

REINFORCING:

- Detailing of concrete reinforcement and accessories shall be in accordance with ACI 315 - "Manual of Standard Practice for Detailing Reinforced Concrete Structures", latest edition.
- All reinforcing bars shall conform to ASTM A615, Grade 60. Reinforcing bars may not be welded without prior approval of the Structural Engineer.
- All welded wire fabric (W.W.F.) shall conform to ASTM 105. (Fy=65 ksi min.) W.W.F. shall be provided in flat sheets. Stair pans may be reinforced with 2x2-W14xW14 W.W.F. or fibermesh at 1/2 lbs. / cu. yd.
- Concrete cover for reinforcement including W.W.F. shall be provided per the following table unless otherwise noted on the drawings:

Condition	Cover (Inches)
Surfaces cast against earth	3
Formed surfaces exposed to earth or weather	
#6 through #18 bars	2
#5 bars and smaller	1 1/2
Formed surfaces not exposed to earth or weather	
Slabs, walls, joists	3/4
Beam girders, columns	1 1/2
Slabs on grade (from top of slab)	1 1/2

Maximum deviation from these requirements shall be 1/8 inch for sections 10 inches thick or less; and 1/4 inch for sections over 10 inches thick. See ACI 318-99, for conditions not listed.

- Provide and Schedule With the shop drawings, all necessary accessories to hold reinforcing securely in position. Minimum requirements shall be:
 - High chairs 4'-0" on center
 - Support bars for high chairs to be No. 5 minimum.
 - Slab bolsters 4'-0" on center
- All reinforcement including W.W.F. shall be continuous through construction joints unless otherwise noted on drawings.
- Where continuous bars are called for, they shall run continuously around corners and be lapped at necessary splices with a class B splice (ACI 318-99), or hooked at discontinuous ends. Lap lengths shall be as given in the splice and development tables in these drawings. Lap beam top bars at mid-span and beam bottom bars at supports, unless otherwise noted.
- All hooks shown on drawings shall be standard hooks unless otherwise noted.
- Provide additional reinforcing at the sides and corners of all openings in concrete in accordance with the typical details on these drawings.
- At multiple top or bottom bar layer placements in footings, pilecaps, etc., bars parallel to short direction to be placed in bottom most or top most layer u.n.o.
- Provide continuous support bars for stirrups where primary bars do not exist.
- Top & bottom horizontal reinforcing in beams and girders shall be detailed to be placed in one layer unless noted otherwise on the drawings. At splices bars may be "above and below" or "side by side" as required for proper fit and alignment.
- All beam and girder "stirrups" or "ties" shall be continuous closed type unless otherwise noted on the drawings. Stirrups or ties do not extend through footings, pile caps, pile caps or caisson caps u.n.o.
- In beams and girders over 18" deep provide continuous #4 bars on the side faces at 12" on center maximum. These side bars do not require development into supports.

STRUCTURAL STEEL:

- Structural steel design conforms to "Specification for Design, Fabrication and Erection of Structural Steel for Buildings" (AISC, Ninth Edition), or "Load and Resistance Factor Design Specification for Structural Steel Buildings" (AISC, Third Edition).
- Any member size shown on the plans, and currently listed in the AISC LRFD Manual of Steel Construction, Latest Edition, which are not currently available must be brought to the Architect and Structural Engineers attention prior to award of steel contract. No claim for additional cost will be accepted after the award, for member/built up member substitutions for these sizes.
- Structural steel rolled shapes, plates, and bars shall conform to the following ASTM designations:
 - ASTM A-572, Grade 50 All W shapes, unless noted otherwise or A992
 - ASTM A-36 All other rolled shapes, plates and bars unless noted otherwise
 - ASTM A-500, Grade B Square or rectangular HSS sections
 - ASTM A-500, Grade C Round HSS sections
 - ASTM A-53, Grade B Pipe
- Do not paint structural steel unless otherwise specified.
- All steel exposed to the weather in the completed building shall be hot dip galvanized.
- Unless otherwise noted, framing members are to be spaced equally between established dimensions.
- The metal decks and/or precast planks are part of the stability system for the completed structure. The Contractor shall provide temporary erection bracing to maintain structural steel in proper position until permanently secured. Remove temporary bracing and their connections only after erection of permanent members is complete and all concrete slabs have been placed and cured and steel decks are properly fastened and precast plank is in place and fully connected. A completed structure has its boundary's defined by the building exterior and/or interior expansion joints where they exist between building segments.
- Do not erect precast facade elements until structure is complete at and below the level in question.

- Shear connectors shall be 3/8" diameter headed studs, with the nominal lengths specified, field applied, with an allowable horizontal shear load (ASD) or nominal shear strength (LRFD) in kips per connector per the tables below.

ASD			LRFD		
f'c (psi)	LWC	NWC	f'c (psi)	LWC	NWC
3000	9.9	11.5	3000	17.7	21.0
3500	10.8	12.5	3500	19.8	21.5
4000	11.5	13.3	4000	21.5	21.5

- Provide an upward beam camber at mid span between supports where indicated thus c=1/8" on the drawings. Camber is to be provided by mill rolling or shop fabrication, or a combination of each. The amount of actual camber for each structural steel member may vary due to mill or shop tolerance and beams with computed initial deflections of no more than 3/8" are not cambered at all.
- Unless otherwise detailed in the drawings, provide galvanized loose steel angle lintels over all openings in masonry construction per the schedule below. Lintels shall have a minimum of 8" bearing on each side of opening. Steel angles in pairs, indicated thus (L), shall be plug welded or bolted at 2'-0" o.c. or stitch welded top and bottom at 1'-0" o.c.

Wall thickness	Span	Lintel
4"	< 5'-0"	L4x3 1/2x5/16
	5'-0" ≤ 7'-0"	L5x3 1/2x5/16
	7'-0" ≤ 9'-0"	L6x3 1/2x3/8
	9'-0" ≤ 12'-0"	L6x3 1/2x1/2
6"	< 7'-0"	L6x6x5/16
	7'-0" ≤ 9'-0"	L6x6x3/8
	9'-0" ≤ 12'-0"	L6x6x1/2
	12'-0" ≤ 15'-0"	L6x6x1/2
8"	< 5'-0"	JL4x3 1/2x5/16
	5'-0" ≤ 7'-0"	JL5x3 1/2x5/16
	7'-0" ≤ 9'-0"	JL6x3 1/2x3/8
	9'-0" ≤ 12'-0"	JL6x3 1/2x1/2
10"	< 5'-0"	L6x3 1/2x5/16 + L6x6x5/16
	5'-0" ≤ 7'-0"	L6x3 1/2x5/16 + L6x6x5/16
	7'-0" ≤ 9'-0"	L6x3 1/2x3/8 + L6x6x3/8
	9'-0" ≤ 12'-0"	L6x3 1/2x1/2 + L6x6x1/2
12"	< 7'-0"	JL6x6x5/16
	7'-0" ≤ 9'-0"	JL6x6x3/8
	9'-0" ≤ 12'-0"	JL6x6x1/2
	12'-0" ≤ 15'-0"	JL6x6x1/2

Note: All angles LLV.

- Screed plates, pour stops, supports of slab edges, and supports for composite, form, metal roof deck or precast plank around columns and diagonal members through floor or roof levels shall be furnished by the Contractor.
- Cuts or burning of holes in or splicing of structural steel members in the field will not be permitted, unless specifically approved in each case by the Structural Engineer.
- All HSS shapes except diagonal bracing members shall have a 3/8" cap plate at exposed ends. Cap plates to be seal welded all around, u.n.o.
- All structural steel, including baseplates and anchor bolts, to be exposed to soil in the finished work, are to be coated with an approved coat for epoxy. 1/8 mils minimum thickness.
- Provide the following hole sizes in baseplates for anchor bolts u.n.o. Bolts used with these hole sizes shall have a 3/8" thick plate washer.

HOLES IN BASEPLATE FOR ANCHOR BOLTS U.N.O.			
Bolt Diameter	Hole Diameter	Bolt Diameter	Hole Diameter
3/4"	1 5/16"	1 1/2"	2 5/16"
7/8"	1 9/16"	1 3/4"	2 3/4"
1"	1 13/16"	2"	3 1/4"
1 1/4"	2 1/16"	2 1/2"	3 3/4"

- All anchor bolts to be ASTM A307 u.n.o.

STRUCTURAL STEEL CONNECTIONS:

- All shop and field welds shall be made by certified welders, and shall conform to "Structural Welding Code - Steel" (AWS D1.1-94), using electrodes conforming to (AWS E-70 series).
- All bolted connections between structural steel members shall be made with ASTM A325 or A490 bolts with appropriate nuts and washers.
- ASTM A325 or A490 bolts shall be installed with the bolt tension (pre-tensioned) specified in table J3.1 of the AISC LRFD Second Edition Specification, shall be used for all connections.
- Connections shown on these drawings are generally schematic. They are intended to define the spatial relationship of the framed members and show a feasible method of making the connection. Alterations of schematic connection details may impact architectural concept and shall not be made without prior written approval of the Engineer. Any connection that is not shown or is not completely detailed on the structural drawings shall be designed by a registered professional Engineer, retained by the contractor. Details and connections may be designed to conform to AISC Manuals Second Edition - LRFD or 9th Edition - ASD. Method of design shall be indicated on the shop detail drawings. Where partial information is given, it shall be the minimum requirement for the connection. Completely detailed means the following information is shown on the shop detail drawings.
 - All connection material dimensions and grades.
 - All weld sizes, lengths, pitches and returns.
 - All hole sizes and spacings.
 - Number and type of bolts: where bolts are shown but no number is given, the connection has not been completely detailed.
- Details and connections completely detailed in the Contract Drawings may not be altered without written approval by the Engineer. Where approved, altered connections shall be completely detailed by the fabricator clearly on the shop drawings. Any alteration made by the detailer on the structural steel shop drawings to connections shown on the contract drawings must be clearly identified by clouding or by direct note on the shop drawing by the detailer prior to submission to the Engineer.
- Unless otherwise noted, all composite and non-composite beam connections shall be double angle (1-3/4") framed beam connections shop welded per Table II, AISC Manual (ninth Edition - ASD) using weld A, or shop bolted using Table III and using 3/4" diameter A325-N bolts in standard or horizontally slotted holes for the field connection. The number of rows of bolts, n, shall be in accordance with the following table.

Beam Size	0	Shear Capacity (kips)
W8x10, W10x12	2	12.3
W8x13, W10x15	2	16.0
W8x18, 21, 24, W10x17, 19, 22, 26	2	17.9
W8 > 28, W10 > 30	2	23.2
W12x14, W12x16	3	22.0
W14 > 30, W12x19, 22, 26, 30	3	26.8
W12x35, 40, 45, W14x34, 38, 43, 48	3	31.7
W12 > 50, W14 > 53	3	42.0
W16 > 31	4	40.0
W16x36, 40, W18x35, W18x40	4	47.9
W16 > 45, W18x46, 50, 55	4	56.1
W18 > 60, W21 > 62, W24x55	5	71.1
W21 > 68, W24x62, 68, 76	5	84.3
W24 > 84, W27x84	6	91.2
W27 > 94, W30x99	7	110.0
W30 > 108	8	148.0
W33	9	167.0
W36	10	186.0
W40	11	205.0

Where the Fabricator proposes an alternate connection, it shall have at least the shear capacity indicated in the above table, where reactions are indicated in the drawings (example R-85k) they supersede the table above and the Fabricator shall provide a connection with a capacity at least equal to the reaction indicated. Seated beam connections will not be allowed unless the seat is used for erection purposes only. For other beam shapes (S, C, MC) provide a two bolt connection unless otherwise shown on the drawings.

- Unless otherwise noted, all connections at HSS sections shall be designed and detailed in accordance with the AISC "Hollow Structural Sections Connections Manual", Latest Edition. All rectangular HSS members to be oriented long side vertical u.n.o.
- All moment plate connections shall be as per detailed on sheet 55.0, unless noted otherwise. Local stresses at bolt holes do not govern. The web connection in all moment connections shall be designed in accordance with structural steel connection Note 6.
- The connection at the ends of axial loaded members shall develop the force due to the design load, indicated but not less than 100% of the compression capacity of the member where no design load is posted. Design forces, if posted, have been factored for wind or seismic loading and no stress increase is permitted. Design forces do not include Factors per LRFD Manual.
- Provide fitted stiffener plates on each side of the web of beams at points of concentrated loads. This includes beams supporting columns up or beams passing over the top of columns or other beams. Minimum stiffener plate thickness shall be 3/8" or flange thickness of column above or below, whichever is greater. Stiffener plates shall be welded all around each side.
- Flat bar stock of equal thickness and material grade may be substituted for "fitted" stiffener plates at all locations. Width of bar may be within (-0", +3/8") of "fitted" plate dimension.
- Weld sizes not shown in details herein shall be the minimum required size based on thickness of thicker part as per AISC 9th Edition, Tables J2.3 & J2.4.
- Discontinue all around welds at the flange tips of open sections.
- The submerged arc welding (SAW) process may be used for welding together built up plate girder or column sections. Fabricator to submit weld sizes equivalent to those specified herein.
- Minimum connection plate thickness shall be 3/8" u.n.o.
- All holes called out to be slotted to be short slotted holes as defined by AISC u.n.o.

METAL ROOF DECK:

- Design of metal roof deck shall be governed by the "Specifications for the Design of Cold Formed Steel Structural Members", by the American Iron and Steel Institute (AISI) and conform to the design and loading requirements of the "Steel Deck Institute" (SDI).

Metal roof deck shall be SDI deck, rolled of steel sheet, galvanized and conforming to ASTM 653 coating class 60. The metal roof deck supplied shall be capable of supporting the design loads given in these drawings. Section properties per foot of width for a given specified deck type and gauge shall be as follows:

METAL DECK PROPERTIES (note #1)					
Depth (inches)	Type	Gauge	I	S (positive)	S (negative)
3	N	18	1.90 inches ⁴	0.680 inches ³	0.740 inches ³
	N	20	0.824 inches ⁴	0.493 inches ³	0.561 inches ³
	N	22	0.667 inches ⁴	0.393 inches ³	0.450 inches ³
2	B	17	0.670 inches ⁴	0.500 inches ³	0.470 inches ³
	B	18	0.628 inches ⁴	0.472 inches ³	0.430 inches ³
1 1/2	B	18	0.310 inches ⁴	0.344 inches ³	0.355 inches ³
	B	20	0.213 inches ⁴	0.252 inches ³	0.265 inches ³
	B	22	0.169 inches ⁴	0.198 inches ³	0.213 inches ³
	Cellular	20/20	0.357 inches ⁴	0.304 inches ³	0.430 inches ³

Notes:

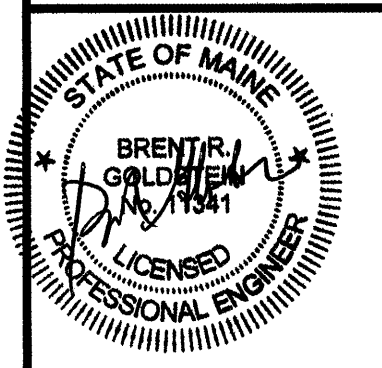
- Section properties for a given gauge may vary slightly with manufacturer.
- Unless otherwise shown on the drawings, metal roof deck shall be fastened to all steel members regardless of deck orientation with 3/8" diameter fusion welds in every rib at end laps, every other rib at intermediate supports and at every rib or 6" o.c. at all supports within 15'-0" of building periphery. Metal deck shall be fastened to 'B.F.' or 'M.F.' members at every rib or 6" o.c. Metal deck shall be fastened to members on each side of roof openings at every rib or 6" o.c. Side laps shall be fastened at 2'-0" maximum o.c.
- Deck units shall be fabricated in lengths to span three or more support spacings where possible.
- Do not suspend pipes, ducts, or conduit directly from metal roof deck.

STRUCTURAL PRECAST CONCRETE:

- Structural precast concrete work shall conform to the standards of PCI and of ACI 318. Plant selected for manufacturer of precast elements shall be certified by the PCI plant certification program.
- Refer to the Architectural Drawings and Specifications for finishes, color, and profile of precast shapes.
- All precast elements shall be manufactured with the reinforcing required to support the required design loads.
 - Full description of products and installation including certifications if appropriate.
 - Structural design by a professional engineer licensed in the State of Maine, if a structural change is involved.
- Material properties:
 - Concrete f'c =5000 psi at 28 days
Regular weight aggregates conforming to ASTM C33.
Maximum water/cement ratio = 0.48, air entrainment 4.5-12%
 - Reinforcing steel Deformed bar, ASTM A615, Grade 60.
Bars to be welded shall be ASTM A706.
 - Welded wire fabric ASTM A95.
 - Prestressing steel Wire strand, ASTM A416, Grade 270.
 - Steel embedments ASTM A36, hot dip galvanized (ASTM A153) after fabrication. Mask for held weld lines.
 - Grout between Approved non-shrink premixed grout with a bearing surfaces compressive strength of 5000 psi at 3 days.
 - Bearing pads Approved elastomeric pads, or other approved material.
 - Anchor bolts ASTM A307.
- Precast manufacturer shall provide all floor elements with edges prepared to receive the joint sealant system approved for the project.
- Precast elements shall be handled with care during all phases of manufacturing, shipping and erection. Provide additional reinforcing if required by handling procedures. Defective or damaged elements will be replaced, or repaired by the Precast Contractor as required by the Architect.
- All surfaces of precast work shall be cleaned to remove dirt and stains after all connections have been made. Galvanized steel connections shall be touched-up with zinc paint.
- The Precast Contractor shall furnish and install all precast concrete elements, all connecting and supporting hardware, grout and other work required to provide functional precast concrete systems.
- The Contractor shall submit for approval to the Architect the following:
 - Erection drawings.
 - Piece drawings.
 - Structural calculations.
 - Test results of quality control tests.
- Manufacturing tolerances shall comply with PCI MNL-116, unless otherwise indicated in the contract documents.
- Erection tolerances shall be per Figure 8.3.1 through 8.3.5 in the PCI Design Handbook, 4th edition.

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