

GENERAL STRUCTURAL NOTES

General Contractor shall review and stamp all the shop drawings before submitting for review. Field verify all existing dimensions, elevations, and conditions. Notify the Engineer for direction if the actual existing conditions differ from the conditions shown or implied on the drawings. Verify all dimensions and elevations with the Civil Drawings. The Contractor shall design, provide, and maintain temporary bracing, shoring, guying, etc., and other methods as required to prevent any excessive loading and to stabilize the structural elements during construction. These methods shall remain in place until all members and final connections have been completed. The Contractor shall retain a licensed geotechnical engineer to verify that the existing soil conditions will provide a minimum net allowable total load bearing pressure of 2000 psf. Long-term settlement at this bearing pressure shall not exceed 3/4 inches. Differential settlement across the structure shall not exceed one-half of the total settlement. Notify the Engineer for further direction if the existing soil conditions are not capable of providing the defined foundation design criteria.

The structural system is designed per the International Building Code - 2012 Edition.

The owner and/or contractor shall perform all material testing and inspection requirements for compliance with the governing building code, the project specifications, the local building inspection department, and the following Structural Special Inspection Notes.

The Contractor shall perform temporary dewatering during the construction of the below grade portions of the project as required to maintain the ground water elevation to level at least two feet below the depth of deepest required excavation.

DESIGN LOADS

Building structure is designed for the following loads and criteria:

Dead:	Weight of materials and construction plus weight of fixed service equipment
Wind:	Basic wind speed (3-second gust): Vult = 115 MPH Ultimate Vasd = 89 MPH Nominal Wind exposure category: C Internal pressure coefficient: ±0.18
Seismic:	Seismic Importance factor: I = 1.0 Site class: D Mapped spectral response accelerations: Ss = 0.104 S1 = 0.054 Spectral response coefficients: Sds = 0.116 Sd1 = 0.086 Seismic Design Category: B Analysis procedure: Equivalent lateral force Response modification factor: R = 3 Seismic response coefficient: Cs = 0.034

STRUCTURAL SPECIAL INSPECTIONS

The owner and/or contractor shall engage one or more qualified independent testing and inspecting agencies to perform the material testing and inspection requirements as outlined in the project specifications and this section. Contractor retained independent testing and inspection agencies are to be approved by the Engineer. The contractor shall review the specifications and coordinate with the Engineer to determine which party, the owner or contractor, is responsible for retaining an agency for each of the testing and inspection services. Testing and inspection reports shall be furnished to the Building Official and the Structural Engineer. Reports shall indicate that the materials tested and the work inspected are in conformance with the Contract Documents. Discrepancies shall be brought to the attention of the Contractor for correction. If the discrepancies are not corrected, the discrepancies shall be reported to the Building Official and the Structural Engineer. The testing and inspecting agencies shall submit a final report for each type of work stating that any discrepancies noted in the testing and inspections have been corrected and that the structural work was, to the best of their knowledge, performed in conformance with the Contract Documents.

The testing and inspection program does not relieve the Contractor of any responsibility for constructing the project in accordance with the Contract Documents and for controlling the quality of construction. The Contractor shall be responsible for the scheduling and the timely notification of the testing and inspection agencies of the need for material testing or inspections.

All work which requires testing or inspection shall be ready for testing or inspection at the time of the testing and inspecting agency's visit. No work shall be performed which would conceal items to be tested or inspected until the work has been reviewed and accepted.

The following types of work require special inspection (IBC references refer to the International Building Code edition referenced above):

- Inspection of fabricators shall comply with IBC Section 1704.2.5.
- Testing and inspection of steel construction shall comply with IBC Section 1705.2, IBC Table 1705.2.2, and American Institute of Steel Construction (AISC) Specification for Structural Steel Buildings 360, (IBC 2015 change to IBC Table 1705.2.3 and add Steel Deck Institute (SDI) Standard for Quality Control and Quality Assurance for Installation of Steel Deck 2011)
 - Submit material test reports, manufacturer's certifications, product data sheets, welding procedure specifications, welding personnel performance qualification records, fabricator/erector quality control manual, fabricator/erector inspector qualifications as specified. Contractor shall maintain same for review by Architect/Engineer as indicated in AISC 360 Chapter N.
 - Submit AWS performance qualification records for personnel performing shop fabrication or field erection welding.
 - Perform visual inspection of the fabricated or erected steel framing to verify compliance with the construction drawings, including member location, bracing, stiffeners, and connection types.
 - Perform visual inspection of all shop fabrication and field erection welds.
 - Perform ultrasonic inspection of all partial or complete joint penetration welds during the shop fabrication and field erection.
 - Perform continuous inspection of all fillet welds greater than 5/16" during the shop fabrication and field erection.
 - Perform visual inspection of all snug-tightened (Type ST) bolted connections.
 - Observe the pre-installation verification testing required for pretensioned bolted connections defined in the Research Council on Structural Connections (RCSG) Specification for Structural Joints Using High Strength Bolts, Section 7.
 - Perform visual inspection of all bolted connections using tension control bolts at slip-critical (Type SC) bolted connections and pretensioned (Type PT) bolted connections.
 - Perform visual inspection of the placement of anchor rods and embed plates in concrete and concrete masonry. Verify diameter, grade, type, length, and embedment of anchors prior to placing concrete or grout.
 - Perform visual inspection and bend testing of headed stud shear connectors in compliance with AWS D11, Section 7.
- Testing and inspection of concrete construction shall comply with IBC Section 1705.3 and IBC Table 1705.3.
 - Perform sampling and testing of cast-in-place concrete as specified.
 - Perform periodic observation of reinforcing for steel size, cover, spacing, positioning, lap lengths and locations.
 - Perform inspection of the reinforcing for steel size, cover, spacing, positioning, lap lengths and locations at slabs on grade.
 - Perform inspection of concrete placement for proper procedures for transporting, placing, consolidating, and finishing of concrete.
 - Perform periodic inspection of concrete curing and protection procedures, including compliance with the hot and cold weather requirements defined in the specifications.
 - Contractor shall maintain records of all batch reports and delivery tickets on each load of concrete delivered to the project site for periodic review by the Engineer.
- Testing and inspection of the soils shall comply with IBC Section 1705.6 and IBC Table 1705.6.
 - Perform sampling, testing, and inspection of the soil type, exposed subgrade, moisture content, lift thickness, and compaction as specified.
 - Perform periodic testing and inspection of the soils at the foundation system bearing elevation to verify the required soil bearing capacities.
- Testing and inspection of post-installed anchors and post-installed reinforcing bars shall comply with IBC Section 1705.11 and IBC Table 1705.3.
 - Perform an initial post-installed anchor and reinforcing bar installation inspection for each type and size of post-installed anchor and reinforcing bar. Any change in the personnel performing the post-installed anchor or reinforcing bar installation shall require an initial installation inspection.
 - Perform periodic post-installed anchor and post-installed reinforcing bar installation inspections during the project to verify that the anchor and reinforcing bar installations continue to be properly performed.
 - Post-installed anchor and reinforcing bar installation inspections shall verify anchor/reinforcing bar type, diameter, embedment depth, spacing, adhesive type and expiration date, hole dimensions, base material, hole cleaning procedures, tightening/installation torque, maximum impact wrench torque rating, and adherence to the manufacturer's printed installation instructions.
 - Perform visual observation of all completed post-installed anchor and post-installed reinforcing bar installations.
 - Perform continuous anchor installation inspections for all post-installed anchors and reinforcing bars that are installed in horizontally or upwardly inclined orientations to resist sustained tension loads.

SUBGRADE PREPARATION AND EARTHWORK NOTES

All subgrade preparation and earthwork shall be performed under the direction of the Geotechnical Engineer. The Geotechnical Engineer shall approve all soil materials, monitor all earthwork operations, and perform the appropriate testing during the earthwork process. Subgrade preparation shall include the removal of all existing slabs, foundations, pavement, and stripping the exposed surface to a minimum 6" depth to remove all surface vegetation, organic material, existing fill material, and other

deleterious material or unsuitable soil material encountered.

After the site preparation work has been completed, proof roll the exposed subgrade in the presence of the Geotechnical Engineer to identify any areas of soft or unstable material. Remove any unsatisfactory material and replace with suitable material as directed by the Geotechnical Engineer.

Soilify, moisture condition, and compact the top 8" of the exposed subgrade prior to starting the engineered fill placement operations. Moisture condition the scarified soils to at least 3 percentage points above the soils optimum moisture content and compact to a minimum of 95% of the maximum dry density as determined by the Standard Proctor, ASTM D-698.

The clean granular drainage base material shall be a well-graded aggregate meeting the ASTM D448 No. 57 material. Provide a minimum 4 inch thick zone of granular base material below all slab on grade floor areas.

The low volume change (LVC) zone material shall be an approved soil, free of organic material and deleterious material. Cohesive soils shall have a liquid limit less than 40 and a plasticity index between 5 and 15. Silty gravel such as KDOT AB-3 would be an acceptable LVC material. Provide a minimum 18 inch thick zone of LVC material below the zone of granular base material at the slab on grade floor areas.

All general engineered fill material required shall be an approved soil, free of organic material and deleterious material with a liquid limit less than 45 and a plasticity index less than 20.

All fill material shall be placed in maximum 8" thick loose horizontal lifts and shall be compacted to at least 95% of Standard Proctor maximum dry density, ASTM D-698.

Cohesive soils shall be placed at a moisture content between optimum and 3 percent above their optimum moisture content. The specified moisture content shall be maintained in the soils until the floor slab has been placed.

CAST-IN-PLACE CONCRETE

All concrete shall have the following properties and minimum compressive strengths at 28-days.

Footings and Foundation Walls: 4000 psi with a max. W/C ratio of 0.50

Exterior Slabs and Pavement: 4000 psi with a max. W/C ratio of 0.45

All concrete shall be proportioned for a 2" to 5" slump range at the point of placement.

All cement shall be Type I or II conforming to ASTM C150. Fly ash conforming to ASTM C681, Type C or F may be used to replace a maximum of 20% of the cement or 100 pounds per cubic yard of concrete, whichever is less.

All aggregate for normal weight concrete shall meet ASTM C33. Aggregates shall be proportioned such that mix design shall contain a minimum of 50% coarse aggregates by gradation requirements set forth in ASTM C33. Coarse aggregate shall meet No. 67 grading requirements.

Exterior exposed concrete shall have from 4 to 7% entrained air. Concrete shall contain a water-reducing admixture meeting ASTM C494, Type A or F, at a dosage to provide the necessary flowability and workability within the specified slump range.

Concrete shall be in strict conformance with the current "ACI Manual of Concrete Practice".

No aluminum shall be placed in the concrete.

Chamfer all exposed edges of the concrete 3/4"

Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support all applied loads during the concrete placement.

Concrete curing shall comply with ACI 301, ACI 305R, ACI 305.1, ACI 306R, and ACI 306.1.

Cast-in-place concrete shall be obtained for testing per ASTM C172 and tested as follows:

- Obtain one set of four test cylinders for each day's pour of each concrete mixture less than 25 cubic yards, plus one set of four test cylinders for each additional 50 cubic yards or fraction thereof.
- Slump: One test at point of discharge per ASTM C143 for each set of test cylinders taken. Perform additional slump test on truckloads when consistency seems to have changed.
- Concrete Temperature: One test per ASTM C1064 for each set of test cylinders taken or hourly when air temperature is below 40°F or above 90°F.
- Air Content: Volumetric method per ASTM C173 or pressure method per ASTM C231 for each set of test cylinders.
- Compression Test Specimens: One set of four standard cylinders per ASTM C31 at the specified frequency.
- Compressive Strength Tests: One set of four cylinders per ASTM C39. Test one cylinder at 7-days, two cylinders at 28-days, and hold one in reserve to be tested as directed.

Personnel trained and certified in concrete sampling shall perform all concrete testing and sampling. Test results shall be submitted to the Engineer and Contractor within 24 hours of completing tests. Concrete testing shall be performed by an approved testing agency.

Submit 3 copies of the concrete mix design to the Engineer for review prior to beginning construction.

REINFORCING STEEL

All welded wire reinforcement (WWR) shall meet ASTM A1064. Lap splice all welded wire reinforcement the cross wire spacing plus 2 inches. Furnish all welded wire reinforcement in flat sheets.

All reinforcing shall meet ASTM A615 - 60,000.

All reinforcing steel shall have adequate coverage as indicated in ACI 318 for the given exposure.

Reinforcing shall be continuous and lapped a minimum of 24 inches or 36 bar diameters whichever is greater, unless otherwise noted.

Reinforcing shall be detailed according to the ACI Detailing Manual and shall be prepared under the supervision of a professional engineer licensed to practice in the State of Kansas.

Provide corner lap bars to match lap size and spacing of all wall, trench footing, and grade beam horizontal bars.

Corner bars are not required in the wall footings, unless specifically indicated.

Do not field cut bars unless the Engineer's approval is obtained.

Provide 2-#5, 4'-0" longer than opening dimension, on all sides of the openings in the slabs and walls.

Provide 200 pounds of extra bars of various sizes to be used as directed. Include labor for placing same.

Provide 3-inch slab bolster with continuous bottom plate at 4'-0" maximum centers for positioning all grade beam bottom bars and all footing bottom bars.

Mark each bundle of the reinforcing with weatherproof tags.

Submit 3 copies of the reinforcing steel shop drawings to the Engineer for review prior to beginning construction.

STRUCTURAL STEEL

Structural steel shall meet the latest AISC "Specification for Structural Steel Buildings."

The steel fabricator and detailer shall be responsible for the design and detailing of all steel framing connections which are not explicitly detailed on the contract documents. The submitted shop drawings shall clearly show and note all shop and field bolting and welding requirements.

All member loads, reactions, and moments defined on the drawings are ASD, service-load level, unless noted otherwise.

Steel framing members shall only be spliced at locations shown on the design drawings or as shown on and approved on the shop drawings.

Structural steel shop drawings shall be prepared under the supervision of a professional engineer licensed to practice in the State of Kansas.

All steel plates and shapes shall meet ASTM A36 except wide flange sections shall meet ASTM A992, Fy = 50 ksi. Structural steel tubing shall meet ASTM A500, Grade B, Fy = 46 ksi or Grade C, Fy = 50 ksi and structural piping shall meet ASTM A53, Grade B, Fy = 35 ksi.

All beam and column connections shall be made with A325 (Type 1) bolts and accessories. Connections shall be designed as snug-tightened (Type ST) bolted connections, unless noted otherwise.

Provide ASTM A325 (Type 1) tension control bolts meeting ASTM F1552 at all slip critical (Type SC) and at all pretensioned (Type PT) bolted connections.

All headed studs and shear connectors shall meet ASTM A108 and A29, Grade 1015-1020, and AWS D11, Type B. Do not shop paint the top surface of beam top flanges to receive field installed headed stud shear connectors.

All unheaded anchor rods shall be ASTM F1554, Grade 36 or ASTM F1554, Grade 55 (Supplement 51).

All threaded steel rods shall meet ASTM A307, Grade B; ASTM F1554, Grade 36; or an approved equal or greater strength threaded rod. All threaded rods cast in concrete or post-installed in concrete or masonry shall be thoroughly cleaned of all surface oils.

All anchor rods set in concrete shall be furnished with double nuts and shall be set with a template.

Provide standard size holes for all bolts and anchors in steel framing members unless noted otherwise (1/16" larger hole than diameter of bolt or anchor).

Where oversized holes are required or desired in steel framing members to accommodate the drill bit size on post-installed anchors, provide a 3/16" thick plate washer at each post-installed anchor location with a standard hole or 1/16" larger hole than the anchor diameter in the center of the plate washer. After the anchors and the steel framing members have been installed, add the plate washer on each anchor prior to installing the nut and tightening the anchor. After the anchor has been properly tightened, weld the plate washer to the steel framing member with a 3/16" fillet weld along each vertical edge of the plate washer.

Welding shall conform to AWS D11, "Structural Welding Code - Steel". All welds shall be AWS prequalified welded joints. No unauthorized welds will be accepted.

ETCxx electrodes shall be used for all welding, U.O.

Use E20xx electrodes for the welding of all ASTM A106-60,000 weldable reinforcing bars or as required to comply with AWS D1.4.

Galvanized structural steel shall conform to ASTM A123 for members and ASTM A153 for connection elements.

Hot-dip galvanize all exposed steel framing members. Provide venting relief holes as required, but locate on the bottom side or at similar non-visible locations where the members are exposed. Show or note the locations of venting holes on the shop drawing submittal.

Touch-up primer for galvanized surfaces shall be SSPC-Paint 20, Type II, organic with a metallic zinc content of 95 percent by weight in dry film and a solids content of 52 percent by volume. Apply two coats with a minimum 1.5 mils dry film thickness per coat. Use ZRC Galvalite Galvanizing Compound by ZRC Worldwide or approved equivalent.

All interior and enclosed structural steel members shall have a surface preparation per SSPC-SP2 Hand Tool Clean or SSPC-SP3 Power Tool Clean.

All exterior and exposed to the weather structural steel members shall have a surface preparation per SSPC-SP6 Commercial Blast Clean.

Submit 3 copies of the structural steel shop drawings to the Engineer for review prior to beginning construction.

POST-INSTALLED ANCHORS

All post-installed anchors and post-installed reinforcing bars shall be installed per the manufacturer's installation instructions. All holes shall be drilled per the manufacturer's instructions with the required bit type and size to provide the minimum embedment length specified in the Structural drawings. All holes shall be cleaned prior to installing the anchor or reinforcing bar per the manufacturer's instructions with the brush and compressed air method or with the manufacturer's proprietary drill bit and dust extraction system. The installation of all post-installed anchors and post-installed reinforcing bars shall be performed by personnel trained and certified by the American Concrete Institute/Concrete Reinforcing Steel Institute or trained by the post-installed anchor and/or adhesive manufacturer for the type of anchor or reinforcing bar being post-installed.

Post-installed anchor types shall be as follows:

- Type I: Expansion anchors installed into concrete shall be Hilti Kwik Bolt TZ, Simpson Strong-Tie Strong-Bolt 2, or DeWalt Power-Stud-SD2 wedge anchors or an approved equal.
- Type II: Expansion anchors installed into solid grouted masonry shall be Hilti Kwik Bolt 3 or DeWalt Power-Stud-SD1 wedge anchors or an approved equal.
- Type III: Adhesive anchors or reinforcing bars installed into concrete shall use Hilti HIT-HY 200 Adhesive Anchoring System or an approved equal.
- Type IV: Adhesive anchors or reinforcing bars installed into solid grouted masonry, hollow block masonry, or brick masonry shall use Hilti HIT-HY TO Adhesive Anchoring System or an approved equal. Adhesive anchors installed into hollow block or brick masonry shall use screen tubes.
- Type V: Screw anchors installed into concrete shall be Hilti Kwik HUS-EZ, Simpson Strong-Tie Titen HD, or DeWalt Screw Bolt+ screw anchors or an approved equal.
- Type VI: Screw anchors installed into solid grouted masonry shall be Hilti Kwik HUS-EZ, Simpson Strong-Tie Titen HD, or DeWalt Screw Bolt+ screw anchors or an approved equal.

A piston plug injection procedure approved by the adhesive manufacturer shall be used for the injection of adhesives into all holes greater than 10 inches in depth.

A piston plug injection procedure approved by the adhesive manufacturer shall be used for the injection of adhesive into all vertical overhead holes. The vertical overhead anchors shall be supported by wedges or other suitable means approved by the adhesive manufacturer until the adhesive is fully cured.

Hilti HIT-RE 500 V3, DeWalt AC208+, and DeWalt Pure 110+ are approved equal adhesive anchoring systems for adhesive anchors or reinforcing bars installed into concrete.

All post-installed expansion anchors must be tightened to the anchor manufacturer's recommended installation torque. The installation of all post-installed anchors and post-installed reinforcing bars shall be reviewed and accepted by the field testing and inspection agency.

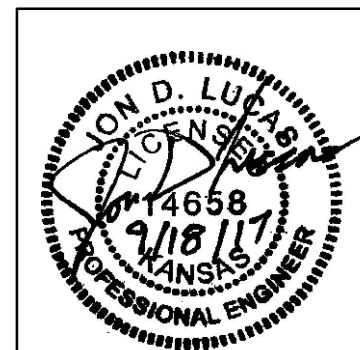
EXPOSED CAST-IN-PLACE CONCRETE SPECIAL REQUIREMENTS

The Contractor shall take special precautions and shall implement special quality control measures to assure that the following concrete coverage requirements are met and maintained at all locations.

Concrete beam stirrups and concrete column ties shall be detailed and fabricated to provide 2" of concrete cover from the formed or unformed surface. Concrete beam stirrups and concrete column ties shall be placed and maintained during the concrete placement to provide between 1 1/2" to 2" of concrete cover at all locations. At least 1 1/2" of concrete cover must be provided on the stirrups, ties, and tie wires from the formed surface at all times. All tie wires must be bent or turned back into the concrete members and away from the formed surface at all locations.

Concrete vertical and horizontal or longitudinal bars in concrete wall, beams, or columns shall be detailed, fabricated, and placed to have 2 1/2" of concrete cover from the formed or unformed surface. Noted bars shall be placed and maintained during the concrete placement to provide between 2" and 2 1/2" of concrete cover at all times. At least 2" of concrete cover must be provided on vertical, horizontal, longitudinal bars and tie wires from the formed surface at all times. All tie wires must be bent or turned back into the concrete members and away from the formed surface at all locations.

The Contractor shall perform special quality control procedures to monitor, inspect, and confirm that the defined concrete coverage requirements are met at all locations. Prior to the installation of the form work to conceal the reinforcing bar placement, a detailed and thorough inspection must be performed to confirm that the defined concrete coverage requirements have been met on the reinforcing bars and tie wires and that all loose tie wires and debris have been removed from the formed enclosure.



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PROJECT NO.
17031.00

DATE
August 8, 2017

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