

## DESIGN CRITERIA

Jurisdictional Code	North Carolina State Building Code 2018
Concrete Design Code	ACI 318-14, Building Code & Commentary
Concrete Design Method	Equivalent Rectangular Stress Block
Masonry Design Code	ACI 530 & ACI 530.1
Masonry Design Method	Allowable Stress Design
Steel Design Code	AISC Steel Construction Manual, 15th Edition
Steel Design Method	Elastic Analysis, Plastic Design

## LIVE LOADS

Mercantile Occupancy First Level	Uniform Load 100 psf	Concentrated Load 2000
Office Occupancy Offices (Traditional) Lobbies Corridors (First Level)	Uniform Load 50 psf 100 psf 100 psf	Concentrated Load 2000 2000 2000
Storage Occupancy Heavy Light	Uniform Load 250 psf 125 psf	Concentrated Load Note 1 Note 1
Roof Occupancy All Surfaces Subject to Workers Awnings & Canopies (Fabric) Awnings & Canopies (Non-Fabric) Ordinary Flat, Pitched, or Curved Roof Primary Member Over General Occupancy	Uniform Load 5 psf 20 psf 20 psf	Concentrated Load 300 Note 2 300
Special Occupancies Stairs & Exit Ways Stair Handrails Fixed Ladders Grab Bars Catwalks (Maintenance) Elevated Walkways Sidewalks (Pedestrian Only) Sidewalks (Vehicle Accessible) Yards & Terraces (Pedestrian Only) Yards & Terraces (Vehicle Accessible) Mechanical Equipment Rooms	100 psf 50 plf 300 250 40 psf 60 psf 100 psf 250 psf 100 psf 250 psf 150 psf	Note 3, 300 200 300 250 300 Note 3, 8000 Note 3, 8000 Note 5, 3000

- Notes:
- A single concentrated load of 3,000 lbs shall be applied over an area of 4.5 in. by 4.5 in., located so as to produce the maximum load effects on the structural elements under consideration. The concentrated load is not required to act concurrently with other uniform or concentrated live loads.
  - Where uniform roof live loads are reduced to less than 20 lb/ft<sup>2</sup> in accordance with Section 4.8.2 and are applied to the design of structural members arranged so as to create continuity, the reduced roof live load will be applied to adjacent spans or to alternate spans, whichever produces the greatest unfavorable load effect. Other uniform loads in accordance with an approved method, which contains provisions for truck loadings, will also be considered where appropriate.
  - The concentrated wheel load will be applied on an area of 4.5 in. by 4.5 in. (114 mm by 114 mm).
  - Minimum concentrated load on stair treads (an area of 2 in. by 2 in. [50 mm by 50 mm]) is to be applied nonconcurrent with the uniform load.
  - Hung MEP loads are to be distributed uniformly along the length of the framing members. Concentrated loads applied to framing members are not permitted to exceed the width of the hanging element multiplied by half the distance to the adjacent framing member in either direction multiplied by the noted hung MEP value. Concentrated loads in excess of this value may be evaluated by the structural engineer of record.

## THEORETICAL DEAD LOADS

1. Roof Construction General Areas	Thermoplastic Roofing Rigid Insulation, 4" Sheathing, 3/4" Open-webbed Steel Joists Hung M/E/P Hung Ceiling	1 psf 5 psf 2.5 psf 3 psf 5 psf 5 psf 22.5 psf
2. Roof Construction Mechanical Areas	Mechanical Allowance Thermoplastic Roofing Rigid Insulation, 4" Sheathing, 3/4" Open-webbed Steel Joists Hung M/E/P Hung Ceiling	30 psf 1 psf 5 psf 2.5 psf 3 psf 5 psf 5 psf 47.5 psf
5. Load Bearing Wall Construction CMU—8"	4" Common Brick 2 1/2" Insulation 8" CMU	30 psf 2 psf 43 psf 75 psf

## ROOF SNOW LOADS

Ground Snow Load, P <sub>g</sub>	15 psf
Terrain Category	B
Flat Roof Snow Load, P <sub>f</sub>	15 psf
Snow Exposure Category, C <sub>s</sub>	1.0
Snow Load Importance Factor, I	1.0
Thermal Factor, C <sub>t</sub>	1.0
Rain on Snow Load	5 psf

## WIND DESIGN DATA

Basic Wind Speed	115 mph
Wind Importance Factor, I	1.0
Occupancy Category	II
Wind Exposure	B
Internal Pressure Coefficient	±0.18
Wind Base Shear, X	30.3 Kips
Wind Base Shear, Y	29.9 Kips
Components and Cladding	Refer to Wind Loading Diagrams.

## EARTHQUAKE DESIGN DATA

Seismic Importance Factor, I	1.0
Occupancy Category	II
Mapped Spectral Response Acceleration, S <sub>s</sub>	15.1% g
Mapped Spectral Response Acceleration, S <sub>1</sub>	7.6% g
Site Class	C
Spectral Response Coefficient, S <sub>DS</sub>	12.1% g
Spectral Response Coefficient, S <sub>D1</sub>	8.6% g
Seismic Design Category	B
Basic Seismic Force Resisting System, X	Intermediate Masonry Bearing Wall
Basic Seismic Force Resisting System, Y	Intermediate Masonry Bearing Wall
Design Base Shear, X	16.4 Kips
Design Base Shear, Y	16.4 Kips
Governing Seismic Response Coefficient, C <sub>s</sub> , X	0.035
Governing Seismic Response Coefficient, C <sub>s</sub> , Y	0.035
Governing Response Modification Factor, R, X	3 1/2
Governing Response Modification Factor, R, Y	3 1/2
Governing Overstrength Factor, Q <sub>s</sub> , X	2 1/2
Governing Overstrength Factor, Q <sub>s</sub> , Y	2 1/2
Governing Deflection Amplification Factor, C <sub>d</sub> , X	2 1/4
Governing Deflection Amplification Factor, C <sub>d</sub> , Y	2 1/4
Governing Redundancy Factor, ρ, X	1.0
Governing Redundancy Factor, ρ, Y	1.0
Analysis Procedure Used	Equivalent Lateral Force

## GENERAL NOTES

- The structural drawings are to be used in conjunction with architectural, civil, mechanical and electrical drawings.
- The contractor will coordinate between all trades. Conflicts between the structural drawings and the drawings of others will be brought to the attention of the architect and the structural engineer in a timely fashion that permits clarifications without affecting the construction schedule.
- These drawings along with any specifications issued constitute the contract design documents for this project. Any discrepancy between the two will be brought to the attention of the architect or structural engineer for clarification. For estimating purposes the contractor will assume the more costly alternative. No materials may be ordered, and no work may proceed until the discrepancy is resolved by the design professional.
- Alternates or substitutions to structural materials or design are at the sole discretion of the licensed structural engineer of record. Any modification must be approved in the manner set forth in the project manual.
- All standards referenced within these documents are to be the editions referenced in Chapter Thirty-five of the North Carolina State Building Code, 2018 Edition.
- Structural members, including beams, columns, joists, trusses, walls, slabs and bracing elements, are designed for the final design loads given on this sheet. The contractor is responsible for all temporary shoring and bracing. Shoring is to be designed to preclude the overstressing any structural element (as required at any stage of construction) until completion of this project.
- The contractor is solely responsible for on-site safety. At a minimum, the contractor is to research and implement all safety regulations in force in the jurisdiction of this project. Prior to the commencement of work, the contractor will bring to the attention of the structural engineer any structural detail that would produce an unusually unsafe condition.
- Field verify all information related to adjacent existing conditions prior to commencing with foundation work or fabrication of any structural steel elements or miscellaneous steel at the building perimeter. Specifically, verify the size and configuration of all adjacent existing structural elements and all dimensions at the existing structure, including the dimensions defining the limits of the exterior wall system. Notify the architect and engineer of any conditions that deviate from those depicted on the architectural and structural drawings prior to proceeding with work.
- Details shown on these drawings are provided to add clarity to the plans and specifications. Similar conditions on plan require the use of similar details whether explicitly cut or not. Details designated as typical may sometimes be included in a drawing set if there is a likelihood that the detail will be necessary in the course of construction.

## FOUNDATIONS & SLABS CAST AGAINST GRADE

- All foundations have been designed on information and recommendations provided in a geotechnical report authored by Geotechnologies, Incorporated and dated April 29, 2019.
- The primary building structure is designed to be supported on spread footings with an allowable net soil bearing pressure of 3000 psf.
- Footings will be placed on undisturbed soils or compacted fill material. If soil at the scheduled footing elevation is of questionable bearing value, the architect and structural engineer are to be notified immediately. Lower footing elevations if required by architect to reach soil of probable providing the net soil bearing pressure.
- Slabs cast against grade have been designed for a subgrade modulus of 100 pci.
- All slabs cast against grade will be placed over 6 inches of #57 stone subbase. The top layer of subbase will be choked with a well graded modified stone. Vapor barrier, if required, will be placed on the top layer of subbase.
- At excavations exceeding a depth of five feet the contractor is to provide sheeting and shoring or whip back the existing slope approved by the on-site geotechnical engineer.
- All excavations will be adequately dewatered before placement of concrete.

## SOIL RETAINING STRUCTURES

- All soil retaining structures have been designed on information and recommendations provided in a geotechnical report authored by Geotechnologies, Incorporated and dated April 29, 2019.
- Design values for soils are as follows:

Unit Weight of Soil, γ	120 pcf
Friction Angle, φ	30
Coefficient of Passive Pressure, K <sub>p</sub>	2.08
Coefficient of Active Pressure, K <sub>a</sub>	0.45
Coefficient of At-Rest Pressure, K <sub>0</sub>	0.55
Coefficient of Sliding Resistance	0.35
- Cantilevered retaining walls may be backfilled as soon as the walls have reached design strength.
- Basement walls, those walls requiring an upper slab for stability, may only be backfilled when the upper slabs are in place. Basement walls are designed with grade beams at their bases and do not rely upon a lower slab for stability.
- Backfilling against soil retaining structures will be done in the manner outlined in the earthwork specification using hand operated equipment. Heavy equipment is not permitted within a horizontal distance equal to the depth of the wall from the top of the footings to the level of grade. At a minimum the backfill placed within 1 foot of a soil retaining structure will be made up of un-graded, free draining stone material.
- The soil retaining structures have not been designed to resist hydrostatic loads. Foundation drains must be present to remove ground water.
- Align bars in interior and exterior reinforcing mats to the maximum extent possible.
- Splice horizontal reinforcing steel in the exterior face of the wall at the midpoint between vertical framing elements, such as intersecting walls or columns, using a Class "A" splice.

## CONCRETE

- All concrete work will comply with the Specifications for Structural Concrete for Buildings, ACI-301 and the Building Code Requirements for Structural Concrete, ACI-318 (editions in force).
- Concrete mixture designs are referenced in the project specifications. For each design a submittal will be made by the contractor as outlined in the specifications.
- All reinforcing steel is to be tied to prevent displacement during concrete placement. Tack welding of reinforcement steel is prohibited.
- The contractor will submit a complete list of accessories and placing details with shop drawings.
- All reinforcing steel is to be continuous. Lap bars 40 diameters for bars #6 and smaller or 48 diameters for bars #7 and larger at splice unless noted otherwise on schedules or details.
- The location of all lap splices will be shown on shop drawings.
- No concrete element may be cored to place through items (ie pipes, electrical lines, etc.). All through items penetrating horizontal surfaces are to be placed in schedule 40, steel, pipe sleeves of a diameter sufficient to accommodate the through item. At penetrations in the vertical plane of elements, the pipe sleeve diameter will be increased by an amount to provide 1 1/2" clear dimension around the through item.
- Refer to architectural drawings for all waterproofing of concrete below grade.
- No horizontal construction joints are permitted in concrete elements. Locate vertical construction joints at the middle third of spans. Provide 2x4, continuous, beveled keyways at slabs (one minimum) and 2x8 beveled keyway at beams. Submit proposed construction joint locations to the architect and structural engineer for approval.

- All intersecting beams, walls, and footings will have corner bars. Refer to typical details.
- Reinforcing steel cast into concrete elements will follow ACI recommendations for edge clearances. The most common occurrences are herein summarized.

Concrete Cast Against and Continuously Exposed to Earth,	All Bar Sizes	3"
Concrete Cast Against a Formed Surface and Exposed to Earth,	#5 or Lesser	1 1/2"
Concrete Cast Against a Formed Surface and Exposed to Earth,	#6 or Greater	2"
Concrete Not Exposed to Earth or Weather, Slabs	All Bar Sizes	3/4"
Concrete Not Exposed to Earth or Weather, Walls	All Bar Sizes	3/4"
Concrete Not Exposed to Earth or Weather, Beams	#5 or Lesser	1 1/2"
Concrete Not Exposed to Earth or Weather, Beams	#6 or Greater	2"
Concrete Not Exposed to Earth or Weather, Columns	Stirrups	1 1/2"
- Where concrete is placed using a pump, no grout materials used to prime the pump may be included in the finished structure.

## STRUCTURAL STEEL

- Dimensions given on the structural drawings are provided as a convenience and are solely to convey the quantity and nature of the structural steel layout. All final dimensions are to be coordinated by the contractor with the project architect before material is ordered or fabrications has begun.
- Unless specifically indicated otherwise on the drawings, shear connections are to be designed using the AISC allowable stress design method (ASD) for the minimum service load reactions provided on the framing plans. Additionally, members will be furnished with a minimum number of web bolt rows as follows:

Member Depth	Minimum Number of Web Bolt Rows
W4 - W10	2 bolts
W12 - W14	3 bolts
W16 - W18	4 bolts
W21 - W24	5 bolts
W27	6 bolts
- Generally, 3/4" Ø, ASTM A325-N bolts are to be used for all bolted shear connections, unless otherwise indicated. The fabricator may use other diameter bolts where AISC recommendations require a shear lag or gage or block shear reasons or where strength reasons require larger diameter bolts. The provider of bolts will provide the head of the standard bolts with identifying colors unique to a particular diameter of bolt and will stripe the framing member on the connection surface outside the faying surface with the corresponding color.
- Fully tension all bolts where designated on structural drawings and at moment connections, including bolts resisting only gravity loads. Provide ASTM A325-SC bolted connections where indicated on drawings. Prepare faying surfaces at such conditions per AISC requirements.
- Single plate shear connection is the preferred method of attachment between beams and girders and where horizontal framing members attach to columns at angles other than 90°.
- Cold bending of plate material is not permitted for use in skewed connections. Heat member or build up from two plates as required and fully test and report weld effects.
- All corners and cuts in structural members are to be made free of notches or other stress concentrators. Corners are to be cut at a minimum radius of 1/4" of the member depth.
- All rolled steel members are to be fabricated with mill camber up.
- Column splices are not anticipated on this project. The fabricator may request column splices subject to approval by the structural engineer of record. Although the actual type of splice will be determined on an individual basis, AISC type VIII-D column splices may be assumed for pricing purposes.
- All welds are to conform with ANSI/AWS D1.1 standard and are to be made by certified welders.
- All full and partial penetration welds in moment connections are to meet cyclical loading standards.
- A weld schedule for all field welds will be furnished by the erector. This schedule is to be prepared by a competent designer of welds and will indicate at a minimum preheat, the weld filler material, the proper weld deposition rate and the welding machine settings.
- The top flanges of all members are to remain un-primed and unpainted unless exposed to view. Additionally, members to receive spray applied fire proofing or members embedded or encased in concrete are to remain un-primed and unpainted.
- All steel elements and connections which will be permanently exposed to exterior conditions will be hot dip galvanized after fabrication.

## OPEN WEBBED STEEL JOISTS

- Steel joists will be designed, fabricated and erected in accordance with the latest Steel Joist Institute specifications. The selected joist manufacturer must be a member of the SJI.
- Unless specifically indicated otherwise on the drawings, K-series joists will bear a minimum of 2 1/2" on steel supports, and each end will be welded to supports using a minimum of 2 - 1/8" x 1" long fillet welds. Increase weld size and length as required to satisfy uplift requirements.
- Unless specifically indicated otherwise on the drawings, long span joists will bear a minimum of 4" on steel supports, and each end will be welded to supports using a minimum of 2 - 1/4" x 2" long fillet welds. Increase weld size and length as required to satisfy uplift requirements.
- Field bolt joists at column lines in accordance with SJI standard specifications and provide bottom chord extensions.
- Joist bridging is indicated schematically on the structural drawings. Provide horizontal and/or diagonal bridging and accessories as required to fully comply with SJI specifications and to resist the uplift pressures indicated.
- Provide top chord extensions to within 1 inch of the edge of deck dimensions shown on plan.
- Provide ceiling extensions as indicated and as necessary to satisfy architectural requirements.

## COLD FORMED METAL FRAMING

- All cold formed, light gage metal framing is to be designed by the supplier's engineer. At the architect's or engineer's request, the Contractor will supply calculations for all cold formed metal framing.
- All framing will comply with the North American Specification for the Design of Cold-Formed Steel Structural Members as prepared by the American Iron and Steel Institute.
- Supply shop drawing for all cold formed steel used to support ceilings or exterior cladding. The shop drawings will show a minimum of the size, gage and spacing of the selected members and all connections to the building structure.
- Member sizes shown on the structural drawing are for preliminary pricing and are to be the minimum sizes supplied. Sizes may be increased as required.

These drawings are instruments of service and as such remain the property of the engineer. No copies or reproductions of these drawings are permitted without the consent of the engineer. Upon completion of the work all the drawings (except the contract copies) are to be returned to the engineer.  
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GENERAL NOTES

ABC STORE HOLLOWAY STREET

ABC STORE RENOVATIONS

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PROJECT NUMBER: 1904501



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