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STRUCTURAL NOTES

(REFER TO PROJECT MANUAL FOR ADDITIONAL INFORMATION)

- 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.
 - 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 ECS (DATED 9-27-18) SHALL BE FOLLOWED.
 - THE FOUNDATIONS HAVE BEEN DESIGNED FOR A SOIL BEARING OF 2,000 psf FOR CONTINUOUS AND 2,500 psf FOR ISOLATED FOOTINGS.
 - FOUNDATIONS AND SLAB SHOULD BEAR ON ADEQUATE NATURAL SOILS OR ON PROPERLY PLACED AND COMPACTED ENGINEERED FILL. 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 REINFORCEMENT AND CONCRETE.
 - FOOTING WIDTHS TO BE AS SHOWN ON PLANS AND DETAILS. BOTTOM OF FOOTING IS TO BE EXCAVATED SQUARE AND TRUE.
 - NO FOOTING TRENCH SHALL BE OPENED WITHOUT HAVING REINFORCING AND CONCRETE READY TO BE PLACED WITHIN THAT WORKING DAY. ANY VARIATION FROM THIS PROCEDURE SHALL ONLY BE UPON THE APPROVAL OF THE PROJECT ARCHITECT.
 - 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 ON 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 6" LIFTS TO AT LEAST 95% OF MAXIMUM DENSITY AS DETERMINED BY STANDARD PROCTOR PROCEDURES (ASTM D 698).
 - STRUCTURAL FILL SHOULD BE PLACED IN NO GREATER THAN 8" LOOSE LIFTS AND COMPACTED TO AT LEAST 95% OF MAXIMUM DENSITY AS DETERMINED BY STANDARD PROCTOR PROCEDURES (ASTM D 698). ADEQUATE DENSITY AND MOISTURE CONTENT TESTS SHOULD BE PERFORMED TO ENSURE COMPLIANCE WITH PROJECT SPECIFICATIONS. SUBGRADE INSPECTION AND FILL TESTING UNDER CONTROLLED CONDITIONS IS CONSIDERED ESSENTIAL IF THE FOOTINGS ARE TO BE FOUNDED IN FILL. A TESTING FREQUENCY 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.
 - CONCRETE:**
 - FOR ALL CONCRETE PLACEMENT UNLESS NOTED OTHERWISE, ALL READY-MIX CONCRETE SHALL BE 4,000 PSI (WATER/CEMENT RATIO = 0.50) DO NOT ADD WATER TO MIX DESIGN AFTER THE PROJECT SITE.
 - EXTERIOR CONCRETE (EXPOSED TO FREEZE-THAW) SHALL BE 4500 PSI WITH 7% CEMENT (WATER/CEMENT RATIO = 0.45).
 - EXPOSED EXTERIOR CONCRETE SHALL BE AIR-ENTRAINED (TOTAL AIR CONTENT = 6%). INTERIOR CONCRETE SHALL NOT BE AIR-ENTRAINED.
 - UNLESS NOTED OTHERWISE, CONCRETE COVER OVER STEEL REINFORCEMENT SHALL CONFORM TO THE MINIMUM REQUIRED BY ACI 318.
 - REINFORCEMENT DETAILING AND PLACEMENT SHALL CONFORM TO ACI 318 AND ALL NOTES, EXCEPT OTHERWISE INDICATED.
 - HOT OR COLD WEATHER CONCRETING SHALL BE PERFORMED IN ACCORDANCE WITH ACI 308-11, 308-10, 308-9, 308-8, 308-7, 308-6, 308-5, 308-4, 308-3, 308-2, 308-1, 308-0, RESPECTIVELY.
 - ANY CONCRETE PLACED BY MEANS OF PUMPS SHALL BE DONE IN ACCORDANCE WITH ACI 304.2R (82).
 - CEMENT SHALL CONFORM TO ASTM C-150.
 - AGGREGATES SHALL CONFORM TO ASTM C-33. NORMAL WEIGHT CONCRETE.
 - READY MIX CONCRETE SHALL BE MIXED AND DELIVERED IN ACCORDANCE WITH ASTM C-94.
 - ADMIXTURES MAY BE USED WITH THE APPROVAL OF THE STRUCTURAL ENGINEER. ADMIXTURES USED TO INCREASE THE WORKABILITY OF THE CONCRETE SHALL NOT BE CONSIDERED TO REDUCE THE CEMENT CONTENT. NO CALCIUM CHLORIDE ADMIXTURES ALLOWED.
 - 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 NO MORE THAN +3/4" (THICKER) AND NO MORE THAN -1/2" (THINNER) FROM THE DESIGN THICKNESS.
 - REINFORCING:**
 - REINFORCING BARS SHALL BE BILLET STEEL, ASTM A 615, GRADE 60. PROVIDE CONTINUOUS BENT BARS AT FOOTING STEPS AND 90 DEGREE BENT TOP CORNERS, UNLESS OTHERWISE NOTED. LAP SPLICES OR EMBEDMENT LENGTHS SHALL CONFORM TO CLASS B SPLICE (SEE SPLICE TABLE). ADJACENT BAR SPLICES IN WALLS AND FOOTINGS TO BE STAGGERED/ALTERNATED. ALL FOOTINGS SHALL REQUIRE HOOKED REINFORCING PROJECTED INTO WALLS, PILASTERS OR COLUMNS. THE SIZE AND SPACING OF DOWELS ARE TO MATCH VERTICAL REINFORCING.
 - WELDING FABRIC (WVF) SHALL CONFORM TO THE CURRENT ASTM SPECIFICATION FOR COLD DRAWN STEEL REINFORCEMENT WIRE. LAP END ANCHORS MINIMUM 6".
 - REINFORCING DETAILING, BENDING, AND PLACING SHALL CONFORM TO ACI 315.
 - MINIMUM CONCRETE COVERAGE: THE MINIMUM CLEAR DISTANCES BETWEEN REINFORCING STEEL AND FACE OF CONCRETE SHALL BE MAINTAINED UNLESS NOTED OTHERWISE:

CONCRETE ABOVE GRADE, FORMED	2"
CONCRETE BELOW GRADE, FORMED	2"
CONCRETE BELOW GRADE, UNFORMED AND POURED AGAINST EARTH	3"
FORM OR OTHER SURFACE EXPOSED TO WEATHER	1-1/2"
 - 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 RODS ASTM F1554, GRADE 55
 - HIGH STRENGTH BOLTS ASTM A325 (7/8") UNLESS NOTED
(OF NORTH AMERICAN MANUFACTURE)
TENSION (T) AND SLIP CRITICAL (SC) BOLTING TO HAVE TENSION CONTROL BOLTS OR DIRECT TENSIONS INDICATOR WASHERS
 - WELDING AND WELDING ELECTRODES AWS D1.1 AND AWS A5.1 (E70XX)
 - PIPE ASTM A53, GRADE 36
 - SQUARE AND RECTANGULAR HOLLOW STRUCTURAL SECTION (HSS) ASTM A500, GRADE B
 - 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 WALL SHALL BE LATERALLY BRIDGED USING 1 1/2" COLD FORM CHANNELS SPACED AT 48" O.C. MAXIMUM VERTICALLY. BRIDGING CHANNEL IS TO BE POSITIVELY CONNECTED AT APPROVED WELDING METHOD.
 - BOTTOM TRACK FASTENERS TO BE SPACED PER TYPICAL COLD-FORMED NOTES ON SHEET S8.
 - REFER TO TYPICAL COLD-FORMED NOTES ON SHEET S8 FOR CONCRETE ANCHORAGE REQUIREMENTS.
 - ALL LOAD BEARING STUDS TO BE SEATED SQUARELY INTO TOP AND BOTTOM WALL TRACKS WITH NO MORE THAN 1/16" GAP.
 - THE DESIGN OF SLIP TRACKS SHALL CONFORM TO THE GUIDELINES ESTABLISHED IN SSMA TECHNICAL NOTE NO. 1 PUBLISHED JANUARY, 2001.
 - CONCRETE MASONRY UNITS (CMU):**
 - ALL CMU SHALL BE 2-CELL BLOCK. CELLS WHICH CONTAIN REINFORCING STEEL SHALL BE FILLED SOLID WITH GROUT, INCLUDING BOND BEAMS AND LINTELS.
 - VERTICAL CELLS TO BE FILLED SHALL HAVE VERTICAL ALIGNMENT SUFFICIENT TO MAINTAIN A CLEAR, UNOBSTRUCTED, CONTINUOUS VERTICAL CELL NOT LESS THAN 2'-3" IN PLAN DIMENSIONS. SEE SECTION 653.
 - UNLESS NOTED OTHERWISE, FOUNDATION DOWELS SHALL EXTEND TO BOTTOM OF FOUNDATION CONCRETE AND 48 DIAMETERS PLUS 8" INTO THE MASONRY WALL OR PARTITION. LAPS OR SPLICES SHALL BE 2'-0" OR 48 DIAMETERS, WHICHEVER IS GREATER. THERE SHALL BE A FOUNDATION DOWEL FOR EACH VERTICAL REINFORCING BAR.
 - VERTICAL WALL REINFORCING SHALL EXTEND CONTINUOUS FROM THE TOP OF FOUNDATION TO EMBED INTO UPPER MOST BOND BEAM.
 - AN ADDITIONAL VERTICAL BAR (#5 MIN.) WITH FOUNDATION DOWEL, SAME SIZE AND LENGTH AS THE DESIGNATED WALL REINFORCING BARS, SHALL BE PLACED:
 - AT INTERSECTION OF WALLS.
 - ON EACH SIDE OF DOOR AND WINDOW OPENINGS.
 - ON EACH SIDE OF CONTROL JOINTS. (REFER TO ARCHITECTURAL ELEVATIONS FOR CONTROL JOINT LOCATIONS.)
 - BOND BEAMS AT TOP OF CMU WALLS SHALL BE CONTINUOUS. ALL INTERMEDIATE BOND BEAMS, IF ANY, SHALL BE CONTINUOUS EXCEPT WHERE INTERSECTED BY OPENINGS.
 - HORIZONTAL MASONRY JOINT REINFORCEMENT SHALL BE FABRICATED 9 GAUGE LADDER TYPE UNITS INSTALLED AT 16" O.C. STARTING AT 16" ABOVE FOUNDATION. WHERE DOUBLE WYTHE CMU IS SHOWN, WYTHES MUST BE CONTINUOUSLY TIED TOGETHER WITH 9 GAUGE LADDER TYPE JOINT REINFORCEMENT.
 - CONCRETE MASONRY UNITS SHALL BE NORMAL WEIGHT AND CONFORM TO THE PROVISIONS OF THE CURRENT BUILDING CODE AND ASTM C-90 (11/1500) WITH TYPE "S" CEMENT MORTAR BY PROPORTION SPECIFICATION ASTM C270 AND COURSE GROUT (2000 PSI) PER ASTM C478, UNLESS NOTED OTHERWISE. SEE DESIGN CRITERIA FOR BUILDING CODE AND ACI 530 INFORMATION.
 - VERTICAL REINFORCING SHALL BE #5 @ 24" O.C. - LAP SPLICES TO BE 48 BAR DIAMETER (30" MIN.). VERTICAL REINFORCEMENT SHALL BE CENTERED IN EACH CELL BY USE OF REBAR POSITIONERS AT A MAXIMUM SPACING OF 24" O.C. - POSITIONERS SHALL BE 9 GA. WIRE AND HOT DIP GALVANIZED.
 - USE DETAILS 2 THROUGH 9 ON SHEET S3.
- LUMBER:**
 - TREATED LUMBER:
 - IN LOCATIONS WHERE TREATED LUMBER IS SHOWN ON DRAWINGS, THE APPROVED PRESSURE TREATED WOODS ARE ACQ-D (CARBONATE) OR CA-B TREATED WOODS WITHOUT AMMONIA CARRIERS. THE CHEMICAL RETENTION LEVELS ARE TO BE NO GREATER THAN 0.4 PCF FOR ACQ-D, 0.21 PCF FOR CA-B. 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 HOT DIP GALVANIZED CONNECTORS PER ASTM A123.

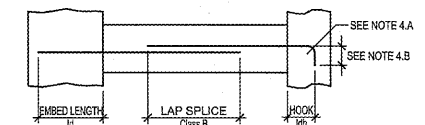
DESIGN CRITERIA IS BASED UPON
2015 VIRGINIA BUILDING CODE

STRUCTURAL DESIGN (RISK CATEGORY II)
(REFER TO STRUCTURAL DRAWINGS)

- LIVE LOADS: 20 PSF
ROOF: REDUCIBLE
- ROOF COLLATERAL LOADS: 2.5 PSF
A. ARCHITECTURAL/MECHANICAL: 2.5 PSF
B. CEILING SYSTEM (PARTS AREA "A"): 2.0 PSF
C. SPRINKLER SYSTEM: 0 PSF
UNIFORM BRANCH PIPE LOAD: 0 PSF
LINEAL LOOP/TIE MAIN PIPE LOAD: 0 PLF
D. STUDS AND GYP SHEATHING: 0 PSF
- SNOW LOADS: $C_e = 1.0$ $C_t = 1.0$
GROUND LOAD (Pg): 25 PSF
MINIMUM ROOF SNOW LOAD (Pm): 20 PSF
IMPORTANCE FACTOR (I_s): 1.0
- WIND LOADS: $G_Cp = \pm 0.18$
BASIC WIND SPEED: $V_{30} = 89$ MPH
 $V_{60} = 115$ MPH
EXPOSURE: C
- SEISMIC: 0.182
S_s: 0.076
S_{d1}: 0.194
S_{d2}: 0.122
IMPORTANCE FACTOR (I_e): 1.0
RISK CATEGORY: D
EQUIVALENT LATERAL FORCE PROCEDURE:
INTERMEDIATE REINFORCED MASONRY SHEARWALLS
 $R = 3.50$ AND $C_s = 0.055$ WITH $V = 0.065W$ kips
STEEL SYSTEM
 $R = 3.00$ AND $C_s = 0.065$ WITH $V = 0.065W$ kips
- LOAD COMBINATIONS:
LOAD COMBINATIONS SHALL BE PER THE ABOVE REFERENCED BUILDING CODE.
- BUILDING DEFLECTION LIMITS:
(REFERENCED CODE DEFLECTION LIMITS, WHERE MORE STRINGENT CODE DEFLECTION APPLY, SHALL SUPERSEDE THE FOLLOWING DEFLECTION LIMITS.)
MAX. ROOF SNOW OR LIVE LOAD: SPAN/240
MAX. ROOF TOTAL LOAD: SPAN/180
MAX. METAL BUILDING RIGID FRAME LATERAL DEFLECTION: HEIGHT/150
MAX. METAL BUILDING HORIZONTAL GIRT LATERAL DEFLECTION: SPAN/240

SPLICE TABLE ¹ (UNLESS NOTED OTHERWISE)					
BAR SIZE	LAP SPLICE (in.) ²		EMBED LENGTH (in.)		
	TOP BARS ³ Class B	OTHERS ⁴ Class B	TOP BARS ³ Id	OTHERS ⁴ Id	HOOKS ⁵ l _{dh}
#3	30	24	24	20	10
#4	40	30	30	24	12
#5	48	40	40	30	16
#6	60	48	48	36	18

- SPLICE TABLE IS BASED ON THE FOLLOWING:
 - CONCRETE $f_c = 4,000$ psi (WATER/CEMENT RATIO = 0.5)
 - CONCRETE EXPOSED TO FREEZE/THAW $f_c = 4,500$ PSI (WATER/CEMENT RATIO = 0.45)
 - GRADE 60 REBAR
 - BAR SPACING NOT LESS THAN 2 BAR DIAMETERS
 - CONCRETE COVER NOT LESS THAN ONE BAR DIAMETERS
- LAP LENGTHS SHOWN ARE FOR CLASS "B" TENSION SPLICES PER ACI 318-05 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.
- RADIUS = 8 BAR DIAMETERS FOR #3 THRU #6
RADIUS = 8 BAR DIAMETERS FOR #8 THRU #11
B. LENGTH = 16 BAR DIAMETERS
- HOOK LENGTH MAY BE REDUCED IN ACCORDANCE WITH ACI 318-05 CHAPTER 12.5



STRUCTURAL SPECIAL INSPECTIONS:

- The structural design for this project is based on completion of special inspections during construction in accordance with section 1704 of the 2012 International Building Code. The owner shall employ one or more qualified special inspectors to provide the required special inspections.
- Special inspections shall be required for the items indicated below. The General Contractor shall provide notification to the inspector when items requiring inspection are ready to be inspected and provide access for those inspections.
 - Placement of Concrete
 - Testing of Concrete
 - Bolts in Concrete
 - Placement of Reinforcing Steel
 - Verification of Soil Bearing Capacities
 - High Strength Bolting
 - Post Installed Anchor Bolts
 - Drill & Epoxy Anchor Bolts and Dowels
 - Structural Welding
 - Structural Steel
 - Light Gauge Stick Framing Inspection
 - Masonry (S1) Periodic.

In addition to material verification, observe all reinforcing voids prior to grouting to confirm clean void and rebar position and lap. Observe grouting.
- Shop Fabrication of Metal Building Fabrication
- The special inspector shall furnish inspection reports to the building official, owner, architect and structural engineer, and any other designated person.
- All discrepancies shall be brought to the immediate attention of the contractor for correction and to the engineer of record with 48 hours by copy of field report, then, if uncorrected within 72 hours, to the proper design authority, building official and structural engineer.
- The special inspector shall submit a final signed report stating that the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans and specifications and the applicable workmanship provisions of the building code.