4. Section 04330 Cavity Wall Masonry System
5. Section 05500 Metal Fabrications
6. Section 07530 Single Ply Membrane Roofing
7. Section 07920 Sealants, Caulking, Waterproofing and Water Repellent Coating
8. Section 15500 Heating, Ventilating and Air Conditioning

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Fabricated by a firm regularly engaged in the manufacture of precast units for similar and comparable work.

C. Design in accordance with pertinent recommendations contained in:

1. ACI 304 Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
2. ACI 309 Standard Practice for Consolidation of Concrete
3. CRSI Manual of Standard Practice
4. MSBC Massachusetts State Building Code
5. PCI JR-195 Precast Prestressed Concrete Industry Code of Standard Practice for Precast Concrete
6. PCI MNL-116 Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete
7. PCI MNL-120 PCI Design Handbook - Precast & Prestressed Concrete
8. PCI MNL-123 Manual on Design of Connections for Precast Prestressed Concrete

9.	PCI MNL-124 PCI	Design for Fire Resistance of Precast and Prestressed Concrete
10.	PCI MNL-125	Plant Cast Precast and Prestressed Concrete - A Design Guide
11.	PCI MNL-127	Recommended Practices for Erection of Precast Concrete
12.	PCI TR-2	Connections for Precast Prestressed Concrete Buildings
13.	PCI	Manual for the Design of Hollow Core Slabs
14.	UL	Underwriter's Laboratories
15.	All applicable local and state codes and regulations.	

D. Where one or more of the references cited conflict, the more stringent shall govern.

E. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 DESIGN REQUIREMENTS

A. Design the precast concrete units to support self-weight, erection forces, and the minimum superimposed dead loads and live loads as indicated on the Drawings and as required by the latest edition of the Commonwealth of Massachusetts State Building Code.

B. Design members for maximum live load deflection of 1/360 of span.

1.4 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.
   1. Product data: Submit fabricator's specifications and instructions for manufactured materials and products. Include fabricator's certifications and laboratory tests reports as required.

   2. Shop Drawings:
      a. Submit shop drawings showing complete information for fabrication and installation of precast concrete units. Indicate member dimensions and cross-sections; location, size and type of reinforcement and prestressing tendons, including special reinforcement and lifting devices necessary for handling and erection.
      b. Indicate layout, dimensions, connection details, edge conditions, support conditions and identification of each precast unit corresponding to sequence and procedures of installation. Indicated welded connections, and joints, including accessories and construction at openings in precast units.
      c. Provide location and details of anchorage devices that are to be embedded in other construction. Furnish templates if required for accurate placement.

d. Submit design analysis calculations, indicating loadings, assumed allowable stresses, deflections, cambers, bearing requirements, special conditions, stress calculations and similar information needed for analysis and to ensure that precast units comply with the requirements. Calculations shall be performed by or under the direct supervision of a registered professional engineer qualified to perform the work in the state where the project is located.

e. Calculations for special conditions shall include load distribution around openings and hanger design at openings.

f. Shop drawings and analysis calculations shall be signed and stamped by a professional engineer experienced in the design of prestressed, precast concrete and qualified to perform the work in the state where the project is located.

3. Erection drawings and instructions: Submit erection/layout drawings produced by the precast concrete fabricator including but not limited to unit designation, location and orientation of all units, accommodations for all roof and floor penetrations, and all pertinent bearing and construction details. Submit also complete handling and erection sequencing and instructions as well as instructions regarding temporary and permanent bracing.

1.5 COORDINATION

A. The provider of the precast concrete items shall coordinate his work with suppliers of embed items and items to be installed inside the chambers to insure that all required dimensions, locations and clearances are met.

1.6 PRODUCT HANDLING

A. Deliver precast concrete units to project site in such quantities and at such times to assure continuity of installation. Handle and store units at project site to prevent cracking, distortion, staining or other physical damage, and so those markings are visible. Lift and support units at designated lift points.

B. Deliver anchorage items which are to be embedded in other construction before start of such work. Provide setting diagrams, templates, instructions and directions as required for installation.

C. Protect edges of members from chipping or spalling.

D. Mark units with date of production and final position in structure.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement:
   1. ASTM C150 – Type I or III.

B. Admixtures:
   1. Water Reducing, Retarding, Accelerating, High-Range Water Reducing Admixtures: ASTM C494

C. Aggregates:
   1. ASTM C33 or C330

D. Water: Potable or free from foreign materials in amounts harmful to concrete and embedded steel.

E. Reinforcing Steel:
   1. Bars:
      a. Deformed Billet Steel: ASTM A615
      b. Deformed Rail Steel: ASTM A616
      c. Deformed Axle Steel: ASTM A617
      d. Deformed Low Alloy Steel: ASTM A706
   2. Wire: Cold Drawn Steel: ASTM A82.

F. Prestressing Strand:
   1. Uncoated, 7-Wire, Low Lax strand: ASTM A416 (including supplement) – Grade 250K or 270K.

G. Welded Studs: In accordance with AWS D1.1.

H. Structural Steel Plates and Shapes: ASTM A36.

I. Grout:
   1. Cement grout: Grout shall be a mixture of not less than one part portland cement to three parts fine sand, and the consistency shall be such that joints can be completely filled but without seepage over adjacent surfaces. The grout shall achieve a minimum 28-day compressive strength of 2,000 psi. Any grout that seeps from the joint shall be completely removed before it hardens.

J. Bearings Strips:
   1. Plastic: Multi-monomer plastic strips shall be non-leaching and support construction loads with no visible overall expansion.
   2. Size and location shall be verified by pre-caster in writing and approved by engineer.
   3. Shall be Korolath or approved equal.

2.2 CONCRETE MIXES

A. 28-day compressive strength: Minimum of 5,000 psi

B. Release strength: Minimum of 3,000 psi

C. Use of calcium chloride or admixtures containing chlorides is not permitted.

2.3 PRECAST PRESTRESSED CONCRETE PLANKS

A. Shall be machine cast in 48-inch widths as manufactured by Oldcastle Precast Building Systems, Selkirk, NY 12158 or an approved equal.

2.4 MANUFACTURE

A. Fabricate precast concrete units complying with manufacturing and testing procedures, quality control recommendations, and dimensional tolerances of PCI MNL-116, and as specified for types of units required.

B. Planks shall be machine cast in 48-inch width.

C. Manufacturing procedures and tolerances shall be in general compliance with PCI MNL 116

D. Openings: Manufacturer shall provide prestressing, design and reinforcement for rectangular openings 10 inches or larger on all sides and as clearly shown on the architectural drawings. They shall be located by the Contractor and then field cut. Round and small openings (less than 10 inches) shall be drilled or cut by the Contractor after grouting. Openings requiring cutting of prestressing strand shall be approved by the precast plank manufacturer before drilling or cutting.

E. Finishes: Bottom surface shall be flat and uniform as resulting from an extrusion process, without major chips, spalls and imperfections. Top surface shall be machine troweled.

F. Patching: Will be acceptable providing the structural adequacy of the hollow core unit is not impaired.

2.5 CONCRETE

A. Place concrete in continuous operation to prevent formation of seams or planes of weakness in precast units, complying with requirements of ACI 304. Thoroughly consolidate placed concrete by internal and external vibration without dislocation or damage to reinforcement and built-in items.
   1. Provide permanent markings to identify pick-up points of orientation in structure, complying with markings indicated on final shop drawings. Importing date of casting on each precast unit on a surface which will not show in finished structure.
   2. Cure by low-pressure steam vapor, by radiant heat and moisture, or other similar process may be employed to accelerate concrete hardening and reduce drying time.

2.6 QUALITY CONTROL

A. Dimensional Tolerances: Precast units having dimensions smaller or greater than required will be rejected of appearance or function of structure is adversely affected, or if smaller or larger dimensions interfere with other construction. Repair, or remove and replace rejected units as required to meet construction conditions.

B. Strength of Units: The strength of precast concrete units will be considered potentially deficient if the manufacturing processes fail to comply with any of the requirements which may affect the strength of the precast units, including the following:
   1. Failure to meet compressive strength test requirements.
   2. Reinforcement not conforming to specified fabrication requirements.
   3. Concrete curing of precast units not as specified.
   4. Precast units damaged during handling and erection.

C. Testing shall be in compliance with testing provisions in MNL-116, Manual or Quality Control for Planks and Production of Precast and Prestressed Concrete Products.

D. Defective Work: Precast concrete units which do not conform to specified requirements, including strength, tolerances, and finishes shall be replaced with precast concrete units that meet requirements of this Section.

PART 3 - EXECUTION

3.1 GENERAL

A. Verify that prepared openings are ready to receive work and field measures are as shown on shop drawings.

B. Beginning of installation means installer accepts existing site conditions.

C. Installation of precast, prestressed concrete shall be performed by the manufacturer or a competent erector with a minimum of 5 years of successful experience in the erection of precast concrete. Members shall be lifted by means of a suitable lifting device at points provided by the manufacturer. Temporary shoring and bracing, if necessary, shall comply with manufacturer's recommendations. Precast unit manufacturer shall be responsible for delivery of the units and shall provide a representative at the time of shipment, to measure and check location of openings and unload and set units in place.

D. Follow manufacturer's recommendations for execution of work.

3.2 PREPARATION

A. Install bearing pads at bearing ends of planks as required.

B. Prepare support devices for the erection procedures and temporary bracing as required to maintain units plumb, parallel and in location indicated.

3.3 ERECTION

A. Hoist units into place by means of lifting equipment suited to sizes and types of units required, applied at designated lift points as recommended by the fabricator, exercising care not to damage units.

B. Anchor units securely at all bearing points to comply with methods and details indicated. Install hangers and hanger tabs as required.

C. Install permanent bracing and related components to enable units to maintain design spacing, withstand live and dead loads including lateral loads and to comply with other indicated requirements.

D. After precast concrete units have been placed and secured, grout plank joints, and trowel smooth. Place additional reinforcing as required. Provide forms or other acceptable methods to retain grout in place until sufficiently hard to support itself.

E. Pack spaces requiring a dry packed grout with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, plumb and level with adjacent concrete surfaces.

F. Keep grouted joints damp for not less than 24 hours after initial set. Promptly remove grout material from exposed surfaces before it hardens.

3.4 TOLERANCES

A. Erect members level and plumb within tolerances.

B. Conform to PCI MNL-116.

C. When members cannot be adjusted to conform to design or tolerance criteria, cease work and advise Engineer. Execute modifications as directed.

END OF SECTION

INDEX

DIVISION 4 – MASONRY

SECTION 04330

CAVITY WALL MASONRY SYSTEM
(FILED SUB-BID REQUIRED)

PART 1 - GENERAL

1.1 SUB-BID REQUIREMENTS

A. In accordance with "Massachusetts General Laws, Chapter 149, Sections 44A and 44L inclusive as amended", the Engineer declares that all of the appropriate Item of Part II of the Form for General Bid, and that each sub-bidder on this work shall submit his bid and bid security as detailed in the Advertisement.
   1. Details for the procedure for filing sub-bids are contained in the Instructions to Bidders.
   2. The Work of this Section is shown on Drawings:
      A-1 thru and including A4 includes elements from and requires coordination with structural, mechanical, and electrical drawings.

1.2 DESCRIPTION

A. Work included: The work of this Section shall include but not be limited to the following: concrete masonry units, flashing, joint reinforcement, vertical reinforcing bar positioners, anchors, insulation and grouting, all as required by the Contract Documents.

B. Products furnished by other Sections and installed under this Section.

1.	Section 03200	Concrete Reinforcement (Seismic, bond beam and lintel reinforcement)
2.	Section 03402	Architectural Precast Concrete
3.	Section 05500	Metal Fabrications (Steel Lintels)

C. Work provided under other Sections:

1.	Section 07920	Sealants, Caulking and Water Repellent Coatings (Vapor barrier and water repellent coating)

D. Related Work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

2.	Section 01410	Testing Laboratory Services
3.	Section 03200	Concrete Reinforcement
4.	Section 05500	Metal Fabrications
5.	Section 07920	Sealants, Caulking, Water Proofing and Water Repellent
6.	Section 08100	Metal Doors and Frames
7.	Division 16	Electrical

1.3 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Coordinate the work of this Section with the work of Division 16 (Electrical) to insure that all conduits, control boxes and devices are installed in the masonry work.

C. Mock-ups:
   1. At an area on the site where approved by the Engineer, provide mock-up cavity wall masonry panel.
      a. Make the mock-up panel approximately 4'-0" high and 6'-0" long.
      b. Panel shall be kept dry.
   2. Mock-up panel shall be constructed at least three (3) weeks before the masonry work is to be started, so that the mortar will dry out and show true color.
   3. Mock-up panel shall be constructed as to be representative of the quality of materials and workmanship that is to be produced throughout the proposed masonry work.
   4. Mock-up panel shall show:
      a. Color range
      b. Maximum texture range
      c. Bonding
      d. Tooled joints
      e. Joint reinforcement
      f. Typical control joint
   5. Do not start masonry work until the mock-up panel has been approved by the Engineer.

D. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.4 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Materials list of items proposed to be provided under this Section.
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

C. Samples
   1. Concrete masonry units: A full size sample of each type and facing color
   2. Prefabricated joint reinforcement
   3. Flashing
   4. Control joint material

1.5 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

B. Store masonry units above ground on level platforms which allow air circulation under the stacked units.

C. All masonry stored on the site shall be protected from the weather and staining.

D. Damaged masonry units shall not be accepted.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS (C.M.U.) INNER BLOCK

A. C.M.U. shall conform to ASTM-C90 normal weight, Grade N, Type I, hollow load bearing units.
   1. Nominal face dimensions shall be eight inch (8") by sixteen inch (16").
   2. Minimum compressive strength on the net area (average of three units) when tested in accordance with ASTM C-140 shall be 2800 lbs. on the net area. Minimum compressive strength of any individual unit shall not be less than eighty (80) percent of the required three (3) unit average.
   3. Provide special units required by the Drawings, including but not limited to bond beam, lintel, jamb and sash blocks.
   4. All units shall be obtained from the same manufacturer.

2.2 EXTERIOR BRICK MASONRY UNITS

A. Brick shall conform to ASTM C216
   1. Nominal modular size of four (4) inch by eight (8) inch by three (3) inches
   2. Red clay brick
   3. Textured and colored to match existing building

2.3 REINFORCEMENTS AND ACCESSORIES

A. Fabricated Joint Reinforcement
   1. Concrete masonry unit reinforcement shall be 170-ML Truss Adjustable Eye-wire as manufactured by Hohmann & Bernard, Inc. Hauppauge, NY or equal.
      a. The eye sections shall be welded on at a maximum of sixteen (16) inches on center.
      b. Shall include adjustable wall ties sized to fit the masonry wall width.
   2. Architectural block joint reinforcement shall be 120 Truss-Mesh as manufactured by Hohmann & Bernard, Inc. Hauppauge, NY or equal.
   3. Side and cross rods shall be no. nine (9) wire size.
   4. All joint reinforcement shall be galvanized after fabrication and conform to ASTM A153, Class B-2.

5. Prefabricated reinforcement shall be manufactured from cold drawn steel wire conforming to ASTM A-82.
6. Corner and tee sections shall be prefabricated.

B. Vertical Bar Positioners
1. Shall be equal to RB Rarbar Positioners as manufactured by Hohmann & Bernard, Inc. Hauppauge, NY.
2. Shall be nine (9) gauge wire size.
3. Coating shall comply with ASTM, A-641, Class 3.

C. Control Joints (8" CMU)
1. Shall be made of quality elastomers meeting the standards of ASTM D-2000.
2. Shall be capable of transferring shear loads at each joint.
3. Control joint gasket shall be "Slot Seal Wide Flange" as manufactured by Williams Products Inc. or RS Series by Hohmann & Bernard, Inc. Hauppauge, NY.

D. Expansion Joints (Brick)
1. Shall be closed cell neoprene which conforms to ASTM, D-1056.
2. Shall be Type NS as manufactured by Hohmann & Bernard, Inc. Hauppauge, NY.
3. Thickness 3/8-inch, width 3-inches.

E. Weep Hole
1. Shall be preformed flexible tubing.
2. O.D. 3/8-inch.

F. Through Wall Flashing
1. Fabric shall be composed of two (2) layers of asphalt saturated woven cotton fabric sandwiching sheet copper.
2. Fabric shall weigh not less than four (4) oz, per square yard before saturation.
3. Sheet copper shall consist of a full sheet of copper weighing no less than three (3) oz. per square foot.

G. Provide mortar nets as required for proper functioning of drainage and reinforcement system. Install in course above flashing and/or weep holes and as described in Contract Documents. Product submittal shall be approved by Engineer during submittal process.

H. Insulation
1. Shall be closed cell styrofoam SM as manufactured by the Dow Chemical Company, Midland, Michigan or equal.
2. Shall be sixteen (16) inches wide by 1 1/2 inches thick and ninety-six (96) inches long.

I. Provide and/or install miscellaneous accessories and attachment members required for the anchorage of the work of this Section and that of other trades requiring attachment to masonry.

2.4 MORTAR

A. Ingredients:
1. Portland cement: Comply with ASTM C150, Type I, low alkali.
   a. Masonry cement shall not be used.
2. Lime:
   a. Provide hydrated lime complying with ASTM C207, Type S.
   b. Measure materials by a consistent method which will produce the desired consistency and specified strength. The Contractor shall demonstrate to the Engineer that his method will provide the required product consistently.
3. Aggregate: Provide clean, sharp, well-graded aggregate free from injurious amounts of dust, lumps, shale, alkali, surface coatings, and organic matter and complying with ASTM C144.
4. Admixtures: Do not use admixtures unless specifically approved in advance by the Engineer.
5. Water: Provide water free from deleterious amounts of acids, alkalis, and organic materials.

B. Mixing:
1. Provide mortar type "S" in accordance with ASTM C270.
2. Proportions:
   a. For type "S" mortar, provide one part Portland cement to 1/2 part hydrated lime and 3-3/4 parts sand by volume.
3. Mechanically mix in a batch mixer for not less than three minutes, using only sufficient water to produce a mortar which is spreadable and of a workable consistency.
4. Retemper mortar with water as required to maintain high plasticity.
   a. On mortar boards, retemper only adding water within a basin formed with mortar, and by working the mortar into the water.
   b. Discard and do not use mortar which is unused after 2 hours following initial mixing.

C. Mortar Color:
1. Shall match color of architectural block.
2. Shall be Mortar Mates by Burns & Russell or equal.
3. Shall be used as a pointing for the pre-faced concrete masonry unit joints.

2.5 GROUT

A. Ingredients:
1. Portland cement: Comply with ASTM C150, Type I, low alkali.
2. Aggregate: Provide clean, sharp, well-graded aggregate in compliance with ASTM C404.
3. Admixtures: Do not use admixtures unless specifically approved in advance by the Engineer.

4. Water: Provide water free from injurious amounts of acids, alkalis, and organic materials.

B. Mixing:
1. Provide "fine grout" or "coarse grout" as designated on the Drawings in accordance with ASTM C476.
2. Minimum compressive strength shall be 3500 psi @ 28 days.
3. Proportions:
a. For "fine grout" provide one part Portland cement to 2-3 parts minimum to 3 parts maximum of damp loose sand with sufficient water to achieve fluid consistency.
b. For "coarse grout" provide one part Portland cement to 3 parts maximum of damp loose sand to two parts coarse aggregate with sufficient water to achieve fluid consistency.
4. "Fluid consistency" is interpreted as meaning as fluid as possible for pouring intimately in place without segregation.

C. Use "fine grout" where called for on the Drawings where the grout space is less than 3-inches in its least dimension.

2.6 PEA GRAVEL

A. Pea gravel for use over the through-wall flashing shall be 3/8-inch and conform to ASTM C-33.

2.7 CLEANING SOLUTIONS

A. To be non-acidic and not harmful to the masonry work or any adjacent or imbedded materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Verify items provided by other sections of work are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

A. Direct and coordinate placement of imbedded items provided by other Sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

C. Coordinate work with electrical contractor (Division 16) to insure that all conduit and device boxes are embedded in the masonry wall.

D. Electrical conduit shall not be run in wall cavity.

3.3 ENVIRONMENTAL CONDITIONS

A. Do not erect masonry when the temperature is below 40 degrees F unless suitable fireproof protective covering and heat are provided to maintain the work and the materials above 40 degrees F for 48 hours after being laid. Masonry units when installed in freezing weather shall be at a temperature between 50 and 90 degrees F, and the mortar shall be at a temperature between 60 and 80 degrees F. Do not build upon frozen work.

B. Do not erect masonry when the ambient air is warmer than 99 degrees F in the shade and has a relative humidity of less than 40 percent unless the work is prevented from drying out for not less than 40 hours after having been installed.

3.4 INSTALLATION

A. General
1. Do not commence installation of the work of this Section until horizontal and vertical alignment of foundation has been checked and in compliance with the requirements of Specification Section 03300.
2. Lay only dry masonry units.
3. Use masonry saws to cut and fit masonry units.
4. Set units plumb, true to line, and with level courses accurately spaced.
5. Lay pre-faced concrete block so the interior surface does not show any irregularities.
6. Clean the top surface of foundation free from dirt, debris, and laitance and expose the aggregate prior to start of installing first course.
7. Accurately fit the units to plumbing, ducts, openings and other interfaces neatly patching all holes.
8. Keep the walls continually clean preventing grout and mortar stains. If grout does run over, clean immediately.
9. Do not use chipped or broken units. If such units are discovered in the finished wall, they shall be removed and new units installed at no additional cost to the Owner.

B. Coursing
1. Establish lines, levels and coursing indicated. Protect from displacement.
2. Maintain masonry courses to uniform dimensions. Form vertical and horizontal joints of uniform thickness.
3. Lay concrete masonry units in running bond.
4. Lay brick units in running bond.

C. Placing and Bonding
1. Place units in mortar with full shoved bed and head joints.

2. Align vertical cells of hollow units to maintain a clear and unobstructed system of flues.
3. Toothing of masonry units shall not be permitted.
4. The webs of the pre-faced CMU around the cells containing reinforcement are to be bedded completely.
5. All CMU at jambs, under sills and overheads of all windows, or similar openings shall be filled solid.
6. Solidly grout spaces around built in items.
7. At door frames, provide 3-inch joint between the masonry and the steel frame. Rake back joint to receive caulking. Grout door frames solid.

D. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:
1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
3. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
5. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
6. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

E. Joint Reinforcement and Anchorages:
1. Provide reinforcement as shown on the Drawings and specified herein.
2. Preformed joint reinforcement shall be placed:
   a. Top of first course and every other course thereafter (16 inches center to center).
   b. Beneath and above all openings extending 24-inches beyond the opening on either side.
   c. Unless noted otherwise, all reinforcement shall be continuous except it shall not pass through vertical masonry control joints.
3. Lap joint reinforcement ends at minimum of six (6) inches.
4. Provide adjustable wall ties at sixteen (16) inches on center.
5. Interrupt joint reinforcement at control and expansion joints.

F. Vertical Reinforcing (Seismic)
1. Vertical and horizontal rods shall be furnished under Specification Section 03200.

2. Place and support rods under this Section as shown on the Drawings and as specified herein and pertinent sections of Specification Section 03200.
3. Vertical bar spacing shall be thirty-two (32) inches.
4. Provide vertical reinforcing at both sides of all masonry openings (full height of wall) and all control joints.
5. Provide required metal accessories to ensure adequate alignment of steel during grout filling operations.

G. Flashing
1. Install Flashing in accordance with NCMA TEK 19-04, Flashing Strategies for Concrete Masonry Walls, and NCMA TEK 19-05, Flashing Details for Concrete Masonry Walls.
2. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
3. Install flashing as follows, unless otherwise indicated:
   a. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
   b. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 8 inches, and 1-1/2 inches into the inner wythe. Form 1/4-inch hook in edge of flashing embedded in inner wythe.
   c. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 8 inches; with upper edge covered with elastomeric membrane, lapping at least 4 inches.
   d. Lap end joint a minimum of six (6) inches and seal watertight.
   e. Use flashing manufacturer's recommended adhesive and sealer.
   f. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.

H. Lintels
1. Install loose steel lintels over all openings in brick (Coordinate with Section 05500).
2. Provide reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.
3. Allow masonry lintels to attain specified strength before removing temporary supports.
4. Maintain minimum of eight (8) inches bearing on each side of opening.

I. Masonry Joints
1. Tool joints to a dense, smooth surface and unless otherwise shown on the Drawings provide jointed of "concave" pattern throughout.
2. Architectural block joints shall be a normal thickness of 3/8-inch.

3. Concrete masonry unit joints shall be a normal thickness of 3/8-inch, except the bed point of the starting course over the foundation, which shall be between ¼-inch and ¾-inch.
4. Joint tolerances:
   a. Head and bed joint thickness ± 1/8-inch.
   b. Head and joint vertical alignment and bed joint level:
      in any 10' of length ± 3-inch
      maximum for the entire length ± 2-inch
   c. The masonry joints on the side which is to receive the vapor barrier shall be struck flush being careful not to pull any mortar from the joint.

J. Tuck-pointing: (Pre-faced Concrete Masonry Units)
1. Rake out joints at least 3-inch.
2. Tuck-point with colored mortar.
3. Tool joint concave.

K. Weep Holes
1. Provide weep holes in mortar joints of exterior wall at every thirty-two (32) inches above the through-wall flashing, at the bottom of the wall and at all lintels (unless otherwise noted).
2. Keep weep holes free of mortar and other obstructions.
3. Provide mortar nets as required for proper functioning of drainage.

L. Pea Gravel
1. Provide pea gravel as shown on the Drawings.

M. Grouting:
1. Perform grouting in strict accordance with the following:
2. Grout shall be placed by the High Lift Method with the following limitations:
   a. Maximum height grouted pour 24-feet
   b. Maximum height grouted lift 4-feet
3. Provide cleanouts units in the bottom course at every dowel where the height of grout placement exceeds four feet. Remove overhanging mortar, mortar droppings and obstructions from grout spaces. Seal cleanout holes only after masonry work, reinforcement, and final cleaning of grout spaces have been approved by the Engineer, and before grouting. Sealing shall match the surrounding masonry.
4. Place grout within one hour after mixing.
5. Grout shall be placed using a grout pump.
6. For vertically reinforced concrete unit masonry, place grout in all cells containing reinforcement, and in lifts of not more than four (4) feet. Consolidate grout at the time of placing by either puddling or vibrating; reconsolidate grout by puddling before plasticity is lost. When grouting will be stopped for one hour or longer, form horizontal construction joints by stopping the grout placement 12-inches below the top of the uppermost grouted unit. Use coarse grout in spaces which are 3-inches or larger in all horizontal directions; place fine grout in grout spaces which are smaller than 3-inches in any horizontal direction.

7. For purposes other than vertically reinforced concrete unit masonry, place grout where indicated and only after mortar joints and other cementitious materials have cured. Place coarse grout in grout spaces which are two inches larger in all horizontal directions; place fine grout in grout spaces which are smaller than 2-inches in any horizontal direction. Place grout at a rate which will allow successive layers to be consolidated while the preceding layer is plastic. Placement height shall not exceed 4-feet. Consolidate grout and puddle. When grouting will be stopped for one hour or longer; form horizontal construction joints by stopping the grout placement 2 the course height below the top of the uppermost grouted unit.
8. Prevent grout from coming into contact with finish surfaces which will be exposed to view, and with those surfaces which are to receive other finishes.

3.5 VAPOR BARRIER

A. Coordinate the work of this Section with the work of Section 07920.

3.6 INSULATION

A. Insulation shall be installed horizontally in cavity wall where shown on the Drawings in accordance with the manufacturer's recommendations.
   1. Coordinate the placing of the insulation with the installation of the masonry ties, wall reinforcement, and vapor barrier.
   2. Cut and fit insulation boards as needed. Butt ends and edges tightly together. Stagger all end joints.
   3. All ends, edges and cut-outs to be sealed with a compatible construction adhesive.

3.7 BUILT-IN WORK

A. As work progresses, build in metal door frames, anchor bolts, fabricated metal frames, electrical conduit and associated device boxes and other items which are furnished by other Sections.
B. Build in items plumb and level.

3.8 CLEANING

A. Inspection and Adjustment:
   1. Upon completion of the work of this Section, make a thorough inspection of installed masonry and verify that units have been installed in accordance with the provisions of this Section.
   2. Defective joints: Rake out the full depth of the joint, patch with mortar, and tool to match adjacent joint.
   3. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
      a. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

b. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Engineer's approval of sample cleaning before proceeding with cleaning of masonry.
c. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
d. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
e. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A, Removal of Stains form Concrete Masonry, applicable to type of stain on exposed surfaces, and NCMA TEK 8-04: Cleaning Concrete Masonry.
f. Remove all efflorescence.

END OF SECTION

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DIVISION 5 – METALS INDEX

SECTION 05500

METAL FABRICATIONS
(Filed Sub-bid Required)

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide fabricated metal work shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
   1. Including but not necessarily limited to:
      a. Galvanized lintels W 8 w/plate lintels
      b. Galvanized angles at roof planks
      c. Galvanized coiling door jambs

B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   2. Section 03300 Cast-In-Place Concrete
   3. Section 04330 Cavity Wall Masonry System
   4. Section 08100 Metal Doors and Frames

C. Related work not included:
   1. Installation of items imbedded in concrete
   2. Masonry ties

D. Coordination
   1. The work of this Section shall be coordinated with the work of other Sections to insure compatibility, before fabrication.
   2. Field measurements shall be taken at the site to verify dimensions and make the required dimension changes, before fabrication.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Perform shop and/or field welding required in connection with the work of this Section in strict accordance with pertinent recommendations of the American Welding Society.

C. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

2. Masonry ties

D. Coordination
1. The work of this Section shall be coordinated with the work of other Sections to insure compatibility, before fabrication.
2. Field measurements shall be taken at the site to verify dimensions and make the required dimension changes, before fabrication.

1.3 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Perform shop and/or field welding required in connection with the work of this Section in strict accordance with pertinent recommendations of the American Welding Society.

C. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.4 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements
3. Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
4. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installing procedures used on the Work.

1.5 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 MATERIALS

A. In fabricating items which will be exposed to view, limit materials to those which are free from surface blemishes, pitting, rolled trade names, and roughness.

B. Comply with following standards, as pertinent,

1.	Steel plates, shapes, and bars	ASTM A36;
2.	Steel plates to be bent or cold-formed	ASTM A283, grade C;
3.	Steel tubing (hot-formed, welded, or seamless)	ASTM A501;
4.	Hot-dip galvanized anchor bolts and nuts	ASTM A307
5.	Gray iron Castings	ASTM A48 Class 30
6.	Galvanizing, General	ASTM A123
7.	Galvanizing, Hardware	ASTM A153
8.	Copper Alloys	ASTM B30
9.	Copper Alloy Castings	ASTM B584, UNS C84400
10.	Stainless Steel Bolts, Bars and Shapes	ASTM A276 (Type 316L)
11.	Stainless Steel Plate and Sheet	ASTM A666 (Type 316L)
12.	Stainless Steel Bolts and Studs	ASTM F593 (Group 2)
13.	Stainless Steel Nuts	ASTM F594 (Group 2)
14.	Aluminum: Extruded Shapes	Alloy 6061-T6
15.	Aluminum: Sheets and Plates	Alloy 6061-T6

2.2 FASTENERS

A. General:

1. Fasteners shall be furnished as necessary for the installation of the work of this section.
2. All fasteners inside chambers holding water shall be Type 316L stainless steel.
3. For exterior use and where built into exterior walls, provide stainless steel fasteners.
4. Provide fasteners of type, grade, and class required for the particular use.
5. Aluminum and stainless steel shall be attached to concrete or masonry with stainless steel machine bolts and iron or steel shall be attached with hot-dip galvanized steel machine bolts unless noted otherwise.

2.3 ALUMINUM FABRICATIONS

A. Aluminum hand railing shall be welded construction,
1 1/2-inch nominal iron pipe size Schedule 40 aluminum pipe meeting all OSHA requirements.

1. All railing shall have mitered and handrail quality welded joints.
2. Maximum post spacing shall be 5' o.c.
3. Make provisions for removable railing sections where shown on the Drawings.
4. Field splicing and expansion provisions shall be accomplished using an internal sleeve welded at one end and rivet fastened at the other.
5. Top mounting in concrete shall be accomplished by setting the support posts in sleeves of the same material as the railing and grouted in place. Post collars shall be provided.
6. All aluminum hand-railings shall be anodized after fabrication.
7. All railing shall be protected from scratches, stains or dents. Any damaged railing shall be removed and replaced by the Contractor.
8. Kick plates to be provided where shown on the Drawings.

9. Field welding shall not be permitted.
10. Verify dimensions on site prior to shop fabrication.

2.4 STAINLESS STEEL FABRICATIONS

A. Material shall be in compliance with paragraph 2.1 of these Specifications.
   1. Field welding shall not be permitted.
   2. All welding shall be by the shielded arc, inert gas, MIG or TIG method.
   3. Butt welds shall have full penetration.
   4. All welds shall have a surface finish of a 2-D sheet finish.
   5. Brushing of welds shall be done only with a stainless steel brush.
   6. After fabrication, all stainless steel assemblies and parts shall be passivated by immersion in a pickling solution of 6% nitric acid and 3% hydrofluoric acid at 140 degrees F for a minimum of 15 minutes. Parts shall be free of iron particles or other foreign material. A complete neutralizing operation shall be required by immersion in a tri-sodium phosphate rinse.

2.5 GALVANIZED FABRICATION

A. Hot Dip Galvanizing
   1. Steel members, fabrications and assemblies to be galvanized after fabrication in accordance with ASTM A123.
   2. Fabricate, clean and brace fabricated items in compliance with the AHDGA.
   3. Coating shall not be less than 2 oz. per square foot of surface area.
   4. Damaged galvanized surfaces shall be cleaned and an organic zinc rich paint (95% by weight) applied. Dry film thickness not to be less than 4 mils.
   5. Items to be hot-dip galvanized include but are not necessarily limited to:
      a. Anchor bolts (unless noted otherwise on the Drawings)
      b. Overhead coiling door jambs
      c. Miscellaneous clips and angles
      d. Lintels
   6. Except as otherwise shown on the Drawings or the approved Shop Drawings, use materials of size, thickness, and type required to produce reasonable strength and durability in the work of this Section.
   7. Fabricate with accurate angles and surfaces which are true to the required lines and levels, grinding exposed welds smooth and flush, forming exposed connections with hairline joints, and using concealed fasteners wherever possible.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 COORDINATION

A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

3.3 INSTALLATION

A. General:
   1. Set work accurately into position, plumb, level, true, and free from rack.
   2. Anchor firmly into position.
   3. Where field welding is required, comply with AWS recommended procedures of manual-shielded metal-arc welding for appearance and quality of weld and for methods to be used in correcting welding work.
   4. Grind exposed welds smooth, and touch-up shop prime coats.
   5. Do not cut, weld, or abrade surfaces which have been hot-dip galvanized after fabrication and which are intended for bolted or screwed field connections.
   6. Repair all damaged galvanized surfaces with ZRC cold galvanizing compound.
   7. Where aluminum is in contact with concrete or masonry it shall be coated with a bitumastic coating.

END OF SECTION

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DIVISION 6 – WOODS AND PLASTICS

SECTION 06100

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide wood, nails, bolts, screws, framing anchors, rough hardware, and other items needed, to perform rough carpentry for the construction as required by the Contract Documents.

B. Set in place all metal doorframes, install metal doors, aluminum doors and framework, access panels and finish hardware furnished under other Sections. Installation shall be as specified under the appropriate section.

C. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 04330 Cavity Wall Masonry System
3. Section 05500 Metal Fabrications
4. Section 07210 Building Insulation
5. Section 07530 Single Ply Membrane Roofing
6. Section 08100 Metal Doors and Frames
7. Section 08710 Finish Hardware

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

C. Codes and Standards :

1. In addition to complying with the pertinent codes and regulations of governmental agencies having jurisdiction unless otherwise specifically directed or permitted by the Engineer comply with:
   a. "Product Use Manual" of the Western Wood Products Association for selection and use of products included in that manual;
   b. "Plywood Specification and Grade Guide: of the American Plywood Association.

c. Western Red Cedar Lumber Association.
d. American Wood Preservers Association (AWPA)

1.3 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610 .

B. Protection:
1. Deliver the materials to the job site and store, in a safe area, out of the way of traffic, and shored up off the ground surface.
2. Identify framing lumber as to grades, and store each grade separately from other grades.
3. Protect lumber from the elements and excessive moisture.
4. Use extreme care in off loading of lumber to prevent damage, splitting, and breaking of materials.

PART 2 - PRODUCTS

2.1 GRADE STAMPS

A. Identify framing lumber by the grade stamp of the Western Wood Products Association.

B. Identify plywood as to species, grade, and glue type by the stamp of the American Plywood Association.

C. Identify other materials of this Section by the appropriate stamp of the agency approved in advance by the Engineer.

2.2 MATERIALS

A. Provide materials in the quantities needed for the Work shown on the Drawings, and meeting and exceeding the following standards of quality:
1. Horizontal framing members: Douglas Fir-Hemlock, Construction grade.
2. Vertical framing members; Douglas Fir-Hemlock, Construction grade.
3. Plywood: APA Structural 1 rated sheathing exposure 1
a. Roof sheathing 3/4-inch
b. Gable end sheathing 1/2-inch
4. Rough hardware:
a. Steel Items: Sheathing clips, truss ties, purlin hangers, column base anchors, and etc. shall be galvanized as manufactured by Kant-Sag, Teco, Simpson or an approved equal.
b. Lag bolts: Square head type complying with Fed Spec FF-B-561.
c. Nails: use galvanized at all locations.
d. Machine Bolts: Comply with ASTM A307, Grade A and be hot-dipped galvanized.
e. Carriage bolts: Comply with ANSI B18.5.

B. Treated Wood: All wood which is in contact with concrete masonry, earth or where otherwise noted on the Drawings shall be pressure treated with Wolman CCA Type C oxide preservative or an approved equal.
   1. Meet the requirements of AWPA Standard P5.
   2. Results of treatment shall conform to AWPA Standard C15.
   3. Dried after treatment to a moisture content of not more than nineteen (19) percent.
   4. Each piece shall bear a label noting company, trademark, year treated, species and third party inspection agency.
   5. Preservative oxide retention shall not be less than 0.40 lbs. per cubic foot.

C. Pressure treated lumber and plywood shall have a follow-up inspection provided by Underwriters Laboratories, Inc. Each piece shall bear the UL label of imprint certifying an FR-S rating, an interior Type A product and kiln dried after treatment.
   1. All fire retardant wood must have an FR-S rating, Class A flamespread and Class A smoke developed, when tested in an extended 30 minute tunnel test in accordance with ASTM E-84, NFPA 255 or UL 723.
   2. All lumber must be kiln dried to a maximum moisture content of 19 percent after treatment. All plywood must be kiln dried to a maximum moisture content of 15 percent after treatment.
   3. All fire retardant wood must meet AWPA Interior Type A standard C-20 for lumber and C-27 for plywood.
   4. Carbon steel, galvanized steel, aluminum, copper and red brass in contact with the fire retardant treated wood must exhibit corrosion rates less than one mil per year when tested in accordance with Federal Specification MIL-L-19140E Paragraph 4.6.5.2.
   5. The fire retardant chemicals used to treat the lumber must be free of halogens, sulfates, ammonium phosphate and formaldehyde.
   6. The fire retardant chemical provides protection against termites and decay and must be registered for use as a wood preservative by the U. S. Environmental Protection Agency
   7. When cutting or handling treated wood, comply explicitly with the manufacturer's handling precautions.

2.3 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 DELIVERIES

A. Stockpile materials sufficiently in advance of need to assure their availability in a timely manner for this work.

B. Make as many trips to the job site as are needed to deliver materials of this Section in a timely manner to ensure orderly progress of the work.

3.3 COMPLIANCE

A. Do not permit materials not complying with the provisions of this Section to be brought onto or to be stored at the job site.

B. Promptly remove non-complying materials from the job site and replace with materials meeting the requirements of this Section.

3.4 WORKMANSHIP

A. Produce joints which are tight, true, and well nailed, with members assembled in accordance with the Drawings and with pertinent codes and regulations.

B. Selection of lumber pieces:
   1. Carefully select the members.
   2. Select individual pieces so that knots and obvious defects will not interfere with placing bolts or proper nailing, and will allow making of proper connections.
   3. Cut out and discard defects which render a piece unable to serve its intended function.
   4. Lumber may be rejected by the Engineer, whether or not it has been installed, for excessive warp, twist, bow, crook, mildew, fungus, or mold, as well as for improper cutting and fitting.

C. Do not shim any framing component.

3.5 GENERAL FRAMING

A. General:
   1. In addition to framing operations normal to the fabrication and erection indicated on the Drawings, install wood blocking and backing required for the work of other trades.
   2. Set horizontal and sloped members with crown up.
   3. Do not notch, cut, or bore members for pipes, ducts, or conduits, or for other reasons except as shown on the Drawings or as specifically approved in advance by the Engineer.
   4. When cutting or handling treated wood, comply explicitly with the manufacturer's handling precautions.

B. Bearings:
   1. Make bearings full unless otherwise indicated on the Drawings.

2. Finish bearing surfaces on which structural members are to rest so as to give sure and even support.
3. Where framing members slope, cut or notch the ends as required to give uniform bearing surface.

3.6 BLOCKING

A. Install blocking as required to support soffit, items of finish and to cut off concealed draft openings, both vertical and horizontal, between ceiling and floor areas.

3.7 ALIGNMENT

A. On framing members to receive a finished surface, align the finish subsurface to vary not more than 1/8-inch from the plane of surfaces of adjacent furring and framing members.

3.8 INSTALLATION OF PLYWOOD SHEATHING

A. Placement:
1. Place plywood with face grain perpendicular to supports and continuously over at least two supports, except where otherwise shown on the Drawings.
2. Center joints accurately over supports, unless otherwise shown on the Drawings.
3. Stagger joints.
4. Install two panel clips per every span between roof trusses.

B. Protect plywood from moisture by use of waterproof coverings until the plywood in turn has been covered with the next succeeding component or finish.

3.9 FASTENING

A. Nailing:
1. Use only common wire galvanized nails or spikes of the dimension required.
2. Provide penetration into the piece receiving the point of not less than 1/2 the length of the nail or spike, provided, however, that 16d nails may be used to connect two pieces of 2-inch (nominal) thickness.
3. Nail without splitting wood.
4. Prebore as required.
5. Remove split members and replace with members complying with the specified requirements.

B. Bolting:
1. Drill holes 1/16-inch larger in diameter than the bolts being used.
2. Drill straight and true from one side only.
3. Do not bear bolt heads on wood (unless they are carriage bolts). Use washers under head and nut where both bear on wood, and use washers under all nuts.

C. Screws:
   1. For lag screws and wood screws, prebore holes same diameter as root of threads, enlarging holes to shank diameter for length of shank.

D. Builders Hardware (framing anchors, sheathing clips, rafter ty-downs, etc.).
   1. Position hardware accurately to insure proper bearing and holding ability.
   2. Attach to members in compliance with the manufacturer's requirements.

END OF SECTION

SECTION 06200

FINISH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide ceiling trim, and all other finish carpentry which is required by the Contract Documents.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide materials in the quantities needed for the Work as shown on the Drawings, and meeting or exceeding the following standards of quality:
1. Trim
a. Polyvinyl chloride trim board by Koma Trimboards, Huntsville, AL or equal.

2.2 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 WORKMANSHIP

A. Produce joints which are true, tight, and well nailed with all members assembled in accordance with the Drawings.

B. Jointing:
1. Make joints to conceal shrinkage; miter exterior joints; cope interior joints; miter or scarf end-to-end joints.
2. Install trim in pieces as long as possible, jointing only where solid support is obtained.

C. Fastening:
1. Install items straight, true, level, plumb, and firmly anchored in place.
2. Where blocking or backing is required, coordinate as necessary with other trades to ensure placement of required backing and blocking in a timely manner.
3. Utilize finish screws of proper dimension to hold the trim firmly in place. Utilize friction type threaded anchors.
4. On exposed work, set nails for putty.
5. Screw, do not drive, wood screws; except that screws may be started by driving and then screwed home.

3.3 INSTALLATION OF OTHER ITEMS

A. Install items in strict accordance with the Drawings, and the recommended methods of the manufacturer as approved by the Engineer, anchoring firmly into position at the prescribed location, straight, plumb, and level.

3.4 FINISHING

A. Sandpaper finished wood surfaces thoroughly as required to produce a uniformly smooth surface, always sanding in the direction of the grain; except do not sand wood which is designed to be left rough.

B. No coarse grained sandpaper mark, hammer mark, or other imperfection will be accepted.

3.5 CLEANING UP

A. Keep the premises in a neat, safe, and orderly condition at all times during execution of this portion of the Work, free from accumulation of sawdust, cut-ends, and debris.

B. Sweeping:
   1. At the end of each working day, and more often if necessary, thoroughly sweep surfaces where refuse from this portion of the Work has settled.
   2. Remove the refuse to the area of the job site set aside for its storage.
   3. Upon completion of this portion of the Work, thoroughly broom clean all surfaces.

END OF SECTION

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DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION 07200

PERIMETER INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide perimeter foundation insulation as required by the Contract Documents.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division l of these Specifications.
2. Section 03300 Cast-In-Place Concrete
3. Section 07920 Sealants, Caulking, Waterproofing and Water Repellent Coatings

1.1 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.2 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 14 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.3 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Perimeter Insulation shall be:
   1. FOAMULAR 400, extruded polystyrene board insulation as manufactured by Owens Corning, Toledo, Ohio, or approved equal.
      a. Shall be panel size of 24" x 96".
      b. Three (3) inch nominal thickness (R-15) (2" thickness for under floor slab).
      c. Minimum compressive strength of 40 psi (25 psi for under floor slab).
      d. Meets ASTM C578.
      e. Maximum water absorption of 0.1% by volume when tested in accordance with ASTM C272.
      f. Water vapor permeance for one-inch product of 1.0 perm (max) when tested in accordance with ASTM E96.

2.2 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

B. Provide acceptable mastic adhesive/sealant, compatible with extruded polystyrene panels, such as Sonneborn Premium Adhesive, as manufactured by BASF, Chemical Co., Foamgrab CG, as manufactured by Dacar Products Co., Inc., or approved equal.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Perimeter Insulation:
   1. Install on the concrete foundation as shown, with adhesive, using methods recommended by the manufacturer.
   2. Provide a smooth even bearing surface for the insulation board under slab which is to be laid on the gravel surface.
   3. Protect the insulation from damage during backfill and concrete placement operations.
   4. Apply weather resistant flashing tape to joints.
   5. Coordinate the installation of foam board insulation with the activities of the affected Sections of the Contract Documents.

3.3 REPAIR OF DEFECTIVE WORK

A. Patch, seal or replace insulation which has become damaged after installations, as required to maintain the integrity of the product.

END OF SECTION

SECTION 07210

BUILDING INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide building roof insulation as required by the Contract Documents.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division l of these Specifications.
2. Section 06100 Rough Carpentry
3. Section 07530 Single Ply Membrane Roofing

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide the following building insulation where shown on the Drawings, or specified herein, as manufactured by Owens Corning, Atlas Roofing Corp., or approved equal.
B. Roof Insulation
1. Insulating board to be installed in one layer Polyiso roof board insulation "AC Foam" as manufactured by Atlas Roofing Corporation. Insulation shall meet the following:
a. ASTM Standard C1289, Type **, Class 1
b. Factory Mutual (FM) approved
c. Underwriters Laboratories, Inc. classification

d. Extruded polystyrene
e. Thickness: Three (3) inches
f. R-Value @ 40°F: 15.00
g. Compressive strength: 25 psi minimum
h. Density: 1.6 pcf

2.2 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

B. Remove, or protect against, projections in construction framing which may damage the insulation vapor barrier or prevent proper installation.

3.2 INSTALLATION

A. Install insulation in strict accordance with the manufacturer's printed installation procedures.

B. Install insulation under the single ply membrane.
1. The base insulation layer shall be three (3) inches thick.
2. Build boards together with no gaps greater than 1/4- inch. Gaps greater than 1/4-inch must be filled with the same material.

END OF SECTION

SECTION 07530

SINGLE PLY MEMBRANE ROOFING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide single ply membrane roofing. Provide a complete fully adhered membrane roofing system including but not necessarily limited to: insulation, membrane compatible flashing accessories, cants, aluminum fascia, all as required by the Contract Documents.

B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions.
   2. Section 07210 Building Insulation

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. The roofing system shall be installed by a contractor who is currently approved in writing by the manufacturer of the roofing system.

C. The roofing system shall have the current approval of Underwriters Laboratories (UL) as a Class A roofing system.

D. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this Section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Prior to the start of the Work, submit three (3) copies of manufacturer's installation instructions and details to the Engineer, and submit one (1) sample each of membrane, insulation and flashing.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Comply with pertinent provisions of Section 01610.

B. Deliver materials to the job site in the original, unopened containers with the manufacturer's name, brand name and installation instructions.

C. Curable materials shall be stored between 60-80 degrees Fahrenheit. Prolonged exposure of these materials to temperatures greater than 80 degrees Fahrenheit will reduce the shelf life of those materials. When liquid adhesives and sealants are exposed to lower temperatures, restore to a minimum of 60 degrees Fahrenheit before use.

D. Insulation and underlayment shall be stored so it is kept dry and is protected from the elements. Store insulation on a skid and completely cover with a breathable material such as tarp or canvas. Insulation should be weighted to prevent possible wind damage.

1.5 WARRANTY

A. Contractor shall furnish a membrane only warranty for a period of forty (40) years from the date of final payment on the project.

B. Contractor shall furnish a labor warrantee for ten (10) years.

PART 2 - PRODUCTS

2.1 GENERAL

A. For purposes of designating type and quality of the product, the roofing system described in this Specification is based on "Roofing Product International" 0.060 Fully Adhered EPDM System. Products which meet or exceed this Specification may be considered.

2.2 MEMBRANE

A. Membrane shall be 0.060 inch thick, non-reinforced EPDM compounded elastomer which is black in color. Membrane shall conform in all respects to ASTM D4637 and ANSI/RMA IPR-1.

1.	Tolerance on nominal thickness	±10%
2.	Tensile strength, minimum	1305 psi
3.	Ultimate elongation, minimum	350%
4.	Tear resistance, minimum	175 lb-ft/inch
5.	Ozone resistance	ASTM D1149
6.	Resistance to outdoor weathering	ASTM G26
7.	Sheet composition	ASTM D297

2.3 ROOF INSULATION

A. See specification 07210 - Building Insulation.

2.4 CLEANERS, ADHESIVES AND SEALANTS

A. Use only cleaners, adhesives and sealants approved by the membrane manufacturer for use on their product and fully compatible with the membrane furnished.

2.5 FLASHING

A. Flashing shall be "Sure-Seal Brite-Ply" EPDM membrane or "Sure-Seal" clean cured flashing or equal.

B. For inside and outside corners, "Sure-Seal Inside/Outside Corner" shall be used or equal.

2.6 METAL FLASHING AND FACIA

A. All metal flashing and fascia shall be fabricated from minimum 0.040-inch thick aluminum.
   1. Comply with ASTM B209 with H14 temper.
   2. Finish shall be clear anodized (medium matte etched finish with a minimum 0.4 mil anodic coating).

2.7 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - INSTALLATION

3.1 SURFACE PREPARATION

A. Prior to start of roofing system installation, the entire roofing system shall be swept clean. Contractor shall not proceed with installation of any new roofing system components until Engineer has reviewed condition of the concrete deck.

3.2 MEMBRANE

A. Install the membrane in strict accordance with the manufacturers printed application requirements for single ply cold adhered membrane system.

3.3 WOOD NAILER AND CURBS

A. Shall be provided and installed where necessary.

3.4 METAL FLASHING AND FACIA

A. Install the facia drips, metal flashing and fascia as shown on the drawings.
   1. Comply with pertinent sections of SMACNA: Architectural Sheet Metal Manual.

2. No face nailing shall be allowed. Provide hold down cleat system.
3. Remove all protective vinyl masking on fascia immediately after installation.

3.5 CLEANUP

A. After completion of all work, thoroughly clean all areas impacted and properly dispose of all materials not incorporated in the work.

END OF SECTION

SECTION 07610

METAL ROOFING SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide a metal awning system as required by the Contract.

1. In general the work includes but is not necessarily limited to: metal awning, penetration flashings, snow guards, soffit and fascia panels, drip caps, base drips, outside corners, fasteners, plates.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. The roofing system and siding materials shall be supplied from a single manufacturer to insure system responsibility. No materials shall be used which would compromise the manufacturer's guarantee.

C. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 REFERENCE STANDARDS

A. Current edition of each shall apply.

1. American Iron and Steel Institute (AISI).
   a. Light Gauge Cold-Formed Steel Design Manual
2. American Society of Testing Materials (ASTM).
   a. A-446 Structural, Physical Quality for Galvanized Steel Sheet.
   b. A-792 General Requirements for Aluminum-Zinc Coated Sheet.
   c. B-117 Method of Salt Fog Exposure Test
   d. D-523 Test Method for Specular Gloss
   e. D-659 Method for Evaluating Degree of Chalkling
   f. D-714 Method for Evaluating Degree of Blistering Paints
   g. D-822 Practice for Operating Carbon Arc Weatherometer
   h. D-968 Abrasion Resistance by Falling Sand Method
   i. D-2244 Method for Evaluating Color Differences of Opaque Materials
   j. D-3359 Method for Measuring Paint Adhesion With Tape
   k. D-3361 Practice for Operating Carbon Arc Dew Cycle Weatherometer

l.
m. D-3363 Test Method for Film Hardness by Pencil Hardness
n. D-1056 Specification for Flexible Cellular Materials
o. E-330 Structural Performance by Static Air Pressure Difference
p. E-1592 Static Air Pressure Testing of Standing Seam Metal Roofing
q. E-1680 Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.

r. E-1646 Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.

3. National Roofing Contractors Association (NRCA)
   a. The NRCA Construction Details
4. Sheet Metal and Air Conditioning Contractors National Association (SMANCA)
   a. Architectural Sheet Metal Manual

1.4 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

D. Samples:
1. Panels: One-piece, 12 inches long of the proposed color to be used.
2. Soffit: One sample at least 6" long with descriptive data.

B. Quality control data certifying that the materials furnished for the project are the same make and manufacture as those tested.

1.5 GUARANTEE AND WARRANTY

A. The panel manufacturer shall provide a (20) year warranty against structural defects or corrosion and a (20) year warranty on finish durability on the installed roofing system.

B. Subcontractors shall provide two (2) year guarantee on workmanship and leaks. The guarantee shall cover material and labor for the repair or replacement of the defective roofing.

PART 2 - PRODUCTS

2.1 GENERAL

A. For purposes of designating type and quality of the product, the roofing and siding system described in this Specification is based on "Zip-Rib Roofing and Siding" as manufactured by Merchant and Evans, Inc. Burlington, NJ. Products which meet or exceed this specification may be considered.

2.2 PANELS AND SHEETS

A. Panels and Sheets: Shall be of the standing seam type with the following attributes:
1. Embossed prefinished AZ-50 Aluminum-Zinc alloy coated steel (Galvalume) 50 ksi per ASTM A792 in 22 minimum gauge.

2. Standing rib 2-1/2 inches minimum with a continuous groove capillary break.
3. Two intermediate stiffener ribs 3/8 inch high shall be located in the flat pan to minimize oil-canning and telegraphing of structural members.
4. Fabricated in full lengths from ridge to eave without end laps.
5. Panel width; 16 inches
6. Concealed anchors that resist wind uplift yet permit expansion and contraction with temperature changes.

B. Flashing: Shall be the same material type and finish as the panels and sheets.

1. Temper may be reduced to facilitate forming.

C. Finish: Shall be factory baked on 70 percent Kynar or Hylar 5000 fluorocarbon coating with a dry film thickness of 0.7 to 0.8 mil exclusive of the primer.

1. Color to be Bronze.

2.3 Soffit

A. Soffit to be equal to Englert B4000 Soffit Panel

1. Panel to be 24 GA Galvalume or 0.040" Aluminum.
2. Panels seams to be 1" high at minimum 12" on center.
3. Color to be white
4. Screws to be corrosion resistant pancake screws

2.4 ACCESSORY ITEMS

A. Anchor Clips: Shall be series 300 non-magnetic stainless steel or stainless steel with galvanized steel base to minimize wear from thermal movement.

B. Fasteners: Screws shall be stainless steel self-taping

1. Exposed fasteners shall match the finish of the panel system and shall be stainless steel.
2. For weathertightness, screws shall have separate washers with hot bonded neoprene faces.
3. Pop-rivets shall be set in wet sealant.
4. Exposed fasteners shall be minimum No.14 size screw or 3/16 inch diameter rivet.
5. Insofar as possible, attachment screws shall be eliminated in favor of concealed cleats or clips.

C. Precut Foam Profile Closures: Shall be black closed cell foam meeting specifications ASTM D-1056 grade SCE-41 Black EPT

2.4 CLEANERS AND SEALANTS

A. SEALANTS
1. Sealant used with the roofing and siding shall be applied between surfaces during assembly with a minimum amount exposed on the completed installation.
2. Concealed sealant may be a non-curing, non-skinning butyl, polyisobutylene or polybutane tape of sufficient thickness to make full contact with both surfaces.
3. Exposed sealant shall be a curing type with excellent weather and sunlight resistance.
   a. Color shall be as selected by the Engineer
   b. Applied in accordance with the sealant manufacturer's recommendations.

B. Use only cleaners approved by the panel and sheet manufacturer for use on their product.

2.5 SNOW GUARDS

A. Snow Guards: Shall be as manufactured by SNOJAX Inc. Mechanicsburg, PA or an approved equal.
1. Clear polycarbonate.
2. Treated with ultraviolet stabilizer.
3. Adhesive application (no penetrations through roof panels)

2.6 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Storage and Handling
1. Protection shall be provided during fabrication, shipment, storage and erection.
   During shipment, finished surfaces shall be protected from abrasion by a removable plastic film between areas of contact.
3. Jobsite storage shall be in a clean, dry area out of direct contact with the ground, under cover or sloped for drainage, protected from abuse by traffic.
4. Installed panels shall be protected from abuse by other trades.

5. It shall be the responsibility of this Contractor to provide walk boards in areas of heavy traffic and any other measures required to prevent damage by his own crews.

B. Before Installation

1. Contractor shall verify that the structure is ready to receive his work.

2. He shall check field dimensions and alignment of structural members to assure that the roof panels and flashing will be straight and true.

C. Installation

1. All work shall be installed in accordance with the approved shop details under the direct supervision of an experienced sheet metal craftsman.
2. Attachments and joints shall allow for expansion and contraction from temperature changes without distortion or elongation of fastener holes.
3. Flashing shall be installed in strict accordance with the recommended practice in the AA, NRCA and SMACNA architectural sheet metal manuals.
4. There shall be no fasteners in end laps and isolated from dissimilar materials.
5. Continuous seal tape shall be installed in the ribs from eave to ridge.
6. The completed work shall be plumb and true, free of scrapes and dents.
7. Panel ribs shall be within the tolerances allowed by the actual construction dimensions.
8. Provide all required siding closure pieces and flashings at interface with dissimilar materials (i.e. exposed connections to pump station walls).
9. Excess sealant shall be removed and touch-up paint applied to any areas where paint scrapes occur.
10. Any panels which are badly damaged and in the judgment of the Engineer cannot be repaired shall be removed and replaced.
11. Snow guards shall be provided in the roof areas over the access doors.

3.2 CLEANUP

A. After completion of all work, thoroughly clean all areas impacted and properly dispose of all materials not incorporated in the work.

3.3 GUARANTEE AND WARRANTY

A. Provide specified guarantee and warranty to the Owner.

END OF SECTION

SECTION 07920

SEALANTS, CAULKING, WATERPROOFING AND WATER REPELLENT COATING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Seal, caulk or waterproof joints and surfaces around louvers, sills, doors, floor/wall penetrations, and existing joints as required by the Contract Documents. Apply water vapor barriers to slabs on grade and cavity walls.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 03300 Cast-in-Place Concrete
3. Section 04330 Cavity Wall Masonry System
4. Section 08100 Metal Doors and Frames
5. Section 15500 Heating, Ventilating and Air Conditioning

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

B. Do not retain at the job site material which has exceeded the shelf life recommended by its manufacturer.

PART 2 - PRODUCTS

2.1 SEALANTS

A. Sealants: Provide the following products or an equal:

Materials

1. Tremco: Dynamic Plus
   a. Location of Use: Throughout the Work, except where other sealant is specified, where anticipated joint movement will be 50% or less.

2. Sikaflex 2cSL: pourable 2-component self-leveling, shall be full length of sleeve
   a. Location of Use: PVC sleeve/PVC duct floor penetration for odor control unit
   b. Primer: Sikaflex Primer 449
      i) 2cSL shall be applied 1-8 hours after primer

3. Sikaflex 2cNS: pourable 2-component non-sag, (3) day min cure
   a. Location of Use: Cold joint between substructure wall and roof slab - rehabilitation/waterproofing
   b. Primer: Sikaflex Primer 429
   c. Waterproofing: Sikatop 144, (2) coats, 16 mils each
      i) Apply 12-inch strip, centered on cold joint

B. For other services, provide products especially formulated for the proposed use and approved in advance by the Engineer.

C. Colors:
   1. Colors for each sealant installation will be selected by the Engineer from standard colors normally available from the specified manufacturer.
   2. Should such standard color not be available from an approved substitute manufacturer except at additional charge, provide such colors at no additional cost to the Owner.

2.2 VAPOR BARRIER

A. Cavity wall 8" CMU exterior surface: Coating shall be rolled applied and equal to "Barriseal-R" as manufactured by Carlisle Coatings & Waterproofing, Wylie, TX, or equal.

B. Concrete slab on grade: Vapor barrier shall be 10 mil thick polyethylene plastic sheeting.
   1. Vapor transmission rating of 0.20 perms or less

2.3 PRIMERS

A. If not specified in above, use only those primers which have been tested for durability on the surfaces to be sealed and are specifically recommended for this installation by the manufacturer of the sealant used.

2.4 BACKUP MATERIALS

A. Use only those backup materials which are specifically recommended for this installation by the manufacturer of the sealant used, which are non-absorbent, and which are non-staining.

2.5 MASKING TAPE

A. For masking around joints, provide an appropriate masking tape which will effectively prevent application of sealant on surfaces not scheduled to receive it, and which is removable without damage to substrate.

2.6 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Concrete surfaces:
   1. Install only on surfaces which are dry, sound, and well brushed, wiping free from dust.
   2. At open joints, remove dust by mechanically blown compressed air if so required.
   3. To remove oil and grease, use sandblasting or wire brushing.
   4. Where surfaces have been treated, remove the surface treatment by sandblasting or wire brushing.
   5. Remove laitance and loose mortar from joint cavities.

B. Steel surfaces:

1. Steel surfaces in contact with sealant:
    a. Use solvent to remove oil and grease, wiping the surfaces with clean white rags only.

C. Aluminum surfaces:
1. Aluminum surfaces in contact with sealant:
    a. Remove temporary protective coatings, dirt, oil, and grease.
    b. When masking tape is used for protective cover, remove the tape just prior to applying the sealant.
    c. Use only such solvents to remove protective coatings as are recommended for that purpose by the manufacturer of the aluminum work, and which are non-staining.

3.3 INSTALLATION OF BACKUP MATERIAL

A. When using backup of tube or rod stock, avoid lengthwise stretching of the material. Do not twist or braid hose or rod backup stock.

B. Installation Tool:
1. For installation of backup material, provide a blunt surfaced tool of wood or plastic, having shoulders designed to ride on the adjacent finished surface and a protrusion of the required dimensions to assure uniform depth of backup material below the sealant.
2. Do not, under any circumstance, use a screwdriver or similar tool for this purpose.
3. Using the approved tool, smoothly and uniformly place the backup material to the depth indicated on the Drawings or otherwise required, compressing the backup material 25% to 50% and securing a positive fit.

3.4 PRIMING

A. Use only the primer approved by the Engineer for the particular installation, applying in strict accordance with the manufacturer's recommendations as approved by the Engineer.

3.5 BOND-BREAKER INSTALLATION

A. Provide an approved bond-breaker where recommended by the manufacturer of the sealant, and where directed by the Engineer, adhering strictly to the manufacturers' installation recommendations.

3.6 INSTALLATION OF SEALANTS AND CAULKING

A. Prior to start of installation in each joint, verify the joint type according to details on the Drawings, or as otherwise directed by the Engineer, and verify that the required proportion of width of joint to depth of joint has been secured.

B. Equipment:
   1. Apply sealant under pressure with power-actuated handgun or manually-operated handgun, or by other appropriate means.
   2. Use guns with nozzle of proper size, and providing sufficient pressure to completely fill the joints as designed.

C. Thoroughly and completely mask joints where the appearance of primer or sealant on adjacent surfaces would be objectionable.

D. Install the sealant in strict accordance with the manufacturer's recommendations, thoroughly filling joints to the recommended depth.

E. Tool joints to the profile shown on the Drawings, or as otherwise required if such profiles are not shown on the Drawings.

F. Cleaning up:
   1. Remove massing tape immediately after joints have been tooled.
   2. Clean adjacent surfaces free from sealant as the installation progresses, using solvent or cleaning agent recommended by the manufacturer of the sealant used.
   3. Upon completion of the work of this Section, promptly remove from the job site all debris, empty containers, and surplus material derived from this portion of the Work.

3.7 LOCATION OF WORK

A. This section shall include but not limited to the following locations:
   1. Perimeter of new sills and louvers, interior and exterior joint.
   2. Perimeter of new doors after recoating interior and exterior.
   3. Exterior surface of 8" CMU wall.
   4. Underside of new concrete slab on grade.

END OF SECTION

INDEX

DIVISION 8 - DOORS AND WINDOWS

SECTION 08100

METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide metal doors and metal frames as required by the Contract Documents.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

C. Related Work Not Included:
1. Installation of doors and frames is included in Section 04330 – Cavity Wall Masonry System, but as specified in this Section.
2. Section 07920 Sealants, Caulking, Waterproofing, and Water Repellent Coatings
3. Section 08710 Finish Hardware

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Provide all products of this Section from a single manufacturer, who specializes in the production of this type of work.

C. Templates for the approved hardware shall be furnished to the door and frame manufacturer by the Contractor for hardware alignment and reinforcing.

D. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section.

2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
3. Shop Drawings showing details of each frame type, elevations of door designs, details of openings, and details of construction, installation, and anchorage.
4. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 MATERIALS

A. To meet the following requirements:
1. ASTM A653 / A653M - 11 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
2. Supports and anchors to be fabricated with no less than 16 ga. sheet metal, galvanized after fabrication in compliance with ASTM A153 Class B.
3. Bolts and fasteners to be hot dip galvanized in compliance with ASTM A153, Class C or D.
4. Rust-inhibitive metal primer capable of being baked and compatible with the finish painting system as specified in Section 09900.

2.2 FABRICATION

A. Doors shall have the following attributes:
1. Face skin shall be (14) ga.
2. Lock rail and hinge rail shall be fourteen (14) ga.
3. Doors shall have smooth, flush surfaces free from visible joints or seams on exposed faces of stile edges except at glazed or louvered panel inserts.
4. Door top to be waterproof and door bottom shall be provided with weep holes.
5. Doors shall be flush type, hollow steel construction, 1 3/4-inches thick.
6. Closer reinforcement
7. Wetwell door to include fixed louver, with stainless steel insect screen.
8. Reinforce doors with rigid tubular frame where stiles and rails are less than 8-in. wide.
9. Core of door shall be sound deadened, reinforced, stiffened and insulated with impregnated Kraft honeycomb core, completely filling the inside face of both panels, with a solid slab of expanded polystyrene foam bonded to the inside of each face sheet
10. 16 ga. closure channels
11. Bevel doors, hinge and lock edges 1/8-inch in two (2) inches.

12. Reinforcement for hinge, mortise and surface mounted materials.
13. Exterior double doors shall provide for mortised manual flush bolts on inactive leaf and astragal for active leaf.

B. Frames

1. Provide galvanized pressed metal frames with profiles as shown on the Drawings with the following attributes:
2. Manufactured from hot dipped galvannealed steel
3. 14 ga. steel
4. Hinge reinforcing: 7 ga.
5. Lock/strike reinforcing: 14 ga.
6. Frame shall be of the integral construction type, welded continuous to full depth of frame with a minimum 5/8-inch deep stop.
7. Jamb anchors shall be of the corrugated or perforated T shape and extend not less than 8-in. into the masonry. Provide a minimum of three anchors for each jamb up to 7'-6" in height.
8. Provide mortar boxes in back of hardware cut-outs and weld to frame.
9. Provide floor anchors for each jamb and have a minimum of two holes for anchoring purposes. Floor anchors shall be fabricated from a minimum of 14 ga. galvanized steel.
10. All anchors shall be welded into frame.
11. Frame to have cut-outs and reinforcement for mortise and surface mounted finish hardware
12. Provide removable spreader bars at the bottom of the frame, tack welded to jambs.
13. Frames to have provisions for silencers .
14. Frame to have provisions for silencers .
15. Provide cutsheets on primer coats applied.
16. Frames shall be bonderized and receive one coat of factory baked-on prime coat.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Frames:
1. Frame setting is to be coordinated with the masonry work.
2. Set frames accurately into position, plumbed, aligned, and securely braced.
3. Fill jambs and head solid with mortar as masonry work progresses.
4. Install all built-in anchoring devices as required.
5. Install all built-in anchoring devices as required.

6. Remove spreader bars after frames are permanently in place.

B. Doors
   1. Install door in proper frame.
   2. Install to insure a smooth swing and proper contact with the frame on closing.

3.3 ADJUSTMENT AND TOUCH-UP

A. Remove and replace with new any door or frame that is damaged.

B. Immediately after erection, sand smooth all rusted and abraded areas of prime coat, and apply touch-up of compatible air-drying primer.

END OF SECTION

SECTION 08306

ALUMINUM HATCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Provide aluminum hatches as required by the Contract Documents.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
1. Section 02605 Precast Concrete Valve Vault
2. Section 02742 Precast Concrete Sanitary Sewer Manholes

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. For purposes of designating type and quality for work in this Section, drawings and specifications are based on aluminum hatches as manufactured by the Bilco Company, New Haven, CT.

C. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 20 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
3. Shop Drawings showing details of each frame type, details of openings, and details of construction, installation and anchorage.
4. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 HATCHES

A. Aluminum hatches shall be type "J" or type "JD" as manufactured by the Bilco Co., New Haven, CT and shall have the following attributes:
   1. Shall have 1/4-inch aluminum diamond plate pattern structurally reinforced to withstand 3000 lbs per s.f. loading.
   2. Channel frame shall be 1/4-inch aluminum with an anchor flange around the perimeter.
   3. Shall include fall protection grating system (not required on precast concrete valve vault access hatch)
      a. An aluminum grating with a safety-yellow power coat paint finish for added durability
      b. Equipped with a stainless steel automatic hold-open device that securely locks the panel in the full open position
      c. Features stainless steel hardware for corrosion resistance
      d. Supplied with a padlock hasp for added security
   4. Door shall be equipped with stainless steel hardware throughout.
   5. Channel frame shall have a 1-1/2 inch drainage coupling.
   6. Lock shall be of the slam lock design with removable key wrench.
   7. Compression spring operators.
   8. A stainless steel safety clasp shall be attached to the hatch with stainless steel machine screws.
   9. Sizes as shown on the Drawings.
   10. Provide two (2) T-wrenches for hatch.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 COORDINATION

A. Coordinate as required with other trades to assure proper and adequate provision in the work of these trades for interface with the work of this Section.

B. Make measurements as required in the field to assure proper fit.

3.3 INSTALLATION

A. Hatches
   1. Coat all aluminum that will be in contact with concrete with bitumastic.
   2. Provide the necessary curb formwork to set the hatch to grade.
   3. Anchor hatch to formwork and insure that it is plumb and level. Operate lid to insure that the frame is not twisted.
   4. Brace hatch securely to insure that it does not move during concrete placement.
   5. Cover all exposed aluminum to prevent staining by the concrete.

3.4 CLEANING AND PROTECTION

A. Once formwork and protective coverings have been removed clean the exposed aluminum of any stains.

B. Provide plywood covers to cover the hatches during construction so they are not damaged. Damaged hatches shall be replaced.

END OF SECTION

SECTION 08520

ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide aluminum windows and screens as required by the Contract Documents.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 07920 Sealants, Caulking, Waterproofing and Water Repellent Coatings
3. Section 08800 Glazing

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. For purposes of designating type and quality for work in this section, drawings and specifications are based on Hope's Series 210T aluminum thermal-break projected and fixed windows.

C. Comply with the following standards:
1. Air infiltration test
   a. ASTM E283.
   b. Maximum air infiltration 0.5 CFM/Ft. of crack length at a test pressure of 6.24 PSF (50 MPH).

2. Water penetration test
   a. ASTM E331.
   b. No water penetration for 15 minutes when window is subjected to a rate of flow of 5 gal./hr./sq.ft. with differential pressure across window unit of 6.24 PSF.

3. Thermal performance: A complete window made in accordance with the plans and specification shall, when tested in accordance with AAMA Standard Test 1502.6-1976, provide a CRF (condensation resistance factor) of not less than 51. Using the testing equipment and conditions outlined in AAMA Test 1502.6-1976, the tested conductive U value shall not exceed .61 BTU/hr./sq.ft./°F. for a unit glazed with 1-inch insulating glass containing a 1/2-inch air space. Calculated "U" value derived from data and theoretical assumptions will not be acceptable.

4. Upon request the window manufacturer shall provide a test report from a qualified independent testing laboratory regularly engaged in testing windows to verify that his products conform to these test requirements.

5. On each unit, provide an AAMA sponsored label certifying compliance with the specified requirements.

D. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades;
4. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

C. Samples
1. Sample of finish
2. Each type of stainless steel fastener

D. Upon approval the above shall become the standard acceptance for the Work in regard to construction and finish of each item.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

PART 2 - PRODUCTS

2.1 ALUMINUM WINDOWS

A. Frame, ventilator and rail members shall be solid extruded aluminum shapes of 6063-T52 alloy, not less than 2-inches deep, with a minimum wall thickness of .125".
   1. All members shall be designed with an internal cavity which is filled with polyurethane to form a thermal separator.
   2. Ventilator members shall have two dovetail grooves extruded into sections to facilitate weather-stripping.
   3. Glazing rebate legs shall provide an unobstructed height of not less than 3/4-inch and designed to accommodate glass up to and including 1-inch thick insulating glass and panel areas up to 1 1/2-inches thick.

B. The frame thermal insulator shall be poured in place polyurethane. The polyurethane shall be self-adhering to the adjacent aluminum surfaces.

C. Glazing beads shall be extruded from 6063-T52 alloy and be not less than .050 thick. Glazing beads will be the hook-on type to accommodate pressure gasket glazing.

D. Weather stripping shall be extruded dual durometer vinyl.

E. Hardware
   1. Ventilators shall be balanced on No. 301AL heavy-duty stainless steel and aluminum assemblies. Nylon slides with a suitable setscrew shall be provided for friction adjustment. Stainless steel pins shall be used at all pivotal points.
   2. Use 1202 bronze fasteners for project-out ventilators.
   3. Use 167 bronze fasteners for project-in ventilators.
   4. All hardware shall be attached with stainless steel screws.

F. Screens
   1. Screen frames shall be extruded aluminum.
   2. Mesh shall be 18 x 16 mesh aluminum wire cloth having a nominal diameter of not less than .011".

2.2 FABRICATION

A. Fabricate aluminum windows in accordance with approved shop drawings.

B. The four corners of both the frame and ventilator shall be miter cut, reinforced with two extruded corner gussets per corner and hydraulically crimped in eight places.

C. Cross rails and muntins shall be coped and mechanically fastened.

D. Where frame sections are reversed, joints shall be coped and reinforced with extruded gussets.

E. The back wall of the polyurethane pocket shall be removed to form a thermal barrier system. There shall be no bridges, corner construction or hardware application that bridges or violates the thermal barrier in any way.

F. Operable hardware
1. Projected vents shall be hung on #301L four bar hinges securely attached to the vent and frame with stainless steel screws.
2. Provide two fasteners per vent where sash width exceeds 4'-8".
3. Projected ventilator fasteners shall be shipped loose for field installation and adjustment.

G. Weather stripping shall be securely interlocked into both the inside and outside weathering grooves of the ventilator. Adhesive applied weather-stripping will not be allowed.

H. Glazing
1. All ventilators and fixed lights shall be designed for glazing.
2. Provide continuous hook-on glazing beads to suit the glass thickness as specified, which shall in no instance bridge the thermal barrier.

I. Screens
1. Screen frames shall be extruded aluminum, rewireable and filled with 18 x 16 mesh aluminum cloth.
2. Screen fastenings shall permit easy attachment and removal from the interior.
3. Provide flat screens for project-in ventilators and wicket screens for project-out ventilators.
4. Finish screens to match sash color.

J. Factory applied finishes. All windows shall be chemically cleaned of all fabricating oils and debris and given the following finish:
1. Duranodic 300 No. AAC12 C22 A42 (.0007 anodic film thickness) Architectural Class I. 312 White

PART 3 - EXECUTION

3.1 INSPECTION

A. Window openings shall conform with details, dimensions and tolerances shown on the window manufacturer's approved shop drawings.

B. Conditions which may adversely affect the window installation must be corrected before installation commences.

3.2 INSTALLATION

A. Windows specified under this section shall be installed by the window manufacturer.

B. Install windows in openings in strict accordance with approved shop drawings.
   1. Set units plumb, level and true to line, without warp or rack of frames or vents.
   2. Anchor units securely to surrounding construction with approved fasteners.
   3. The exterior joints between the sash, trim and mullions shall be properly sealed watertight with an approved sealant and neatly pointed.

C. Attach ventilator hardware and adjust ventilators to operate smoothly, free from twist and be weather tight when closed.

3.3 CLEANING

A. Labels:
   1. Leave all labels in place, intact and legible, until reviewed and approved by the Engineer.

B. Prior to completion of the Work, thoroughly clean all exposed surfaces of windows and screens.
   1. Use only the cleaning materials and techniques recommended by the manufacturer of the material being cleaned.
   2. Do not scratch or otherwise damage the aluminum finish.

END OF SECTION

SECTION 08710

FINISH HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:
1. Furnish finish hardware as required by the Contract Documents.
2. Furnish trim attachments and fastenings, specified or otherwise required, for proper and complete installation.
3. Deliver to the job site those items of finish hardware scheduled to be installed at the job site; and deliver to other points of installation those items of finish hardware scheduled to be factory installed.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 08100 Metal Doors and Frames

C. Related Work not Included:

D. Definitions:
1. "Hardware Sets" are described in the Hardware Schedule in Part 3 of this Section.

1.2 QUALITY ASSURANCE

A. The hardware supplier shall have in his employment a member of the American Society of Architectural Hardware Consultants who shall be responsible for the finish hardware Section of this specification.

B. Contractor shall require Hardware Supplier's Representative to visit prior to placement of order to confirm sizing and function of materials specified and any recommendations for variance shall be submitted to Engineer for review prior to placement of order.

C. Hardware Supplier's Representative shall be present at completion of construction, and:
1. Inspect installation of all finish hardware items;
2. Make all minor adjustments required; and
3. Report to the Engineer on completeness of the installation.

D. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Materials list of items proposed to be provided under this Section.

C. Samples:
   1. Within 15 calendar days after being so requested by the Engineer, deliver to the Engineer Samples of each finish hardware item.
   2. All Samples will be returned to the Contractor; provided those Samples which are approved by the Engineer are positively identified and are installed in the Work at locations agreed to by the Engineer.

D. Templates: In a timely manner to assure orderly progress of the Work, deliver templates or physical samples of the approved finish hardware items to pertinent manufacturers of interfacing items such as doors and frames.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

B. Individually package each unit of finish hardware, complete with proper fastenings and appurtenances, clearly marked on the outside to indicate contents and specific locations in the Work.

PART 2 - PRODUCTS

2.1 GENERAL

A. Fasteners:
   1. Furnish necessary screws, bolts, and other fasteners of suitable size and type to anchor the hardware in position for long life under hard use.
   2. Where necessary, furnish fasteners with toggle bolts, expansion shields, hex bolts, and other anchors approved by the Engineer, according to the material to which the hardware is to be applied and according to the recommendations of the hardware manufacturer.
   3. Provide fasteners which harmonize with the hardware as to finish and material.

B. Where butts are required to swing 180 degrees, furnish butts of sufficient throw to clear the trim.

C. Furnish silencers for doorframes at the rate of three for each single door and two for each door or pair of doors.

2.2 KEYING

A. All doors shall be provided with a Best (manufacturer) lock cylinder, for Town standard. Town of Natick will provide their own core once project is accepted.

B. Provide cylinder housings to accept permanent cores for the Town's existing Best key system conforming to the following requirements:
   1. Provide construction cores with construction master keying for use during construction. The Town shall install permanent keyed cores upon completion of the project. The temporary construction cores are to be returned to the hardware supplier.
   2. Permanent cores shall be furnished and keyed by the Owner.
   3. The hardware supplier, accompanied by a qualified factory representative for the manufacturer of the cores and cylinders, shall meet with Town and Engineer to review keying requirements and lock functions prior to ordering finish hardware.
   4. Provide keys as follows
      a. Three key blanks per lock and/or cylinder.
      b. Two construction core control keys
      c. Six construction master keys for each type (Contractor is to provide one set of construction keys to Engineer)
   5. Deliver all key blanks from the factory or authorized distributor directly to the Owner in sealed containers, return receipt requested. Failure to comply with these requirements may be cause to require replacement of all or any part of the keying system that was compromised at no additional cost to the Owner.
   6. Approved products: Best, no substitute.

2.3 DOOR CLOSERS

A. Provide door closers certified to ANSI/BHMA A156.4 Grade 1 requirements by a BHMA certified independent testing laboratory. Closers shall be ISO 9000 certified. Units shall be stamped with date of manufacture code.

B. Door closers shall have fully hydraulic, full rack and pinion action with a high strength cast iron cylinder, and shall utilize full complement bearings at shaft. Cylinder body shall be 1-1/2 inch diameter, and double heat-treated pinion shall be 11/16 inch diameter.

C. Provide hydraulic fluid requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F. Fluid shall be fireproof and shall pass the requirements of the UL10C "positive pressure" fire test.

D. Spring power shall be continuously adjustable over the full range of closer sizes, and allow for reduced opening force as required by accessibility codes and standards. Hydraulic regulation shall be by tamper-proof, non-critical valves. Closers shall have separate adjustment for latch speed, general speed, and backcheck.

E. Provide closers with a solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers and include hold open functionality.

F. Closers shall not incorporate Pressure Relief Valve (PRV) technology.

G. Closer cylinders, arms, adapter plates, and metal covers shall have a powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or shall have special rust inhibitor (SRI).

H. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other finish hardware items interfering with closer mounting.

I. Door closers meeting this specification: Stanley Commercial Hardware QDC100 series, Allegion LCN 4040XP series, Assa Abloy Sargent 280 series factory assembled (without PRV).

2.4 MORTISE LOCKS

A. Provide mortise locks certified as ANSI A156.13, Grade 1 Operational, Grade 2 Security, and manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance. Lock case shall be multi-function and field reversible for handing without opening the case. Cylinders: Refer to 2.2 KEYING.

B. Provide locks with a standard 2-3/4 inches backset with a full 3/4 inch throw stainless steel mechanical anti-friction latchbolt. Deadbolt shall be a full 1-inch throw, constructed of stainless steel.

C. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.

D. Lever trim shall be solid brass, bronze, or stainless steel, cast or forged in the design specified, with wrought roses and external lever spring cages. Levers shall be thru-bolted to assure proper alignment, and shall have a 2-piece spindle.
   1. Lever design shall be Stanley Best 14H.
   2. Lever trim on the secure side of doors serving rooms considered by the Town having jurisdiction to be hazardous shall have a tactile warning.
   3. Acceptable manufacturers and/or products: Stanley Best 45H series, Allegion Schlage L9000 series, Assa Abloy Sargent 8200 series.

2.5 CYLINDRICAL LOCKS

A. Provide cylindrical locks conforming to ANSI A156.2 Series 4000, Grade 1. Cylinders: Refer to 2.2 KEYING.

B. Provide locks with a standard 2-3/4 inches backset, unless noted otherwise, with a 1/2 inch latch throw. Provide proper latch throw for UL listing at pairs.

C. Provide locksets with a separate anti-rotation throughbolts, and shall have no exposed screws. Levers shall operate independently, and shall have two external return spring cassettes mounted under roses to prevent lever sag.

D. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.

SECTION 08710

FINISH HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:
1. Furnish finish hardware as required by the Contract Documents.
2. Furnish trim attachments and fastenings, specified or otherwise required, for proper and complete installation.
3. Deliver to the job site those items of finish hardware scheduled to be installed at the job site; and deliver to other points of installation those items of finish hardware scheduled to be factory installed.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 08100 Metal Doors and Frames

C. Related Work not Included:

D. Definitions:
1. "Hardware Sets" are described in the Hardware Schedule in Part 3 of this Section.

1.2 QUALITY ASSURANCE

A. The hardware supplier shall have in his employment a member of the American Society of Architectural Hardware Consultants who shall be responsible for the finish hardware Section of this specification.

B. Contractor shall require Hardware Supplier's Representative to visit prior to placement of order to confirm sizing and function of materials specified and any recommendations for variance shall be submitted to Engineer for review prior to placement of order.

C. Hardware Supplier's Representative shall be present at completion of construction, and:
1. Inspect installation of all finish hardware items;
2. Make all minor adjustments required; and
3. Report to the Engineer on completeness of the installation.

D. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Materials list of items proposed to be provided under this Section.

C. Samples:
   1. Within 15 calendar days after being so requested by the Engineer, deliver to the Engineer Samples of each finish hardware item.
   2. All Samples will be returned to the Contractor; provided those Samples which are approved by the Engineer are positively identified and are installed in the Work at locations agreed to by the Engineer.

D. Templates: In a timely manner to assure orderly progress of the Work, deliver templates or physical samples of the approved finish hardware items to pertinent manufacturers of interfacing items such as doors and frames.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

B. Individually package each unit of finish hardware, complete with proper fastenings and appurtenances, clearly marked on the outside to indicate contents and specific locations in the Work.

PART 2 - PRODUCTS

2.1 GENERAL

A. Fasteners:
   1. Furnish necessary screws, bolts, and other fasteners of suitable size and type to anchor the hardware in position for long life under hard use.
   2. Where necessary, furnish fasteners with toggle bolts, expansion shields, hex bolts, and other anchors approved by the Engineer, according to the material to which the hardware is to be applied and according to the recommendations of the hardware manufacturer.
   3. Provide fasteners which harmonize with the hardware as to finish and material.

B. Where butts are required to swing 180 degrees, furnish butts of sufficient throw to clear the trim.

C. Furnish silencers for doorframes at the rate of three for each single door and two for each door or pair of doors.

2.2 KEYING

A. All doors shall be provided with a Best (manufacturer) lock cylinder, for Town standard. Town of Natick will provide their own core once project is accepted.

B. Provide cylinder housings to accept permanent cores for the Town's existing Best key system conforming to the following requirements:
   1. Provide construction cores with construction master keying for use during construction. The Town shall install permanent keyed cores upon completion of the project. The temporary construction cores are to be returned to the hardware supplier.
   2. Permanent cores shall be furnished and keyed by the Owner.
   3. The hardware supplier, accompanied by a qualified factory representative for the manufacturer of the cores and cylinders, shall meet with Town and Engineer to review keying requirements and lock functions prior to ordering finish hardware.
   4. Provide keys as follows
      a. Three key blanks per lock and/or cylinder.
      b. Two construction core control keys
      c. Six construction master keys for each type (Contractor is to provide one set of construction keys to Engineer)
   5. Deliver all key blanks from the factory or authorized distributor directly to the Owner in sealed containers, return receipt requested. Failure to comply with these requirements may be cause to require replacement of all or any part of the keying system that was compromised at no additional cost to the Owner.
   6. Approved products: Best, no substitute.

2.3 DOOR CLOSERS

A. Provide door closers certified to ANSI/BHMA A156.4 Grade 1 requirements by a BHMA certified independent testing laboratory. Closers shall be ISO 9000 certified. Units shall be stamped with date of manufacture code.

B. Door closers shall have fully hydraulic, full rack and pinion action with a high strength cast iron cylinder, and shall utilize full complement bearings at shaft. Cylinder body shall be 1-1/2 inch diameter, and double heat-treated pinion shall be 11/16 inch diameter.

C. Provide hydraulic fluid requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F. Fluid shall be fireproof and shall pass the requirements of the UL10C "positive pressure" fire test.

D. Spring power shall be continuously adjustable over the full range of closer sizes, and allow for reduced opening force as required by accessibility codes and standards. Hydraulic regulation shall be by tamper-proof, non-critical valves. Closers shall have separate adjustment for latch speed, general speed, and backcheck.

E. Provide closers with a solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers and include hold open functionality.

F. Closers shall not incorporate Pressure Relief Valve (PRV) technology.

G. Closer cylinders, arms, adapter plates, and metal covers shall have a powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or shall have special rust inhibitor (SRI).

H. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other finish hardware items interfering with closer mounting.

I. Door closers meeting this specification: Stanley Commercial Hardware QDC100 series, Allegion LCN 4040XP series, Assa Abloy Sargent 280 series factory assembled (without PRV).

2.4 MORTISE LOCKS

A. Provide mortise locks certified as ANSI A156.13, Grade 1 Operational, Grade 2 Security, and manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance. Lock case shall be multi-function and field reversible for handing without opening the case. Cylinders: Refer to 2.2 KEYING.

B. Provide locks with a standard 2-3/4 inches backset with a full 3/4 inch throw stainless steel mechanical anti-friction latchbolt. Deadbolt shall be a full 1-inch throw, constructed of stainless steel.

C. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.

D. Lever trim shall be solid brass, bronze, or stainless steel, cast or forged in the design specified, with wrought roses and external lever spring cages. Levers shall be thru-bolted to assure proper alignment, and shall have a 2-piece spindle.
   1. Lever design shall be Stanley Best 14H.
   2. Lever trim on the secure side of doors serving rooms considered by the Town having jurisdiction to be hazardous shall have a tactile warning.
   3. Acceptable manufacturers and/or products: Stanley Best 45H series, Allegion Schlage L9000 series, Assa Abloy Sargent 8200 series.

2.5 CYLINDRICAL LOCKS

A. Provide cylindrical locks conforming to ANSI A156.2 Series 4000, Grade 1. Cylinders: Refer to 2.2 KEYING.

B. Provide locks with a standard 2-3/4 inches backset, unless noted otherwise, with a 1/2 inch latch throw. Provide proper latch throw for UL listing at pairs.

C. Provide locksets with a separate anti-rotation throughbolts, and shall have no exposed screws. Levers shall operate independently, and shall have two external return spring cassettes mounted under roses to prevent lever sag.

D. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.

E. Lever trim shall be solid cast levers without plastic inserts, and wrought roses on both sides. Locksets shall be thru-bolted to assure proper alignment.
   1. Lever design shall be Stanley Commercial Hardware Summit (M).
   2. Lever trim on the secure side of doors serving rooms considered by the Town having jurisdiction to be hazardous shall have a tactile warning.

F. Acceptable manufacturers and/or products: Stanley Commercial Hardware QCL100 series, Allegion Schlage ND series, Assa Abloy Sargent 10-Line series.

2.6 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Provide thresholds, weatherstripping (including door sweeps, seals, astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items as closely as possible. Size of thresholds shall be as follows:
   1. Exterior Saddle Thresholds – 1/2 inch high x jamb width x door width
   2. Interior Saddle Thresholds – ¼ inch high x jamb width x door width
   3. Bumper Seal Thresholds – 1/2 inch high x 5 inches wide x door width

B. Provide door sweeps, seals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.7 PRODUCT SUMMARY

A. Single source for items:
   1. Except as specifically otherwise approved in advance by the Engineer, furnish for each item (such as "door butt type 1") only the product of a single manufacturer.
   2. To the maximum extent practicable, furnish similar items (such as "door butts") only as the product of a single manufacturer.

B. All hardware shall be of the best grade entirely free from imperfections in manufacture and finish.

C. For each of the required items of finish hardware, provide from the specified manufacturer or from one of the indicated acceptable substitutes.

ITEM	MANUFACTURER	ACCEPTABLE SUBSTITUTE
Cylinders and Keying	Best	None
Hinges	Stanley	McKinney, Hager
Closers	Stanley	LCN, Sargent
Mortise Locksets	Best	Corbin, Sargent
Cylindrical Locksets	Stanley	Schlage, Sargent
Exit Device (panic/fire exit)	Precision	Von Duprin, Sargent
Lever and Escutcheon	(see locksets)	
Latch protector	Best	
Overhead stop	ABH Manufacturing	Glynn Johnson, Rixson
Exit Kick Plate		S.S.

Mortised Auto Door Bottom	National Guard Prod.	Reese, Pemko
Thresholds, Weatherstrip	National Guard Prod.	Reese, Zero
Flush Bolts	Ives	
Astragal	National Guard Prod.	Reese
Stops	Ives	Sargent, Glynn Johnson
Door Sweep	National Guard Prod.	Reese, Pemko
Rain Drip	National Guard Prod.	Reese, Pemko
Silencers	Glyn Johnson	Baldwin

D. Provide the finishes as shown on the Hardware Set.

E. Closers are to be sized for the size and location of the door it shall serve and shall have hold-open feature.

F. Hinges on exterior doors shall have non-removable pins when the door is in the closed position.

G. Kick plates shall be stainless steel 8-inches high, 2-inches less in width than the door and a minimum thickness of 0.050".

2.8 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 DELIVERIES

A. Stockpile items sufficiently in advance to assure their availability, and make necessary deliveries in a timely manner to assure orderly progress of the total Work.

3.2 INSTALLATION

A. Installation of hardware items shall be in accordance with the hardware manufacturer's recommendations and templates. ANSI A115.IG, "Installation Guide for Doors and Hardware" shall be consulted for other pertinent information.

3.3 COORDINATION

A. Coordinate as necessary with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

B. Upon completion of the Work, and as a condition of its acceptance, provide the inspection, adjustment, and report described in Article 1.2 above.

3.4 FINISH HARDWARE SCHEDULE

A. Furnish the following Hardware Sets.

B. Model numbers given in the Hardware Sets are for the Manufacturer, as listed in Par. 2.7.C.

C. The listed sets are per location:

Hardware Sets No. 1:

(1) Mortise lockset, Best	45H-7D14H, 626
(1) Cylindrical lockset, Stanley	QCL171M, 626
(3) Hinges, Stanley	CB199 NRP, US32D
(1) Latch protector, Best	LP-211-SL
(1) Closer, Stanley Comm. Hardware	QDC115, 689
(1) Overhead stop, ABH Manufacturing	Concealed HD 1000 Series, 630
(1) Kick Plate	S.S.
(1) Weatherstrip (head and jambs), Reese	655A
(1) Door sweep, Reese	354C
(1) Threshold, Reese	S425A
(1) Rain drip, Reese	R201A

END OF SECTION

SECTION 08800

GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide glazing and glazing accessories as required by the Contract Documents.

B. Related work:
   1. Documents affecting work of this Section, include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   2. Section 08520 Aluminum Windows

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Comply with pertinent recommendations contained in:
   1. Flat Glass Marketing Association:
      a. "Glazing Sealing Systems Manual"
      b. "Glazing Manual"

C. The Contractor shall conduct all work in a first-class workmanlike manner, and he/she shall use reasonable and appropriate care and skill in the performance of the work under this section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data: Within 60 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Materials list of items proposed to be provided under this Section.
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
   3. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01610.

B. During storage and handling of glass, provide cushions at edges to prevent impact damage.

PART 2 - PRODUCTS

2.1 GLASS

A. General
1. For all glass, provide the type and thickness required by the Contract Documents.
2. Where type or thickness, or both, are not shown on the Drawings or specified herein, provide type and thickness directed by the Engineer from the specified products.
3. Each piece of glass shall bear the manufacturer's label showing grade, thickness, strength and quality of the glass. All labels are to remain in place until the glass has been set and inspected by the Engineer. On the glass which is not cut to size by the manufacturer, the glazing contractor shall submit an affidavit stating the strength, grade, thickness, type, quality and the manufacturer of the glass furnished.

B. Insulating glass shall be Solarbronze tinted units as manufactured by P.P.G. Industries, or equals by Ford Glass or ASG Industries, Inc. The units shall consist of two lights of 1/4-inch fully tempered glass, as specified below with 1/2-inch air space. Outside light to be tinted bronze and the inside light clear.

C. Insulating glass units shall carry a written 10-year guarantee from the manufacturer against failure of the hermetic seal. The guarantee period shall start at final acceptance of the Work.

2.2 GLASS SCHEDULE

A. Fully Tempered Glass

2.3 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

B. Clean glazing channels, stops, and rabbets to receive the glazing materials, making free from obstructions and deleterious substances which might impair the work.
   1. Remove protective coatings which might fail in adhesion or interfere with bond of sealants.
   2. Comply with manufacturers' instructions for final wiping of surfaces immediately prior to application of primer and glazing compounds or tapes.
   3. Prime surfaces to receive glazing compounds in accordance with manufacturer's recommendations.

C. Environmental Conditions
   1. Do not apply glazing materials in temperature below 40 degrees F., during damp or rainy weather, or when temperature is above 100 degrees F. Do not allow condensation to form on surfaces of openings to receive glass.

3.2 INSTALLATION

A. Inspect each piece of glass immediately prior to start of installation.
   1. Do not install items which are improperly sized, have damaged edges, or are scratched, abraded, or damaged in any other manner.
   2. Do not remove labels from glass.
   3. Install glass so distortion waves, if present, run in the horizontal direction.

B. Locate setting blocks at sills one quarter of the width of the glass in from each end of the glass, unless otherwise recommended by the glass manufacturer.
   1. Use blocks of proper size to support the glass in accordance with manufacturer's recommendations.
   2. Provide spacers for all glass sizes larger than 50 united inches, to separate glass from stops; except where continuous glazing gaskets or felts are provided.
      a. Locate spacers no more than 24-inches apart, and no closer than 12-inches to a corner.
      b. Place spacers opposite one another.
      c. Make bite of spacer on glass 1/4-inch or more.

C. Set glass in a manner which produces the greatest possible degree of uniformity in appearance.

D. Do not use two different glazing materials in the same joint system unless the joint use is approved in advance by the Engineer.

E. Mask, or otherwise protect, surfaces adjacent to installation of sealants.

F. Miter cut and seal the joints of glazing gaskets in accordance with the manufacturer's recommendations, to provide watertight and airtight seal at corners and other locations where joints are required.

3.3 PROTECTION

A. Protect glass from breakage after installation by promptly installing streamers or ribbons, suitably attached to the framing and held free from glass. Do not apply warning markings, streamers, ribbons, or other items directly to the glass except as specifically directed by the Engineer.

B. Prior to final acceptance, replace broken, damaged or defective materials, remove all labels, and clean and polish lites inside and outside.

END OF SECTION