

# GENERAL NOTES

## SECTION 1.1 - DOCUMENTS

- 1.1.1 Structural Drawings are not stand-alone documents. They must be coordinated with Architectural, Civil and Mechanical/Electrical/Plumbing/HVAC documents.
- 1.1.2 General Notes and Typical Details apply generally throughout the project wherever conditions similar to those depicted exist and are not necessarily referenced specifically in the documents.
- 1.1.3 Structural documents are protected by U.S.A. Copyright Laws, and shall not be used for any purpose other than construction of the building described in the Architectural documents and at the geographic location shown. The structural design described in these documents is not valid for any other purpose, use or location.
- 1.1.4 The Geotechnical Report referenced herein is not part of the Structural Documents; however, a copy should be obtained for reference during installation of foundations and subgrade preparation.

## COORDINATION

- 1.1.5 Contractor is responsible for coordinating Structural Documents with other trades and disciplines including: architectural, civil, mechanical, electrical, HVAC and fire protection. Some requirements are not known prior to issue and may change as layout and fabrication drawings are developed. Promptly report deviations and interferences with structural components for resolution by the Engineer.

- 1.1.6 Contractor shall verify the location, size and detail of roof openings and curbs for mechanical equipment prior to fabricating materials. Report deviations from assumed conditions to the Engineer before proceeding with work.
- 1.1.7 Contractor shall verify location and size of floor and roof penetrations and sleeves for mechanical and electrical components. Openings in beams and slabs are subject to prior approval of the Engineer.

- 1.1.8 Do not scale plans, details and sections for quantity, length or fit of materials.

## REFERENCE ELEVATIONS

- 1.1.9 Heights of floor and roof decks and various framing components are given on the drawings relative to a reference elevation of 100'-0". This reference elevation is equivalent to a Mean Sea Level Elevation of 569.0'.

## TEMPORARY BRACING

- 1.1.10 Structural systems are designed for in-place conditions only. Contractor shall provide temporary bracing of structural components (including but not limited to beams and walls) for conditions that will exist during construction and to meet all regulatory requirements for safety of workmen.

- 1.1.11 Temporary frame bracing shall remain until installation of permanent structural bracing elements, member connections and floor or roof diaphragms are complete.

## SECTION 1.2 - CODES AND STANDARDS

- 1.2.1 Building Code of jurisdiction : 2006 International Building Code
- 1.2.2 Structural Concrete Code - American Concrete Institute (ACI) 318
- 1.2.3 Structural Steel Code - American Institute of Steel Construction (AISC) 360

## SPECIAL INSPECTIONS

- 1.2.4 The following items of structural construction require special inspection in accordance with the building code:

- Installation of drilled concrete piers or caissons  
Placement of structural concrete  
Placement of concrete reinforcing  
Anchor bolts placed in concrete or masonry  
Installation of drilled-in concrete or masonry anchors (expansion, friction, cemented, or grouted anchors)  
Reinforced masonry construction  
Structural steel fabrication and erection  
Welded and bolted steel connections  
Welding of steel roof deck

- 1.2.5 See Technical Specifications for other materials testing and inspection requirements.

## SECTION 1.3 - DESIGN CRITERIA

- 1.3.1 Live Loads
- |                            |         |
|----------------------------|---------|
| Public Areas               | 100 psf |
| Storage                    | 150 psf |
| Rest Rooms                 | 50 psf  |
| Roof, Slope less than 4:12 | 20 psf  |
- 1.3.2 Dead Loads
- |                   |            |
|-------------------|------------|
| Restroom Flooring | 10 psf     |
| Roof Collateral   | 5 psf (1)  |
| Roof Insulation   | 2 psf (3)  |
| Roof Sprinklers   | 3 psf (3)  |
| Roofing System    | 10 psf (2) |

- Notes:  
(1) Collateral loads include; lighting, ductwork, miscellaneous framing.  
(2) Roofing system weight is the maximum unit weight of roofing materials and ballast (where applicable) for which the roof structure is designed.  
(3) Sprinkler loads are for distribution lines and heads, exclusive of mains, which are included separately as concentrated dead loads.

- 1.3.3 Wind Loads
- |                              |        |
|------------------------------|--------|
| Base Mean Wind Velocity      | 90 mph |
| Wind Exposure Classification | C      |
| Wind Importance Factor       | 1.0    |

- 1.3.4 Concentrated Loads
- |                          |             |             |      |
|--------------------------|-------------|-------------|------|
| Location                 | Load-pounds | Area        | Note |
| Metal Roof Deck          | 250         | 1 sq.ft.    |      |
| Roof Opng Support Frames | 500         | 6.25 sq.ft. |      |

## SECTION 2 - FOUNDATIONS AND RELATED EARTHWORK

### GEOTECHNICAL REPORT

- 2.1 Design of foundations and structural components in contact with soil is based on the recommendations given in the following:

- Report by : Alpha Testing, Inc  
Date of Report : December 16, 2010  
Report Number : 0101250

- 2.2 Refer to the soil report for subsol conditions that may be encountered in the installation of foundations, and other information relevant to foundations and site preparation.

### SOIL IMPROVEMENT UNDER BUILDING SLABS

- 2.3 Design of soil-supported building slabs is based on a range of soil movement of 0 inch(es) to 1 inch(es), based on the recommendations of Geotechnical Report.

- 2.4 Earthwork preparation under the building slab is required as follows:  
a) Over-excavate and remove existing soil to a depth of 11 ft below final grade or to the top of shaly limestone (whichever occurs first).  
b) Extend over-excavation not less than 5 feet outside the perimeter grade beams.  
c) Profroll the exposed subgrade with at least a 20-ton roller to evidence an even and firm surface.  
d) Remove any exposed organic material, wet, soft or loose soil and replace with well-compacted material as specified below.  
e) Scarify the exposed subgrade to a depth of 6".  
f) Compact on-site clay soils to 90% of Standard Proctor maximum dry density with a moisture content of at least 4 percentage points above optimum moisture content, in accordance with ASTM D698  
g) Deposit and compact in loose lifts less than 8" thick.  
h) Fill to not less than 12 inches of the final pad grade using on-site moisture-conditioned soils.  
i) Complete interior building pad fill using a minimum of 12" of compacted non-expansive material. Non-expansive material may consist of "select earth fill", "flex base", or "processed on-site limestone".  
j) Compact "select earth fill" in maximum 8-inch loose lifts at -1% to +3% of soil's optimum moisture at 95% Standard Proctor maximum dry density.  
k) Compact "flex base" in maximum 8-inch loose lifts at -2% to +2% of soil's optimum moisture at 95% Standard Proctor maximum dry density.  
l) Compact "processed on-site limestone" in maximum 8-inch loose lifts to at least 95% Standard Proctor maximum dry density.  
m) Place the non-expansive material within 48 hours of completing the installation of the moisture conditioned soils or protect with a moisture barrier of at least 6 mil plastic.  
n) Do not extend the non-expansive material outside of the perimeter grade beam or beneath the perimeter grade beam.  
o) Shape and finish select earth fill to form the subgrade for concrete slabs on grade. Fire grade the areas to the proper elevations and leave compacted surfaces smooth without waves and ruts.

- 2.5 Soil Materials:  
a) Select Earth Fill: Soil with a liquid limit less than 35, with a Plasticity Index between 4 and 15, and with no more than 0.5% fibrous organic materials by weight. Select earth fill shall contain no deleterious materials.  
b) Flex Base: Crushed Chico stone flex base or recycled crushed concrete flex base that comply with TxDOT Item 247, Type A, B, C, or D.  
c) Processed on-site limestone: Processed limestone with individual rock pieces less than 2 inches in dimension, with a gradation of at least 40% passing a standard No. 4 sieve, and a plasticity index less than 15.  
d) Chemical for soil chemical injection: Chemical specifically formulated for long-term reduction of shrink-swell capacity in expansive clayey soils. Chemical for soil chemical injection shall be environmentally safe and long lasting.

- 2.6 Field Quality Control  
a) Compaction Tests: Field density testing of the select fill material under the building and paving and at perimeter grade beam shall be performed by an Independent Testing Laboratory.  
b) Independent Inspection and Testing Laboratory shall monitor the placement of the moisture-conditioned clays on a continuous basis. Independent Inspection and Testing Laboratory shall make one in-place density test for each 2500 sq. ft. of area per lift, but in no case less than two tests, and one test per 100 linear feet of backfill area adjacent to grade beams, to ensure that the specified density is obtained.

1. Perform additional tests until required density and moisture content are achieved.  
2. Test "Select Earth Fill", "Flex Base", and "Processed on-site limestone" material for soil characteristics (moisture content, plasticity index).  
c) Independent Inspection and Testing Laboratory shall monitor the site chemical injection on a continuous basis.

1. Following the curing period recommended by the injection contractor, obtain relatively undisturbed Shelby tube samples (ASTM D1587) at 1-foot intervals throughout the total injected depth. Obtain samples of the injected soils from a minimum of one test boring per each 5,000 square feet of injected area (minimum two borings per injected area).  
2. Determine moisture content and pocket penetrometer strength of each sample.  
3. Perform free swell tests (minimum 4 swell tests per boring) on selected samples of the injected material. Location of the test borings and selection of the free swell test samples shall be determined by the Geotechnical Engineer based on results of field observations and results of moisture content tests. Conduct free swell tests after applying the overburden pressure and expected foundation loading. The free swell of the chemically injected soils shall not exceed 1 percent, considering the applied floor slab loads and final overburden pressures.

- 2.7 STRAIGHT SHAFT PIERS  
Design Criteria:  
Bearing Stratum : Gray Shale or Gray Shaly Limestone  
Top of Stratum Elevation : EL 76'-0"  
(for Bidding Purposes Only)  
Allowable End Bearing : 18,000 psf  
Positive Side Friction : 2,500 psf  
Upheaval Side Friction : 1,000 psf (\*)  
Upheaval Design Depth : 12 ft  
Negative Side Friction : 2,000 psf  
(\*) Upheaval Side Friction assumes subgrade has been moisture-conditioned or chemically injected to reduce potential vertical rise to 1".

- 2.8 Pier depths indicated are for bidding purposes only. Actual pier depths may vary depending on depth to bearing stratum.

- 2.9 Steel dowels at tops of piers or footings shall extend 30 bar diameters above and below top of pier unless noted otherwise (noted as "LAP" on typical details).

- 2.10 Top of pier elevations given are relative to reference elevation 100'-0".

- 2.11 Overpour at tops of piers ("mushrooms") shall be removed to the required pier diameter.

## SECTION 3 - STRUCTURAL CONCRETE

### SECTION 3.1 - CONCRETE FORMS

- 3.1.1 Formed Voids - Provide retained void spaces between bottom of structural members and subgrade as follows:  
Grade Beams 8 inches

- 3.1.2 Grade Beams - shall be formed both sides unless specifically shown or noted otherwise in the details.

- 3.1.3 Submittals- Submit product data for the following items for review prior to construction:  
1. Form oil  
2. Form release agent  
3. Form sealer  
4. Fiberboard void forms  
5. Void retainer panels

- 3.1.4 Void retainers shall be extruded polystyrene closed-cell foam panel, equivalent to Foamular as manufactured by Owens Corning. Two inch minimum thickness. Minimum compressive strength of 25 psi and minimum flexural strength of 75 psi.

- 3.1.5 Fiberboard void forms (void boxes): manufactured using corrugated paper material with a water resistant fiberboard material exterior, capable of supporting weight of wet concrete without crushing but non-durable in long term (deteriorates over time with the absorption of moisture). Void forms to be laminated using moisture resistant adhesive.

1. Provide all shapes required (rectangular, trapezoidal, etc.)  
2. Provide special shapes adjacent to round or skewed components  
a. Do not cut fiberboard void forms in the field  
3. Provide caps at each end of units.  
a. Provide a layer of protective cover board over void forms as necessary to distribute working load and protect the void forms from puncture and other damage during concrete placement.  
1) Protective cover board to be 1/2-inch minimum thickness hardboard/fiberboard or approved equal.

4. Do not use material that is entirely wax impregnated.

## SECTION 3.2 - STEEL REINFORCING

### STEEL REINFORCING

- 3.2.1 All bars shall be deformed in accordance with ASTM A615. Reinforcing indicated to be welded shall conform to ASTM A706.

- 3.2.2 Strength of bars shall be as follows:  
All Bars Grade 60

- 3.2.3 Shop Drawings  
1. Submit shop and installation drawings for review by Architect, and shall not be used for any purpose other than construction of the building described in the Architectural documents and at the geographic location shown.

2. Review of shop drawings is for member sizes, spacings, details, and general compliance with Contract Documents only.  
3. Material quantities, lengths, fit, verification of job conditions, and coordination with other trades are responsibility of Contractor.  
4. Reproductions of Contract Drawings shall not be used for shop drawings.

- 3.2.4 Quality Control Submittals  
1. Submit certified copies of mill reports, evidencing compliance with requirements of Specifications.  
2. Submit copies of laboratory testing and inspection reports.

- 3.2.5 SPlicing OF REINFORCING BARS  
Lap reinforcing 24 bar diameters at splices unless noted or detailed otherwise.

- 3.2.6 Bottom bars in beams or slabs shall be spliced at supports, unless noted otherwise.

- 3.2.7 LAPPED SPLICE LENGTHS  
Clearance from face of concrete to face of reinforcing:  
Piers 3'  
Formed Grade Beams 1-1/2' top, 2' sides, 3' bottom

- 3.2.8 Tension splice lengths shall be calculated in accordance with ACI 318. Use Class "B" splices unless noted otherwise

- 3.2.9 CONCRETE COVER TO REINFORCING  
Clearance from face of concrete to face of reinforcing:  
Piers 3'  
Formed Grade Beams 1-1/2' top, 2' sides, 3' bottom

- 3.2.10 OFFSETS IN REINFORCING  
Offsets in reinforcing bars shall be bent at a ratio of 1 (normal to bar axis) to 6 (parallel to bar axis).

- 3.2.11 Provide corner bars at intersections of beams and walls in accordance with Typical Details.

- 3.2.12 Provide dowels from grade beams or foundation equal in size and spacing to vertical bars in walls and extend one splice length above and below joint line, unless noted otherwise.

- 3.2.13 Start stirrup spacing in beams 2 inches outside of face of supports.

- 3.2.14 Place first bar of slab reinforcing parallel to side 2 inches from a free edge or half of required bar spacing from face of edge beam.

- 3.2.15 Single layer reinforcing in walls shall be placed at center of walls unless noted otherwise.

## SECTION 3.3 - CONCRETE MIX DESIGNS

- 3.3.1 Concrete Mix Schedule:  
a) "HRC" refers to hardwood concrete having air dry unit weight of approximately 145 PCF.  
b) Where w/c ratio is indicated in the Concrete Mix Schedule, it shall be as necessary to meet strength requirements.  
c) Where the w/c ratio is shown, it shall be adhered to regardless of strength requirements.  
d) Strength is required compressive cylinder strength at an age of 28 days.  
e) Secure composite samples in accordance with ASTM C172. Make one strength test sample for each 100 cubic yards or fraction thereof of each mix design of concrete placed in any single day. A single strength test shall consist of 4 cylinders: one to be tested at 7 days age; two to be tested at 28 days age; and one reserved for future test if requested.  
f) Submit concrete mix designs and product data for review prior to construction.

Conc. Class	Strength psi	Agg. Type	Agg. Size	Slump Inches	Max w/c	Notes
A	3000	HRC	1-1/2"	5-7	---	
B	4000	HRC	1"	3-5	---	
C	5500	HRC	1"	3-5	---	

Description of Use	Concrete Class	Air Content
Drilled Piers	A	3-6%
Grade Beams	B	3-6%
Slab-on-Grade	C	3-6%

- 3.3.2 Mix Usage Schedule:

- 3.3.3 Laboratory Testing and Inspection  
1. Concrete Compression Testing: Secure composite samples in accordance with ASTM C172. Make one strength test for each 100 cubic yards or fraction thereof of each mix design of concrete placed in any single day. A single strength test shall consist of 4 cylinders: one to be tested at 7 days age; two to be tested at 28 days age; and one reserved for future test if requested.  
2. Determine slump for each strength test and whenever consistency of concrete appears to vary, in accordance with ASTM C143.  
3. Determine total air content of normal-weight concrete sample for each strength test in accordance with ASTM C231.  
4. Determine temperature of concrete sample for each strength test.  
5. Inspection and Monitoring:  
a. Inspect concrete mixing and loading of transit-mix trucks at plant.  
b. Monitor for signs of water to concrete at job site and length of time concrete is allowed to remain in truck during pour.  
c. Certify each delivery ticket indicating class of concrete delivered (or poured), amount of water added and time at which cement and aggregate were discharged into truck, and time at which concrete was discharged from truck.

- 5.1.8 Where fillet weld sizes are not indicated on weld symbols, fillet size shall be 1/16th inch smaller than thickness of thinner of materials being joined.

- 5.1.9 Complete penetration welds are indicated by notation "CP" on weld symbols, partial penetration by "PP".

- 5.1.10 Bolts indicated on details shall be 3/4 inch diameter, unless noted otherwise.

- 5.1.11 Bolts shall be tightened by the AISC "Snug Tight" method unless noted otherwise.

- 5.1.12 Edge angles at perimeters of floors and roofs noted as "CHORD MEMBERS" or "CONTINUOUS" on details shall be butt welded at splices to develop full allowable tensile strength of member.

- 5.1.13 Edge angles supporting roof deck shall be spliced only over supports.

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- 5.1.15 Edge angles supporting roof deck shall be spliced only over supports.

- 5.1.16 Edge angles supporting roof deck shall be spliced only over supports.

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- 5.1.18 Edge angles supporting roof deck shall be spliced only over supports.

- 5.1.19 Edge angles supporting roof deck shall be spliced only over supports.

- 5.1.20 Edge angles supporting roof deck shall be spliced only over supports.

- 5.1.21 Edge angles supporting roof deck shall be spliced only over supports.

- 5.1.22 Edge angles supporting roof deck shall be spliced only over supports.

## SECTION 3.8 - CONCRETE ACCESSORIES

- 3.8.1 Headed Stud Anchors: comply with ASTM A108, Grades 1010 through 1020, with sizes and lengths as shown on Drawings, and complying with AWS D1.1, Section 7.

- 3.8.2 Submit shop and installation drawings showing shop and field connection details, including material grades, material sizes, and details of fabrication.  
1. Do not begin fabrication of materials prior to review of shop drawings.  
2. Review of shop drawings is for member sizes, spacings, details, and general compliance with Contract Documents only.  
3. Material quantities, lengths, fit, verification of job conditions, and coordination with other trades are responsibility of Contractor.

## SECTION 4 - STRUCTURAL MASONRY

### GENERAL

- 4.1.1 Refer to Architectural layout and Drawings and Specifications for details and exact dimensions of brick masonry work including rustication, corning, coursing, reglets, weep holes, waterproofing and flashing.

- 4.1.2 Grout lifts at reinforced masonry walls shall not exceed five feet.

- 4.2.1 STRUCTURAL PROPERTIES  
Required prism strength of structural assembly = 1500 psi

- 4.2.2 Concrete Masonry Units: ASTM C90 Lightweight with minimum net area compressive strength of 1900 psi

- 4.2.3 Masonry Mortar: ASTM C270, Type S (Proportion Specification)  
Masonry cement shall not be used for mortar.

- 4.2.4 Masonry Grout: ASTM C476 (Proportion Specification)

- 4.3.1 REINFORCING  
Horizontal joint reinforcing shall be "Truss Type" 9 ga. welded wire spaced 16 inches on center vertically.

- 4.3.2 Horizontal reinforcing in trough tiles shall be lapped 30 bar diameters at splices. Stagger splices in adjacent bars at least 4'-0". See details for reinforcing.

- 4.3.3 Provide corner bars at intersections of reinforced trough tiles equal in size and number to horizontal reinforcing lapped 30 bar diameters each way.

- 4.3.4 Typical wall reinforcing for load bearing CMU walls shall be #5 bars vertical spaced at 24 inches on center in grout filled cells.

- 4.3.5 The first cell at corners, ends of walls, and each side of openings shall be grouted and reinforced with 1 #5 vertical.

- 4.3.6 Vertical reinforcing in grouted cells and pilasters shall be lapped 48 bar diameters and wire tied at splices, unless otherwise noted.

- 4.3.7 Do not splice vertical reinforcing within 1/4th of wall height above or below mid-height.

- 4.3.8 Submit CMU wall reinforcing for review prior to construction.

## SECTION 5 - STRUCTURAL STEEL

### SECTION 5.1 - STRUCTURAL FRAME

- 5.1.1 Structural Steel Properties:  
High Strength Steel: ASTM A992 Grade 50  
Use High Strength Steel for W Shapes and WT's, u.n.o.  
Structural Steel (Normal Strength): ASTM A572  
Use for Angles, Channels, and Plates, u.n.o.  
Hollow Structural Sections (HSS): ASTM A500, Grade B  
Erection Bolts: ASTM A307  
High Strength Bolts: ASTM A325N

- 5.1.2 SUBMITTALS  
Submit detailed shop and installation drawings showing shop and erection details including member sizes, grades of materials, details of fabrication and erection, and end connections.  
1. Do not begin fabrication of materials prior to review of shop drawings.  
2. Review of shop drawings is for member sizes, spacings, detail, and general compliance with Contract Documents only.  
3. Material quantities, lengths, fit, verification of job conditions and coordination with other trades are responsibility of Contractor.  
4. Reproductions of Contract Drawings shall not be used for shop drawings.

- 5.1.3 Submit descriptive data illustrating general procedure for erection of structural steel including sequence of work, proposed schedule and details of temporary staying and bracing.

- 5.1.4 Submit Mill Certifications showing compliance of materials with ASTM and AISC Specifications.

- 5.1.5 Submit Mill Certifications (Manufacturer's Inspection Certificates) for bolts, nuts and washers.

- 5.1.6 Submit manufacturer's data sheets or certified test results indicating compliance with requirements for manufactured components.

- 5.1.7 WELDING  
Unless otherwise noted, angles, plates, rods, and miscellaneous framing shall be welded at contact joints and supports. Weld sizes shall conform to AWS D1.1 minimums, except where noted otherwise.

- 5.1.8 Where fillet weld sizes are not indicated on weld symbols, fillet size shall be 1/16th inch smaller than thickness of thinner of materials being joined.

- 5.1.9 Complete penetration welds are indicated by notation "CP" on weld symbols, partial penetration by "PP".

- 5.1.10 Bolts indicated on details shall be 3/4 inch diameter, unless noted otherwise.

- 5.1.11 Bolts shall be tightened by the AISC "Snug Tight" method unless noted otherwise.

- 5.1.12 Edge angles at perimeters of floors and roofs noted as "CHORD MEMBERS" or "CONTINUOUS" on details shall be butt welded at splices to develop full allowable tensile strength of member.

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## SECTION 5.4 - METAL ROOF DECK

5.4.1 Metal Deck Schedule:

Deck Gauge	Deck Type	Sheet (In.)	Min. Width (In.)	Min. Spacing (In.)	Min. Sx(top) Sx(bot)	Finish	
20	WR	1.5	36	0.201	0.234	0.247	Painted

5.4.2 Metal Deck Connection Schedule:

Conn. #	Conn. #	Sidelap	Req'd Shear	
Inst. Mark	Support (W/N)	Parallel Edges (In.)	Capacity (PLF)	
1	36/4	12	5	477

- 5.4.3 Support and parallel edge connections shall be 5/8-inch diameter puddle welds. Sidelap connections shall be no. 10 hex head screws.

- 5.4.4 W/N = sheet width/no. connections each sheet.

- 5.4.5 Roof deck shall be 20 gauge with Mark I connection, typical.

## STRUCTURAL PROPERTIES

- Required prism strength of structural assembly = 1500 psi

- Concrete Masonry Units: ASTM C90 Lightweight with minimum net area compressive strength of 1900 psi