

GENERAL NOTES

In case of conflict between the General Notes below and the Specifications, the more rigid requirement shall govern unless amended in writing by the Structural Engineer of Record.

DESIGN DATA

- Design Codes -- (All latest editions unless noted otherwise.)
 - International Building Codes (IBC 2018)
 - American Society of Civil Engineers (ASCE 7-16) Minimum Design Loads for Buildings and Other Structures
 - American Concrete Institute (ACI)
 - American Institute of Steel Construction (AISC)
 - American Welding Society (AWS)
 - American Iron and Steel Institute Specifications for the Design of Cold Formed Steel Structural Members (AISJ)
 - National Design Specification for Wood Construction (ANSI/AF&PA NDS-2001)
 - Steel Deck Institute (SDI)
- Design Loads (IBC & ASCE7)
 - Dead Load Design Data
 - Roof: 20 psf
 - Exterior Stud Wall: Self Weight
 - Exterior CMU Wall: Self Weight
 - Live Load Design Data
 - Slab-On-Grade: 100 psf
 - Live Roof Load Design Data
 - Roof (Sloped): 20 psf
 - Roof (Flat): 20 psf
 - Wind Design Data
 - Risk Category: II
 - Velocity: 160mph
 - Wind Exposure Category: C
 - Internal Pressure Coefficient, C_{pi} : 0.18±
 - Snow Design Data
 - Importance Factor for Snow, I_s : 1.0
 - Ground Snow Load, P_g : 0 psf
 - Exposure Coefficient, C_e : 1.0
 - Thermal Factor, C_t : 1.0
 - Roof Slope Factor, C_s : 1.0
 - Flat Roof Snow Load, P_f : 0 psf

- Seismic Criteria
 - Risk Category: II
 - Seismic Importance Factor, I_e : 1.0
 - Site Soil Class: E
 - Mapped Spectral Response Coefficients
 - $S_a = 0.0956 / S_1 = 0.059$
 - $S_{a1} = 0.153 / S_{a1} = 0.165$
- Seismic Design Category: Ordinary Masonry Reinforced Shear Wall
- Basic Seismic Force Resisting System: 0.0306W
- Design Base Shear: 0.03
- Seismic Response Coefficient, C_s : 5.0
- Response Modifications Factor, R : Equivalent Lateral Force
- Analysis Procedure

- Deflection and Drift Limitations
- Roof/Floor Members
 - Building Drift: L/360
 - Max Wall Deflection: L/600
 - Story Drift (Seismic): L/600
 - 0.025 max

- Material & Component Design Criteria
 - Cast-In-Place Concrete
 - Concrete Reinforcing -- Bar (Typical): ASTM A615, GR 60
 - Concrete Reinforcing -- Bar (Weldable): ASTM A706, GR 60
 - Concrete Reinforcing -- Welded Wire Fabric: ASTM A185, (Plain)
 - ASTM A497, (Deformed)
 - Cement: ASTM C150
 - Aggregate: ASTM C33, ASTM C330

Class Use	Category	F _c , PSI	WT, PCF	AGG, IN	AE, %
I. FTG/FDN/PC	1 0 1 1	3500	145	¾"	NA
II. Interior Slab	0 0 0 0	4000	145	¾"	NA
III. Exterior Slab	1 0 1 1	4000	145	¾"	S+1
IV. All Other	1 0 1 1	4000	145	¾"	NA

Reference ACI 318 Chapter 19 For Additional Information Regarding Durability Category And Class Requirement

Concrete Mix Design Shall Be Submitted For Each Class In Accordance With The Procedure Outlined in ACI 301, Standard Specification For Structural Concrete. Documentation Submitted Shall Include The Mix Data. For Additional Submittal Requirements, Reference ACI 301. For Requirements On The Use Of Admixtures And Limits On The Water/Cementitious Materials Ratio For Durability, Reference The Project Manual/Specifications And ACI 318, Building Code Requirements For Structural Concrete.

DESIGN DATA cont.

- Structural Masonry
 - Design Compressive Strength (F_m= 1,500 PSI)
 - Concrete Masonry Unite: ASTM C90, NORMAL WT
 - Reinforcing Steel (UNO):
 - Bar Reinforcing (Typical): ASTM A615, GR 60
 - Bar Reinforcing (Weldable): ASTM A706, GR 60
 - Joint Reinforcement: ASTM A615
 - Grout (F_c= 3,000 PSI, Self Consolidating): ASTM C476 and ASTM C109
 - Mortar, Type S: ASTM C270 or ASTM C780

- Structural Steel
 - Structural Shapes (UNO)
 - Wide Flange: ASTM A992 or ASTM A572
 - Channels, Angles and Plates: ASTM A36 or ASTM A572
 - Non-Shrink Grout Under Plates (F_c=8000 PSI): ASTM C1107, GR A
 - Hollow Structural Sections
 - HSS, (F_y= 46 KSI): ASTM A500, GR C
 - Pipe, (F_y= 35 KSI): ASTM A53, GR C
 - Bolts And Fasteners (UNO): ASTM A325
 - Structural/Anchor Rods: ASTM F1554, Grade 55 (Weldable)
 - Headed Shear Studs: ASTM A108, AWS D1.1, Type B

- Design Soil Bearing Pressures
 - Footings on natural soils or compacted structural fill are designed for a minimum soil bearing pressure of 1,500 psf.
 - If the soil at the footing bearing elevations show is of questionable bearing value, the Engineer or Architect shall be notified immediately.
 - After footing excavations are completed and before placing concrete, the excavated areas shall be inspected and approved by the Owner selected independent testing laboratory.

GENERAL INFORMATION

- All columns shall be centered on grid lines unless noted otherwise.
- All column footings shall be centered on columns unless noted otherwise.
- All wall footings shall be centered on walls unless noted otherwise.
- Unless otherwise noted or detailed, concrete pads for mechanical equipment shall be 4" thick (minimum) and reinforced with #3 @ 12" oc each way centered.
- Substitution of expansion anchors for embedded anchors shall not be permitted.
- Weights of mechanical equipment shown on the structural plans are for units specified by the Mechanical Engineer. Contractor shall verify weights and any substitutions that result in increased weight shall be approved by the Structural Engineer.
- Backfill both sides of all foundation and retaining walls equally until low side is up to finish grade. Do not backfill any walls until concrete has reached its specified 28-day compressive strength.
- Permanent stability of the building and components is not provided until the erection is completed as shown on the contract drawings. Per AISC Latest Edition Code of Standard Practice, "Temporary supports, such as temporary guys, braces, falsework, cribbing or other elements required for the erection operation will be determined, furnished and installed by the erector."
- The contractor shall insure that no construction load exceeds the design live loads indicated on the structural drawings and that these loads are not put on the structural members prior to the time that all framing members and their connections are in place.
- The Contractor shall be responsible for verifying all existing conditions. The Contractor shall be responsible for coordinating architectural, structural, mechanical, and electrical details and dimensions. Any discrepancies between such details and dimensions shall be reported to the OR prior to proceeding with the work.
- The Contractor shall be responsible for erection procedure and sequence to insure the integrity of the building and it's component parts during construction.

SUBMITTALS

- Review of shop drawings and other submittals by the Structural Engineer does not relieve the Contractor of the responsibility to review and check shop drawings before submitting to the Structural Engineer. The Contractor remains solely responsible for errors and omissions associated with the preparation of shop drawings as they pertain to member sizes, details, and dimensions specified in the Contract Documents. All shop drawings must be stamped by the Contractor prior to submittal.
- Shop Drawings: The Contractor shall submit for Structural Engineer review shop drawings for the following items. Items marked (*) shall have shop drawings sealed by a Professional Engineer registered in the state in which the project is located. Items marked (P) shall be submitted for Structural Engineer's record only.
 - A. Structural Steel (*)
 - B. Steel Deck
 - C. Concrete Mix Designs
 - D. CMU Reinforcing Steel
 - E. Concrete Reinforcing Steel
 - F. Wood Trusses (*)
- Design Calculations: The Contractor shall submit for Structural Engineer's record, design calculations sealed by a Professional Engineer registered in the state in which the project is located for the following items.
 - A. Structural Steel Connections
 - B. Wood Trusses (*)

FOUNDATIONS

- All soil preparation shall be in accordance with the recommendations given in the referenced Geotechnical Report.
- Strip area of all gravel, surface vegetation, topsoil, and any debris. Remove all existing structures, foundations, and below grade site features. After stripping and making required cuts, exposed subgrade should be compacted. Overexcavate and stabilize any soft or unstable areas discovered by proof rolling.
- The Geotechnical Engineer shall be present during proof rolling and shall inspect the subgrade prior to any fill operations. All compacted fill shall be continuously inspected by the Owner's selected independent testing laboratory.
- If the soil at the bearing elevations show is of questionable bearing value, the Structural Engineer of Record or Architect shall be notified immediately.
- After footing excavations are completed and before placing concrete, the excavated areas shall be inspected and approved by the Owner's selected independent testing laboratory.
- A polyethylene film vapor barrier. See Arch.

CAST-IN-PLACE CONCRETE

- Arrangement and bending of reinforcing steel shall be in accordance with ACI Detailing Manual, latest edition.
- Reinforcing steel shall be new and all bars shall be deformed.
- Reinforcing Bars: ASTM A615 Grade 60 and ASTM A706 Grade 60 for weldable reinforcing.
- Unless noted otherwise, bar laps shall be Class B tension laps and shall be lapped with minimum lengths as shown in Typical Details, where splices are required in reinforcing. Shorter laps may be acceptable if specific locations of alternate laps are shown on the reinforcement placement drawings and calculations are submitted by a Registered Professional Engineer, licensed to practice in the state in which the project is located, justifying the alternate lap lengths.
- Provide suitable wire spacers, chairs, ties, etc. for supporting reinforcing steel in the proper position while placing concrete. Do not "wet stick" dowels.
- All Welded Wire Fabric (WWF): ASTM A185, Minimum lap and embedment to be the greater of one cross wire spacing plus 2" or 6".
- Minimum concrete protective covering for reinforcement at surfaces not exposed directly to the ground shall be ¾" for slabs, joists, and walls and 1½" for beam stirrups, column ties, or spirals unless noted otherwise.
- Before placing concrete, clean reinforcement for foreign particles or coatings. Place, support, and secure reinforcement against displacement. For cast-in-place concrete, provide cover as shown below, unless noted otherwise on drawings, and as specified in ACI 318, building code requirements for structural concrete.

Application/condition	Required cover, Inches
Cast against and permanently exposed to earth	3"
Exposed to earth or weather:	
No.6 through No. 19 bars	2"
No.5 bar, W31 or D31 wire, and smaller	1½"

- Not exposed to weather or in contact with ground:
- Slab, walls, joints:
 - No. 14 and No. 18 bars: 1½"
 - No. 11 bar and smaller: ¾"
- Beam, columns:
 - Primary reinforcements, ties, stirrups, spirals: 1½"
- Shells, folded plate members:
 - No.6 bar and larger: ¾"
 - No.5 bar, W31 or D31 wire, and smaller: 1½"

- Locations and sizes of openings, sleeves, etc. required for other trades must be verified by these trades before placing concrete.
- All slots, sleeves, trenches, and other embedded items shall be set and secured against movement before the concrete is placed. See Architectural, Electrical, Mechanical, Plumbing, and Vendor drawings for sizes and locations. Coordinate locations, spacings, and sizes with the Structural Engineer of Record prior to pouring concrete.
- Conduits and pipes embedded in concrete slabs may be no larger than ½ of the slab thickness (based on the maximum outside diameter) and shall have a center-to-center spacing no less than three (3) conduit diameters. Regardless of diameter, the minimum clear spacing between conduits or reinforcing shall be one (1) inch.
- No more than four conduits may be placed adjacent to each other without prior approval in writing from the Structural Engineer of Record.
- No aluminum conduits, devices, or fixtures may be embedded into the concrete so that the aluminum is in direct contact with the concrete.
- Corner bars shall be provided for all horizontal reinforcing bars at the intersections and corners of all strip footings, beams, and walls unless noted otherwise. Corner bars shall be of the same size and grade as the horizontal reinforcing they connect. Minimum lap lengths shall be as indicated with the Typical Details unless noted otherwise.
- For slabs-on-grade, provide saw-cut control joints at intervals of 15'-0" oc max across the width of the slab. Refer to the Structural Drawings for typical control joint layout and details.
- Saw-cuts shall be made as soon as the concrete can support the saw without damaging the surface (eight (8) hours max from the start of the concrete pour).
- Reinforcing steel shown in sections and detail are a schematic indication that reinforcing exists. See schedules, section notes and General Notes for actual reinforcing required.
- Detail reinforcement in accordance with ACI 315. Reinforcement shall not be welded unless noted or approved by the Structural Engineer.
- Pedestal, Column and Wall Vertical Reinforcing: Dowel to foundation with hooked bars of same size and spacing as vertical reinforcing, terminate top of reinforcement with hooked bar of same size and spacing as vertical reinforcing.
- Beam Horizontal Reinforcing: Terminate each end with standard.
- Closed Tie and Stirrup Reinforcing: Terminate each end with standard hook.
- Concrete design and detailing shall conform to the requirements of ACI 318 and ACI 301, latest editions.
- Contractor shall provide reinforcing shop drawings which adequately depict the reinforcing bar sizes and placement. Written description of reinforcement without adequate sections, elevations and details is not acceptable.
- Submit written reports of each proposed mix design for each class of concrete with concrete cylinder test results at least 15 days prior to start of work.
- All concrete that will be exposed to the weather shall have air entrainment.
- All structural concrete exposed to view to be smooth formed finished with ¾" chamfers at all exposed edges.

ACI lap splice length (inches)												
BAR SIZE	F _c = 3000 PSI				F _c = 3500 PSI				F _c = 4000 PSI			
	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS
#3	28	42	22	32	26	39	21	30	24	36	19	28
#4	37	56	29	43	35	52	27	40	32	48	25	37
#5	47	70	36	54	44	65	34	51	40	60	31	47
#6	56	84	43	64	52	78	40	60	48	72	37	56
#7	61	122	63	119	76	114	59	88	70	106	54	61
#8	63	139	72	107	87	130	67	100	80	121	62	83
#9	105	157	81	121	89	147	76	113	91	136	70	105
#10	118	177	91	136	110	165	85	127	102	153	79	118
#11	131	196	101	151	122	183	94	141	113	170	87	131

BAR SIZE	F _c = 4500 PSI				F _c = 5000 PSI				F _c = 6000 PSI			
	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS
#3	23	35	18	27	22	33	17	25	20	30	16	23
#4	31	46	24	35	29	43	22	33	26	40	20	31
#5	38	57	30	45	36	54	28	42	33	49	25	38
#6	46	69	35	53	43	64	33	50	40	59	31	46
#7	67	100	52	77	63	94	49	73	58	86	44	66
#8	76	115	59	88	72	108	55	83	66	98	51	76
#9	86	129	67	100	81	122	63	94	74	111	57	85
#10	97	145	75	112	91	137	70	105	83	125	64	96
#11	107	161	83	124	101	152	78	117	93	139	71	107

- NOTES:
- Tabulated values are based on grade 60 bars and normal weight concrete.
 - Cases 1 and 2, which depend on the type of structural element, concrete cover, and the center-to-center spacing of the bars, are defined as:
 - Beams or columns:
 - Case 1: Cover at least 1.0 db and C.C. spacing of at least 2.0 db.
 - Case 2: Cover less than 1.0 db and C.C. spacing less than 2.0 db.
 - All others:
 - Case 1: Cover at least 1.0 db and C.C. spacing of at least 3.0 db.
 - Case 2: Cover less than 1.0 db and C.C. spacing less than 3.0 db.
 - Top bars are horizontal beam and slab bars with more than 12" of concrete below the bars.
 - For lightweight aggregate concrete, multiply the tabulated values by 1.3.
 - For epoxy-coated bars, multiply the tabulated values by one of the following factors:

Concrete cover and spacing	Top bars	Other bars
Cover < 3.0 DB or C.C. spacing < 7.0 DB	1.7/1.3 = 1.31	1.50
Cover > 3.0 DB or C.C. spacing > 7.0 DB	1.20	1.20
 - Bar development length = lap spliced length / 1.3.
 - Wire mesh lap
 - Lap all wire mesh cross wires one cross wire spacing plus 2", typical.

MINIMUM LAP SPLICE LENGTH (INCHES)												
BAR SIZE	F _c = 3000 PSI				F _c = 3500 PSI				F _c = 4000 PSI			
	6" CMU	8" CMU	10" CMU	12" CMU	6" CMU	8" CMU	10" CMU	12" CMU	6" CMU	8" CMU	10" CMU	12" CMU
#3	12	12	12	12	12	12	12	12	12	12	12	12
#4	20	15	12	12	12	12	12	12	12	12	12	12
#5	32	23	18	15	12	12	12	12	12	12	12	12
#6	54	43	34	28	12	12	12	12	12	12	12	12
#7	N/P	60	46	38	12	12	12	12	12	12	12	12
#8	N/P	72	71	57	12	12	12	12	12	12	12	12
#9	N/P	N/P	82	74	12	12	12	12	12	12	12	12

Note: N/P= Not Permitted

CONCRETE MASONRY

- For product material specifications, reference the structural notes, material & component design criteria and the project specification.
- Submit documentation demonstrating compliance with the specified strength of masonry, F_m, in accordance with the lap test method or the unit strength method as outlined in the TMS 402/602-16, Building Code Requirements for Masonry Structures, and the applicable building code. Submit product and test data as specified for level 1 quality assurance. This shall include verification of F_m both prior to construction and during as well as verification of materials and proportions for concrete masonry units, mortar and grout construction for every 5000 square feet of masonry placed.
- Submit reinforcing shop drawings showing placement of all reinforcement and embedments and the reinforcing fabrication dimensions and details.
- Place concrete units such that the vertical cells to be grouted are aligned and provided unobstructed openings for grout placement. Face shells of bed joints shall be fully mortared. Webs shall be fully mortared in all courses of piers, columns and pilasters, in the starting course on foundations, when necessary to confine grout or loose-fill insulation and when otherwise noted. Head joints are to be mortared a minimum distance from each face equal to the face shell thickness of the unit. Unless otherwise required, solidly fill collar joints less than 3/4" wide with mortar as the work progresses.
- Place reinforcement and embedments in accordance with the drawings. Maintain a clear distance between the reinforcing bars and any face of masonry unit or formed surface of not less than 1/2" unless noted otherwise. Where reinforcing bar are spliced, provide a minimum lap as shown in chart below or a mechanical splice that provides 125% of the bar capacity. Tolerances for placement of reinforcing bars shall be +/- 1/2 inch perpendicular to the face of the masonry unit and within 2-inches along the length of the wall unless noted otherwise. Reinforcement shall be tied in place or otherwise supported to prevent displacement during grouting.
- Place grout within 1 1/2 hours from introducing water in the mixture and prior to initial set. Grout pour height shall conform to the requirements as outlined in TMS 402/602-16, Specification for Masonry Structures, for grout type and grout space dimensions. In no case shall grout lift exceed 4 feet in height. Consolidate pours by mechanical vibration and reconsolidate by mechanical vibration after initial water loss and settlement has occurred.
- Provide joint reinforcement in every bed joint (8-inch on center) for stack bond and every other joint (16-inch on center) for running bond masonry placement. Place such that longitudinal wires overlap 6-inches and are embedded in mortar with a minimum cover of 5/8".
- As a minimum, control joints in masonry walls shall be provided within 4-feet of corners, at each change of wall height or thickness and at a maximum spacing of 25-feet unless noted otherwise on drawings.
- Structural masonry shall be reinforced a specified on the drawings. All cells containing reinforcing shall be fully grouted. Provide dowels from the foundation to match the vertical reinforcing.
- Provide a bond beam with continuous bars where shown on the drawings and, at a minimum, at the tops of all masonry walls and at all slab or beam bearing locations where the wall is not already grouted solid below the bearing. Extend the bond beam a minimum of 2-feet beyond the end of the bearing condition.
- At beam bearing locations, reinforce each cell below the bearing plate with typical vertical reinforcing to the top of the footing unless noted otherwise.
- At masonry control joints, reinforce the first cell either side at the joint with the typical wall reinforcing specified on the drawings. Also, at ends of walls, reinforce the last cell with the typical wall reinforcing specified. Horizontal joint reinforcing shall be discontinuous at control joints. Bond beam reinforcing shall be discontinuous across control joints.
- All cells containing reinforcing bars shall be fully grouted.
- All expansion bolts placed in masonry are to be Hilti Kwik Bolt III or approved equal are to be installed in grouted cells in accordance with the manufacturer's recommendations and inspected by the special inspector. All post-installed anchors shall be installed in the presence of the special inspector.

CONCRETE MASONRY cont.

- All post installed dowels placed in masonry are to be set in Hilti HIT-HY 70 adhesive or approved equal are to be installed in accordance with the manufacturer's recommendations and inspected by the special inspector. All post-installed anchors shall be installed in the presence of the special inspector.
- All mechanical anchors shall be installed in accordance with the product manufacturer's recommendations and the installation shall be inspected by the special inspector. Individual products shall be submitted to the architect/engineer for approval prior to installation. All post-installed anchors shall be installed in the presence of the special inspector.
- When the ambient temperature falls below 40F or the temperature of the masonry units is below 40F, comply with the provisions of TMS 602, Section 1.8C, Specification for Masonry Structures, for cold weather construction.
- When the ambient temperature exceeds 90F, comply with the provisions of TMS 602, Section 1.8D, Specification for Masonry Structures, for hot weather construction.
- Brick Ties: (for stud backup)
 - There shall be a minimum of one brick tie for every 2.67 sq. ft. of wall area. These shall be spaced at a maximum of 18-inches on center. Ties shall be of a minimum 3 GA, corrosion resistant wire and shall be of an adjustable type such as DUR-O-WALL adjustable D/A 213 or equal. Corrugated galvanized sheet ties are not acceptable. All ties must be attached through the sheathing to the studs per manufacturer's recommendations.
- Brick Ties: (for masonry backup)
 - There shall be a minimum of one brick tie for every 2.67 sq. ft. of wall area. These shall be spaced at a maximum of 18-inches vertical. Ties shall be of a minimum of 3/16" diameter corrosion resistant wire. Corrugated galvanized sheet ties are not acceptable.

CMU Lap Splice Lengths
Reinforcement Centered
1 Bar Per Core

MINIMUM LAP SPLICE LENGTH (INCHES)												
BAR SIZE	F _c = 3000 PSI				F _c = 3500 PSI				F _c = 4000 PSI			
	6" CMU	8" CMU	10" CMU	12" CMU	6" CMU	8" CMU	10" CMU	12" CMU	6" CMU	8" CMU	10" CMU	12" CMU
#3	12	12	12	12	12	12	12	12	12	12	12	12
#4	20	15	12	12	12	12	12	12	12	12	12	12
#5	32	23	18	15	12	12	12	12	12	12	12	12
#6	54	43	34	28	12	12	12	12	12	12	12	12
#7	N/P	60	46	38	12	12	12	12	12	12	12	12
#8	N/P	72	71	57	12	12	12	12	12	12	12	12
#9	N/P	N/P	82	74	12	12	12	12	12			