Architecture, Engineering, and Construction Division
and
Temple Design Services Division

Extended Structural Analysis, Design and Drawing Checklists

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All previous versions of this document are obsolete.

A copy of this document is available for download to Church Employees, Consulting Architects and Consulting Engineers on the AEC Website located at:

- http://aec.ldschurch.org/aec/
- Select “Design Guidelines” under “Support Documents”
- Select “Extended Civil Analysis, Design, Contract Documents and Construction Checklists” under “Supplemental Documents” to download the document

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with questions or suggestions for improvement.

Salt Lake City, Utah

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The following checklists are provided as a guide to encourage thorough review and completion of the structural contract documents. They are intended to promote the production of high quality structural contract documents with minimal errors. They are not to be interpreted as representing all items that the structural engineer should consider. Not all items in these checklists will be applicable to the project and will vary depending upon the agreement(s) made with the Owner's Representative and the area in which the project is to be built. These lists have been developed based on Owner experience and other resources. An abbreviated version of this checklist is available on the AEC Website (http://aec.ldschurch.org/aec/design_guidelines/).

STRUCTURAL DESIGN, CRITERIA AND SCOPE OF WORK REVIEW

I. Building Codes and Miscellaneous Items Information:

- ❑ Obtain, read and understand the "*Owner Guidelines*" and the structural portion of the "*AEC Design Guidelines*" available on the AEC Website (http://aec.ldschurch.org/aec/design_guidelines/)?
  - ❑ Use materials, methods, and design techniques as described and site adapt the specifications to reduce maintenance and save costs long term?
- ❑ Determine applicable codes, project address (location) and project function?
- ❑ Verify floor and roof live loads, snow loads and snow load drifting requirements with the authority having jurisdiction and with the Owner design guidelines?
- ❑ Determine the lateral loading requirements with the authority having jurisdiction, but verify with the Owner design guidelines?
- ❑ Determine the occupancy category or risk category of the building per code, but verify the category with the Owner design guidelines?
- ❑ Determine if any special design provisions are to be followed with the authority having jurisdiction?
- ❑ Determine if any special fire assemblies are required?

II. Owner and Architect Supplied Information:

- ❑ Obtain a Geotechnical Evaluation Report from the Owner?
  - ❑ Evaluate the impact and remedies for moisture (expansive or collapsible) or load sensitive soils?
- ❑ Obtain the overall project budget and the budget set aside for the structural portion of the project?
- ❑ Determine the required sheet size and title block to be used?
- ❑ Determine any special drafting standards and/or drafting formats required by the Owner?
- ❑ Verify location of buildings on adjacent properties?
- ❑ Obtain and verify accuracy of drawings for buildings on adjacent properties and if new project might impact adjacent properties?
- ❑ Determine from the Owner if future expansion of the building is being considered (many Church projects can be built in phases)?
- ❑ Determine if building needs to resist blast loading from the Owner?
- ❑ Determine if any special vibration criteria need to be met (temples, congregation areas, cultural halls and so forth)?
- ❑ Verify the required fire resistance requirements with the authority having jurisdiction, architect and owner?
- ❑ Verify the required security requirements with the Owner?

III. Architect Supplied Information:

- ❑ Obtain a site plan from which the top of footing elevations can be determined?

- ❑ Obtain dimensioned floor plans and elevations?
  - ❑ Determine the extent to which dimensions and elevation will be shown on the structural drawings?
- ❑ Determine the floor to floor heights?
- ❑ Determine and coordinate the location of any building expansion joints?
- ❑ Obtain wall sections?
- ❑ Obtain edge of slab locations?
  - ❑ Coordinate which discipline will dimension the edge of interior and exterior slab locations (architectural or structural)?
- ❑ Obtain the height of any parapets?
- ❑ Obtain information for any roof screen wall locations and configurations?
- ❑ Obtain the type and the weight of the roofing system?
- ❑ Obtain the locations and the depths of any floor recesses?
  - ❑ Coordinate which discipline will dimension the locations and the depths of any floor recesses (architectural or structural)?
- ❑ Determine whether the restroom floors be recessed for tile or will tile be thin set without recesses?
- ❑ Obtain information about any elevators:
  - ❑ Will the elevator will be hydraulic or traction?
  - ❑ Where will the machine room be located?
  - ❑ What are the weights of the equipment to be supported?
  - ❑ How is the equipment to be supported?
  - ❑ What is the maximum allowable vertical span of the elevator rails?
    - ❑ Does this maximum span need to be specified on the structural plans?
  - ❑ Is additional structural support needed between floors for the elevator rails?
  - ❑ How are elevator rails to be structurally supported at floor levels?
  - ❑ How deep does the elevator pit need to be?
  - ❑ Will water stops be shown on the structural drawings?
  - ❑ Is a sump needed?
  - ❑ How is the elevator pit being waterproofed?
    - ❑ Is this information to be shown on the architectural drawings?
  - ❑ Does the elevator require a roof “over-run” (an extension above the roof)?
  - ❑ What is the clearance required between the elevator cab and the bottom of any structure?
- ❑ Will the exterior architectural wall system be “panelized”:
  - ❑ What are the anchorage requirements of the panelized wall system?
  - ❑ Determine what design professional is responsible for the design?
  - ❑ Are deferred submittals for the panelized wall system required?
  - ❑ To what value must deflections be limited for the panelized wall system?
  - ❑ Do not camber exterior spandrel beams?
  - ❑ Determine what discipline will be detailing the “panelized” wall system?
- ❑ Obtain stair and elevator smoke hatch locations?
- ❑ Obtain information regarding skylight rough opening sizes and locations?
  - ❑ Coordinate which discipline will dimension rough opening sizes and locations (architectural or structural)?
- ❑ Locate all areas on the suspended levels that will require heavier design loading criteria, such as would be needed at storage rooms, libraries, mechanical rooms or electrical rooms?
- ❑ Will the structure need to be designed for high density file storage?
  - ❑ Are there embeds or recesses needed for the high density file storage that should be detailed on the structural drawings?

- ❑ Obtain the roof drainage plan with deck bearing elevations and roof drain locations?
  - ❑ Will the structure need to be sloped to the drains or will slopes be created with insulation?
- ❑ What roof top life safety anchorages (i.e.: window washing davits) are required?
- ❑ Determine if any footings will need to be dropped to accommodate piping, roof or floor drains?
- ❑ Is the structural engineer responsible for the design and detailing of any retaining or miscellaneous site walls (sometimes the design and detailing of site walls is provided by the civil engineer)?
  - ❑ Are the details to be shown on the structural drawings or on the drawings of other disciplines (architectural or civil)?
- ❑ Electrical Information:
  - ❑ Where will any electrical rooms be located?
  - ❑ Where will electrical floor penetrations be required?
  - ❑ Will penetrations through floor or roof beams be required, or will all of the electrical items be placed below the floor or roof beams?
  - ❑ How extensive is the electrical system and how much does it weigh?
- ❑ Mechanical Information:
  - ❑ Obtain the weight, configuration, orientation, location and support requirements of mechanical equipment on the floor(s) or roof?
  - ❑ Are any concrete pads required beneath the mechanical equipment to dampen vibrations?
    - ❑ How thick do the concrete pads need to be?
    - ❑ Do the concrete pads need to be level; without slope?
  - ❑ Is a mechanical penthouse required?
    - ❑ Obtain the configuration, orientation, location and support requirements of any penthouse(s)?
    - ❑ Obtain information for required penthouse floor slabs, curbs, pads, openings and equipment loads?
    - ❑ Will louvers be required in the penthouse walls?
    - ❑ How much will equipment hung from the roof of the penthouse weigh?
- ❑ Will penetrations through beams be required, or will all of the mechanical be placed below or between the floor and roof beams?
- ❑ Obtain coordination drawings showing duct loops, penthouse layout (with housekeeping pad locations), roof layout, and any required floor and roof penetrations.
  - ❑ Coordination drawings must show the location and configuration of ducts through and under the floor and roof.

IV. Structural System Information:

General Information:

- ❑ Understand the floor to floor height requirements, as well as ceiling height requirements, and determine if they are achievable?
- ❑ Consider thermal loads in design and if they have impact on the structure?
- ❑ Coordinate location of building expansion and shrinkage joints with Client?
- ❑ Determine the preferred structural framing scheme, and type of construction, to be used?
- ❑ Verify that there is a definable load path for transmission of lateral and gravity loads to the foundations?
- ❑ Verify that the structural system selected is within budget?
- ❑ Verify that the selected structural system is appropriate for the project?

- ❑ Verify that the Client has approved the structural system selected and that it satisfies the Client's needs?
- ❑ Determine all of the material properties? Take note of any uncommon material types or material strengths used?
- ❑ Notify the Client of potential vertical and lateral deflections?
- ❑ Notify the Client of the structural floor vibration characteristics, if applicable?

Lateral Analysis and Design Information:

- ❑ Determine from the Owner guidelines if any special seismic or wind design criteria apply?
- ❑ Using local codes, determine the correct seismicity, seismic criteria and seismic coefficients?
- ❑ Using local codes, determine the correct wind loads, wind criteria and wind coefficients?
- ❑ Determine if snow loads, if any, are to be included in lateral analysis?

Lateral Force Resisting System Analysis and Design Information:

- ❑ Compare lateral force resisting systems, and select best overall approach:
  - ❑ Braced frames (concentric, eccentric, BRBF and so forth):
    - ❑ Verify that the location, extent and vertical alignment of frames are acceptable?
    - ❑ Verify that overturning and shear force transfer are acceptable?
    - ❑ Verify that frames do not interfere with doors, windows, ductwork and so forth?
    - ❑ Verify that diaphragm loads can be delivered to the frames?
  - ❑ Moment frames (special, ordinary and so forth):
    - ❑ Verify that an adequate number of frames can be provided?
    - ❑ Verify that drift limits are achievable per local codes and Owner guidelines?
    - ❑ Verify that diaphragm loads can be delivered to the braced frames?
  - ❑ Shear walls (concrete, masonry, wood and so forth):
    - ❑ Verify that the location, extent and vertical alignment of walls are acceptable?
    - ❑ Verify that overturning and shear force transfer to the foundations are acceptable?
    - ❑ Verify that diaphragm loads can be delivered to the shear walls?
  - ❑ Diaphragms (concrete, wood, brace and so forth)
    - ❑ Verify that the chord members can be made continuous?
    - ❑ Verify that diaphragm deflections can be limited to those allowed by local codes?
    - ❑ Verify that the anchorage of drag struts and tension members can be accomplished?
    - ❑ Verify that anchorage of walls can be achieved for out of plane lateral forces?

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CALCULATION ANALYSIS AND DESIGN REVIEW

I. General Information:

- ❑ Verify that the preferred structural scheme is being used?
- ❑ Has the client been informed of the proposed structural system to be used and accepted the structural approach?
- ❑ Are the calculations well organized and easily reviewed?
- ❑ Is the name of the structural engineer preparing the calculations identified within the calculations?
- ❑ Has an index to the calculations been provided?
- ❑ Are calculations dated and numbered?
- ❑ Has the design criteria of the drawings been included in the calculations (codes, loads, material properties, soil properties, type of lateral force resisting system and so forth)?
- ❑ Is the design and analysis for miscellaneous items such as stairs, landings, handrails, retaining walls, site walls, bracing of nonstructural elements and so forth required by the structural scope of work of the contract agreement?
  - ❑ Has the design and detailing of these items been coordinated with the architect?
- ❑ Does design appear to be visually correct (such as longer spans have larger members)?
- ❑ Has the serviceability of the structure (longevity, durability, vertical and lateral load deflections, crack control, corrosion control, vibrations, shrinkage and so forth) been considered?
- ❑ Have potential floor vibrations been determined, reviewed, found to be acceptable and discussed with the Client?
- ❑ For economy, is the structure designed to be modular with repeating elements where possible?
  - ❑ Have consistent bay sizes, element spacing and element sizes been used?
- ❑ Does the structure meet the required fire requirements, including using minimum allowable member sizes?
- ❑ Verify that the structure provides the dimensional clearances defined in Checklist I? Does the structure fit within the space limitations of the building (clear heights and so forth)?
- ❑ Has the structure been evaluated for future modifications (new loadings, partitions and so forth)?
- ❑ Do the key plans, marks and symbols match those used in the drawings?

II. Vertical (Gravity) Load Forces:

- ❑ Have dead loads and live loads been itemized?
  - ❑ For Temples, include an additional 10 psf minimum for ceiling systems supported by roof and floor systems?
- ❑ Verify that the dead loads used for design represent those actually supported by the structure?
  - ❑ Review and compare initial dead load assumptions with the weights of the members chosen for design?
- ❑ Has the weight of exterior cladding been included in the design?
  - ❑ Have cladding connections been checked?
  - ❑ Anchorage and details for anchoring cladding provided?
  - ❑ Has it been decided which discipline will show cladding and cladding connections (architectural or structural)?
- ❑ Verify that the weight of partition loads have been included in the design?
  - ❑ Verify the loads used with Owner guidelines?
- ❑ Verify that the roof live and roof snow loads used for design are equal or greater than those required by code, by the authority having jurisdiction and by Owner guidelines?

- ❑ Has snow drift load at parapets, equipment, screen walls, low roofs been included in the design of the roof members?
- ❑ Has rain on snow surcharge been included in the design of the roof members?

❑ Verify that floor live loads used for design are those required by code, by the authority having jurisdiction and by the Owner guidelines?
- ❑ Verify that 100 psf live load has been used at all exits, corridors, assembly and common areas (chapels and cultural halls) and as otherwise required by the Owner guidelines?
- ❑ Have live load reductions been properly applied?

❑ Have the HVAC loads, RTU loads, suspended equipment, tank loads and so forth been included in the design of floor and roof members?

❑ Have out of the ordinary loads (mechanical equipment, electrical equipment, storage tanks, file cabinets, heavy partitions and so forth) been included in the design of the floor and roof members?

❑ Have wind uplift loads been considered?

❑ Has hydrostatic uplift been considered?

❑ Has the roof system been checked for ponding (roof slopes less than 1/4" per foot)?

❑ Have thermal expansion and contraction stresses been considered for long (more than about 250') structures?

❑ Has a complete, continuous load path from the roof to the foundations been provided for vertical (gravity) loads?
- ❑ Are the structural connections defined and complete?
- ❑ Have the foundations been designed in accordance with the geotechnical evaluation report?

❑ Is the distribution of vertical (gravity) loads logical?

❑ Are vertical deflections of beams, columns and frames acceptable?

❑ Have the correct unbraced lengths of beams and columns been used for primary and secondary members (for instance, has the correct unbraced compression flange length been used for beams that support cooling towers for which the flanges are not laterally supported)?

❑ Has the floor system been checked for vibrations and reviewed with the Client and Owner guidelines?

❑ Have all applicable load combinations been used and been included in calculations?
- ❑ Have unbalanced live loading combinations been considered?

❑ Has Strength Design or Allowable Stress Design methods been consistently used and noted in the calculations?
- ❑ Clearly clarify which calculation method was used: Working Stress (ASD) versus LRFD (ULT)?

III. Lateral Load Forces:

General:

❑ Is there a defined load path and are load paths continuous, for all lateral loads from the roof to the foundations? Are the load paths complete?

❑ Have the correct factors for wind and seismic forces been used considering code requirements and Owner guidelines?

❑ Have the lateral loads been properly determined and distributed?
- ❑ Have the relative rigidities the vertical force resisting systems been accounted for in distributing lateral forces? Are the lateral loads resisted in proportion to their relative rigidities?
- ❑ Have the relative rigidities of the horizontal diaphragms been accounted for in distributing lateral forces?

- ❑ Are the lateral connections for each level (or mass) complete from the roof to the foundations?
- ❑ Have diaphragm loads been correctly calculated?
  - ❑ Do the horizontal diaphragms have the strength to transfer the lateral loads to the vertical force resisting elements?
  - ❑ Have collectors, chords, crossties and drag struts been correctly designed and detailed?
  - ❑ Have diaphragm deflections been calculated and assessed?
- ❑ Have overturning forces been properly considered?
- ❑ Have uplift loads been considered and taken into account for design of the structural systems?
- ❑ Have walls been anchored for minimum out of plane loads?
- ❑ Are the exterior walls capable of withstanding both inward and outward lateral forces?
- ❑ Is the analytical distortion of the structure consistent with the configuration of the structure and loading?
- ❑ Has the overall building stability been assessed?
- ❑ Have the local element stabilities been assessed?

Seismic:

- ❑ Have the correct dead and partition loads been used to determine the seismic base shear?
- ❑ Have any redundancy factors been correctly calculated and used?
- ❑ Are the diaphragms properly designed for seismic forces?
- ❑ Have the seismic story and total building drift deflections been calculated and checked against code allowed deflections and Owner guidelines?
- ❑ Have large changes in mass or stiffness been accounted for in the design?
- ❑ Are any discontinuities accounted for in the design of the lateral force resisting system?
- ❑ Are seismic expansion joints consistent with the calculated horizontal displacements?
- ❑ Have seismic forces on nonstructural items been considered?
  - ❑ Is the structural engineer under contract to design and detail the bracing of nonstructural elements (partitions, lights, ducts, ceilings and so forth)?
  - ❑ Has the architect been reminded that nonstructural elements (partitions, lights, ducts, ceilings and so forth) need to be designed and detailed to resist seismic forces?
  - ❑ Have the lateral forces for non-building elements been correctly calculated?
  - ❑ Has any rigid equipment been correctly anchored for the generated seismic forces?

Wind:

- ❑ Are the diaphragms properly designed for wind forces?
- ❑ Have the wind story and total building drift deflections been calculated and checked against code allowed deflections and Owner guidelines?
- ❑ Are wind expansion joints consistent with the calculated horizontal displacements?

IV. Computer Analysis and Design:

- ❑ Are the analysis units consistent?
  - ❑ Have they been checked against the output?
- ❑ Have the computer models been checked and reviewed?
  - ❑ Is the input intended to be “global” or “local”?
  - ❑ Are the global restraints correct (note that foundations must be designed for the output)?
  - ❑ Is the loading input “negative” or “positive”?
  - ❑ Has self-weight been applied correctly?
  - ❑ Are the overall dimensions of the plans correct, including slab edges?
  - ❑ Have loading patterns been correctly input?

- ❑ Have the correct load combinations been used?
- ❑ Are the member orientations correct?
- ❑ Check that the unbraced lengths of the members are correct.
- ❑ Check the plot of the model for configuration, loads and loading direction case by case.
- ❑ Are mid span member forces and deflections reported and critical or are they critical only at the nodes?

❑ Connection design is to be performed based on code requirements as well as computer generated force (code requirements may be greater than computer generated forces)?

V. Foundation Analysis and Design:

General:

❑ Study and understand the recommendations and requirements of the geotechnical evaluation report?
- ❑ Discuss any concerns, questions and discrepancies with the geotechnical consultant?

❑ Design the foundations in accordance with the geotechnical evaluation report?

❑ Has the Client been notified of the type of the foundation system to be used?

❑ Has the Client been notified of any potential cost increases due to the type of foundation system to be used and to unforeseen soil conditions?

Conventional Foundation System (Spread and Continuous Footings):

❑ Are the determined foundation loads less than the maximum loads assumed by the geotechnical consultant as noted in the geotechnical evaluation report?

❑ Are the calculated soil bearing pressures less than the allowable soil bearing pressures allowed by the geotechnical evaluation report?

❑ Have footings, foundation walls and retaining walls been designed?

❑ Have the correct “active”, “at-rest” and “passive” pressures been used in the design of the foundations?

❑ Have the resisting forces needed to brace basement walls against soil loads been considered in analysis, and do the elements and connections resisting the soil loads have the required capacity?
- ❑ Do all wall elements have adequate resistance through attachments, friction and so forth?

❑ Has the weight of soil, slabs and superimposed loads been included in footing design and foundation wall design; if applicable?
- ❑ Have the lateral earth pressures, as noted in the geotechnical evaluation report, including surcharge loads, been correctly applied to any foundation walls?
- ❑ Have hydrostatic forces been applied to foundation walls; if applicable?

❑ Does foundation settlement or heave need to be addressed in the building analysis and design?

❑ Have the effects of expansive soils (heaving soils) or collapsible soils (settling soils) been addressed in the building analysis and design?

❑ Has settlement of large fills adjacent to foundation walls and footings been addressed (additional vertical loads, from friction, on foundation walls)?

❑ Do footings have adequate soil cover for frost protection or confinement needs?

❑ Has overturning stability, sliding resistance, bearing pressure, concrete bending and concrete shear in foundation walls and footings been checked?
- ❑ Does the reinforcing and anchor bolts have adequate development length?

Deep Foundation System:

❑ Has settlement of large fills adjacent to piers been considered?

- ❑ Have vertical and horizontal forces, applied to the deep foundations, been adequately addressed in analysis and design?
- ❑ Does pier (pile) spacing conform to the requirements of the geotechnical evaluation report?
- ❑ Does pier (pile) cap design conform to the requirements of the geotechnical evaluation report?
- ❑ Can both downward and upward loads be transmitted from the pier (pile) cap to the piers (piles)?
- ❑ Have pier (pile) caps and piers (piles) been tied together with grade (tie) beams capable of resisting 10% of axial loads?

VI. Concrete Analysis and Design:

General:

- ❑ Verify that dead loads and live loads have been correctly factored?
- ❑ Verify that correct load and reduction factors have been used?
- ❑ Has the shear capacity of any lightweight concrete been reduced?
- ❑ Have any needed shear friction calculations at construction joints been performed?
- ❑ Has minimum concrete cover over reinforcing been correctly accounted for throughout the calculations?
  - ❑ Has code prescribed cover depth been correctly maintained throughout the calculations?
- ❑ Do the reinforcing bar spacings conform to both minimum and maximum code prescribed spacings?
- ❑ Have the factors affecting splice lengths (f'c, fy, spacing, cover, bar location, lightweight concrete, epoxy coated, excess reinforcing, seismicity and so forth) been checked?
- ❑ Are any concrete diaphragm topping slabs 2.1/2" thick minimum?
- ❑ Have structural members been checked using code prescribed loads and stresses?
- ❑ Have deflections of flexural members been checked based on cracked sections?
- ❑ Have the restraining effects of walls and footings been included in the analysis and design of affected members?
- ❑ Have temperature, creep, shrinkage and elastic shortening effects been considered in the analysis and design?
- ❑ Are any steel bearing plate bearing areas adequate (bearing on masonry or concrete)?
- ❑ Has the embedment of anchor bolts, headed studs and expansion anchors been verified to be adequate?
  - ❑ Has the capacity of anchors for close gage spacing and edge distances been reduced? Be conservative, these connections are usually very critical.
- ❑ Has the placement of intersecting bars, reinforcing mats, bar placement and so forth been considered:
  - ❑ Consider the most conservative location of reinforcing bars for design?
  - ❑ Verify that the location of reinforcing bars used for design is consistent with the placement of bars at the jobsite:
    - ❑ Beams?
    - ❑ Columns?
    - ❑ Slabs?
    - ❑ Walls?
  - ❑ Verify that in beams, columns and beam/column joints:
    - ❑ Code required space is available for bars to be placed?
    - ❑ Congestion does not prevent accurate bar placement?
    - ❑ Concrete can be consolidated around bars?
    - ❑ Consider the use of headed anchors to replace hooks to reduce congestion?

Concrete Beams, Joists and Girders:

- ❑ Have required bar splice requirements provided and allowable locations indicated?
- ❑ Have all edge beams been designed and reinforced for torsion, if applicable?
- ❑ Have intermediate face bars been provided for deep beams, those beams over 30” deep?
- ❑ Has the required spacing, size and configuration of beam stirrups been determined?
- ❑ Are the "d" values used in design consistent with allowed jobsite bar placement tolerances?
- ❑ Has at least the minimum amounts of steel (based both on minimum amounts due to stresses and minimum amounts per code) been determined?
- ❑ If more than 75% of allowable tension reinforcing steel has been provided for flexural members, consider adding compression steel?
- ❑ Has the length of the top reinforcing in cantilever beams been calculated to extend past the point of inflection in the backspan?
- ❑ Has the effect of creep and shrinkage been calculated for any cantilevered beam sections?
- ❑ For detailing, use 135 degree bends for ties?
  - ❑ Place ties at 4” o.c. for ductile detailing or as determined by code requirements?
- ❑ Have vertical punching shear and additive torsional shear due to unbalanced moments been considered?

Concrete Columns:

- ❑ Have the concrete columns been designed for all loading conditions and all load combinations (gravity loads, lateral loads and post tensioning (if used) loads)?
- ❑ Have the correct unbraced lengths of the columns been used in the analysis?
- ❑ Have minimum code required eccentricities been used and have P-Delta effects been included?
- ❑ Has the required spacing, size and configuration of column ties been determined and used?
- ❑ Has at least the minimum amounts of reinforcing steel (based both on minimum amounts due to stresses and minimum amounts per code) been determined?
- ❑ If the reinforcing steel percentage exceeds 50% of that allowable, has congestion been checked at splices and beam/column joints?
- ❑ Limit the percentage of reinforcing steel in gravity columns to 4% and in moment frame columns to 3% to allow for proper lap splices and to reduce congestion at beam/column joints?
- ❑ Are proper splices required in columns where the percentage of reinforcing steel exceeds 4%?
- ❑ Do gravity load supporting columns have more than 1% steel but less than 4%?
- ❑ For detailing, use 135 degree bends for stirrups and ties?
  - ❑ Place ties at 4” o.c. for ductile detailing or as determined by code requirements?

Concrete Footings:

- ❑ Check bending, one way shear and punching shear to determine reinforcing bar and thickness requirements?
- ❑ Have footings been sized for uplift, if applicable?

Concrete Suspended Slabs:

- ❑ In two way slabs, has the correct "d" value been used in both directions?
- ❑ Check bar size, spacing and coverage?
- ❑ Has the length of the top reinforcing bars in cantilevers been calculated to extend past the point of inflection in the backspan?
- ❑ Has the effect of creep and shrinkage been calculated for cantilevered slab sections?
- ❑ Consider vertical punching shear and additive torsional shear due to unbalanced moments?

Concrete Walls:

- ❑ Does the construction sequence need to be considered in the design of any backfilled foundation walls?

VII. Masonry Analysis and Design:

General:

- ❑ Are reasonable allowable design capacities used for design?

Masonry Beams/Lintels:

- ❑ Have the beams/lintels been analyzed, sized and reinforced for the loads they must support?
- ❑ Has the amount of reinforcing steel been limited to that allowed by code?
- ❑ Has the vertical deflections of the beams/lintels been determined?
- ❑ Have the correct masonry stirrup sizes and spacings been determined?
- ❑ Has the required bond length of flexural reinforcement been determined?
- ❑ Has the vertical deflection of beams/lintels or veneer supports been limited to less than Span Length/600 or other appropriate criteria?

Masonry Columns:

- ❑ Have the columns been analyzed, sized and reinforced for the loads they must support?
- ❑ Has the amount of reinforcing steel been limited to that allowed by code?
- ❑ Have the correct masonry tie sizes and tie spacings been determined?
- ❑ Does the selected reinforcing fit within the masonry and allow for splices?

Masonry Walls:

- ❑ Have the walls been analyzed, sized and reinforced for the loads they must support?
- ❑ Has the amount of reinforcing steel been limited to that allowed by code?
- ❑ Have allowable height to thickness ratios for the walls been checked?
- ❑ Has a distinction been made in the calculations for allowable stresses used for running bond design versus those allowed for stack bond design?
- ❑ Have all openings in masonry walls been designed for vertical (gravity) and out of plane lateral loads?
- ❑ Have vertical and lateral load deflections of the walls been limited to those allowed by code?
- ❑ Are masonry control joints determined and are they shown on the documents? Note that the spacing of CMU control joints should not exceed about 26'?
- ❑ Has the location of vertical masonry wall control joints for shear wall and overturning analysis been taken into consideration?
- ❑ Are vertical control joints located beyond the lintel bearing to allow for arching action?
- ❑ Has minimum code required anchorage of the masonry walls to floors and roofs been provided?
- ❑ Are horizontal bond beams adequately designed to distribute large vertical loads, if that was intended?
- ❑ Are horizontal bond beams adequately designed to be used as chords or drag struts, if that was intended?
- ❑ Have horizontal steel bearing plates in masonry walls been designed to provide adequate bearing area and not exceed the allowable stresses in the masonry?
- ❑ Has the rotation of steel beam/joist ends, which cause concentrated stresses at the face of the horizontal bearing plates, been considered in design and detailing?

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VIII. Steel:

General:

- ❑ Are reasonable allowable design stresses used for design?
- ❑ Have cross slope purlins, on sloped roofs, been designed for unsymmetrical loads or have the purlins been designed (or braced) to accommodate the unsymmetrical loads (members not square to the loads)?
- ❑ Are bolt types and weld materials specified consistent with design calculations?
- ❑ Have bolt sizes, bolt types and number of required bolts been analytically determined?
- ❑ Have weld sizes, weld lengths and weld returns been analytically determined?
- ❑ Have complicated connections been designed and adequately detailed on the plans?
- ❑ Have large steel trusses been designed to allow for shipment to the jobsite?
  - ❑ Is it intended that large steel trusses be built at the jobsite?
- ❑ Have required anchor bolt materials and required embedment lengths been calculated?
  - ❑ Have the anchor bolts been designed to resist uplift forces?
- ❑ Are there any special requirements for the steel deck that need to be considered (i.e. simple span conditions, finishes, minimum thicknesses, insurance requirements, Owner guidelines for connections and so forth)?

Steel Beams:

- ❑ Has web buckling of deep members with concentrated loads been checked?
- ❑ Are actual connection eccentricities consistent with design assumptions?
- ❑ Have torsional loads been considered at spandrel beams and connections of spandrel beams to columns?
- ❑ Has the capacity of tension loaded members been reduced due to the area lost for bolt holes?
- ❑ Have the correct unbraced compression flange lengths been used for design of flexural members?
- ❑ Has the rotation of beam bearings been considered in analysis and design?
- ❑ Brace the bottom flanges of continuous beams, if needed by analysis, where moment reversal occurs? The bracing should have the capacity to resist 2% of the flange force.
- ❑ Brace the bottom flanges of beams, if needed by analysis, where there is net wind uplift. The bracing should have the capacity to resist 2% of the flange force.
- ❑ For stability, have beam stiffeners have been provided in steel beam webs in beams that are continuous over steel columns?

Composite Steel Beams:

- ❑ Are the flanges of beams thick enough for the diameter of the steel studs used?
- ❑ Have concrete recesses been accounted for in the design?
- ❑ Are the steel studs at least 2” higher than the top of any steel deck after installation?
- ❑ Do not camber both beams and girders?
- ❑ Do not camber spandrel (exterior) beams?
- ❑ Consider using larger beams or girders where the required camber would be less than ¾”?

Steel Braces:

- ❑ Based on their length, adjust the allowable stresses in braces?
- ❑ For braces (other than BRBF), check that no more than 70% of the braces are oriented in the same direction, unless the allowable stresses are adjusted per code requirements?
- ❑ For brace frames, do not use “K bracing”, except as allowed by code?
- ❑ For built-up members in braced frames, use stitch plates to limit local L/r ratios to less than that of the built up member?

- ❑ For connections in braced frames, review and incorporate the requirements of the code?
- ❑ For braces in braced frames, check the net areas of the braces against that required by code?
- ❑ For braced frame connections, check the gusset plate configurations against code requirements?
- ❑ For braced frames, check the bracing configuration selected against that allowed by code?
- ❑ For columns of braced frames, incorporate the splice and detailing requirements of the code?
- ❑ For beams in braced frames, do the bottom flanges need to be braced?

Steel Columns:

- ❑ Has the possibility of a moment load, due to the eccentricities of beam connections to the column, been considered?
- ❑ Have column strengths, splices and slenderness ratios been reviewed and been found to be acceptable?
- ❑ For columns of braced frames, incorporate the code requirements for splice and detailing requirements?

Steel Connections:

- ❑ Have eccentricities on bolt groups or eccentricities on welds been considered?
- ❑ Has prying action been considered and designed for, if applicable?
- ❑ Has the width and thickness of gusset plates been analytically determined?
- ❑ Have the bolt bearing stresses on plates been reviewed and been found to be acceptable?
- ❑ Have bolt capacities been correctly chosen (i.e. SC, N, X)?
- ❑ Have collector, drag strut and chord connections been designed and detailed correctly?
- ❑ Are connections designed by the steel fabricator?
  - ❑ Do the drawings and specifications make this requirement clearly understood?
  - ❑ Include the loads on the drawings for connection design?

Steel Open Web Joists and Girders:

- ❑ At least 3 psf has been used for the dead load weight of joists?
- ❑ Are the joist/girder bearing depths compatible with adjacent and parallel steel beam connection details?
- ❑ Has adequate bearing been provided for the ends of joists and girders? Beams should be a minimum of 5” wide if joists bear on the beam from both sides.
- ❑ Is the performance specification for joists/girders by the fabricator?
- ❑ Does the design responsibility for joists/girders belong to the fabricator?
- ❑ Does the design of the bridging and the uplift bridging belong to the fabricator?
  - ❑ Are uplift forces for the joists and girders noted on the drawings?
  - ❑ Has uplift bridging for roof joists been specified on the drawings?
- ❑ Are the connections of the joists/girders to the building detailed by the engineer of record?
- ❑ Define the design loads; dead loads, live loads, live load reductions, equipment loads, roof screen loads, snow loads, snow drift loads, rain or snow surcharge loads?
  - ❑ Provide details to add web reinforcement where concentrated loads are located farther than 6” from a top or bottom chord panel point?
- ❑ Are the collector/chord/drag strut loadings defined?
- ❑ The depth of joists/girders should be equal to or greater than the span of the member divided by 24 (Span Length/24)?
- ❑ Specify the deflection criteria (L/180, L/240, L/360, and L/480)?
  - ❑ Have the appropriate allowable total and live load deflections been indicated?
- ❑ Are the load and deflection criteria noted for any cantilevered members?
- ❑ Does vibration criteria need to be noted?

- ❑ Are joists/girders to be prime painted? Galvanized?
- ❑ Use "VG" type girders to allow easier installation of ductwork though girders?
- ❑ If joists/girders are part of a moment resisting lateral force resisting system, have the minimum required section moduli and moment of inertias been determined and noted on the drawings?
  - ❑ Are the moment resisting connections designed and detailed?
- ❑ Have connection details been shown for the condition where joists and girders both bear on columns?
- ❑ Have OSHA requirements been incorporated into the plans?
- ❑ Has special hanging equipment (basketball standards, partitions, mechanical units) been included in the design with joist deflections limited?

IX. Wood:

- ❑ Does the wood need to be fire resistant and the wood treated with fire retardant?
  - ❑ Have allowable stresses been reduced for pressure impregnated fire retardant treated wood?
- ❑ Are the types, stress grades and allowable design stresses for lumber used in design reasonable?
  - ❑ Has lumber that is available and also economical been used for design?
  - ❑ Have the diaphragm and anchor connection designs been adjusted for the type of lumber being used, if applicable?
  - ❑ Has the correct nail holding capacity been determined for the type of lumber being used?
- ❑ Have repetition and duration of load factors been taken into consideration in design?
- ❑ Have allowable stress adjustment factors been applied (duration, size, repetitive member, flat use, wet use etc.)?
- ❑ Has the size factor for glued laminated members been taken into consideration in design?
- ❑ Have unbraced lengths and slenderness ratios for columns and jambs been correctly considered?
- ❑ Are calculated deflections of wood members (joists and beams) acceptable?
- ❑ Have splices been kept to a minimum and located at points of minimum stress?
- ❑ Have wood sheathed walls, floors and roofs been designed in accordance with code requirements?
- ❑ Do not put wood members, such as ledgers, into cross grain tension or bending?
- ❑ Do not use "heel cuts" or "bottom notches" near bearing?
- ❑ Provide adequate bearing area for lumber and engineered products?
- ❑ Have wood connections been correctly designed and detailed?
- ❑ Does the design of connections address the direction of the loads (cross grain bending or tension, forces perpendicular to grain and so forth) on the individual members?
- ❑ Have the minimum bolt to edge distances, minimum bolt to end distances and minimum bolt spacings been provided and maintained?
- ❑ Has adequate penetration of nails been required and noted on the drawings?
  - ❑ Do reductions for wet use, or other reductions, apply?
- ❑ Have the diaphragms been correctly designed?
  - ❑ Are the lateral deflections of the diaphragms acceptable?
  - ❑ Has the design for forces around large diaphragm openings been performed and detailed?
  - ❑ Have cross ties, collectors, chords and drag struts been designed and detailed?
  - ❑ Have continuous cross ties been designed and detailed (only required with "heavy" walls)?
  - ❑ Have sub-diaphragms been designed and detailed (only required with "heavy" walls)?

- ❑ Do floor and roof anchorage connections to walls provide at least the minimum code required capacity?

X. Calculation Summary:

- ❑ Have the initial design assumptions been compared against the final design assumptions (loads and so forth)?
- ❑ Verify that any key plans used in the calculations are correct?
- ❑ Verify that the calculations show “units” in the equations or that the units being used are clear?
- ❑ Verify that the structural calculations are complete and are organized based per the structural calculations index at the beginning?
- ❑ Verify that the structural design criteria table is complete and is included at the front of the structural calculations (code(s) used, gravity load criteria, wind criteria, seismic load criteria, materials used, geotechnical information and so forth)?
- ❑ Verify that the design calculations have been performed using the approved codes and standards, the site structural design criteria and conditions, and Owner guidelines?
- ❑ Verify that the seismic, wind, and live load design criteria and coefficients are correct?
- ❑ Has coordination with the architectural and other design disciplines been completed and do the calculations include vertical (gravity) and lateral loads attributable to items from the other disciplines?
- ❑ Verify that the load combinations used for design are accurate and complete?
- ❑ Have the foundations been designed using the recommendations of the geotechnical evaluation report?
- ❑ Have the foundations been designed for the overturning and sliding forces of lateral loads?
- ❑ Is the gravity load analysis and design complete?
- ❑ Is the lateral load analysis and design complete?
- ❑ Have the floor and roof diaphragms been designed for the required lateral loads?
- ❑ Does the design appear to be visually correct (for instance, do longer spans have larger members)?
- ❑ Have calculations for architectural and ancillary structures have been included (steeple, folding partition supports, equipment anchorage, fence, storage building, pavilions, stairs, handrails, guardrails, ceiling assemblies, interior partitions, suspended equipment and so forth)?

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STRUCTURAL CONTRACT DOCUMENT REVIEW

I. General Drawing Format:

- ❑ Does the title block information on the structural plans match that of the architect's plans?
- ❑ Do the structural plans show:
  - ❑ The project name?
  - ❑ The name of the ward or branch and the stake or mission?
  - ❑ The church property number?
  - ❑ The address?
  - ❑ The north arrow?
  - ❑ The drawing and detail scale?
  - ❑ The name and address of the structural engineer?
- ❑ Is the structural engineer's firm's name included in the sheet title block with the name of the CAD operator, the design engineer and the reviewing engineer?
  - ❑ Is the seal of responsible structural engineer included on the drawings (if applicable)?
- ❑ Does the size of the structural plan sheets match the size of the architectural plan sheets?
- ❑ Is the font type and font size used in the plans acceptable to the architect and conform to the Owner's guidelines?
- ❑ The plans should include a statement such as PRELIMINARY, CONCEPT, SCHEMATIC, DESIGN DEVELOPMENT, NOT FOR CONSTRUCTION and so forth until the plans are ready for final submittal?
- ❑ Do the structural sheet titles and drawing numbers match the sheet titles and drawing numbers used in the General Drawing Index?
- ❑ Is the nomenclature throughout the drawings, details and specifications consistent?
- ❑ Has a list of definitions for abbreviations, symbols, marks and legend symbols been provided on the plans?
- ❑ Are the plans drawn to scale?
  - ❑ Are graphic scales included and are they drawn to scale?
  - ❑ Are the plans drawn to the scale required by the Owner's guidelines?
- ❑ Existing construction should be shown "grayscale" with "(E)" or "EXISTING"?
  - ❑ Dimension the location of new construction with respect to existing construction?
  - ❑ Dimensions that need to be "field verified" should be clearly noted?
- ❑ Revisions to final plans (inclusion of addenda, change of scope, requests for clarifications and so forth) should be "clouded" with the revision date and a revision description?
- ❑ Gridlines and grid to grid dimensions should be shown on each plan sheet?
  - ❑ Show other dimensions as arranged with the Client?

II. Structural Coordination with Site Civil Drawings:

- ❑ Do utilities affect the foundations (pipes, pipe penetrations, trench backfill and so forth)?
- ❑ Has the location of property lines been accounted for in the design and detailing of the foundations?
- ❑ If the structural engineer is responsible for analysis and design of any site retaining walls but the information is shown in the site civil drawings:
  - ❑ Verify that the structural schedules and details incorporated into the site civil drawings are correct?
  - ❑ Verify that the wall heights indicated in the site civil drawings are addressed by the retaining wall schedules and details?

- ❑ Verify that finish grades slope away from the building per the Owner's guidelines (1/4" per foot for 12' with finish grades being 6" lower than the finish floor elevations adjacent to the building)?

III. Structural Coordination with the Architectural Plans:

- ❑ Was the architect provided with the lateral (seismic and wind) design criteria for the design of doors, windows, cladding and roofing systems?
- ❑ Do the grid lines shown on the structural drawings match those on the architectural drawings?
- ❑ Do the dimensions shown on the structural drawings match those on the architectural drawings?
- ❑ Does the column orientation shown on the structural drawings match the architectural drawings?
- ❑ Do the slab edges at the building perimeter and at interior openings as shown on the structural drawings match the architectural drawings?
  - ❑ Are the dimensions for slab edges to be shown on the structural drawings?
- ❑ Are any depressed and recessed slabs shown on the structural drawings and do they match the architectural drawings (tile floors, entries, restrooms and so forth)?
- ❑ Are slopes to drains shown on the structural drawings and do they match the architectural drawings?
- ❑ Do the floor and roof elevations shown on the structural drawings match those on the architectural drawings? Are top of steel, top of concrete, finished floor, joist bearing, top of plywood and top of column elevations provided?
  - ❑ Is showing elevations in the structural drawings required?
    - ❑ Do any elevations shown match those in the architectural drawings?
- ❑ Do openings shown on the structural drawings match the locations shown on the architectural drawings?
- ❑ Do the clear heights between floors meet the needs of the project?
- ❑ Do the roof slopes shown on the structural drawings match those on the architectural drawings?
  - ❑ Are roof slopes supposed to be shown on the structural drawings?
- ❑ Do expansion joints and control joints shown on the structural drawings match the joint locations shown on the architectural drawings?
  - ❑ Are expansion and control joints supposed to be shown on the structural drawings?
- ❑ If steel lintels are shown on the architectural drawings, provide a lintel schedule (or details) on the structural drawings?
  - ❑ Are steel lintels supposed to be shown on the structural drawings?
- ❑ If folding or suspended partitions are used, provide structural framing and structural details for their support?
- ❑ Stairs:
  - ❑ Are stair penthouses needed and are they shown and detailed?
  - ❑ Does the structural scope of work include the design and the drawings for stairs and landings? Has this been coordinated with the architect?
  - ❑ If a performance specification is provided, is the design and the drawings the responsibility of the fabricator? Is the fabricator required to provide a seal and signature? Is this noted in the contract documents?
  - ❑ Have the stairs been detailed to provide for code required head clearances?
  - ❑ Have the stairs been provide with slotted holes at any connections to the suspended floor slabs? Possible differential movement between floors needs to be provided to account for lateral story drift.

- ❑ Of what are the treads and risers built? Steel bar grating? Concrete? Steel?
- ❑ Of what are the stringers built? Channels? Steel tubes?
- ❑ Of what are the landing built? Concrete? Steel Deck?
- ❑ Is the stair assembly galvanized? Is it painted?
- ❑ Can the stair assembly be constructed one run at a time?

❑ Has the elevator information been coordinated?
- ❑ Have elevator shaft openings been shown?
- ❑ Have elevator shaft openings been located?
- ❑ What slab edge angles are needed?
- ❑ Are divider beams needed?
- ❑ Do elevator guide rail supports need to be provided (vertical framing elements to laterally support the elevator rails)?
- ❑ Are elevator rails shown?
- ❑ Have the connection details of the elevator rail support to the structure been coordinated?
- ❑ Have the hoist beam above the elevator shaft and miscellaneous support beams been detailed and coordinated (limit deflections of hoist beams to L/600)?
- ❑ Is a machine roof required?
  - ❑ Are elevator penthouses shown and detailed?
- ❑ Is elevator overrun space above the roof, over the elevator shaft, needed and has it been provided?
- ❑ If elevator pits are used, are sumps needed and are they indicated?

❑ Has the information in the architectural wall sections been coordinated with the structural drawings and details?

❑ Are any brick support angles shown in the architectural drawings properly designed and detailed?

❑ Has the design and the connections for the architectural exterior cladding system been reviewed?
- ❑ Is this within the written scope of the structural engineer?

❑ Is the architectural “skin” indicated on the structural plans and partially indicated in the details?
- ❑ Is this within the written scope of the structural engineer?

❑ Has a review of the architectural nonstructural walls and their bracing to the structure been performed?
- ❑ Is this within the written scope of the structural engineer?

IV. Structural Coordination with Mechanical, Electrical and Plumbing Drawings:

❑ Verify whether any underground utility line locations interfere with the structural foundations?

❑ Verify that the toilet layout and associated culinary water line and sanitary sewer line penetrations do not conflict with structural beams or structural foundations?

❑ Verify that the location of any pipes or ducts does not adversely affect the structure?

❑ Verify that openings through walls, beams, floor systems and roof systems needed for pipes and ducts as shown in the electrical and mechanical drawings match those shown in the structural drawings?

❑ Have details accounting for location and passage of pipes and ducts through walls, beams, floor systems and roof systems been provided?

❑ Are mechanical units/roof drains/misc. openings shown in the structural drawings with correct detail references?

- ❑ Have support details for roof drains been provided?
- ❑ Has the weight of large pieces of mechanical equipment been shown in the structural drawings?
- ❑ Verify that the structure is designed to support any concentrated loads from electrical cable trays?
- ❑ Verify that structural support has been provided for mechanical equipment?
- ❑ Verify that embedded conduit material, size and spacing conforms to codes?
- ❑ Verify that the structure does not interfere with the light fixture layout?

V. General Structural Items:

General:

- ❑ Have the requirements of the geotechnical evaluation report been incorporated into the plans and specifications? Has the information been coordinated?
  - ❑ Has a letter from the geotechnical engineer stating that the structural plans and specifications were reviewed and were prepared in accordance with the geotechnical evaluation report recommendations and requirements been provided?
- ❑ Verify that the dead loads used for design match the dead loads indicated on the drawings?
- ❑ Verify that the roof live/snow loads used for design meet the requirements of the code and Owner guidelines?
- ❑ Verify that the roof live/snow loads used for design match the live/snow loads shown on the drawings?
- ❑ Verify that the floor live loads used for design meet the requirements for the required occupancy and usage and Owner guidelines and match those shown in the drawings?
- ❑ Has the structure serviceability been considered (crack control, corrosion control, shrinkage)?
- ❑ Have the loads from special equipment (basketball standards, partitions, mechanical units and so forth) been included in design?
- ❑ Does the plan requirements and information match the detail requirements and information?
- ❑ Verify that the structural costs fall within the structural budget constraints?
- ❑ Does the information on the structural plans match the calculation's input and output?
- ❑ Include the structural design criteria on the plans?
  - ❑ Correct codes been referenced?
  - ❑ Wind load criteria is noted (wind speed, exposure factor, enclosed/partially open, topographic factor, importance factor and so forth)?
  - ❑ Seismic load criteria is noted (Ss, SDS S1,SD1, Fa, Fv, SDC, IE, R, Cs and so forth)?
  - ❑ Geotechnical information is noted:
    - ❑ The name of the firm providing the report should be listed as well as the report's name, the firm's project number and the date written?
      - ❑ Reference should be made to the report, but it should not be included as part of the contract documents?
    - ❑ Basis of foundation design is noted (earthwork preparation requirements, allowable soil bearing pressures, equivalent backfill fluid pressures, allowable end bearing pressures and so forth)?
  - ❑ Live and dead loads used for design?
  - ❑ Note any design criteria needed for specialty items designed by others for deferred submittals and delegated design on the structural plans (cladding systems, window systems and so forth)?
  - ❑ Vertical (gravity) and lateral deflection limits?
- ❑ Include the required structural material properties on the plans and in the specifications?
  - ❑ Concrete?

- ❑ Connectors (anchors, anchor bolts, framing bolts (A325N, A325SC, A307 and so forth), headed studs, nails, powder actuated fasteners, weld electrodes and so forth)?
- ❑ Grout (non-shrink, cementitious, flowable and so forth)?
- ❑ Masonry?
  - ❑ Clay block or concrete block requirements?
  - ❑ Grout?
  - ❑ Mortar?
- ❑ Post-installed anchors?
- ❑ Prefabricated metal building systems?
- ❑ Reinforcing steel?
- ❑ Steel?
- ❑ Wood?
- ❑ Verify that the calculations list the structural design criteria and the material properties used for design?
- ❑ Have any uncommon material types or strengths been used and have they been included in the plans and specifications?

❑ Are general structural notes used and are they complete?
- ❑ Have general structural notes been coordinated with other plan and specification information?

❑ Verify that wood sheathing or metal deck attachment requirements are provided either in the general structural notes, drawings or specifications?

❑ Have earthwork requirements been included and have they been coordinated with the specifications?

❑ Is steel surface preparation requirements included in the contract documents (SSPC-SP6 and so forth)?
- ❑ Paint: None/primer/galvanize/galvanize and paint?
- ❑ Do no surface preparation if the steel is fireproofed?

❑ Have inspection and testing requirements been provided?

❑ Have structural observation requirements been provided?

❑ Are required procedures for welding joints in steel moment frames provided, if any?

❑ Are plan notes complete and coordinated?
- ❑ Edit the specifications to match the information of the general structural notes, detail notes and plan notes?

❑ Are detail notes complete?

❑ Are schedules complete?

❑ Have the structural plans been checked/coordinated with the architectural plans?
- ❑ Have structurally needed dimensions been provided?
- ❑ Verify that door, window and other openings match the locations shown on the architectural plans?

❑ Verify that the clear height provided by the structural framing provides the required clearances?
- ❑ Are floor elevations, roof elevations and dimensions as arranged with the architect shown on the structural plans?

❑ At sloping roofs, verify that horizontal or large members do not protrude through ceilings or the roof?

❑ Has adequate access to bolts that need to be field installed been provided?

❑ Do walls above openings need to be braced diagonally to the diaphragms?

❑ Is the structure “buildable” (can it be built without “skyhooks”)?

❑ Have pour back slabs are shown and detailed?

- ❑ Have possible locations of construction joints considered?
- ❑ Have all details been referenced from plan detail cuts, general notes plan notes or detail notes?
- ❑ Has information been called out in more than one location on the drawings?
  - ❑ Is it consistent?
  - ❑ Is it necessary to show the item in more than one location?
- ❑ Have special requirements of the authority having jurisdiction and Owner guidelines been integrated into the analysis, design, drawings and specifications?
- ❑ Has the structure been prepared for future expansion, if this is a possibility (dowels, brackets, keys, embeds, couplers and so forth)?
- ❑ Is a "safety and means and methods of construction" disclaimer needed?
- ❑ Is a note needed directing the contractor to shore adjacent existing buildings?
- ❑ Is a note needed directing the contractor to protect adjacent existing buildings?

Nonstructural Items:

- ❑ Has lateral bracing and vertical slotted connections been provided, if within the structural scope of work, for architectural walls?
- ❑ Have parapets been designed for seismic, wind and window washing equipment loads?
  - ❑ Are window washing equipment support details and locations within the structural scope of work and if so have they been coordinated with the architectural drawings?
- ❑ Are heavy nonstructural items secure and connected to the structure?
- ❑ For cladding and windows; have performance specifications been provided and is it clear who is responsible for the design? Is a seal by the fabricator required?
- ❑ Are brick veneer anchor ties required?
  - ❑ Is the structural engineer responsible for the design and detailing of brick veneer anchor ties?

VI. Foundations:

General:

- ❑ Has uncompacted fill been removed and replaced, or modified as required by the geotechnical evaluation report?
  - ❑ Does the site have moisture sensitive soils?
  - ❑ Have the effects of expansive or collapsible soils been addressed and mitigated?
- ❑ Have the requirements of the geotechnical evaluation report been incorporated into the contract documents?

Conventional Foundations (Spread and Continuous Footings and Foundation Walls)

- ❑ Is footing embedment per the recommendations of the geotechnical evaluation report?
- ❑ Has frost cover been provided per the recommendations of the geotechnical evaluation report or local code requirements?
- ❑ Will the required location of reinforcing bars in footings be consistent with the placement of bars at the jobsite?
- ❑ Are the footing elevations coordinated with the architectural elevations?
- ❑ Are footing step locations and elevations shown?
  - ❑ Has a footing step detail been provided?
  - ❑ Are longitudinal reinforcing bars developed at footing steps?
- ❑ Is top reinforcing steel needed in footings and has it been shown in the "foundation schedules" and foundation details?
- ❑ Have the locations of footings been dimensioned (footings should be centered under walls and columns)?

- ❑ If footings are not centered directly under walls and columns, have the effects of eccentric loading been considered?

- ❑ If footing, wall, column and other concrete schedules are used, are they clear and complete?
  - ❑ Have instructions and details been provided with the schedules showing the required location of reinforcing steel?
  - ❑ Is concrete cover over reinforcing steel adequate?
- ❑ Is backfill against basement walls noted to be placed after basement slab and the floor structure is in place?
  - ❑ Is backfilling against basement walls allowed prior to construction of the floor structure?
  - ❑ Are notes for bracing, shoring and a construction sequence for backfilling against basement walls needed?
  - ❑ If the drawings allow for basement walls to be braced and shored as backfill is placed but before the floor structure is in place, has needed design criteria been provided?
  - ❑ Are notes for backfill and drainage fill properly included and coordinated with the conditions used for design of foundation walls?
  - ❑ Is damp proofing, bituminous coating required at foundation walls (basements)?
    - ❑ Is it required to be shown on the structural drawings or just the architectural drawings?
- ❑ Is foundation wall reinforcement shown to be located on the intended face of walls?
  - ❑ Do foundation walls require reinforcing steel in both faces?
  - ❑ Have the required foundation dowel lap splice lengths been provided?
- ❑ Indicate any water stops required in the concrete foundations (see architectural drawings)?
- ❑ Has supplementary reinforcing at wall penetrations and interruptions been provided?
- ❑ Compare the amount of reinforcing steel required versus the wall height. Does the amount required reinforcing make sense?
- ❑ Has the datum elevation been defined and coordinated with site civil and architectural plans?
- ❑ Have potential pipe penetrations through footings been considered?
  - ❑ Are details for pipe sleeves through foundation walls for piping needed?
- ❑ Have compaction requirements for soils around the building been included in the drawings?
- ❑ Do existing or new sewer and storm drain lines and locations impact the new foundations?
- ❑ Do storm water downspouts require that footing elevations be lowered?
- ❑ Do property lines impact the new foundations?
- ❑ Do existing adjacent footings impact the new foundations?
- ❑ Do adjacent existing structures need to be underpinned?
- ❑ Does the elevation of the water table need to be taken into consideration for design and detailing of the foundations (hydrostatic head for slab design, fluid pressures on walls, waterproofing, vapor retarders and so forth)?
- ❑ Detail depressed slabs, sump pits, elevator pits, underground tunnels and so forth?
- ❑ Has the depth and slope of any dock leveler pits been reviewed and have the pits been detailed?

Deep Foundation Systems:

Concrete Piers (Drilled):

- ❑ Does the pier cap design conform to the requirements of the geotechnical evaluation report?
- ❑ Is the pier capacity noted for each different size pier?
- ❑ Is a CONCRETE PIER CAP SCHEDULE used?
  - ❑ Have the “top of pier cap elevations” been shown?
  - ❑ Are the pier caps dimensionally located on the plans?

- ❑ Have the required thicknesses been provided?
- ❑ Has the required reinforcing been provided?
- ❑ Has a sufficient number of details been provided?

❑ Is a CONCRETE PIER SCHEDULE used?
- ❑ Are pier diameters provided?
- ❑ Are the bell diameters, if any, provided?
- ❑ Are "top of pier elevations" provided?
- ❑ Are bottom of pier elevations, as least for bidding purposes, provided?
  - ❑ Has the required depth of embedment into bedrock been provided?
- ❑ Has the required pier reinforcing been provided?
  - ❑ Size, quantity and length of longitudinal reinforcing provided?
  - ❑ Are reinforcing bar splices permitted or required? Are they required to be staggered?
  - ❑ Have dowel sizes, quantities, lengths, and embedment into pier caps/grade beams above been shown?
    - ❑ If the doweled rebar protruding from the top of the pier required to have hooks, are the hooks compatible with grade beam reinforcing steel?
    - ❑ Do dowel or anchor bolt template details need to be provided?
  - ❑ Have tie or spiral tie reinforcing requirements been provided (spacing, lap splice lengths and so forth)?
- ❑ Is steel casing, if any, indicated?
  - ❑ If the doweled rebar protruding from top of the pier have hooks, are they compatible with casing removal (if casing is to be removed)?
- ❑ Has a sufficient number of details been provided?

❑ Are load test piers required and shown?

❑ Are single piers tied in two directions with grade or tie beams?

❑ Are single piers, and two pier groups, tied in two directions with grade or tie beams?

❑ Do the dowels from the top of the piers need to create "fixity" with the pier caps or grade beams?

Concrete Piles (Precast):

❑ Does the pile cap design conform to the requirements of the geotechnical evaluation report?

❑ Is the pier capacity noted for each different size pier?

❑ Is a CONCRETE PILE CAP SCHEDULE been shown?
- ❑ Have the "top of pile cap" elevations indicated?
- ❑ Are the pile caps dimensionally located on the plans?
- ❑ Have the required thicknesses been provided?
- ❑ Has the required reinforcing been provided?
- ❑ Has a sufficient number of details been provided?

❑ Is a CONCRETE PILE SCHEDULE used?
- ❑ Are pile sizes provided?
- ❑ Are "top of pile elevations" provided?
  - ❑ Are pile cutoff elevations provided?
- ❑ Are bottom of pier elevations, as least for bidding purposes, provided?
  - ❑ Has the required depth of embedment into bedrock been provided?
- ❑ Has the required pile reinforcing been provided?
  - ❑ Size, quantity and length of longitudinal reinforcing indicated?

- ❑ Are reinforcing bar splices permitted or required? Are they required to be staggered?
- ❑ Have dowel sizes, quantities, lengths, and embedment into pier caps/grade beams above been shown?
  - ❑ If the doweled rebar protruding from the top of the pier required to have hooks, are the hooks compatible with grade beam reinforcing steel?
  - ❑ Do dowel or anchor bolt template details need to be provided?
- ❑ Have tie or spiral tie reinforcing requirements been provided (spacing, lap splice lengths and so forth)?

❑ Has a sufficient number of details been provided?

❑ Are load test piers required and shown?
❑ Are single piers tied in two directions with grade or tie beams?
❑ Are single piers, and two pier groups, tied in two directions with grade or tie beams?
❑ Are piles to be driven and are the driving requirements indicated on plans?
❑ Are specifications for the piles provided (5,000 psi concrete)?
❑ Do the tops of the concrete piles need to be stripped of concrete in order for the dowels from the top of the piles to create "fixity" with pile caps and grade beams?

VII. Floor Framing Plan Documents:

❑ Does the fabricator have enough information to determine the lengths of steel beams and columns?
❑ Have floor thicknesses been clearly indicated and have they been coordinated throughout the structural drawings?
❑ Has the location of vertical force resisting systems been shown (braced frames, moment frames and so forth)?
❑ Have any moment resisting connections been indicated by symbol?
❑ Have the design dead and live loads been itemized and shown on the plans (this helps with coordination and future structural reviews and remodels)?
❑ Have all beam sizes been indicated?
❑ Have all column sizes been indicated (this might only be called out once on the foundation plans)?
❑ Are any FLOOR PLAN NOTES and LEGENDS needed and have they been coordinated?
  - ❑ Provide requirements for steel deck or wood deck and attachment requirements?
  - ❑ Consider truss fabrication notes?
❑ Have all the connections been detailed?
❑ Have all floor details been referenced?
❑ Have all collectors, drag struts and chords been detailed?
  - ❑ Has any reinforcing in masonry or concrete walls used as collectors, drag struts or chords been detailed?
❑ Have any concrete, masonry or wood beams been clearly noted?
❑ Have any concrete, masonry or wood columns been clearly noted?
❑ Has structural framing needed to support suspended or folding partition walls been provided and detailed?
❑ Do the expansion and contraction joints, if any, allow for expansion and contraction?
❑ Clearly delineate structural walls from non-structural walls with symbols or other means?

VIII.Roof Framing Plan Documents:

❑ Does the fabricator have enough information to determine the lengths of steel beams and columns?

- ❑ Have floor thicknesses been clearly indicated and have they been coordinated throughout the structural drawings?
- ❑ Has the location of vertical force resisting systems been shown (braced frames, moment frames and so forth)?
- ❑ Have the design dead and live loads been itemized and shown on the plans (this helps with coordination and future structural reviews and remodels)?
- ❑ Have all beam sizes been indicated?
- ❑ Have all column sizes been indicated (this might only be called out once on the foundation plans)?
- ❑ Are any ROOF PLAN NOTES and LEGENDS needed and have they been coordinated?
  - ❑ Provide requirements for steel deck or wood deck and attachment requirements?
  - ❑ Consider truss fabrication notes?
- ❑ Have all the connections been detailed?
- ❑ Have all the roof details been referenced?
- ❑ Roof drains shown and framed?
- ❑ Has adequate roof drainage been provided to prevent ponding (1/4" per foot minimum)?
- ❑ Have supports for satellite dishes and antennas been provided and detailed?
- ❑ Do parapet walls need to be braced?
  - ❑ Have the code required lateral forces been applied to parapet walls?
- ❑ Have all collectors, drag struts and chords been detailed?
  - ❑ Has any reinforcing in masonry or concrete walls used as collectors, drag struts or chords been detailed?
- ❑ Does the roof structure support hoists, cranes, monorails, signs and so forth that should be indicated on the roof plan?
- ❑ Is the required camber in beams and trusses indicated?
- ❑ Have any concrete, masonry or wood beams been clearly noted?
- ❑ Have any concrete, masonry or wood columns been clearly noted?
- ❑ Has structural framing needed to support suspended or folding partition walls been provided and detailed?
    - ❑ Do the expansion and contraction joints, if any, allow for expansion and contraction?
- ❑ Clearly delineate structural walls from non-structural walls with symbols, line weights or other means?

IX. Concrete:

General:

- ❑ Have the required concrete material properties been clearly noted in the contract documents (required concrete strength, concrete weight, water to cementitious ratio, slump, fly ash, admixtures, corrosion inhibitors and so forth)?
  - ❑ Are the different types of concrete used for different purposes clearly delineated in the contract documents?
  - ❑ Has air entrainment of between 5% and 7% been required where the concrete is subject to freeze thaw conditions?
- ❑ Reinforcing bars:
  - ❑ Has a REINFORCING BAR LAP SPLICE SCHEDULE been included?
  - ❑ Do the indicated reinforcing steel spacings meet code minimums and maximums?
  - ❑ Have the code prescribed minimum amounts of reinforcing steel for beams, slabs and walls been provided?

- ❑ If seismic detailing is required, have the seismic detailing requirements of the code been incorporated (ACI 318 for instance)?
  - ❑ Do lateral force resisting members have hooked and continuous bottom reinforcing?
- ❑ Does the size of columns, beam and walls allow for concrete to flow between reinforcing steel bars?
- ❑ Is the reinforcing steel spacing such that concrete can flow between reinforcing bars and at bar splices (reinforcing steel is doubled at lap splices)?
- ❑ Have reinforcing bar splice details and hooks been detailed (lap splices or mechanical splices)?
- ❑ Has splicing all horizontal bars as though they were top bars been considered?
- ❑ Are minimum concrete clear cover requirements to the reinforcing steel indicated in the contract documents?
  - ❑ Has additional clear cover been provided in areas of soil or weather corrosivity (areas of salt laden air)?
- ❑ Is corrosion resistant reinforcing required (epoxy coated, stainless steel, galvanized and so forth) in areas of soil or weather corrosivity (salt laden air)?
- ❑ Are reinforcing chairs required to be stainless steel, galvanized or plastic tipped in areas of soil or weather corrosivity (areas of salt laden air)?
- ❑ Are stainless steel chairs required for sand blasted or bash hammered concrete?
- ❑ Are specifications for reinforcing steel included in the contract documents?
  - ❑ Grade 40, 60, or A706 if welded?
- ❑ Are additional diagonal bars at corners, wall intersections, openings and re-entrant corners in walls, floors and roof shown?
- ❑ Have adequate reinforcing bar development lengths been provided where needed?
- ❑ Have adequate reinforcing bar hook embedments been provided where hooks are used?
- ❑ Have requirements for layering of reinforcing steel been provided (beams, slabs, walls and so forth)?
  - ❑ Is the required location of reinforcing bars is consistent with the placement of bars at the jobsite?
  - ❑ Are intersecting bars compatible and layered?

- ❑ Have control joints been indicated and detailed (keyed, dowels, roughness and so forth)
- ❑ Have construction joints been indicated and detailed (keyed, dowels, roughness and so forth)?
- ❑ Have construction joints been provided between concrete stairs and the structure to allow for the concrete stairs to be built later?

Concrete Beams, Joists and Girders (Additional Items):

- ❑ If a CONCRETE BEAM/JOIST/GIRDER SCHEDULE is used, have all beams on the framing plans been provided “marks”?
  - ❑ Have the reinforcing steel requirements been provided (size, number, details splices and so forth)?
  - ❑ Have the stirrup reinforcing requirements been provided (size, number, details, spacing and so forth)?
  - ❑ Have the types of required hooks been shown?
- ❑ Avoid hooking both ends of a continuous bar; this creates placing, length and congestion problems?
- ❑ Is the reinforcing in spandrel members properly sized and detailed?
  - ❑ Does the spacing and configuration of the stirrups meet code requirements in spandrel beams resisting torsional forces?
- ❑ Do beam top bars extend beyond beam ends and into suspended slabs where possible?

- ❑ Are corners required to be chamfered?
  - ❑ Are chamfers required to be shown on the structural drawings?
- ❑ Have additional reinforcing bars been added around handrail post sleeves (#3 rebar on each side of handrail sleeves)?
- ❑ For concrete systems, consider vertical punching shear and additive torsional shear due to unbalanced moments?

Concrete Columns (Additional Items):

- ❑ If a CONCRETE COLUMN SCHEDULE is used, have all columns on the framing plans been provided "marks"?
  - ❑ Have the reinforcing steel requirements been provided (size, number, details splices and so forth)?
  - ❑ Have the tie reinforcing requirements been provided (size, number, details, spacing and so forth)?
- ❑ Are additional column ties required at column/beam or column/beam/slab joints?
- ❑ Are ties in columns needed at 6" o.c?
- ❑ Is the required column concrete strengths compactible with the floors/roofs concrete strengths?

Concrete Suspended Slabs (Additional Items):

- ❑ If a CONCRETE SLAB SCHEDULE is used, have all slabs on the framing plans been provided with "marks"?
  - ❑ Have the reinforcing steel requirements been provided (size, number, details splices and so forth)?
  - ❑ Have the types of required hooks been shown?
  - ❑ Is the direction of the primary and secondary reinforcing steel clearly shown?
- ❑ Are re-entrant corners of slab cutouts required to have additional reinforcing?

Concrete Walls (Additional Items):

- ❑ If a CONCRETE WALL SCHEDULE is used, have all walls on framing plans been provided with "marks"?
  - ❑ Have the reinforcing steel requirements been provided (size, number, details splices and so forth)?
    - ❑ Is the scheduled reinforcing shown to be on the correct walls face and correctly layered?
  - ❑ Have the types of required hooks been shown?
- ❑ Are boundary elements at ends of shear walls needed, noted and detailed?
- ❑ Retaining walls:
  - ❑ If the structural engineer is responsible for analysis and design of retaining/site walls but the structural details are located in the site/civil drawings, verify that the details are correct?
  - ❑ If the structural engineer is responsible for analysis and design of retaining/site walls but the structural details are located in the structural drawings, verify that the location, the height and the bearing elevations agree with the structural analysis performed?
  - ❑ Have retaining walls been designed for hydrostatic pressures or are they adequately drained?
    - ❑ Is backfill provided that prevents hydrostatic pressures from accumulating?
    - ❑ Drainage is provided behind the wall with drainage rock and/or geotextile fabric?
    - ❑ Are weep holes shown?
  - ❑ Have details and expansion joint spacing been provided?

- ❑ Have details and construction joint spacing been provided?
- ❑ Have details and control joint spacing been provided?
- ❑ Is the top of the retaining wall unrestrained and allowed to move?
- ❑ Do retaining walls have a safety factor of 1.5 against sliding?

Concrete Post Tensioned Building Structures (Additional Items):

- ❑ If a POST TENSIONED CONCRETE BEAM SCHEDULE is used, have all beams on the framing plans been provided with "marks"?
  - ❑ Have the reinforcing steel requirements been provided (tendon forces, size, number, details splices and so forth)?
  - ❑ Have the correct center of gravity dimensions to the tendons been provided?
  - ❑ Have non-typical center of gravity dimensions to the tendons been provided for unique span situations?
- ❑ Have the concrete columns been designed for all loadings; vertical (gravity), lateral and post tensioning loads?
- ❑ Have the plan notes and details been coordinated with the beam tendons and banded tendon requirements?
- ❑ Have construction joint locations been coordinated with the contractor?
  - ❑ Have these locations been shown and detailed on the framing plans?
  - ❑ Are tendon anchorage locations provided and coordinated with the construction joint locations?
- ❑ If required, have pour back strips been provided and detailed?
- ❑ Has the additional reinforcing steel required by code been provided has it been coordinated with the schedules and details?
- ❑ Have all slab to concrete wall connections been correctly designated and correctly detailed as "slip connections", or "locked in connections"?
- ❑ Has 5,000 psi concrete, minimum, been required?

Concrete Post Tensioned Parking Structures (Addition Items):

- ❑ Have vehicle barrier walls been provided and detailed?
- ❑ Have expansion joints for vehicle barrier walls been coordinated with the architectural plans?
- ❑ Have reveals in the concrete formwork been coordinated with the architectural plans?
- ❑ Have additives been required to protect the reinforcing steel?
- ❑ Has reinforcing steel been epoxy coated?
- ❑ Has 5,000 psi concrete, minimum, been required?

Concrete Slab on Grade (Interior):

- ❑ Slab on grade:
  - ❑ Are the slab on grade floor thicknesses and elevations shown?
  - ❑ Is reinforcing required (reinforcing bars, welded wire fabric and so forth)?
    - ❑ Have reinforcing sizes, spacings and location requirements been provided?
    - ❑ Required support for fabric or rebar indicated?
  - ❑ Are control joints shown and detailed correctly?
    - ❑ Have the spacing of control and construction joints been indicated?
    - ❑ Has the type of control joint (weakened plane, keyed, thickened edge, greased dowel) and construction joint (greased dowels) been indicated?
    - ❑ Do not use control joints in meetinghouse type projects. Use a 4" thick slab and reinforce it with #4 at 18" o.c. each way with 1" clear to the top of the slab.
    - ❑ Has the requirement that saw cut control joints be installed as early as possible?

- ❑ Is a thickened slab on grade provided under heavy line loads (masonry walls and so forth)?
- ❑ Are depressed slabs, recesses, slopes, drains and miscellaneous openings shown?
- ❑ Are curbs, housekeeping pads shown on structural plans?
- ❑ Are expansion joints used?
  - ❑ Are perimeter felt joints or premolded joint fillers required adjacent to foundation walls or existing construction and have they been correctly located, indicated and detailed?
  - ❑ Are slabs tied (not tied) to the foundation walls or existing construction without (with) expansion joints?
  - ❑ Has expansion joint material been used around steel columns or slab blockouts?
- ❑ Have the finish requirements been indicated (troweled)?
- ❑ Have the required floor flatness and levelness requirements been provided?
- ❑ Has a 15 mil vapor retarder been placed immediately beneath the concrete slab (take measures to prevent curling of the concrete slab by using frequent control joints, reinforcing, additives and so forth)?
  - ❑ Is the vapor retarder to be shown on the structural drawings or just the architectural drawings?
- ❑ Is the aggregate base course (gravel capillary break) and thickness indicated?

Concrete Tilt Up Wall Panels (Precast Concrete Wall Panels):

- ❑ Are the panels being designed by others and have performance requirements and specifications been provided?
  - ❑ Are drawings being provided with the engineer seal of the specialty fabricator?
- ❑ Have the locations of gridlines been carefully coordinated with the architectural drawings?
- ❑ Has the height to thickness ratio for single reinforced tilt up wall panels been limited to about 50?
- ❑ Has the height to thickness ratio for wall panels with reinforcing in both faced been limited to about 65?
  - ❑ If the panels have reinforcing in both faces, has this been carefully scheduled and coordinated with the locations of reveals and rustication features?
- ❑ Are the vertical (gravity) and lateral load paths complete and detailed?
  - ❑ Wall panel reveals are indicated and have been taken into account during design?
- ❑ If a CONCRETE TILT UP WALL PANEL SCHEDULE is used, have all wall panels on the framing plans been provided “marks”?
  - ❑ Has it been coordinated with the architectural plans
  - ❑ Have the reinforcing steel requirements been provided (size, number, details splices and so forth)?
  - ❑ Have wall columns been defined (longitudinal bars and ties)?
    - ❑ Have the available wall panel jamb widths been crosschecked with the scheduled wall panel jamb widths?
  - ❑ Has beam reinforcing and stirrups been?
    - ❑ Consider using a typical 30” deep lintel for simplicity?
  - ❑ Panel thicknesses are indicated?
    - ❑ Are the thicknesses of the panels set to match those of “dimensional lumber”?
    - ❑ Are the thicknesses indicated on the framing plans?
- ❑ Panels are braced into the floors/roof diaphragms?
  - ❑ Are braces at floors/roof indicated on the framing plans and have they been detailed?

- ❑ Are the steel columns around the perimeter detailed such that 1" of clear cover has been provided between the steel column and the wall panels?
- ❑ Do the elevations (floor, roof, etc.) on the panel elevations match those indicated on the framing plans?

Post Installed Anchors (Epoxy Bolts, Screw Anchors, Wedge Anchors and So Forth):

- ❑ Are ICC reports required?
- ❑ Do post-installed anchors conform to the requirements of the code (Appendix D in ACI 318)?
- ❑ Are the required diameters, embedments, minimum edge distances and minimum spacings indicated?
- ❑ Do the post-installed anchors suit the type of construction being used and the fire ratings required?

X. Masonry:

General:

- ❑ Is CMU block grade N, lightweight or normal weight if exposed to weather required?
- ❑ Is the value of f'm specified?
- ❑ Are the required material and strength properties of grout and mortar indicated?
  - ❑ Use type M mortar below grade, otherwise type S?
  - ❑ Grout 3/8" max aggregate size, f 'c of 2000 psi, 8 to 10" slump?
- ❑ Has the bond pattern been specified (running bond or stack bond)?
  - ❑ Does the code used require that the allowable strength values for masonry be decreased if stack bond is used?
- ❑ Has the type of mortar joints been specified (concave joints are more durable than raked joints)
- ❑ Define which cells are to be grouted (cells with reinforcing only or all cells)?
- ❑ Reinforcing bars:
  - ❑ Has a REINFORCING BAR LAP SPLICE SCHEDULE been included?
  - ❑ Do the reinforcing steel spacings meet code minimums and maximums?
  - ❑ Have the code prescribed minimum amounts of reinforcing steel for columns, beams and walls been provided?
  - ❑ If seismic detailing is required, have the seismic detailing requirements of the code been incorporated?
    - ❑ Do lateral force resisting members have hooked and continuous bottom reinforcing?
  - ❑ Does the size of columns, beams and walls allow grout to flow between reinforcing steel bars?
  - ❑ Is the reinforcing steel spacing such that concrete can flow between reinforcing bars and at bar splices (reinforcing steel is doubled at lap splices)?
    - ❑ Masonry columns often have more reinforcing at splices than allowed by code and grout is unable to flow through and around the bars?
  - ❑ Have reinforcing bar splice details and hooks been detailed (lap splices or mechanical splices)?
  - ❑ Are minimum clear cover requirements to the reinforcing steel indicated in the contract documents?
    - ❑ Has additional clear cover been provided in areas of soil or weather corrosivity (areas of salt laden air)?
  - ❑ Is corrosion resistant reinforcing required (epoxy coated, stainless steel, galvanized and so forth) in areas of soil or weather corrosivity (salt laden air)?
  - ❑ Are specifications for reinforcing steel included in the contract documents?

- ❑ Grade 40, 60, or A706 if welded?
- ❑ Have adequate reinforcing bar development lengths been provided where needed?
- ❑ Have adequate reinforcing bar hook embedments been provided where hooks are used?
- ❑ Is the required location of reinforcing bars is consistent with the placement of bars at the jobsite?
- ❑ Are intersecting bars compatible and layered?
- ❑ Has additional reinforcing been provided at wall corners, wall intersections, door openings, window openings (extend horizontal reinforcing 24" minimum beyond openings) and below beam bearings?
- ❑ Have dimensions to the reinforcing steel (or centerline of reinforcing steel) been provided?

❑ Have details of for "nonstandard construction" (bond beam intersections, etc) been included?
❑ Are anchors for floor/roof joists, beams, etc properly located and detailed?
❑ Is the lateral chord for the diaphragms, using the reinforcing steel within the bond beams of the masonry, designed and detailed?
❑ Are the steel columns around the perimeter detailed such that 1" of clear cover has been provided between the steel columns and the masonry walls?
❑ Are vertical expansion joints to be shown on the structural framing plans?
- ❑ Have they been detailed?

❑ Is bond beam reinforcing continuous through vertical expansion joints?
❑ Consider extending all horizontal reinforcing through vertical expansion control joints (space horizontal bars at 24" o.c. for this)?
❑ Are vertical expansion joints placed beyond lintel bearings?
❑ With brick veneer, have required brick anchors and spacings been provided?
- ❑ Are they shown on the architectural plans or the structural plans?
- ❑ Have the correct masonry ties been used to distinguish between a cavity and a veneer wall?

❑ Are steel angle lintels required to support brick veneer over openings?
- ❑ Is a STEEL ANGLE LINTEL SCHEDULE needed?
- ❑ Should the steel angle be galvanized or is paint adequate?
- ❑ Are they properly located and do they extend far enough beyond the openings?

Masonry Beams/Lintels:

❑ If a MASONRY BEAM SCHEDULE is used, have all beams on the framing plans been provided "marks"?
- ❑ Have the reinforcing steel requirements been provided (size, number, details splices and so forth)?
- ❑ Have the stirrup reinforcing requirements been provided (size, number, details, spacing and so forth)?
- ❑ Have the types of required hooks been shown?

❑ Have lintels used at all openings?
- ❑ Have the elevations at the bottom of masonry beams been provided?

Masonry Columns:

❑ If a MASONRY COLUMN SCHEDULE is used, have all columns on the framing plans been provided "marks"?
- ❑ Have the reinforcing steel requirements been provided (size, number, details splices and so forth)?
- ❑ Have the tie reinforcing requirements been provided (size, number, details, spacing and so forth)?

- ❑ Verify that at lapped splices that the amount of vertical reinforcing steel does not exceed that allowed by code?

Masonry Walls:

- ❑ If a MASONRY WALL SCHEDULE is used, have all walls on framing plans been provided with "marks"?
  - ❑ Have the thicknesses of the walls been provided?
  - ❑ Have the reinforcing steel requirements been provided (size, number, spacing, details, splices and so forth)?
    - ❑ Is joint reinforcing steel used in lieu of horizontal bond beam reinforcing? Has the size, type and spacing been indicated?
  - ❑ Have the types of required hooks been shown?
- ❑ Are boundary elements at ends of shear walls needed, noted and detailed?
- ❑ Do hollow block cells with rebar measure at least 2" x 2"?
- ❑ Are cells required to be filled with grout rather than mortar?

XI. Steel:

General:

- ❑ Have edge of floor/roof conditions and edge angles been defined, detailed and coordinated with the architectural drawings?
- ❑ Has framing for roof screens, wall columns and braces been provided and detailed?
- ❑ Have structural work points been defined?
- ❑ Are member forces, axial loads and end reactions shown for connections that are to be designed and detailed by a specialty fabricator?
  - ❑ If a specialty fabricator is to design the connections, provide a performance specification defining its scope and responsibility?
  - ❑ Will an engineer's seal be required?
- ❑ Have structural steel connections to concrete or masonry been analyzed, designed and detailed?
  - ❑ Have horizontal bolt holes been used to facilitate construction?
- ❑ Are purlin and girder connections shown?
  - ❑ Do the purlins and girders connections prevent purling overturning on sloped roofs/side walls?
- ❑ Are vertical openings "trimmed" to resist lateral loads?
- ❑ Have steel tube columns been slotted for shear plates or a less costly shear tab or framing angles?
- ❑ Have complicated connections been adequately detailed on the plans?

Steel Base Plates (Additional Items):

- ❑ Have the elevations for the bottom of base plates been shown?
- ❑ Have the thicknesses of the base plates been analytically determined?
- ❑ Are the base plate sizes, thicknesses, orientations and connections to the columns above clearly shown?
- ❑ Have required non-shrink grout properties and thicknesses been provided?
- ❑ Have "relief holes" for large baseplates been provided?
- ❑ Have the base plates been welded to the columns (avoid fillet welds in tension for high seismic loads in critical locations)?
- ❑ Anchor bolts:

- ❑ Are the number, sizes, lengths, embedments, projections, threads, minimum edge distances and layout of anchor bolts provided (use a minimum of 4 bolts for erection safety)?
- ❑ Have the allowable hole sizes in the base plates for anchor bolts been provided?
- ❑ Are the anchor bolt diameters the right size (3/4" minimum diameter for columns up to about 70 pounds, 1.1/4" minimum diameter for larger columns)?

Steel Beams (Additional Items):

- ❑ Have all beam sizes been indicated on the framing plans?
- ❑ Have beam web stiffeners been required for handrail posts?
- ❑ Is the orientation of the beams clear?
- ❑ Are the required connections provided?
- ❑ Are splice details provided, if needed?
- ❑ Is the required camber provided; if any?

Composite Steel Beams:

- ❑ Headed Steel Stud Anchors:
  - ❑ Have the size, length and spacing (or number) of the steel studs been indicated?
  - ❑ Has the required method for attaching the steel studs to the beams been provided?
  - ❑ Do the steel studs extend 2" above the composite steel deck after welding?
  - ❑ Have steel stud lengths been coordinated with any slab recesses?
  - ❑ Are the flanges of the beams thick enough for the diameter of the steel stud selected?
- ❑ Camber:
  - ❑ Has the required camber been noted?
  - ❑ Is the camber specified at least ¾" (use larger beam without camber for beams needing less than ¾" camber)?
  - ❑ Do not camber both beams and girders?
  - ❑ Do not camber spandrels?
  - ❑ Is the floor to be "placed level" or placed per the "beam camber"?

Steel Braces (Additional Items):

- ❑ Have all brace sizes been indicated on the framing plans?
- ❑ Is the orientation of the braces clear?
  - ❑ Has the gap between double angles been provided? Have stitch plates requirements been provided?
- ❑ Have the connections been analyzed and accurately detailed?
- ❑ Have splice details, if needed, been provided?
- ❑ Verify that the locations of the braces do not conflict with windows, louvers etc?

Steel - Cold Formed (Additional Items):

- ❑ Have all cold formed members been indicated on the framing plans?
  - ❑ Have the required gauges, sizes, section properties and grades been provided?
  - ❑ Is showing these members the responsibility of the structural engineer or the architect?
- ❑ Have required weld lengths, screw sizes and screw quantities been provided?
  - ❑ Have anchorage details been provided (expansion anchors, bolts, screws and so forth)?
- ❑ Are punched webs acceptable? Are stiffened flanges needed?
- ❑ Have bridging (walls and roof/floors) requirements been provided?
- ❑ Have diagonal strap bracing locations and details been provided (braced walls)?

- ❑ Have sheathing and sheathing attachment requirements been provided (shear walls)?
- ❑ Anchorage details provided (expansion anchors, screws, etc)?

Steel Columns:

- ❑ If a STEEL COLUMN SCHEDULE is used, have all columns on the framing plans been provided "marks"?
  - ❑ Have all column sizes been indicated?
  - ❑ Have the required steel grades been indicated?
  - ❑ Are any surfaces required to be milled?
  - ❑ Have base plate and cap details been provided?
  - ❑ Are any splice elevations shown and have they been detailed?
- ❑ Have top of column elevations provided on the structural plans (unless they are shown architecturally and won't be shown on the structural plans)?

Steel Connections:

- ❑ Will a STEEL BOLT CONNECTION SCHEDULE be used?
  - ❑ Have the size and number of bolts been specified?
  - ❑ Have the required type of bolts been indicated (A325N, A325SC, S307 and so forth)?
    - ❑ Are bolt threads allowed in the shear plane?
  - ❑ Is it clear whether the bolts are "slip critical (friction)" or not? Are the bolts in "bearing"?
    - ❑ Faying surfaces for "slip critical (friction) bolts noted to not be shop painted?
  - ❑ Have sufficient wrench clearances (installation clearances) been provided?
  - ❑ Have allowances for steel member "K fillets" and coping been provided?
  - ❑ Have the types of holes in the structural members been defined (STD, OVS, short or long slots and orientation of slot)?
  - ❑ Are bolts to be installed as "snug tight", fully pretensioned or slip critical?
- ❑ Welds:
  - ❑ Have all weld sizes, lengths, symbols, types, electrodes and procedures been provided?
  - ❑ Have code prescribed minimum weld sizes been provided?
- ❑ Have economical framing connections been used?
- ❑ Have require inspection and testing requirements been incorporated into the contract documents?

Steel Decking:

General:

- ❑ Has the required steel deck gage, configuration and depth been shown on the contract documents?
- ❑ Has the required steel deck structural properties been shown and coordinated with the contract documents?
- ❑ Is the deck finish indicated? Does it need to be galvanized for corrosion protection (usually G-60 is provided)?
- ❑ Has the deck attachment to the structure requirements been provided? Have the side lap connections been provided (deck panel to deck panel)?
- ❑ If deck bearing elevations (or top of slab, or top of beams) are being shown, have they been double-checked with the architectural drawings?
- ❑ Is decking required to be continuous to achieve required design capacity?
- ❑ Has deck support been shown and detailed around deck openings?
- ❑ Are laps adequate? Consider a 6" laps for "B" deck?
- ❑ Detail connections in load path from diaphragm to vertical shear resisting elements?

- ❑ Does the deck have the needed lateral shear capacity for lateral forces?

Floor Deck:

- ❑ Is deck noted to be "composite steel deck" if supporting concrete?
- ❑ Where steel columns extend through the floor, has support for the steel deck been provided?
- ❑ Is a continuous edge angle provided at the perimeter of the deck? Are deformed bar anchors from the angle into the concrete needed?
- ❑ Are sheet metal pour stops or end dams, detailed or required by plan notes?
- ❑ Is the deck to be "vented"?
- ❑ Is deck to be provided with "tabs" from which ceiling systems can be suspended?

Steel Embed Plates:

- ❑ Have the sizes and thicknesses of the embed plates been detailed?
  - ❑ Have the locations, diameters, number and configuration of steel studs been provided?
  - ❑ Were the plate thicknesses determined analytically?
  - ❑ Were the number and orientation of steel studs determined analytically?
- ❑ Has adequate room or "relief holes" to allow concrete to flow under horizontal plates been provided?
- ❑ Have steel stud properties been specified?
- ❑ Are the steel stud locations compatible with reinforcing in the supporting concrete or masonry?

Steel Open Web Joists and Girders:

- ❑ Is the type of bridging and spacing indicated? Has uplift bridging been shown?
  - ❑ Is the bridging design to be by the fabricator?
  - ❑ Provide two bays of "x" bridging when bridging is discontinuous?
- ❑ Are the connections of the members to the building and to each other detailed (bolts, welds)?
- ❑ Is the size and the spacing of the joists clearly shown?
- ❑ Is the depth of the bearing ends noted?
- ❑ Does the depth of the ends of the members required by the framing plans match the depth shown in the details?
- ❑ If bearing walls are skewed, have the joist bearing angle lengths been increased?
- ❑ Are design loads indicated with the member designation to decrease costs (live loads/total loads)?
- ❑ Are mechanical units/roof drains/misc. openings shown with correct detail references?
- ❑ Are the design loads shown for any cantilevered ends?
- ❑ Are the allowable deflections of joists/girders shown on the framing plans?
- ❑ Has the finish been specified (paint (primer/none), galvanizing)?
- ❑ Are joists/girders being used as chords/drag struts and have the details been checked for correct information and weld requirements?
  - ❑ Have the chord/drag strut loads been indicated?
  - ❑ Is steel blocking needed to collect lateral force from the roof and deliver them to the girders?
  - ❑ If joists/girders are part of a moment resisting steel frame lateral force resisting system, have the minimum allowable section modulus and moment of inertia been provided?
- ❑ Have additional or strengthened joists been used over any fire riser rooms to carry large pipes?
- ❑ If deck bearing elevations are being shown, have they been double-checked with the architectural drawings?
  - ❑ Has a brief review shown that the roof slopes are at least ¼" per foot?

- ❑ At sloped surfaces, are joists "tilted" or "vertically aligned" with a cap?
- ❑ Have bolted connections been required at column locations (OSHA requirement)?
  - ❑ Are joists that are over 40' long bolted to the girders?
- ❑ Have stabilizer plates been provided for joists and girders at columns?
  - ❑ Do not weld the joist or girder bottom chord to the stabilizer plates?
- ❑ Are bottom chord ceiling extensions needed?
- ❑ Are special connection details shown for joist to column flange or webs?
- ❑ Is bottom flange bracing of any continuous steel beams provided by extending joist bottom chords?
- ❑ Is the span to depth ratio for joists and girders greater than 24?

Steel Prefabricated Metal Building:

- ❑ Has a performance specification for the prefabricated metal building been provided?
- ❑ Are the prefabricated metal building drawings required to be sealed by the supplier?
- ❑ Are the foundation drawings for the prefabricated metal building to be sealed by the project structural engineer?
  - ❑ Have the responsibilities of the structural engineer and the prefabricated metal building supplier been defined?
  - ❑ Is the erection of the prefabricated metal building to be overseen by the structural engineer or by the prefabricated metal building supplier?
- ❑ Has design criteria been provided on the structural plans for the prefabricated metal building supplier to follow (allowable lateral load deflections, allowable gravity load deflections, minimum dead and live loads and so forth)?
- ❑ Is the prefabricated metal building required to be designed for unusual dead loads such as ventilation equipment, sprinkler system piping, ceilings, cranes and so forth? Are these loads noted on the structural plans?
- ❑ Has a note been included stating that foundations for prefabricated buildings are not to be placed until the prefabricated metal building shop drawings with design loads and anchor bolt sizes and arrangement have been submitted and reviewed?
  - ❑ Are the required depths of the anchor bolts indicated (the prefabricator is responsible for the size, number, material, location and layout of bolts)?
  - ❑ Consider showing the prefabricated metal building reactions on the structural plans?
- ❑ Are footing sizes and top of footing elevations noted?
  - ❑ Are footings, foundation walls and concrete pier requirements noted? Have top of wall and pier elevations been provided?
  - ❑ Is the top of concrete elevations on which the columns bear clearly understood? Is it on top of the footings, on top of piers and so forth? This information should be coordinated at the front end of the project and then double checked with the prefabricated metal building supplier's drawings?
- ❑ Is this a "pass by" framing system or an "infill framing system" (is this a "conventional prefabricated system" or a "standard prefabricated system")?
  - ❑ Do structural details match the type of system being used?
- ❑ Is the relationship between the anchor bolts/steel columns and the exterior walls clearly understood. Has showing the dimensions and bolt layouts from the prefabricator's drawings on the structural drawings been considered?
- ❑ Is grout being placed under the base plates? This needs to be clearly understood and correctly detailed on the structural drawings? Many prefabricators prefer to not use grout.
- ❑ Is the prefabricator responsible for miscellaneous vestibules, overhangs, canopies and so forth or is the structural engineer responsible for this miscellaneous work?

- ❑ Have the outward thrusts of the prefabricated metal building columns been addressed by using hairpins, ties, oversized footings and so forth? Has the resolution of these thrust forces been clearly detailed?
- ❑ Have concrete slabs on grade been shown and have control and construction joints been shown and detailed? Is the concrete slab reinforced or unreinforced?
- ❑ Have the structural plans been checked and coordinated with the architectural and prefabricated metal building plans?

Steel Trusses:

- ❑ Consider truss fabrication notes?
- ❑ Are gusset plate thicknesses provided? Do welds conform to AWS standards?
- ❑ Are force diagrams provided if trusses to be detailed by a fabricator?
- ❑ Are member to member connection details provided?
- ❑ Are truss to structure details provided?

XII. Wood:

- ❑ If a WOOD BEAM SCHEDULE is used, have all beams on the framing plans been provided "marks"?
  - ❑ Have supporting columns been defined?
  - ❑ Have king and bearing studs been defined?
  - ❑ Have beam to column connection requirements been provided?
- ❑ If a WOOD COLUMN SCHEDULE is used, have all columns on the framing plans been provided "marks"?
  - ❑ Have beam to column connection requirements been provided?
- ❑ If a WOOD WALL SCHEDULE is used, have all walls on the framing plans been provided "marks"?
  - ❑ Have the stud sizes and spacings been indicated?
  - ❑ Are wood sheathing edges solid blocked? Are blocking requirements provided?
  - ❑ Have nail size and embedment depth requirements been provided?
  - ❑ Have edge and in-field nailing requirements been provided?
  - ❑ Have thicker studs been used where nail spacing is dense?
  - ❑ Have the number of top plates been indicated? Have splices been designed to transfer drag and chord forces?
  - ❑ Have sill plates, anchor bolt diameters, lengths and spacings been provided?
  - ❑ Have hold down sizes, bolts, embedments and post sizes all been indicated?
  - ❑ Are structural walls differentiated from nonstructural walls?
  - ❑ Do span to width ratios of vertical shear walls conform to code?
- ❑ If a WOOD HOLD DOWN SCHEDULE is used, have all hold downs on the framing plans been provided "marks"?
- ❑ If a WOOD SHEATHING ATTACHMENT SCHEDULE is used, has wood sheathing on the framing plans been provided a "mark"?
  - ❑ Has the wood sheathing (roof, floor, shearwall) thicknesses, grades, span ratings, exposure requirements, finishes, whether it is tongue and groove, whether it is blocked/unblocked, what the nailing pattern is, been provided?
  - ❑ Are wood sheathing edges solid blocked? Are blocking requirements provided?
  - ❑ Have nail size and embedment depth requirements been provided?
  - ❑ Have edge and in-field nailing requirements been provided?
  - ❑ Is wood sheathing required to be glued and nailed to floor joists (adhesive AFG-01)?

- ❑ Has a FRAMING NAILING REQUIREMENTS SCHEDULE used for miscellaneous nailing requirements been included (stud to plate, joists to top plates, plate laps and so forth)?
- ❑ Are nails required to be common or box nails?
  - ❑ Codes are often based on the use of common nails which are larger in diameter than box nails. However, box nails are commonly used in nail guns.
  - ❑ Are nails called out to be galvanized if used at the exterior?
  - ❑ Are nails required to have special finishes when installed in treated wood?
  - ❑ Nails are not subject to pullout or withdrawal?
  - ❑ Are nails required to be long enough to provide code required nail penetration?
- ❑ Are the wood groups (species) and stress grades of lumber adequately defined for visually graded lumber?
- ❑ Is the modulus and stress grades of lumber adequately defined for machine stress rated (MSR) lumber?
- ❑ Have the framing material and grades (DF#2, SP #2, and SPF #2) required for joists, rafters, studs, beams, columns, sills, all been indicated?
- ❑ Have wood piles been treated with wood piling preservation treatment?
- ❑ Are wood plates in contact with concrete preservative treated or redwood?
- ❑ Does wood detailing prevent cross grain tension or bending stresses?
- ❑ Do the details accurately reflect the architectural finishes (if shown)?
- ❑ Have the required lateral bracing, blocking, and bridging been shown and detailed?
- ❑ Have joists been blocked at bearings to prevent warping and overturning?
- ❑ Have needed wood framing connection details been provided?
- ❑ Is framing hardware prefabricated and are their designations provided?
- ❑ Is there a note requiring all holes in framing hardware be filled with nails or bolts?
- ❑ Are connections using through bolts and lag bolts detailed?
- ❑ Are bolt sizes and types clearly indicated and provided with large washers to avoid wood crushing?
  - ❑ Have minimum edge and end distances for bolts been provided (4d for compression and 7d for tension)?
- ❑ Are top of plate, deck bearing and joist bearing elevations indicated?
- ❑ Have the connections for the vertical (gravity) and lateral load paths from the horizontal diaphragms to the vertical shear resisting elements been provided?
- ❑ Do span to width ratios of horizontal diaphragms conform to code?
  - ❑ Have the diaphragms been designed”
  - ❑ Have large diaphragm openings been detailed?
  - ❑ Have the diaphragm chords and drag struts been noted and detailed?
  - ❑ Have sub diaphragms with cross ties for support of concrete walls or masonry walls been designed and detailed?
- ❑ Are dimensions used to locate wood elements clearly understood?
- ❑ Has vertical wood shrinkage been considered?
- ❑ Has support and blocking to support nonstructural walls parallel to floor joists been provided and detailed?
- ❑ Have the roof mechanical units been shown and have additional joists been placed beneath them?
- ❑ Are any wood parapets structurally stable?
- ❑ Are the foundation walls the correct thickness for the overall system being used? Verify with the architectural details?
- ❑ Has blocking been called out at ridges, hips and valleys?

XIII. Wood – Manufactured Wood Products:

- ❑ Has the floor stiffness, vibration and vibration perceptibility been reviewed?
  - ❑ Are the live load deflections limited to L/480?
  - ❑ Have the hanger types, size and nail quantities and requirements for web stiffeners been noted?
- ❑ Have the required allowable Fb, E, Wet-use values and so forth been noted?
- ❑ Are glulam beams to be cambered…or not?
- ❑ Are adequate nailer thicknesses provided for top mounted hangers?
- ❑ Prefabricated Wood Trusses:
  - ❑ Have performance specifications been provided?
  - ❑ Are trusses required to comply with the Truss Plate Institute Standards?
  - ❑ Are bridging and bridging connection requirements the responsibility of the prefabricator?
  - ❑ Have design loads been provided on the framing plans?
  - ❑ Has a deflection criteria been provided?
  - ❑ Has a roof slope and ceiling profile been provided (refer to architectural drawings)?
  - ❑ Has the bearing type, bearing dimensions, and cantilever/overhang dimensions been provided?
  - ❑ Are structural walls delineated from nonstructural walls on the framing plans?
  - ❑ Have hurricane anchors at truss ends been provided?
  - ❑ Show sheathing on valley trusses and below “California Framing” or “overbuilds”?
  - ❑ Are the forces at the termination of truss bracing adequately resisted?

XIV. Final Items to Consider:

- ❑ Provide general structural notes and design criteria (codes, standards, design loads, design material stresses)?
- ❑ Consider the following schedules?
  - ❑ Beam or joist?
  - ❑ Column (including cap and base plates)?
  - ❑ Materials?
  - ❑ Wall (Concrete, shear, bearing, retaining)?
  - ❑ Lintel (Concrete, masonry, steel)?
  - ❑ Footing?
  - ❑ Bar Bending?
  - ❑ Concrete Slab?
  - ❑ Roof Diaphragm Schedule?
  - ❑ And so forth?
- ❑ Check proper scale, north reference, adequate cross reference, dimensions, dates, etc?
- ❑ Cross-check all related details when changes occur?
- ❑ Special considerations?
  - ❑ Expansion and contraction of total structure?
  - ❑ Testing and Inspections where required?
  - ❑ Notes on shoring and bracing?
  - ❑ Notes on special construction sequence?
  - ❑ Check final location of mechanical units
  - ❑ Adequate development length and tensile anchorage
  - ❑ Prestressed concrete (indicate design loads). Check lateral shear and elastic shortening?
- ❑ Coordinate with the Architect:
  - ❑ Prepare final cost estimate if required

- ❑ Ensure specifications include allowance for welding, soil and concrete inspection and testing?
- ❑ Ensure floor live load signs are posted in commercial and industrial buildings?

❑ Drawings and specifications should note the geotechnical evaluation report requirements?
❑ Drawings should show all primary structural elements (foundations, suspended floor slabs, columns, walls, beams, trusses and so forth)?
❑ Structural layout has been coordinated with the architectural drawings?
❑ Details for structural connections and attachments have been provided?
❑ Vertical (gravity) and lateral load paths are defined and detailed?
❑ Attachment and anchorage of masonry or concrete to the structure is complete?
❑ Observation, testing, and inspection requirements are noted in the structural drawings or in the specifications?
❑ Reinforcement to meet design and code requirements has been provided in masonry and concrete structural elements?
❑ Details for architectural and ancillary structures (steeple, folding partition supports, equipment anchorage, fence, storage building, pavilions, etc.) have been provided?
❑ The information on the structural drawings has been coordinated with the specifications.