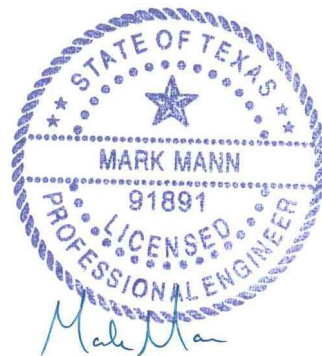


TECHNICAL SPECIFICATIONS
Authority General Office – Maintenance Building
Environmental Services Division – Metal Canopies



9/13/22

**SPECIAL PROVISION NO. 1
TO
PRE-ENGINEERED METAL BUILDINGS**

01.2 Description - The Structure Span shall be revised as follows:

Furnish and install a 40 ft x 50 ft metal building with 16 ft eve height, a 22 ft x 205 ft and 22 ft x 73'-9" open metal canopies with 12 ft eve height. Structure span will have a total of twenty feet (20 ft) with structural column members at not greater than 25'-0" on center.

01.5 Manufacturers - Revise this section as follows:

The building for this project shall be manufactured by Mueller; Tyler Building; Metallic Buildings; Star Buildings, Alliance Buildings, Steel Building Supply Inc. (Center Texas); Pinnacle Structures; Metal Depot; Whirlwind; or prior approved equivalent.

03.10 Painting - Revise this section as follows:

ALL STRUCTURAL FRAMING MEMBERS SHALL BE GALVANIZED.

04 - Roof and Wall Coverings - Revise this section as follows:

1. General

- a) The roof and wall panels shall be a minimum of 24 gauge steel panels.
- c) The manufacturer shall provide for a water tight roofing system with zero leakage.

10. Painted Finish

Add subsection "e" as follows:

- e) Color to be selected by OWNER from manufacturer's standard color selection chart.

06 - Door and Window Schedule - Add the following section.

The following items are to be provided with the building per this specification and as scheduled on the drawings. Products to meet the load performance requirements per 2015 International Building, with Texas Revisions for wind rating of 135 mph, Inland Area II. Reference to dimensions, including thickness, are minimums.

1. Passage Doors

- a. Nominal Dimension: 3'0" x 6'8".
- b. Door Leaf: 1-3/4" thick Hollow Metal Doors. Doors shall include 16" x 16" tempered glass windows on all interior and exterior locations. Provide door closures and all emergency exit style latch hardware for on all doors.

- c. Door Frame: To be steel or aluminum.
- d. Leaf/Frame Finish: Thoroughly cleaned, prime coated and top coated with smooth durable finish capable of passing 200 hour salt spray in accordance with ASTM B-117 and 500 hour humidity in accordance with ASTM D2247.
- e. Hardware: Rim Panic Device with exterior lever handle with key entry to unlock lever. Surface applied door closer. Three non-removable pin template hinges. Threshold to be saddle type with aluminum mill finish. Weather strip shall be kerf, factory installed to jamb and header stops.

2. Overhead Door(s)

- a. Nominal Dimension: 20'-0" x 12'-0", one (1) each.
- b. Curtain: Flat, type slat from minimum 22 gage galvanized steel.
- c. Mounting: Frame mounted to building structure.
- d. Operation: Manual chain hoist
- e. Weatherseal: Bottom bar astragal.
- f. Hood: 24 gage galvanized steel
- g. Lock: NA
- h. Finish: Powder-coat paint finish.

PRE-ENGINEERED METAL BUILDINGS

01 - GENERAL

1. Scope. The building shall include all primary and secondary structural framing members, connection bolts, roof covering, skylights, flashing, fasteners, closures, sealant tape, caulking, and other miscellaneous items as shown or called for in the drawings or specifications, unless specifically included in CONTRACTOR'S agreement.
2. Description
 - a. "WRF" - The building is a single span, welded rigid frame structure, fabricated from welded-up plates with solid webs. The frames are either tapered or of uniform depth and are considered pinned at the base. Minimum standard roof slope is 2:12.

"Structure span shall be by Special Provision to this spec."
3. Building Nomenclature.
 - a. The building "Width" and "Length" shall be measured from inside to inside face of the wall covering. Dimensions of each cover shall be as shown by Special Provision
 - b. The building "Eave Height" shall be measured from the bottom of the base plate of the frame columns to the intersection of lines representing the inside of the wall covering and the inside of the roof covering. The building eave height shall be by Special Provision.
 - c. The "Bay Spacing" shall be measured center line to center line of main column frames.
4. Drawings and Certification. CONTRACTOR will furnish complete erection drawings showing anchor bolt settings, sidewall, endwall, and roof framing, transverse cross sections (when required), covering and flashing details, and accessory installation details to clearly indicate the proper assembly of all building parts. The CONTRACTOR shall also furnish a certificate, signed and sealed by a Texas Registered Professional Engineer, that the building design meets the requirements of the specifications and is in accordance with accepted engineering practices. A copy of all loads and calculations shall be provided.
5. Manufacturers. The building for this project shall be as shown by Special Provision.

02 - DESIGN

1. General.
 - a. All structural steel sections and welded plate members shall be designed in accordance with the AISC, "Specifications for the Design, Fabrication, and Erection of the Structural Steel for Buildings."
 - b. All light gauge cold-formed, structural members and exterior covering shall be designed in accordance with the AISI, "Specification for the Design of Cold-Formed Steel Structural Members."

PRE-ENGINEERED METAL BUILDINGS

2. Design Loads. The basic standard design loads, including roof live load, snow load, wind load, and the building structural dead load shall be as specified in the 2015 IBC International Building Code with a minimum design parameter for members to withstand actually calculated dead load, 20 p.s.f. nominal live load, and loads due to pressure and suction of wind for 135 m.p.h. wind velocity, 3 second wind gusts Inland Area II; additional dead load of 5 p.s.f. for mechanical equipment and ceiling (roof purlins to withstand the additional dead load of 5 p.s.f. as if applied at 5 foot centers along their length). All other loads shall be considered as auxiliary loads.
3. Design Load Combinations. The design loads, unless otherwise specified in the contract documents, shall be applied in accordance with the "Low Rise Building Systems Manual" of the Metal Building Manufacturer's Association (MBMA).
4. Building Design. The building structure shall be designed based on a fully completed building. The building for this project will not include walls, doors, and windows. Generally, the building for this project will include the structural frame and necessary supports, roof coverings, and roof guttering with downspouts.

03 – STRUCTURAL FRAMING

1. General.
 - a. All framing members shall be shop fabricated for bolted, field assembly. Field cutting or drilling, when required, shall be clearly noted on the drawings.
 - b. Primary structural framing shall include the transverse rigid frames, lean-to rafter beams and columns, canopy beams, intermediate columns, bearing end frames, endwall columns, and wind bracing.
 - c. All hot-rolled steel plate and flat bar used in the fabrication of welded assemblies shall be in accordance with ASTM A572, Grade 50, or ASTM A36 Modified, having a minimum yield point of 50,000 PSI.
 - d. All hot-rolled steel sheet, 10 Gauge and heavier, used in the fabrication of welded assemblies and cold-formed assemblies shall be in accordance with ASTM A570, Grade 50, having a minimum yield point of 50,000 PSI.
 - e. All hot-rolled structural shapes used in building fabrication shall conform to ASTM A36, having a minimum yield point of 42,000 PSI.
 - f. All hot-rolled strip used in the fabrication of cold-formed members shall conform to the requirements of ASTM A570, Grade 50, having a minimum yield point of 55,000 PSI.
 - g. All tubing and pipe used in the fabrication of intermediate columns and/or strut bracing shall be in accordance with ASTM A53, Grade B, having a minimum yield point of 42,000 PSI.
 - h. All galvanized EHS cable used in the fabrication of assemblies to be used for diagonal wind bracing shall conform to ASTM Specification A475. All hardware used in these assemblies shall have physical characteristics meeting or exceeding the cable used.

PRE-ENGINEERED METAL BUILDINGS

- i. All hot-rolled rounds used in the fabrication of diagonal wind bracing shall be in accordance with ASTM A36, having a minimum yield point of 42,000 PSI. Light gauge cold-formed sections shall be manufactured by precision roll or brake forming. All dimensions shall be true and the formed member shall be free of fluting, buckling, or waviness.
 - j. All shop connections shall be by welding, in accordance with the AWS "Structural Welding Code-Steel", AWSI/AWS D1.1. All flange to web welds shall be in the continuous gas metal or submerged arc partial penetration fillet welds on one side off the web. Other welds shall be by either the gas metal, or submerged or shielded arc process. Butt welds in flange plates and webs shall be full penetration.
 - k. All field connections shall be bolted. Bolts shall be either high-strength bolts, furnished with nuts, conforming to ASTM Specification A325, or machine bolts, furnished with nuts, conforming to ASTM Specification A307. Drawings will be furnished indicating the placement of the differing bolts. A325 bolts shall be tightened by the "turn-of-the-nut" method. The faying surfaces of all bolted connections shall be smooth and free from burrs or distortions. All A307 bolts shall be electro-plated with zinc. All A325 bolts shall be furnished black.
 - l. All framing members shall carry an easily visible identifying mark - stamped, stenciled or painted on each member.
 - m. Other materials may be used based on the particular building design requirements.
2. Rigid Frames, Lean-To Frames, Canopy Beams. All members shall be welded, built-up "I" shapes, either constant depth or tapered.
3. Bearing End Frames. Bearing end frames shall consist of columns at the building corners and a continuous rafter beam supported by the endwall columns.
4. Purlins and Girts. Purlins shall be cold-formed "Z" sections with 2-1/2" wide flanges and stiffening lips. Stiffening lips shall be formed at an angle of 50o with the flanges to permit nesting during shipping and when making overlapping connections. Girts shall be cold-formed "Z" sections or cold-formed "C" sections. Purlins and girts will be minimum 16 gauge.
5. Eave Struts. Eave struts shall be cold-formed, unequal flange "C" sections formed so as to provide adequate backup for both roof and wall panels at the building eave. Eave struts will be sufficient gauge to provide support of the eave overhang.
- Provision for an eave overhand of two foot (2'-0") clear distance overhang as indicated in the construction documents shall be made with sufficient rigid support to accommodate live and dead loads as specified in the Southern Building Code.
6. Wind Bracing. Buildings shall be designed to resist wind loads by diaphragm action of the roof and wall panels, diagonal bracing consisting of either rods, cables, angles, structural ind bents, fixed base columns or a combination of these methods.
7. Flange Bracing. The inside flange of frames shall be braced adequately so that the allowable compressive stress is adequate for the design load combination.

PRE-ENGINEERED METAL BUILDINGS

8. Sill Support. A sill support is not required for this project. A continuous member sill support shall be provided (if required) to which the base of the wall covering may be attached. This member shall be a 14 gauge angle, secured to the concrete floor by erector supplied fasteners at maximum three feet on center (3'-0" o.c.). This member shall be painted with red-oxide primer.
9. Framed Openings. Structural framing members for all openings shall be adequate for the specified design loads. All framing members furnished for these openings will be painted with red-oxide primer.
10. Painting. Refer to Special Provision.

04 – ROOF AND WALL COVERING

1. General.
 - a. Roof covering shall be of 24 gauge steel panels, "Super Span" or approved equivalent and translucent fiber glass panels. Steel panels will be factory painted galvanized aluminum panels. Panel coverage will be thirty-six inches (36") to weather with one and one quarter inch deep (1 1/4") major ribs every 12" and two 3/16" deep minor ribs between each major rib. The roof, when constructed with the aforementioned panel and in conjunction with CONTRACTOR'S installation procedures shall be UL rated - Class 90 for wind uplift by Underwriters Laboratories.
 - b. Wall covering (if required) shall be of 24 gauge steel "Super Span", "Low rib", or "Monarch" panels or approved equivalent. Panels will be either unpainted or painted galvanized aluminum panels. Panel coverage will be 36" to weather. Walls are not required on this project, however the structural frame shall be designed to accommodate the installation of walls at a future date.
 - c. The manufacturer shall provide for a weather tight roofing system with zero leakage.
2. Panel Materials. Panels shall be coated steel for roof and wall panels, and shall conform to ASTM Specification A792, Grade 80 (80,000 PSI minimum yield strength). Panels will be coated with a zinc-aluminum alloy which if applied at 0.5 ounces (combined total of both sides) per square foot.
3. Fasteners.
 - a. All fasteners furnished for building panels will be #14 x 3/4", self-tapping (not self-drilling), sheet metal screws. Fasteners shall conform to ASA Standard B 18.6, shall have type "A" threads, and match the finish of the panels.
 - b. Screws and washers shall be carbon steel with a 0.0007" zinc plating.
 - c. After plating, all fasteners and washers shall be coated with zinc-phosphate, one prime coat, and two finish coats of baked-on silicon polyester paint. The finish of the fasteners shall match the building panels and trim.
 - d. Fasteners shall have separate steel and neoprene sealing washers for weathertightness.

PRE-ENGINEERED METAL BUILDINGS

- e. Structural blind rivet shall be special 1/8" diameter, pull type fasteners having a stainless steel body and mandrel. All rivets shall match the finish of the trim. When installed, the body shall deform in such a manner as to securely clinch the joined surfaces together.

4. Sidelap Tap Sealant

- a. Sealant for roof sidelaps, endlaps, and flashings shall be a gray, pressure sensitive, 100% solids, butyl based continuous tape. Width of the tape sealant shall be 3/8" while the thickness shall be 3/32". Sealant tape shall be provided in fifty foot rolls incorporating the use of a coated, waterproof release paper for ease of installation.
- b. The tape sealant shall be comprised of not less than a 50% blend of butyl rubber and elastomeric polymers. The balance of ingredients shall be both stable reinforcing and inert fillers. The material shall be non-asphaltic, non-shrinking, non-drying, and non-toxic. Adhesion shall be superior on metals, plastics, and painted surfaces at a temperature range of -40°F to +220°F.
- c. Life expectancy of the sealant tape shall be a minimum of twenty years.

5. Installation of Panels

- a. Roof panels shall be continuous from ridge to eave on buildings 7'-0" wide or less. Where endlaps are required, they shall be a minimum of 5" and shall occur at a roof purlin. A die-formed closure strip shall be installed at the eave.
- b. Wall panels (if required) shall be continuous from 1 1/2" below the column base to the roofline, except where the required length would exceed thirty-five feet (35'-0") in which case the panels would endlap at a wall girt. All panels shall be square cut at the roofline.
- c. Before securing, all laps of roof panels shall be sealed with a continuous ribbon of sealant tape.
- d. Roof and wall panels (if any) shall be secured to intermediate framing members with #14 sheet metal screws at a maximum spacing of 12". At endlaps, the maximum spacing for screws for roof panels shall be 6". #14 sheet metal stitch screws at a maximum of 20" shall be installed at the sidelaps on the roof and a maximum of 42" at the sidelaps on the walls.

6. Flashing, Closures, and Trim

- a. Flashing and/or trim shall be furnished at the rake, corners, and eaves, at framed openings, and wherever necessary to provide weathertightness and a finished appearance.
- b. Steel for flashing, metal closures, trim and other miscellaneous uses shall be either unpainted or painted galvanized aluminum framing to ASTM Specification A792, Grade 50 and shall be 26 gauge unless specified otherwise.
- c. A die-formed panel, matching the adjoining roof panels, shall be provided along the building ridge for roof slopes up through 4:12.
- d. Standard trim colors shall be submitted for approval.

PRE-ENGINEERED METAL BUILDINGS

7. Closure Strip

A closed cell, chemically cross-linked, polyethylene, die-formed closure strip shall be provided for installation at the eave and the rake of the building. All closure strip shall be formed to accommodate the appropriate panel's inside or outside face, as required.

8. Tube Sealant

A tube sealant shall be provided for sealing applications including (but not exclusively) the following: gutter/ downspout joinings, window and door perimeter caulking. The sealant shall provide a high performance, flexible seal with superior adhesion and elasticity.

9. Insulation

Minimum 3" vinyl faced insulation shall be provided on all walls and roof areas of the entire building.

10. Eave Gutters and Downspouts

- a. Eave gutters shall be roll-formed to a tube profile, free of objectionable waviness and any other imperfections, from 26 gauge factory painted galvanized aluminum panels. The face of the gutter shall match the profile of the rake trim. All gutter sections shall be securely fastened and sealed at end laps. The outside face of the gutter shall be supported by 22 gauge unpainted galvanized aluminum supports or factory painted galvanized aluminum supports on three foot (3'-0") centers.
- b. Downspouts shall be 4" x 4" roll-formed box sections made from 26 gauge factory painted galvanized aluminum. Matching finish 26 gauge steel straps shall be provided for securing downspouts to the building wall. Kickouts (not elbow type) shall be provided on each downspout.

11. Panel Warranty

- a. Unless otherwise specified, the exposed surfaces of all roof and wall panels, trim, and other exterior steel surfaces shall be either unpainted galvanized aluminum or factory painted galvanized aluminum.

Specific conditions concerning each finish shall be covered in detail on the written warranty issued, on request, with each building. Factory painted galvanized aluminum is required on all metal panels for this project.

- b. Galvanized aluminum panels shall be under warranty for a period of 20 years after the building has been delivered to the jobsite. The warranty provides that galvanized aluminum panels will not rupture, fail structurally, or perforate within a period of 20 years after shipment due to exposure to normal atmospheric corrosion.

PRE-ENGINEERED METAL BUILDINGS

The color finish on factory painted galvanized aluminum panels shall be under warranty for a period of twenty years after the building has been delivered to the jobsite. The warranty provides protection from excessive chalking and color change (fading), peeling, and cracking within this twenty year period. All of CONTRACTOR'S standard colors shall be painted with a silicone polyester enamel Ceram-A-Sil, as manufactured by Hanna Chemical Coatings or approved equivalent. The warranty and color choice to be submitted for approval.

12. Painted Finish

- a. All galvanized aluminum panels will be factory coated by a firm which coats products exclusively. The coater shall be responsible for issuing color consistency, paint film hardness, and paint film thickness.
- b. The galvanized aluminum panels will be pre-treated before painting in chemical solutions formulated to clean and prepare the steel for superior paint adhesion.
- c. Each side of the galvanized aluminum panels will be coated with a baked-on primer before the color coating.
- d. A baked-on silicone polyester finish coat will be applied on one side while a baked-on straight polyester wash coat will be applied on the other.

Thickness of the finish coat will be a nominal 1.0 mils (including the primer coat). Thickness of the wash coat will be a nominal 0.5 mils (including the primer coat).

- e. Color to be selected by OWNER from manufacturer's standard color selection chart.

05 - BUILDING ANCHORAGE AND FOUNDATIONS

1. Anchorage

The building anchor bolts shall be designed to resist the column reactions resulting from the specified loads as applied in the specific loading combinations. The sizes and design shall be as specified by the building manufacturer.

2. Foundation

The building manufacturer shall include recommendations for Archer Bolt Pattern, size, and length for the supplied building based on the foundation system as shown in the plans.

06 - MEASUREMENT AND PAYMENT

No separate payment for work performed under this item. Include cost of same in contract price bid for work of which this is a component part.

ITEM - STRUCTURAL CONCRETE

01 - DESCRIPTION

This item governs materials, proportioning and mixing, testing, placing, finishing and curing of all plain and reinforced cast-in-place concrete, fibermesh reinforced concrete and prestressed concrete.

The concrete shall be composed of Portland or other hydraulic cement, fine and coarse aggregate, fibermesh, and water, with or without admixtures, conforming to the design and test requirements of this specification. This item excludes lightweight aggregate concrete.

02 - QUALITY ASSURANCE

1. Materials and work shall conform to the requirements of all standards, codes and recommended practices required in this section. In conflicts between standards, required standards and this specification, or this specification and the local building code, the more stringent requirement shall govern.
2. Contractor shall provide at least one person, when requested by the Engineer, who shall be present at all times during execution of this portion of the work and who shall be thoroughly trained and experienced in placing the type of concrete specified and who shall direct all work performed under this section.

03 - MATERIALS

Ready mix concrete conforming to ASTM C-94 or site-mixed concrete (dry weight 145-150 pounds per cubic foot.)

1. All cement used in any one monolithic placement shall be of the same type and brand. Only one brand of each type will be permitted in any one structure unless otherwise authorized by the Engineer. Only one brand shall be used for exposed concrete.
 - a. Portland Cement shall conform to ASTM C-150.
 - b. Blended Hydraulic Cement shall conform to ASTM C-595, excluding Type S and Type SA.
 - c. Expansive Hydraulic Cement, Type E-1 shall conform to ASTM C-845-76T.

ITEM - STRUCTURAL CONCRETE

CLASSIFICATION TABLE

Class - Type	Min. Comp. Strength (psi)		Max. Water Content (1)		Min. Cement Per C.Y. (1)		Slump Range (in.) *	Total Air Content (%)
	7-day	28-day	lbs. of Water / lb. Cement	Gallons of Water / Bag Cement	Lbs.	Bags		
A - Structural	2,000	3,500	0.55	6.25	494	5.25	2-1/2 to 4-1/2	2-1/2 to 4-1/2
A _{sp} - Structural (1)	2,000	3,000	0.50	5.65	423	4.50	7 to 10(1)	3 to 5
B - Slope Protection	1,200	2,000	0.75	8.50	400	4.25	2-1/2 to 4	2-1/2
C - Pipe Blocking	---	1,500	0.97	11.00	282	3.00	3 to 5	3 to 6
D - Seal Slab	---	---	---	---	376	4.00	6 to 8	as needed
E - Monolithic Sewer	2,000	3,000	0.55	6.25	564	6.00	4 to 6	3 to 5
F - Prestressed(1)	---	5,000	0.51	5.75	635	6.75	2 to 3	as needed
G - Prestressed (5)	---	6,000	0.49	5.50	658	7.00	2 to 3	as needed
K - Structural(1)	2,800	4,000	0.45	5.65	564	6.00	3-1/2 to 5	2-1/2 to 4-1/2
K _{sp} - Structural (3)	2,800	4,000	0.45	5.00	517	5.50	7 to 10(4)	3 to 5
P - Paving 6-inch (1)	1,800	2,800	0.66	7.50	423	4.50	3 to 5	2-1/2 to 4-1/2
	450(8)							
P - Paving 8-inch (7)	2,000	3,000	0.66	7.50	470	5.00	3 to 5	2-1/2 to 4-1/2
	450 (8)							

* All Slump Ranges +1/2 inch Tolerance.

2. Water used in mixing concrete shall be clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances that may be deleterious to concrete or reinforcement.
3. Aggregate shall conform to ASTM C-33. Nominal maximum size of coarse aggregate shall not be larger than:

- (1) A_{sp} and K_{sp} to contain approved High Range Water Reducing (HRWR) Admixture.
- (2) Maximum 2-inch slump before additional HRWR Admixture.
- (3) For prestressed concrete, water reducing admixture may be used as needed.
- (4) Use approved water-reducing and retarding admixtures.
- (5) Slump range 1-3 inch when slip form method of construction used.
- (6) Minimum flexural strength at 7 days.

ITEM - STRUCTURAL CONCRETE

- (1) 1/5 the narrowest dimension between sides of forms, nor
 - (2) 1/3 the depth of slabs, nor
 - (3) 3/4 the minimum clear spacing between individual or bundles or reinforcing bars.
4. Fibermesh Reinforcement. Shall be 100 percent virgin polypropylene, fibrillated fibers containing no reprocessed olefin materials and specifically manufactured for use as concrete secondary reinforcement. Volume per cubic yard shall equal a minimum of 0.1% (1.5 pounds).
5. Admixtures (requiring prior approval of the Engineer) to be used in concrete shall be produced and serviced by established, reputable manufacturers and used in compliance with manufacturer's recommendations.
- a. Air-entraining Admixture shall conform to ASTM C-260, and when requested, certification attesting to compliance shall be furnished by the manufacturer.
 - b. Water-reducing, Set Controlling Admixture shall conform to ASTM C-494 and when requested, a qualified concrete technician employed by the manufacturer shall be available to advise and assist in the use, proportioning and adjustment of concrete mix.
 - c. Fly-ash or Other Pozzolans used as admixtures shall conform to ASTM C-618.

04 - CONCRETE PROPORTIONING

The Contractor shall be responsible for the design of concrete mixtures. Concrete shall be proportioned and produced to provide an average compressive strength as provided for herein. (f'_c = specified compressive strength of concrete).

1. Proportioning of concrete for the required f'_c shall be based on 28-day compressive test shall be based on laboratory trial batches performed by an independent testing laboratory meeting the requirements of ASTM E-329 and approved by the Engineer, and/or on the basis of field experience, both as set forth in ACI 318-Latest Edition and this specification. The average compressive strength used as a basis for selecting the proportions shall exceed the specified f'_c as required by ACI 31B.
2. Proportions of materials for concrete shall conform to minimum cement content and maximum water content for various classes as shown on Classification Table.
3. Where different materials are to be used for different portions of the work, each combination shall be evaluated separately.
4. Concrete proportions, including water-cement ratio, shall be established on the basis of field experience, or laboratory trial batches, with materials to be employed, as required herein.
5. 1.5 lbs of fiber mesh per cubic yard of concrete, where noted for use on plans, shall be added to the mixer before placement. Fibermesh is required in all sidewalks.
6. Average Strength Reduction

After sufficient test data become available from the job, methods of "Recommended Practice for Evaluation of Compression Test Results of Concrete (ACI 214-65)" may be used to reduce the amount by which the average strength must exceed f'_c .

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- (1) Probable frequency of strength tests more than 500 psi below f'_c will not exceed 1 in 100;
- (2) Probable frequency of an average of three consecutive strength tests below f'_c will not exceed 1 in 100, and;
- (3) Concrete Classification Requirements Table are met.

8. Evaluation and Acceptance of Concrete

- a. Frequency of Testing. Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, nor less than once for each 150 cubic yard of concrete, nor less than once for each 5000 sq. ft. of surface area for slabs or walls.

On a given project, if total volume of concrete is such that frequency of testing required would provide less than five strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.

When total quantity of a given class of concrete is less than 50 cubic yards, strength tests may be waived by the Engineer if in his judgment adequate evidence of satisfactory strength is provided.

Average strength of two cylinders from the same sample, tested at 28 days or the specified earlier age, is required for each strength test.

- b. Tests of Cured Specimens. Samples for strength tests shall be taken in accordance with "Method of Sampling Fresh Concrete" (ASTM C-172).

Cylinders for strength tests shall be molded and laboratory-cured in accordance with "Method of Making and Curing Concrete Test Specimens in the Field" (ASTM C-31) and tested in accordance with "Method of Test for Compressive Strength of Cylindrical Concrete Specimens" (ASTM C-39).

Strength level of an individual class of concrete shall be considered satisfactory if both of the following requirements are met:

- (1) The average of all sets of three consecutive strength tests equal or exceed required f'_c .
 - (2) No individual strength test (average of two cylinders) falls below required f'_c by more than 500 psi.
- c. Investigation of Low-Strength Test Results. If any strength test of cured cylinders falls below required f'_c by more than 500 psi or if test indicate deficiencies in protection and curing, steps shall be taken to assure that load-carrying capacity of the structure is not jeopardized.

If the likelihood of low-strength concrete is confirmed and computations indicate that load-carrying capacity may have been significantly reduced, tests of cores drilled from the area in question may be required in accordance with "Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete" (ASTM C-42). In such case, three cores shall be taken for each strength test more than 500 psi below required f'_c .

ITEM - STRUCTURAL CONCRETE

If concrete in the structure will be dry under service conditions, cores shall be air dried (temperature 60 to 80 degree Fahrenheit, relative humidity less than sixty (60%) percent) for seven (7) days before test and shall be tested dry.

If concrete in the structure will be more than superficially wet under service conditions, cores shall be immersed in water for at least 48 hours and be tested wet.

Concrete in an area represented by core tests shall be considered structurally adequate if the average of three cores is equal to at least eighty-five (85%) percent of f'_c and if no single core is less than seventy-five (75%) percent of f'_c . To check testing accuracy, locations represented by erratic core strengths may be retested.

If criteria above are not met, and if structural adequacy remains in doubt, the Engineer may order load tests for the questionable portion of the structure, or take other action appropriate to the circumstances.

05 - MIXING AND PLACING CONCRETE

1. Preparation

Preparation before concrete placement shall include the following:

- (1) All equipment for mixing and transporting concrete shall be clean.
- (2) All debris and ice shall be removed from spaces to be occupied by concrete.
- (3) Forms shall be properly coated.
- (4) Masonry filler units that will be in contact with concrete shall be well drenched.
- (5) Reinforcement shall be thoroughly clean of ice or other deleterious coatings.
- (6) Water shall be removed from place of deposit before concrete is placed unless a tremie is to be used or unless otherwise permitted by the Engineer.
- (7) All laitance and other unsound material shall be removed before additional concrete is placed against hardened concrete.

2. Mixing

All concrete shall be mixed until there is a uniform distribution of materials and shall be discharged completely before mixer is recharged.

Ready-mixed concrete shall be mixed and delivered in accordance with requirements set forth in "Specification for Ready-Mixed Concrete" (ASTM C-94).

Job-mixed concrete shall be mixed in accordance with the following:

- (1) Mixing shall be done in a batch mixer of approved type.
- (2) Mixer shall be rotated at a speed recommended by the manufacturer.

ITEM - STRUCTURAL CONCRETE

- (3) Mixing shall be continued for at least 1-1/2 minutes after all materials are in the drum, unless a shorter time is shown to be satisfactory by the mixing uniformity tests of "Specification for Ready-Mixed Concrete" (ASTM C-94).

3. Conveying

Concrete shall be conveyed from mixer to place of final deposit by methods that will prevent separation or loss of materials.

Conveying equipment shall be capable of providing a supply of concrete at site of placement without separation of ingredients and without interruptions sufficient to permit loss of plasticity between successive increments.

4. Depositing

Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing.

Concreting shall be carried on at such a rate that concrete is at all times plastic and flows readily into spaces between reinforcement.

Concrete that has partially hardened or been contaminated by foreign materials shall not be deposited in the structure.

Retempered concrete or concrete that has been remixed after initial set shall not be used unless approved by the Engineer.

After concreting is started, it shall be carried on as a continuous operation until placing of a panel or section, as defined by its boundaries or predetermined joints, is completed except as permitted or prohibited by Section 07.4.

Top surfaced of vertically formed lifts shall be generally level.

When construction joints are required, joints shall be made in accordance with Section 07.4.

All concrete shall be thoroughly consolidated by suitable means during placement and shall be thoroughly worked around reinforcement and embedded fixtures and into corners of forms.

06 CURING

1. Concrete (other than high-early-strength) shall be maintained above 50° F and in a moist condition for at least the first seven (7) days after placement, except when cured in accordance with 200.06.3.
2. High-early strength concrete shall be maintained above 50° F and in a moist condition for at least the first three (3) days, except when cured in accordance with Section 06.3.
3. Accelerated Curing
 - a. Curing by high pressure steam, steam at atmospheric pressure, heat and moisture, or other accepted process, may be employed to accelerate strength gain and reduce time of

ITEM - STRUCTURAL CONCRETE

curing, with prior approval of the Engineer.

- b. Accelerated curing shall provide a compressive strength of the concrete at the load stage considered at least equal to required design strength at that load stage.
- c. Curing process shall be such as to produce concrete with a curability at least equivalent to the curing method specified.
- d. Supplementary strength tests may be required to assure that curing is satisfactory. The Engineer may require strength tests of cylinders cured under field conditions to check adequacy of curing and protection of concrete in the structure.

4. Cold Weather Requirements

- a. Adequate equipment shall be provided for heating concrete materials and protecting concrete during freezing or near-freezing weather.
- b. All concrete materials and all reinforcement, forms fillers, and ground with which concrete is to come in contact shall be free from frost.
- c. Frozen materials or materials containing ice shall not be used.

5. Hot Weather Requirements

During hot weather, proper attention shall be given to ingredients, production methods, handling, placing, protection, and curing to prevent excessive concrete temperatures or water evaporation that may impair required strength or serviceability of the member or structure.

07 - FORMWORK AND CONSTRUCTION JOINTS

1. Design

- a. Forms shall result in a final structure that conforms to shapes, lines, and dimensions of the members as required by the design drawings and specifications.
- b. Forms shall be substantial and sufficiently tight to prevent leakage of mortar.
- c. Forms shall be properly braced or tied together to maintain position and shape.
- d. Forms and their supports shall be designed so as not to damage previously placed structure.
- e. Design of formwork shall include consideration of the following factors:
 - (1) Rate and method of placing concrete;
 - (2) Construction loads, including vertical, horizontal, and impact loads;
 - (3) Special form requirements for construction of shells, folded plates, domes, architectural concrete, or similar types of elements.
- f. Forms for prestressed concrete members shall be designed and constructed to permit movement of the member without damage during application of prestressing force.

ITEM - STRUCTURAL CONCRETE

2. Removal of Forms

- a. No construction loads shall be supported on, nor any shoring removed from any part of the structure under construction except when that portion of the structure (in combination with remaining forming and shoring system) has sufficient strength to support safely its weight and loads placed thereon.

Sufficient strength may be demonstrated by field-cured test cylinders and by a structural analysis considering proposed loads in relation to field-cured cylinder strengths and strength of the forming and shoring system. Such analysis and strength test data shall be furnished by the Contractor to the Engineer when so required.

- b. No construction loads exceeding combination of superimposed dead load plus specified live load shall be supported on any unshored portion of the structure under construction, unless analysis indicates adequate strength to support such additional loads.
- c. Forms shall be removed in such manner as not to impair safety and serviceability of the structure. All concrete to be exposed by form removal shall have sufficient strength not to be damaged thereby.
- d. Form supports for prestressed concrete members may be removed when sufficient prestressing has been applied to enable prestressed members to carry their dead load and anticipated construction loads.
- e. Forms will remain in place a minimum of 72 hours for all conditions except in the following case:

Concrete subject to high bending stress and wholly (or almost wholly) reliant on forms for vertical support. Examples: Roof or floor slabs and beams; undersides of sloping surfaces (flatter than 1:1); walkways and platforms; bridge decks and girders.

Forms will remain in place a minimum of 4-1/2 days in those areas where no immediate superimposed loading will occur and a minimum of 10 days at all other areas.

- f. The early removal of forms (except as noted above) to facilitate the normal progress of work will be permitted only by approval of the Engineer, and in no case less than 24 hours.

3. Conduits and Pipes Embedded in Concrete

- a. Conduits, pipes and sleeves of any material not harmful to concrete may be embedded in concrete with approval of the Engineer, provided they are not considered to replace structurally the displaced concrete.
- b. Except when plans for conduits and pipes are approved by the Structural Engineer, conduits and pipes embedded within a slab, wall, or beam (other than those merely passing through) shall satisfy the following:
 - (1) They shall not be larger in outside dimension than 1/3 the overall thickness of slab, wall, or beam in which they are embedded.

ITEM - STRUCTURAL CONCRETE

- (2) They shall not be spaced closer than 3 diameters or widths on center.
- (3) They shall not impair significantly the strength of the construction.
- (4) Concrete cover for pipes and fittings shall not be less than one and one-half (1-1/2") inches for concrete exposed to earth or weather, nor three-fourths (3/4") inches for concrete not exposed to weather or in contact with ground.

4. Construction Joints

- a. Where a construction joint is to be made, the surface of concrete shall be thoroughly cleaned and all laitance and standing water removed.
- b. Vertical construction joints shall be thoroughly wetted and coated with neat cement grout immediately before new concrete placement.
- c. Construction joints not indicated on the design drawings shall be so made and located as not to impair significantly the strength of the structure.
- d. Construction joints in floors shall be located near the middle of spans of slabs, beams, or girders, unless a beam intersects a girder at the middle location, in which case joints in the girders shall be offset a distance equal to twice the width of the beam.

Provision shall be made for transfer of shear and other forces through construction joints.

- e. Beams, girders, or slabs supported by columns or walls shall not be cast or erected until concrete in the vertical support members is no longer plastic.
- f. Beams, girders, column capitals, and haunches shall be considered as part of a slab system and shall be placed monolithically therewith.
- g. Structures containing liquids shall have all exterior walls and bottom slab joints constructed with water stops and/or seals. When prevention of contamination and/or control of leakage is necessary at exterior or interior wall/slab, water stops and/or seals shall be provided at joints.
- h. Horizontal joints in walls less than twelve feet high are not to be located for contraction or expansion, but for construction only. Such horizontal wall joints shall be minimal and as approved by the Engineer only.

Triangular fillet seals should be made on liquid-face when leakage control is necessary.

- i. Vertical joints in walls shall be located at points of no shear. Joints shall be constructed with water-stops and fillet seals where control of leakage is required.
- j. Where slabs are cast in two separate lifts, joints are to be staggered. All joints shall be located at positions of no shear.
- k. Longitudinal keys at least one and one-half (1-1/2") inches deep shall be provided in all joints in walls and between walls and slabs or footings.

ITEM - STRUCTURAL CONCRETE

- I. When joints are not indicated on plans, Contractor shall supply shop drawings clearly indicating all joints in any part of the structures, sequence of pours and time lapse for control of shrinking, for approval by the Engineer. No intermediate joints will be allowed other than those on the approved shop drawings without the express approval of the Engineer.

08 - PATCHING AND SURFACE FINISH

After forms are removed, the Contractor shall remove all concrete fins, projections and form ties. All surfaces which will remain exposed will be inspected by the Engineer and all voids, stone pockets, tie holes, honeycombed and defective areas shall be patched as directed. The patching mortar shall be sand-cement grout with sufficient white Portland Cement added to effect a match with the concrete surfaces. Areas to be patched shall be clean, free of loose material and dampened before applying grout. The patched areas shall be rubbed before the grout is set hard to blend into adjacent areas.

Rub-Finish exposed vertical and battered surfaces from 6-inches below ground surface or from 6-inches below normal water level to top, except for small plinths and similar structures which extend less than 12 inches above finished grade.

09 - DEFECTIVE WORK

The following defects shall be cause for rejection of placed concrete:

1. Voids, rock pockets, honeycombing, and spalled areas which, in the opinion of the Engineer, cannot be satisfactorily repaired, will affect the strength of the structure materially, or will limit the life of the reinforcement.
2. Uneven or bulged surfaces resulting from shifting of the forms during placement or curing.
3. Concrete found structurally inadequate after thorough investigation according to Item 04.8, Subsections a through c.

Upon discovery of any of these defects, the Engineer may declare the structure defective and require the Contractor to remove and replace the portion of the structure affected, at the Contractor's expense.

REINFORCEMENT STEEL

01 - GENERAL

This item shall govern deformed reinforcement; plain reinforcement; prestressing tendons; and reinforcement consisting of structural steel, steel pipe, or steel tubing as specified herein.

Reinforcement to be welded is indicated on the drawings. Reinforcement of the specified ASTM steel, except for ASTM A-706, shall require a report of material properties conforming to "Reinforcing Steel Welding Code" (AWS D12.1) of the American Welding Society.

02 - MATERIALS

1. Deformed Reinforcement

- a. Deformed reinforcing bars shall conform to one of the following specifications, except as provided in Section 1.b below.
 - (1) "Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement" (ASTM A-615), Grade 60.
 - (2) "Specification for Rail-Steel Deformed and Plain Bars for Concrete Reinforcement" (ASTM A-616), Grade 60.
 - (3) "Specification for Axle-Steel Deformed and Plain Bars for Concrete Reinforcement" (ASTM A-617), Grade 60.
 - (4) "Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement" (ASTM A-706).
- b. Deformed reinforcing bars shall conform to the following exceptions to the ASTM specifications listed in Section 1.a. above.
 - (1) For ASTM A-615, and A-617, yield strength shall correspond to that determined by tests on full size bars.
 - (2) For ASTM A-615, A-616, and A-617, bend test requirements for all bar sizes #3 through #11 shall be based upon 180 deg. bends of full-size bars around pins with diameters specified in Table 1. If #14 or #18 bars meeting these specifications are to be bent, full-size bar specimens shall be bend tested 90 deg. at a minimum temperature of 60° F around a 9d_b pin without cracking of the bar. However, if #14 and #18 bars as used in the structure are required to have bends exceeding 90 deg., specimens shall be bend tested 180 deg. with other criteria the same as for 90 deg.

REINFORCEMENT STEEL

TABLE 1
BEND TEST REQUIREMENTS

Bar Designation	Pin Diameter for Bend Test
#3, #4, and #5	3-1/2d _b
#6, #7, and #8	5d _b
#9, #10, and #11	7d _b
#9, #10, and #11 (of Grade 40)	5d _b

- c. Bar and rod mats for concrete reinforcement shall conform to "Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement" (ASTM A-184).
- d. Deformed wire for concrete reinforcement shall conform to "Specification for Deformed Steel Wire for Concrete Reinforcement" (ASTM A-496).
- e. Welded deformed wire fabric for concrete reinforcement shall conform to "Specification for Welded Deformed Steel Wire Fabric for Concrete Reinforcement" (ASTM A-497).

2. Plain Reinforcement

- a. Plain bars for spiral reinforcement shall conform to the specification listed in Section 1.a. (1), (2), or (3) including additional requirements of Section 1.b.
- b. Smooth wire for spiral reinforcement shall conform to "Specification for Cold-Drawn Steel Wire for Concrete Reinforcement" ASTM A-82).
- c. Welded smooth wire fabric for concrete reinforcement shall conform to "Specification for Welded Steel Wire Fabric for Concrete Reinforcement" (ASTM A-185).

3. Prestressing Tendons

- a. Wire, strands, and bars for tendons in prestressed concrete shall conform to one of the following specifications:
 - (1) "Specification for Uncoated Stress-Relieved Wire for Prestressed Concrete" (ASTM A-421).
 - (2) "Specification for Uncoated Seven-Wire Stress-Relieved Strand for Prestressed Concrete" (ASTM A-416).
 - (3) "Specification for Uncoated High-Strength Steel Bar for Prestressing Concrete" (ASTM A-722).
- b. Wire, strands, and bars not specifically listed in ASTM A-421, A-416, or A-722 may be used provided they conform to minimum requirements of these specifications and do not have properties that make them less satisfactory than those listed in ASTM A-421, A-416, or A-722.

REINFORCEMENT STEEL

4. Structural Steel, Steel Pipe, or Tubing

- a. Structural steel shall conform to one of the following specifications:
 - (1) "Specification for Structural Steel" (ASTM A-36).
 - (2) "Specification for High-Strength Low-Alloy Structural Steel" (ASTM A-242).
 - (3) "Specification for High-Strength Low-Alloy Structural Manganese Vanadium Steel" (ASTM A-441).
 - (4) "Specification for High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality" (ASTM A-572), Grade 60.
 - (5) "Specification for High-Strength Low-Alloy Structural Steel with 50,000 psi Minimum Yield Point to 4 in. Thick" (ASTM A-588).
- b. Steel pipe or tubing shall conform to one of the following specifications:
 - (1) Grade B of "Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless" (ASTM A-53).
 - (2) "Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes" (ASTM A-500), Grade B.
 - (3) "Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing" (ASTM A-501).

03 - SIZES AND WEIGHTS

The nominal sizes and areas, and the theoretical weights of deformed bars shall not be less than the current standard of the Concrete Reinforcing Steel Institute.

04 - BENDING

Reinforcement bars shall be bent cold to the shapes indicated on the plans.

All bending of hard grade new billet and rail steel bars shall be done in the shop; other grades shall preferably be bent in the shop. Bends shall be made around pins; the diameter of pins shall be not less than four (4) times the minimum thickness of the bar. Heating for bending shall be employed only when authorized specifically.

05 - STORAGE

Reinforcement shall be stored above the ground surface upon skids, platforms, or other supports, and shall be protected from mechanical injury and from deterioration by exposure to the weather. When placed in the work, the reinforcement shall be free from dirt, loose rust, scale, paint, oil, or other foreign material.

06 - SPLICES

REINFORCEMENT STEEL

No splices of bars, except when shown on the plans, will be permitted except upon the written approval of the Engineer. Splices which are permitted shall have a length of not less than that required by the ACI Code, and shall be well distributed or else located at points of low tensile stress. The spacing between bars shall meet the recommendation of the ACI Code for anchorage bond and placing concrete.

Where welded splices may be required, they shall conform to AWS D 12.1 "Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction." Welded splices shall develop in tension at least 125% percent of the specified yield strength of the reinforcing bar. Splices shall transfer the entire computed stress from bar to bar without exceeding three-fourths of the permissible bond. Welded wire fabric shall be lapped not less than two mesh, i.e., the length of the lap shall be at least equal to the spacing of wires parallel to the lap.

Bars shall be rigidly clamped or wired at all splices in a manner approved by the Engineer.

07 - REJECTION

Reinforcement may be rejected for failure to meet any of the requirements of this specification on account of any of the following:

1. Reinforcement exceeding the allowable variations in size or weight.
2. Reinforcement with bends not in conformity with the details.
3. Reinforcement with a coating of dirt, loose rust, scale, paint, oil, or other foreign substance at time of placing in the work.
4. Twisted bars.

08 - DETAILING

1. Completely detailed shop drawings and schedules shall be submitted by the Contractor for approval of the Engineer in accordance with requirements specified for working drawings.
2. The bars shall be supplied in lengths which will allow them to be conveniently placed in the work and provide sufficient lap at joints. Dowels of proper length, size, and shape shall be provided for tying walls, beams, floors, and the like together where shown, specified, or ordered.
3. Steel reinforcement shall be of the type and size, cut to lengths, and bent to shape as indicated on the plans. Where dimensions of hooks are not shown, the diameter of the hook shall equal six (6) times the bar diameter for bar sizes #3 through #8 and 8 times for #9, #10 and #11, with a straight length of bar at the end of the hook equal to four (4) times the bar diameter, or 2-1/2" minimum, whichever is greater.

REINFORCEMENT STEEL

09 - PLACING REINFORCEMENT

Reinforcement, before being placed, shall be thoroughly cleaned of mill and rust scale and of coatings that will destroy or reduce the bond with the concrete. When there is a delay in concreting operations and the reinforcement has been in place in excess of two (2) days, it shall be reinspected and, when necessary, cleaned.

Metal reinforcement shall be accurately positioned and dimensioned in accordance with the plans and specifications. The bars and mesh shall be tightly secured against displacement by using annealed wire of not less than No. 16 gauge and suitable clips at intersections. The reinforcement shall be supported in a manner that will keep all metal away from the interior surfaces of forms, or the surface against which the concrete is placed, in accordance with the "clear" dimensions as shown on the plans or as specified single layer reinforcement in slabs shall be placed at mid-depth unless otherwise dimensioned in plans.

Nails shall not be driven into the outside forms to support reinforcement, nor shall any other device for this purpose come in contact with outside form, except that wood strips shall be inserted between the reinforcement and the forms at intervals to maintain the required clear distances between the reinforcement and the outside surfaces of the concrete. These wood strips shall be pulled up and removed as the level of the concrete rises in the forms. In the case of slabs and beams, metal chairs, spacers, and other metal accessories necessary to provide the required clear distances and proper alignment and spacing between bars shall be used subject to the approval of the Engineer. Precast concrete blocks wired to the reinforcing bars will not be permitted as supports or spacers.

10 - CONCRETE PROTECTION FOR REINFORCEMENT

Steel reinforcement shall be placed and held in position so that the concrete cover as measured from the surface of the bar, shall be the following, except as otherwise shown, specified, or directed:

Slabs:

3/4 inch, in general, top and bottom;

1-1/2 inches at surfaces troweled as floor finish, walkway, or driveway;

1-1/2 inches at bottom for slabs over water;

Footings:

3-1/2 inches at top of footings;

3 inches at bottom, sides, and end of footings;

Walls:

2 inches on surfaces against earth;

1 inch on interior surfaces;

REINFORCEMENT STEEL

1-1/2 inches on interior surfaces contacting water;

3 inches at top surface;

Beams and Girders:

1-1/2 inch minimum for stirrup steel, top and bottom; 2 inch minimum to main longitudinal steel;

Columns:

2 inches, in general to main vertical reinforcement.

ITEM - PVC AND CPVC PIPE SCHEDULES 40 AND 80

01 - GENERAL

Furnish PVC and CPVC pipe and fittings of size(s) shown on PLANS. This item governs materials, fittings and incidentals required for the joining and bedding of pipe type for use in small diameter potable and non-potable water lines and chemical solution lines.

02 - MATERIALS

1. Pipe. PVC pipe conforming to ASTM D1785 and CPVC pipe conforming to ASTM F441. Raw material for potable water piping shall contain only additives approved by NSF.
2. Fittings. PVC fittings conforming to ASTM D2466 and D2467 and CPVC fittings conforming to ASTM F438 and F439.
3. Joints. Use solvent weld joints as specified by ASTM D2855 using primer and cement conforming to ASTM F656 and D2564.

03 - INSTALLATION

1. Trenching. To be in accordance with Item "Underground Plant Piping".
2. Pipe Zone Bedding. Install in accordance with ASTM D-2774, using well rounded sand or gravel with a maximum particle size of 1/2 inch. Hand tamp bedding material around haunches to a point twelve (12) inches above the top of pipe.
3. Backfill Above Pipe Zone. To be in accordance with Item "Underground Plant Piping".
4. Aboveground. Install using commercial hangars. Insulate all above ground piping with styrofoam insulation.

04 - MEASUREMENT AND PAYMENT

No separate payment.

STRUCTURAL EXCAVATION, FOUNDATIONS, & BACKFILL

01 - DESCRIPTION

This item shall govern the removal of all earth, rock, water, and other materials, regardless of their nature of the manner in which they are removed, to the extent required for the construction of such facilities as shown on the plans. This item shall include preparing the subgrade and/or sub-base for the foundation of the facilities and drilling of footings to lines and grades established by the plans.

This item does not provide for excavation and/or trenching and backfilling necessary for the installation of pipe culverts, sewers, and/or any other pipe installation which may be required; or the removal of old structures.

02 - EXCAVATION AND FOUNDATIONS

1. **General.** Excavations shall be of such dimensions as to permit the construction of the work in the manner, shape, and size shown on the plans. Excavation shall extend a sufficient distance from the walls to allow for placing and removal of forms, installation of piping, installation of excavation safety system, and inspection. The sides of the excavation shall be laid back or stepped when warranted by the soil conditions encountered, or when required by the Contractor's excavation safety system. The Contractor shall furnish any necessary temporary supports for piping and structures within the excavation, at no extra compensation.

Final trimming and bottom excavation shall be done just prior to placing of steel and concrete to insure a firm footing base. If such bases become softened, the Contractor shall excavate to firm material by facing and concreting to replace the softened material at no extra compensation.

When caissons are used for excavation, no excavation shall be made outside the outer face of the caisson.

Any excavation five (5) feet or deeper shall include a TRENCH SAFETY SYSTEM. Any payment shall be included in and be subsidiary to the corresponding safety bid item.

2. **Changes in Footing Depths.** When it is necessary to increase or decrease footing depths for a structure, the Contractor shall modify the structural details as directed by the Engineer.
3. **Seal Slabs.** The Contractor shall provide a two-inch seal slab under all proposed structural slabs located below grade.

The seal slab shall cover the entire area of the excavation on which the structure will rest, as shown on the plans. The Contractor shall excavate to the depth required for the seal slab, performing final excavation to grade just before placement of the seal slab.

4. **Material Storage.** Excavated materials which will be used for backfill shall be stored at points convenient for rehandling, or as directed by the Engineer.

Storage piles shall be located so as not to interfere with traffic, drainage, plant operation, other construction work, or surveying which is necessary for construction.

5. **Protection of Excavations.** Excavations shall be protected from rainfall and surface water. If bearing values of supporting soils are affected by excessive moisture or drying, the Contractor

STRUCTURAL EXCAVATION, FOUNDATIONS, & BACKFILL

shall excavate deeper and/or wider at no cost to the Owner.

The Contractor shall pump or bail from the foundation enclosure if necessary to prevent water from moving through or alongside concrete being placed. No pumping or bailing shall be done during concrete placement, or within 24 hours thereafter, unless it is done from a suitable sump separated from concrete work by a watertight wall.

Pumping or bailing for dewatering sealed cofferdams shall not be started until the seal has set for at least 36 hours.

6. **Groundwater Control.** When requested by Contractor and approved by Engineer, install well points to maintain hydrostatic ground water levels to 3 feet below the bottom of excavations. Install a 2-inch piezometer into the zone of soil being dewatered to observe effectiveness of dewatering. Piezometer to include 2" diameter standpipe with screwed lid, tip consisting of a minimum of 4 feet of well screen and a surrounding zone of filter sand in with 100% passing No. 10 sieve and 100% retained on No. 10 sieve and 100% retained on No. 16 sieve and a seal consisting of cement grout or bentonite slurry placed between the standpipe and well screen to isolate the zone.

03 - STRUCTURAL BACKFILLING

The backfill material may be composed of excavated clay soils or an imported clay. Clay backfill shall be compacted to a minimum of 95 percent of the maximum density as defined by the standard moisture-density relationship (ASTM D-698). Use select clay fill, plasticity index of 10 to 20, in areas where excavation extends under or to within 5 feet of slab on grade. Compact select fill to a minimum of 95 percent of the maximum density and 0 to +2% of optimum moisture as defined by the standard moisture - density relationship (ASTM D-698).

All backfilling shall be deposited in layers of not more than six (6) inches thick. No backfill may be placed against a concrete wall until the concrete has cured at least seven (7) days and the forms have been removed.

Before placing backfill against walls of a partially completed structure, the Contractor shall determine from the Engineer whether the design features of the wall will permit such backfilling operations. The Contractor shall exercise care to prevent wedging action of backfill against structures, including stepping or serrating adjacent slopes if necessary.

Unless otherwise authorized by the Engineer, all backfilling shall be performed in the presence of the Engineer or his authorized representative.

04 - MEASUREMENT AND PAYMENT

No separate payment except for groundwater control where approved by Engineer. Groundwater control (Well pointing) will be paid at the unit price bid per each setup.

TBM - CANOPY FOUNDATION BOLT
ELEV = 25.75

NORTH

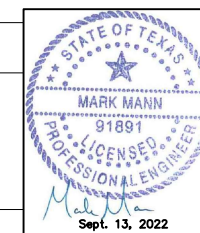
TBM - 1/2 ROD ELEV=25.17

PROPOSED 40 X 50
MAINTENANCE BUILDING
WITH R/C FOUNDATION

PROPOSED 22 X 73'-9"
METAL CANOPY (ALT BID)

PROPOSED 22 X 205
METAL CANOPY

SITE PLAN



REV.		DESCRIPTION		BY	APPR.	DATE
DRAWN	MM	DATE	SABINE RIVER AUTHORITY OF TEXAS AUTHORITY GENERAL OFFICE NEW STORAGE BUILDING ADDITION			
	CHKD.	8/2022				
	APPR.					
	APPR.					
SCALE:		NTS		FOR: FOR CONSTRUCTION		
				DRAWING NO. A-1		REV. 0

50'-0"

NG 24.36

NORTH



40'-0"

20'-0"

3'-0"

WASHER DRYER

W/H

EX TOC 22.5'

UNISEX
(FUTURE)

OFFICE
(FUTURE)

SAFE ROOM

STORAGE ROOM
(FUTURE)

EQUIPMENT STORAGE

VEHICLE

VEHICLE

EX. METAL
CANOPY

TBM - CANOPY
FOUNDATION BOLT
ELEV = 257.5.

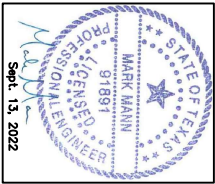
NG 25.00

REMOVE EXISTING
CONCRETE SLAB AND
REPLACE WITH NEW
APPROACH DRIVE.

30'-0"

NG 25.37

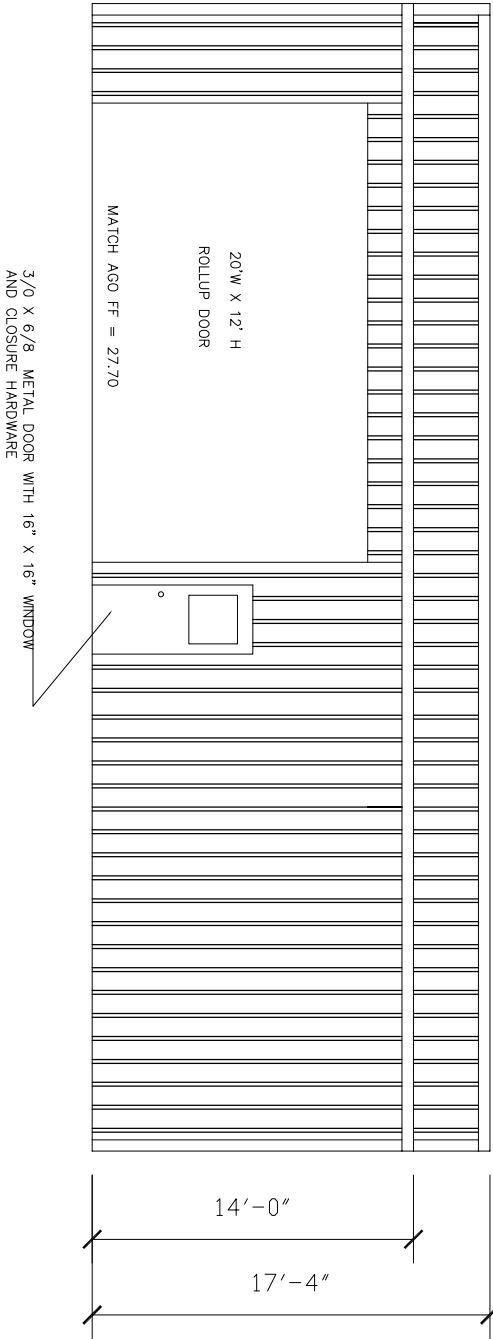
25'-0"



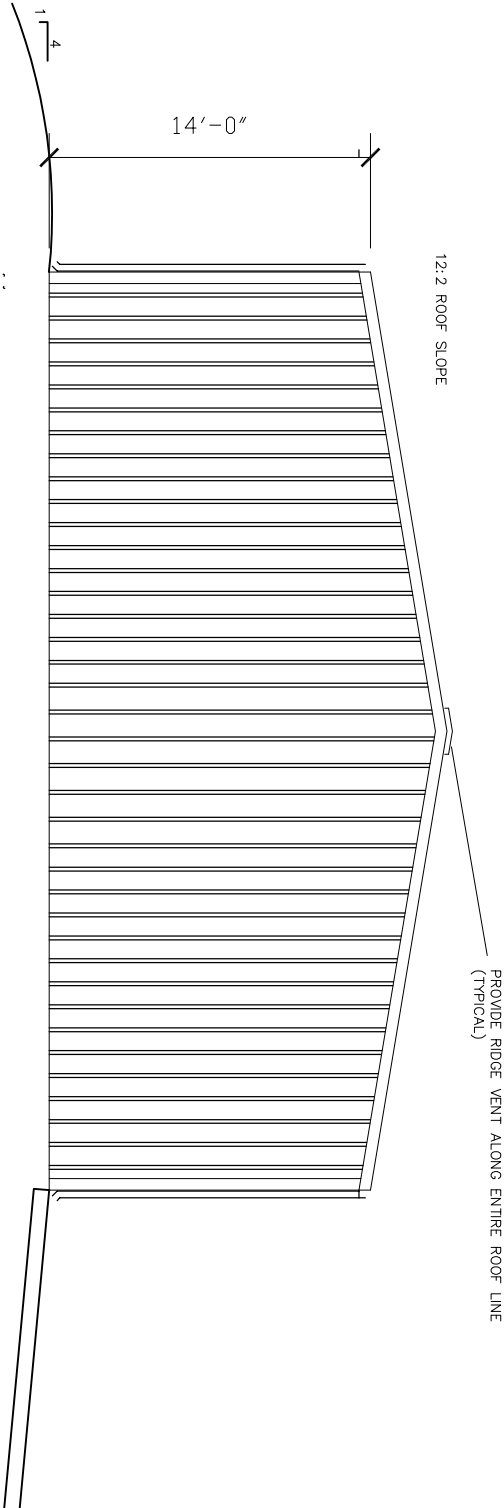
FLOOR PLAN

REV.		DESCRIPTION		BY	APPR.	DATE
	BY	SABINE RIVER AUTHORITY OF TEXAS AUTHORITY GENERAL OFFICE NEW STORAGE BUILDING ADDITION				
	DRAWN					
	CHKD.					
	APPR.					
	APPR.					
SCALE:		FOR: FOR CONSTRUCTION				
		DRAWING NO.		REV.		
NTS		A-2		0		

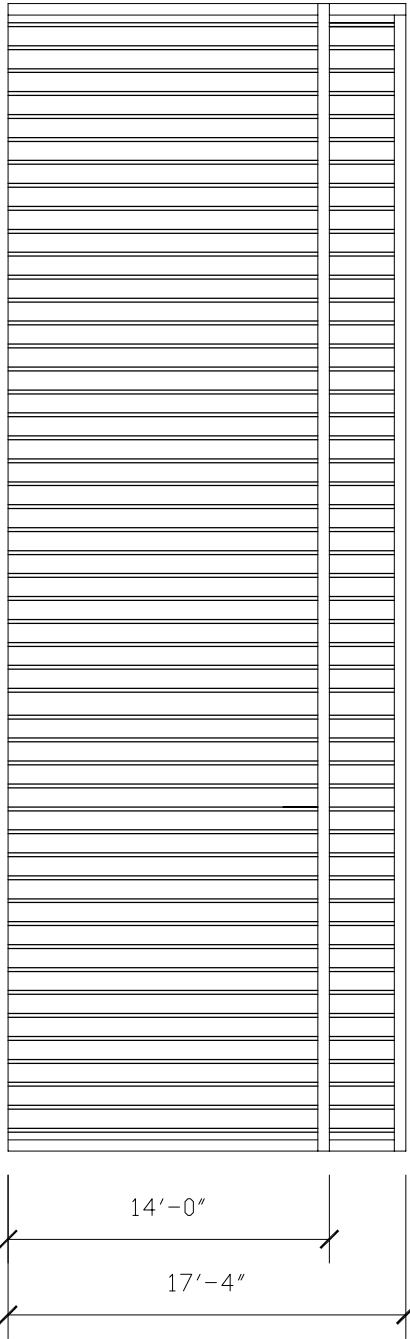
EAST ELEVATION



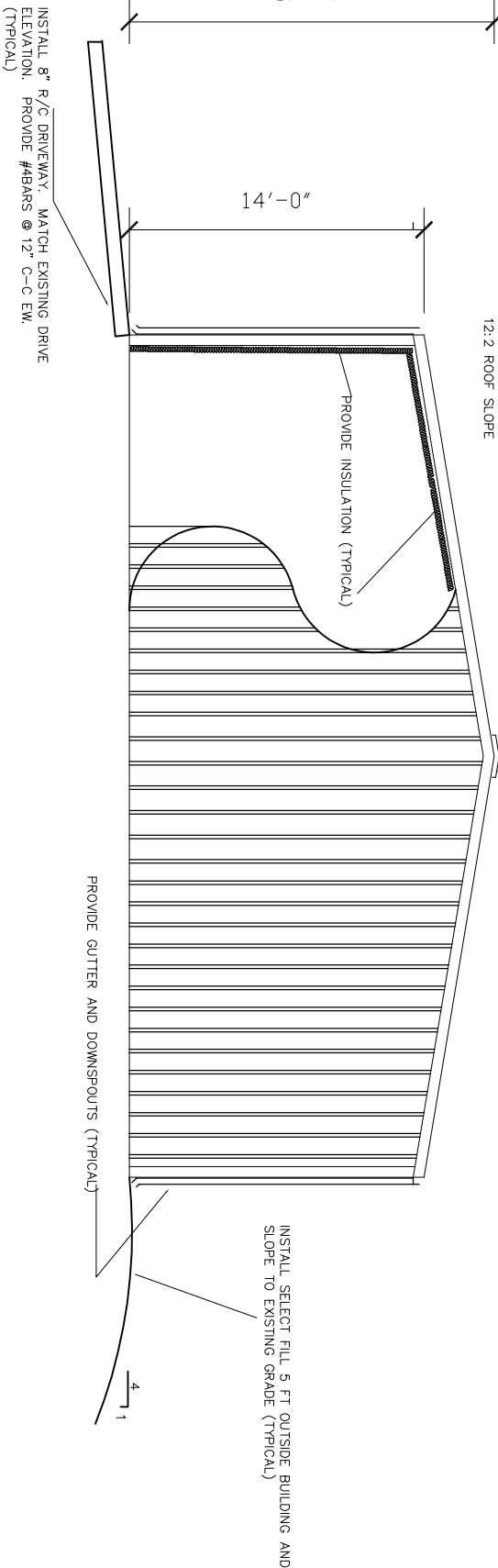
NORTH ELEVATION



WEST ELEVATION

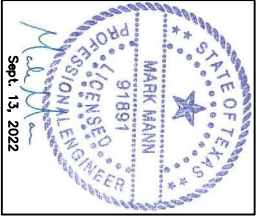


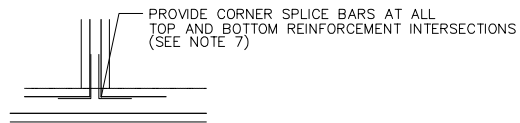
SOUTH ELEVATION



ELEVATIONS

REV.	DESCRIPTION	BY	APPR.	DATE
BY	DATE	SABINE RIVER AUTHORITY OF TEXAS		
DRAWN	MM	8/2022	AUTHORITY GENERAL OFFICE	
CHKD.			NEW STORAGE BUILDING ADDITION	
APPR.			FOR: FOR CONSTRUCTION	
APPR.			DRAWING NO. A-3	
SCALE:	NTS		REV.	0





PROVIDE RELIEF FOR WALL PANELS
PER BUILDING PROVIDERS RECOMMENDATIONS

2'-0"

GRADE

#3 STIRRUPS
@ 12" C/C

1'-4"

(6) #5 BARS (CONT.)

8" SLAB

12

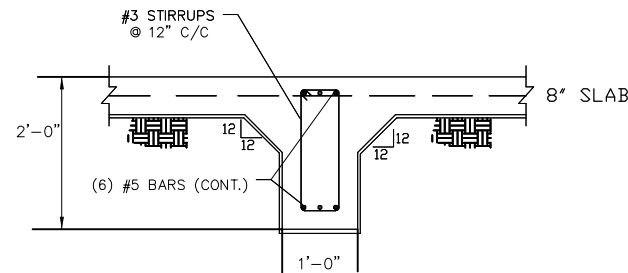
12

6 MIL. POLY. VAPOR BARRIER

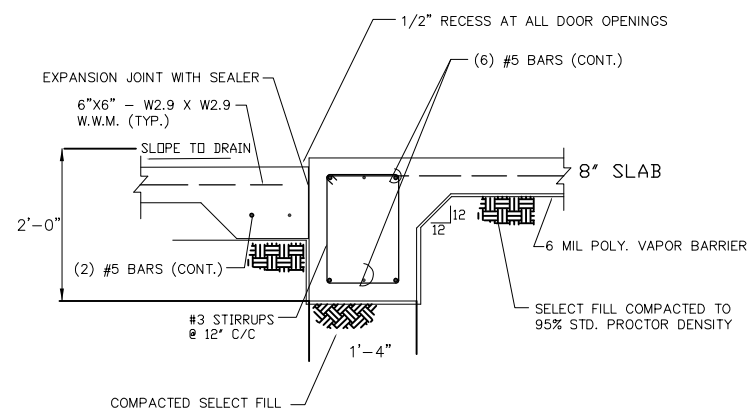
SELECT FILL COMPACTED TO
95% STD. PROCTOR DENSITY

COMPACTED SELECT FILL

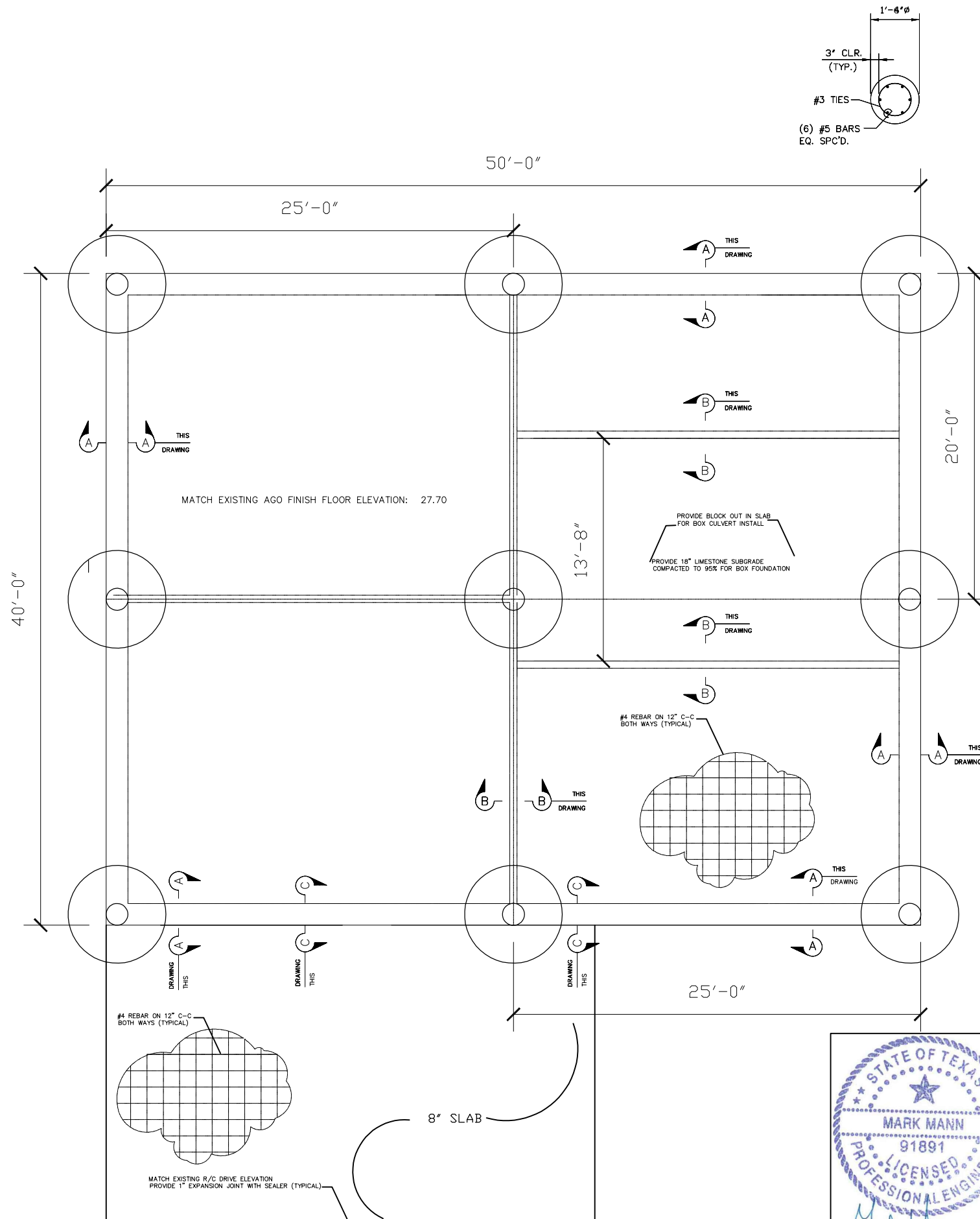
SEE FDN. PLAN



SEE FND. PLAN

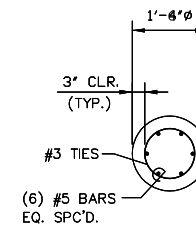


SEE FDN. PLAN

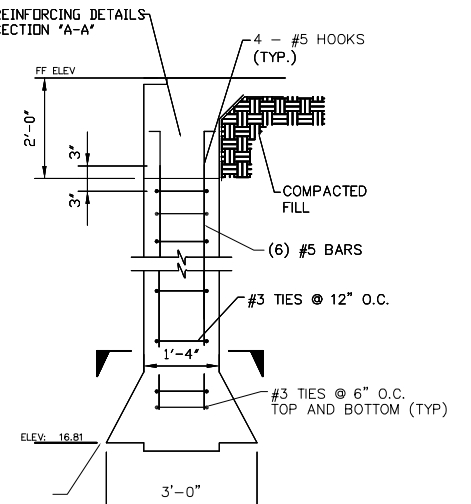


Scale: NTS

NOTE: CONTRACTOR SHALL FIELD LOCATE ALL DOOR OPENINGS PER FLOOR PLAN. ALL ANCHOR BOLTS SHALL BE PER BLDG. MFR.



SEE FDN. PLAN



1) ALL CONCRETE WORK AND REINFORCING STEEL INSTALLATIONS SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE LATEST EDITION OF THE AMERICAN CONCRETE INSTITUTE BUILDING CODE—A.C.I. #318

2) ALL CONCRETE SHALL BE 4000 PSI, 5 SACK (MIN.) MIX DESIGNED TO DEVELOP FULL COMPRESSIVE STRENGTH AT 28 DAYS. ADDITIVES NOT BE INCLUDED IN THE CONCRETE MIX DESIGN OR ADDED TO THE MIX DESIGN WITHOUT PRIOR APPROVAL FROM THE ENGINEER.

3) CONCRETE SLUMP SHALL BE 5" MAX. AT THE JOBSITE WITH NO WATER ADDED TO THE CONCRETE AT THE JOBSITE WITHOUT APPROVAL FROM THE ENGINEER.

4) PORTLAND CEMENT SHALL CONFORM TO A.S.T.M. DESIGNATION C-150 LATEST EDITION.

5) AGGREGATE USED SHALL CONFORM TO THE LATEST A.S.T.M. DESIGNATION AS SHOWN BELOW:

6) ALL REINFORCING STEEL USED SHALL BE NEW BILLET STEEL CONFORMING TO A.S.T.M. DESIGNATION A-615 AND CONFORM TO THE LATEST A.S.T.M. DESIGNATIONS AS SHOWN BELOW:

#3 REINFORCING BARS OR SMALLER TO BE GRADE 40.
#4 REINFORCING BARS OR LARGER TO BE GRADE 60.

7) CORNER BARS SHALL BE PROVIDED FOR CONTINUOUS HORIZONTAL REINFORCING IN THE OUTSIDE FACE OF TWO INTERSECTING BEAMS OR BOTH FACES OF THREE INTERSECTING BEAMS. CORNER BARS SHALL BE THE SAME SIZE AS THE LARGEST INTERSECTING BAR AND SHALL EXTEND (30 x BAR DIAMETER) EACH WAY FROM CORNER. LAP ALL REBAR A MIN. OF 18 BAR DIAMETERS AND INSTALL 3'x3", #5 CORNER BARS (TOP & BOTTOM) AT ALL TEES, INSIDE CORNERS, AND OUTSIDE CORNERS WHERE GRADE BEAM SIZE REMAINS CONSTANT.

8) PROVIDE 1-#5 EACH FACE DIAGONAL REINFORCING BARS AT EACH CORNER OF ALL OPENINGS THRU SLABS, GRADE BEAMS, AND WALLS. LENGTH OF THESE BARS TO BE 1.5 TIMES THE SMALLER OPENING DIMENSION.

9) WHERE BULK CONCRETE IS TO BE POURED AND REINFORCING IS NOT OTHERWISE SHOWN OR NOTED, PROVIDE #4 @ 12" ON CENTER, EACH WAY, TOP AND BOTTOM.

10) CONTRACTOR SHALL VERIFY ALL ASSUMED JOB SITE CONDITIONS PRIOR TO THE FABRICATION OF MATERIALS.

11) ALL REINFORCING STEEL SHALL BE PLACED IN THE BEAM AND SLAB AREAS USING BRICK BATTS OR PLASTIC CHAIRS TO SUPPORT THE STEEL WITH A MINIMUM EDGE DISTANCE OF 3" BETWEEN THE WOOD FORMS OR FILL MATERIALS AND THE REINFORCING STEEL.

12) SEE ARCHITECTURAL AND MECHANICAL PLANS FOR VERIFICATION OF ALL PLUMBING LOCATIONS, CAST-IN-PLACE BOLTS, INSERTS, ANCHORS, ETC. AND FOR ALL SLAB LEAVE-OUTS, SLOPES, DEPRESSIONS, ETC..

13) UNLESS OTHERWISE SHOWN, NOTED OR DETAILED:
(A) TOP CONTINUOUS BEAM REINFORCING TO SPLICE, AT MID-SPAN OF INTERIOR SPAN AND LAP (30 x BAR DIAMETER).

(B) BOTTOM CONTINUOUS BEAM REINFORCING TO SPLICE, OVER SUPPORT AND SPLICE (12 x BAR DIAMETER).

14) CENTERLINE DIMENSIONS ARE TO CENTERLINE OF BUILDING COLUMNS. VERIFY ALL UNDERREAM LOCATIONS WITH BUILDING MFRS. LAYOUT.

15) ALL IN-SLAB PLUMBING & ELECTRICAL PIPING & CONDUITS SHALL CROSS THE GRADE BEAMS AT 90° ANGLES ONLY.

16) CONTRACTOR SHALL SUBMIT THE CONCRETE MIX DESIGN AND PERFORMANCE TEST DATA TO THE ENGINEER FOR APPROVAL PRIOR TO ORDERING CONCRETE TO THE JOBSITE.

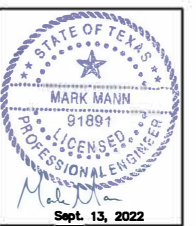
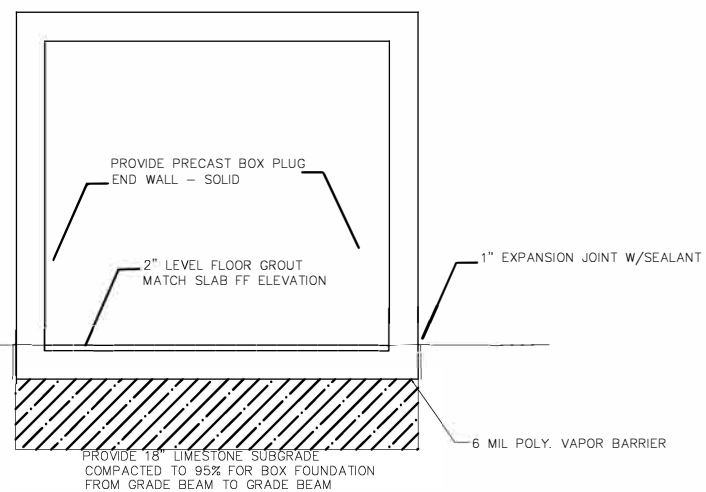
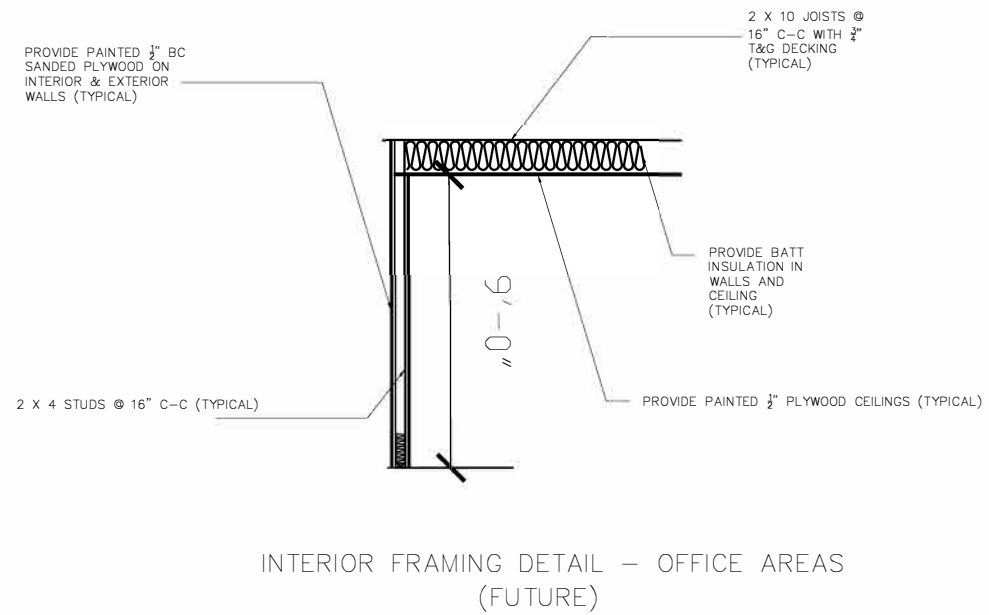
17) CONTRACTOR SHALL CONTACT THE ENGINEER FOR FOUNDATION INSPECTION AT LEAST 24 HOURS PRIOR TO SCHEDULING CONCRETE FOR PLACEMENT.

18) THE FINISHED CONCRETE FOUNDATION SHALL BE SPRAYED WITH SONNEBORN "KURE-N-SEAL" CURING COMPOUND PER MFRS. INSTRUCTIONS, AND/OR COVERED WITH POLY AND KEPT MOIST BY WATERING FOR A MIN. 3 DAYS PRIOR TO WRECKING OUT THE WOOD FORMS. WAIT A MIN. SEVEN DAYS BEFORE APPLYING ANY LOADS TO THE FOUNDATION.

REV.		DESCRIPTION		BY	APPR.	DATE
	BY	DATE	SABINE RIVER AUTHORITY OF TEXAS AUTHORITY GENERAL OFFICE NEW OFFICE BUILDING ADDITION			
DRAWN	MM	8/2022				
CHKD.						
APPR.						
APPR.						
FOR:			FOR BIDS ONLY			
SCALE:			DRAWING NO.		REV.	
REDUCED			A-4		0	

NOTED: 7/19/07

FOUNDATION PLAN



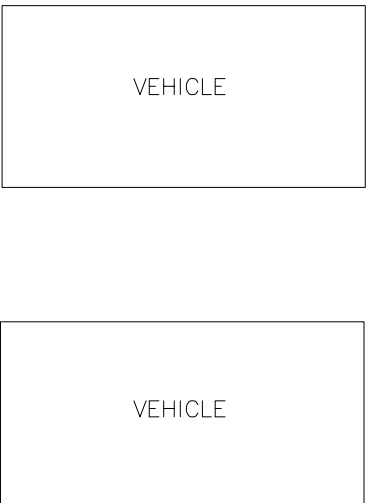
SAFE ROOM

REV.		DISCRIPTION		BY	APPR.	DATE
	BY	DATE	SABINE RIVER AUTHORITY OF TEXAS AUTHORITY GENERAL OFFICE NEW STORAGE BUILDING ADDITION			
DRAWN	MM	8/2022				
CHKD.						
APPR.						
APPR.						
			FOR: FOR CONSTRUCTION			
SCALE:			DRAWING NO.		REV.	
NTS			A-5		0	

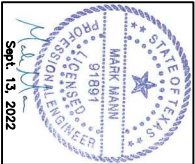
NORTH

50'-0"

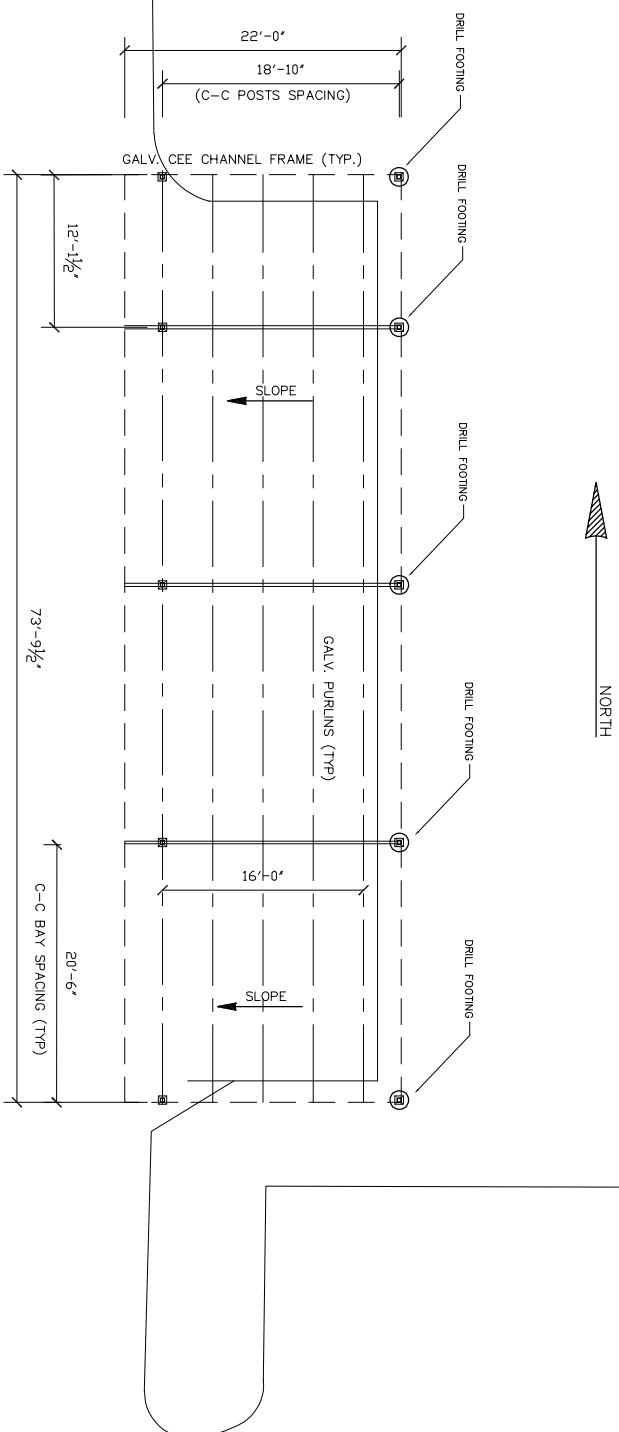
40'-0"



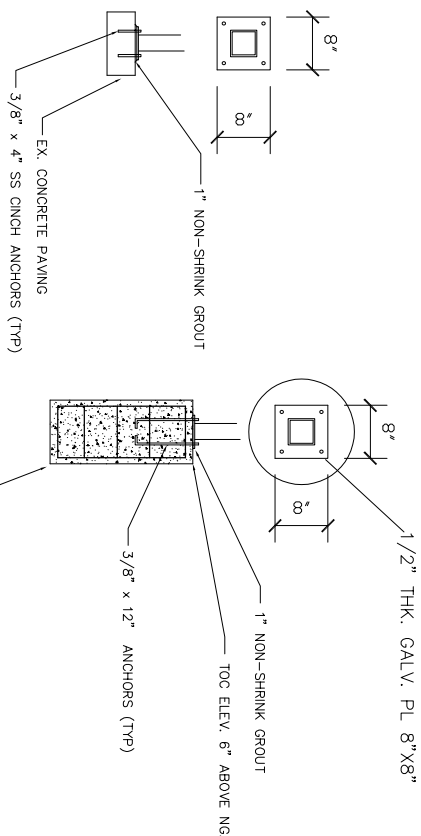
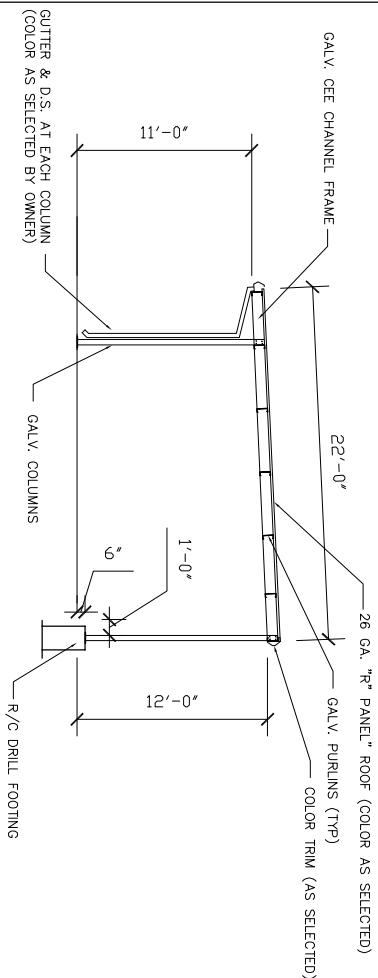
PLUMBING PLAN



REV.		DESCRIPTION		BY	APPR.	DATE
	BY	SABINE RIVER AUTHORITY OF TEXAS AUTHORITY GENERAL OFFICE NEW STORAGE BUILDING ADDITION				
	DRAWN					
	CHKD.					
	APPR.					
SCALE:		FOR: FOR CONSTRUCTION		DRAWING NO.	REV.	
NTS		A-6			0	

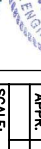


ESD SITE PLAN WEST CANOPY (ADDITIVE ALT BID)



METAL CANOPY NOTES

1. THE CANOPY SHALL BE FIELD CONSTRUCTED USING COMPONENT MATERIALS THAT ARE AVAILABLE LOCALLY. ALL STRUCTURAL COLUMNS SHALL BE HOT-DIPPED GALVANIZED SQUARE TUBING EACH WITH AN 8"x8"x1/2" BASE PLATE WITH HOLES FOR (4) 3/8" DIA. ANCHOR BOLTS. NEW FOOTING FOUNDATIONS SHALL BE INSTALLED AT NEW COLUMN LOCATIONS AS SHOWN.
2. ALL CANOPY FRAMING SHALL BE PRE-GALVANIZED STEEL AS SHOWN ON THE PLAN. ALL FRAMING SHALL BE INITIALLY CONNECTED TOGETHER USING SEALTITE "MAXX 50" SD SCREWS FOR ALL STRUCTURAL CONNECTIONS. AFTER CANOPY IS PLUMB AND COMPLETED, EACH RECEIVER CHANNEL AND PURLIN CONNECTION SHALL BE BOLTED WITH (1) 1/2" DIA. A-325 STRUCTURAL BOLT WITH HEAVY FLAT WASHERS AND NUT.
3. THE CANOPIES SHALL BE OF NOMINAL DIMENSIONS TO PLAN SIZES SHOWN AND SHALL HAVE 26 GA. CORRUGATED METAL ROOF PANELS ("R" PANELS) "GALVALUME" (20 YEAR WARRANTY) FINISH ALL ROOF FASTENERS SHALL BE STAINLESS STEEL SCREWS WITH NEOPRENE WASHERS TO MATCH THE ROOF PANELS. ALL ROOF FASTENERS SHALL BE INSTALLED AT 12" CENTERS ALONG EACH PURLIN AND 2'-0" ALONG EACH PANEL LAP.
4. THE CANOPY SHALL HAVE PAINTED GUTTER WITH MATCHING RAKE EW TRIM AND HIGH SIDE TRIM. PAINTED METAL DOWNSPOUTS ARE REQUIRED AT EACH COLUMN. ALL TRIM, GUTTER, AND DOWNSPOUTS SHALL BE PAINTED - COLOR TO BE SELECTED BY THE OWNER.
5. ALL DIMENSIONS SHALL BE FIELD VERIFIED PRIOR TO ORDER AND FABRICATION OF THE CANOPY AND COMPONENTS.

	REV.	DESCRIPTION		
	BY	APPR.	DATE	
	DRAWN	MM	4/22	
	CHKD.			
	APPR.			
SCALE:		FOR: CONSTRUCTION		
REDUCED		DRAWING NO. A-8		
Sept. 13, 2022		REV.	0	