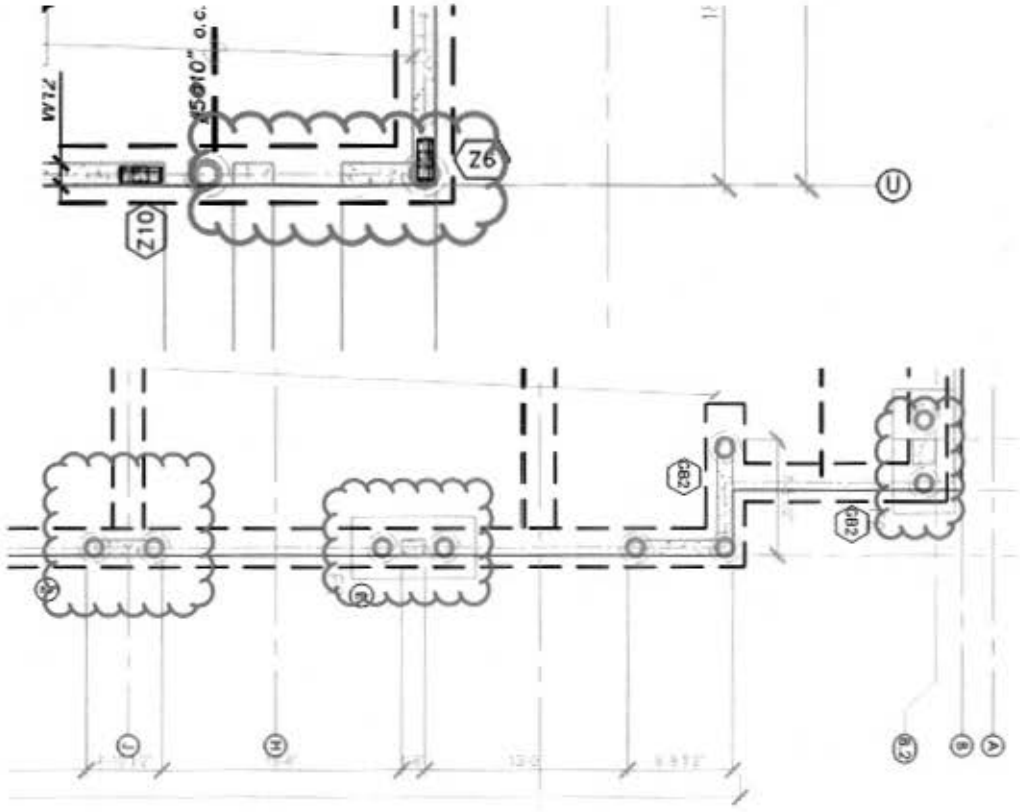
S30. Sheet S-1.0: Please address the following:

a) There appear to be multiple wall segments which meet the definition of Chapter 2 of ACI 318-14 as Wall Piers. Please provide details for the reinforcing in these wall sections in accordance with Section 1810.8.1 of ACI 318-14. *(Advisory: Even if these are not considered as part of the Lateral Force Resisting System, Section 18.14.6.1 of ACI 318-14 still requires them to meet the same detailing.)*



S31. Sheet S-2.3: Please address the following:

a)Section A4.1 of AISC 341-10 requires that members of the SFRS be designated on the construction documents. For the canopy framing please clarify which steel members will be part of the SFRS, this includes chords, collectors, and any vertical lateral force resisting elements.

i) Per Section D2.2(4) of AISC 341-10 any bolts which are transferring seismic loads as part of the SFRS are required to be pre-tensioned high strength bolts with Class A Faying surfaces. Please provide separate details showing for collector and chord connections in accordance with these requirements.

S32. Column calculations (starting on Page 30) of the calculations refer to ACI 318-11 and the 2013 CBC. Please update calculations to the 2016 CBC and reference ACI 318-14.

S33. Please provide calculations and information to clarify how building irregularities per Table 12.3-1 and 12.3-2 of ASCE 7-10 have been addressed.

a)Provide a deflection analysis to verify if the building contains a torsional or extreme torsional irregularity. *(The Torsional Analysis of Rigid Diaphragms starting on Page 42 of the Calculations does not appear to address this.)* Please be aware that Per Section 12.3.3.1 of ASCE 7-10, this building is not allowed to have an extreme torsional irregularity.

b) Please clarify how reentrant corner irregularities have been addressed.

S34. Page 102 of the calculations: The plans indicate that the vertical lateral force resisting system for the steel canopy at the porte cochere is intended to be Special Cantilevered Columns. Please address the following:

a) Per CBC 1603.1.5 please include this system and its design values on the structural drawings, in addition to the special reinforced concrete shear walls.

b) As the Porte Cochere is not seismically isolated from the concrete building please address the combination of the different lateral force resisting systems as required by Section 12.2.3.3 of ASCE 7-10. *(Advisory: While the weight of the porte cochere is such that it is insignificant to the concrete structure, the concrete structure will have a significant effect on the porte cochere. As designed the porte cochere with an R – 2.5 is not sufficiently Ductile to undergo the induced plastic deformations required by the more ductile R-5 Special Reinforced Concrete building.)*

S35. Please address the following for the calculations for the Porte Cochere:

a)Please include the Global Design Parameters for the RISA calculations to verify that the appropriate codes have been used and to verify if P-Delta affects have been accounted for.

b) Please provide calculations per AISC 360-10 verifying that members are adequate for the design forces.

c) Please provide anchorage calculations into the concrete per Chapter 17 of ACI 318-14.

i) The RISA calculations appear to be done per ASD load combinations, strength design (LRFD) is required per Chapter 17 of ACI 318-14. Please include information as to how strength level forces have been calculated.

d) Please provide information and calculations showing that the special cantilevered columns will meet the minimum detailing and design requirements of AISC 341-10. This includes the following:

i) Per Section E6.4a of AISC 341-10 please verify that the load combinations including the Amplified Seismic load do not exceed 15% of the available axial strength of the columns.

ii) Provide information, per Section E6.4b of AISC 341-10, to show that the columns will be braced as required for as moderately ductile beams per Section D1.2a of AISC 341-10.

iii) Provide calculations to show that column sections selected are Highly Ductile members as required by Section E6.5a of AISC 341-10.

iv) Provide detailing on the plans showing the location of the protected zone per Section E6.5c of AISC 341-10. Indicate the restrictions within the protected zone.

v) Per Section E6.6a of AISC 341-10, the welds from the column to the base plate are required to be Demand Critical Welds. Please indicate this requirement on the plans.

vi) Per Section E6.6b of AISC 341-10 column bases are required to comply with Section D2.6. Provide required calculations and detail for welding to base plate. Anchorage calculations shall be per the Amplified Seismic Load.

S36. Please provide calculations for the grade beams tying the pier caps together per Section 12.13.6.2 of ASCE 7-10.

S37. Please provide calculations and details for the design of the carports.

a) Please verify that these structures can accommodate the 5 – 8 inches of liquefaction induced settlement or clarify how liquefaction will be remediated for these structures.

FOUNDATION COMMENTS:

F1. Submit a letter from the soil engineer confirming that the foundation plan, grading plan, and specifications have been reviewed and that it has been determined that the recommendations in the soil report are properly incorporated into the plans.

F2. Specify on plans that the soil engineer shall be retained to provide observation and testing services during the grading and foundation phase of construction per soil report recommendations and that inspection and testing reports shall be submitted to the Building Department.

F3. Sheet L3.0 includes a detail "S" which is a keystone retaining wall. Please provide structural detail and calculations for this wall. Also clarify the location of this wall. Please note that the soil engineer shall provide soil properties of the soil being retained.

F4. Provide calculations for the walls and foundations as shown at elevator pit detail 4/SD1.1.

F5. Please clarify if detail 5/E6.0 will be used as barrier for the cars/automobile. If so please provide structural detail and calculations per CBC 1607.7.3 for the steel bollard and its foundation. Please note that it shall be designed to resist a single load of 6000 pounds applied horizontally in any direction applied at a height of 1'-6" above the floor. The embedment depth shall be calculated per CBC 1807.3.2.1.

F6. Detail 8/E6.0: Provide structural detail for pole foundation. Please include details and calculations for connection of pole to the base plate, base plate anchorage and foundation. The foundation shall be designed per CBC 1807.3.2.1.

F7. Detail 6/SD1.1 refers to detail 7 for grade beam details, but sheet SD1.1 does not included detail 7. Please revise the reference.

F8. Earthquake Design Criteria on page 6 of soils refer shall refer to 2016 CBC instead of 2013 CBC. Please revise.

F9. Please revise calculations for the foundation including the section of the beam and slab on page 86. Include the location where this section of the foundation occurs.

a) Provide partial plan for the slab and beam. The thickness of the slab used in these calculations is 12.5 inches. Where is this slab located?

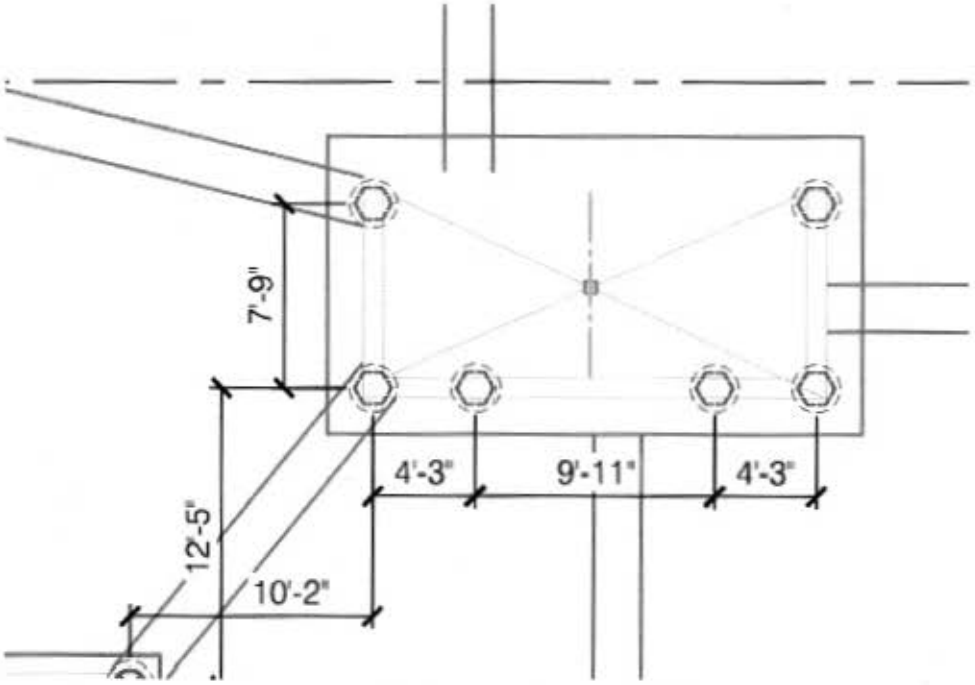
b) The calculations indicate that #6 bar at 10" o.c. shall be provided at top of slab over the beam, #5 at 8" o.c. as bottom steel. Please clarify where this is indicated on the plan.

i) If this is slab on grade why the cover of 2 inches is being deducted from the thickness. Shouldn't this be 3" + ½ the diameter of rebar? Please clarify.

F10. On page 87 of the calculations it appears that the depth of reinforcement needs to be revised. The dimension "d" will be calculated as 'h' minus 3 inch clear cover minus the diameter of the ties minus half the diameter of the rebar. It appears that the depth should be 26 inches instead of 27 inches as shown.

F11. Provide calculations for the foundation (pile cap) between grid line L & H and grid line 5 & 14 supported by six (6) piles.

F12. Sheet DDP-2.1: Please clarify how the grade beams will be framing into pile cap mentioned shown below.



F13. Detail on sheet DDP-3.2 refers to detail 1 for the pile cap, detail 1 is missing. Please clarify where the details for the pile cap could be found.

F14. Detail 8 on sheet SD1.2 refers to plan for pile cap reinforcement, please revise note to detail 2 on sheet SD1.2 instead.

F15. Please clarify the location of pile cap designed on page 97. Reviewer cannot find this pile cap on the foundation plan.

F16. Provide calculations for the square shape pile cap supported by three (3) piles.

F17. Provide calculations for the grade beam supporting the shear walls at the perimeter of the building.

F18. The geotechnical report indicates that liquefaction is present at the site but that per the Exception to Section 20.3.1 of ASCE 7-10 a site specific spectral analysis is not required where the period of the building is less than 0.5 seconds. As this is a 6 story building please provide calculations showing the period of the full building and verify that site specific spectral analysis is not required.

a) Page 9 of the geotechnical report indicates that the geotechnical analysis assumes that the building is a regular building, 5 stories or less, with a period less than 0.5 seconds. The proposed building is 6 stories and is L shaped and therefore irregular. Please address.

F19. Sheet DDP-1.0: Please address the following:

a) Special inspections are required to comply with CBC Section 1705. Please indicate the required test and their frequency.

i) Per CBC Table 1705.8 Continuous inspection is required of the drilling operation and the placement and size of piers.

ii) Please include all of the required inspections for the concrete per CBC Table 1705.3.

b) The plans call for a single test pile. The geotechnical report recommends a minimum of 6 test piles be provided. Please coordinate.

i) Please indicate the location of the test pile(s) on the plans.

F20. Sheet DDP-3.2: Please address the following:

a) While Section 20.3.1 of ASCE 7-10 allows the soil values to be based on Site Class D for determining soil values Fa and Fv, the site is still susceptible to liquefaction and is a Site Class F. Please provide additional reinforcing in the pier and pile cap as required by CBC 1810.3.9.4.2.2. This will require close ties at a maximum spacing of 4 inches and a minimum transverse reinforcing per Section 18.7.5.4 of ACI 318-14 (Section 21.6.4.4 of ACI 318-11). Please address.

i) This comment would also apply to reinforcing within the pile cap per detail 8/SD1.2.

F21. The geotechnical report indicated that piles closer than 3 pile diameters would need to be reduced to account for group effects. It appears that the pier spacing is less than this, please verify that group effects have been accounted for

If you have any questions regarding the above comments, please contact Amar Hasenin (amarh@wc-3.com) and or Donald Zhao (donald@wc-3.com) for plan review comments via email or telephone (650) 754-6353.

Note: Responses to these corrections may generate additional correction comments.

**********DO NOT CLOUD CHANGES**********

[END]

November 16, 2017

Attn: Karen Kinahan, Permit Technician
WC3

RE: City Pmt: B17-1420
WC3# 217-411-225

Dear Karen,

Please find the following responses to the Building plan check comments for 550 Gateway Blvd, South San Francisco.

A1a. These items have been added under the "Separate Permits" heading on sheet A0.0.

A1bi. The note has been added. Refer to revised note #1 of detail D10 on Sheet A2.2.

A2. The project statistics have been revised to include an A-3 occupancy. Refer to the project statistics on sheet A0.0

A3a. The Porte Cochere area has been added to the 1st floor area as a U occupancy per CBC 312.1. The building area calculations have been updated. Refer to sheet A1.0.

A3b. The code referenced section has been revised to Section 508.3 for non-separated occupancies. Refer top A1.0

A3c. The note has been revised. Refer to Sheet A1.0

A3d. The frontage increase calculation has been revised. The area of the building fronting the outdoor lounge has been removed and the If calculation revised to .61. Refer to Sheet A1.0

A4a. The start of the rated corridor has been defined as where the residential occupancies start at each wing of the ground floor per table 1020.1. A pair of 20 min doors have been added with magnetic hold opens opening in the direction of travel at each location. Refer to A5.0A and A5.0C and door 35 on the door schedule on sheet A9.0.

A5a. The field exterior building walls at the roof level have been revised to 2 hr rated walls. Refer to floor plan and legend on sheet A3.4 and detail B12 on Sheet A10.3.

A5ai Detail B12 has been added reflecting the 2 hour exterior wall. Refer to sheet A10.3

A5b 2 hour walls and fire barriers have been indicated on the plans. Refer to note 327 on sheet A3.4 at the common wall between the elevator machine room and the elevator shaft.

A5c A 2 hour floor/ ceiling assembly has been added below the elevator machine room. Refer to reference note 328 on sheet A3.4 detail F12/ A10.3 and 2 hour assembly on sheet A10.0.

A5d Door 31 has been revised to a 90 min door. Refer to sheet A9.0.

A6. Sections shown on A4.3 show roof conditions being provided as part of the prefabricated units. Refer to note 325 on Roof plan, Sheet A3.5, for site built assembly locations and detail references.

A7. The wall between the storage room and guest room has been revised to a 1-hr Wall. Refer to sheet A5.0a.

ADDRESS 1306 Johnson Avenue / San Luis Obispo, CA 93401 CONTACT 805.547.2240 / arris-studio.com
Thomas E. Jess, ARCHITECT #C27608 Stephen A. Rigor, ARCHITECT #C33672

A8. Refer to note 529 on sheet A5.0B and detail D12/A10.3 for site built 2 hour wall assembly at elevator shaft.

A9. Detail F8/A10.3 has been revised to indicated fire treated wood.

A10. Detail K4/A10.4 has been revised to indicate exterior rated fire treated lumber.

A11. Detail B2/A10.6 has been revised to non-combustible construction.

A12a. The walls for the laundry room and Elec/ Mech. Room extend to the bottom of the concrete deck above and The doors to these areas rooms have been provided with smoke seals and self-closers. Refer to doors 23, 34, and 13 as indicated on sheet A5.0C and their related hardware as listed in sheet A9.0

A12b. Self-closers have been indicated for doors 23, 34, and 13 as indicated on sheet A5.0C and their related hardware as listed in sheet A9.0.

A13. The structural members for the main building 1st floor structure is concrete and requires no protection. Refer to details B4 and D4 on sheet A10.8 for the fire resistive details for the steel members of the porte cochere and reference notes 304 on sheet A3.3 and 536 on sheet A5.0B. All structural members and bearing wall fire protections for floors 2-6 are covered in the prefabricated building drawings.

A14a. Refer to detail C7/A8.1.

A14bi. The intersection of the 2 hr wall and 1 hr roof/ ceiling has been added. Refer to detail K10/A10.3 and reference note 325 on sheet A3.5.

A 14bii. The intersection of the 2 hr wall and 1 hr roof/ ceiling has been added. Refer to detail K10/A10.3 and reference note 325 on sheet A3.5. The parallel and perpendicular conditions are similar and are covered by the same detail.

A15a. The PBX room has been renamed a server room and has an occupant load factor of 1:300 and an occupant load of 1.

A15b. An occupant load factor of 1:15 has been applied to the breakroom which results in a total occupant load of 24. Refer to A1.0.

A15ci. The cumulative occupant load of all of the spaces including half the load of the boardroom is 44 occupants and the common path of egress travel is less than 100' which only requires a single exit from this area. (CBC Table 1006.2.1) Refer to updated calculations on sheet A1.0.

A15cii. No second exit is required per CBC Table 1006.2.1

A15ciii. Only a single exit is required per CBC table 1006.2.1. Separation distance does not apply in this case.

A15civ. Only a single exit is required per CBC table 1006.2.1.

A15d. The egress exiting requirements Table has been revised to show 36" doors. Refer to A1.0

A15e. Occupancy signs have been posted at locations of A occupancies. Refer to reference note 534 on sheet A5.0A and reference note 535 on sheet A5.0B.

A16a. Floors 2-5 are identical. The wording of "similar" has been revised to Identical. Refer to Sheet A1.1.

A16ai. Floors 2-5 are identical. The wording of "similar" has been revised to Identical. Refer to

Sheet A3.3.

A16b. A hatch has been created and added to the plan legend. Refer to sheet A3.3.

A17a. The common path of travel is sown and listed as 99'-10". Refer to A1.2.

A17b. Common path shown. Refer to A1.2.

A17c. CPET is 99'-10" which is less than the max. allowed of 100' per Table 1006.2.1 for sprinklered buildings.

A18. The required egress width for the upper floor is 36" based on Table 1020.2. When fully open the exit width of the roof catwalk is only reduced by 6" providing an unobstructed width of 30". Refer to sheet A1.2.

A19. There are only exhaust fans and no appliances located on the roof that require maintenance access as defined in CMC section 203.0 and 304.1 therefore a roof hatch or permanent access to the roof is not required. Access to the exhaust fans will be made via a ladder because the upper roof is less than 15' above the adjacent lower roof per CMC 304.3.1.

A20. There are no mechanical appliances located on the roof therefore no fall protection is required.

A21. Door type at stair 1 has been revised to door 5. Refer to A5.0A and door schedule on sheet A9.0 for hardware.

A22. The luggage storage has been removed from the Vestibule. Refer to sheet A5.0B.

A23. Hand rail has been extended to be parallel with stair run and 36" clearance has been provided between handrail and nearest adjacent obstruction. Refer to sheet A8.0

A24. Card readers have been specified on the plans with a "CR" on the side of the door on which they are located. Refer to A1.0 and A1.2. Note: All guest rooms have card readers at the public side of the doors.

A25. Sliding glass door specification has been attached to this plan check response.

A26a. Attachment for the walkway shall be adhesive based. Calculations for the attachment will be provided as part of the deferred submittal listed on sheet A0.0.

A26b. Walkway surface shall be perforated metal and slip resistant. Refer to reference note 306 on sheet A3.4. A certification for the slip resistance of the walkway will be included with the deferred submittal listed on sheet A0.0

A26c. Refer to detail K6/A10.6 for transition detail between building and roof top walkway.

A26d. The maximum height of the walkway above the adjacent roof surface will be +/- 12". No Guardrails will be required.

A26e. Floor surface will be perforated metal in compliance with CBC 11B-302.3. Refer to reference note 306 on sheet A3.4.

A27. Exit signs have been located on the exit plans. Refer to sheets A1.0, A1.1, and A1.2.

A28a. 3 accessible means of egress have been provided from each floor and include the stairs and elevator. Refer to A1.1 and A1.2

A28ai. Access means of egress component have been identified and consist of the elevator and

both stairs. Refer to A1.1 and A1.2.

A28aii. The elevator has been identified as an accessible means of egress. Refer to A1.1 and A1.2.

A28aiii. A natural gas generator will be provided as a means of emergency power. Refer to Site Reference Note 140 on sheet A2.0.

A29. This project is complying with CBC1203.5.1.2 and will have rigid insulation above the structural decking and batt insulation held in contact with the sheathing below. Refer to B10/10.3.

A30. Smoke curtains are referenced on sheet A1.1 and A1.2. A specification for the specific smoke curtain we intend to use has been included with this plan check response.

A31. A pressurized hoist way is not required because the elevator opening will be protected by a minimum 90 min elevator door and a UL compliant draft curtain.

A32. Emergency signs will be provided. Refer to note 329 on sheets A3.3 and A3.4.

A33. The elevator will be required to have a recall switch. Refer to Elevator Note A on sheet A0.1.

A34. A natural gas generator will be provided as a means of emergency power. Refer to Site Reference Note 140 on sheet A2.0.

A35 2 way communication has been indicated on the plans. Refer to sheets A3.3 and A3.4 reference note 330.

A36a. This note was included in error and has been removed from sheet A0.1. An acoustical analysis is not required by planning as part of this project and is not listed in the conditions of approval as a requirement. Refer to sheet A0.6.

A36b. This note was included in error and has been removed from sheet A0.1. An acoustical analysis is not required by planning as part of this project and is not listed in the conditions of approval as a requirement. Refer to sheet A0.6.

A36c. Note B has been removed. An acoustical analysis is not required. Refer to Sheet A0.1

A37. Unisex symbol has been revised to gender neutral. Refer to K10/A0.3.

D1. Code references to the 2013 CBC have been removed and the notes have been updated to current standards. Refer to A0.2

D2a. Details have been updated.

D2b. Federal standard has been revised. Refer to H8/A0.3.

D2c. Depth of drinking fountain revised. Refer to D12/A0.3

D2d. Door width revised to 42". Refer to K12/A0.3.

D3a. Dimension revised to 17"-18". Refer to H6/A0.4

D4a. An accessible path has been provided to the trash enclosure. Refer to reference note 137 on sheet A2.0 and civil grading plans.

D4b. Refer to project statistics on sheet A0.0 for ADA parking count. 5 spaces have been provided.

D5. Note has been added. Refer to K6/A0.4

D6. 15 min. dimension is shown on detail. Height of crane bolt is dimensioned as 1'-6". Refer to K4/A2.2.

D7a. 24" clearance has been shown. Refer to A2.1.

D7b. The handrail has been shown centered on the clear floor space. Refer to A2.1.

D8a. A clearance of 5'-0" has been shown between doors 34 and 26 in the breakroom. Refer to A5.0A.

D8B. 18" clearance shown at pull side of door 19. Refer to A5.0A.

D9. The landing depth of door 12 have been shown. Refer to A5.0C.

D10. The standard urinal screens are 24" deep. Only the 30" wide clear floor space is required. Refer to reference note 76 on sheet A7.2.

D11. Note D has been revised to indicate a range of 34"-44". Refer to A9.0.

D12a An accessible passenger drop off has been provided at the porte cochere. Refer to A2.0

D12b. A vehicle pull up space has been provided. Refer to reference note 135 on sheet A2.0.

D12c. A 60" wide x 40' long accessible aisle has been provided at the vehicle drop off. Refer to reference note 134.

D12d. A 60" wide x 40' long accessible aisle has been provided at the vehicle drop off. Refer to reference note 134.

D12e. A 60" wide x 40' long accessible aisle has been provided at the vehicle drop off. Refer to reference note 134.

D13a. Refer to reference note 530 on sheet A5.0A.

D13b. 30x48 clear space shown at lockers. Refer to sheet A5.0A.

D13c. Refer to reference note 530 on sheet A5.0A.

D13d. Refer to reference note 530 on sheet A5.0A.

D13e. Refer to reference note 530 on sheet A5.0A.

D14a. (4) Wireless listening devices will be provided. Refer to Reference note 531 on sheet A5.0A and Calculations on sheet A1.0.

D14b. The seating layout originally shown on the plans was to indicate the potential layout of the space for internal planning purposes and is not meant to be permanent. The space is meant to be flexible in setup based on the needs of the user. The furniture has been removed from the floor plan and a wireless assisted listening system will be provided to allow for greater flexibility of the space.

D14c. International Symbol of Access for hearing loss plaque has been provided at entry door to the meeting room space. Refer to reference note 532 on sheet A5.0A and detail K12 on sheet A0.4.

D14d. The seating layout originally shown on the plans was to indicate the potential layout of the space for internal planning purposes and is not meant to be permanent. The space is meant to be flexible in setup based on the needs of the user. The furniture has been removed from the floor plan and a wireless assisted listening system will be provided to allow for greater flexibility of the space.

D15. The outdoor lounge is a seating area only and not used for dining. It has been excluded from the dining tabulations. The dining area is limited to room "Breakfast 1"

D15a. Dining tabulation provided. Refer to A5.0B

D15b. Dining areas have been dispersed through the breakfast area. Refer to A5.0B.

D15c. A forward approach has been shown at each of the accessible seating locations. Refer to A5.0B.

D15d. 34" max height indicated. Refer to reference note 537 on sheet A5.0B.

D15e. 27" min. knee clearance indicated. Refer to reference note 537 on sheet A5.0B.

D15f. The minimum accessible clearances have been met.

D15g. There is no bar as part of this scope of work. The breakfast serving area has a counter height of 34" along its length. Refer to reference note 533 on sheet A5.0B.

D16a. The access counter is located on an accessible route in an open area which complies with 11B-904.2. Refer to A5.0B

D16b. The height of the service counter has been listed as 28" min to 34" max. Refer to Reference note 523 on sheet A5.0B. The aisle at the market has been dimensioned as 5'-3". Refer to A5.0B. Note the work stations behind the front desk are employee only areas.

D16c. The height of the service counter has been listed as 28" min to 34" max. Refer to Reference note 523 on sheet A5.0B.

D16d. A 30x48 clearance has been shown at the accessible portion of the counter for a parallel approach. Refer to A5.0B.

D17. A 30x48 clear space has been shown adjacent to each piece of exercise equipment. Refer to A5.0C.

D17a. Per CBC table 11B-228.1.1 (1) van accessible and (1) standard accessible charging station will be required. All charging stations will be installed in the future, however, one of the future stations has been moved to the van accessible space at the entrance to the building and the adjacent curb has been revised to allow for proper clearance around the future station location. Refer to A2.0.

D17b. All EV parking stalls will be installed at a future date under a separate permit. Only the raceways and conduits are being installed per CalGreen 5.106.5.3. Refer to reference note 113 on sheet A2.0.

D18. Baby changing station detail added. Refer to F8/A0.4

Mechanical Comments:

M1. 'Not for Construction' note removed. See revised sheets.

M2a. Code year reference updated to 2016. See revised sheets.

M2b. Duct smoke detectors provided where required. See note #4, Variable Refrigerant Flow Schedule' and note #1, 'Dedicated Outdoor Air Unit Schedule'. Smoke detector symbols shown on mechanical floor plans.

M3a. See note added to details 21/M1.1 and 31/M1.1. Also, added note 45/M1.1.

M3b. See note added to detail 23/M1.1 and refer to electrical drawings for backup power.

M4. See note added to detail 45/M1.1.

M5a. See added rated-wall hatch, sheet M3.1

M5b. Required Fire/Smoke dampers shown at DOAS and Exhaust shaft. See mechanical drawings. Dampers not required at Guest Room shafts per CBC 717.5.3(1)

M5c. Guest Room PTACs supply 35CFM of outside air (see schedule M0.1) and continuously operating bathroom exhaust fans remove 35CFM. Design is compliant with CMC 402 and ASHRAE 62.1.

M5d. Dampers revised. See sheet M3.1 and revised detail 41/M1.1.

M5e. Ground mounted mechanical equipment is protected by a 6" curb and is not immediately adjacent to a vehicular path. Refer to sheet A2.0.

M5f. Food Prep room does not have cooking equipment installed.

M5g. Code year reference updated to 2016. See revised note #4/M3.1.

Electrical Comments:

E1. "NOT FOR CONSTRUCTION" note has been removed.

E2. PV note has been revised to state "under a separate permit".

E3. Electrical schedules have been revised to print larger for legibility purposes.

E4a. See General Notes under Penetrations on sheet E0.1.

E4c. See Hilti detail "CLIV, CLIV7" on sheet E6.2.

E4d. Not Applicable, no other listed material and methods shall be provided.

E5a. Means of egress illumination has been provided on sheet E4.0-E4.2. Fixtures on relays 16 through 26 of LCP1 and relays 9 through 15 of LCP4 will be provided with emergency power.

E5b. Illumination of exit discharge has been provided on sheet E2.1 and E4.0. Fixtures S1A, S1B, S1C, and S4 will be provided with emergency power.

E5e. Means of egress illumination on the pathway to the exit stairs on the sixth floor has been provided, see sheet E4.2, fixture S5 on relay 11 of LCP4.

E6c. Lengths of each conductor has been provided. See Feeder Schedule and the electrical schedules on sheet E1.1 – E1.5. Resistance of conductors is provided in the NEC.

Plumbing Comments:

P1. See 'Plumbing Fittings and Piping' section of Specifications, sheet P0.1.

P2. Please see 'Utility Line Sizing' table, sheet P0.1 for domestic water sizing. Project is new construction.

P3. Piping revised around the 1st floor Guest Rooms 139-143. All other areas already compliant. Reference note #8 added, sheet P4.1

P4. Floor sinks with indirect drains provided for all ice machines and ice bins. See sheets P4.1

and P4.2.

P5. See added 'Grease Interceptor Sizing' table, sheet P4.1.

P6. 'Roof Drain Sizing' table reference updated to South San Francisco. Rainfall data remains unchanged.

Energy Compliance Comments:

T1. See signed Title 24 sheets.

T2. T-24 compliance documentation has been revised to climate zone 3.

Structural Comments:

For additional information please refer to the structural engineer's hand-written responses that have been included as part of this plan check.

S1a. Calculations provided. Refer to structural engineer's response in attached letter.

S1b. Calculations provided. Refer to structural engineer's response in attached letter.

S1c. Calculations provided. Refer to structural engineer's response in attached letter.

S1d. Weight of upper structure has been added. Refer to Structural engineer's response letter for additional information.

S2. The EOR has verified the applied load. Refer to Structural engineer's response letter for additional information.

S3. Load combinations include the weight of the Super structure plus the podium weight. Refer to Structural engineer's response letter for additional information.

S4a. Added note 1.1 to CBC table 1705.3 on sheet SN-1

S4b. Added note 2.1 to CBC table 1705.3 on sheet SN-1.

S5. Calculations provided. Refer to structural engineer's response in attached letter.

S6. Added note #22 to reinforcing notes on sheet SN-1

S7. See attached trash enclosure calculations and detail 27/SD-2

S8. Detail 1/E6.1 does not apply and has been deleted.

S9a. Refer to structural engineer's response in attached letter.

S10. Correct. The column reactions are ultimate.

S11. Correct there are two types of Columns. Refer to structural engineer's response in attached letter for additional information.

S12. Column numbers have been added. Refer to structural engineer's response in attached letter for further information.

S13. Refer to sheet S2.3 and Detail 3/SD2

S14. Calculation provided on page 125.

S15. Refer to structural engineer's response in attached letter.

S16. Refer to revised calculation on page 100 and 100.2.

S17a. Revised calculations have been provided on pages 49 thru 85

S17b. Ties extend a minimum of 12" into the footing. Refer to detail 19/SD1.1.

S17c. Refer to detail 19/SD1.1

S18. Calculations provided. Refer to structural engineer's response in attached letter.

S19. Refer to structural engineer's response in attached letter.

S20. Stairs are prefabricated by others. Refer to sheet SN-1 for deferred submittal requirements.

S21. The slab has been redesigned. Refer to structural engineer's response in attached letter.

S22. Refer to comment response 27 and structural engineer's response in attached letter.

S23. Column numbers added to page 34. Also refer to responses 5 thru 15 above.

S24. Refer to structural engineers and modular design engineers response in attached letter.

S25. Refer to structural engineer's response in attached letter.

S26. Spa is design build by others.

S27a. Refer to structural engineer's response in attached letter.

S28. Refer to structural engineer's response in attached letter.

S29a. Added structural steel special inspection notes on sheet SN-1

S29bi. SDC revised to E

S29bii. Calculations revised for revised parameters.

S30a. Refer to structural engineer's response in attached letter.

S31a. SFRS members identified on sheet S2.3.

S31ai. Note added to details 4,5,and 6/SD-2

S33a. See revised calculations added on page 46.1 to 46.2.

S33b. See revised calculations added to page 46.7 to 46.10 and sheets S-2.2 and Detail 20/ S1.1.

S34a. Values added to Sheet SN-1

S34b. Refer to structural engineer's response in attached letter.

S35a. Included on page 116.1 of revised calculations.

S35b. Refer to structural engineer's response in attached letter.

S35c. Refer to structural engineer's response in attached letter.

S35di. Refer to structural engineer's response in attached letter.

S35dii. Refer to structural engineer's response in attached letter.

S35diii. Refer to structural engineer's response in attached letter.

S35div. Refer to structural engineer's response in attached letter.

S35dv. Refer to structural engineer's response in attached letter.

ADDRESS 1306 Johnson Avenue / San Luis Obispo, CA 93401 CONTACT 805.547.2240 / arris-studio.com
Thomas E. Jess, ARCHITECT #C27608 Stephen A. Rigor, ARCHITECT #C33672

S35Dvi. Refer to structural engineer's response in attached letter.

S36. Refer to structural engineer's response in attached letter.

S37. The carport design will be a deferred submittal by the carport manufacturer.

Foundation Comments:

F1. The letter from the soils engineer has been provided with this plan check letter.

F2. Foundation note #8 revised on sheet SN-1

F3. The retaining wall calculation has been attached. Refer to pages RTN1 – RTN5 on the attached structural engineers response and Sheet SD3.1 and SD3.2.

F4. See calculations added to pages 84.1 to 84.4 for walls 29-31 and refer to structural engineer's response in attached letter.

F5. 5/e6.0 is not used as a barrier for automobiles it is used to protect items such as walls. CBC 1607.7.3 is not applicable.

F6. See attached calculation on page LP1.

F7. Reference corrected to 7/SD1.2.

F8. Refer to attached soils update letter accompanying this plan check response.

F9a. Slab is at 1st level shown on sheet S1.0. Added slab section reference to detail 5/SD1.2. Also added schematic section calculations on page 86.

F9b. See detail 5SD1.2. Refer to structural engineer's response in attached letter.

F10. Refer to structural engineer's response in attached letter.

F11. Refer to structural engineer's response in attached letter.

F12. Added detail 11/SD1.2.

F13. The detail reference has been updated.

F14. Note has been corrected.

F15. This has been corrected. This is for a 3-pile system. Critical dimensions for analysis is based on triangular distribution, however, square shape is shown on plans since it makes construction easier.

F16. See previous response.

F17. See calculations on page 88 for GB2.

F18. We understand that the current design is for a L-shaped 6 story building. Furthermore, based on an email from the project Structural Engineer dated November 2, 2017, we understand that the fundamental period of the proposed building is 0.484 second. Therefore, the proposed building meets the requirements for the Exception to Section 20.3.1 of ASCE 7-10 and a site-specific spectrum analysis is not required.

F19ai. Special inspections have been added to sheet DDP-1.0.

F19aii. Special inspections have been added to sheet DDP-1.0.

F19bi. Single test pile location has been indicated on sheet DDP-2.1.

F20a. Refer to structural engineer's response in attached letter.

F21. Farrell has revised the pile cap layout to reflect a minimum spacing of 3 pile diameters. See sheet DDP-3.1 detail 13.

If you have any questions, please don't hesitate to contact us.

Sincerely,

Anthony Silva, Architect
Arris Studio Architects

ADDRESS 1306 Johnson Avenue / San Luis Obispo, CA 93401 CONTACT 805.547.2240 / arris-studio.com
Thomas E. Jess, ARCHITECT #C27608 Stephen A. Rigor, ARCHITECT #C33672

PLAN CHECK - 1

STRUCTURAL RESPONSE

HOME2 SUITES BY HILTON

550 GATEWAY BLVD

SOUTH SAN FRANCISCO

INDEX TO STRUCTURAL RESPONSE

11/14/2017

Structural Response
Home2 Suites
South San Francisco

2017-06
BCI
11/9/17.
(C1)

GREEN BUILDING COMMENTS:

No Comments

ENERGY COMPLIANCE COMMENTS:

T1. Sheet M0.2: Provide the required signatures on the Title 24 Energy forms.

T2. Sheet E.02: Revise to use climate zone 3.

STRUCTURAL COMMENTS:

S1. It is our understanding that two-stage Analysis Procedure will be used in this project (see page 2 of Calculations by HCP Engineering). In order to use this method it must meet with the limitations of Section 12.2.3.2 of ASCE 7-10. Please verify the following:

a) Please provide calculations to show that the stiffness of the concrete framing will be at least 10 times as stiff as the wood framing above.

b) Provide calculations showing the period of the upper portion alone as well as for the building as a whole. The whole building period shall be no more than 1.1 times the period of the wood framed portion alone.

c) Also, please clarify if the seismic calculated for the lower portion was multiplied by 1.69 as calculated on page 2.

d) Clarify if the weight of the super-structure was added to the weight of the lower portion.

S2. Page 4 of the calculations indicate that the dead and live loads for super-structure was supplied by the designer of super-structure. It is our understanding that the super-structure is approved by State, but, did the EOR for this portion checked the weight of the super-structure (including weight of roof, floors, and all the walls interior and exterior). Please clarify.

S3. Page 5 of calculations by HCP Engineering indicates that the seismic load for the super-structure was provided by DCI Engineers, please clarify if the weight used in the calculations includes weight of exterior, interior walls, roof, ceiling and floor framing was included for the super-structure. Provide a copy of such calculations to verify the weight used in the seismic load calculations for the super-structure.

S4. Please provide following note on the plans as required per CBC 1705.3:

a) Periodic special inspection shall be provided during and upon completion of the placement of reinforcing.

b) Continuous special inspection is required during the welding of reinforcing steel in boundary members of the concrete shear wall and welding of the shear reinforcement.

S5. The calculations on page 1 indicate that live load reduction factor (R) will be equal to 0.75. Reducing the live load from 40 PSF to 30 PSF. Please clarify how this reduction factor was determined in accordance with CBC 1607.10. Live load reduction typically varies in quantity depending on the member being designed not uniformly throughout a building.

S6. Provide a note on the plan indicating that certified mill test report for each shipment of reinforcing steel used to resist flexural and axial force in reinforced concrete boundary members shall be provided to the inspector.

S7. Provide structural calculations for the masonry wall and it's foundation for the trash enclosure as shown on detail K12/A2.2.

2017-06
BCD1
(12)

S8. Provide structural details and calculations for Equipment mounting frame as shown on detail 1/E6.1.

S9. It is our understanding that pages 22 and 23 of the calculations may include the ratio between (moment capacity/Demand), the numbers on this page are not legible, please provide a legible copy.

a) Please clarify if the plan checker is reading the output correctly. If it is the ratio between the two, why are some numbers so large, such as 514.28. The title is misleading. Please revise accordingly.

S10. It is our understanding that page 27 includes ultimate load carried by columns, please verify. The title does not indicate the same, but checking column type 1 we assume that the loads on page 27 are ultimate Pu=1.2DL + 1.6LL = 1.2 x 468.17 + 1.6 x 189.01 = 864.22kips. Please verify if all the loads shown on page 27 are ultimate loads. The title should reflect this.

S11. The calculations for columns include calculations for two types of columns, type 1 and 2, it is our understanding the you are dividing the columns in two types, type 1 with ultimate load of 864 kips to 584 kips, type 2 with ultimate load less than 584 kips. EOR shall verify if this is correct, also verify that the output for ultimate load has been verified by him and is correct.

S12. Page 35 of calculations indicate that there will be 21 columns, page 27 which includes key plan for the column has only 18 columns. Please include the missing columns on the key plan and framing plans.

S13. Page 124 includes calculations for a steel beam to the 15 inches thick wall. Please clarify where this occurs. Also provide the detail number and the sheet number where this detail could be found.

S14. Provide calculations to check the adequacy of the connection as shown at detail 4/SD-2.

S15. Provide calculations to check the adequacy of the stud rail against the punching shear, see detail 1/SD1.2.

S16. A note on sheet SD-2 indicates that 20 GA metal deck will be welded using ¾"ϕ puddle weld at 12 inches o.c. please check it's adequacy against the diaphragm shear at deck.

S17. Shear wall calculations starting on Page 45 of the calculations all reference ACI 318-11 and the 2016 CBC, This is incorrect as the currently adopted 2016 CBC references ACI 318-14. Please revise calculations to be compliant with ACI 318-14. (It appears that some references have been updated but not all please coordinate.)

a) Please revise the calculation for boundary elements to comply with Section 18.10.6.2(a) of ACI 318-14. As of this version of the code a 1.5 factor has been added to the calculation of deflection. The ratio of deflection to height is now limited to 0.005. It is no longer conservative to assume a design displacement of 0.007*height of the wall. Please revise the calculations to correspond with the 2014 version of the code.

b) Where boundary element are required the special boundary element transverse reinforcement shall extend vertically above and below the critical section at least the greater of lw and Mu/4Vu, except as permitted in 18.10.6.4(g) of ACI318-14. Where boundary elements are required by 18.10.6.2 or 18.10.6.3 (a) through (h) shall be satisfied. Please note where the special boundary elements terminates on a footing, mat, or pile cap, special boundary element transverse reinforcement shall extend at least 12 in. into the footing, mat, or pile cap, unless greater extension is required by 18.13.2.3.

c) Please provide detail of boundary element showing near edge and not near edge of footing. Cannot find such detail in the package.

S18. Clarify if the adequacy of the reinforcement was checked against the compressive/tensile force indicated on the superstructure plans framing into the corners or edges of the concrete slab. Details at 6/SD1.2 are for edges but not for the corner. Please include a plan to show the layout of the reinforcement. Provide calculations to check the adequacy of the reinforcement provided.

S19. Please check the embedment of the holdown and adequacy of the steel in the slab for the anchors creating 38 kips of uplift/tensile force at interior shear walls.

S20. Provide structural calculations for the stairs as shown on 23/SD1.0.

S21. Page 22 of the calculations include moment diagrams in x-direction, the Maximum demand to Capacity ratio exceeds 1, which is not good please revise.

a)Also check page 23 of the calculations where the ratio also exceeds 1.00.

S22. Sheet S-2.1 includes layout of the bottom reinforcement in the slab and sheet S-2.2 includes the top reinforcement in the slab, please provide input and output of the calculations for the slab so that the review could be completed.

S23. Page 34 includes a key plan showing column creating punching shear, but there are no numbers, please provide calculations showing punching shear so that the design of stud rail could be reviewed. Please provide design of stud rails and show their adequacy.

S24. Sheet M0.1 indicates that an Air Unit weighing 2300 pounds will be used in this project, please clarify the location of this unit. Please provide details showing how the mechanical unit will be connected to the curb, and how curb will be secured to the framing below as required by CBC 1613.1 and Chapter 13 of ASCE 7-10.

S25. Provide calculations and detail for the gravity retaining wall as shown on IMP 2 – Cross Section on sheet C8 OF C14.

S26. Sheet A2.1 includes an out-door spa, please provide structural details and calculations for the same.

S27. Page 6 of the calculations is where the podium calculations start. It includes pre-stressing material properties. Page 7 includes the information about one-way slab, beams, two way slab. Page 8 includes information about one-way slab, two way slab. Please clarify what type of slab will be used in this project.

a) The plan checker when called the EOR he was told that they are using flat slab and using Adapt to design the slab. On asking where these calculations could be found, he mentioned the following pages: Page 10, where a key plan for columns is provided, page 11 includes mesh, page 12 includes support line, page 13 includes design strips in direction x, and page 14 includes design strip in direction y. These are line only, no numbers. Please provide input for the flat slab and copy of calculations so that the design of slab could be reviewed. Clarify if it is intended to use two way slab or flat slab. The design of the slab could not be completed due to lack of information, please provide required input and output to complete the review of slab.

S28. Page 124 includes calculations for a connection, please clarify where this connection occurs.

S29. Sheet SN-1: Please address the following:

a) Please include all of the required special inspections for structural steel per CBC 1705.2.1 and AISC 360-10. This should include all required inspections, prior to, during, and after welding and bolting as noted in Chapter N of AISC. The note that shop welding, field welding, and high strength bolts require special inspection is not adequate.

b) The seismic design parameters listed on the cover sheet do not match what is specified by the Geotechnical report. The Geotechnical Engineer indicates that the Ss = 1.94 and S1 =0.909, these values correspond with what is reported by USGS for this site. Please coordinate.

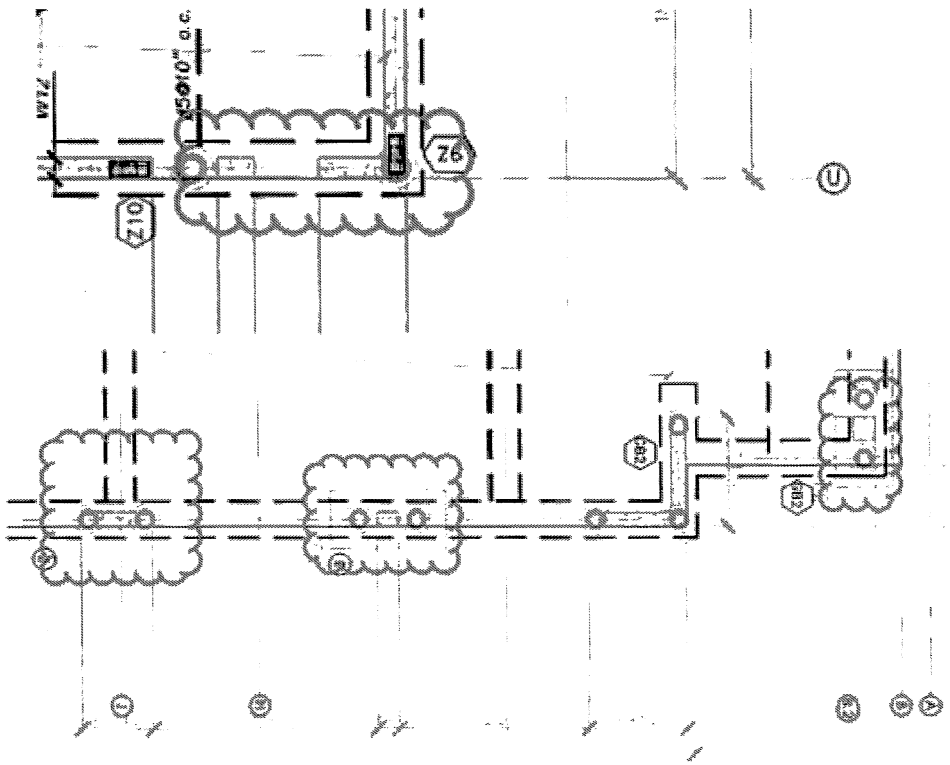
i) The Seismic Design Category (SDC D) for this building per Section 11.6 of ASCE 7-10 should be E instead of D as listed.

ii) Please revise the calculations and loads to incorporate the correct values.

2017-06
BDC1
(C4)

S30. Sheet S-1.0: Please address the following:

a) There appear to be multiple wall segments which meet the definition of Chapter 2 of ACI 318-14 as Wall Piers. Please provide details for the reinforcing in these wall sections in accordance with Section 1810.8.1 of ACI 318-14. *(Advisory: Even if these are not considered as part of the Lateral Force Resisting System, Section 18.14.6.1 of ACI 318-14 still requires them to meet the same detailing.)*



S31. Sheet S-2.3: Please address the following:

a)Section A4.1 of AISC 341-10 requires that members of the SFRS be designated on the construction documents. For the canopy framing please clarify which steel members will be part of the SFRS, this includes chords, collectors, and any vertical lateral force resisting elements.

i) Per Section D2.2(4) of AISC 341-10 any bolts which are transferring seismic loads as part of the SFRS are required to be pre-tensioned high strength bolts with Class A Faying surfaces. Please provide separate details showing for collector and chord connections in accordance with these requirements.

S32. Column calculations (starting on Page 30) of the calculations refer to ACI 318-11 and the 2013 CBC. Please update calculations to the 2016 CBC and reference ACI 318-14.

S33. Please provide calculations and information to clarify how building irregularities per Table 12.3-1 and 12.3-2 of ASCE 7-10 have been addressed.

a)Provide a deflection analysis to verify if the building contains a torsional or extreme torsional irregularity. *(The Torsional Analysis of Rigid Diaphragms starting on Page 42 of the Calculations does not appear to address this.)* Please be aware that Per Section 12.3.3.1 of ASCE 7-10, this building is not allowed to have an extreme torsional irregularity.

b) Please clarify how reentrant corner irregularities have been addressed.

S34. Page 102 of the calculations: The plans indicate that the vertical lateral force resisting system for the steel canopy at the porte cochere is intended to be Special Cantilevered Columns. Please address the following:

a) Per CBC 1603.1.5 please include this system and its design values on the structural drawings, in addition to the special reinforced concrete shear walls.

b) As the Porte Cochere is not seismically isolated from the concrete building please address the combination of the different lateral force resisting systems as required by Section 12.2.3.3 of ASCE 7-10. *(Advisory: While the weight of the porte cochere is such that it is insignificant to the concrete structure, the concrete structure will have a significant effect on the porte cochere. As designed the porte cochere with an R – 2.5 is not sufficiently Ductile to undergo the induced plastic deformations required by the more ductile R-5 Special Reinforced Concrete building.)*

S35. Please address the following for the calculations for the Porte Cochere:

a)Please include the Global Design Parameters for the RISA calculations to verify that the appropriate codes have been used and to verify if P-Delta affects have been accounted for.

b) Please provide calculations per AISC 360-10 verifying that members are adequate for the design forces.

c) Please provide anchorage calculations into the concrete per Chapter 17 of ACI 318-14.

i) The RISA calculations appear to be done per ASD load combinations, strength design (LRFD) is required per Chapter 17 of ACI 318-14. Please include information as to how strength level forces have been calculated.

d) Please provide information and calculations showing that the special cantilevered columns will meet the minimum detailing and design requirements of AISC 341-10. This includes the following:

i) Per Section E6.4a of AISC 341-10 please verify that the load combinations including the Amplified Seismic load do not exceed 15% of the available axial strength of the columns.

ii) Provide information, per Section E6.4b of AISC 341-10, to show that the columns will be braced as required for as moderately ductile beams per Section D1.2a of AISC 341-10.

iii) Provide calculations to show that column sections selected are Highly Ductile members as required by Section E6.5a of AISC 341-10.

iv) Provide detailing on the plans showing the location of the protected zone per Section E6.5c of AISC 341-10. Indicate the restrictions within the protected zone.

v) Per Section E6.6a of AISC 341-10, the welds from the column to the base plate are required to be Demand Critical Welds. Please indicate this requirement on the plans.

vi) Per Section E6.6b of AISC 341-10 column bases are required to comply with Section D2.6. Provide required calculations and detail for welding to base plate. Anchorage calculations shall be per the Amplified Seismic Load.

S36. Please provide calculations for the grade beams tying the pier caps together per Section 12.13.6.2 of ASCE 7-10.

S37. Please provide calculations and details for the design of the carports.

a) Please verify that these structures can accommodate the 5 – 8 inches of liquefaction induced settlement or clarify how liquefaction will be remediated for these structures.

FOUNDATION COMMENTS:

F1. Submit a letter from the soil engineer confirming that the foundation plan, grading plan, and specifications have been reviewed and that it has been determined that the recommendations in the soil report are properly incorporated into the plans.

F2. Specify on plans that the soil engineer shall be retained to provide observation and testing services during the grading and foundation phase of construction per soil report recommendations and that inspection and testing reports shall be submitted to the Building Department.

F3. Sheet L3.0 includes a detail "S" which is a keystone retaining wall. Please provide structural detail and calculations for this wall. Also clarify the location of this wall. Please note that the soil engineer shall provide soil properties of the soil being retained.

F4. Provide calculations for the walls and foundations as shown at elevator pit detail 4/SD1.1.

F5. Please clarify if detail 5/E6.0 will be used as barrier for the cars/automobile. If so please provide structural detail and calculations per CBC 1607.7.3 for the steel bollard and its foundation. Please note that it shall be designed to resist a single load of 6000 pounds applied horizontally in any direction applied at a height of 1'-6" above the floor. The embedment depth shall be calculated per CBC 1807.3.2.1.

F6. Detail 8/E6.0: Provide structural detail for pole foundation. Please include details and calculations for connection of pole to the base plate, base plate anchorage and foundation. The foundation shall be designed per CBC 1807.3.2.1.

F7. Detail 6/SD1.1 refers to detail 7 for grade beam details, but sheet SD1.1 does not included detail 7. Please revise the reference.

F8. Earthquake Design Criteria on page 6 of soils refer shall refer to 2016 CBC instead of 2013 CBC. Please revise.

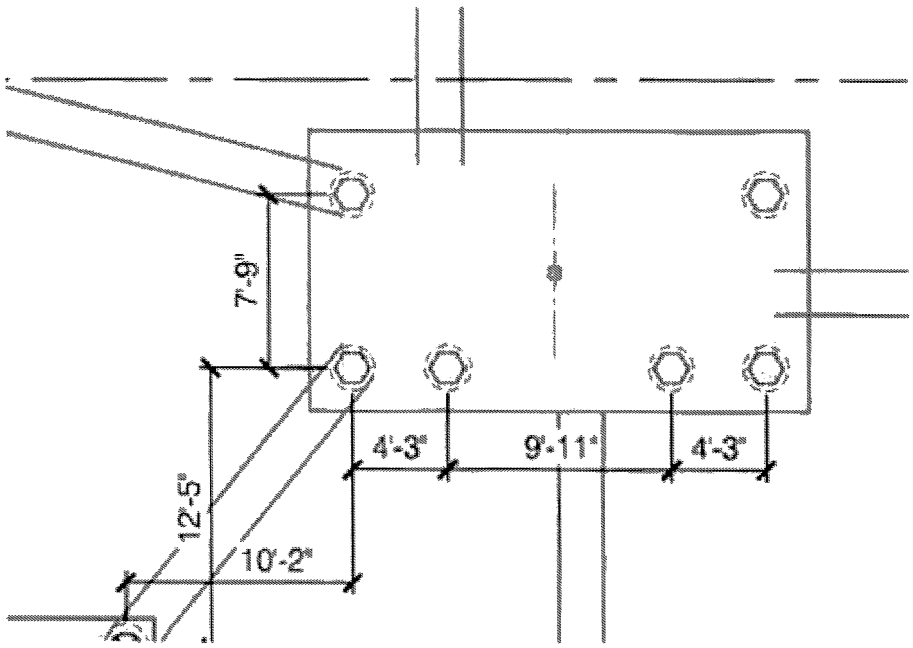
F9. Please revise calculations for the foundation including the section of the beam and slab on page 86. Include the location where this section of the foundation occurs.

- a) Provide partial plan for the slab and beam. The thickness of the slab used in these calculations is 12.5 inches. Where is this slab located?
- b) The calculations indicate that #6 bar at 10" o.c. shall be provided at top of slab over the beam, #5 at 8" o.c. as bottom steel. Please clarify where this is indicated on the plan.
  - i) If this is slab on grade why the cover of 2 inches is being deducted from the thickness. Shouldn't this be 3" + ½ the diameter of rebar? Please clarify.

F10. On page 87 of the calculations it appears that the depth of reinforcement needs to be revised. The dimension "d" will be calculated as 'h' minus 3 inch clear cover minus the diameter of the ties minus half the diameter of the rebar. It appears that the depth should be 26 inches instead of 27 inches as shown.

F11. Provide calculations for the foundation (pile cap) between grid line I & H and grid line 5 & 14 supported by six (6) piles.

F12. Sheet DDP-2.1: Please clarify how the grade beams will be framing into pile cap mentioned shown below.



F13. Detail on sheet DDP-3.2 refers to detail 1 for the pile cap, detail 1 is missing. Please clarify where the details for the pile cap could be found.

F14. Detail 8 on sheet SD1.2 refers to plan for pile cap reinforcement, please revise note to detail 2 on sheet SD1.2 instead.

F15. Please clarify the location of pile cap designed on page 97. Reviewer cannot find this pile cap on the foundation plan.

F16. Provide calculations for the square shape pile cap supported by three (3) piles.

F17. Provide calculations for the grade beam supporting the shear walls at the perimeter of the building.

F18. The geotechnical report indicates that liquefaction is present at the site but that per the Exception to Section 20.3.1 of ASCE 7-10 a site specific spectral analysis is not required where the period of the building is less than 0.5 seconds. As this is a 6 story building please provide calculations showing the period of the full building and verify that site specific spectral analysis is not required.

a) Page 9 of the geotechnical report indicates that the geotechnical analysis assumes that the building is a regular building, 5 stories or less, with a period less than 0.5 seconds. The proposed building is 6 stories and is L shaped and therefore irregular. Please address.

F19. Sheet DDP-1.0: Please address the following:

a) Special inspections are required to comply with CBC Section 1705. Please indicate the required test and their frequency.

i) Per CBC Table 1705.8 Continuous inspection is required of the drilling operation and the placement and size of piers.

ii) Please include all of the required inspections for the concrete per CBC Table 1705.3.

b) The plans call for a single test pile. The geotechnical report recommends a minimum of 6 test piles be provided. Please coordinate.

i) Please indicate the location of the test pile(s) on the plans.

F20. Sheet DDP-3.2: Please address the following:

a) While Section 20.3.1 of ASCE 7-10 allows the soil values to be based on Site Class D for determining soil values Fa and Fv, the site is still susceptible to liquefaction and is a Site Class F. Please provide additional reinforcing in the pier and pile cap as required by CBC 1810.3.9.4.2.2. This will require close ties at a maximum spacing of 4 inches and a minimum transverse reinforcing per Section 18.7.5.4 of ACI 318-14 (Section 21.6.4.4 of ACI 318-11). Please address.

i) This comment would also apply to reinforcing within the pile cap per detail 8/SD1.2.

F21. The geotechnical report indicated that piles closer than 3 pile diameters would need to be reduced to account for group effects. It appears that the pier spacing is less than this, please verify that group effects have been accounted for

If you have any questions regarding the above comments, please contact Amar Hasenin (amarh@wc-3.com) and or Donald Zhao (donald@wc-3.com) for plan review comments via email or telephone (650) 754-6353.

Note: Responses to these corrections may generate additional correction comments.

**********DO NOT CLOUD CHANGES**********

[END]

STRUCTURAL RESPONSE - 1ST REVIEW
HOME 2 SUITE
SOUTH SAN FRANCISCO

2017-06
BDCI
(1)

5.1) a) STIFFNESS ANALYSIS.

UPPER

$\Delta_{E/W\ UPPER_X} = 1.74"$ (SEE ATTACHED p. 1.1)

$\Delta_{N/S\ UPPER_Y} = 1.63"$ (SEE ATTACHED p 1.2)

LOWER

$\Delta_{X_{AVG}} = 0.001"$ (SEE ATTACHED p 1.3)

$\Delta_{Y_{AVG}} = 0.001"$ (SEE ATTACHED p. 1.4)

STIFFNESS

$$X\text{-DIR} = \frac{\Delta_{UPPER_X}}{\Delta_{LOWER_X}} = \frac{1.74}{0.001} = 1740 > 10 \quad \text{OKAY}$$

$$Y\text{-DIR} = \frac{\Delta_{UPPER_Y}}{\Delta_{LOWER_Y}} = \frac{1.63}{0.001} = 1630 > 10 \quad \text{OKAY}$$

b) PERIODS. (SEE ALSO RESPONSE BY DCI ENGINEERS) ATTACHED

X-DIR

$$\frac{T_{UPPER}}{T_{LOWER}} = \frac{0.485}{0.484} = 1.002 < 1.1 \quad \text{OKAY}$$

Y DIR:

$$\frac{T_{UPPER}}{T_{LOWER}} = \frac{0.472}{0.470} = 1.004 < 1.1 \quad \text{OKAY}$$

c) 1.65 FACTOR APPLIED TO LOAD COMBINATIONS
Eg: LOAD COMBINATION 7 = 0.9D + EQX =
= 1.65 SEISX + 0.5 SELF WT + 0.9DL + 1.65 EQX.

d) WEIGHT OF SUPER STRUCTURE WAS ADDED AS APPLIED DEAD LOAD (REACTION PROVIDED BY SUPER STRUCTURE ENGINEERS DCI ENGINEERING) SEE APPLIED DEAD LOAD p. 18

2017.06
BDC1
(1.1)

From DCI Engineers (Mahnen Building)

Wood Only (EAST/WEST)						
Level	W [kip]	F_{ULT} [kip]	Verify F_{ULT}	δ_{AVG} [in]	$W\delta^2$ [kip-in^2]	$F^{ULT}\delta$ [kip-in]
Roof	730	238	234	0.351	90	83.5
Level 5	740	174	171	0.459	156	79.9
Level 4	740	116	114	0.470	163	54.5
Level 3	740	58	52	0.457	155	26.5
Σ =	2950	586		Δ_1 = 1.74"	563	244.3

$$T = 2\pi\sqrt{\left(\sum_{i=1}^{n} w_i\delta_i^2\right) \div \left(g\sum_{i=1}^{n} f_i\delta_i\right)} = \boxed{0.485}$$

UPPER

	W	F			
LEVEL 2:	7840^K	1775^K	0.001	0.754 / 564	1.78 / 246

$$T_{WHOLE} = 2\pi\sqrt{\frac{564}{246\,(12\times 32.2)}} = 0.484 \text{ SEC}$$

2017-06
DCI
(1.2)

From DCI Engineers (Maximum Building)

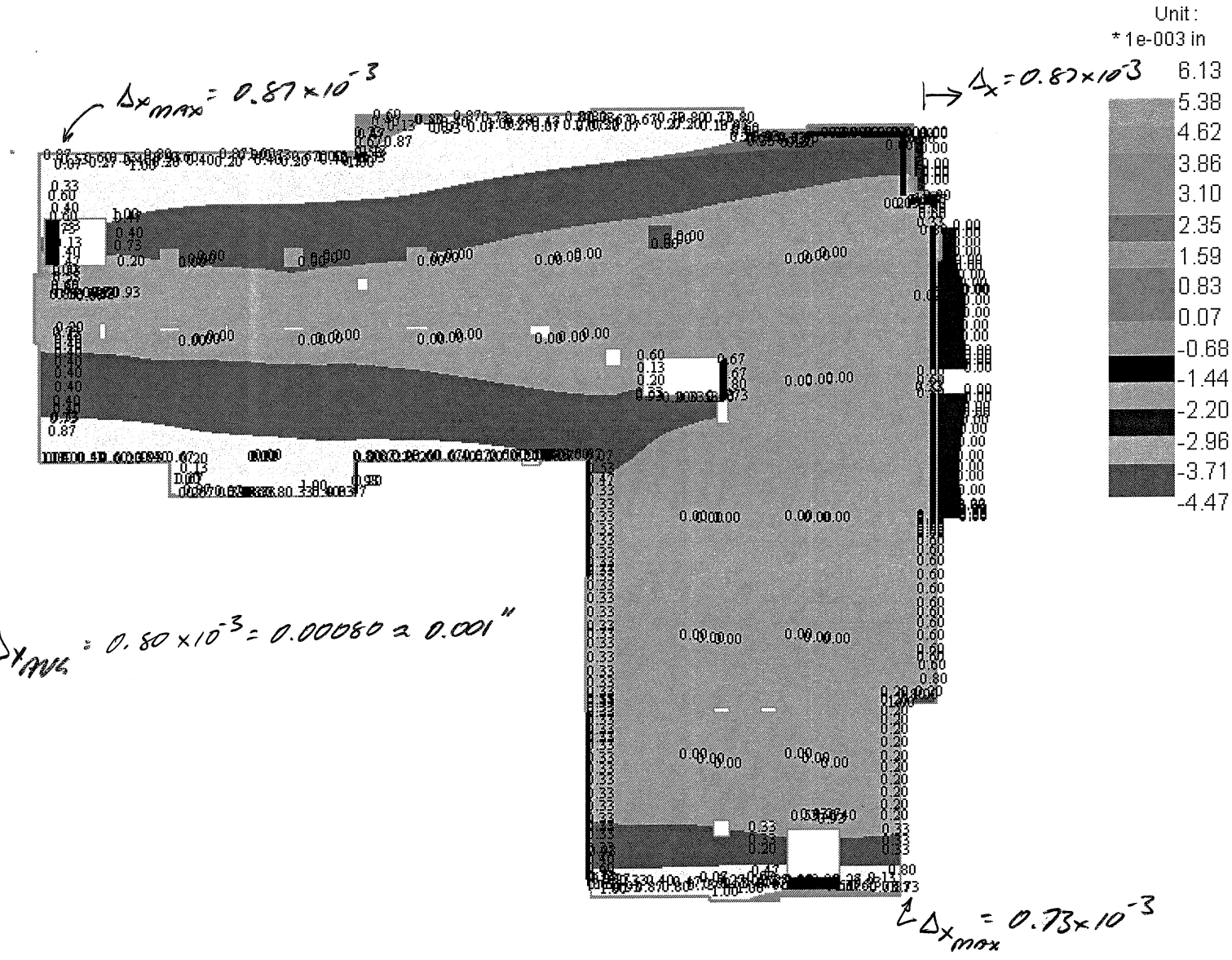
Wood Only (NORTH/SOUTH)						
Level	W [kip]	F_{ULT} [kip]	Verify F_{ULT}	δ_{AVG} [in]	$W\delta^2$ [kip-in^2]	$F^{ULT}\delta$ [kip-in]
Roof	730	238	247	0.334	81	79.4
Level 5	740	174	181	0.404	121	70.4
Level 4	740	116	121	0.470	163	54.5
Level 3	740	58	61	0.423	132	24.5
Σ =	2950	586		Δ_T = 1.63"	498	228.8

$$T = 2\pi\sqrt{\left(\sum_{i=1}^{n} w_i\delta_i^2\right) \div \left(g\sum_{i=1}^{n} f_i\delta_i\right)} = \boxed{0.472}$$

MAPDA

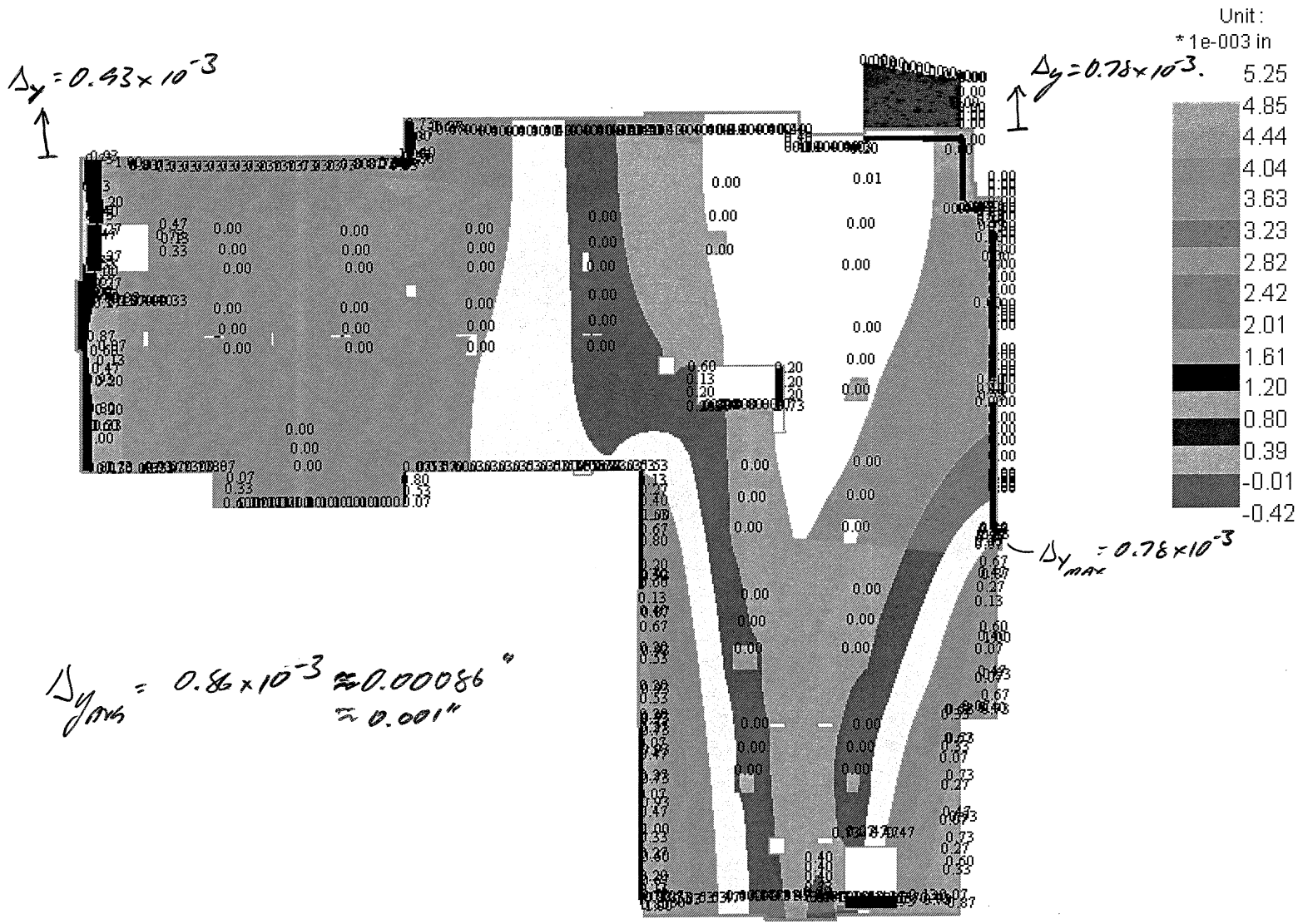
	W	F			
Level 2:	7540	1775	0.001	0.754	1.78
				455	231

$$T_{WHOLE} = 2\pi\sqrt{\frac{455}{231(32.2\times12)}} = 0.470 \text{ sec}$$



X-Translation

10/28/17 13:02:56	Home2 - SSF Seismic-X (Service Load)	Units: in
h2ssf-Adapt-171020-NoPorteCo.adv		Deformation



Y-Translation

10/28/17 13:04:20	Home2 - SSF Seismic-Y (Service Load)	Units: in
h2ssf-Adapt-171020-NoPorteCo.adv		Deformation

Adapt

2017-06
BDCI
(2)

S2) EOR VERIFIED APPLIED LOADS VIA CONFERENCE CALL WITH DCI ENGINEERS (SUPER STRUCTURE DESIGNERS) REGARDING INTERPRETATION OF APPLIED LOADS AND REACTIONS PROVIDED BY DCI ENGINEERS. (SEE ALSO ATTACHED DCI RESPONSE TO ITEM S2).

S3) LOAD COMBINATIONS INCLUDE THE WEIGHT OF THE SUPER STRUCTURE (SUPPLIED BY DCI) PLUS PODIUM SELF WEIGHT. IN ADDITION THE SEISMIC REACTIONS AT EACH WALL LINE OF SUPER STRUCTURE IS APPLIED TO THE PODIUM. SEE P. 20 & 21 (INCLUDED HOLDDOWN REACTIONS)

S4) a) PERIODIC SPECIAL INSPECTION:
ADDED NOTE 1.1 TO CBC TABLE 1705.3 ON SHEET SN-1.

b) CONTINUOS SPECIAL INSPECTION
ADDED NOTE 2.1 TO CBC TABLE 1705.3 ON SHEE SN-1.

S-5) THIS REDUCTION FACTOR IS FOR BEAM & COLUMN DESIGN. FOR THE UPPER PORTION. SINCE HILO ENGR DID NOT DESIGN THE UPPER PORTION, THIS FACTOR WAS NOT USED. HOWEVER, THE FACTOR WAS DETERMINED PER ASCE 7-10, 4.7.2.

$$L = L_0\left[\underbrace{0.25 + \frac{15}{\sqrt{K_{LL} A_T}}}_{R = 0.75}\right] \qquad A_T \geq 450\ sf \qquad K_{LL} = 2.$$

S-6) ADDED NOTE #22 TO REINFORCING NOTES ON SHEET SN-1

S-7) SEE ATTACHED TRASH ENCLOSURE CALC'S TS1-TS7 & DTL 27/SD2

S-8) PER ELECTRICAL CONSULTANT - DETAIL 1/EE6.1 IS NOT APPLICABLE AND HAS BEEN DELETED.

S-9) P 22 & 23 SHOWS MOMENT DEMAND WITH MOMENT CAPACITY ENVELOP. IT DOES NOT SHOW RATIOS BETWEEN THE TWO. SO THE VALUES YOU SEE SUCH AS S14.28 IS S14.28 FT-KIP MOMENT. NOTE TITLE STATES "MOMENT CAPACITY w/ DEMAND" (NOT RATIO).

S-10) CORRECT - COLUMN REACTION ARE ULTIMATE.

S-11) CORRECT - COLUMNS ARE GROUPED INTO TYPES

TYPE 1 - 18"×18" $P_{UMAX} = 864^{k}$ ($\phi P_N = 925^{k}$)

TYPE 2 - 18"×12" $P_{UMAX} = 584^{k}$ ($\phi P_N = 584^{k}$)

S-12) COLUMN NUMBERS ADDED. NOTE: COLUMNS 21-24 OF ORIGINAL DESIGN ARE PORTE-COCHERE REMOVED FROM MODEL SINCE THE PORTE COCHERE WAS CHANGED FROM CONCRETE TO STEEL STRUCTURE

S-13) SEE SHEET S2.3 AND REFERENCED DETAIL 3/SD2

S-14) CALCULATION PROVIDED ON p. 125.

S-15) PUNCHING SHEAR AND STUD RAIL DESIGN IS INTERNAL TO ADAPT SOFTWARE. SEE p. 34 FOR PUNCHING SHEAR CHECK. p. 35 SHOWS PUNCHING SHEAR PARAMETER (INTERIOR, CORNER EDGE ...) USE TO DETERMINE A_0. p. 36-37 STUD RAILS REQUIRED. (FOR COMPARISON SEE ATTACHED PAGE (A1-A3 USING DEACON STUD RAIL SUPPLIER SOFTWARE - COLUMN 11 - $P_N(D+L) = 580^{k}$ - NOTE NO STUD RAILS REQUIRED PER DEACON. DIFFERENCE IS DUE TO THE WAY ADAPT CONSIDERS PUNCHING SHEAR

2017-06
BDC1
(4)

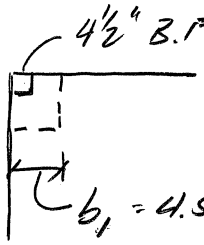
USING FINITE ELEMENT FOR ROOM TECH. SUPPORT.

S-16) SEE REVISED CALCULATIONS p. 100 & 100.2.

S-17) a) REVISED CALCULATION SEE p. 49 TO 65.
b) TIES EXTEND 12" MINIMUM INTO FOOTING, SEE 19/SD1.1
c) SEE DETAIL 19/SD1.1

S-18) ADDED DETAIL 12/SD1.1 FOR SLAB CORNER REINFORCING AND REVISED DETAIL 6/SD1.2.
CHECK PUNCHING SHEAR AT CORNER:
MAX HOLDOWN = 31350#
$P_u = 1.6(31350) = 50160^{\#} = 50.2^{K}$

BEARING PLATE = 4½" SQ.
SLAB THK = 15"
$d_c = 15 - 2\frac{1}{2} = 12.5"$



$b_o = 2b_1 = 34"$

$A_p = b_o d_c = 425 in^2$

$\phi P_N = \phi 4 \sqrt{F'_c}\, A_p$

$= \frac{0.75(4)\sqrt{5000}(425)}{1000} = 90.1^{K} > P_u = 50.2^{K}$

∴ OKAY
NO SHEAR R/F REQ'D

S-19) SEE ITEM S-18 ABOVE. BY INSPECTION HOLDOWN CAPACITY OKAY AT INTERIORS (NOTE: MAX. UPLIFT = 31.35^{K}. SEE p. 5)

S-20) STAIRS ARE PRE-FABRICATED STAIRS BY OTHERS. SEE SHEET SN-1 FOR DEFERRED SUBMITTAL REQUIREMENTS.

S-21) SLABS REDESIGNED - SEE REVISED P. 22.
DEMAND TO CAPACITY RATIO (MAXIMUM) IS 1.01 < 1.05
OKAY.
WITHIN 5% DESIGN TOLERANCE.

2017-06
BOC
(5)

S-22) See Item S-27 Below For Input & Output Explanation.

S-23) Column Numbers Added To p. 34. See Also Response To Item # S-15 Above For Punching Shear.

S-24) Loads Included By Modular Building Components Designer And Already Included With Podium Slabs Loads. (See Attached Response By DCI Engr.)

S-25) See Attached Page 12.11 To Ring & Sheets S03.1 & S03.2.

S-26) SPA Is Design-Build By Others.

S-27) The Slabs Is Designed As A Two-Way Slabs (Not Flat Slabs) See Page 14.1 & 14.2 Added To Calculations For Design Criteria Used For Each Design Section. Because Adapt Program Is Finite Element Program, Input & Output Are Best Presented Graphically. Design Criteria And Material Properties Are Provided On Pages 6-9, However Not All Materials Are Used (Ex Prestress Tendons) Parameters For Both One-Way & Two-Way Design Are Input. For All Slabs Design Sections The Program Checks Whether One-Way Or Two-Way Design Is Applicable. Design Criteria Used For Each Design Section Are Shown On Page 14.1 & 14.2 (Two-Way). The Structure Model (Input) Is Shown On Pages 10-14. Load Combinations On Pages 15-17. Loads (Input Graphically) Pages 18-20. Analysis Output (Graphically) - Moment Demand Versus Moment Capacity Pages 22-23, Slabs Deflections Pages 24-26. Column Reactions Pages 27-29, Column Reaction - Tabular Format Pages 29.1 to 29.14.

2017-06
RFI
(6)

S-28) Connection Design on p. 124 is for Node N-5 of RISA Model (See p. 106 - Connection for Member M-6) and Referenced as Detail 3/SD2 on Sheet S2.3.

S-29) a) Added Structural Steel Special Inspection Notes on Sheet SN-1

b) Seismic Parameters Revised

i) SDC Revised to "E"

ii) Calculations Revised for Revised Parameters.

S-30) Wall Piers - See Detail 16/SD1.1

i) $l_w/b_w \leq 6.0$

$b_w = 12" = 1'-0"$

$\therefore l_{w\,min} \leq 6.0 \Leftarrow$

ii) $h_w/l_w \geq 2.0$

$h_w = 8'-0$

$\therefore l_w \leq 4.0$

$\therefore$ Wall Pier w/ $l_w \leq 6.0$ Designed as Columns.

Longitudinal R/F

$A_{g\,min} = 0.1(12)(12) = 1.44 in^2/ft$ = 2-#5 V @ 5" o.c.

Transverse R/F

$A_{sh}/s_{bc} = 0.09\left(\frac{f'_c}{f_y}\right) = 0.0075 \Leftarrow$ Gov.

or $0.3\left(\frac{A_g}{A_{ch}} - 1\right)\left(\frac{f'_c}{f_y}\right) = 0.3\left(\frac{864}{700} - 1\right)(0.083) = 0.006$.

#3 ties $b_c = 12 - 2 = 10$

$\therefore s = 2.93" \approx 3"$ $\therefore$ #3 □ @ 3" o.c. for $l_o = 12"$ &

$l_o = 12"$ #3 □ @ 10" o.c. for Remainder

2017-06
Doc 1
(7)

S-31) SFRS Members Identified on Sheet S-2.3.

i) Note Added To Details 4, 5, & 6 / SD-2

S-32) Revised Column Calculations To ACI 318-14 & CBC 2016, See p. 30 - 33.1

S-33) a) See Revised Calculations Added p. 46.1 to 46.2.

b) See Revised Calculations Added p 46.7 to 46.10 & Sheet S-2.2 & Detail 20/S1.1.

S-34) a) Values Added to Sheet SN-1

b) Ponte Cochere:

X-Direction - Ponte Co Load is Dragged Into The Podium - See Calc's p 125 & Detail 4/SD2.

Y-Direction Cantilever Column w/ R = 2.5 Per ASCE 7-10, 12.2.3.3 Exception
1. Risk Category I or II - Okay.
2. 2 Story or Less ∴ One Story OK
3. R Used For Ponte Co Diaphragm = 2.5 (See p. 100).

S-35) a) Included p. 116.1 w/ Revised Calculations.
b) RISA-3D Design Based on AISC-360-10 (See p. 116.1)
c) Reactions Factored x 1.6 (See p. 124 & 125).
d) See Following Page.

S-35 (cont)

d) Verify Cantilevered Column
Member M16 & M17

Reaction At Joint N18

$P_z = 17.1^k$ $\quad P_{uz} = 1.6(17.1) = 27.4^k$
$P_x = 1.4^k$ $\quad P_{ux} = 1.6(1.4) = 2.2^k$
$P_y = 0.5^k$ $\quad P_{uy} = 1.6(0.5) = 8^k$
$M_x = 2.4^{k-1}$ $\quad M_{ux} = 1.6(2.4) = 3.8^{k-1}$

i) Check AISC-341-10, E6.4a - Axial Strength

$\frac{P_c}{\Omega_2}_{ROBO} = \frac{17.1}{0.15} = 117^k$ - Use W10×68 (See C.)

$\frac{P_c}{\Omega_2} = 206^k$

ii) Bracing W10×68

$M_r = \frac{R_y F_y Z}{1.5}$

$R_y = 1.0$
$F_y = 50\ ksi$
$Z_x = 85.3\ in^3$

$= \frac{1(50)(85.3)}{1.5(12)} = 237^{k-1} > M_x = 2.4^{k-1}$

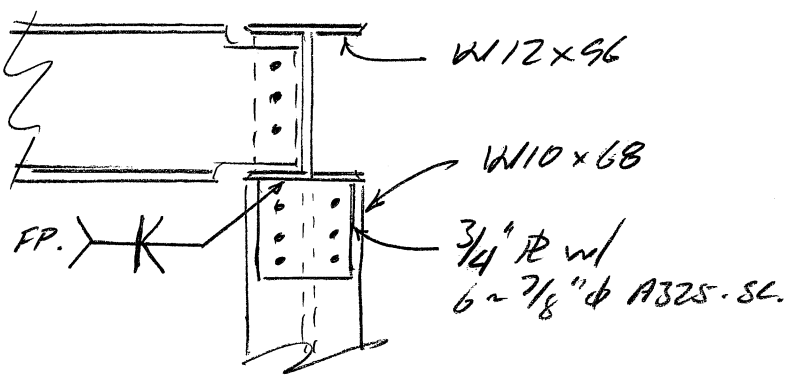
$L_{b\ max} = \frac{0.17 r_y E}{F_y} = \frac{0.17(2.59)(29000)}{50} = 255'' > 10''$ OK

$P_{br} = 0.004 P_r = 0.004(17.1) = 0.07^k$

$6 \sim 7/8''\phi$ A325-SC $= 6(14.4) = 86.4^k \gg 0.07^k$

FP $= 14.4(0.75)(10) = 108^k \gg 0.07^k$

$t_f = 0.75''$
$b_f = 10$



2017-06
BDC1
(5)

iii) HIGHLY DUCTILE PROVISIONS. W10×68

$$\frac{b}{t} = \frac{10.10}{2(0.77)} = 6.6 < 0.30\sqrt{\frac{E}{F_y}} = 7.22$$

OK

$$\frac{h}{t_w} = \frac{10.4}{0.47} = 22 < \frac{1.67(206)}{50} = 6.8$$

OK

$$1.49\sqrt{\frac{E}{F_y}} = 35.$$

iv) SHOWN ON DETAIL 6/SD2

v) NOTED ON DETAIL 6/SD2

vi) SEE ADD CALC p. 127 OF REVISED CALCULATIONS

S-36) $T_{TIE\ BM} = 0.10\, S_{DS}\, T_{PILE\ CAP}$

60" PILE CAP w/ #8 @ 12" O.C

$$T_{PILE\ CAP} = \left(\frac{60}{12}+1\right)(60)(0.75) = 248^{K}$$

$$T_{TIE\ BM} = 0.1(1.253)(248) = 32^{K}$$

$$A_{S_{12}} = \frac{32}{0.5(60)} = 0.60\ in^2 \ll \frac{12\text{-}\#8\ MIN}{\text{PROVIDE IN}\ 6\#12\ BM}$$

S-37) CARPORT DESIGN BY CAR PORT MANUFACTURER

F1) ATTACHED LETTER

F2) NOTE ADDED TO FOUNDATION NOTE #8 ON SHEET SN-1.

F3) SEE RETAINING WALL CALCULATION ATTACHED PAGES RTN1 - RTN5 AND SHEET SD3.1 & SD3.2

F4) SEE CALCULATIONS ADDED PAGE 64.1 TO 64.4 FOR WALLS 29 - 31.

OUT RUNNER / RETAIN WALL

$H = 5'0$

$W = 60.0$ PCF (ACT. ASSU)

$W_u = 1.6(60)$

$M_u = 875^{\#-1}/_{FT}$.

1 #5 V @ 12" o.c. E.F.

$\phi M_n = 13.500^{\#-1}/_{FT} \gg M_u = 875^{\#-1}/_{FT}$.

∴ 12" CONC. WALL w/ #5 V @ 12" O.C E.F. OKAY

ELEV. PIT SLAB

ELEV. BUFFER LOAD = 20,250#

$P_u = 2(20,250) = 40500^{\#}$

SLAB THK $t = 24"$ MIN.

BEARING PLATE ≈ 6" SQ.

CHECK PUNCHING

$d = 24 - 3 = 2(0.5)(0.75) = 18.125"$ — #7 T&S

$b_o = 18.125\pi = 56.94"$

$A_p = 56.94(18.125) = 1032 \text{ in}^2$

$\phi P_n = 0.75(4)\sqrt{5000}(1032) = 219^{K} > P_u = 41^{K}$

∴ 24" THK SLAB w/ #7 @ 10" O.C EW

WALL FOOTING

SEE GRADE BEAM CALC'S FOR GRADE BEAM GB-2 @ 88

F5) 5/E6.0 IS NOT USED AS A BARRIER FOR AUTOMOBILES IT IS USED TO PROTECT ITEMS SUCH AS WINDOWS. CBC 1607.7.3 IS NOT APPLICABLE FOR THIS SITUATION.

F6) SEE ATTACHED CALCULATION - PAGE LP1.

F7) REFERENCED CORRECTED TO 7/SD1.2

F8) SEE RESPONSE BY GEOTECH ENGINEER.

F9) a) SLABS IS AT 1ST LEVEL SHOWN ON SHEET S-1.0. ADDED SLABS SECTION REFERENCE TO DETAIL 5/SD1.2 ALSO ADDED SCHEMATIC SECTION TO CALC's p. 86.

b) SEE DETAIL 5/SD1.2. CALCULATION p. 89 CORRECTED FOR $d = 12.5 - 3.5 = 9''$

F10) CORRECTED FOR $d = 12.5 - 3.5 = 9''$

F11) SEE ITEM F4 ABOVE FOR ELEVATION DIF.

F12) ADDED DETAIL 11/SD1.2

F13) THE REFERENCED DETAIL HAS BEEN ADDED

F14) CORRECTED

F15) CORRECTED - THIS IS FOR A 3-PILE SYSTEM. CRITICAL DIMENSIONS FOR ANALYSIS IS BASED ON TRIANGULAR DISTRIBUTION, HOWEVER, SQUARE SHAPE IS SHOWN ON PLANS SINCE IT MAKES CONSTRUCTION EASIER.

F16) SEE ITEM F15

F17) SEE CALCULATIONS p. 88 FOR GB2.

F18) PERIOD IS $T = 0.484$ SEC (SEE ITEM S.1.6).

F19) a) SPECIAL INSPECTIONS HAVE BEEN ADDED TO SHEET DDP-1.0
b) SINGLE TEST PILE LOCATION HAS BEEN INDICATED ON SHEET DDP-2.1. SEE GEOTECHNICAL ENGINEER RESPONSE FOR SINGLE TEST PILE

F20) • REQUIREMENTS OF ACI 318-14, 18.7.5.4 DOES NOT APPLY TO PILE CAPS SINCE PILE CAPS ARE NOT DESIGNED AS A MOMENT FRAME. SEE PILE SYSTEM DESIGNER RESPONSE FOR TRANSVERSE REINFORCEMENT IN PILES.
• PER GEOTECHNICAL ENGINEER COMMENT RESPONSE. SITE CLASS 'D' WILL REMAIN. NO CHANGES TO DDP SHEETS.

F21) FERRELL HAS REVISED THE PILE CAP LAYOUT TO REFLECT A MINIMUS SPACING OF 3-PILE DIAMETERS. SEE SHEETS DDP-2.1 DETAIL 13.

5

2017-06
IBC
(A1)

STDesign 3.1 Decon® Studrail® Design

Connection 1, Page 1

PROJECT DATA

Project name: Home2, SSF
Project number: 2017-06
Engineer:
Date: 18 October 2017
File path: F:\HCP ENGINEERING\ENGINEERING PROGRAM DATA\DeconStudRails\2017-06-Home2,SSF.srp

Column 11
Check Punching Shear

INPUT DATA

Connection name: Connection 1

General:
Design code: ACI 318-05
System of units: US (in, k, k-ft, psi)

Connection:
Connection location: Interior
Column dimension, c_x: 60.00 in
Column dimension, c_y: 60.00 in

Loads:
V_u: 580.0 k
M_{ux}: 0.000 k-ft
M_{uy}: 0.000 k-ft

Openings:
None.

Slab:
Effective depth, d: 13.00 in
Slab thickness: 15.00 in
Top cover: 1.000 in
Bottom cover: 1.000 in
Concrete compressive strength, f'_c: 5000 psi
Concrete density: Normal weight
Prestress, f_{pc}: 0.000 psi

Studrails:
2003/2006 IBC ductility requirement: No
Stud yield strength, f_{yv}: 5.000×10^4 psi
Stud diameter: Automatic
Typical stud spacing, S: Automatic
End stud spacing, S_0: Automatic
Number of studrails: Automatic

WDT-06
R001
(A2)

STDesign 3.1 Decon® Studrail® Design
Connection 1, Page 2

STUDRAIL SUMMARY

Number of studrails per column: N/A
Number of studs per studrail: N/A
Stud diameter: N/A
Typical stud spacing, S: N/A
End stud spacing, S_0: N/A
Overall height of studrail: N/A

OUTPUT DATA

Inner Critical Section (d/2 outside of column face):

Common Properties

Area, A_c: 3796 in^2
Critical Section Perimeter, b_0: 292.0 in

Natural Axis Properties

Centroid coordinate, e_x: 0.0 in
Centroid coordinate, e_y: 0.0 in
Section moment of inertia, I_x: 3.371×10^6 in^4
Section moment of inertia, I_y: 3.371×10^6 in^4
Section product of inertia, I_{xy}: 0.0 in^4

Principal Axis Properties

Centroid coordinate, e_1: 0.0 in
Centroid coordinate, e_2: 0.0 in
Section moment of inertia, I_1: 3.371×10^6 in^4
Section moment of inertia, I_2: 3.371×10^6 in^4
Principal axis rotation, (theta): 0.0 degrees
Moment fraction, γ_{v1}: 0.400
Moment fraction, γ_{v2}: 0.400

Natural Axis Loads

V_u: 580.0 k
M_{ux}: 0.0 k-ft
M_{uy}: 0.0 k-ft

Principal Axis Loads

V_u: 580.0 k
M_{u1}: 0.0 k-ft
M_{u2}: 0.0 k-ft

Stresses

Maximum shear stress, v_u: 152.8 psi
at x = 36.50 in, y = 36.50 in

Shear resistance, ϕv_n (concrete only): 200.5 psi
Shear resistance, ϕv_n (upper limit): 318.2 psi

Outer Critical Section (d/2 outside of reinforced zone): N/A

Design Comments:

Studrails are not required. The maximum factored shear stress, v_u, is only 152.8 psi, but the resistance without Studrails, ϕv_c, is 200.5 psi.
For prestressed slabs, concrete strength above 4900 psi does not result in increased punching resistance.

2017-06
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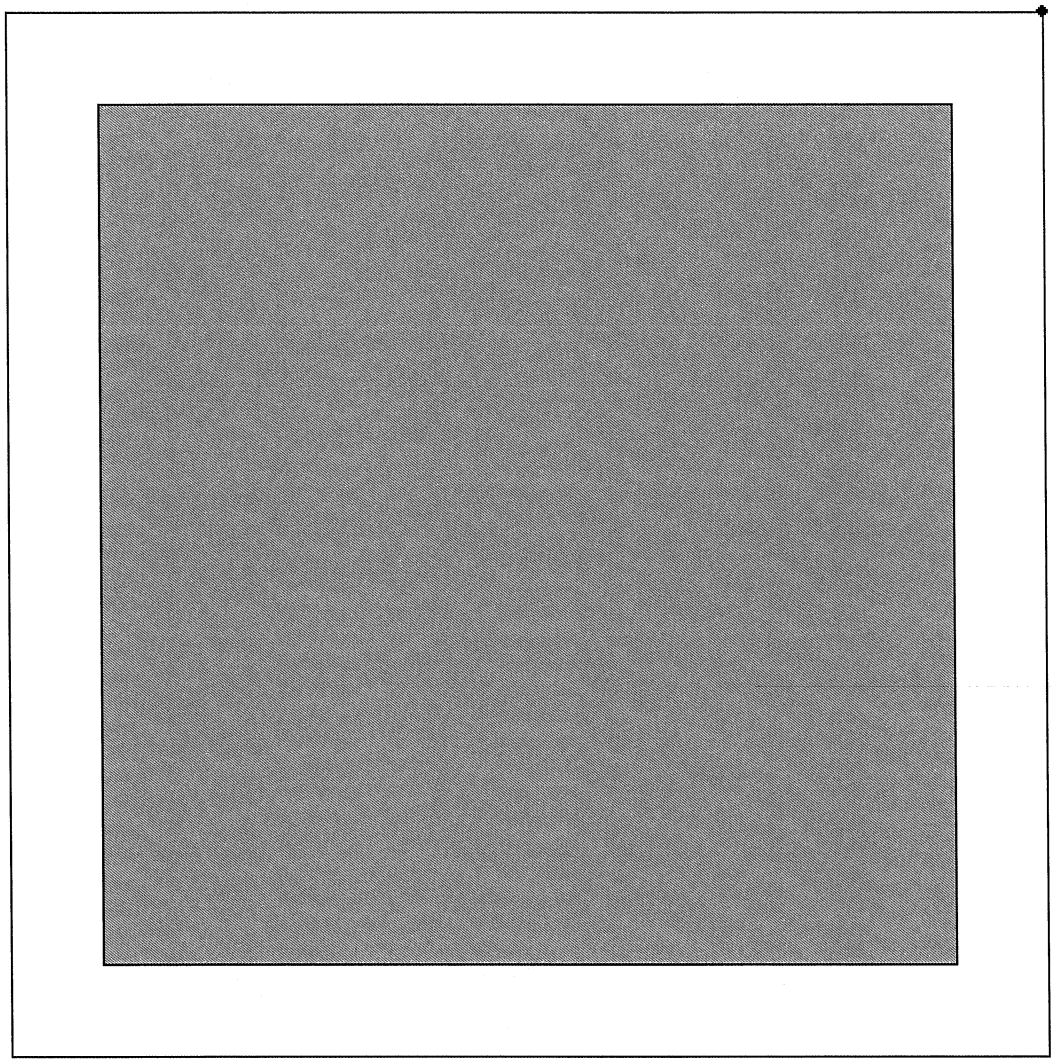
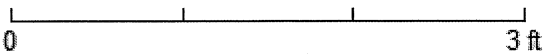
123

STDesign 3.1 Decon® Studrail® Design

Connection 1, Page 3

PLAN VIEW





ELEVATION VIEW

2017-06
(TR1)

TRELLIS

DEAD LOAD

FINISHING: 2×12	4.0 PSF
MISC	1.0 PSF
BEAMS	4.0
	9.0 PSF

LIVE LOAD 10.0 PSF
OR 300# CONCENTRATED.

TRUSS = 2×12 @ 16" O.C

L = 11'6"
W = (9+10)(1.33) = 26 PLF

R = 150#
M = 5.2 K-IN
I = 13 in⁴

w/ CONCENTRATED LOAD.
P = 300#
w_{DL} = 9(1.33) = 12 PLF.

R = 215#
M = 13 K-IN
I = 30 in⁴

2×12 @ 16" O.C OKAY

BEAMS

L = 11'6"
W = 19(11.5) = 215 PLF

R = 1400#
M_q = 4 K-FT

HSS12×4×3/16 (ARCH. ROOF'S SIZE)
$\frac{M_d}{\Omega}$ = 46 K-FT

L = 18'0"
W = 219 PLF.

R = 2200#
M_q = 9.7 K-FT

HSS12×4×3/16 (ARCH ROOF'S SIZE)
$\frac{M_d}{\Omega}$ = 48 K-FT

2017-06
(TRZ)

COLUMN

$H = 12^0$

$P_{MAX} = 1400 + 2200 = 3{,}600^{\#}$

$KL = (1)(12) = 12'$

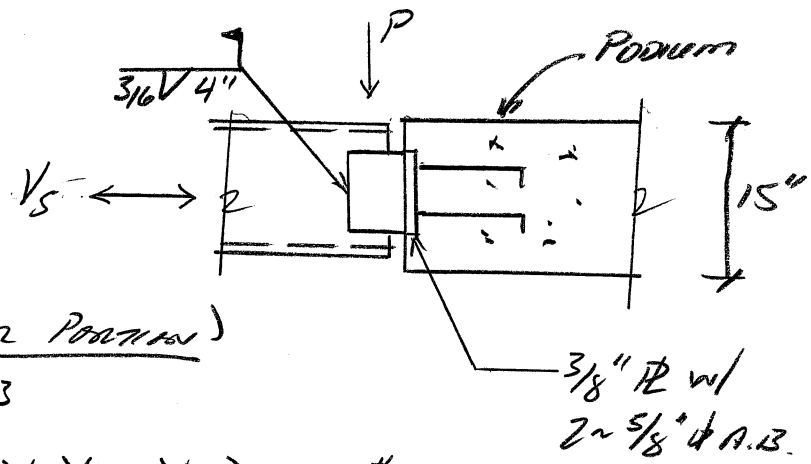
HSS 4x4x1/8 (MIN SIZE)

$\frac{P_u}{\phi_c} = 27.8^{k} \gg 3.6^{k}$ ∴ HSS 4x4x1/8

TIE TO PODIUM

$P_{MAX} = 1400^{\#}$

$P_u = 2170^{\#}$



SEISMIC (SMALLER PORTION)

ASCE 7-10, 12.1.3

$V_s = 0.133(1.243)(9)(11.5)(30) = 534^{\#}$

2~5/8" ϕ A.B. $\phi V_N = 2.3^{k}$ PER 5/8" ϕ A.B. $> P_u = 1.7^{k}$

$\phi N_n = 6.9^{k}$ PER 5/8" ϕ A.B. $> V_s = 0.5^{k}$

∴ 2~5/8" ϕ A.B. @ 12" O.C.

FOOTINGS

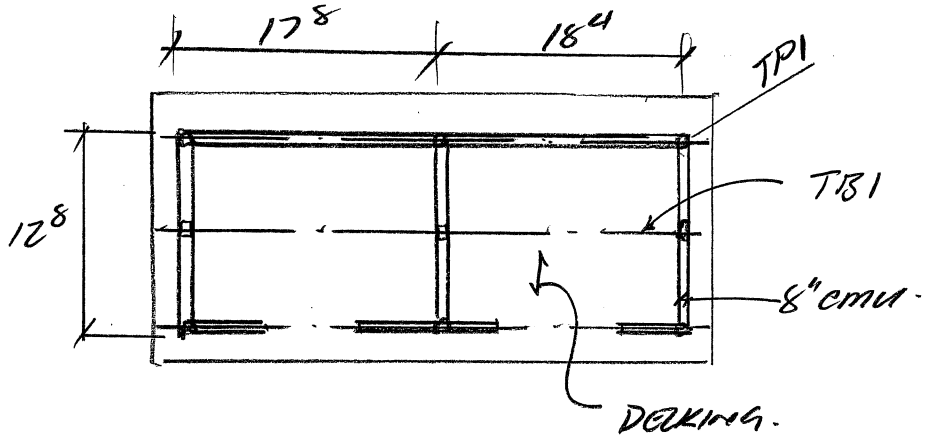
$P = 3600^{\#}$

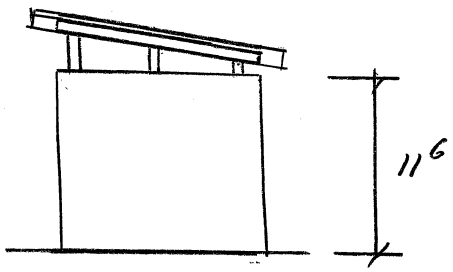
ASP: 1500 PSF

USE 2' SQ x 12" THK
W/ #4 @ 12" O.C. EW
($P_A = 6{,}000^{\#}$)

2017-06
TS1

TRASH ENCLOSURE





LOADS

DEAD

Roofing - Decking w/ Sm. Scuppers	6.0 PSF
Framing	6.0
	12.0 PSF

LIVE

20.0 PSF

WIND

110 MPH
$p = 16.0$ PSF

SEISMIC

$$V_S = \frac{0.8 S_1 W_S}{R/I}$$

$S_1 = 0.909$
$R = 3.0$
$I = 1.0$
$W_S = 6400^{\#}$

$$V_S = 0.24 W_S$$

$$V_{S\,ASD} = 0.7(0.24)(6400) = 1075^{\#}$$

2017-06
TS2

DECKING

$L_{max} = 6'$

$W = 32$ PSF — USE ASC - B-36x2000
$S_{allow} = 66$ PSF

$q = \frac{1085}{2(12.7)} = 43^{\#/"} < S_m = 1041^{\#/"}$.

BEAM

TB1 $L = 18'$

$W = 32(6.33) = 203^{\#/'}$

$R = 1853^{\#}$

$M_u = 10.0^{'k-'}$

HSS 8x4x1/4

$\frac{M_r}{\Omega} = 33^{'k-'}$

$\Delta = 0.455" = L/475$

STUB POST - TP1

$H = 1'-6"$ max.

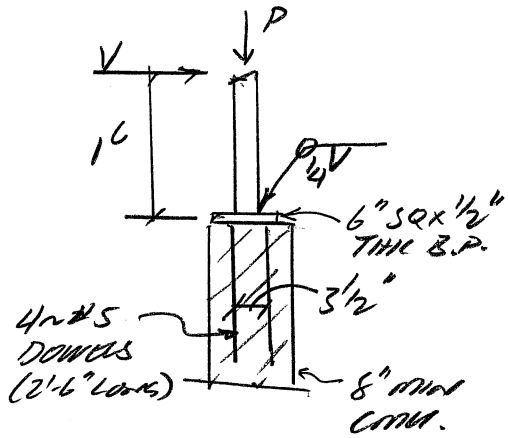
$P = 1853^{\#} \times 2 = 3714^{\#}$

$P_{DL} = 1352^{\#}$

$V_s = \frac{1085}{6} = 181^{\#}$

$V_w = \frac{16(2)(36)}{6} = 192^{\#}$

$M_{col} = 192(1.5) = 288^{\#-'}$ — HSS4x4x3/16 $\frac{M_r}{\Omega_b} = 8.42^{'k-'}$



BASE PL

$M = 288^{\#-'}$

$M_u = 1.4(288) = 403^{\#-'}$

2-#5 DWL (4 TOTAL)

$b = 6"$ $d = 3.5 + 1.5 = 4.75"$

$F_c' = 1500$ PSI

$a = 5.84"$ — $\phi M_n = 3.3^{'k-'} > 0.403^{'k-'}$ ∴ USE 6"SQx1/2" THK B.P W/ 4-#5x2'-6" DOWELS

Inward Allowable (f_b/Ω) and Factored (Φf_b) Distributed Load (lbs/ft²)

Gage	Span	Limit Condition	Panel Span (Support Spacing) 4' - 0"	5' - 0"	6' - 0"	7' - 0"	8' - 0"	9' - 0"	10' - 0"	11' - 0"	12' - 0"
22	SS	f_b/Ω	177	113	79	58	44	35	28	23	20
		Φf_b	281	180	125	92	70	56	45	37	31
		L/360	120	61	35	22	15	11	8	6	4
		L/240	-	92	53	34	22	16	11	9	7
		L/180	-	-	71	45	30	21	15	12	9
		L/120	-	-	-	-	-	32	23	17	13
	DS	f_b/Ω	185	118	82	60	46	37	30	24	21
		Φf_b	293	188	130	96	73	58	47	39	33
		L/360	-	-	-	54	36	25	18	14	11
		L/240	-	-	-	-	-	-	28	21	16
		L/180	-	-	-	-	-	-	-	-	-
		L/120	-	-	-	-	-	-	-	-	-
	TS	f_b/Ω	231	148	103	75	58	46	37	31	26
		Φf_b	367	235	163	120	92	72	59	48	41
		L/360	-	135	78	49	33	23	17	13	10
		L/240	-	-	-	74	50	35	25	19	15
		L/180	-	-	-	-	-	-	34	25	20
		L/120	-	-	-	-	-	-	-	-	-
20	SS	f_b/Ω	221	141	98	72	55	44	35	29	25
		Φf_b	350	224	156	114	88	69	56	46	39
		L/360	149	76	44	28	19	13	10	7	6
		L/240	-	114	66	42	28	20	14	11	8
		L/180	-	-	88	56	37	26	19	14	11
		L/120	-	-	-	-	-	39	29	21	17
	DS	f_b/Ω	233	149	104	76	58	46	37	31	26
		Φf_b	370	237	164	121	93	73	59	49	41
		L/360	-	-	-	67	45	31	23	17	13
		L/240	-	-	-	-	-	-	34	26	20
		L/180	-	-	-	-	-	-	-	-	-
		L/120	-	-	-	-	-	-	-	-	-
	TS	f_b/Ω	292	187	130	95	73	58	47	39	32
		Φf_b	463	296	206	151	116	91	74	61	51
		L/360	-	168	97	61	41	29	21	16	12
		L/240	-	-	-	92	62	43	32	24	18
		L/180	-	-	-	-	-	-	42	32	24
		L/120	-	-	-	-	-	-	-	-	-
18	SS	f_b/Ω	300	192	133	98	75	59	48	40	33
		Φf_b	475	304	211	155	119	94	76	63	53
		L/360	208	106	62	39	26	18	13	10	8
		L/240	-	160	92	58	39	27	20	15	12
		L/180	-	-	123	78	52	36	27	20	15
		L/120	-	-	-	-	-	55	40	30	23
	DS	f_b/Ω	312	200	139	102	78	62	50	41	35
		Φf_b	495	317	220	162	124	98	79	65	55
		L/360	-	-	-	93	63	44	32	24	19
		L/240	-	-	-	-	-	-	48	36	28
		L/180	-	-	-	-	-	-	-	-	-
		L/120	-	-	-	-	-	-	-	-	-
	TS	f_b/Ω	390	250	173	127	97	77	62	52	43
		Φf_b	619	396	275	202	155	122	99	82	69
		L/360	-	235	136	86	57	40	29	22	17
		L/240	-	-	-	-	86	60	44	33	25
		L/180	-	-	-	-	-	-	59	44	34
		L/120	-	-	-	-	-	-	-	-	-
16	SS	f_b/Ω	376	241	167	123	94	74	60	50	42
		Φf_b	597	382	265	195	149	118	96	79	66
		L/360	262	134	78	49	33	23	17	13	10
		L/240	-	201	116	73	49	34	25	19	15
		L/180	-	-	155	98	65	46	33	25	19
		L/120	-	-	-	-	-	69	50	38	29
	DS	f_b/Ω	383	245	170	125	96	76	61	51	43
		Φf_b	608	389	270	198	152	120	97	80	68
		L/360	-	-	-	118	79	55	40	30	23
		L/240	-	-	-	-	-	-	61	45	35
		L/180	-	-	-	-	-	-	-	-	-
		L/120	-	-	-	-	-	-	-	-	-
	TS	f_b/Ω	479	306	213	156	120	95	77	63	53
		Φf_b	760	486	338	248	190	150	122	100	84
		L/360	-	296	171	108	72	51	37	28	21
		L/240	-	-	-	-	108	76	55	42	32
		L/180	-	-	-	-	-	-	74	56	43
		L/120	-	-	-	-	-	-	-	-	-

DGB-36 & DGBF-36

Arc Spot/Seam Welds to Supports with DeltaGrip® Side Seam Attachment

Allowable Diaphragm Shear, q_a (plf)

Flexibility Factor, F (10^{-6}in/lbs)

Gage	Welds	Spacing		Span 4'-0"	5'-0"	6'-0"	7'-0"	8'-0"	9'-0"	10'-0"	11'-0"	12'-0"
20	36/7/4	4"	q_a	2332	2261	2211	2173	1916	1514	1226	1013	852
			F, lap	5.9-0.6R	6-0.6R	6.1-0.5R	6.2-0.5R	6.3-0.4R	6.4-0.4R	6.4-0.4R	6.4-0.4R	6.5-0.3R
			F, no lap	4.1+22.9R	4.6+18.3R	4.9+15.2R	5.1+13.1R	5.3+11.5R	5.5+10.2R	5.6+9.2R	5.7+8.4R	6.2+6.6R
		6"	q_a	2025	1924	1851	1796	1754	1514	1226	1013	852
			F, lap	6.6-1R	6.9-0.9R	7.1-0.9R	7.2-0.9R	7.4-0.8R	7.5-0.8R	7.6-0.7R	7.6-0.7R	7.7-0.6R
			F, no lap	4.8+22.5R	5.4+17.9R	5.9+14.8R	6.2+12.7R	6.4+11.2R	6.6+9.9R	6.8+8.9R	6.9+8R	7.5+6.3R
		8"	q_a	1825	1751	1618	1590	1503	1493	1226	1013	852
			F, lap	7.1-1.3R	7.4-1.2R	7.8-1.3R	7.9-1.2R	8.3-1.2R	8.3-1.1R	8.6-1.1R	8.6-1R	8.8-0.9R
			F, no lap	5.3+22.2R	5.9+17.6R	6.6+14.4R	6.9+12.4R	7.3+10.8R	7.4+9.5R	7.8+8.5R	7.9+7.7R	8.5+6R
		12"	q_a	1587	1445	1344	1269	1211	1160	1114	1013	852
			F, lap	7.9-1.8R	8.5-1.9R	9-2R	9.4-1.9R	9.7-1.9R	10-1.9R	10.2-1.8R	10.5-1.8R	10.6-1.5R
			F, no lap	6.1+21.7R	7.1+16.9R	7.8+13.7R	8.3+11.6R	8.7+10.1R	9.1+8.8R	9.4+7.8R	9.7+6.9R	10.3+5.4R
		18"	q_a	1452	1329	1128	1066	1020	897	877	861	781
			F, lap	8.5-2.2R	9.1-2.3R	10.2-2.8R	10.5-2.7R	10.8-2.5R	11.7-2.9R	11.9-2.7R	12-2.6R	12.6-2.3R
			F, no lap	6.7+21.3R	7.6+16.5R	9+12.9R	9.4+10.9R	9.8+9.4R	10.9+7.8R	11.1+6.9R	11.3+6.2R	12.4+4.6R
		24"	q_a	1308	1207	996	954	823	809	719	717	650
			F, lap	9.1-2.8R	9.7-2.8R	11-3.4R	11.3-3.2R	12.4-3.6R	12.5-3.4R	13.5-3.7R	13.5-3.4R	14.2-3R
			F, no lap	7.3+20.7R	8.3+16R	9.8+12.3R	10.2+10.4R	11.4+8.4R	11.6+7.3R	12.7+6R	12.8+5.3R	13.9+3.9R
		36"	q_a	1308	1056	865	841	724	634	640	574	519
			F, lap	9.1-2.8R	10.6-3.5R	12-4.2R	12.2-3.9R	13.4-4.3R	14.7-4.9R	14.5-4.3R	15.7-4.8R	16.3-4.1R
			F, no lap	7.3+20.7R	9.1+15.3R	10.8+11.5R	11.1+9.7R	12.4+7.6R	13.8+5.8R	13.7+5.3R	14.9+3.9R	16.1+2.9R
		48"	q_a	1145	1056	865	728	626	634	561	502	453
			F, lap	10-3.6R	10.6-3.5R	12-4.2R	13.4-4.8R	14.7-5.4R	14.7-4.9R	15.8-5.3R	17.1-5.8R	17.7-4.8R
			F, no lap	8.2+19.9R	9.1+15.3R	10.8+11.5R	12.3+8.8R	13.8+6.6R	13.8+5.8R	15+4.3R	16.4+2.9R	17.5+2.1R
		60"	q_a	1145	898	865	728	626	546	483	502	453
			F, lap	10-3.6R	11.7-4.5R	12-4.2R	13.4-4.8R	14.7-5.4R	16.2-6R	17.5-6.5R	17.1-5.8R	17.7-4.8R
			F, no lap	8.2+19.9R	10.2+14.3R	10.8+11.5R	12.3+8.8R	13.8+6.6R	15.3+4.6R	16.7+3.1R	16.4+2.9R	17.5+2.1R
	36/5	4"	q_a	1884	1847	1820	1799	1782	1514	1226	1013	852
			F, lap	6-0.6R	6.1-0.5R	6.2-0.5R	6.3-0.4R	6.4-0.4R	6.4-0.4R	6.5-0.3R	6.5-0.3R	6.5-0.3R
			F, no lap	-4.7+139.3R	-2.4+111.4R	-0.9+92.8R	-0.1+80.2R	0.6+70.7R	1.2+62.8R	1.7+56.8R	2.2+51.6R	5.2+40.9R
		6"	q_a	1699	1637	1592	1557	1530	1507	1226	1013	852
			F, lap	6.8-0.9R	7.1-0.9R	7.3-0.8R	7.4-0.8R	7.5-0.7R	7.6-0.7R	7.7-0.7R	7.8-0.6R	7.8-0.5R
			F, no lap	-3.9+138.9R	-1.5+111R	0.1+92.4R	1+79.8R	1.7+70.4R	2.4+62.5R	3+56.5R	3.5+51.3R	6.5+40.6R
		8"	q_a	1564	1518	1426	1409	1345	1340	1226	1013	852
			F, lap	7.5-1.3R	7.7-1.2R	8.1-1.2R	8.2-1.1R	8.5-1.1R	8.5-1R	8.8-1R	8.8-0.9R	9-0.8R
			F, no lap	-3.3+138.5R	-0.9+110.7R	1+92R	1.8+79.5R	2.7+70R	3.4+62.2R	4.1+56.1R	4.5+51R	7.6+40.4R
		12"	q_a	1390	1288	1212	1155	1110	1074	1044	1013	852
			F, lap	8.4-1.9R	9-2R	9.5-2R	9.8-1.9R	10.2-1.9R	10.4-1.8R	10.7-1.7R	10.9-1.7R	11-1.4R
			F, no lap	-2.3+137.9R	0.4+109.9R	2.3+91.3R	3.4+78.7R	4.3+69.3R	5.3+61.4R	5.9+55.4R	6.5+50.2R	9.6+39.7R
		18"	q_a	1285	1194	1039	1001	971	863	846	833	756
			F, lap	9.1-2.4R	9.7-2.4R	10.9-2.9R	11.2-2.7R	11.4-2.5R	12.4-2.9R	12.6-2.7R	12.7-2.5R	13.3-2.3R
			F, no lap	-1.6+137.5R	1.1+109.5R	3.7+90.4R	4.8+77.9R	5.6+68.6R	7.3+60.3R	7.8+54.5R	8.3+49.4R	11.9+38.9R
		24"	q_a	1166	1092	943	910	785	775	689	690	625
			F, lap	9.9-3.1R	10.5-3R	11.9-3.6R	12.1-3.3R	13.3-3.7R	13.4-3.4R	14.5-3.7R	14.4-3.4R	15.1-3.1R
			F, no lap	-0.8+136.8R	1.9+108.9R	4.7+89.6R	5.7+77.3R	7.5+67.4R	8.2+59.8R	9.7+53.4R	10.1+48.5R	13.8+38.1R
		36"	q_a	1166	980	814	797	686	600	610	546	493
			F, lap	9.9-3.1R	11.6-3.8R	13.2-4.6R	13.3-4.1R	14.6-4.6R	16-5.2R	15.7-4.5R	17-5R	17.7-4.3R
			F, no lap	-0.8+136.8R	3+108R	6+88.6R	6.9+76.5R	8.8+66.5R	10.9+58R	11+52.6R	12.7+46.9R	16.4+36.9R
		48"	q_a	1034	980	814	685	588	600	531	474	427
			F, lap	11.1-4.1R	11.6-3.8R	13.2-4.6R	14.8-5.3R	16.3-5.9R	16-5.2R	17.4-5.6R	18.8-6.2R	19.5-5.2R
			F, no lap	0.4+135.8R	3+108R	6+88.6R	8.4+75.3R	10.5+65.2R	10.9+58R	12.6+51.5R	14.4+45.7R	18.1+36R
		60"	q_a	1034	837	814	685	588	512	452	474	427
			F, lap	11.1-4.1R	13-5.1R	13.2-4.6R	14.8-5.3R	16.3-5.9R	18-6.6R	19.5-7.2R	18.8-6.2R	19.5-5.2R
			F, no lap	0.4+135.8R	4.5+106.8R	6+88.6R	8.4+75.3R	10.5+65.2R	12.8+56.6R	14.7+49.9R	14.4+45.7R	18.1+36R
	36/4	4"	q_a	1575	1555	1540	1528	1520	1513	1226	1013	852
			F, lap	6.1-0.5R	6.3-0.5R	6.4-0.4R	6.4-0.4R	6.5-0.3R	6.5-0.3R	6.6-0.3R	6.6-0.3R	6.6-0.2R
			F, no lap	-9+197.5R	-5.9+157.9R	-3.8+131.6R	-2.6+113.8R	-1.8+100.3R	-0.8+89.2R	-0.2+80.6R	0.5+73.2R	4.7+58.1R
		6"	q_a	1434	1397	1369	1348	1332	1319	1226	1013	852
			F, lap	7.1-0.9R	7.3-0.8R	7.5-0.8R	7.6-0.7R	7.7-0.7R	7.8-0.6R	7.9-0.6R	7.9-0.5R	8-0.5R
			F, no lap	-8.1+197.1R	-4.8+157.6R	-2.6+131.2R	-1.5+113.4R	-0.5+100R	0.5+88.9R	1.1+80.3R	1.8+73R	6+57.8R
		8"	q_a	1323	1300	1234	1228	1182	1184	1149	1013	852
			F, lap	7.8-1.3R	8-1.1R	8.5-1.2R	8.5-1R	8.8-1R	8.8-0.9R	9.1-0.9R	9-0.8R	9.2-0.7R
			F, no lap	-7.3+196.7R	-4.2+157.3R	-1.7+130.8R	-0.6+113.1R	0.6+99.7R	1.5+88.6R	2.3+80R	2.9+72.7R	7.3+57.6R
		12"	q_a	1170	1099	1047	1008	977	952	931	914	852
			F, lap	9-2R	9.6-2R	10-1.9R	10.4-1.8R	10.7-1.8R	10.9-1.7R	11.1-1.6R	11.3-1.6R	11.4-1.3R
			F, no lap	-6.2+196R	-2.6+156.4R	-0.1+130.1R	1.3+112.3R	2.4+98.9R	3.6+87.8R	4.4+79.2R	5.2+71.9R	9.5+57R
		18"	q_a	1073	1014	887	865	849	761	755	750	680
			F, lap	9.9-2.5R	10.4-2.4R	11.8-2.9R	12-2.7R	12.2-2.5R	13.3-2.8R	13.3-2.6R	13.4-2.4R	14.1-2.2R
			F, no lap	-5.3+195.5R	-1.8+156R	1.7+129.1R	3+111.4R	3.9+98.2R	6+86.7R	6.6+78.3R	7.3+71.1R	12.2+56.1R
		24"	q_a	960	917	793	779	671	674	597	606	548
			F, lap	11-3.4R	11.5-3.2R	13.1-3.8R	13.1-3.4R	14.5-3.8R	14.4-3.4R	15.6-3.7R	15.5-3.4R	16.3-3.1R
			F, no lap	-4.2+194.6R	-0.7+155.2R	2.9+128.2R	4.1+110.8R	6.3+96.9R	7.1+86.1R	8.9+77.1R	9.3+70.1R	14.4+55.2R
		36"	q_a	960	809	661	667	572	498	518	463	417
			F, lap	11-3.4R	12.9-4.2R	14.8-5.1R	14.6-4.4R	16.2-4.9R	17.8-5.5R	17.2-4.7R	18.6-5.1R	19.5-4.5R
			F, no lap	-4.2+194.6R	0.7+154.2R	4.7+126.9R	5.6+109.8R	7.9+95.8R	10.4+84R	10.5+76.2R	12.5+68.4R	17.6+53.8R
		48"	q_a	829	809	661	554	473	498	440	391	351
			F, lap	12.6-4.7R	12.9-4.2R	14.8-5.1R	16.6-5.8R	18.5-6.5R	17.8-5.5R	19.3-6R	20.9-6.6R	21.9-5.6R
			F, no lap	-2.5+193.3R	0.7+154.2R	4.7+126.9R	7.6+108.3R	10.2+94.2R	10.4+84R	12.6+74.9R	14.8+66.9R	19.9+52.7R
		60"	q_a	829	654	661	554	473	411	361	391	351
			F, lap	12.6-4.7R	14.9-5.9R	14.8-5.1R	16.6-5.8R	18.5-6.5R	20.3-7.3R	22.1-7.9R	20.9-6.6R	21.9-5.6R
			F, no lap	-2.5+193.3R	2.8+152.5R	4.7+126.9R	7.6+108.3R	10.2+94.2R	13+82.2R	15.4+72.9R	14.8+66.9R	19.9+52.7R

HCP ENGINEERING
STRUCTURAL ENGINEERING & DESIGN

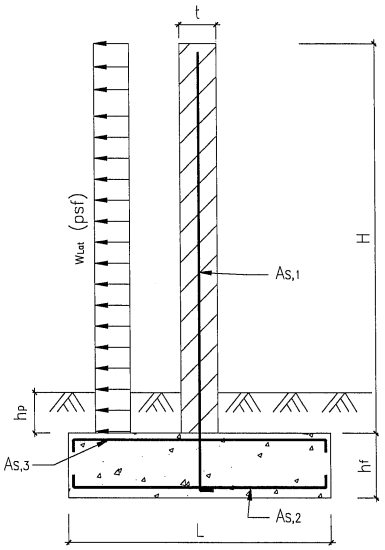
PROJECT : Home2, SSF - Trash Encl.
CLIENT :
JOB NO. : DATE :

PAGE : 2017-06
DESIGN BY :
REVIEW BY : TSS

Free Standing Masonry Wall Design Based on TMS 402-16/13 & ACI 318-14

INPUT DATA & DESIGN SUMMARY

SPECIAL INSPECTION (0=NO, 1=YES)			1	Yes		
TYPE OF MASONRY (1=CMU, 2=BRICK)			1	CMU		
MASONRY STRENGTH	f_m'	=	1.5	ksi		
CONCRETE STRENGTH	f_c'	=	3	ksi		
REBAR YIELD STRESS	f_y	=	60	ksi		
PASSIVE SOIL PRESSURE	P_p	=	350	pcf (equivalent fluid pressure)		
ALLOW SOIL PRESSURE	Qa	=	1.5	ksf		
FRICTION COEFFICIENT	μ	=	0.35			
SOIL SPECIFIC WEIGHT	γ_s	=	110	pcf		
SOIL OVER	hp	=	12	in		
WALL LATERAL FORCE, ASD	w_{Lat}	=	16	psf		
HEIGHT OF STEM	H	=	12	ft		
THICKNESS OF WALL	t	=	8	in		
WALL VERT. REINF. ($A_{s,1}$)		#	5	@	16	in o.c.
$A_{s,1}$ LOCATION (1=at middle, 2=at each face)			1	at middle		
FOOTING WIDTH	L	=	3.5	ft		
FOOTING THICKNESS	hf	=	12	in		
BOT. REINF.OF FOOTING ($A_{s,2}$)		#	5	@	16	in o.c.
TOP. REINF.OF FOOTING ($A_{s,3}$)		#	5	@	18	in o.c.



[THE WALL DESIGN IS ADEQUATE.]

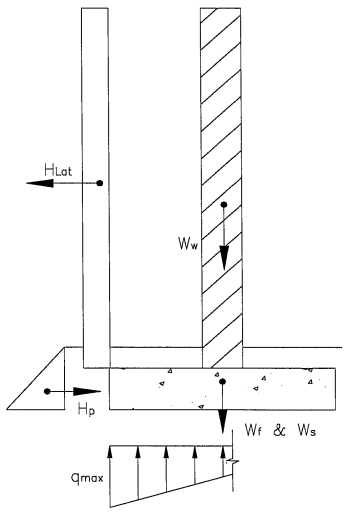
ANALYSIS

SERVICE LOADS

$H_{Lat} = w_{Lat} H$	=	0.19	kips / ft
$H_p = 0.5 P_p (h_p + h_f)^2$	=	0.70	kips / ft
$W_w = t H \gamma_m$	=	1.04	kips / ft
$W_f = h_f L \gamma_c$	=	0.53	kips / ft
$W_s = h_p (L - t) \gamma_s$	=	0.31	kips / ft

FACTORED LOADS

$\gamma H_{Lat} = 1.6 H_{Lat}$	=	0.31	kips / ft
$\gamma H_p = 0.0 H_p$	=	0.00	kips / ft
$\gamma W_w = 1.2 W_w$	=	1.25	kips / ft
$\gamma W_f = 1.2 W_f$	=	0.63	kips / ft
$\gamma W_s = 1.2 W_s$	=	0.37	kips / ft



OVERTURNING MOMENT

	H	γH	y	H y	γH y
HLat	0.19	0.31	7	1.34	2.15
Σ	0.19	0.31		**1.34**	2.15

RESISTING MOMENT

	W	γW	x	W x	γW x
Ws	0.31	0.37	1.75	0.55	0.65
Wf	0.53	0.63	1.75	0.92	1.10
Ww	1.04	1.25	1.75	1.82	2.18
Σ	1.88	2.25		**3.28**	3.94

OVERTURNING FACTOR OF SAFETY

$$SF = \frac{\Sigma Wx}{\Sigma Hy} = 2.444 > 1.5$$ **[Satisfactory]**

CHECK SOIL BEARING CAPACITY (ACI 318 13.3.1.1)

= 0.72 ft < L / 3

= 1.21 ksf < Q_a **[Satisfactory]**

2012-IBC T56

CHECK FLEXURE CAPACITY, AS,1, FOR STEM (TMS 402 8.3.3)

$$M = \frac{w_{Lat} H^2}{2} \quad = \quad 1.15 \text{ ft-kips / ft} \qquad P = W_w \quad = \quad 1.04 \text{ kips / ft}$$

$$M_{allowable} = MIN\left[\frac{1}{2} b_w kd F_b \left(d - \frac{kd}{3}\right) - P\left(d - \frac{t_e}{2}\right) \;,\; A_s F_s \left(d - \frac{kd}{3}\right) + P\left(\frac{t_e}{2} - \frac{kd}{3}\right)\right]$$

where t_e = 7.63 in , <== Based on effective section area.

d = 3.82 in , <== Based on TMS 402 6.1.3.5

b_w	= 12 in	E_m	= 1350	ksi
F_b	= 0.495 ksi	E_s	= 29000	ksi
F_s	= 24 ksi	n	= 21.48	
A_s	= 0.23 in^2	k	= 0.37	
ρ	= 0.005			

and $M_{allowable}$ = 1.17 ft-kips , > M **[Satisfactory]**

CHECK SHEAR CAPACITY FOR MASONRY STEM (TMS 402 8.3.6)

$$V = H_{Lat} \quad = \quad 0.19 \text{ kips / ft}$$

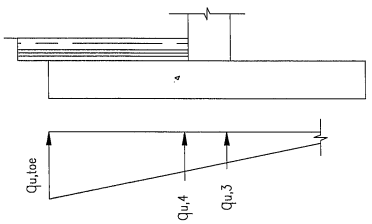
$$V_{allowable} = d b_w 1.125 \sqrt{f'_m} \quad = \quad 1.99 \text{ kips / ft} \quad > \quad V \quad \textbf{[Satisfactory]}$$

CHECK FLEXURE CAPACITY, $A_{S,3}$, FOR FOOTING (ACI 318-14 13, 21, & 22)

$$\rho_{MAX} = \frac{0.85\beta_1 f'_c}{f_y} \frac{\varepsilon_u}{\varepsilon_u + \varepsilon_t} \quad = \quad 0.015 \qquad \rho_{MIN} = \frac{0.0018}{2} \frac{h_f}{d} \quad = \quad 0.001$$

$$M_{u,3} = \begin{cases} \dfrac{(L-t)}{4}\left(0.5\gamma W_s + \dfrac{(L-t)}{2L}\gamma W_f\right) - \dfrac{(q_{u,3} + 2q_{u,heel})b}{6}\left(\dfrac{L-t}{2}\right)^2, & for \quad e_u \le \dfrac{L}{6} \\ \dfrac{(L-t)}{4}\left(0.5\gamma W_s + \dfrac{(L-t)}{2L}\gamma W_f\right) - \dfrac{q_{u,3} b S^2}{6}, & for \quad e_u > \dfrac{L}{6} \end{cases} \quad = \quad 0.309 \text{ ft-kips}$$

$$\rho = \frac{0.85 f'_c \left(1 - \sqrt{1 - \dfrac{M_{u,3}}{0.383 b d^2 f'_c}}\right)}{f_y} \quad = \quad 5.52E\text{-}05$$



where d = 10.19 in, e_u = 0.95 ft, S = 0.30 ft

$q_{u,\,toe}$ = 1.89 ksf, $q_{u,\,heel}$ = n/a ksf, $q_{u,\,3}$ = 0.24 ksf

$(A_{S,3})_{required}$ = 0.13 in^2 / ft < $A_{S,3}$ = 0.21 in^2 / ft **[Satisfactory]**

CHECK FLEXURE CAPACITY, $A_{S,2}$, FOR FOOTING (ACI 318-14 13, 21, & 22)

= 0.015 = 0.000

= 1.34 ft-kips

where d = 8.69 in

$q_{u,\,4}$ = 0.767 ksf

= 0.000329

(cont'd)

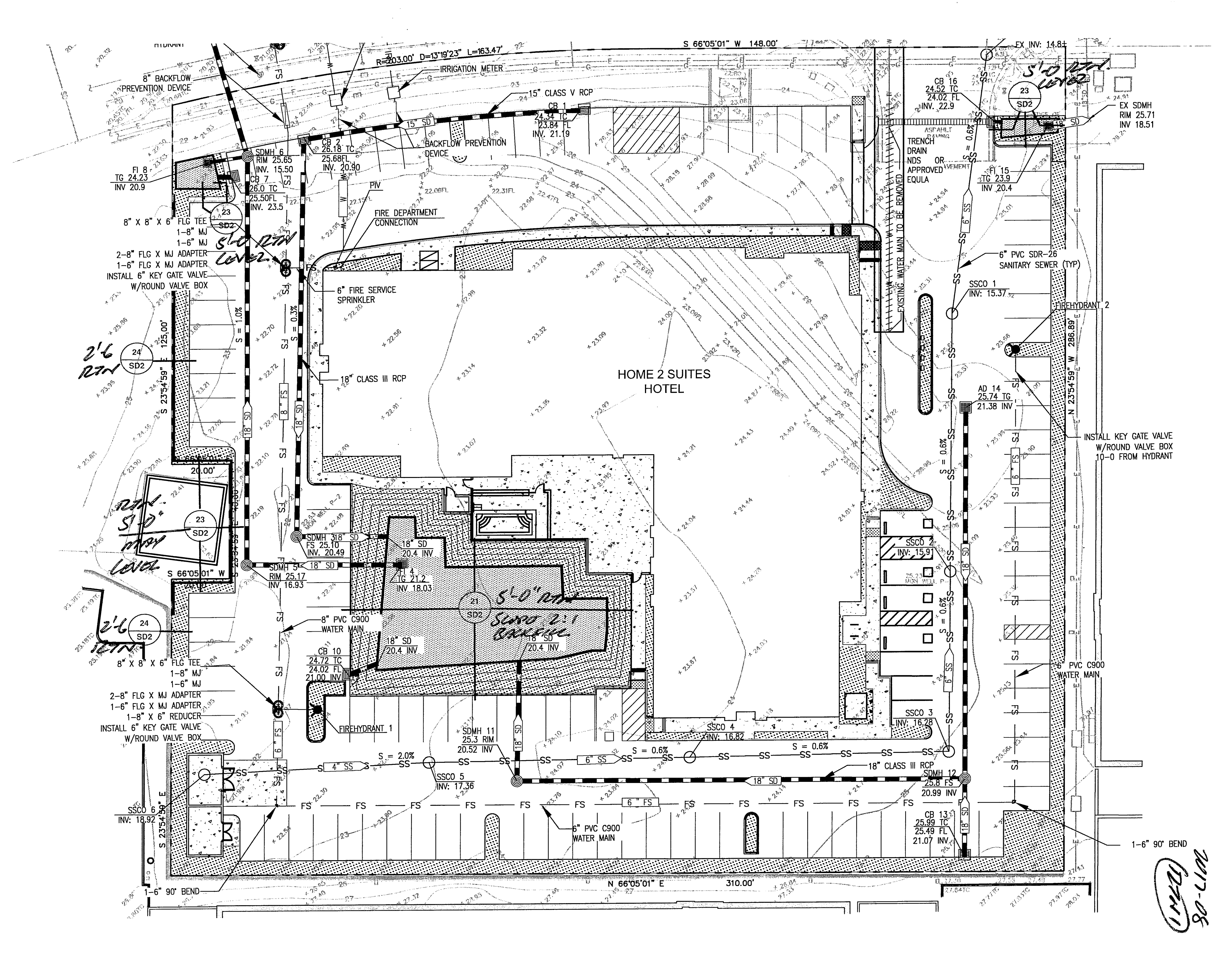
$(A_{S,2})_{required}$ = 0.05 in^2 / ft < $A_{S,2}$ = 0.23 in^2 / ft **[Satisfactory]**

2017-06
#57

CHECK SLIDING CAPACITY (2015 IBC 1807.2.3)

1.5 (H_{Lat}) = 0.29 kips / ft < $H_p + \mu \Sigma W$ = 1.36 kips / ft

[Satisfactory]


HOME 2 SUITES
HOTEL
S 66°05'01" W 148.00'
R=203.00' D=13°19'23" L=163.47'
IRRIGATION METER
8" BACKFLOW PREVENTION DEVICE
15" CLASS V RCP
BACKFLOW PREVENTION DEVICE
CB 1 24.34 TC 23.84 FL INV. 21.19
SDMH 6 RIM 25.65 INV. 15.50
CB 2 26.18 TC 25.68FL INV. 20.90
CB 7 26.0 TC 25.50FL INV. 23.5
FI 8 TG 24.23 INV 20.9
PIV
FIRE DEPARTMENT CONNECTION
6" FIRE SERVICE SPRINKLER
18" CLASS III RCP
8" X 8" X 6" FLG TEE
1-8" MJ
1-6" MJ
2-8" FLG X MJ ADAPTER
1-6" FLG X MJ ADAPTER
INSTALL 6" KEY GATE VALVE W/ROUND VALVE BOX
S 23°54'59" E 125.00'
S 66°05'01" W 20.00'
SDMH 3 FS 25.10 INV. 20.49
SDMH 5 RIM 25.17 INV 16.93
FI 4 TG 21.2 INV 18.03
18" SD 20.4 INV
8" PVC C900 WATER MAIN
CB 10 24.72 TC 24.02 FL 21.00 INV
8" X 8" X 6" FLG TEE
1-8" MJ
1-6" MJ
2-8" FLG X MJ ADAPTER
1-6" FLG X MJ ADAPTER
1-8" X 6" REDUCER
INSTALL 6" KEY GATE VALVE W/ROUND VALVE BOX
FIREHYDRANT 1
SDMH 11 25.3 RIM 20.52 INV
SSCO 5 INV: 17.36
SSCO 6 INV: 18.92
S 23°54'59" E
1-6" 90° BEND
6" PVC C900 WATER MAIN
N 66°05'01" E 310.00'
SSCO 4 INV: 16.82
S = 2.0%
S = 0.6%
18" CLASS III RCP
SDMH 12 25.8 FS 20.99 INV
CB 13 25.99 TC 25.49 FL 21.07 INV
1-6" 90° BEND
SSCO 3 INV: 16.28
SSCO 2 INV: 15.9
6" PVC C900 WATER MAIN
INSTALL KEY GATE VALVE W/ROUND VALVE BOX 10-0 FROM HYDRANT
N 23°54'59" W 286.89'
FIREHYDRANT 2
AD 14 25.74 TG 21.38 INV
SSCO 1 INV: 15.37
6" PVC SDR-26 SANITARY SEWER (TYP)
EXISTING WATER MAIN TO BE REMOVED
TRENCH DRAIN NDS OR APPROVED EQULA
ASPHALT PAVING
CB 16 24.52 TC 24.02 FL INV. 22.9
FI 15 TG 23.9 INV 20.4
EX SDMH RIM 25.71 INV 18.51
EX INV: 14.8±
S = 1.0%
S = 0.3%
2017-08