STRUCTURAL - GENERAL NOTES

GENERAL REQUIREMENTS

GOVERNING CODE: The design and construction of this project is governed by the **"International Building Code (IBC)", 2009 Edition**, hereafter referred to as the SBC, as adopted by the Birmingham, MI understood to be the Authority Having Jurisdiction (AHJ).

REFERENCE STANDARDS: Refer to Chapter 35 of 2009 IBC. Where other Standards are noted in the drawings, use the latest edition of the standard unless a specific date is indicated. Reference to a specific section in a code does not relieve the contractor from compliance with the entire standard.

DEFINITIONS: The following definitions cover the meanings of certain terms used in these notes:

"**Architect/Engineer**" – The Architect of Record and the Structural Engineer of Record.

- "**Structural Engineer of Record%(SER)** – The structural engineer who is licensed to stamp & sign the structural documents for the project. The SER is responsible for the design of the Primary Structural System.
- "**Submit for review**" - Submit to the Architect/Engineer for review prior to fabrication or construction.
- "**Per Plan**" – Indicates references to the structural plans, elevations and structural general notes.
- **"Specialty Structural Engineer" (SSE) –** A professional engineer (PE or SE), licensed in the State where the project is located, (typically not the SER), who performs specialty structural engineering services for selected specialty-engineered elements identified in the Contract Documents, and who has experience and training in the Specialty. Documents stamped and signed by the SSE shall be completed by or under the direct supervision of the SSE.
- **"Bidder-designed" –** Components of the structure that require the general contractor, subcontractor, or supplier who is responsible for the design, fabrication and installation of specialty-engineered elements identified in the Contract Documents to retain the services of an SSE. Submittals of "Bidder-designed" elements shall be stamped and signed by the SSE.

SPECIFICATIONS: Refer to the project specifications issued as part of the contract documents for information supplemental to these drawings.

OTHER DRAWINGS: Refer to the architectural, mechanical, electrical and plumbing drawings for additional information including but not limited to: dimensions, elevations, slopes, door and window openings, non-bearing walls, stairs, finishes, drains, waterproofing, railings, mechanical unit locations, and other non-structural items.

STRUCTURAL DETAILS: The structural drawings are intended to show the general character and extent of the project and are not intended to show all details of the work. Use details marked "typical" wherever they apply.

STRUCTURAL RESPONSIBILITIES: The structural engineer (SER) is responsible for the strength and stability of the primary structure in its completed form.

COORDINATION: The Contractor is responsible for coordinating details and accuracy of the work; for confirming and correlating all quantities and dimensions; for selecting fabrication processes; for techniques of assembly; and for performing work in a safe and secure manner.

PRE-CONSTRUCTION MEETINGS: The Contractor is responsible for coordinating pre-construction meetings prior to commencing work. Pre-con meetings, scheduled approximately two weeks prior to the start of the relevant work, are required for the following phases of construction: **Structural Steel Stairs, Cold-Formed Steel, Concrete and Demolition**. Attendees for pre-construction meeting are to include contractor, relevant subcontractors, fabricators, inspectors, architect/engineer, and representative of the Authority Having Jurisdiction where required. Meeting agendas are to include review of the work scope, project schedule relevant to the work, contact information of responsible parties, inspection points, review of materials and any special cases or issues, procedures for clarifications if required, testing and acceptance, etc.

MEANS, METHODS and SAFETY REQUIREMENTS: Contractor is responsible to adhere to OSHA regulations regarding steel erection items specifically addressed in the latest OSHA regulations. Bolting and field welding at all member connections is to be completed prior to the release of the member from the hoisting mechanism unless reviewed and approved by the General Contractor's temporary bracing and shoring design engineer.

BRACING/SHORING DESIGN ENGINEER: The contractor shall at his discretion employ an SSE, a registered professional engineer for the design of any temporary bracing and shoring. Submit construction sequence to Architect/Engineer for review.

TEMPORARY SHORING, BRACING: The contractor is responsible for the strength and stability of the structure during construction and shall provide temporary shoring, bracing and other elements required to maintain stability until the structure is complete. It is the contractor's responsibility to be familiar with the work required in the construction documents and the requirements for executing it properly.

CONSTRUCTION LOADS: Loads on the structure during construction shall not exceed the design loads as noted in DESIGN CRITERIA & LOADS below or the capacity of partially completed construction as determined by the Contractor's SSE for Bracing/Shoring.

CHANGES IN LOADING: The contractor has the responsibility to notify the SER of any architectural, mechanical, electrical, or plumbing load imposed onto the structure that differs from, or that is not documented on the original Contract Documents (architectural / structural / mechanical / electrical or plumbing drawings). Provide documentation of location, load, size and anchorage of all undocumented loads in excess of **400** pounds. Provide marked-up structural plan indicating locations of any new equipment or loads. Submit plans to the Architect/Engineer for review prior to installation.

NOTE PRIORITIES: Plan and detail notes and specific loading data provided on individual plans and detail drawings supplements information in the Structural General Notes.

DISCREPANCIES: In case of discrepancies between the General Notes, Specifications Plan/details or Reference Standards, the Architect/Engineer shall determine which shall govern. Discrepancies shall be brought to the attention of the Architect/Engineer before proceeding with the work. Should any discrepancy be found in the Contract Documents, the Contractor will be deemed to have included in the price the most expensive way of completing the work, unless prior to the submission of the price, the Contractor asks for a decision from the Architect as to which shall govern. Accordingly, any conflict in or between the Contract Documents shall not be a basis for adjustment in the Contract Price.

ON SITE VERIFICATION: The contractor shall verify all dimensions and conditions at the site. Conflicts between the drawings and actual site conditions shall be brought to the attention of the Architect/Engineer before proceeding with the work.

ALTERNATES: Alternate products of similar strength, nature and form for specified items may be submitted with adequate technical documentation to the Architect/Engineer for review. Alternate materials that are submitted without adequate technical documentation or that significantly deviate from the design intent of materials specified may be returned without review. Alternates that require substantial effort to review will not be reviewed unless authorized by the Owner.

DESIGN CRITERIA AND LOADS

DESIGN LIVE LOADS	AREA	LIVE LOADS (PSF) UNO	REMARKS & FOOT-NOTES
	Assembly Areas, Lobbies, Corridors, Retail	100	2000 lbs, (Movable seats)
	Railing & Guardrails	50 PLF	any direction or 200 lbs (1)
	Stairs & Landings	100	(2)
	Light Storage Area	125	
	Mechanical Rooms	150	

(1) To be applied horizontally at right angle to the top rail.
(2) Stair treads designed for 300 lb concentrated load placed to produce maximum stress.

SUBMITTALS

SUBMIT FOR REVIEW: SUBMITTALS of shop drawings, product data and mill tests are required for items noted in the individual materials sections and for *bidder designed* elements.

SUBMITTAL REVIEW PERIOD: Submittals shall be made in time to provide a minimum of TWO WEEKS for review by the Architect/Engineer prior to the onset of fabrication.

GENERAL CONTRACTOR'S PRIOR REVIEW: Prior to submission to the Architect/Engineer, the Contractor shall review the submittal for completeness. Dimensions and quantities are not reviewed by the SER, and therefore, must be verified by the General Contractor. Contractor shall provide any necessary dimensional details requested by the Detailer and provide the Contractor's review stamp and signature before forwarding to the Architect/Engineer.

SHOP DRAWING REVIEW: Once the contractor has completed his review, the SER will review the submittal for general conformance with the design concept and the contract documents of the building and will stamp the submittal accordingly. Markings or comments shall not be construed as relieving the contractor from compliance with the project plans and specifications, nor departures there from.

SHOP DRAWING DEVIATIONS: When shop drawings (component design drawings) differ from or add to the requirements of the structural drawings they shall be designed and stamped by the responsible SSE.

DEFERRED SUBMITTALS

BIDDER-DESIGNED ELEMENTS
Submit "Bidder-Designed" deferred submittals to the Architect and SER for review prior to submission to the city for approval.

Design of prefabricated, "bidder designed", manufactured, pre-engineered, or other fabricated products shall be complied with the following requirements:

1) Design considers tributary dead, live and earthquake loads in combinations required by IBC.
2) Design within the Deflection Limits noted herein and as specified or referenced in 2009 IBC.
3) Design shall conform to the specifications and reference standards of the governing code.
4) Submittal shall include:
   a. Calculations prepared, stamped and signed by the SSE demonstrating code conformance.
   b. Engineered component design drawings are prepared, stamped and signed by the SSE.
   c. Product data, technical information and manufacturer's written requirements and Agency approvals as applicable.
   d. SSE may submit to the Architect/Engineer, a request to utilize relevant alternate design criteria of similar nature and generally equivalency which is recognized by the Code and acceptable to the Authority Having Jurisdiction. Submit adequate documentation of design.

DEFLECTION LIMITS:	VERTICAL	LIMIT
	Floor Members, Total Load (TL) uno	L / 240
	Floor Live Load (LL) uno	L / 360
	Operable Partition Support Members	L / 600 or ¼" maximum
	HORIZONTAL	**LIMIT and FOOTNOTE**
	Members Supporting Brittle Finishes	L / 240 (1)
	Members Supporting Flexible Finishes	L / 180 (1)

GENERAL CONTRACTOR'S PRIOR REVIEW: Once the contractor has completed his review of the SSE component drawings, the SER will review the submittal for general conformance with the design of the building and will stamp the submittal accordingly. Review of the Specialty Structural Engineer's (SSE) shop drawings (component design drawings) is for compliance with design criteria and compatibility with the design of the primary structure and does not relieve the SSE of responsibility for that design. All necessary bracing, ties, anchorage, proprietary products shall be furnished and installed per manufacturer's instructions or the SSE's design drawings and calculations. These elements include but are not limited to:

- Handrails, Guardrails and Balcony Rail Anchorages
- Metal Deck Edge Forms
- Mechanical, Electrical, Plumbing & Sprinkler Hanger Plans
- Temporary Shoring Systems
- Space Frames (Unistrut)

TESTS AND INSPECTIONS

INSPECTIONS: Special Inspections and Testing shall be done in accordance the STATEMENT OF SPECIAL INSPECTIONS per IBC Sections 1704, 1705 as applicable. Contractor shall coordinate all required inspections with the Building Official.

SPECIAL INSPECTORS: Special Inspectors shall be employed by the **Owner** to provide Special Inspections for the project. Special Inspectors shall be qualified persons who **are registered with an Approved Agency**

STATEMENT OF SPECIAL INSPECTIONS per 1704 and 1705. Special Inspections and Testing are required by 1704, 1706, 1707 and 1708 for the following:

FABRICATION SHOP INSPECTION: Where off-site Fabrication of gravity LOAD BEARING MEMBERS & ASSEMBLIES is performed, Special Inspector shall verify that the fabricator complies with IBC 1704.2

STRUCTURAL STEEL per IBC Section 1704.2: Special Inspector shall review the Fabrication shop's Quality Control procedures for completeness and adequacy relative to AISC 360-05 Chapter M, the AISC Code of Standard Practice, AWS D1.1-2004 Structural Welding Code and 2009 IBC code requirements for the fabricator's scope of work.

STRUCTURAL STEEL per IBC Section 1704.3 and Table 1704.3 at the site and the fabrication Shop, shall be done in accordance with the following requirements:

- **Periodic** inspection required:
  - Prior to the start of Fabrication for:
    - Verification of Shop compliance with IBC Section 1704.2.1 for completeness and adequacy of Fabrication and Quality Control procedures.
    - Verification of Shop compliance with AWS D1.1-2004 Structural Welding Code
    - Verification of Shop compliance with AISC 360-05 Chapter M & Code of Standard Practice.
  - During welding of Single-pass Fillet Welds NOT exceeding 5/16" size as noted in IBC Table 1704.3.
  - During Field welding of all Metal Floor and Metal Roof Deck per AWS D1.3 as noted in IBC Table 1704.3.
  - During the welding operations - Verification of welder qualifications
  - During the welding operations - Verification of valid weld procedure specifications per AWS D1.1.
  - Prior to painting, shipping to site and erection - Verification of all welded joints per AWS D1.1 Table 6.1.
  - Prior to the start of Erection - Verification of framing requirements and *bolting procedures* per AISC.
  - During High Strength Bolting per IBC Section 1704.3.2 and 1704.3.3
- **Continuous** inspection required during:
  - Welding of Complete- or Partial Joint Penetration (CJP or PJP) Groove Welds per IBC Table 1704.3 & 1707.
  - Welding of Multi-pass Fillet Welds and Fillet Welds exceeding 5/16" size per IBC Table 1704.3 & 1707

COLD-FORMED STEEL per IBC Section 1707.4 shall be done in accordance with the following requirements:

- **Periodic** inspection required for Verification during/of:
  - Screw attachment, bolting, anchoring, and other fastening of components within the seismic force resisting system, including struts, braces, hold-downs, diaphragms and shear walls.
  - Periodic spot check inspections (**minimum of 30 percent**) for the following:
    - Verify that screw attachment, bolting, anchoring and other fastening of components within the gravity load system are per structural specifications.
    - Verify that stud and track size, yield strength and galvanized coating weight are per structural specifications.
    - Verify that no members are bent, damaged, notched or cut. Coring of holes in studs or joists is not acceptable without prior approval from SER.
    - Verify that all load bearing studs are seated with a maximum space of 1/16 inch between stud and track.
    - Verify that spacing between bottom track and support is less than 1/8 inch.
    - Verify that all pre-punched web holes are a minimum of ten inches from bearing ends and a minimum of 24 inches on center.
    - Verify that all load bearing and/or exterior studs, joists and tracks are plumb (within 1:1000).
    - Verify that all bundled studs and bundled joists are connected together per plans.
    - Verify that screw heads are flush with the steel surface and penetrate into the steel studs by a minimum of three exposed threads. Verify that connections are not stripped.
    - Verify that seismic straps are connected with the minimum required screws or bolts into each member.
    - Verify that screws are installed a minimum of 3/8 inches from steel edges with no less than 3/4" on center spacing.
    - Verify that all welding is done in accordance with the approved design or recognized design standard.
    - Verify that screws or pins in wood shear walls or horizontal diaphragms are driven so that the head is no more than 1/16" below the surface of the sheathing. Ensure that blocking or straps are provided at all panel edges if required on plans.

Where off-site prefabrication of assemblies occurs, Special Inspector shall review the Fabrication shop's Quality Control procedures for completeness and adequacy relative to AISI Code of Standard Practice, AWS D1.3 Structural Welding Code – Sheet Steel and 2009 IBC 1704.2 code requirements for the fabricator's scope of work.

POST-INSTALLED ANCHORS TO CONCRETE AND MASONRY: shall comply with IBC Section 1703. Inspections shall be in accordance with the requirements set forth in the approved ICC Evaluation Report and as indicated by the design requirements specified on the drawings. Refer to the POST INSTALLED ANCHORS section of these notes for anchors that are the basis of the design. Special inspector shall verify anchors are as specified in the POST INSTALLED ANCHORS section of these notes or as otherwise specified on the drawings. Substitutions require approval by the SER and require substantiating calculations and current 2009 IBC recognized ICC Evaluation Services (ES) Report. Special Inspector shall document in their Special Inspection Report compliance with each of the elements required within the applicable ICC Evaluation Services (ES) Report.

INSPECTION SUBMITTALS: Special inspection reports shall be provided on a weekly basis. Final special inspection reports will be required by each special inspection firm per IBC 1704.1.2. Submit copies of all inspection reports to the Architect/Engineer and the Authority Having Jurisdiction for review.

CONTRACTOR RESPONSIBILITY: Prior to issuance of the building permit, the Contractor is required to provide the Authority Having Jurisdiction a signed, written acknowledgement of the Contractor's responsibilities associated with the above Statement of Special Inspections addressing the requirements listed in IBC Section 1709. Contractor is referred to IBC Chapter 1707.6 and 1707.7 for architectural and MEP building systems that may be subject to additional inspections (based on the building's designated Seismic Design Category listed in the CRITERIA), including anchorage of HVAC ductwork containing hazardous materials, piping systems and mechanical units containing flammable, combustible or highly toxic materials, electrical equipment used for emergency or standby power, exterior wall panels and suspended ceiling systems.

PREFABRICATED CONSTRUCTION: All prefabricated construction shall conform to IBC Section 1703.

CAST-IN-PLACE CONCRETE

REFERENCE STANDARDS: Conform to:
(1) ACI 301-05 "Specifications for Structural Concrete",
(2) IBC Chapter 19-Concrete,
(3) ACI 318-08/318R-08
(4) ACI 117-10

FIELD REFERENCE: The contractor shall keep a copy of ACI Field Reference manual, SP-15, "Standard Specifications for Structural Concrete (ACI 301) with Selected ACI and ASTM References."

CONCRETE MIXTURES: Conform to ACI 301 Section 4 "Concrete Mixtures" and IBC Section 1904.3.

MATERIALS: Conform to ACI 301 Section 4.2.1 "Materials" for requirements for cementitious materials, aggregates, mixing water and admixtures.

SUBMITTALS: Provide all submittals required by ACI 301 Section 4.1.2. Submit mix designs for each mix in the table below. Substantiating strength results from past tests shall not be older than 12 months per ACI 318 Section 5.3.

TABLE OF MIX DESIGN REQUIREMENTS

Member Type/Location	Strength f'c (psi)	Test Age (days)	Maximum Aggregate	Exposure Class	Max W/C Ratio	Air Content	Notes (1 to 8 Typical UNO)
Interior Footings	3000	28	1"	-		-	-
Exterior Stem Walls, Curbs, and Slabs	4000	28	1"	-	0.45	5%	-

Table of Mix Design Requirements Notes:

(1) W/C Ratio: Water–cementitious material ratios shall be based on the total weight of cementitious materials. Maximum ratios are controlled by strength noted in the Table of Mix Design Requirements and durability requirements given in ACI 318 Section 4.3.

(2) Cementitious Materials:
   a. The use of fly ash, other pozzolans, silica fume, or slag shall conform to ACI 318 Sections 4.3.1 and 4.4.2. Maximum amount of fly ash shall be 25% of total cementitious content unless reviewed and approved otherwise by SER.
   b. For concrete used in elevated floors, minimum cementitious-materials content shall conform to ACI 301 Table 4.2.2.1. Acceptance of lower cement content is contingent on providing supporting data to the SER for review and acceptance.
   c. Cementitious materials shall conform to the relevant ASTM standards listed in ACI 318 Section 3.2.1.

(3) Air Content: Conform to ACI 318 Section 4.4.1. Minimum standards for exposure class are noted in the table. If freezing and thawing class is not noted, air content given is that required by the SER. Concrete surfaces in contact with the soil require entrained air. Tolerance is ±1-½%. Air content shall be measured at point of placement.

(4) Aggregates shall conform to ASTM C33.

(5) Slump: Conform to ACI 301 Section 4.2.2.2. Slump shall be determined at point of placement.

(6) Chloride Content: Conform to ACI 318 Section 4.3.1.

(7) Non- chloride accelerator: Non-chloride accelerating admixture may be used in concrete placed at ambient temperatures below 50°F at the contractor's option.

(8) Shrinkage Limit: Concrete used in elevated slabs and beams shall have a shrinkage limit of .045% at 28 days measured in accordance with ASTM C157. Submit laboratory test results to SER for approval prior to construction.

MEASURING, MIXING, AND DELIVERY: Conform to ACI 301 Section 4.3.

HANDLING, PLACING, CONSTRUCTING AND CURING: Conform to ACI 301 Section 5. In addition, hot weather concreting shall conform to ACI 305.1-06 and cold weather concreting shall conform to ACI 306.1-90.

CONCRETE CURING: Provide curing compounds for concrete as follows:

(1) Use membrane curing compounds that are compatible with and will not affect surfaces to be covered with finish materials applied directly to concrete.

(2) Apply curing compounds at a rate equivalent to the rate of application at which curing compound was originally tested for in conformance to the requirements of ASTM C 309-07 and the manufacturer's recommendations.

(3) Apply specified curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

(4) Use curing compound compatible with and applied under direction of system manufacturer of protective sealer.

(5) Apply two separate coats with first allowed to become tacky before applying second. Direction of second application shall be at right angles to direction of first.

EMBEDDED ITEMS: Position and secure in place expansion joint material, anchors and other structural and non-structural embedded items before placing concrete. Contractor shall refer to mechanical, electrical, plumbing and architectural drawings and coordinate other embedded items.

GROUT: Use 7000 psi non-shrink grout under column base plates

POST-INSTALLED ANCHORS to CONCRETE: Anchor location, type, diameter and embedment shall be as indicated on drawings. Reference the POST INSTALLED ANCHORS section for applicable Post-Installed Anchor Adhesives. Anchors shall be installed and inspected in strict accordance with the applicable ICC-Evaluation Service Report (ESR). Special inspection shall be per the TESTS and INSPECTIONS section.

BONDING AGENT: Use BASF CONCRESIVE Liquid (LPL). Apply in accordance with manufacturer's instructions.

STRENGTH TESTING AND ACCEPTANCE:

Testing: Obtain samples and conduct tests in accordance with ACI 301 Section 1.6.4.2. Additional samples may be required to obtain concrete strengths at alternate intervals than shown below.

- Cure 4 cylinders for 28-day test age test 1 cylinder at 7 days, test 2 cylinders at 28 days, and hold 1 cylinder in reserve for use as the Engineer directs. After 56 days, unless notified by the Engineer to the contrary, the reserve cylinder may be discarded without being tested for specimens meeting 28-day strength requirements.

Acceptance. Strength is satisfactory when:

(1) The averages of all sets of 3 consecutive tests equal or exceed the specified strength.

(2) No individual test falls below the specified strength by more than 500 psi.

A "test" for acceptance is the average strength of two 6 by 12 in. cylinders or three 4 by 8 in. cylinders tested at the specified test age.

CONCRETE PLACEMENT TOLERANCE: Conform to ACI 117-10 for concrete placement tolerance.

CONCRETE REINFORCEMENT

REFERENCE STANDARDS: Conform to:
(1) ACI 301-05 "Standard Specifications for Structural Concrete", Section 3 "Reinforcement and Reinforcement Supports."
(2) ACI SP-66-04 "ACI Detailing Manual" including ACI 315-99 "Details and Detailing of Concrete Reinforcement."
(3) CRSI MSP-09, 28th Edition, "Manual of Standard Practice."
(4) ANSI/AWS D1.4 "Structural Welding Code - Reinforcing Steel."
(5) IBC Chapter 19-Concrete.
(6) ACI 318-08.
(7) ACI 117-10

SUBMITTALS: Conform to ACI 301 Section 3.1.1 "Submittals, data and drawings." Submit placing drawings showing fabrication dimensions and locations for placement of reinforcement and reinforcement supports.

Reviewed for Code Compliance
Approved with Comments
Building Department
Date: 04/26/17

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ISSUED / REVISED	DATE
QA SET	11/11/16
LL/PERMIT SET	11/17/16

STRUCTURAL GENERAL NOTES

S-101