SECTION 03420

PRECAST PRESTRESSED CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

The extent of precast concrete units shall be concrete vaults for solenoid valves.

1.2 DESIGN LOADS

All prestressed concrete products shall be designed to support the dead loads from the structures shown on the plans and live loads for H20 Traffic Loads from vault lids.

1.3 QUALITY ASSURANCE

A. Comply with the requirements of applicable codes and standards as specified in the referenced sections of these specifications and as herein specified.

B. Fabricator Qualifications: Only a firm which has had a minimum of five (5) years successful experience in the fabrication and design of precast concrete units similar to the units required for this project will be acceptable. Fabricator must have sufficient production capacity to produce the required units without causing any delay in the work. Fabricator shall preferably have in-house engineering staff.

Fabricator must be an active member of the Prestressed Concrete Institute (PCI) and be certified under its Plant Certification Program.

C. Fabrication Qualifications:

(1) Produce precast concrete units as a fabricating plant engaged primarily in the manufacturing of similar units, unless plant fabrication is impractical. If units are produced at locations other than precast concrete fabricating plants, maintain procedures and conditions for quality control which are equivalent to plant production.

Comply with PCI MNL-116 "Manual for Quality Control" for the production of precast concrete units.

(2) Verify dimensions of supporting structures at the project site and adjust final shop drawings to reflect actual field dimensions.

(3) Design modifications may be made only as necessary to meet field conditions and to ensure proper fitting of the work, and only as acceptable to the Engineer. Maintain the general design concept shown without increasing or decreasing size of members or altering profiles and alignment shown. Provide complete design calculations and drawings prepared by a registered engineer.

(4) Deliver precast concrete units to the project site in such quantities and at such times as will assure the continuity of the installation. Store units at the project site to ensure against cracking, distortion, staining, or other physical damage. Lift and support units at the same points where they will be supported in the finished structure.

D. Reference Specifications:

(1) Formwork: Comply with applicable requirements of Section 03300 for materials, fabrication, installation, and removal of formwork for precast concrete units and as herein specified.

(2) Reinforcement: Comply with applicable requirements of Section 03300 for materials, fabrication, and installation of reinforcement for precast concrete units and as herein specified.

(3) Concrete: Comply with applicable requirements of Section 03300 for materials, testing, mixing, placing, curing, and finishing of concrete for precast concrete units and as herein specified.

(4) Prestressed Precast Concrete Units: Comply with the recommended practices and procedures of the Prestressed Concrete Institute (PCI) MNL-116, and as herein specified.

1.4 SUBMITTALS

Submit the following for precast concrete in accordance with Section 01300:

A. Manufacturer's Data, Precast Concrete: Submit (2) two copies of manufacturer's specifications and instructions for all manufactured materials and products. Include manufacturer's certifications and laboratory test reports as required. Include erection procedure for precast units, sequence of erection, and required handling equipment. Indicate that copy of each instruction has been transmitted to the installer.

B. Design Data and Engineer's Certification: Submit complete structural calculations for all precast prestressed concrete members prepared by a

professional engineer registered in the state in which the work is to be performed. All calculations and related drawings shall bear the seal of the professional Engineer.

C. Shop Drawings, Precast Concrete: Submit shop drawings complete with information for the fabrication and installation of precast concrete units. Indicate member dimensions and cross-section, location, size, and type of reinforcement, including special reinforcement and lifting devices necessary for handling and erection.

Provide layout, dimensions, and identification of each precast unit corresponding to the sequence and procedure of installation. Indicate welded connections by AWS standard symbols. Detail inserts, connections and joints, including accessories and construction at openings in precast units.

Provide location and details of anchorage devices that are to be embedded in other construction.

Provide details on grouting accessories to be cast into precast units.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Uncoated 10 gauge wire cage with ⅜" diameter re-bar as required to meet ACI codes and load requirements.

2.2 CONNECTION MATERIALS

A. Steel Plates: Structural quality, hot-rolled carbon steel complying with ASTM A-36 or ASTM A-283, Grade C.

B. Structural-Size Steel Shapes: ASTM A-36.

C. Bar-Size Steel Shapes, Steel Bar Flats, and Steel Bar Rounds: ASTM A36 or ASTM A306, Grade 65.

D. Anchor Bolts: Flexible type, as follows:

Tempered hardboard, not less than ⅛-inch thick, smooth two (2) sides, complying with Commercial Standard CS251. Size as shown.

Elastomeric material of vulcanized, chloroprene elastomeric compound, molded to size or cut from a molded sheet. Size as shown.

2.3 CONCRETE MIX DESIGN AND TESTING

A. Comply with the applicable requirements of Section 03100 for materials, mix design, testing, and types of concrete required, and as herein specified.

B. Cure compression test cylinders using the same methods as used for the poured-in-place concrete work.

C. Conduct compressive strength tests for every 10 precast units, or fraction thereof, cast in any one day. Test two (2) specimen cylinders at seven (7) days, three (3) specimen cylinders at 28 days, and retain one specimen cylinder for further testing as may be required.

D. Produce standard-weight concrete consisting of the required Portland cement, aggregates, admixtures, and water to produce the following properties:

Compressive Strength:	4,000 psi minimum at 28 days.
Maximum Aggregate Size:	¾-inch
Minimum Cement Content:	Seven (7) sacks per cu. yd. of concrete.
Slump at Point of Discharge:	3 Inch Maximum.
Total Air Content:	Not less than 4% nor more than 6%.
Additives	Fiberglass

E. Dimensional Tolerances: Fabricate precast concrete units complying with the dimensional tolerances of PCI MNL-116 unless otherwise shown on the drawings.

F. Comply with reference specifications for applicable methods of formwork and reinforcement, concrete mixing, placing, curing, and finishing, and as herein specified.

G. Prestressed Precast Concrete Forms: In addition to the requirements of Section 03300, construct forms to withstand tensioning and detensioning operations. Unless forms for plant-manufactured prestressed concrete units are stripped prior to detensioning, design forms so that stresses are not induced in precast units due to deformation of concrete under prestress, or to movement during detensioning.

H. Built-In Anchorages: Accurately position built-in anchorage devices and secure to the formwork. Locate anchorages where they do not affect the position of main reinforcement or the placing of concrete.

I. Place concrete in a continuous operation to prevent the formation of seams or planes of weakness in precast units. Thoroughly consolidate placed concrete in each precast unit by internal and external vibration without dislocation or damage to reinforcement and build-in items.

J. Identification: Provide permanent markings in precast units to identify pick-up points and orientation in the structure complying with the markings indicated on the final shop drawings. Imprint the date and casting on each precast unit where it will not show in the finished structure.

K. Curing by low-pressure steam, by steam vapor, by radiant heat and moisture, or other similar process may be employed to accelerate concrete hardening and to reduce the curing time.

2.4 ACCESS DOORS

A. Heavy duty double leaf doors shall be furnished and be rated for AASHTO H-20 wheel loads.

B. Doors shall be as manufactured by U.S. Foundry or Bilco. Doors shall have a clear opening of 48" wide by 60" long.

C. Door leafs shall be ¼-inch thick aluminum diamond plate reinforced to withstand H-20 loading.

D. All hardware for frame and doors shall be stainless steel.

E. Units shall be equipped with stainless steel vertical springs, recessed staple for padlock, removable key wrench, automatic hold open arm, safety chains and with a warranty of 10 years against defects in materials and workmanship.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installer must examine the conditions under which the precast concrete work is to be erected. Notify the contractor in writing of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

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

C. Do not install precast units until concrete has attained its design ultimate compressive strength.

D. Installation Tolerances: Install precast units without exceeding the following tolerance limits:

Variations from Level or Elevation: total plus or minus ½-inch at any location.

E. Accessories: Provide all clips, hangers, and other accessories required for installation of precast units and for support of subsequent construction or finishes.

F. Grouting Connections and Joints: Grout open spaces at connections and joints after precast concrete units have been placed and permanently connected with the following:

Cement grout consisting of 1 part Portland cement, 2½ parts sand, and only enough water required for placement and hydration.

Provide forms or other method for retaining grout in place until hard enough to support itself. Pack spaces with grout by tamping or ramming until voids are completely filled.

G. Cutting Openings in Precast Slabs: Perform cutting and fitting of precast slab units as required for the passage of other projecting or adjacent work. Provide straight and clean cuts without breaking or spalling edges.

Do not cut any reinforcing steel members without written authorization from the precast unit manufacturer.

Reinforce edges of cut openings where required to maintain the structural integrity of the precast units.

3.2 PERFORMANCE REQUIREMENTS

A. Evaluate quality of concrete work for precast concrete units as specified in Section 03300. Conduct inspections, perform testing, and make repairs or replace unsatisfactory precast units as required.

In addition to above, in-place precast units may be rejected for any one of the following:

(1) Exceeding the specified installation tolerances.

(2) Damage during construction operations.

(3) Exposed-to-view surfaces which develop surface finish deficiencies.

END OF SECTION 03420.