Long Beach Remodel

A Senior Project

Presented to

the Faculty of the Architectural Engineering Department

California Polytechnic State University, San Luis Obispo

In Partial Fulfillment

of the Requirements for the Degree

Bachelor of Science

by

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Summary of Long Beach Remodel

For my senior project, I created a set of plans for a remodel of a single family residence located in Long Beach, California. The project mandate included the following:

1) Create a set of as-built drawings (i.e. existing drawings of the building and site)
2) Work with an architect on a proposed design
3) Produce a set of structural drawings and calculations

The house was built in 1949. The prior owner of the house added a detached three-car garage and converted an existing attached garage into a den. The current owner wanted to demolish the den and build a larger family and dining room, and a more functional kitchen.

A surveyor was hired to identify the two front corners of the lot. Without a survey, it would have been difficult to determine exactly where the property lines were located and thus, how to “set” the house on the lot.

Meeting California’s stringent Title 24 Energy Requirements was a challenging aspect of the project, based on the proposed window, glass door, and skylight configuration. Unfortunately, just upgrading the insulation in the floors, walls and ceilings wasn’t enough to meet California’s Title 24 Energy Requirements. We faced a choice of either having to upgrade the existing windows in the house or converting the existing conventional water heater to a more energy efficient tankless model. Due to more favorable economics, we proceeded with the tankless model.

Another challenge we faced was making sure the new roof would plane in properly with the existing roof. The existing roof was framed with 2x4 members, which were of sufficient strength per code when the house was built in 1949. However, under the current code, roof framing members required more strength. Since the owner wanted to expedite construction, we decided to use roof trusses. This also enabled ceiling heights and eaves to match up, without a great deal of labor.

I decided to pursue this project primarily because I wanted “hands on” experience creating a comprehensive set of construction documents. Wood construction is something I can relate to well given my background and find it to be an aesthetically appealing material. I suspect wood design will be an important part of my focus as an engineer.

The documents that follow include a set of as-built drawings, a proposed design and structural drawings and details. I also included in the package that follows a set of calculations for gravity and lateral loads.
1. EXTERIOR JOINTS AROUND WINDOW AND DOOR FRAMES, BETWEEN WALL SOLE PLATES AND SMALL SPACES BETWEEN WALLS AND FLOORS SHALL BE CONSTRUCTED, INSTALLED AND SEAL ADHESIVE JUMPSHEET, ALUMINUM FOIL SCRUBBER, OR SIMILAR MATERIALS CONFORMING TO THE APPROPRIATE SECTIONS OF THE CALIFORNIA BUILDING CODE. THE FIRST FLOOR AND SECOND FLOOR WALLS AND FLOORS AND BETWEEN EXTERIOR WALL PANELS.

2. EXHAUST FANS SHALL BE PROVIDED WITH BACKDRAFT DAMPS OR AUTOMATIC DAMPS.

3. EXHAUST FANS SHALL BE PROVIDED WITH THERMOSTATICALLY CONTROLLED HEATING AND COOLING SYSTEMS, EXCEPT ELECTRIC HEAT PUMPS, SHALL HAVE AUTOMATIC THERMOSTAT SET POINTS FOR AT LEAST TWO PERIODS WITHIN 24 HOURS.

4. DUCTS SHALL BE CONSTRUCTED, INSTALLED AND FOLLOW THE CODE OF THE CALIFORNIA MECHANICAL CODE.

5. THERMOSTATICALLY CONTROLLED HEATING AND COOLING SYSTEMS, EXCEPT ELECTRIC HEAT PUMPS, SHALL HAVE AUTOMATIC THERMOSTAT SET POINTS FOR AT LEAST TWO PERIODS WITHIN 24 HOURS.

6. ALL HEATING, VENTILATING AND AIR CONDITIONING (HVAC) EQUIPMENT SHALL MEET THE CALIFORNIA ENERGY COMMISSION.

7. ALL CONSTRUCTION SHALL BE SECURED TO THE JAMB AND THE FACE OF THE DOOR OR IS OTHERWISE ACCESSIBLE TO GRIPPING TOOLS.

8. SLIDING GLASS WINDOWS SHALL BE PROVIDED WITH A DEVICE IN THE UPPER CHANNEL OF THE MOVING PANEL TO PROHIBIT RAISING AND REMOVING OF THE REMOVABLE PANEL IN THE CLOSED OR PARTIALLY OPEN POSITION.

9. GENERAL LIGHTING AND SWITCHES AND OUTLETS SHALL HAVE AN EFFICIENCY OF AT LEAST 10 LUMENS PER WATT.

10. WRAP STORAGE TYPE WATER HEATERS AND STORAGE AND BACKUP TANKS FOR SOLAR WATER SYSTEMS WITH MINIMUM R-12 INSULATION AND R-16 FOR INTERIOR.
1. VERIFY ALL CONDITIONS PRIOR TO DEMOLITION. DISCREPANCIES BETWEEN DESIGN AND EXISTING CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE DESIGNER AND ENGINEER PRIOR TO PROCEEDING WITH WORK.

2. REMOVE ALL ABANDONED CONDUIT, PIPING AND EQUIPMENT.

3. DEMOLISH (E) ITEMS TO REMAIN.

4. SEE STRUCTURAL SHEETS FOR ADDITIONAL ITEMS TO BE DEMOLISHED.

5. PROVIDE GROUND-FAULT CIRCUIT INTERRUPTERS (GFI) PROTECTION FOR ALL 125-VOLT, SINGLE PHASE, AND 20-AMPERE RECEPTACLES INSTALLED IN BATHROOMS, KITCHENS, GARAGES (AND OUTDOORS) CRAWL SPACES, BASEMENTS WITHIN 6' OF ANY SINK OR WET BAR.

6. PROVIDE ARC-FAULT CIRCUIT INTERRUPTER PROTECTION FOR ALL 125-VOLT, SINGLE PHASE, 15 AND 20-AMPERE RECEPTACLES INSTALLED IN BATHROOMS, KITCHENS, GARAGES (AND OUTDOORS) CRAWL SPACES, BASEMENTS WITHIN 6' OF ANY SINK OR WET BAR.

7. REPLACE (E) DOOR.

8. REMOVE (E) DOOR.

9. REMOVE (E) CABINETS.

10. PROVIDE CORROSION-RESISTANT WEEP SCREEN ON ALL EXTERIOR STUD WALLS AT OR BELOW THE GRADE, OR 2" ABOVE PAVED AREAS.

11. PROVIDE UNOBSERVED PASSAGE 24" WIDE WITH SOLID CONTINUOUS FLOORING FROM ACCESS TO EQUIPMENT AND/OR CONTROL PANEL.

12. PROVIDE CORROSION-RESISTANT WEEP SCREEN AROUND W.H. ELECTRIC PANEL.

13. PROVIDE UNOBSERVED PASSAGE 24" WIDE WITH SOLID CONTINUOUS FLOORING FROM ACCESS TO EQUIPMENT AND/OR CONTROL PANEL.

14. PROVIDE UNOBSERVED PASSAGE 24" WIDE BETWEEN ANY POINT AROUND WAP IN TABLE ROOMS.

15. PROVIDE UNOBSERVED PASSAGE 24" WIDE BETWEEN any POINT OF ENTRY OF THE SERVICE ENTRANCE CONDUCTORS.

16. PROVIDE A SEPARATE MEANS FOR DISCONNECTING ALL UNDERGROUND CONDUCTORS.

17. PROVIDE A SEPARATE MEANS FOR DISCONNECTING THERMOSTATIC MIXING VALVES.

18. PROVIDE A SEPARATE MEANS FOR DISCONNECTING STUDB @ 16" O.C. MIN., U.N.O.

19. PROVIDE A SEPARATE MEANS FOR DISCONNECTING STUD WALLS AND PARTITION WALLS, AND IN OPENING AROUND VENTS, PIPES, DUCTS, CHIMNEYS, BETWEEN FAMILY & DINING ROOM, ATTIC ACCESS MIN. 22" X 30" NOT OVER 20'-0" MAX.

20. PROVIDE A SEPARATE MEANS FOR DISCONNECTING A HEIGHT SURVEY CONDUCTED BY A LICENSED SURVEYOR MAY BE REQUIRED AT THE TIME OF ADDITION.

21. PROVIDE A SEPARATE MEANS FOR DISCONNECTING IF APPLICABLE, PROVIDE DRYER VENT TO OUTSIDE. MAX. LENGTH 14'-0 WITH 2 90-DEGREE ELBOWS.

22. PROVIDE A SEPARATE MEANS FOR DISCONNECTING PROVIDE RECEPTACLE OUTLET WITHIN SIX FEET OF ALL TOILETS TO BE LOW FLOW (1.6 FGALLON / FLUSH).

23. PROVIDE A SEPARATE MEANS FOR DISCONNECTING PROVIDE ARC-FAULT CIRCUIT INTERRUPTER PROTECTION FOR ALL 125-VOLT, SINGLE PHASE, 15 AND 20-AMPERE RECEPTACLES INSTALLED IN BATHROOMS, KITCHENS, GARAGES (AND OUTDOORS) CRAWL SPACES, BASEMENTS WITHIN 6' OF ANY SINK OR WET BAR.

24. PROVIDE GROUND-FAULT CIRCUIT INTERRUPTERS (GFI) PROTECTION FOR ALL 125-VOLT, SINGLE PHASE, AND 20-AMPERE RECEPTACLES INSTALLED IN BATHROOMS, KITCHENS, GARAGES (AND OUTDOORS) CRAWL SPACES, BASEMENTS WITHIN 6' OF ANY SINK OR WET BAR.

25. PROVIDE A SEPARATE MEANS FOR DISCONNECTING PROVIDE ARC-FAULT CIRCUIT INTERRUPTER PROTECTION FOR ALL 125-VOLT, SINGLE PHASE, 15 AND 20-AMPERE RECEPTACLES INSTALLED IN BATHROOMS, KITCHENS, GARAGES (AND OUTDOORS) CRAWL SPACES, BASEMENTS WITHIN 6' OF ANY SINK OR WET BAR.

26. PROVIDE ARC-FAULT CIRCUIT INTERRUPTER PROTECTION FOR ALL 125-VOLT, SINGLE PHASE, 15 AND 20-AMPERE RECEPTACLES INSTALLED IN BATHROOMS, KITCHENS, GARAGES (AND OUTDOORS) CRAWL SPACES, BASEMENTS WITHIN 6' OF ANY SINK OR WET BAR.

27. PROVIDE ARC-FAULT CIRCUIT INTERRUPTER PROTECTION FOR ALL 125-VOLT, SINGLE PHASE, 15 AND 20-AMPERE RECEPTACLES INSTALLED IN BATHROOMS, KITCHENS, GARAGES (AND OUTDOORS) CRAWL SPACES, BASEMENTS WITHIN 6' OF ANY SINK OR WET BAR.

28. PROVIDE ARC-FAULT CIRCUIT INTERRUPTER PROTECTION FOR ALL 125-VOLT, SINGLE PHASE, 15 AND 20-AMPERE RECEPTACLES INSTALLED IN BATHROOMS, KITCHENS, GARAGES (AND OUTDOORS) CRAWL SPACES, BASEMENTS WITHIN 6' OF ANY SINK OR WET BAR.

29. PROVIDE ARC-FAULT CIRCUIT INTERRUPTER PROTECTION FOR ALL 125-VOLT, SINGLE PHASE, 15 AND 20-AMPERE RECEPTACLES INSTALLED IN BATHROOMS, KITCHENS, GARAGES (AND OUTDOORS) CRAWL SPACES, BASEMENTS WITHIN 6' OF ANY SINK OR WET BAR.

30. PROVIDE ARC-FAULT CIRCUIT INTERRUPTER PROTECTION FOR ALL 125-VOLT, SINGLE PHASE, 15 AND 20-AMPERE RECEPTACLES INSTALLED IN BATHROOMS, KITCHENS, GARAGES (AND OUTDOORS) CRAWL SPACES, BASEMENTS WITHIN 6' OF ANY SINK OR WET BAR.
ELEVATION NOTES:
1. CHIMNEY TO EXTEND A MIN. OF 2'-0" ABOVE ROOF OR PARAPET WITHIN 1'-0" VERTICAL OF CHIMNEY Top.
2. PROVIDE AN APPROVED SPARK ARRESTOR AT ALL CHIMNEY CAPS. NOT LESS THAN FOUR (4) TIMES NET FREE AREA OF OUTLET OF CHIMNEY Cap.
3. ALL EXTERIOR STUCCO SIDING TO BE PAINTED WITH ELASTOMERIC TYPE PAINT.
4. ALL EXTERIOR STUD WALL TO RECEIVE CORROSION-RESISTANT WEEP SCREED AT A MINIMUM OF 4" ABOVE GRADE OR 2" ABOVE PAVED AREAS.
1. CHIMNEY TO EXTEND A MIN. OF 2'-0" ABOVE ROOF OR PARAPET WITHIN 10' OF RADII OF CHIMNEY.

2. PROVIDE AN APPROVED SPARK ARRESTOR AT ALL CHIMNEY CAPS, NOT LESS THAN FOUR (4) TIMES NET FREE AREA OF OUTLET OF CHIMNEY.

3. ALL EXTERIOR STUCCO SIDING TO BE PAINTED WITH ELASTOMERIC TYPE PAINT.

4. ALL EXTERIOR STUD WALL TO RECEIVE CORROSION-RESISTANT WEEP SCREEN AT A MINIMUM OF 4" ABOVE GRADE OR 2" ABOVE PAVED AREAS.
1. Roofing shingles to be architectural roof shingles.
2. Roofing nails to be copper, brass, or stainless steel, U.N.O.
3. All necessary flashings to be galv. steel, including ridge, valley, eave, chimney, U.N.O.
4. All gutters to be 4" K-style galv. steel, U.N.O.
5. All downspouts to be rectangular and galv. steel, U.N.O.
6. All concentrated drainage including roof water to be connected to an approved location.
7. Gutter drains, if applicable, to be same size as roof drain. Gutter flow drain to be installed with the inlet 2' above the level of the ground. Gutter flow drain shall be installed in accordance with manufacturer’s current recommendations and all pertinent codes and standards.
8. Provide min. 22" x 30" attic access minimum.
9. Attic ventilation openings to be covered with corrosion resistant metal mesh with mesh openings of ¼" in dimension.
10. All plumbing and heating roof vents to be out of view if practical.

**ATM VENTILATION (NEW):**

**CODE REQUIREMENT:** 1/150 OF ATTIC AREA

**(ATTIC AREA: 88 SQFT)**

**88/150 = APPROX. 0.59 SQFT**

**TOTAL 0.59 SQFT OF ADDITIONAL VENT AREA REQUIRED**
GENERAL NOTES:
1. ALL EXTERIOR LIGHTING SHALL BE HIGH EFFICACY, OR CONTROLLED BY A MOTION SENSOR WITH PHOTOCONTROL.
2. LUMINAIRES THAT ARE RECESSED INTO INSULATED CEILINGS SHALL BE APPROVED FOR ZERO CLEARANCE (IC) AND CERTIFIED AIRTIGHT, AND LABELED AS AIR TIGHT (AT).
3. SMOKE DETECTORS FOR (N) AREAS SHALL BE HARD WIRED WITH BATTERY BACKUP; SMOKE DETECTORS FOR (E) AREAS SHALL BE HARD WIRED OR BATTERY OPERATED; SMOKE DETECTORS SHALL BE FOR CARBON MONOXIDE AS WELL.

DEDICATED REC. OUTLET IN CAB.

S.D.

S.D.

S.D.

S.D.

SPLIT CIRCUIT FOR GD & DW

(E) 200A SERVICE PANEL

50A (N) CARRIER 17" COMPACT A/C TO REPLACE (E)

(N) DISCONNECT JBOX

(N) RINNAI TANKLESS WATER HEATER. RU98E W/ GRUNDFOS RECIRC. PUMP. MIN. 0.80 EFF.

JBOX

JBOX

JBOX

JBOX

UNDERCAB. LIGHTS (3 LOCATIONS)

(N) 36" DIRECT VENT GAS FIREPLACE. HEAT N GLO 6000CL FP OUTLET (LOWER RIGHT CORNER)

SWITCHED OUTLET IN EAVE

LONG BEACH, CA
GENERAL NOTES:
1. THE FOLLOWING SPECIFICATIONS SHALL CONFORM TO THE 2012 CBC AND ANY OTHER CITY OR COUNTY ORDINANCES THAT ARE IN FORCE AT THE TIME OF THIS PROJECT.
2. THE SELECTED GENERAL CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS AND CONDITIONS PER IntroING ANY FIELDWORK.
3. ANY OCCUPATION CAUSED BY THE FIELD CONDITIONS OR ANY CONDITIONS DIFFERENT FROM THOSE INDICATED ON THE PLANS SHALL BE BROUGHT TO THE DESIGNER'S ATTENTION.
4. TYPICAL DETAILS SHALL APPLY WHERE NO SPECIFIC DETAILS OR SECTIONS AND PROCEDURES ARE PROVIDED.
5. DIMENSIONS SHOWN ON PLANS OR DETAILS TAKE PRECEDENCE OVER OVERLAYS SHOWN.
6. THE SELECTED GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE SATISFACTORY COMPLETION OF ALL WORK IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS.

STRUCTURAL STEEL:
1. STRUCTURAL STEEL SHALL CONFORM TO A-36 T.M. (A-6) SPECIFICATIONS AND TO THE LATEST APPROVED EDITIONS OF THE AISC SPECIFICATIONS FOR STEEL CONSTRUCTION.
2. ALL BOLTS SHALL CONFORM TO A-36 (A-6) FOR UNFINISHED BOLTS.
3. ALL BOLTS HOLE IN STEELS, MEMBERS SHALL BE TRUE, BURNING OF HOLES FOR CONNECTIONS WILL NOT BE PERMITTED.
4. PROVIDE FULL BEARING ON UNBROKEN PORTION OF BOLTS SHANK FOR ALL STEEL CONNECTIONS.
5. PROVIDE LEVELING NUTS FOR ALL BOLTS AT BEAM SEATS AND COLUMN BASE PLATES.
6. ALL NUTS FOR STRUCTURAL STEEL Connections SHALL BE HEAVY HEXAGONAL NUTS.
7. ALL WELDING SHALL BE INDICATED ON THE DETAILS AND PERFORMED IN A QUALIFIED SHOP, UNDER CONTINUOUS INSTRUCTION PER AISC C.B.C. TABLE 15.2.1 FIELD WELDING, OTHER THAN METAL WELDING THAT WELDING IS NOT PERMITTED.
8. PROVIDE FULL BEARING ON UNBROKEN PORTION OF BOLTS FOR ALL STEEL CONNECTIONS.

CONCRETE:
1. CONCRETE FOR SLABS ON GRADE, BEAM FOOTINGS OR Piers SHALL BE FIBER REINFORCED CONCRETE A CONCRETE OF MINIMUM COMBINED COMpressive STRENGTH OF 3000 PSI AT 28 DAYS, UNLESS NOTED OTHERWISE ON THE PLANS.
2. THE MINIMUM AGGREGATE SIZE SHALL BE 3/4", AND MINIMUM SLUMP SHALL BE 4".
3. ANCHOR BOLTS, HOLLOW BOLTS, DOWELS, AND OTHER REQUIRED NAILS OR ANCHORS IMPACT DRIVEN, AT PRIOR REQUESTED PLACES WITHIN THE STRUCTURE.
4. THE SELECTED GENERAL CONTRACTOR SHALL TAKE ALL THE NECESSARY MEASURES TO PROVIDE A PROPER COMPACTION OF THE CONCRETE.
5. THE EXCAVATED BOTTOM OF ALL FOOTINGS SHALL EXTEND TO ELEVATIONS SHOWN ON THE PLANS AND THE FOOTINGS SHALL BE FOUND IN WHAT ELEVATIONS, WITHOUT SIDE FORMS AS POSSIBLE.

SUBMIT REPORT (AVAIL. CHAPTER 14 MEMBERS, APPL'D)
1. THE SELECTED GENERAL CONTRACTOR SHALL BOND HIMSELF A FINANCE-LINK WITH ALL OF THE 2012 CBC INVESTIGATION REPORT REQUIREMENTS AND RECOMMENDATIONS, AND THAT ALL NECESSARY MATERIALS FOR ALL PROCEEDING WILL BE CONFORM TO A-36 SPECIFICATION.

REINFORCING STEEL:
1. REINFORCING STEEL SHALL BE OF CONFORMING TO A-36 T.M. (A-6) MM AT REQUIREMENTS AND PROCEED SHALL BE LAPPED A MINIMUM OF 30 BAR IN SPECIFICATION.
2. DOWELS IN CONCRETE FOR FABRICATION WALLS SHALL BE 2-no. 4 OR AS SHOWN ON THE PLANS.
3. ALL BOLT HOLES IN STEEL MEMBERS SHALL BE TRUE; BURNING OF HOLES FOR CONNECTIONS WILL NOT BE PERMITTED.
4. ALL REINFORCEMENT SPLICES SHALL BE LAPPED A MINIMUM OF 30 BAR IN SPECIFICATION.
5. CONCRETE COVER FOR REINFORCEMENT SHALL BE:
   a. 2" MINIMUM AND HEAVY TIES ARE REQUIRED.
   b. 2" MINIMUM AND HEAVY TIES ARE REQUIRED.
6. CONCRETE COVER FOR REINFORCEMENT SHALL BE:
   a. 2" MINIMUM AND HEAVY TIES ARE REQUIRED.
   b. 2" MINIMUM AND HEAVY TIES ARE REQUIRED.
7. CONCRETE MASONRY:
   a. ALL MASONRY WORK SHALL BE COMPLETE INSPECTION MASONRY AND CONCRETE MASONRY AS INDICATED ON THE DETAILS.
   b. ALL MASONRY WORK SHALL BE COMPLETE INSPECTION MASONRY AND CONCRETE MASONRY AS INDICATED ON THE DETAILS.
   c. ALL MASONRY WORK SHALL BE COMPLETE INSPECTION MASONRY AND CONCRETE MASONRY AS INDICATED ON THE DETAILS.
   d. ALL MASONRY WORK SHALL BE COMPLETE INSPECTION MASONRY AND CONCRETE MASONRY AS INDICATED ON THE DETAILS.
8. CONCRETE COVER FOR REINFORCEMENT SHALL BE:
   a. 2" MINIMUM AND HEAVY TIES ARE REQUIRED.
   b. 2" MINIMUM AND HEAVY TIES ARE REQUIRED.
   c. 2" MINIMUM AND HEAVY TIES ARE REQUIRED.
   d. 2" MINIMUM AND HEAVY TIES ARE REQUIRED.
9. CONCRETE COVER FOR REINFORCEMENT SHALL BE:
   a. 2" MINIMUM AND HEAVY TIES ARE REQUIRED.
   b. 2" MINIMUM AND HEAVY TIES ARE REQUIRED.
   c. 2" MINIMUM AND HEAVY TIES ARE REQUIRED.
   d. 2" MINIMUM AND HEAVY TIES ARE REQUIRED.

LUMBER:
1. WOOD MEMBERS LESS THAN 4" IN WIDTH SHALL BE Douglas Fir-2 or BE 11/16" AND 4" IN WIDTH SHALL BE Douglas Fir-2 OR BETTER, UNLESS NOTED OTHERWISE ON THE PLANS.
2. UNLESS NOTED OTHERWISE ON THE PLANS, ALL ANCHOR BOLTS SHALL BE PER C.B.C. TABLE 2305.1.
3. ALL CONNECTING HARDWARE SHALL BE SIMPSON COMPANY TYPE, 290-3/4" LUMBER CONNECTORS TYPE B EQUAL, AND INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS, U.I.C.
4. GLU-LAMINATED BEAMS SHALL BE OF A GRADE COMBINATION PROVIDING A MINIMUM COMBINED COMpressive STRENGTH OF 2400 PSI.
5. ROOF SHEATHING SHALL BE A MINIMUM OF CDX PLYWOOD WITH EXTERIOR GLUE, GROUP 2. REINFORCING GROUTED MASONRY SHALL BE AS INDICATED ON THE ARCHITECT'S/DESIGNER'S DWGS. OR EQUAL.
7. FLOOR SHEATHING SHALL BE 1-1/2" OSB WITH EXTERIOR GLUE (SHEP). 2. SBS, PLUMB FOR 8".
8. BEARING AND NONBEARING WALLS SHALL HAVE DOUBLE TOP PLATES, LAPPED AT INTERSECTIONS, BUT COSTS SHALL BE STATED If AS SHOWN ON THE PLANS.
9. ALL RETAINING BLOCK WALLS SHALL BE PROVIDED WITH AN APPROVED SUPPORTS.
10. THE EXCAVATED BOTTOM OF ALL FOOTINGS SHALL EXTEND TO ELEVATIONS SHOWN ON THE PLANS.
11. ALL WELDING SHALL BE AS INDICATED ON THE DETAILS and PERFORMED IN A QUALIFIED SHOP.
12. HOLES FOR BOLTS SHALL BE BORED WITH A BIT 11/16" LARGER THAN THE NUT+/1/4" CLEARANCE, ALL BOLTS SHALL BE TREATED PRIOR TO APPLICATION OF PLASTIS, ORB, ORB, ORB.
13. STRUCTURAL MEMBERS SHALL NOT BE CUT OR REMOVED, UNLESS SPECIFICALLY NOTED ON THE DETAILS.
14. ALL SOCKETED BOLTS SHALL BE PLACED BETWEEN JOISTS OR PARTETS AT ALL SUPPORTS.

REMODELING PROJECT
1. CONCRETE PLACEMENT AND STEEL PLACEMENT REQUIREMENTS SHALL BE 2007 CBC, SECTION 1701.
2. A SBS, PLUMB FOR 8".
3. INSTALLATION OF HIGH-STRENGTH BOLTS SHALL BE PER 2007 CBC, SECTION 1701.3.3.

S1.0

GENERAL STRUCTURAL NOTES

REMODELING PROJECT
LONG BEACH, CA
FOUNDATION NOTES:
1. SEE D-1 FOR GENERAL NOTES.
2. SEE D-2 FOR TYPICAL DETAILS.
3. VERIFY ALL DIMENSIONS ON SITE AND NOTIFY ARCHITECT & ENGINEER OF ANY
   CONFLICTING DIMENSIONS AND/OR CONDITIONS.
4. ANCHOR BOLTS, SEWS, AND HOLD-DOWN ANCHORS SHALL BE SECURELY HELD IN
   PLACE PRIOR TO FOUNDATION INSPECTION.
5. HOLD-DOWNS SHALL BE RETIGHTENED JUST PRIOR TO COVERING THE WALL FRAMING.
6. FOUNDATION SILL SHALL BE NATURALLY DURABLE OR PRESSURE TREATED WOOD
   MEMBERS.
7. IF ADVERSE SOIL CONDITIONS ARE ENCOUNTERED, A SOILS INVESTIGATION REPORT MAY
   BE REQUIRED.
8. CONCRETE STRENGTH FOR FOUNDATIONS SHALL BE 2,500 PSI MIN.
9. ALL CONCRETE IN CONTACT WITH SOIL SHALL BE 6" X 12,000 PSI AT 28 DAYS WITH TYPE V
   CEMENT AND HIDE INEXCHANGE RATIO EQUAL TO 0.45 UNLESS OTHERWISE
   RECOMMENDED IN SOILS REPORT.
10. MINIMUM ANCHOR BOLT SIZE AND SPACING SHALL BE 3/8" DIAMETER AT 12" O.C. WITH
    MINIMUM FRAMING AND 2" X 8" PLATE WRAPS, OR A MINIMUM OF 3/4" DIAMETER
    AT 12" O.C. WITH MINIMUM FRAMING AND 2" X 10" PLATE WRAPS.
11. FOOTINGS SHALL BE LOCATED AT CENTER OF COLUMNS AND WALLS, UNLESS NOTED
    OTHERWISE ON PLANS.
12. FOUNDATION SUBGRADES SHALL BE PREPARED PER GEOTECHNICAL REPORT.
13. THE CONCRETE SLAB ON GRADE HAS NOT BEEN DESIGNED FOR ANY SPECIFIC
    VEHICULAR TRAFFIC OR CRANE LOADS. ONLY GENERAL OFFICE OCCUPANCY UNIFORMLY
    DISTRIBUTED LOADS ARE CONSIDERED.
14. ALLOWABLE SOIL PRESSURE: 1500 PSF

SHEAR WALL SCHEDULE NOTES:
1. MINIMUM OF TWO BOLTS PER PIECE OF S.D.
2. USE COMMON NAILS UNLESS OTHERWISE NOTED.
3. PLYWOOD SHEATHING SHALL BE STRUCTURAL 1 GRADE U.N.O. ON SCHEDULE.
4. NAILING SHALL BE 36" FROM EDGE OF PANEL MINIMUM.
5. PANELS SHALL BE 3/8" MINIMUM EXCEPT @ BOUNDARIES.
6. PANELS SHALL CONFORM TO DOC PS-1 OR PS-2.
7. ALL ANCHOR BOLTS TO BE 3/8" DIAMETER MINIMUM w/ 3" X 3" X 1/4" THICK WASHERS TYPICAL.
8. USE DOUBLE THE ANCHOR BOLTS IN SCHEDULE IF 2x SILL PLATE IS USED INSTEAD
    OF 3x SILL PLATE.
9. IT IS ACCEPTABLE TO USE O.S.B. PANELS AS A SUBSTITUTE FOR PLYWOOD
    PANELS.
10. MINIMUM ANCHOR BOLT SIZE AND SPACING SHALL BE 3/8" DIAMETER AT 72" O.C. WITH
    MINIMUM FRAMING AND 2" X 8" PLATE WRAPS, OR A MINIMUM OF 5/8" DIAM.
    AT 72" O.C. WITH MINIMUM FRAMING AND 2" X 10" PLATE WRAPS.
FLOOR FRAMING NOTES:

1. SEE S-1 FOR GENERAL NOTES.
2. SEE S-4 FOR TYPICAL DETAILS.
3. SEE ARCHITECTURAL AND MECHANICAL PLANS FOR FLOOR PENETRATION SIZES AND LOCATIONS.
4. VERIFY ALL DIMENSIONS ON SITE AND NOTIFY ARCHITECT AND ENGINEER OF ANY CONFLICTING CONDITIONS AND/OR DIMENSIONS.
5. FACE GRAIN OF PLYWOOD SHALL BE PERPENDICULAR TO SUPPORTS. FLOOR SHALL HAVE TONGUE AND GROOVE OR BLOCKED PANEL EDGES.
6. WALL TOP PLATE ELEVATION AT 8'-0" ABOVE F.F., UNLESS OTHERWISE NOTED ON PLANS.
7. FLOOR DECKING (2X2):
   - 1" x 12" PLY (AT JOISTS)
   - 1" x 6" PLY
8. ELEVATED FLOOR STRUCTURES HAVE NOT BEEN DESIGNED FOR SPECIFIC VIBRATION EFFECTS FROM MECHANICAL AND OTHER SOURCES, SUCH AS CHIMNEYS, LEBLANKS OR LARGE STUDIO ETC.

FLOOR DESIGN LOADS:

D = 12 PSF (AT JOISTS)
L = 40 PSF
ROOF FRAMING NOTES:

1. SEE S-1 FOR GENERAL NOTES.
2. SEE S-3 FOR TYPICAL DETAILS.
3. SEE ARCHITECTURAL AND MECHANICAL PLANS FOR FLOOR PENETRATION SIZES AND LOCATIONS.
4. VERIFY ALL DIMENSIONS ON SITE AND NOTIFY ARCHITECT AND ENGINEER.
5. ROOF SHEATHING SHALL CONSIST OF MIN. 1/2" THICK CDX PLYWOOD AT JOISTS, 10" & 12" NAILING & BLOCKED.
6. ROOF ENVELOPE SHALL BE INSPECTED BEFORE COVERING. FACE GRANDE OF PLYWOOD SHALL BE PERPENDICULAR TO SUPPORTS.
7. ROOF DESIGN LOADS:
   - D = 15 PSF (AT JOISTS)
   - L = 20 PSF

**Scale**

2016.1

**Date**

11.01.16
FLOOR SHEATHING (SEE PLAN)

FLOOR SHEATHING EDGE NAILING

(3) 8D TOE NAIL AT EACH JOIST GIRDER HANGER

SILL NAILING. 16D @ 16" O.C. U.N.O ON SHEAR WALL SCHEDULE

A35 @ 16" O.C. U.N.O. ON PLAN

2X6 P.T. MUD SILL

2X FLOOR JOISTS (SEE PLAN FOR SIZE AND PLACING)

5/8" Ø X 10" A.B. @ 4'-0" O.C. U.N.O ON SHEAR WALL SCHEDULE

0' - 6"

WALL EDGE NAILING (SEE PLAN AND SHEAR WALL SCHEDULE)

MIN. 12"

MIN. 18"

EXTERIOR FINISH GRADE

#5 REBAR TOP AND BOTTOM

MIN. 6"

WALL EDGE NAILING (SEE PLAN AND SHEAR WALL SCHEDULE)

2X SOLID BLOCKING

ROOF RAFTER

PLYWOOD ROOF SHTG. NEED NOT TO CONT. PAST 2X8 BOARD

ROOF E.N.

2X8 BOARD NOTCH AS REQ'D WITH 3-16D PER R/R FOLLOWING LINE OF CALIFORNIA FRAMING PLYWOOD ROOF SHTG. SEE PLAN EDGE NAILING

DOUBLE TOP PLATE

2X ROOF RAFTER (OR TRUSS)

A35 AT 24" O.C. U.N.O.

ROOF SHEATHING

ROOF E.N.

FREIZE

BLOCKING

NOTE: ALT. TO A35'S 16D'S TOE-NAILED AT 6" O.C. U.N.O. FROM BLOCKING TO DOUBLE TOP PLATE

DRILL & EPOXY SET (2) 1/2" Ø X 24" LG. DOWELS 4" MIN. INTO EXISTING FOUNDATION LAP SPLICE MIN. 20" TO CONT. REBARS

CLEAN AND DISTRESS SURFACE FOR A GOOD BOND AT TIE-IN AREA

NOTE: VERIFY EXACT HEIGHT REQUIRED FOR FLUSH SUBFLOOR TIE-IN. FLOOR STRUCTURE MAY DIFFER NEW FOUNDATION STRUCTURE

MIN. 20" LAP

NEW FOUNDATION TO BE POURED EXISTING FOUNDATION STRUCTURE

CONCRETE PAD

PAD GRADE

SIMPSON PB TYPE POST BASE W/ (8) 16D POST (SEE PLAN)

SIMPSON BC TYPE HARDWARE GIRDER (SEE PLAN)

2X6 FLOOR JOIST (SEE PLAN)

(3) 8D TOE NAIL EACH JOIST

MIN. 12"
1. Planed finishers and grade primers
2. All finishers to be 1/2 of 1/2 in. thick where 1/2 coats are required.
3. Nail the finisher to 2x4 joists and 2x6 headers and typical finisher framing details.
4. If finisher damper is required, provide 2x6 framing to keep damper from coming in contact with headers or joists.
5. Finisher nailing: Finisher edge shall be 1/2 in. above headers and edges shall be finisher edges.

Notes:
- Field nailing shall be 3 in. or wider, and nails shall be staggered where:
  1. Nails are spaced 2 in. or 2 1/2 in. on center
  2. 10d nails having penetration into framing of more than 1 5/8 in. are spaced 3 in. or less on center

1. 3 5/16" Ø for 2x6 studs
2. 2 1/8" Ø for 2x4 studs

Note: If wider studs are used than would be required for the application, then only the required stud width will be subject to the limitation on depth of cutting or notching.

Min. 5/8".

Notes:
- Field nailing at adjoining panel edges shall be 3 in. or wider, and nails shall be staggered where:
  1. Nails are spaced 2 in. or 2 1/2 in. on center
  2. 10d nails having penetration into framing of more than 1 5/8 in. are spaced 3 in. or less on center

1. Boring
2. Max. 40% brg walls
3. 60% non brg walls

Notes:
- All plywood sheets to be 4'-0" x 8'-0" except where job conditions prohibit.
- Nailing per specifications, framing plan notes and typical plywood nailing detail.
- If blocked diaphragm is required: provide 2x full depth @ 8'-0" O.C. & 3x4 flat blocking at other panel edges.

Notes:
- Notches and holes shall not occur at the same location on a stud.
- Any stud may be bored with a minimum hole of 1/2 in. of the stud's width at the floor, if the floor is doubled, and only if this does not affect the stability of the floor.
STRUCTURAL CALCULATIONS
FOR
LONG BEACH REMODEL

ARCE 415
SR. PROJECT
DECEMBER 1, 2016

JOHN HINRICHWS
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- Building Weights          A3

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- Headers                     G2.1
- Floor Joists, Beams & Girders G3.1
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- Seismic Forces             L1.1
- Diaphragm Design           L2.1
- Shearwall Design           L3.1
- Overturning                L4.1
PROJECT DESCRIPTION / DATA

Project: Residential Remodel & Addition
Location: Long Beach, CA
Architect: --
Owner: --
Jurisdiction: Long Beach, CA
Building Code: 2013 California Building Code (CBC)

Selected IBC References:

Loads:    ASCE 7-10
Steel:     AISC 360-10
           AISC 341-10 (Seismic)
Wood:     NDS -15
           NDS Supplement - 15
           NDS SDPWS -15 (Wind & Seismic)
Concrete: ACI 318-14
          ACI 530

Structural Systems:

Vertical    Wood stud bearing walls
            Raised foundation with spread footings

Lateral     Wood shear walls

Soils Engineer: --
Soils Report No.: --
Soils Report Date: --
Soils Bearing: Assume 1500 PSF bearing capacity per Table 1806-2
Other Soils Data: Assume soil site Class D
STRUCTURAL MATERIALS

Lumber: Visually Graded Douglas Fir – Larch
2x Framing DF-L #2
4x framing DF-L #1
Posts/Timbers DF-L #1
Glu-Lam Beams – Visual Comb. 24F-V4 DF/DF
Hardware: Simpson “Strong-Tie”

Masonry: Grade “N” Units: f’m = 1,500 psi (all cells grouted)

Concrete: Roof Deck 3000 psi Lightweight (110 pcf)
(f’c in 28 days) Floor Deck 3000 psi Lightweight (110 pcf)
Beams 3000 psi
Columns 4000 psi
Walls 4000 psi
Foundation 2500 psi

Reinforcing: ASTM A615 – Grade 60 ASTM A706 – Grade 60

Steel: Structural ASTM A992 for WF beams
ASTM A36 for channels, angles
Pipes ASTM A53
Tubes ASTM A500 Grade B
Bolts ASTM A307
ASTM A325SC
Metal Studs SSMA Member

Note: Unless noted otherwise in structural calculations or drawings.
## BUILDING WEIGHTS

### ROOF DEAD LOAD TAKE OFF (PSF)

<table>
<thead>
<tr>
<th>Material</th>
<th>Unit Weight (PSF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comp. Roofing</td>
<td>3.5</td>
</tr>
<tr>
<td>Insulation, 10-inch Fiberglass Batt</td>
<td>0.6</td>
</tr>
<tr>
<td>1/2&quot; Plywood / Sheathing</td>
<td>1.5</td>
</tr>
<tr>
<td>Pre-fab Trusses</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>Total, Sloped Members</strong></td>
<td><strong>8.6</strong></td>
</tr>
<tr>
<td><strong>Horizontal Conversion</strong></td>
<td><strong>9.0</strong></td>
</tr>
<tr>
<td>Gypsum Wallboard</td>
<td>2.5</td>
</tr>
<tr>
<td>MEP &amp; Misc.</td>
<td>3.5</td>
</tr>
<tr>
<td><strong>Total to Rafters/Joists</strong></td>
<td><strong>15.0</strong></td>
</tr>
<tr>
<td>Beams</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>Total to Beams</strong></td>
<td><strong>18.0</strong></td>
</tr>
<tr>
<td>Columns (King Post)</td>
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<tr>
<td><strong>Total to Columns</strong></td>
<td><strong>19.0</strong></td>
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### LIVE LOADS

<table>
<thead>
<tr>
<th>Material</th>
<th>Unit Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof (Reducible)</td>
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### FLOOR DEAD LOAD TAKE OFF (PSF)

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<thead>
<tr>
<th>Material</th>
<th>Unit Weight</th>
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<tbody>
<tr>
<td>Flooring - Hardwood</td>
<td>4.0</td>
</tr>
<tr>
<td>3/4&quot; Plywood / Sheathing</td>
<td>3.0</td>
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<tr>
<td>Insulation, 6-inch Fiberglass Batt</td>
<td>0.5</td>
</tr>
<tr>
<td>MEP &amp; Misc.</td>
<td>3.0</td>
</tr>
<tr>
<td>Joists 2x6 @ 16&quot; O.C.</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Total to Joists</strong></td>
<td><strong>12.0</strong></td>
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<tr>
<td>Beams</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>Total to Beams</strong></td>
<td><strong>15.0</strong></td>
</tr>
<tr>
<td>Columns</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Total to Columns</strong></td>
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### LIVE LOADS

<table>
<thead>
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<th>Unit Weight</th>
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</thead>
<tbody>
<tr>
<td>Residential (Reducible)</td>
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### EXTERIOR WALL DEAD LOAD TAKE OFF (PSF)

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<th>Material</th>
<th>Unit Weight</th>
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</thead>
<tbody>
<tr>
<td>Gypsum Wallboard, 1/2&quot;</td>
<td>2.5</td>
</tr>
<tr>
<td>Studs, 2x4 @ 16&quot; O.C.</td>
<td>1.0</td>
</tr>
<tr>
<td>1/2&quot; Plywood / Sheathing</td>
<td>1.5</td>
</tr>
<tr>
<td>Stucco, 7/8&quot;</td>
<td>10.0</td>
</tr>
<tr>
<td>Insulation, 4-inch Fiberglass Batt</td>
<td>0.5</td>
</tr>
<tr>
<td>Misc.</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Total to Joists</strong></td>
<td><strong>18.0</strong></td>
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### INTERIOR WALL DEAD LOAD TAKE OFF (PSF)

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<thead>
<tr>
<th>Material</th>
<th>Unit Weight</th>
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<tr>
<td>Gypsum Wallboard, 1/2&quot;</td>
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</tr>
<tr>
<td>Studs, 2x4 @ 16&quot; O.C.</td>
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</tr>
<tr>
<td>Insulation, 4-inch Fiberglass Batt (Sound Barrier)</td>
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</tr>
<tr>
<td>Misc.</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Total to Joists</strong></td>
<td><strong>8.0</strong></td>
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</tbody>
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Site Information:

Customer: Stone Truss

Job Description: LONG BEACH REMODEL

Address:  

City, State, Zip: LONG BEACH, CA 90815

Job Engineering Criteria:

Design Code: CBC 2013 Res

View Version: 15.01.01.0611.00  JRef #: 1VPB2920001

Wind Standard: ASCE 7-10  Wind Speed (mph): 110  

Roof Load (psf): 20.00-14.00-0.00-10.00  Floor Load (psf): None

This package contains a job notes page, 5 truss drawings and 1 details.

<table>
<thead>
<tr>
<th>Item</th>
<th>Seal #</th>
<th>Truss</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>090.16.1728.21503</td>
<td>A MONO HIP H8</td>
</tr>
<tr>
<td>2</td>
<td>090.16.1728.25540</td>
<td>A1 HIP 9-2-6</td>
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<tr>
<td>3</td>
<td>090.16.1728.29487</td>
<td>A2 HIP H12</td>
</tr>
<tr>
<td>4</td>
<td>090.16.1728.36887</td>
<td>B HIP H6</td>
</tr>
<tr>
<td>5</td>
<td>090.16.1728.41957</td>
<td>B1 COMN</td>
</tr>
</tbody>
</table>
Lumber
Top chord 2x4 DF-L #1 & Better, g
Bot chord 2x4 DF-L #1 & Better, g
Wells 2x4 DF-L Standard, g

Plating Notes
Connectors in green lumber (g) designed using NDS/TPI reduction factors.

Loading
#1 hip with 7-10-15 setback supports jack trusses, or rafters and joists, spanning between this truss and the end wall. Corner(s) framed as a hipJack supporting corner rafters and joists, or open-end jacks.
Use this design for common hip trusses @ 24° OC. Extend sloping TC of truss and jacks to hip rafter.
Support extensions every 4.0 f from flat TC. Spacing of supports originates from #1 hip. Attaching 2x4 lateral bracing to flat TC @ 32° OC with 2-16d Box or Gun nail (0.135" x 3.5" mm) and diagonally brace per DWG. BRCA HIP1014. Support rafter jack with cripples at 5-7-14 OC.

Purlins
In lieu of structural panels or rigid ceiling use purlins to brace all flat TC @ 32° OC, all BC @ 120° OC.

Wind
Member design based on both MWFRS and C&C.
Right end vertical not exposed to wind pressure.

---

**WARNING**
**IMPORTANT** FURNISH THIS DRAWING TO ALL CONTRACTORS INCLUDING THE INSTALLERS

Trusses require extreme care in fabricating, handling, installing, and bracing. Refer to and follow the latest edition of BCSI (Building Component Safety Information), by TPI and SBCA for safety practices when installing these functions. Installers shall provide temporary bracing per BCSI, unless noted. BCSIPic 5-10 truss shall have properly attached structural sheathing and bottom chord shall have a properly attached rigid ceiling. Locations shown for permanent lateral restraint of webs shall have bracing per BCSI sections 83, 87, or B10 as applicable. Apply plates to each face of truss and position as shown above and on the joint details, unless noted otherwise. Refer to drawings 16A-2 for standard plate positions.

Alpine, a division of TVW Building Components Group Inc. shall not be responsible for any deviation from this drawing that may not result in the assembly of the trusses in conformance with ANSI/SP1. 1, or for handling, shipping, installing and bracing of trusses. Seat on this drawing or cover page listing this drawing, indicates acceptance of professional engineering responsibility solely for the design shown. The suitability and use of this drawing for any structure is the responsibility of the Building Designer per ANSI/SP1.1 Sec.2.


---

Job Number: T600
LONG BEACH REMODEL
Truss Label: A MONO HIP H8
Loading Criteria

Wind Criteria
- Wind Std: ASCE 7-10
- Speed: 110 mph
- Enclosure: Closed
- Risk Category: II
- EXP: C
- Mean Height: 15.00 ft
- TCDL: 8.4 psf
- BCDL: 6.0 psf
- Load Duration: 1.25
- Spacing: 30.0°
- MWFRS Parallel Dist: 0 to h/2
- C&C Dist at: 3.00 ft
- Loc. from endwall: Any
- Gd: 0.18
- Wind Duration: 1.33

Snow Criteria
- PG: NA
- CW: NA
- CAT: NA
- PG: NA
- CW: NA
- CAT: NA
- Snow Duration: NA

De/wsi Criteria
- PP Deflection in loc: L
- VERT( LL): 0.031 C 999 240
- VERT(TL): 0.105 C 999 180
- HORIZ( LL): 0.016 G -
- HORIZ(TL): 0.033 G -
- Greep Factor: 2.0
- Max TC CSI: 0.027
- Max BC CSI: 0.026
- Max Web CSI: 0.027

Maximum Reactions (lbs)

<table>
<thead>
<tr>
<th>Loc</th>
<th>R</th>
<th>U</th>
<th>Rw</th>
<th>Rh</th>
<th>RL</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>921</td>
<td>188</td>
<td>561</td>
<td>-</td>
<td>-</td>
<td>198</td>
</tr>
<tr>
<td>G</td>
<td>797</td>
<td>15</td>
<td>464</td>
<td>-</td>
<td>-</td>
<td>358</td>
</tr>
</tbody>
</table>

Wind reactions based on C&C
- B Min Brg Width Req = 1.5
- G Min Brg Width Req = 1.5
- Bearings B & G are a rigid surface.

Members not listed have forces less than 375# Maximum Top Chord Forces Per Ply (lbs)

D - E 157 - 1003 C - D 115 - 1171
B - C 256 - 1678

Maximum Bot Chord Forces Per Ply (lbs)

B - H 1551 - 358 H - G 603 - 82

Maximum Web Forces Per Ply (lbs)

Webs Tens.Comp. Webs Tens. Comp.
C - H 224 - 598 E - G 114 - 504
H - E 490 - 102

**WARNING** READ AND FOLLOW ALL NOTES ON THIS DRAWING!

**IMPORTANT** FURNISH THIS DRAWING TO ALL CONTRACTORS INCLUDING THE INSTALLERS

Trusses require immediate care in handling, bracing, installation, and bracing. Refer to and follow the latest edition of BCSI (Building Component Safety Information) by TPI and SBCA for safety practices prior to performing these functions. Installers shall provide temporary bracing per BCSI. Top chord shall have properly attached structural sheathing and bottom chord shall have properly attached rigid ceiling. Locations shown for permanent lateral restraint of webs shall have bracing installed per BCSI sections B3, B7, or B10, as applicable. Apply plates to each face of truss and position as shown above and in the Joint Details, unless noted otherwise. Refer to drawings 16A-2 for standard plate positions.

Alpine, a division of ITW Building Components Group Inc. shall not be responsible for any deviation from this drawing, any failure to build the trusses, or any performance with ANSI/TPI 1 or for handling, shipping, installation and bracing of trusses. A seal on this drawing or cover page listing this drawing indicates acceptance of professional engineering responsibility solely for the design shown. The suitability and use of this drawing for any structure is the responsibility of the Building Designer per ANSI/TPI 1 Sec 2.

For more information see this job's general notes page and these web sites: ALPINE: www.alpinetea.com; TPI: www.tpiest.org; SBCA: www.sbcaindustries.com; ICC: www.iccsafe.org
**WARNING** READ AND FOLLOW ALL NOTES ON THIS DRAWING!

**IMPORTANT** FURNISH THIS DRAWING TO ALL CONTRACTORS INCLUDING THE INSTALLERS

Trusses require extreme care in fabricating, handling, shipping, installing and bracing. Refer to and follow the latest edition of BCSI (Building Component Safety Information), by TPI and SBCCA for safety practices prior to performing these functions. Installers shall provide temporary bracing per BCSI. Unless noted otherwise, top chord shall have properly attached structural shearling and bottom chord shall have properly attached rigid ceiling. Locations shown for permanent lateral restraint of webs shall have bracing installed per BCSI sections B3, B7, or B10, as applicable. Apply plates to each face of truss and position as shown above and on the Joint Details, unless noted otherwise. Refer to drawings 160A-2 for standard plate positions.

Alpine, a division of ITW Building Components Group Inc. shall not be responsible for any deviation from this drawing, any failure to build the truss in conformance with ANSI/TPI 1, or for handling, shipping, implications and bracing of truss. A seal on this drawing or cover page listing this drawing, indicates acceptance of professional engineering responsibility solely for the design shown. The suitability and use of this drawing for any structure is the responsibility of the Building Designer per ANSI/TPI 1 Sec.2.

For more information see this job's general notes page and these websites: ALPINE: www.alpinewtruss.com; TPI: www.tpiindustry.org; SBCCA: www.sbcindustry.com; ICC: www.iccsafe.org

No C 58065
03/31/2016

CIVIL

8351 River Circle
Sacramento, CA 95828

ALPINE
ANTICIPATING}

357 Jones Road
GA. 2054
**WARNING** READ AND FOLLOW ALL NOTES ON THIS DRAWING!

**IMPORTANT** Furnish this drawing to all contractors including the installers.

Trusses require extreme care in handling, hoisting, shipping, installing and bracing. Refer to and follow the latest edition of BCSI (Building Component Safety Information) by TPI and SBCA for safety practices prior to performing these functions. Installers shall provide temporary bracing per BCSI. Unless noted otherwise, top chord shall have properly attached structural sheathing and bottom chord shall have a properly attached rigid ceiling. Locations shown for permanent lateral restraint of webs shall have bracing installed per BCSI sections B3, B7, or B10, as applicable. Apply plates to each face of truss and position as shown above and on the joint details, unless noted otherwise. Refer to drawings 160a-2 for standard plate standards.

Alpine, a division of ITW Building Components Group Inc. shall not be responsible for any deviation from this drawing if any failure to build the truss in conformance with ANSI/TPI-I, or for handling, shipping, installing and bracing of trusses. A seal on this drawing or cover page listing this drawing, indicates acceptance of professional engineering responsibility solely for the design shown. The suitability and use of this drawing for any structure is the responsibility of the Building Designer per ANSI/TPI-1 Sec. 2.

For more information see the job’s general notes page and these web sites: ALPINE, www.alpinetruss.com; TPI: www.tpi-int.org; SBCA: www.sbsondustry.com; ICC: www.iccsafe.org

**Lumber**

Top chord 2x4 DF-L #15&Bet (g)
Bot chord 2x4 DF-L #15&Bet (g)
Vetsos 2x4 DF-L (Standard)

**Loading**

Bottom chord checked for 10.00 psf non-concurrent live load.

**Plating Notes**

Connectors in green lumber (g) designed using NDS/TPD reduction factors.

**Wind**

Member design based on both MWF/RS and C&C.
CALIFORNIA HIP PERMANENT BRACING DETAIL - END JACKS SUPPORTED 48" O/C

PERMANENT BRACING

START OF TOP CHORD EXTENSIONS. (SLOPING TO FLAT)
FLAT TOP CHORD. (TYPICAL)
PURLINS. (CONTINUOUS)
START OF TOP CHORD EXTENSIONS. (SLOPING TO FLAT)

Permanent Diagonal Bracing

Permanent bracing forms braced bays. Repeat at all hip ends.
Maximum interval equals 20 ft. Note: The first braced bay at the
#1 hip can be excluded when the following conditions are met:
1. Continuous purlins are attached to the flat top chord of the #1 hip.
2. The end jacks are sheathed with properly attached structural panels.

Note: Conventional framing, including cripples and their connections,
is not the responsibility of the truss designer, plate manufacturer, or
truss Fabricator. Persons erecting trusses are cautioned to seek
advice of a local professional engineer regarding conventional framing.
Trusses shall be designed for the appropriate tributary area.

Section A-A

FIELD APPLIED CRIPPLE
CRIPPLE SPACING
CHORD EXTENSION
BUILT-IN CRIPPLES IN PLANE OF TRUSSES

Section B-B

CRIPPLE SUPPORT LAYOUT

- HIP RAFTERS
- CALIFORNIA HIP SYSTEM TRUSSES
- COMMON TRUSSES
- HIP TRUSSES

PITCHED AND SHEATHED CHORD AREA:

Wind: Maximum wind speed 120 mph. Expo. C, Cat. II, 30 ft. mean roof height and
5 psf min. dead load. Connect cripples to rafter extensions with #6 10d nails
(0.128x3''), and to top chord of hip truss and purliner with (3) 10d nails.

- OR-
- Butt cripples to jack rafter and hip truss top chord, and provide connection
- For 360# uplift each end (ITWBCG H125 clip with 8d nails (0.131x1.5'')
or equivalent).

(A) Hip truss top chord.  (B) 2X4 continuous purliner, 24" O/C typ.
(C) CRIPPLES: a - Cripple Location. (4" O/C, cripple spacing shown)
Cripples support extended top chords of end jacks, hip jacks, and hips.
Material: 2X4 SPF, HF, DF-L, or Saplone Standard Stud/#3 min. grade.
Max. cripple length = 6'/36. Max. 40 psf Snow Load = 14 psf Dead Load.
(D) Cripples and horizontal false top chords may be built into truss.

End Jack Cripples

See cripple drawings for specific design information.

REF CALIF. BRACE
DATE 10/01/14
DRWG BRCALHIP0104

Design Crit: NDS-2012
Spacing: 24" oc, typ.
ROOF BEAMS

HDR-1 & HDR-2

W = 556 PlF

↑ 8'-0" ↑

* HDR-1 Has Similar Loading As HDR-2

Lr = Lo R1 R2

R1 = 1.0 (Tc < 2000 SE)

R2 = 1.0 (F ≤ 4)

Lr = Lo = 20 BF

W = (18 BF + 20 BF) 14' +

18 BF (16/12) = 556 PlF

V = W/2 = 556 (8) = 2220 #

M = W/2 = 556 (8²) = 4450 1'-#

DEFLECTION

ΔL = L / 240 = 8 x 12 / 240 = 0.40"'

I Req = 5 x 12⁴ / 384 x ΔL

= 5 (20 x 14) 8⁴ 12³

= 38 m⁴

ΔD+L = L / 180 = 8 x 12 / 180 = 0.53

I Req = 5 (556) 8⁴ 12³

= 57 m⁴

Try: 4 x 10 PF-L #1

I = 230.8 in.⁴

S = 49.91 in.³

A = 52.38 in.²
\[ C_L = 1.0 \Rightarrow \frac{d}{h} = \frac{1.0}{4} = 0.25 \quad \text{Per NDS 4.4.1} \]

**Check Bending**

\[ f_b = \frac{w}{s} = \frac{4450 \times h^2}{49.81} = 1070 \text{ PSI} \]

\[ F'_b = F_b \cdot C_F = (1000 \text{ PSI})(1.25) = 1500 \text{ PSI} \]

\[ f_b = 1070 \text{ PSI} < F'_b = 1500 \text{ PSI} \quad \text{OK} \]

**Check Shear**

\[ f_s = \frac{3 \cdot V}{2 \cdot k} = \frac{3 \cdot (2220)}{2 \cdot (32.38)} = 103 \text{ PSI} \]

\[ F'_s = F_s \cdot C_F = (180)(1.25) = 225 \text{ PSI} \]

\[ f_s = 103 \text{ PSI} < F'_s = 225 \text{ PSI} \quad \text{OK} \]

**Use 4x10 DF-2 #1 (HWR & HWR)**
\[ w = 556 \text{ lb} \]
\[ L_1 = 60 \text{ ft} \]
\[ L_2 = 20 \text{ ft} \]
\[ t_1 = 1.0 \text{ in} \]
\[ t_2 = 1.0 \text{ in} \]
\[ T_1 = 200 \text{ ft}\cdot\text{in} \]
\[ T_2 = 20 \text{ ft}\cdot\text{in} \]
\[ \rho = 4 \text{ ft} \]

\[ \omega = (18 \text{ psf} + 20 \text{ psf}) \]
\[ + 18 \left( \frac{11}{12} \right) = 556 \text{ psf} \]

\[ V = \frac{\omega L_2^2}{2} = \frac{556 \left( 2.83 \right)^2}{2} = 648 \text{ ft}^3 \]
\[ M = \frac{\omega L_2^2}{8} = \frac{556 \left( 2.83 \right)^2}{8} = 578 \text{ in} \cdot \text{lb} \]

**Deflection**

\[ \Delta_L = \frac{L}{240} = \frac{2.33}{240} = 0.12'' \]

\[ I_{100} = \frac{5wL^4}{384EI} = \frac{5 \cdot (20 \times 14) \cdot 2.33^4}{384 \cdot (1.7 \times 10^6) \cdot 0.12} = 0.91 \text{ in}^4 \]

\[ \Delta_{100} = \frac{L}{180} = \frac{2.33}{180} = 0.16'' \]

\[ I_{100} = \frac{5wL^4}{384EI} = \frac{5 \cdot (556) \cdot 2.33^4 \cdot 12^2}{384 \cdot (1.7 \times 10^6) \cdot 0.16} = 1.34 \text{ in}^4 \]

**Try 4\times4 DF-L #1**

\[ I = 12.51 \text{ in}^4 \]
\[ S = 7.65 \text{ in}^3 \]
\[ A = 12.25 \text{ in}^2 \]
\[ C_L = 1.0 \Rightarrow \frac{C}{b} = \frac{4}{4} = 1.0 \quad \text{PER REDS 4.4.1} \]

**Check Bending**

\[ F_b = \frac{M}{s} = \frac{378 \times 12}{7.15} = 634 \text{ PSI} \]

\[ F'_b = F_b C_D C_T = 1000 (1.25) (1.50) = 1875 \text{ PSI} \]

\[ F_L = 643 \text{ PSI} < F'_b = 1875 \text{ PSI} \quad \text{OK} \]

**Check Shear**

\[ F_v = \frac{3V}{2A} = \frac{3 (648)}{2(2.25)} = 79.3 \text{ PSI} \]

\[ F'_v = F_v C_D = 180 (1.25) = 225 \text{ PSI} \]

\[ F_v = 79.3 \text{ PSI} < F'_v = 225 \text{ PSI} \quad \text{OK} \]

**Use 4x4 BE-L #1 (H3D3)**
Try 4 x 6 DF - #1

\[ I = 48.53 \text{ in}^4 \]
\[ S = 17.65 \text{ in}^3 \]
\[ A = 19.25 \text{ in}^2 \]
\[ c_2 = 1.0 \Rightarrow \frac{b}{L} = \frac{6}{4} = 1.5 \quad \text{Per AISC 4.4.1} \]

**Check Bond**

\[ F_b = \frac{M}{\frac{b}{L}} = \frac{1260 \times 12}{17.65} = 857 \text{ kips} \]

\[ F' = F_b c_d c_f = 1000 \times (1.25) \times (0.3) = 1625 \text{ kips} \]

\[ F_b = 857 \text{ kips} < F' = 1625 \text{ kips} \quad \text{OK} \]

**Check Shrinkage**

\[ F_V = \frac{3V}{2A} = \frac{3 \times (1180)}{2 \times (19.25)} = 91.9 \text{ kips} \]

\[ F' = F_c c_d = 180 \times (1.25) = 225 \text{ kips} \]

\[ F_V = 91.9 \text{ kips} < F' = 225 \text{ kips} \quad \text{OK} \]

**Use 4\times6 DE-L #1 (HR-2)**
Floor Framing

**FJ-1**

\[ w = 69.3 \text{ PlF} \]

\[ h = 7' 4" \]

**Deflection**

\[ \Delta_2 = \frac{wL^4}{384EA} = \frac{720^2}{384 \times 610 \times 0.35} = 0.23'' \]

\[ I_{250} = \frac{5wL^4}{384EA} = \frac{5 \times 69.3 \times 720^4}{384 \times (1.6 \times 10^6) \times 0.35} = 7.83 \text{ in}^4 \text{ Correct} \]

\[ \Delta_{2+L} = \frac{wL^4}{240E} = \frac{720^2}{240 \times 610} = 0.35'' \]

\[ I_{250} = \frac{5wL^4}{384EA_{2+L}} = \frac{5 \times 69.3 \times 720^4}{384 \times (1.6 \times 10^6) \times 0.35} = 6.69 \text{ in}^4 \]

**Try 2x6 BF-L #2**

\[ I = 20.8 \text{ in}^4 \]

\[ S = 7.56 \text{ in}^3 \]

\[ A = 8.25 \text{ in}^2 \]
**Check Bonding**

\[ f_b = \frac{M}{s} = \frac{425 \times 12}{7.56} = 675 \text{ psi} \]

\[ F_b = F_{b,c} = 900 (1.0) 1.3 (1.15) = 1350 \text{ psi} \]

\[ F_b = 675 \text{ psi} < F_b = 1350 \text{ psi} \quad \text{OK} \]

**Check Shear**

\[ f_v = \frac{3V}{2A} = \frac{3(243)}{2(8.25)} = 44.2 \text{ psi} \]

\[ F_v = F_{v,c} = 80 (1.0) = 80 \text{ psi} \]

\[ F_v = 44.2 \text{ psi} < F_v = 80 \text{ psi} \quad \text{OK} \]

**Check Torsion**

\[ C_b = \frac{q + \frac{h}{2}}{q} = \frac{4 + \frac{3}{2}}{4} = 1.09 \]

\[ A = \frac{\pi}{4} b = 4 (2) = 8 \pi \text{ in}^2 \]

\[ F_{c,\perp} = \frac{P}{A} = \frac{243}{8} = 30.4 \text{ psi} \]

\[ F_{c,\perp} = F_{c,\perp} C_b = 625 (1.09) = 681 \text{ psi} \]

\[ F_{c,\perp} = 30.4 \text{ psi} < F_{c,\perp} = 681 \text{ psi} \quad \text{OK} \]

Use 2x6 DF-L #2 (FT-1)
FB-1

\[ w = 770 \text{ lb} \]

\[ 6' - 0'' \]

\[ T_a = 6' \times 14' = 84 \text{ ft} \]

\[ k1Lr = 8' \times 2 = 16 \text{ ft} \times 40 \text{ sf} \]

\[ \Rightarrow \text{no reduction allowed} \]

\[ w = (15.13 \text{ ft} + 40 \text{ psf}) \times 14' = 770 \text{ psf} \]

\[ V = \frac{wL}{2} = \frac{770(14)}{2} = 2310 \text{ ft}^2 \]

\[ M = \frac{wL^2}{8} = \frac{770(14)^2}{8} = 3470 \text{ ft}^3 \]

**Deflection**

\[ \Delta_2 \leq \frac{L}{480} = \frac{6 \times 12}{480} = 0.120'' \]

\[ f_2o = \frac{5wL^4}{384EA} = \frac{5(40 \times 14)^4(1.7 \times 10^5)0.120}{384(1.7 \times 10^5)} = 48.0 \text{ in}^4 \text{ continuous} \]

\[ \Delta_{DL} \leq \frac{L}{240} = \frac{6 \times 12}{240} = 0.150'' \]

\[ f_{DL} = \frac{5wL^4}{384EA_{DL}} = \frac{5(770)^4(1.7 \times 10^5)0.120}{384(1.7 \times 10^5)} = 44 \text{ in}^4 \]

**Try 4 x 10 DF-L #1**

\[ I = 230.8 \text{ in}^4 \]

\[ S = 49.91 \text{ in}^3 \]

\[ A = 32.38 \text{ in}^2 \]
Check Bending

\[ f_b = \frac{M}{S} = \frac{3470 \times 12}{49.91} = 83.4\ \text{ksi} \]

\[ f_b = \frac{F_b c_b d_p}{1000 (1.0) 1.2} = 1200\ \text{ksi} \]

\[ f_b = 83.4\ \text{ksi} < 1200\ \text{ksi} \quad \text{OK} \]

Check Stress

\[ f_v = \frac{3v}{2a} = \frac{3(230)}{2(32.38)} = 107\ \text{ksi} \]

\[ F_b = F_2 c_b = 180 (1.0) = 180\ \text{ksi} \]

\[ f_v = 107\ \text{ksi} < 180\ \text{ksi} \quad \text{OK} \]

Use 4 x 10 DF-L #1 (FB-1)
Foundations

Wall Footings (FTG-1)

Loads

\[
\begin{align*}
(15 \text{ psf} + 20 \text{ psf}) \times 7' &= 245 \text{ plf} \\
18 \text{ psf} \times 8' &= 144 \text{ plf} \\
(12 \text{ psf} + 40 \text{ psf}) \times 3.5' &= 182 \text{ plf} \\
150 \text{ plf} (1' \times 0.5' + 2' + 0.5') &= 225 \text{ plf} \\
\hline
&= 796 \text{ plf}
\end{align*}
\]

Maximum ftg. width = \[\frac{796 \text{ plf}}{1500 \text{ psf}} = 0.53'\]

Use 12" wide ftg.

Minimum bond = 2" x 6" x 0.060 lb/ft = 0.26 \text{ in}^2

Use #5 bar (0.31 \text{ in}^2)

Use 12" wide by 6" thick wall ftg. w/ 1-#5 cont. 1511 ftf, top (bot.)

Pier Footings (FTG-2)

Loads

\[
\begin{align*}
(15 \text{ psf} + 40 \text{ psf}) \times 6' \times 7' &= 2310 \text{ #} \\
\frac{2310 \#}{1500 \text{ psf}} &= 1.54 \text{ #/sf} \\
\hline
\text{Use 18" sq. ftgs.}
\end{align*}
\]
V = CsW (lbs) Seismic Base Shear.

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Calculate Cs:

| Cs = 0.162 |
| Cs max = 0.770 |
| Cs min = 0.046 |

Solutions

| Cs = 0.162 |

USE Cs = 0.2
Building Weights

**Roof** 15 Psf \( \left( \frac{14.5 \times 26.25}{14 \times 14.25} + \frac{11 \times 11.5}{11 \times 11.5} \right) \) = 24700 lbs

**Int. Walls** 8 Psf \( \left( \frac{6.25 \times 4}{8.25 \times 4} \right) \) = 4650 lbs

**Ext. Walls** 18 Psf \( \left( \frac{2 \times 45.5}{2 \times 42.25} + \frac{2 \times 2}{2 \times 2} \right) \times 4 = 13.600 \) lbs

Bldg. Wt = 43000 lbs

**Diaphragm**

\[ F_{pk} = \frac{\sum F_i}{\sum W_i} \]

\( F_{pk} = 0.2 \times W_{pk} \)

**Limits**

\( 0.5 \times 0.5 \times W_{pk} = 0.4 (1.05) (W_{pk}) = 0.420 W_{pk} > F_{pk} \) OK

\( 0.2 \times 0.5 \times W_{pk} = 0.2 (1.05) (W_{pk}) = 0.210 W_{pk} > F_{pk} \)

\( F_{pk} = 0.210 W_{pk} \)
Diaphragm Design

\[ F_{PC} = 0.210 \times \frac{W_{PC}}{D} \times 1.3 \times \left( \frac{43000}{1.4} \right) = 8390^* \]

\[ F_{RooP} = \frac{F_{PC}}{\text{Roof Area}} = \frac{8390^*}{1500 \text{ ft}^2} = 5.60 \text{ psf} \]

N-S Dir.

\[ N_{N-S} = \frac{5.60 \text{ psf} \times 1500 \text{ ft}^2}{2 \times 47.25} = 88.9 \text{ pcf} \]

Use 1/2" RDX w/ 100 @ 6" x 6" 12" blocked at 1/2"

\[ U_n = 290 \text{ pcf} > U_{N-S} \quad \text{OK} \]

E-W Dir.

\[ N_{E-W} = \frac{5.60 \text{ psf} \times 1500 \text{ ft}^2}{2 \times 45.5} = 92.3 \text{ pcf} \quad \text{OK} \]
Shenwall Design

N-S Direction

\[ U = 5.60 \text{ psf} \]

@ Gridline 1, \[ V_1 = 5.60 \text{ psf} \times 28.25' \times \frac{15.25'}{2} = 1210' \]

\[ V_1 = \frac{1210'}{(12'+4')} = 76 \text{ psf} \]

Use Shenwall 1 Per Schedule \((U_a = 280 \text{ psf})\) OK

@ Gridline 2, \[ V_2 = 5.60 \text{ psf} \times 28.25' \times \left(\frac{15.25'}{2} + \frac{12'}{2}\right) = 2160' \]

\[ V_2 = \frac{2160'}{12'} = 180 \text{ psf} \]

Use Shenwall 2 Per Schedule \((U_a = 280 \text{ psf})\) OK

@ Gridline 3, \[ V_3 = 5.60 \text{ psf} \times 47.75' \times \left(\frac{12'}{2} + \frac{8.75'}{2}\right) \]

\[ = 4070' \]

\[ V_3 = \frac{4070'}{8.5'} = 478 \text{ psf} \]

Use Shenwall 2 Per Schedule \((U_a = 510 \text{ psf})\) OK

@ Gridline 4, \[ V_4 = 5.60 \text{ psf} \times 26.25' \times \frac{8.75'}{2} = 1380' \]

\[ V_5 = \frac{1380'}{6'} = 230 \text{ psf} \]

Use Shenwall 1 Per Schedule \((U_a = 280 \text{ psf})\) OK
E-W DIRECTION

@ STUDLING A: $V_A = 5.60\, \text{psf} \times 45.5' \times \frac{28.25'}{2} = 3600\#$

$V_A = \frac{3600\#}{11.5} = 313\, \text{Plf}$

USE SHEARWALL 2 PER SCHEDULE ($V_A = 510\, \text{Plf}$)

@ STUDLING B: $V_B = 5.60\, \text{psf} \times 41' \times \left(\frac{28.25'}{2} + \frac{17'}{2}\right)$

$V_B = 5190\#$

$V_B = \frac{5190\#}{10'} = 519\, \text{Plf}$

USE SHEARWALL 3 PER SCHEDULE ($V_A = 665\, \text{Plf}$)

@ STUDLING C: $V_C = 5.60\, \text{psf} \times 14.25' \times \frac{17'}{2} = 678\#$

$V_C = \frac{678\#}{41} = 170\, \text{Plf}$

USE SHEARWALL 1 PER SCHEDULE ($V_C = 280\, \text{Plf}$)
Shortwave On

UCS Walls

Guideline 1

\[ V = 76 \text{ PSF} \times 6' = 912 \text{#} \]

\[ \text{UPLIFT} = \left[ 912 \times 8' - 0.467 \left( 15 \text{ PSF} \times 7.38' \times \frac{12^2}{2} + 18 \text{ PSF} \times 8' \times \frac{12^2}{2} \right) \right] + 42 \]

\[ = 49.4 \text{#} \]

\[ V = 76 \text{ PSF} \times 4' = 304 \text{#} \]

\[ \text{UPLIFT} = \left[ 304 \times 8' - 0.467 \left( 15 \text{ PSF} \times 4' \times \frac{12^2}{2} + 18 \text{ PSF} \times 8' \times \frac{12^2}{2} \right) \right] / 4 \]

\[ = 126 \text{#} \]

Use Simpson HDU 2 Holdown

\[ Ta = 3075 > T = 418 \text{#} \quad \text{OK} \]

Guideline 2

\[ V = 2(60 \text{#}) \]

\[ \text{UPLIFT} = \left[ 2(60 \text{#}) \times 8' - 0.467 \left( 15 \text{ PSF} \times 7.38' \times \frac{12^2}{2} + 18 \text{ PSF} \times 8' \times \frac{12^2}{2} \right) \right] + 42 \]

\[ = 126 \text{#} \]

Use Simpson HDU 2 Holdown \quad \text{OK}
Grinding 3

\[ V = 4070 \]  
\[ \text{UPLIFT} = \left[ \frac{4070 \times 8'}{-0.467 \left( 15^{\text{BF}} \times 7' \times \frac{8.5^2}{2} + 18 \times 8' \times \frac{8.5^2}{2} \right)} \right] \times 8.5' \]

\[ = 3440 \]  

Use Simpson Hold Down Hold Down

\[ T_a = 4065 \]  

\[ T = 3440 \]  

Grinding 4

\[ V = 1380 \]  
\[ \text{UPLIFT} = \left[ \frac{1380 \times 8'}{-0.467 \left( 15^{\text{BF}} \times 6' \times \frac{6^2}{2} + 18 \times 8' \times \frac{8^2}{2} \right)} \right] \times 6' \]

\[ = 1580 \]  

Use Simpson Hold Down Hold Down

Ok
**E-W Walls**

**Guideline A**

\[ U = \frac{3}{12} \text{ PLF} \times 3.5 = 1100 \text{ #} \]

\[ \text{UPLIFT} = \left[ 1100 \times 8' - 0.467 \left( \frac{15.75 \times 3.5 \times \frac{3.5}{2} + 10 \times 8' \times \frac{3.5}{2}}{2} \right) \right] \]

\[ = 2380 \text{ #} \]

**UPLIFT FORCES FOR OTHER TWO WALLS ON GUIDELINE A ARE SIMILAR**

**Use Simpson Hour Holdown**

**Guideline B**

\[ U = 519 \text{ PLF} \times 3' = 1560 \text{ #} \]

\[ \text{UPLIFT} = \left[ 1560 \times 8' - 0.467 \left( 15.75 \times 3 \times \frac{3.5}{2} + 10 \times 8' \times \frac{3.5}{2} \right) \right] \]

\[ = 4040 \text{ #} \]

**UPLIFT FORCES FOR OTHER TWO WALLS ON GUIDELINE B ARE SIMILAR**

**Use Simpson Hour Holdown**

\[ Ta = 4565 \text{ #} > T = 4040 \text{ #} \]

**OK**
V = 678 #

UPLIFT = \left[ 678 \times 8' - 0.467 \left( 15 \text{ ft} \times 4' \times \frac{4'}{2} + 18 \text{ ft} \times 8' \times \frac{4'}{2} \right) \right] \div 2

= 1190#

USE SIMPSON HDUZ HOLDOWN OK