

STRUCTURAL NOTES

(REFER TO PROJECT MANUAL FOR ADDITIONAL INFORMATION)

1. FOOTINGS & FOUNDATION EXCAVATION:

- A GEOTECHNICAL ANALYSIS HAS BEEN PERFORMED ON THIS SITE. SEE PROJECT MANUAL FOR GEOTECHNICAL INFORMATION. APPROPRIATE RECOMMENDATIONS STATED IN THE GEOTECHNICAL REPORT ISSUED BY EGS MID-ATLANTIC, LLC DATED APRIL 13, 2018 SHALL BE FOLLOWED.
- THESE FOUNDATIONS HAVE BEEN DESIGNED FOR A SOIL BEARING OF 2000 PSF FOR CONTINUOUS AND ISOLATED FOOTINGS.
- FOUNDATIONS AND SLAB SHOULD BEAR ON APPROVED FILL MATERIALS OR NATURAL SOILS. SEE GEOTECHNICAL REPORT FOR SPECIFIC REQUIREMENTS REGARDING EXCAVATION AND PREPARATION OF SUBGRADE. A GEOTECHNICAL ENGINEER SHOULD BE PRESENT TO DIRECT THE REMOVAL OF UNSUITABLE SOILS AND TO DETERMINE THE ADEQUACY OF THE BEARING SURFACE PRIOR TO PLACEMENT OF THE REINFORCEMENT AND CONCRETE.
- FOOTING WIDTHS TO BE AS SHOWN ON PLANS AND DETAILS. BOTTOM OF FOOTING IS TO BE EXCAVATED SQUARE AND TRUE.
- WHERE ANY OPEN TRENCH HAS BEEN EXPOSED TO RAIN, SNOW OR ICE PRIOR TO POURING CONCRETE, ALL REINFORCING IN THAT TRENCH SHALL BE REMOVED AND THE BOTTOM OF THE TRENCH SHALL BE DRAINED OF ALL WATER AND CLEANED OF MUD, SNOW OR ICE. A GEOTECHNICAL ENGINEER OR HIS TECHNICAL REPRESENTATIVE SHALL INSPECT THE BOTTOM OF THE TRENCH AND OBSERVE THE RE-COMPACTION OF SOILS PRIOR TO PLACING REINFORCEMENT AND POURING OF CONCRETE.
- ALL STRIP FOOTINGS SHALL BE CENTERED UNDER WALLS BEING SUPPORTED AND ALL ISOLATED FOOTINGS SHALL BE CENTERED UNDER COLUMNS, UNLESS NOTED OTHERWISE.
- MINIMUM EXTERIOR FOOTING DEPTH SHALL BE AS INDICATED ON THE FOUNDATION PLAN SHEET S2.
- IN THE EVENT THAT ORGANIC SOIL OR UNCOMPACTED FILL IS FOUND BELOW FOOTINGS OR FLOOR SLABS, IT SHALL BE REMOVED AND REPLACED WITH SELECT FILL, COMPACTED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT.
- STRUCTURAL FILL SHOULD BE PLACED IN NO GREATER THAN 8" LOOSE LIFTS AND COMPACTED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT. ADEQUATE DENSITY AND MOISTURE CONTENT TESTS SHOULD BE PERFORMED TO INSURE COMPLIANCE WITH PROJECT SPECIFICATIONS. SUBGRADE INSPECTION AND FILL TESTING UNDER CONTROLLED CONDITIONS IS CONSIDERED ESSENTIAL IF THE FOOTINGS ARE TO BE FOUND IN FILL. A TESTING FREQUENCY OF AT LEAST ONE FIELD DENSITY TEST FOR EACH 2500 SQUARE FEET OF LIFT, BUT NOT LESS THAN 3 TESTS PER LIFT IS RECOMMENDED WITHIN THE BUILDING AREAS.

2. CONCRETE:

- ALL READY MIX CONCRETE SHALL BE 4000 psi FOR ALL CONCRETE PLACEMENT. DO NOT ADD WATER TO THE MIX DESIGN AFTER DELIVERY TO THE PROJECT SITE.
- EXPOSED EXTERIOR CONCRETE SHALL BE AIR-ENTRAINED (TOTAL AIR CONTENT = 5%). INTERIOR CONCRETE SHALL NOT BE AIR-ENTRAINED.
- UNLESS NOTED OTHERWISE, CONCRETE COVER OVER STEEL REINFORCEMENT SHALL CONFORM TO THE MINIMUM REQUIREMENT BY ACI 318.
- REINFORCEMENT DETAILING AND PLACEMENT SHALL CONFORM TO ACI 318 AND ACI 315, EXCEPT WHERE OTHERWISE INDICATED.
- HOT OR COLD WEATHER CONCRETING SHALL BE IN ACCORDANCE WITH ACI 305-89 AND ACI 306-1-90, RESPECTIVELY.
- ANY CONCRETE PLACED BY MEANS OF PUMPING SHALL BE DONE IN ACCORDANCE WITH ACI 304.2R (82).
- CEMENT SHALL CONFORM TO A.S.T.M. C-150 TYPE 1.
- AGGREGATES SHALL CONFORM TO A.S.T.M. C-33 FOR NORMAL WEIGHT CONCRETE & A.S.T.M. C-330 FOR LIGHTWEIGHT CONCRETE.
- READY MIX CONCRETE SHALL BE MIXED AND DELIVERED IN ACCORDANCE WITH A.S.T.M. C-94.
- ADMITTURES MAY BE USED WITH THE APPROVAL OF THE STRUCTURAL ENGINEER. ADMITTURES USED TO INCREASE THE DURABILITY OF THE CONCRETE SHALL NOT BE CONSIDERED TO REDUCE THE CEMENT CONTENT. NO CALCIUM CHLORIDE ADMIXTURES ALLOWED.

3. SLABS ON GRADE:

- FLOOR SLABS ARE TO BE PLACED AND FINISHED IN ACCORDANCE WITH ACI 302 (SEE PROJECT MANUAL FOR ADDITIONAL INFORMATION).
- THICKNESS TOLERANCE FOR ALL SLABS IS TO BE PER ACI 117 AND IS TO BE NO MORE THAN + $\frac{3}{8}$ " (THINNER) AND NO MORE THAN - $\frac{3}{4}$ " (THINNER) FROM THE DESIGN THICKNESS.
- CONCRETE USED FOR FLOOR SLABS SHALL INCLUDE SUPERPLASTOIZER. SEE PROJECT MANUAL FOR ADDITIONAL INFORMATION.

4. REINFORCING:

- REINFORCING BARS SHALL BE BILLET STEEL, ASTM A 615, GRADE 60. PROVIDE CONTINUOUS BENT BARS AT FOOTING STEPS AND 90 DEGREE BENT TIES AT CORNERS. UNLESS OTHERWISE NOTED, LAP SPLICES IN WALLS AND FOOTINGS SHALL CONFORM TO CLASS B SPLICE (SEE SPLICE TABLE). ADJACENT BAR SPLICES IN WALLS AND FOOTINGS SHALL BE ALTERNATED. ALL FOOTINGS SHALL REQUIRE HOOKED REINFORCING PROJECTED INTO WALLS, PLASTERS OR COLUMNS. THE SIZE AND SPACING OF DOWELS SHALL MATCH VERTICAL REINFORCING.
- WELDED WIRE FABRIC (WWF) SHALL CONFORM TO THE CURRENT ASTM SPECIFICATION FOR COLD DRAWN STEEL REINFORCEMENT WIRE. LAP END AND EDGES MINIMUM 6".
- REINFORCING DETAILING, BENDING, AND PLACING SHALL CONFORM TO ACI 308.
- MINIMUM CONCRETE COVER: THE MINIMUM CLEARANCES BETWEEN REINFORCING STEEL AND FACE OF CONCRETE SHALL BE MAINTAINED UNLESS NOTED OTHERWISE:
 SLABS ON EARTH..... CENTER OF SLAB
 CONCRETE BELOW GRADE FORMED..... 2"
 CONCRETE BELOW GRADE UNFORMED AND POLISHED AGAINST EARTH..... 3"

5. LUMBER:

- ALL LUMBER SHALL BE FIRE TREATED IN ACCORDANCE WITH PROJECT SPECIFICATIONS. REFER TO ARCHITECTURAL AND PROJECT MANUAL FOR MORE INFORMATION AND SPECIFIC REQUIREMENTS.
- TREATED LUMBER IN LOCATIONS WHERE TREATED LUMBER IS SHOWN ON DRAWINGS, THE APPROVED PRESURE TREATED WOODS ARE ACQ-D (BORONATED) OR TREATED WOODS WITHOUT AMMONIA CARRIERS. THE CHEMICAL RETENTION LEVELS ARE TO BE NO GREATER THAN 0.4 LBS PER ACQ-D 2.0 LBS PER CA-S. ALL METAL CONNECTORS ARE TO HAVE A GALVANIZED COATING OF NO LESS THAN 1.85 OUNCES OF ZINC PER SQUARE FOOT PER ASTM A653. ALL BOLTS, SCREWS, NAILS AND OTHER FASTENERS ARE TO BE GALVANIZED PER ASTM A153. WHERE TREATED LUMBER IS SHOWN IN EXTERIOR INSTALLATIONS WITH NO ROOF COVERINGS TO PREVENT DIRECT EXPOSURE TO RAIN, USE 30 MIN. DIP GALVANIZED CONNECTORS PER ASTM A123.

6. STRUCTURAL STEEL:

- FABRICATOR QUALIFICATIONS: FABRICATOR MUST PARTICIPATE IN THE AISC QUALITY CONTROL PROGRAM AND BE DESIGNATED AN AISC-CERTIFIED PLANT.
 MATERIALS:
 STRUCTURAL STEEL..... ASTM A992, GRADE 50 UNLESS NOTED
 PLATES, ANGLES, CHANNELS, AND MISCELLANEOUS STEEL..... ASTM A36
 ANCHOR BOLTS..... ASTM F1554, GRADE 36
 HIGH STRENGTH BOLTS..... ASTM A325 (3/4") UNLESS NOTED (OF NORTH AMERICAN MANUFACTURE)
 WELDING ELECTRODES..... AWS E5.1 (E70XX)
 PIPE..... ASTM A53, GRADE B
 SQUARE AND RECTANGULAR HOLLOW STRUCTURAL SECTIONS (HSS)..... ASTM A500, GRADE B

7. LIGHT GAUGE STEEL: SHALL CONFORM TO AISI (LATEST EDITION) AND THE FOLLOWING:

- ALL LIGHT GAUGE METAL STUDS, JOISTS AND HEADERS ARE TO MEET OR EXCEED INDUSTRY STANDARDS AS SET FORTH BY THE STEEL STUDS MANUFACTURER'S ASSOCIATION (SSMA).
- LIGHT GAUGE STEEL MEMBER DESIGNATIONS SHOWN ON THE CONSTRUCTION DOCUMENTS ARE SSMA STANDARD DESIGNATIONS.
- ALL LIGHT GAUGE STEEL WALLS SHALL BE LATERALLY BRACED AT 48" O.C. (VERTICALLY) USING 2"x20ga STRAP BRACING ATTACHED TO EACH STUD FLANGE. SOLID BLOCKING WITHIN THE PLANE OF THE STRAP BRACING MUST BE PROVIDED AT EACH END OF WALL, ADJACENT TO WALL OPENINGS, AND AT 8' O.C. MAXIMUM. ALL BRIDGING AND BRACING IS TO BE POSITIVELY CONNECTED TO STUDS.
- MINIMUM TRACK GAUGE TO MEET OR EXCEED GAUGE OF SUPPORTED STUDS.
- BOTTOM TRACK FASTENERS TO BE SPACED AT EACH END OF WALL, ADJACENT TO WALL OPENINGS, AND AT 48" O.C. MAXIMUM.
- POWDER ACTUATED FASTENERS SHALL BE DS HEAVY DUTY 0.177x1 $\frac{1}{2}$ " LONG MANUFACTURED FROM MODIFIED AISI 1061 STEEL AUTEMPERED TO A HARDNESS OF 52-56 HRC AND ZINC PLATED IN ACCORDANCE WITH ASTM B633.S01, TYPE III. FASTENERS SHALL BE INSTALLED BY A QUALIFIED OPERATOR IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. POWDER ACTUATED FASTENERS SHALL BE AS MANUFACTURED BY "MULTI FASTENING SYSTEMS" OR EQUIVALENT.
- ALL LOAD BEARING STUDS TO BE SEATED SQUARELY INTO TOP AND BOTTOM WALL TRACKS WITH NO MORE THAN A $\frac{1}{8}$ " GAP.
- THE DESIGN OF SLIP TRACKS SHALL CONFORM TO THE GUIDELINES ESTABLISHED IN SSMA TECHNICAL NOTE NO. 1 PUBLISHED JANUARY, 2001.

8. GENERAL:

- CONTRACTOR HAS SOLE RESPONSIBILITY TO COMPLY WITH ALL OSHA REGULATIONS.
- THE STRUCTURAL DESIGN OF THE BUILDING IS BASED UPON THE FULL INTERACTION OF ALL ITS COMPONENT PARTS, WITH NO PROVISION MADE FOR CONDITIONS OCCURRING DURING CONSTRUCTION. THE STRUCTURE IS STABLE ONLY IN ITS COMPLETED FORM. THE CONTRACTOR SHALL PROVIDE ADEQUATE BRACING DURING CONSTRUCTION. TEMPORARY SUPPORTS REQUIRED FOR STABILITY DURING ALL INTERMEDIATE STAGES OF CONSTRUCTION SHALL BE DESIGNED, FURNISHED AND INSTALLED BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR CONSTRUCTION ANALYSIS AND ERECTION PROCEDURES, INCLUDING DESIGN AND ERECTION OF FALSEWORK, TEMPORARY BRACING, ETC.
- THE STRUCTURAL ENGINEER ASSUMES NO LIABILITY FOR THE STRUCTURE DURING CONSTRUCTION.
- CORRECTIONS DUE TO UNFORESEEN FIELD CONDITIONS OR DIMENSIONAL DISCREPANCIES ON CONSTRUCTION DOCUMENTS MUST BE BROUGHT TO THE ATTENTION OF THE PROJECT ARCHITECT FOR REVIEW AND AUTHORIZATION PRIOR TO CORRECTIVE MEASURES BEING IMPLEMENTED.
- STRUCTURAL DRAWINGS ARE TO BE USED IN CONJUNCTION WITH ARCHITECTURAL, MECHANICAL, AND ELECTRICAL DRAWINGS.
- NOTES AND DETAILS ON DRAWINGS SHALL TAKE PRECEDENCE OVER THESE GENERAL NOTES.
- ALL SHOP DRAWINGS SHALL BE REVIEWED AND APPROVED BY THE PROJECT ARCHITECT/ENGINEER PRIOR TO SUBMITTING TO THE BUILDING DEPARTMENT FOR REVIEW AND APPROVAL.

9. SIMPSON "AT-20" ADHESIVE SYSTEM: CONCRETE MIXED PER-263 - MASONRY MIXED PER-261:

- CONTRACTOR TO FOLLOW ALL REQUIREMENTS, INSTRUCTIONS, AND RECOMMENDATIONS FOR ADHESIVE APPLICATION.
- SUBSTITUTIONS FOR SIMPSON "AT-20" ANCHORING ADHESIVE SHALL BE ONLY UPON THE APPROVAL OF THE PROJECT ENGINEER OF RECORD.

10. SPECIAL INSPECTIONS REQUIREMENTS:

- OWNER SHALL ENGAGE ONE OR MORE QUALIFIED SPECIAL INSPECTORS AND/OR TESTING AGENCIES TO CONDUCT STRUCTURAL TESTS, CONSTRUCTION MATERIAL TESTING, AND SPECIAL INSPECTIONS SPECIFIED IN THE "STATEMENT OF SPECIAL INSPECTIONS".
- FOR THE SPECIFIC RESPONSIBILITY OF THE OWNER, CONTRACTOR, AND SPECIAL INSPECTOR REFER TO SECTION 01 45 16 OF THE PROJECT MANUAL.

DESIGN CRITERIA

BUILDING CODE: 2012 VIRGINIA UNIFORM STATEWIDE BUILDING CODE (2012 IBC)

DESIGN LOADS:

- ROOF DEAD LOAD..... 5.0 psf
- ROOF COLLATERAL LOAD..... 2.5 psf
- ADDITIONAL CEILING SYSTEM COLLATERAL AT PARTS AREA "A"..... 2.0 psf
- ROOF LIVE LOAD..... 20.0 psf
- SPRINKLER LOADS
 UNIFORM BRANCH PIPE LOAD..... 0.0 psf
 LINE-LOAD PIPE MAIN PIPE LOAD..... 0.0 psf
- CLOUD ELEMENT..... 0.0 psf

SNOW LOAD:

- P_s = 25 psf
- P_f = 20 psf
- C_e = 1.0
- C_t = 1.0
- I_s = 1.0

WIND CALCULATION METHOD: ENVELOPE:

- V_{ult} = 115 mph V_{act} = 9.1 mph
- EXPOSURE = "C"
- RISK CATEGORY = II
- BUILDING ENCLOSED = 1.18

MAIN FORCE RESISTING SYSTEM:

- WALL AND PARAPETS..... 14.7 psf
- PARAPETS..... 15.4 psf

WIND COMPONENTS & CLADDING: All Wind Pressures & Forces in "ASD"

(Wind pressures below were used by JS Smith Consulting Engineers, P.C. for design. Components designed by others for use in project will require wind pressures derived by that supplier.)

- WALL AREAS 10 SQUARE FEET OR LESS = 21.1 psf
- WALL INTERIOR ZONES = 14.0 psf & -15.5 psf
- WALL END ZONES = 14.0 psf & -17.6 psf
- PARAPETS AT INTERIOR ZONES = 11.7 psf & -18.6 psf
- PARAPETS AT END ZONES = 11.7 psf & -21.2 psf
- ROOF INTERIOR ZONES = 5.6 psf & -15.8 psf
- ROOF EDGE ZONES = 5.6 psf & -18.8 psf
- ROOF CORNER ZONES = 5.6 psf & -18.8 psf

BASE SHEAR:

- V_w WIND = 20.1 k
- SEISMIC = 29.8 k
- V_s WIND = 18.5 k
- SEISMIC = 29.8 k

SEISMIC DESIGN: EQUIVALENT FORCE PROCEDURE

- S_s = 0.142
- S₁ = 0.055
- S_{0.2} = 0.237
- S_{0.1} = 0.128
- SITE CLASS = E
- SEISMIC DESIGN CATEGORY = B
- I_e = 1.0

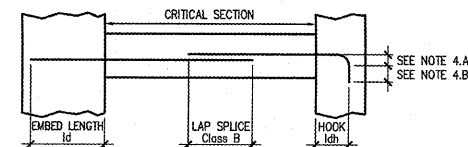
SEISMIC FORCE RESISTING SYSTEM:

- STEEL NOT DETAILED FOR SEISMIC
- R = 3.00
- C_s = 0.079
- p = 1.00

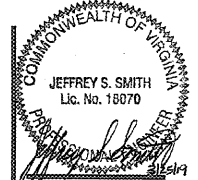
SPLICE TABLE¹
(UNLESS NOTED OTHERWISE)

BAR SIZE	LAP SPLICES (in.) ²		EMBED LENGTH (in.)		
	TOP BARS ³ Class B	OTHERS Class B	TOP BARS ³ ld	OTHERS ld	HOOKS ⁵ ldh
#3	25	19	19	15	8
#4	33	25	25	19	10
#5	41	31	31	24	12
#6	49	37	37	29	15
#7	71	54	54	42	17

- SPLICE TABLE IS BASED ON THE FOLLOWING:
 - CONCRETE f_c = 4000 psi
 - GRADE 60 REBAR
 - BAR SPACING NOT LESS THAN 2 BAR DIAMETERS OR 1"
 - CONCRETE COVER NOT LESS THAN ONE BAR DIAMETER
- LAP LENGTHS SHOWN ARE FOR CLASS "B" TENSION SPLICES PER ACI 318-11 CHAPTER 12.
- TOP BARS ARE DEFINED AS HORIZONTAL REINFORCEMENT PLACED SO THAT MORE THAN 12" OF CONCRETE IS CAST BELOW THE REINFORCEMENT IN THAT MEMBER.
- STANDARD 90° HOOKS:
 - RADIUS = 4 BAR DIAMETERS FOR #3 THRU #8
 - RADIUS = 5 BAR DIAMETERS FOR #9 THRU #11
 - LENGTH = 12 BAR DIAMETERS
- HOOK LENGTH MAY BE REDUCED IN ACCORDANCE WITH ACI 318-11 CHAPTER 12.5



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FREDERICKSBURG, VA #4
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