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For instruction and other information, read the master plan check list attached.

References:

- 9 LABC - 2011 City of Los Angeles Building Code, Jan 2011
- 9 AISC 341 - The AISC Seismic Provisions for Structural Steel Buildings, March 9, 2005 with Supplemental No.1 Nov 16, 2005, published by the American Institute of Steel Construction
- 9 AISC 360 - Specification for Structural Steel Buildings, Mar 9, 2005
- 9 P/BC 2008-098 - Information Bulletin P/BC 2008-098 for Structural Design Requirements for Steel Moment Frame Connections
- 9 FEMA 350 - Recommended Seismic Design Criteria for New Steel Moment Frame Buildings, July 2000 by Federal Emergency Management Agency
- 9 AWS D1.1 - The Structural Welding Code-Steel AWS D1.1/D1.1M:2008 by American Welding Society
- 9 AWS D1.8 - Structural Welding Code-Seismic Supplement AWS D1.8/D1.8M:2009 by American Welding Society
- 9 ASCE 7 - The Minimum Design Loads for Buildings and other structures ASCE 7-05 by American Society of Civil Engineers. Including Supplemental No.1 and 2, excluding Chapter 14 and Appendix 11A
- 9 ACI 318 - Building Code Requirements for Structural Concrete ACI 318-08 by American Concrete Institute

Obtain the following Information Bulletins, Affidavits or Forms from our web site (www.ladbs.org)

A. GENERAL

- ' Refer to Information Bulletin P/BC 2008-098 "Structural Design Requirements for Steel Moment Frame Connections" for qualification requirements and limitations of steel moment frame connections.
- ' Structural design drawings and specifications shall show the work to be performed, and include items required by the AISC 341 and the following, as applicable:
 - AISC 341 PART I - 5.1, LABC 2204.1.1*
 - ' Designation of the seismic load resisting system (SLRS).
 - ' Designation of the members and connections that are part of the SLRS.
 - ' Configuration of the connections.

- ' Connection material specifications and sizes.
- ' Locations of demand critical welds.
- ' Locations and dimensions of protected zones.
- ' Welding requirements as specified in AISC 341 Part I - Appendix W, Section W2.1. and LABC 2204.1.1
- ' Structural design drawings and specifications shall include, as a minimum, the following information: *AISC 341 PART I - APPENDIX W W2.1*
 - ' Locations where backup bars are required to be removed.
 - ' Locations where supplemental fillet welds are required when backing is permitted to remain.
 - ' Locations where fillet welds are used to reinforce groove welds or to improve connection geometry.
 - ' Locations where weld tabs are required to be removed.
 - ' Splice locations where tapered transitions are required.
 - ' The shape of weld access holes, if a special shape is required.
 - ' Joints or groups of joints in which a specific assembly order, welding sequence, welding technique, or other special precautions are required.
- ' Clearly identify in the structural calculation and structural plan what type of steel moment frame system the building is designed for.
- ' The R value used for design of the steel moment frame system shall not be greater than the least R value of any different structural systems used in the building in the same direction of resistance. Deflection amplification factor, C_d , and the system over strength factor Ω_o in the direction under consideration at any story shall not be less than the largest value of this factor for the R factor used in the same direction that is being considered. *ASCE 7 12.2.3.2*
- ' **NOTES TO PLANS:**
 - ' All of the minimum specifications, tables, and notes from the “LADBS Standard Quality Assurance Plan for Steel Moment Frames” shall be attached to OR made part of the structural plans. This can be obtained at http://ladbs.org/faq/steel_moment_std_plans.htm. *P/BC 2008-098 Part D*
 - ' Identify prominently on the plan the type of Lateral Force Resisting System the building is designed for. Note to plan “The Lateral Force Resisting System for this building is a (Special Moment Frame) (Intermediate Moment Frame) (Ordinary Moment Frame).”

- ' Provide on plan both continuous and periodic special inspections for steel elements of buildings and structures as required by LABC Section 1704.3 and Table 1704.3
- ' Structural Observation per Section 1709 is required for this project. The engineer of record shall prepare an observation program, including the name(s) of the individuals or firms who will perform the work. The observation program shall be shown on the first sheet of the structural plans.
- ' Provide the following Structural Observation Checklist in addition to the structural observations that may be required on the structural plan;
 - ' Orientation and placement of connected components
 - ' Removal of backing bars, as required
 - ' Placement of reinforcing fillets, as required
 - ' Presence of continuity plates, as required
 - ' Welding of continuity plates, as required
 - ' Presence and type of doubler plates, as required
 - ' Welding of doubling plates, as required
 - ' Configuration and finish of access holes
 - ' Placement of beam stiffeners, as required
 - ' Contour and finish of RBS profile, if applicable
 - ' Placement of welds for web connection, as required
 - ' Type and placement of bolts
 - ' Inaccessible conditions
- ' For buildings over 160 feet in height with structural steel moment-resisting frames, comply with LABC 1707.2. Continuous special inspection is required for structural welding in accordance with AISC 341 and during fabrication and erection of building, The engineer responsible for structural design *and* general contractor shall submit a statement in writing to the Department stating that they know from personal knowledge that the material installed and structural work performed is in compliance with the approved plan, specifications and change orders. *LABC 1707.1, 1707.2, 1707.2.1*
- ' **Material Specifications**
 - ' The structural steel used in SLRS described in Sections 9, 10, and 11 shall meet one of the following ASTM Specifications : A36, A53, A500(Grade B or C), A501, A529, A572 (Grade 42, 50, or 55), A588, A913 (Grade 50, 60 or 65), A992 or A1011 HSLAS Grade 55. The structural steel used for column base plates shall

meet one of the preceding ASTM specifications or ASTM A283 Grade D.

AISC 341 Part 1-6.1

- ' Structural steel used in Seismic Load Resisting (SLRS) shall meet requirements of AISC 360 section A 3.1a except as modified by AISC 341. The minimum yield stress of steel to be used for members in which inelastic behavior is expected shall not exceed 50 ksi for SMF and IMF, nor exceed 55 ksi for OMF, unless the suitability of the material is determined by testing or other rational criteria. This limitation does not apply to columns for which the only expected inelastic behavior is yielding at the column base.
AISC 341 Part 1-6.1

- ' **Charpy V-Notch (CVN) Requirements**

- ' **Heavy Sections**

- ' Hot rolled shapes with flanges 1 1/2 in. thick and thicker shall have a min. CVN toughness of 20 ft-lb at 70°F. *AISC 341 Part 1-6.3*
- ' Plates 2 in. thick and thicker shall have a min. CVN toughness of 20ft-lb at 70°F, where the plate is used in the following:
 - ' Members built-up from plate
 - ' Connection plates where inelastic strain under seismic loading is expected.
 - ' As the steel core of buckling-restrained braces.

AISC 341 Part 1-6.3

- ' **Welded Joints**

- ' All welds used in members and connections in the SLRS shall be made with a filler metal that can produce welds that have a min. CVN toughness of 20 ft-lb at 0°F. *AISC 341 Part 1-7.3a*
- ' Where welds are designated as demand critical, they shall be made with a filler metal capable of providing a min. CVN toughness of 20 ft-lb at -20°F and 40 ft-lb at 70°F as determined by Appendix X or other approved method, when the steel frame is normally enclosed and maintained at a temperature lower than 50°F, the qualification temperature for Appendix X shall be 20°F above the lowest anticipated service temperature, or at a lower temperature.
AISC 341 Part 1-7.3b

B. SPECIAL MOMENT RESISTING FRAME (SMF)

- ' **PLAN DETAILS**

- ' All prequalified connections and connections qualified by cyclic tests with variations such as additional haunches or cover plates, additional welds, or deviations from the tested weld access hole configuration at moment connections

are not permitted.

P/BC 2008-098 Part C Sec B.2

- ' (Column Weak Axis) (Skewed) (Dual Axis) moment connection is not permitted.
P/BC 2008-098 Part C Sec B.2
- ' For Reduced Beam Section (RBS) moment connections, comply with AISC 358 Section 5.3 for Prequalification limits.
- ' For Bolted Unstiffened and Stiffened Extended End-Plate (BSEEP, BUEEP) moment connections, comply with AISC 358 Section 6.3 for Prequalification limits. Note: SMF systems in direct contact with concrete structural slabs are not prequalified.
- ' Clearly identify on the plan the location and length of the expected plastic hinging zone. No welded, screwed, bolted, or shot-in attachment is permitted within this zone.
AISC 341 Part I-7.4, 9.2d
- ' Column and beam members used in SMF shall meet the I_{ps} limitations of Table I-8-1 per AISC 341 Part I-8.2.b.
AISC 341 Part I-9.4a
- ' Provide a beveled transition detail where changes in thickness and width of flanges and webs occur in complete joint penetration groove welded column splices.
AISC 341 Part I-8.4a, AWS D1.1 2.7.1, 2.16.1.1
- ' Column splices made with fillet welds or partial joint penetration groove welds shall be located 4 ft or more away from the beam-to-column connections. When the column clear height between beam-to-column connections is less than 8 ft, splice shall be half the clear height. Detail this on the plan.
AISC 341 Part I-8.4a
- ' Column web splices made with bolted connections shall use plates or channels on both sides of the column web. Detail this on the plan.
AISC 341 Part I-8.4a
- ' Where groove welds are used for column splice, they shall be complete-joint-penetration groove welds that meet the requirement of AISC 341 Part I-7.3b for demand critical welds. Weld tabs shall be removed upon completion of weld.
AISC 341 Part I-9.9, 7.3b
- ' Doubler plate connection shall be detailed on the plan to match the tested connection per AISC 341 Part I-9.3c and comply as follows:
 - ' When doubler plates are welded to the column flanges, welds shall either be complete joint penetration groove welded or fillet welded joint.
 - ' When doubler plates are placed against the column web, they shall be welded across the top and bottom edges.
 - ' When doubler plates are placed away from the column web, they shall be placed symmetrically in pairs and welded to continuity plates.
- ' Continuity plate for SMF connection shall be detailed on the plan to match the

prequalified connection in AISC 358 or connection prequalified in accordance with Appendix P or Appendix S of AISC 341. *AISC 341 Part I-9.5*

- ' Weld access hole shall be detailed on the plan to match prequalified connection requirements or AISC 341 Figure 11-1.
- ' Weld access holes are prohibited in the beam web adjacent to the end-plate in bolted moment end-plate connections (Stiffened or Unstiffened)
- ' When the beam-to-column moment ratio calculated using Equation (9-3) is more than 2 (column remains elastic), the column flanges shall be laterally supported at the top level of beam flange. *AISC 341 Part I-9.7a*
- ' When the beam-to-column moment ratio calculated using Equation (9-3) is less than or equal to 2 (column does not remain elastic), the following requirements shall apply;
 - ' Column flanges shall be laterally supported at the levels of both the top and bottom beam flanges. Lateral bracing shall be either direct by lateral bracing element or, alternatively shall be indirect by column web and continuity plates or by the flanges of perpendicular beams. *AISC 341 Part I-9.7a(1)*
 - ' Each column-flange lateral brace shall be designed for a required strength that is equal to 2 percent of the available beam flange strength $F_y b_f t_{bf}$ (LRFD) or $F_y b_f t_{bf} / 1.5$ (ASD), as appropriate. *AISC 341 Part I-9.7a(2)*
- ' Where unbraced connections occur in special cases such as two-story frames, atriums and similar architectural spaces. Comply with AISC 341 Part I-9.7b 1,2,3 for unbraced Beam -to-Column connections to avoid lateral-torsional buckling of column. *AISC 341 Part I-9.7b.1)2)3)*
- ' Lateral bracing of beam flanges per AISC 341 Part I-9.8 shall be provided as follows; *AISC 341 Part I-9.8*
 - ' Both flanges of beams shall be laterally braced.
 - ' The unbraced length between lateral supports shall not exceed $0.086 r_y E_s / F_y$ for SMF.
 - ' Lateral supports shall be provided near concentrated forces, changes in cross-section and other locations where analysis indicates that a plastic hinge will form during inelastic deformations.
 - ' The required strength of lateral bracing shall meet the provisions of Eq A-6-7 and A-6-8 of Appendix 6 of the AISC 360, and the required strength of lateral bracing provided adjacent to plastic hinges shall be at least; $P_u = .06M_u/h_o$ (LRFD) or $P_a = .06M_a/h_o$ (ASD), and required stiffness shall meet the provisions of Eq A-6-8 of Appendix 6 of the AISC 360.

- ' The individual thicknesses of column webs and doubler plates, if used, shall not be less than that specified in Equation (9-2) per AISC 341 Part I-9.3b.

' CALCULATIONS

- ' Provide calculation to show that P_u / NP_n for column strength is not greater than 0.4, otherwise the requirements of AISC 341 Part I-8.3 (amplified seismic load) must be satisfied to prevent global column failure. *AISC 341 Part I-8.3*
- ' The measured flexural resistance of the connection, determined at the column face, shall equal at least 0.80Mp of the connected beam at an interstory drift angle of 0.04 radians. *AISC 341 Part I-9.2a(2)*
- ' The required shear strength, V_u , of the connection shall be determined using the load combination 1.2D + 0.5L + 0.2S plus the shear resulting from the application of a moment of $2[1.1 R_y F_y Z / \text{distance between plastic hinges}]$. *AISC 341 Part I-9.2a(3)*
- ' The maximum inelastic response displacement, D_M , of the frame shall not exceed (0.015)(0.020h) (0.025h) per IB-2008-098 Table 1,2,3.
- ' The connection of the frame to the Column Base shall be designed to transmit forces to the foundation per IB-2002-098 Part C Sec B.3.a Column base elements include anchor bolts, base plate welds, and any elements that transfer shear, moment, or tension to the foundation. *P/BC 2008-098 Part C Sec B.3a*
 - ' The seismic loads to be transferred to the foundation interface shall be based upon the seismic load combinations of ASCE 7 section 12.4.3.2.
 - ' Design of concrete elements at the Column Base, including anchor rod embedment and reinforcement steel, shall be in accordance with LABC Chapter 19.
 - ' Grade beams shall be provided with ductile detailing per ACI 318 Chapter 21.
- ' Provide calculation to show that the required shear strength, R_u , of the panel-zone is less than the design shear strength, $N_v R_v$, of the panel zone per AISC 341 Part I-9.3a.
- ' Members shall be sized to provide strong column/weak beam in accordance with Equation (9-3) per AISC 341 Part I-9.6.
- ' Where column splice occurs, provide calculation to show that the required flexural and shear strength of column splices satisfy AISC 341 Part I-9.9, and AISC 341 Part I-8.4a.

C. INTERMEDIATE MOMENT RESISTING FRAME (IMF)

' PLAN DETAILS

- ' All prequalified connections and connections qualified by cyclic tests with variations such as additional haunches or cover plates, additional welds, or deviations from the tested weld access hole configuration at moment connections are not permitted. *P/BC 2008-098 Part C Sec B.2*
- ' (Column weak axis) (Skewed) (Dual axis) moment connection is not permitted. *P/BC 2008-098 Part C Sec B.2*
- ' For Reduced Beam Section (RBS) moment connections, comply with AISC 358 section 5.3 for Prequalification limits
- ' For Bolted Unstiffened and Stiffened Extended End-Plate (BSEEP, BUEEP) moment connections, comply with AISC 358 Section 6.3 for Prequalification limits.
- ' Clearly identify on the plan the location and length of the expected plastic hinging zone. No welded, screwed, bolted, or shot-in attachment is permitted within this zone. *AISC 341 Part I-7.4, 10.2d*
- ' Column and beam members used in IMF shall meet the I_p limitations of Table B4.1 per AISC 341 Part I-8.2a. *AISC 341 Part I-10.4a*
- ' Provide a beveled transition detail where changes in thickness and width of flanges and webs occur in complete joint penetration groove welded column splices. *AISC 341 Part I -8.4a, AWS D1.1 2.7.1, 2.16.1.1*
- ' Column splices made with fillet welds or partial joint penetration groove welds shall be located 4 ft or more away from the beam-to-column connections. When the column clear height between beam-to-column connections is less than 8 ft, splice shall be half the clear height. Detail this on the plan. *AISC 341 Part I -8.4a*
- ' Column web splices made with bolted connections shall use plates or channels on both sides of the column web. Detail this on the plan. *AISC 341 Part I -8.4a*
- ' Where groove welds are used for column splice, they shall be complete-joint-penetration groove welds that meet the requirement of AISC 341 Part I-7.3b for demand critical welds. *AISC 341 Part I -10.9, 7.3b*
- ' Continuity plate for IMF connection shall be detailed on the plan to match the prequalified in AISC 358 or connection prequalified in accordance with Appendix P or Appendix S of AISC 341. *AISC 341 Part I-10.5*
- ' Weld access hole shall be detailed on the plan to match prequalified connection requirements or AISC 341 Figure 11-1.
- ' Weld access holes are prohibited in the beam web adjacent to the end-plate in bolted moment end-plate connections (Stiffened or Unstiffened)
- ' Lateral bracing of beam flanges per AISC 341 Part I-10.8 shall be provided as follows; *AISC 341 Part I-10.8*

- ' Both flanges of beams shall be laterally braced.
- ' The unbraced length between lateral supports shall not exceed $0.17 r_y E_s / F_y$ for IMF.
- ' Lateral supports shall be provided near concentrated forces, changes in cross-section and other locations where analysis indicates that a plastic hinge will form during inelastic deformations.
- ' The required strength of lateral bracing shall meet the provisions of Eq A-6-7 and A-6-8 of Appendix 6 of the AISC 360, and the required strength of lateral bracing provided adjacent to plastic hinges shall be at least; $P_u = .06M_u/h_o$ (LRFD) or $P_a = .06M_a/h_o$ (ASD), and required stiffness shall meet the provisions of Eq A-6-8 of Appendix 6 of the AISC 360.
- ' The individual thicknesses of column webs and doubler plates, if used, shall comply with the AISC 360.

' CALCULATIONS

- ' Provide calculation to show that P_u / NP_n for column strength is not greater than 0.4, otherwise the requirements of AISC 341 Part I-8.3 (amplified seismic load) must be satisfied to prevent global column failure. *AISC 341 Part I-8.3*
- ' The measured flexural resistance of the connection, determined at the column face, shall equal at least .80Mp of the connected beam at an interstory drift angle of 0.02 radians. *AISC 341 Part I-9.2a(2), 10.2a*
- ' The required shear strength, V_u , of the connection shall be determined using the load combination 1.2D + 0.5L + 0.2S plus the shear resulting from the application of a moment of $2[1.1 R_y F_y Z / \text{distance between plastic hinge locations}]$. Except that a lesser value of V_u (LRFD) or V_a (ASD) as appropriate, is permitted if justified by analysis. The required shear strength need not exceed the shear resulting from the application of appropriate load combinations in the applicable building code using amplified seismic load. *AISC 341 Part I-10.2a(2)*
- ' The maximum inelastic response displacement, D_M , of the frame shall not exceed (0.015h) (0.020h) (0.025h) per IB-2008-098 Table 1,2,3.
- ' The connection of the frame to the Column Base shall be designed to transmit forces to the foundation per IB-2008-098 Part C Sec B.3.a Column base elements include anchor bolts, base plate welds, and any elements that transfer shear, moment, or tension to the foundation. *P/BC 2008-098 Part C Sec B.3.a*
 - ' The seismic loads to be transferred to the foundation soil interface shall be based upon the seismic load combinations of ASCE 7 section 12.4.3.2.
 - ' Design of concrete elements at the Column Base, including anchor rod embedment and reinforcement steel, shall be in accordance with LABC

Chapter 19.

- ' Grade beams shall be provided with ductile detailing per ACI 318 Chapter 21.
- ' Where column splice occurs, provide calculation to show that the required flexural and shear strength of column splices satisfy AISC 341 Part I-10.9, and AISC 341 Part I-8.4a.
- ' R value used in determining the base shear shall be limited to 4.5 Limited height to (35 ft) (65 ft). Limit story to (No Limit) (1). Limit weight of each wall, roof or floor to (No Limit) (20 psf) (35 psf). *P/BC 2008-098 Table 1,2,3*
- ' For limitations on IMFs designed with FEMA 350, see PART E below.
- ' For moment joint field connections with bolts, framing shall be limited to 1 story metal buildings only up to 65 ft high. *P/BC 2008-098 Table 1,2,3*

D. ORDINARY MOMENT RESISTING FRAME (OMF)

' PLAN DETAILS

- ' All prequalified connections and connections qualified by cyclic tests with variations such as additional haunches or cover plates, additional welds, or deviations from the tested weld access hole configuration at moment connections are not permitted. *P/BC 2008-098 Part C Sec B.2*
- ' (Column weak axis) (Skewed) (Dual axis) moment connection is not permitted. *P/BC 2008-098 Part C Sec B.2*
- ' Provide a beveled transition detail where changes in thickness and width of flanges and webs occur in complete joint penetration groove welded column splices. *AISC 341 Part I -8.4a, AWS D1.1 2.7.1, 2.16.1.1*
- ' Column splices made with fillet welds or partial joint penetration groove welds shall be located 4 ft or more away from the beam-to-column connections. When the column clear height between beam-to-column connections is less than 8 ft, splice shall be half the clear height. Detail this on the plan. *AISC 341 Part I -8.4a*
- ' Column web splices made with bolted connections shall use plates or channels on both sides of the column web. Detail this on the plan. *AISC 341 Part I -8.4a*
- ' Where column splice subject to net tensile load effect and where partial-joint-penetration (PJP) groove welds are used for column splice, they shall be at least design for 200 percent of required strength. *AISC 341 Part I -8.4a*
- ' Continuity plate for OMF connection shall be detailed on the plan and in accordance with Section J10 of AISC 360. Provide continuity plate per AISC 340

- ' Weld access hole shall be detailed on the plan to match connection requirements or AISC 341 Figure 11-1.
- ' Weld access holes are prohibited in the beam web adjacent to the end-plate in bolted moment end-plate connections (Stiffened or Unstiffened)
AISC 341 Part I-11.2a.2
- ' Column and beam members are limited to wide flanges only (except for steel moment frame with "Symmetrical Shapes" in IB-2008-098 Table 1,2,3).
- ' Backing bars and weld tabs shall comply with the following:
 - ' Where top beam flange backing bar is not removed, detail the attachment of the backing bar to the column by a continuous fillet weld on the edge below the complete joint penetration groove weld.
AISC 341 Part I-11.2a.1
 - ' Clearly identify on the plan the removal of the bottom beam flange backing bar upon completion of the welded joint. Following removal of backing bar, the root pass shall be backgouged to sound metal and backwelded with a minimum 5/16" reinforcing fillet weld.
AISC 341 Part I-11.2a.1.i
 - ' Weld tab removal shall extend to within 1/8" of the base metal surface except at continuity plates where removal to within 1/4" of the plate edge is acceptable.
AISC 341 Part I-11.2a.1.ii
- ' Single side partial-joint-penetration groove welds and single fillet welds shall not be used to resist tensile forces in the connections. *AISC 341 Part I-11.2a.3*
- ' Continuity plates shall be detailed on the plan as follows: *AISC 341 Part I-11.5*
 - ' For two-sided connections, the minimum thickness of continuity plate shall equal to that of the thicker of beam flanges (or beam-flange connection plate). For one-sided connections, continuity plate thickness shall be at least one half of the thickness of the beam flange (or beam-flange connection plate).
 - ' Welded joints of the continuity plates to the column flanges shall be made with either complete joint penetration groove welds, partial joint penetration welds combined with reinforcing fillet welds or two-sided fillet welds.

' CALCULATIONS

- ' Provide calculation to show that P_u / NP_n for column strength is not greater than 0.4, otherwise the requirements of AISC 341 Part I-8.3, (amplified seismic load) must be satisfied to prevent global column failure. *AISC 341 Part I-8.3*
- ' For Fully Restrained connections

- ' Comply with AISC 341 Part I-11.2a.(1) for a flexural strength that is equal to $1.1R_yM_p$ (LRFD) or $(1.1/1.5)R_nM_p$ (ASD), as appropriate, of the beam or girder, or the Maximum moment that can be developed by the system, whichever is less. *AISC 341 Part I-11.2a*
- ' For FR connections, the required shear strength V_u (LRFD) or V_a (ASD), as appropriate of the connection shall be determined using the E for earthquake load effect per Eq (11-1) of AISC Part I. *AISC 341 Part I-11.2a.(4)*
 - ' Where E is used for strength design, the required shear strength, V_u of the connection shall be determined using load combination $1.2D + L + .2S$ (where L can be reduced to .5 per exception of Section 2.3 of ASCE 7-05).
 - ' Where E is used in ASD load combinations that are additive with other transient loads that are based on AEI/ASCE 7, the 0.75 combination factor for transient loads shall not be applied to E.
 - ' The required shear strength need not exceed the shear resulting from the application of appropriate load combination stated in the applicable code using the amplified seismic load.
- ' For Partial Restrained connections, comply with AISC 341 Part I-11.2b.(1)(2)(3)(4) for minimum flexural and shear strength. *AISC 341 Part I-11.2b.(1)(2)(3)(4)*
- ' The maximum inelastic response displacement, D_M , of the frame shall not exceed $(0.015h)$ $(0.020h)$ (_____) per P/BC 2008-098 Table 1,2,3.
- ' The connection of the frame to the Column Base shall be designed to transmit forces to the foundation per P/BC 2008-098 Part C Sec B.3.a Column base elements include anchor bolts, base plate welds, and any elements that transfer shear, moment, or tension to the foundation. *P/BC 2008-098 Part C Sec B.3.a*
 - ' The seismic loads to be transferred to the foundation soil interface shall be based upon the seismic load combinations of ASCE 7 section 12.4.3.2.
 - ' Design of concrete elements at the Column Base, including anchor rod embedment and reinforcement steel, shall be in accordance with LABC Chapter 19.
 - ' Grade beams shall be provided with ductile detailing per ACI 318 Chapter 21.
- ' Where column splice occurs, provide calculations to show that the required flexural and shear strength of column splices satisfy AISC 341 Part I-11.9 and AISC 341 Part I-8.4a.

- ' OMF shall only be used in Light Frame Construction, Metal Buildings, or Miscellaneous Structures. *P/BC 2008-098 Table 1,2,3*
- ' R value used in determining the base shear shall be limited to (1.5) (3.5). The height shall be limited to (No Limit) (35 ft) (65 ft). The number of stories shall be limited to (No Limit) (1). Limit weight of each roof, wall, or floor shall be limited to (No Limit) (20 psf)(35 psf). *P/BC 2008-098 Table 1,2,3*
- ' The design of the beam-to-column connection shall comply with Equation $M_u \leq 1.1 R_y M_p$ (LRFD) or $(1.1/1.5) R_y M_p$ (ASD) as appropriate for the beam, the girder, or for the maximum moment that can be developed by the system, whichever is less. *AISC 341 Part I-11.2a*

E. FEMA 350 CONNECTIONS

' PLAN DETAILS

- ' (WUF-B) (FF) (BUFP) (BSEP) (DST) connection is not permitted. *P/BC 2008-098 Table 1,2,3*
- ' (WUF-W) (WFP) (BFP) connection used as a SMF connection is not permitted. *P/BC 2008-098 Table 1,2,3*
- ' Permissible Material Specification; A572 grade 50, A992, A913, Grade 50/S75.
- ' The individual thicknesses of web doubler plates, if used, shall not be less than that specified in FEMA 350 Sec 3.3.3.2.
- ' The individual thicknesses of continuity plates, shall not be less than that specified in FEMA 350 Sec 3.3.3.1.
- ' Weld access hole shall be detailed on the plan to match FEMA 350 Figure 3-5.
- ' Continuity and web doubler plates shall be detailed on the plan to match FEMA 350 Figure 3-6.
- ' Limit beam flange thicknesses to (3/4")(1")(1 1/4")(1 1/2")(1 3/4") per FEMA 350 prequalification data tables for (_____) connection.
- ' Beam depth shall be limited to a maximum size of W36. *FEMA 350 Table 3-3, 3-5, 3-6, & 3-10*
- ' (WUF-W)(WFP) (BFP) connection shall have the beam-to-column moment connection detailed on the plan as shown in FEMA 350 Figure 3-8. *(FEMA 350 Figure 3-11) (FEMA 350 Figure 3-17)*
- ' Refer to C. INTERMEDIATE MOMENT RESISTING FRAME (IMF) above for additional plan detail requirements for IMF.
- ' Refer to D. ORDINARY MOMENT RESISTING FRAME (OMF) above for

additional plan detail requirements for OMF.

' CALCULATIONS

- ' Provide calculations to show that flexural demand on the girder due to gravity load does not exceed 30% of the girder's plastic capacity, otherwise a plastic analysis of the steel frame shall be required to determine the appropriate plastic hinge locations. *FEMA 350 Sec 3.2.3*
- ' WUF-W connection designed for use as an IMF or OMF shall comply with the following:
 - ' Only allow to be used in Light Frame Construction. *P/BC 2008-098 TABLE 1,2,3*
 - ' Provide calculation to show compliance with FEMA 350 Table 3-3 using the FEMA OMF criteria
 - ' Provide calculation to show compliance with FEMA 350 Sec 3.5.2.1.
- ' WFP connection designed for use as an IMF or OMF shall comply with the following:
 - ' Only permit to be used in Light Frame Construction. *P/BC 2008-098 TABLE 1,2,3*
 - ' Provide calculation to show compliance with FEMA 350 Table 3-5 using the FEMA OMF criteria.
 - ' Provide calculation to show compliance with FEMA 350 Sec 3.5.4.1.
 - ' Flange plate thickness shall be determined in accordance with FEMA 350 Sec 3.5.4.1.
- ' BFP connection designed for use as an IMF or OMF shall comply with the following:
 - ' Only permit to be used in Light Frame Construction. *P/BC 2008-098 TABLE 1,2,3*
 - ' Provide calculation to show compliance with FEMA 350 Table 3-10 using the FEMA OMF criteria.
 - ' Provide calculation to show compliance with FEMA 350 Sec 3.6.3.1.
 - ' Flange plate size and thickness shall be determined in accordance with FEMA 350 Sec 3.6.3.1.
 - ' Bolt diameter and spacing shall be determined in accordance with FEMA 350 Table 3-10.

- ' Check requirements for continuity plates per FEMA 350 Sec 3.3.3.1
- ' Check requirements for web doubler plates per FEMA 350 Sec 3.3.3.2
- ' Refer to C. INTERMEDIATE MOMENT RESISTING FRAME (IMF) above for additional calculation requirements for IMF.
- ' Refer to D. ORDINARY MOMENT RESISTING FRAME (OMF) above for additional calculation requirements for OMF.