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PROJECT GLENSHIRE - NORTH DECK PAGE 1 OF 20
LOCATION 15726 GLENSHIRE DR., GLENSHIRE
JURISDICTION TOWN OF TRUCKEE STATE CA BY RTF
JOB # 17028 DATE 5/30/17 REV

SPECIFICATIONS AND GENERAL NOTES FOR CONSTRUCTION AND FABRICATION

A. GENERAL NOTES

ver 15.1 (California) 1/1/2017

1. All construction shall be in accordance, with the minimum requirements of the **2016** edition of the California Building Code (**CBC**), **2016** edition of the California Residential Code (**CRC**) and local building codes, or as specifically noted on these plans and calculations, with the most stringent condition governing. It is the responsibility of the contractor to be familiar and comply with requirements as stated in the **CBC**, **CRC** and local building codes.
2. If any changes and/or substitutions are made from these plans and calculations, the engineer shall be notified prior to making such changes and/or substitutions in the field and the client shall obtain the necessary certified plans and calculations. If such changes are made without the written approval of the engineer, then the engineer will assume no responsibility for the entire structure or any portions thereof, and shall be held harmless from any resulting claims. The engineering required for these changes and/or substitutions will be viewed as additional services and billed accordingly.
3. The contractor shall verify all dimensions on these plans before starting work and the engineer shall be notified of any discrepancies found before work commences.
4. These calculations are based on a completed structure as per the plans and calculations. This engineer shall not be responsible for, and held harmless from, any damage resulting to an uncompleted structure subject to design loads unless first consulted for an interim design.
5. This structural design is based on loading conditions as determined by local building codes and by the **CBC / CRC**. This engineer is not responsible for damage resulting to a structure due to load conditions exceeding those for which the structure has been designed, or due to "Acts of God" (e.g., fire, flood, war, etc.)
6. Grades as shown on plot maps and elevation drawings are the responsibility of the client. The engineer takes no responsibility for damage to, or additional construction costs of, any structure for which the client, designer, architect, surveyor or any other party has misrepresented the relative position of the structure to the natural finish grades of the building site. Any engineering required to adjust for misrepresented information will be viewed as additional services and billed accordingly.
7. All rafters, trusses, and joists shall stack directly over and/or below wall studs unless noted.
8. The contractor is responsible for all temporary bracing and shoring. Construction and job safety procedures are the responsibility of the contractor.
9. The reproduction of structural contract documents for re-submittal as shop drawings is prohibited. Shop drawing reproduced in such a manner will be rejected and returned.
10. In case of conflict between plans, specifications, details, or notes, the most rigid requirement shall govern until the engineer issues a clarification in writing.
11. In areas where snow is to be considered, the structure is designed for snow loads as determined by the local jurisdiction. These snow loads are based on the assumption that the snow on the structure and the snow on the ground are not connected or "bridged". In some locations periodic maintenance may be required to eliminate any bridging between the snow on the structure and the snow on the ground.



12. No substitutions of material specifications, provided in the engineering, shall be allowed unless written approval from the engineer is obtained. It is the general contractor's responsibility to obtain the specified material. Material suppliers shall not make substitutions of materials unless prior approval of the engineer is obtained. Material suppliers shall not make judgement on whether a substituted material is adequate for its intended use.
13. Duties and responsibilities of the special inspector: 1) The special inspector shall furnish inspection reports to the building official and the engineer and architect of record. All discrepancies shall be brought to the immediate attention of the contractor for correction. Then, if uncorrected, to the proper design authority and to the building official. 2) The special inspector shall submit a final signed report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans and specifications and the applicable workmanship provisions of the current building code.
14. Walls shall be balloon framed (continuous studs) between the top of the foundation or floor diaphragm to the bottom of an upper floor joist or roof rafters/trusses.
15. The contractor shall thoroughly review the plans and the engineering prior to the start of construction. Any question regarding the structural portion of the project shall be brought to the attention of the engineer prior to the start of construction. If the builder has no questions it is understood that he/she has a complete understanding of the framing and how the elements are to be installed. Any misinterpretation shall be the responsibility of the contractor. The contractor shall also be responsible to insure that his/her sub-contractors have a complete understanding of their portion of the project.
16. Framing members shall not be hung unless otherwise noted.

B. TIMBER

1. Foundation sill plates shall be pressure treated Douglas Fir. For special connection requirements see section C.12.
2. Studs shall be Douglas Fir stud grade or better. Studs shall be continuous between horizontal diaphragms, unless specifically noted on the drawings or in this engineering.
3. Framing shall be Douglas Fir, dry (19% Maximum moisture content).
 - a. 2x Joist, Rafters, Plates, Headers ----- Douglas Fir #2, unless noted on the plans.
 - b. 4x Joist, Rafters, Headers, Beams ----- Douglas Fir #2, unless noted on the plans.
 - c. 6x,8x,10x,12x Beams, Posts, Timbers ----- Douglas Fir #1, unless noted on the plans.
4. Glu-Laminated members shall be classified as 24F-V4 with the following minimum design values, unless noted on the plans:
 - a. Horizontal shear stress (Fv) ----- 240 psi
 - b. Bending stress - Positive (Fb) ----- 2400 psi
Negative (Fb) ----- 1850 psi
 - c. Modulus of Elasticity (E) ----- 1800000 psi
 - d. Compression Perpendicular to grain (Fc) -- 650 psi
 - e. Manufacture with wet use adhesives where exposed.
5. Laminated Veneer Lumber (LVL) shall be classified as 2.0E with the following minimum design values, unless noted on the plans:
 - a. Horizontal shear stress (Fv) ----- 285 psi
 - b. Bending Stress (Fb) ----- 2600 psi
 - c. Modulus of Elasticity (E) ----- 2000000 psi
 - d. Compression Perpendicular to grain (Fc) -- 750 psi
6. Parallel Strand Lumber (PSL) shall be classified as 2.0E with the following minimum design values, unless noted on the plans:
 - a. Horizontal shear stress (Fv) ----- 290 psi
 - b. Bending Stress (Fb) ----- 2900 psi
 - c. Modulus of Elasticity (E) ----- 2000000 psi
 - d. Compression Perpendicular to grain (Fc) -- 750 psi

7. Laminated Strand Lumber (LSL) shall be classified as 1.55E with the following minimum design values, unless noted on the plans:
- a. Horizontal shear stress (Fv) ----- 310 psi
 - b. Bending Stress (Fb) ----- 2325 psi
 - c. Modulus of Elasticity (E) ----- 1550000 psi
 - d. Compression Perpendicular to grain (Fc) -- 800 psi
 - e. Compression on the wide face (Fc) ----- 375 psi
8. High strength Glu-Laminated members shall meet the following minimum design values, unless noted on the plans:
- | Anthony Power Beam (APB)
(EWS 30F-E2M1& 28F-E2M1) | Rosboro Big Beam (RBB)
(EWS 30F-E2M3) |
|---|---|
| a. Horizontal shear stress (Fv) ----- 290 psi | a. Horizontal shear stress (Fv) ----- 300 psi |
| b. Bending Stress, 3.5" & 5.5" (Fb) ----- 3000 psi | b. Bending stress (Fb) ----- 3000 psi |
| 7" (Fb) ----- 2800 psi | |
| c. Modulus of Elasticity (E) ----- 2100000 psi | c. Modulus of Elasticity (E) ----- 2100000 psi |
| d. Compression Perpendicular to grain (Fc) -- 740 psi | d. Compression Perpendicular to grain (Fc) -- 650 psi |
9. All stud walls are to have double top plates of the same dimension as the stud. Plates are to be lapped a minimum of 4'- 0" between splices with at least eight 12d nails through both plates on each side of all the plate splices or as noted on framing plans or in the engineering. Where plates are discontinuous due to a post or other framing member, a MSTC28 strap shall be used to splice the plate line together or as noted on framing plans or in the engineering.
10. All partition walls shall have a minimum of a single joist or solid blocking directly below the partition, U.O.N.
11. All built-up, laminated double or multiple 2x joist and beams shall be nailed together with 12d nails at 12" O.C. at both the top and bottom, staggered with three 12d nails at ends unless otherwise noted.
12. All headers at exterior walls and at roof bearing walls shall be 6 x 12 DF #1, bearing on one stud trimmer each side, except where specifically noted.
13. In no instance shall a stud wall be used as a retaining wall; i.e., to resist lateral pressure due to earth backfill, or water or snow build-up against the wall. In the case of snow build-up against a stud wall, it shall be the responsibility of the owner to remove such snow or create a gap between the snow and wall (e.g., through heat loss from the structure). The engineer is not responsible for, and shall be held harmless from, damage and claims resulting from movement of or damage to the structure due to the lateral pressure of snow, water or earth against a stud-wall.
14. All trimmers shall have solid bearing to foundation with solid blocking provided in all joist bays below trimmers, continuous to the foundation.
15. On all seat cuts and similar notches there shall be no over cut at the inside corner of the notch.
16. On all seat cuts the bearing length shall not exceed the width of the supporting member and there shall be only one vertical cut, unless otherwise noted.
17. Nailing of members shall be in accordance with **CBC table 2304.10.1** unless otherwise noted.
18. All floor joists shall have a minimum of double blocking at all roof bearing walls (double rim joist, rim and blocking or double blocking), unless specifically noted on the plans or in the engineering. Blocking and or rim joist shall be the same depth as the floor joist. All exterior walls, which run parallel with the floor joist, shall have a double rim joist.
19. Nail multiple plies of LVL's together with 2 rows of 12d nails at 12" on center into each member unless otherwise noted.
20. All rafters and joists shall be blocked solid at bearing points unless specifically noted.
21. Wall top plates shall be at the same elevation (no steps) along a wall line unless specifically addressed in the engineering.
22. Cripple wall studs shall be of the same size, quantity and spacing as the studs above unless specifically noted otherwise.
23. Camber has not been designed or specified unless specifically noted. Contact engineer if camber is desired.

C. CONNECTIONS

1. All posts and columns are to be installed with Simpson Strong Tie or USP (cross-referenced) post or column caps and bases, unless otherwise noted in the plans.
2. All hardware (i.e., column caps and bases, beams and joist hangers, straps, etc.) shall be Simpson Strong Tie, USP (cross referenced) or custom fabricated specifically as detailed on the plans or calculations, and shall be installed with nails or bolts exactly as called for by the manufacturer or as noted on the plans. The most stringent nail or bolt options as specified by the manufacturer shall be used unless otherwise noted. Other ICC approved hardware may be substituted for Simpson, however the builder shall submit a list of substituted hardware, prior to its use, to the engineer for approval.
3. All bolts, in wood members, shall comply with ASTM A-307 standard or better, unless otherwise noted.
4. Posts used for beams or girder supports shall be either (1) solid, continuous members to the foundation, or (2) spliced at mid depth of floor joist, with full end grain bearing and using solid blocking or MSTC28 straps on all sides of post splice unless otherwise noted.
5. All ledgers for rafters, joists, etc., shall be let into bearing wall studs the width and depth of the member for a tight fit and nailed to wall studs with three 12d nails, unless specifically noted in the calculations or on the plans.
6. All nails specified in this engineering shall meet the requirements of ASTM F1667 and the minimum specifications as noted below:

For framing member connections:

Nail Designation	Minimum Diameter	Minimum Length
6d	0.113 in	2.00 in
8d	0.131 in	2.50 in
10d	0.148 in	3.00 in
12d	0.148 in	3.25 in
16d	0.162 in	3.50 in
20d	0.192 in	4.00 in

For roof and floor diaphragms:

Nail Designation	Minimum Diameter	Minimum Length
6d	0.113 in	1.25 in + Sheathing thickness
8d	0.131 in	1.50 in + Sheathing thickness
10d	0.148 in	1.625 in + Sheathing thickness

For shear walls:

Nail Designation	Minimum Diameter	Minimum Length
6d	0.113 in or 0.099 in*	1.25 in + Sheathing thickness
8d	0.131 in or 0.113 in*	1.50 in + Sheathing thickness
10d	0.148 in or 0.128 in*	1.625 in + Sheathing thickness
16d	0.162 in or 0.148 in*	3.50 in

* - Galvanized box nail, hot dipped or tumbled.

Any nail meeting the minimum diameter and minimum length may be used regardless of its designation, i.e. a 16d sinker with a minimum diameter of 0.148 in. and minimum length of 3.25 in. may be used in place of a 10d or 12d as specified in the engineering.

Hardware nails, see note C.2 above.

7. All hold-down hardware shall be installed per the manufacturer's recommendations. Hold-downs shall be secured to a minimum of double full-height studs at locations specified on the plans. Full height studs are those which run from the sole plate to the top plates. Window and door trimmers do NOT qualify as hold-down studs unless specifically noted. Where "pony" walls exist below shearwalls, the hold-down shall extend through the pony wall to its intended wall fastening point. All hold-down studs shall have solid blocking and an equivalent stud bearing below, continuous to the foundation.
8. Larger hold-downs may be substituted for smaller hold-downs when installed in accordance with the manufacturer's recommendations.
9. Hold-down bolts shall not be counter sunk into the hold-down stud unless specifically noted.
10. Where #4 rebar pins are used to connect members together, use a 7/16" diameter lead hole for the pins. Embed the pins a minimum of 9" into the top of posts and a minimum of 6" into horizontal members, unless otherwise noted. Place the pin in the center of the members.
11. Lead holes for lag bolts shall be as follows: 3/8" lag – 1/4" lead hole, 1/2" lag – 5/16" lead hole, 5/8" lag – 3/8" lead hole, 3/4" lag – 1/2" lead hole.
12. Metal connectors (hangers, nails, anchor bolts, etc.) that come in contact with treated wood shall meet the following requirements: Wood treated with ACQ (alkaline copper quat), CBA-A & CBA-B (copper azole type a & b), SBX (sodium borate), CCA (chromated copper arsenate) and other NON-DOT borates shall use either hot dipped galvanized, Simpson Z-max or USP Triple Zinc connectors. Standard G90 connectors may be used with TrusJoist timberstrand LSL zinc borate treated members. Stainless steel connectors may be used with any type of treated wood.
13. Except at cantilevered frames and unless specifically noted, the following options may be used in place of (E)PC or BC connections: 1) Interior – EPC, BC, 2 – LPC's, 2 – AC(E)'s, 2x siders on each side with 5 – 12D nails into each member, or 1/2" thick or greater plywood or OSB gusset with 5 – 6D nails into each member. 2) Exterior – EPC, BC, 2 – LPC's, 2 – AC(E)'s, 2x siders on each side with 5 – #8 x 3" screws into each member or 2 – 1/2" diam. M. bolts or 2 – 1/2" diam. X 4" lags into each member.

D. WOOD STRUCTURAL PANEL DIAPHRAGMS

1. Where the word plywood is used in notes 2 through 6 below, it shall be understood that any APA structural panel of the same thickness and span rating may be substituted.
2. Horizontal diaphragms: (1) Plywood shall be a minimum of 19/32" thick, APA 32/16 CDX (exterior glue) rated, with face grain perpendicular to the supports, in a staggered pattern unless otherwise noted; (2) Plywood is to be nailed with 8d common nails at a minimum of 6" O.C. at building perimeter and at all panel edges, at 12" O.C. at all intermediate supports or as noted on the framing plans or in the engineering. The sheathing shall not be less than 24" in width or length unless blocked on all edges.
3. Vertical diaphragms (shear walls): All exterior walls of a structure shall be covered with minimum 3/8" CDX or other structural plywood, nailed with 8d common nails or 8d galvanized box nails at 6" O.C. at all panel edges, and at 12" O.C. at all intermediate supports (studs) unless otherwise noted. One stud or plate shall be provided at all plywood edges. Check framing plans and engineering to see if more stringent conditions are called for. Plywood shall be span rated for the appropriate stud spacing.
4. Nail diaphragm sheathing to all rafters, trusses, joists, blocking, struts and foundation sills connected to shear walls with diaphragm boundary nailing (or edge nailing if boundary nailing is not given). Pneumatic driven fasteners shall not be driven below the surface of the sheathing.
5. Roof diaphragms shall be completely sheathed under all California framing and other overframing.
6. Plywood shall conform to the American Plywood Association's (APA) current product specification and shall be performance rated by the APA to the grade indicated on the drawings.
7. The top plates along a shear wall must form a continuous line along the length of the wall unless specifically addressed in the engineering.

E. PREFABRICATED TRUSSES

1. The manufacturer shall design trusses according to the loading conditions as called for in these calculations, namely: (1) live & dead loads; (2) unequal loading; (3) truss spacing; (4) spans and eave overhangs; (5) roof pitch; (6) bearing points. The manufacturer shall be responsible for any additional bearing requirements for the trusses. Any variation from the conditions as shown in these calculations shall first be approved by this engineer.
2. This engineer shall review the signed truss calculations prior to truss fabrication and building construction, for any manufactured trusses. Without the review, the plans are considered incomplete and this engineer will be held harmless from all resulting claims.
3. Continuous lateral bracing for webs in compression will not be accepted. The truss manufacturer shall use optional materials to minimize the need for additional support of the webs. If the truss manufacturer is not able to eliminate the buckling of the webs by using alternate materials, the design engineer shall provide a detail for web stiffening using "T" bracing, "L" bracing, "U" bracing or other type of bracing along with any other permanent bracing required by the truss manufacturer. This additional bracing design shall be considered additional services under the contract.

F. FOUNDATIONS

1. All footings shall be keyed into and bear on firm, undisturbed, non-organic soil, or on fill compacted to 95% of maximum density based on ASTM D 1557.
2. Fill material must meet the following requirements unless written approval from the engineer is obtained: 1) The material must not degrade more than 35% using the Los Angeles Rattler Abrasion test. 2) The material must have a minimum dry compacted density of 118 pcf.
3. All perimeter or exterior footings and piers shall be set to a depth of at least 18" below finished grade, or at a depth below the frostline, whichever is greater unless otherwise noted on the plans.
4. Unless otherwise noted, an assumed basic allowable soil bearing pressure of 2000 psf has been used. All footings are to be level or level stepped unless specifically noted. The top of foundation walls, footings and pilasters are to be level.
5. Waterproofing of foundations and retaining walls is the responsibility of the owner or contractor and in no way is the responsibility of this engineer.
6. The engineer is not responsible for the adaptability of these plans to the building site, unless a field inspection is specifically called for. If any questionable soil conditions are discovered, including fill, water, organic matter, loose or competent rock, etc, the contractor or owner shall obtain the services of an engineer specializing in soils to provide a soils report for the site. If this report is provided after the structural engineering has been completed, and modifications are required, they will be viewed as additional services and billed for accordingly.
7. Sill plates shall be pressure-treated Douglas Fir #2 and shall be attached to all stem walls with a minimum of 5/8" x 10" anchor bolts for 2x sills and 5/8" x 12" anchor bolts for 3x or 4x sills. The maximum anchor bolt spacing shall be 54 inches on center or as noted on the plans. Anchor bolt washer and nuts are not to be counter sunk into the foundation sill.
8. All footings shall be reinforced with a minimum of two #4 bars run continuous along the footing and placed 3.5 inches from the bottom of the footing. All stem walls shall be reinforced with one #4 bar run continuous in the stem wall, 3.5 inches from the top of the wall and shall be a minimum of 8 inches wide unless specifically noted on the plans. All stemwalls shall be reinforced with #4 bars vertical at 24 inches on center. The engineer shall design all stem walls over 36 inches tall.
9. All footings shall be a minimum of 10 inches in thickness and reinforced with a minimum of two #4 bars running in two perpendicular directions. See plans or calculations for additional reinforcing requirements. All reinforcing shall be placed uniformly in concrete. Bars shall have a minimum of 3" of concrete cover on the sides and bottom of the footing.

10. Exterior concrete isolated footings shall have concrete pier risers on which to bear the structural member. Pier risers shall be poured monolithically with the footing or cast in two pours if proper lapping of the reinforcing is carried out. The minimum pier riser width must be at least the size of the post & have 3 inches of side cover from the embedded portion of the post base. In any case, the pier riser width shall not be less than 8 inches. For most cases it will be 7 inches plus the width of the post. Pilasters which are 24 inches or less in height shall be reinforced with two #4 bars vertical which shall be lapped into the footing reinforcing. Pilasters which are greater than 24 inches in height to 48 inches in height shall be reinforced with four #4 bars vertical which shall be lapped into the footing reinforcing and have #3 ties at 12" on center around the vertical bars. The engineer shall design pilasters that are greater than 48 inches in height. See plans or calculations for more stringent requirements of the above criteria. The section of the pier riser outside the post shall have the top sloped away from the post to provide for drainage.

11. All foundations, including footings, stem walls, piers and pier risers, shall be poured concrete unless otherwise noted. Any foundation retaining more than 4 feet of earth (from top of grade to bottom of footing) shall be engineered as a retaining wall. It is the contractor's responsibility to recognize such conditions and bring them to the attention of the Engineer.

12. The exact placement of the hold-down anchors shall be the responsibility of the builder. Placement shall be made such that the hold-down can be installed to the hold-down stud at the edges of the shear wall. The builder shall consider the required hold-down stud and shear panel length when placing the anchor. **DO NOT SCALE THE HOLD-DOWN LOCATIONS OFF THE FOUNDATION OR SHEAR PLANS.**

G. CONCRETE AND MASONRY

1. All concrete foundations shall have a minimum compressive strength of 2500 psi unless otherwise noted. Slabs shall have a minimum compressive strength of 3000 psi unless otherwise noted. Slabs and concrete exposed to severe freeze-thaw conditions shall have a minimum compressive strength of 3500 psi unless otherwise noted.

2. Grout and dry pack for steel base plates to be "Sonocrete-SonogROUT 10K" mixed and placed in accordance with the manufacturer's recommendations.

3. Place concrete using methods which avoid segregation. Mechanically vibrate all concrete to consolidate in forms.

4. Freshly deposited concrete shall be protected from premature drying and excessive hot or cold temperatures for a minimum of 5 days.

5. For cold weather, follow "Recommended Practice For Cold Weather Concrete", ACI 306. For hot weather, follow "Recommended Practice For Hot Weather Concrete", ACI 305.

6. Masonry units shall be ASTM C-90, Grade N-1 units made of lightweight aggregates. Masonry design strength is $F_m = 1500$ psi. Masonry units strength to be 1900 psi minimum based on net areas. Use open-end units where possible. Use bond beam units at horizontal reinforcing. See drawings for unit size and configurations required.

7. Mortar shall be type "S" made with clean sharp sand in conformance with ASTM C-270. Minimum mortar strength 1800 psi. Mortar materials shall be free of soluble salts to prevent efflorescence.

8. Grout shall be coarse grout. Grout shall be in accordance with ASTM C-476 with a minimum 28 day compressive strength of 2000 psi. Grout walls after mortar has cured 24 hours. Place grout in 5'-4" maximum vertical lifts. Mechanically vibrate all grout as it is placed to consolidate; revibrate just before set. Key grout pours by holding top of grout 1-1/2" below top of block.

9. Dry brush exposed masonry after mortar has set. Leave surrounding work clean and remove debris from the site.

10. Protect masonry work as required by specifications for cold weather or hot weather conditions; and moisture.

11. All reinforcing steel shall be ASTM A 615 deformed bars. For #4 bars and smaller use Grade 40 and For #5 Bars and larger use Grade 60, unless noted otherwise. Horizontal bars shall be continuous around corners. All splices for both concrete and masonry shall lap as follows: #3 bars – 23 inches, #4 bars – 31 inches, #5 bars – 39 inches, #6 bars – 47 inches.

12. Minimum concrete cover (see ACI 318 for additional cover requirements):
- a. Cast against and permanently exposed to earth ----- 3"
 - b. Exposed to earth and weather - #6 and larger -----2"
 - #5 and smaller -----1.5"
 - c. Not exposed to weather or in contact with earth -----3/4"

Provide accessories necessary to properly support reinforcement.

13. Specified concrete strength is based on a 28-day cure time.

H. STEEL FABRICATION

1. All wide flange shapes shall conform to ASTM A992 or as noted on the plans; Steel tubing to ASTM A500, GR B, Fy=46 ksi; and Pipe to ASTM A501, Fy=36 ksi. All other structural steel shapes, plates, and rods, shall conform to ASTM A36.
2. All steel to steel bolts shall conform to ASTM A-325N unless otherwise noted. All steel to wood connections shall conform to ASTM A-307; Anchor bolts and threaded rods to ASTM A36.
3. All shop welding shall be by an approved fabricator as specified in the current addition of the **CBC Sec. 1704.2.5.2**. All field welding shall be by an AWS qualified welder possessing current qualification documents for each specific welding process and procedure.
4. All welds requiring "special inspection" shall be inspected by an AWS certified inspector. "Special inspectors" must be notified and provided with structural steel plans and details prior to any welding.
5. All materials and procedures shall conform to current AWS, AISC, ASTM, and **CBC** requirements.
6. Shop drawings shall be submitted for approval.
7. All structural and miscellaneous steel work, except for steel to be embedded in concrete or field welded, shall be shop primed and touched up in the field after erection.
8. Holes in fabricated steel members shall be 1/16" larger in diameter than the bolt or lag specified at the connection, u.n.o.
9. ASTM A325 and A490 bolts shall be fully tensioned when used in any lateral resisting element, including but not limited to steel moment frames, braced frames, etc.

I. SKYLIGHTS

1. Skylight manufacturer must provide engineering on all skylights for design snow load.

PROJECT : GLENSHIRE - NORTH DECK REPLACEMENT
 LOCATION: 15726 GLENSHIRE DR., GLENSHIRE
 TRUCKEE, CA
 APN # : 40-110-01
 Latitude : 39.3519 N
 Longitude : -120.0983 W

START DATE: 5/7/17
 PRINT DATE: 5/30/17

VERTICAL LOAD DESIGN INFORMATION

Design Code: 2015 IBC & IRC, 2016 CBC & CRC and ASCE 7-10

Site Elevation \leq	5900	ft.	Ground depth of snow =	7.40	ft
Ground snow load, P_g =	185	psf	$P_f = \max.(0.7P_g C_e I_s C_t \text{ or } 20 I_s)$		
Snow density, γ =	25.00	pcf	$P_f = (C_t = 1.0) =$	130	psf
Snow Exposure factor, C_e =	1.00	(ASCE 26.7 & Table 7-2)	$P_f = (C_t = 1.1) =$	142	psf
Snow Importance factor, I_s =	1.00	(ASCE Table 1.5-2)	$P_f = (C_t = 1.2) =$	155	psf
Roof Live Load duration, C_D =	1.15				
Thermal factor, C_t =	See ASCE Table 7-3		Site Soil Bearing =	2000	psf
W or I_u =	Eave to Ridge Dist.		Footing depth =	18	in

SEISMIC LOAD DESIGN INFORMATION

Percent of snow load for seismic = 20%
 Number of stories = 1
 Risk Category = II (ASCE Table 1.5-1)
 Seismic Importance factor, I_E = 1.00 (ASCE Table 1.5-2)
 Site class = D (ASCE Table 20.3-1)
 Spectral response acceleration S_S = 1.31 g USGS web site or (ASCE Figures 22-1 through 22-18)
 Spectral response acceleration S_1 = 0.437 g USGS web site or (ASCE Figures 22-1 through 22-18)

Basic Seismic Force-Resisting System used => Heavy Timber Ordinary Braced Frame
 (See ASCE Table 12.2-1)

	Alpha	Numeric	
Response Modification Coefficient R =	5.6	5.6	(ASCE Table 12.2-1 or 12.14-1)
System Over-strength factor Ω_o =	2.2	2.2	(ASCE Table 12.2-1 or 12.14-1)
Deflection Amplification Factor C_d =	3.5	3.5	(ASCE Table 12.2-1 or 12.14-1)

Analysis procedure used (ELF,SA) => ELF Equivalent Lateral Force

WIND LOAD DESIGN INFORMATION

Basic wind speed =	130	mph	K_d =	0.85	(ASCE Table 26.6-1)
Exposure =	C	(ASCE Sec. 26.7.3)	K_{zt} =	1	(ASCE Table 26.8-1)
Wind Importance factor, I_w =	1.00	(ASCE Table 1.5-2)			

LOAD COMBINATIONS

IBC/CBC (16-17)	D + L + (L_r or S or R)	IBC/CBC (16-20)	D + L + $0.6\omega W/2$ + S
IBC/CBC (16-18)	D + L + $0.6\omega W$	IBC/CBC (16-21)	D + L + S + E/1.4
IBC/CBC (16-19)	D + L + $0.6\omega W$ + S/2	IBC/CBC (16-22)	$0.9D$ + E/1.4

ROOF LOADING

A) Roof Pitch							
Pitch	C _t	degree	C _s	P _s (psf)	W & I _u (ft)	U-B. load (psf)	Warm roof with C _t ≤ 1.0 (ASCE 7.4.1) 0° to 30°, C _s = 1.0 30° to 70°, C _s = 1.0 - (slope - 30°)/40° Cold roof with C _t = 1.1 (ASCE 7.4.2) 0° to 37.5°, C _s = 1.0 37.5° to 70°, C _s = 1.0 - (slope - 37.5°)/32.5° Cold roof with C _t = 1.2 (ASCE 7.4.2) 0° to 45°, C _s = 1.0 45° to 70°, C _s = 1.0 - (slope - 45°)/25°
3 /12	1.0	14.04	1.00	130	0.00	0	
0 /12	1.0	0.00	1.00	NA	0.00	NA	
0 /12	1.0	0.00	1.00	NA	0.00	NA	
0 /12	1.0	0.00	1.00	NA	0.00	NA	
0 /12	1.0	0.00	1.00	NA	0.00	NA	

B) Roof Valleys						C) Roof Dead Loads		
Roof	Valley Angle	C _v	Factor	P _s (psf)	Net P _s (psf)	Roofing	na	psf
	0	0	1	0	0	Roofing felt	na	psf
	0	0	1	0	0	Plywood	na	psf
	0	0	1	0	0	Insulation	na	psf
	0	0	1	0	0	2x12 rafter @ 16" oc	na	psf
	0	0	1	0	0	Gypsum board	na	psf
	0	0	1	0	0	Misc.	na	psf
						Total =	0.0	psf

FLOOR LOADING

A) Floor Live Loads				B) Floor Dead Loads			
Living areas =	40	psf		Flooring	na	psf	
Garage =	50	psf		Plywood	na	psf	
				2x12 joist @ 16" oc	na	psf	
C) Wall Dead Loads				Insulation	na	psf	
Exterior =	15	psf		Gypsum board	na	psf	
Interior =	10	psf		Gypcrete	na	psf	
				Misc.	na	psf	
				Total =	0.0	psf	

ROOF & DECK LOADING

A) Roof & Deck Drift & Sliding Loading									
Location	Δ Heights h (ft)	Lower P _f , P _s (psf)	Upper P _f , P _s (psf)	Sliding (Y/N)	U. Width at ridge I _u (ft)	h _d (ft) Factor	D. Height h _d (ft) (slide adj.)	h _b (ft)	P _m (psf)
North Deck	18.00	130	130	N	40	0.85	4.00	5.18	195
	0.00	0	0	Y	0	1	0.00	0.00	NA
	0.00	0	0	Y	0	1	0.00	0.00	NA

B) Roof & Deck Impact Loading

Location	Δ Heights h (ft)	Lower P _f , P _s (psf)	Upper P _f , P _s (psf)	Imp. Factor C _i	Impact L. P _i (psf)	Total L. P _t (psf)
	0.00	0	0	0.00	0	0
	0.00	0	0	0.00	0	0
	0.00	0	0	0.00	0	0

VERTICAL LOAD SUMMARY =====

	Floor	Deck	Roof 3/12	Roof 3/12 Valley	Roof 6/12	Roof 6/12 Valley	Roof 9/12	Exterior Wall	Interior wall
Live Load (psf)	0	195	0	0	0	0	0	0	0
Dead Load (psf)	0	10	20	20	20	20	20	15	10
TL (psf)	0	205	20	20	20	20	20	15	10
Overhang (psf)			20	20	20	20	20		
For lateral (psf)	0	49	20	20	20	20	20	15	10
U-bal. load (psf)			0	0	0	0	0		

SCOPE: THIS ENGINEERING IS FOR THE STRUCTURAL AND ARCHITECTURAL ELEMENTS OF THE NEW DECK ONLY.

FNW ENGINEERS AND THIS ENGINEER DO NOT ASSUME ANY RESPONSIBILITY FOR ANY SITE-PLANNING, CIVIL, MECHANICAL, ELECTRICAL, SOILS ENGINEERING OR ANY OTHER ENGINEERING OR DESIGN ASPECT OF THE WORK.

FOUNDATIONS HAVE BEEN DESIGNED USING STANDARD SPREAD FOOTINGS AND PIERS. IF DURING EXCAVATION WET SOIL, ROCK OUTCROPPINGS OR OTHER TYPE OF SOIL PROBLEMS ARE ENCOUNTERED, THE CONTRACTOR SHALL CONTACT THIS ENGINEER.

4) MAIN FLOOR FRAMING.

4.1) DECKING.

Three-Span, One Uni. Load (THS4)

U.L. =	205	psf			^		L	^		L	^		L	^		R1
L =	1.33	ft			R1			R2			R2			R1		
w =	102	plf														
Adj Fact =	1.00		Fv =	200	psi					Net Fv =	200	psi				
Adj Fact =	1.00		Fb =	250	psi					Net Fb =	250	psi				
Adj Fact =	1.00		E =	100000	psi					Net E =	100000	psi				
C _D =	1.00															
DELTA L/	360		delta all.	0.04	in											
Cl =	1.0															
BEAM b =	5.5	in	Hole diam. =	0												
BEAM d =	1.5	in	# of mem. =	1												
LSL (Y/N)	N															
R1 =	55	lbs	Vmax =	82	lbs					GL = 24F - V4						
R2 =	150	lbs	Mmax =	18	ft-lbs											
Ar = 1.5 x (Vm - (d x w)) / (Fv x Fcv x C _D) =										0.52	in^2					
Sr = 12 x Mm / (Fb x Fcb x C _D) =										0.87	in^3					
Ir = Maximum defl. / (E(net) x Allw. defl) =										0.86	in^4					

* *****
 * USE 1.5" x 5.5" TREX DECKING. CONNECT THE DECKING TO EACH JOIST *
 * WITH A MIN. OF (2) #8 SCREWS. *
 * *****

4.2) DECK/LANDING JOIST.

Check 6.5' simple span.

Simply Supported Beam, one U.L. (SB1)

U.L. =	205	psf						^		L		^	
L =	6.5	ft						R1				R2	
w =	273	plf											
Adj Fact =	0.97		Fv =	180	psi				Net Fv =	201	psi		
Adj Fact =	1.15		Fb =	900	psi				Net Fb =	1547	psi		
Adj Fact =	0.90		E =	1600000	psi				Net E =	1440000	psi		
C _D =	1.15												
DELTA L/	360		delta all.	0.22	in								
Cl =	1.00												
BEAM b =	3.5	in	Hole diam. =	0	in								
BEAM d =	7.25	in	# of mem. =	1									
LSL (Y/N)	N												
					Vmax =	886	lbs						
R1 =	886	lbs						Mmax =	1440	ft-lbs			
R2 =	886	lbs											
Ar = 1.5 x (Vm - (d x w)) / (Fv x Fcv x C _D) =									5.39	in^2			
Sr = 12 x Mm / (Fb x Fcb x C _D) =									11.17	in^3			
Ir = Maximum defl. / (E(net) x Allw. defl) =									35.1	in^4			

* *****
 * USE 4 x 8 DF #2 AT 16" OC. WHERE HUNG USE LUS46 OR HUC46. *
 * WHERE THEY BEAR ON THE SUPPORT USE SDWS221000DB SCREW VERTICAL *
 * TO CONNECT THE JOIST TO THE GIRDER. *
 * CONNECT THE JOIST TO THE GIRDERS AND EXISTING RIM JOIST AND BLOCK WITH *
 * DTT1Z WITH SDWH27600G SCREW AT 48" OC. OFFSET THE HDTT1Z 2" FROM *
 * THE END OF THE JOIST. *

* ***** *

4.3) GIRDER AT GRID 4.

Check single span.

Simply Supported Beam, one U.L. (SB1)

U.L. =	205	psf						^	L	^
L =	10.75	ft						R1		R2
w =	666	plf								
Adj Fact =	1.00		Fv =	170	psi			Net Fv =	196	psi
Adj Fact =	1.00		Fb =	1350	psi			Net Fb =	1537	psi
Adj Fact =	1.00		E =	1600000	psi			Net E =	1600000	psi
C _D =	1.15									
DELTA L/	360		delta all.	0.36	in					
CI =	0.99									
BEAM b =	5.5	in	Hole diam. =	0	in					
BEAM d =	9.5	in	# of mem. =	1						
LSL (Y/N)	N									
R1 =	3581	lbs			Vmax =	3581	lbs			
R2 =	3581	lbs			Mmax =	9623	ft-lbs			
Ar = 1.5 x (Vm - (d x w)) / (Fv x Fcv x C _D) =								23.43	in^2	
Sr = 12 x Mm / (Fb x Fcb x C _D) =								75.11	in^3	
Ir = Maximum defl. / (E(net) x Allw. defl) =								349.1	in^4	

* ***** *

* USE 6 x 10 DF #1. *

* HANG TO CONTINUOUS 6 x 6 DF #1 POSTS WITH HUCQ610-SDS. *

* BEAR ON THE MID SPAN POST AND CONNECT WITH HGA10 CLIP ON TWO SIDES. *

* IF THE GIRDER IS SPLICED OVER THE POST USE A MSTC28 STRAP ACROSS THE *

* SPLICE. *

* CONNECT THE GIRDER TO THE EXISTING 4x MUDDSILL WITH SDWH27800G SCREWS *

* AT 48" OC. *

* ***** *

4.4) ALL OTHER DECK AND LANDING GIRDERS, U.O.N.

Simply Supported Beam, one U.L. (SB1)

U.L. =	205	psf						^	L	^
L =	5	ft						R1		R2
w =	666	plf								
Adj Fact =	0.97		Fv =	180	psi		Net Fv =	201	psi	
Adj Fact =	1.00		Fb =	900	psi		Net Fb =	1336	psi	
Adj Fact =	0.90		E =	1600000	psi		Net E =	1440000	psi	
C _D =	1.15									
DELTA L/	360		delta all.	0.17	in					
CI =	0.99									
BEAM b =	3.5	in	Hole diam. =	0	in (multiply by 1.5 for GL)					
BEAM d =	7.5	in	# of mem. =	1						
LSL (Y/N)	N									
R1 =	1665	lbs			Vmax =	1665	lbs			
R2 =	1665	lbs			Mmax =	2082	ft-lbs			
Ar = 1.5 x (Vm - (d x w)) / (Fv x Fcv x C _D) =							9.33	in^2		
Sr = 12 x Mm / (Fb x Fcb x C _D) =							18.69	in^3		
Ir = Maximum defl. / (E(net) x Allw. defl) =							39.0	in^4		

* ***** *

4.5) RAILING TOP CAP.

Check point load.

Simply Supported Beam, one P.L. (SB3)

U.L. =			psf		^ (x)		L		^	
L = 6.5			ft		R1				R2	
p = 200			lbs							
x = 3.25			ft (from R1)							
Adj Fact =	0.97		Fv =	180	psi		Net Fv =	175	psi	
Adj Fact =	1.00		Fb =	900	psi		Net Fb =	899	psi	
Adj Fact =	0.90		E =	1600000	psi		Net E =	1440000	psi	
C _D =	1.00									
DELTA L/	360		delta all.	0.22	in					
CI =	1.00									
BEAM b =	5.5	in	Hole diam. =	0	in					
BEAM d =	2.5	in	# of mem. =	1						
LSL (Y/N)	N									
R1 =	100	lbs				Vmax =	100	lbs		
R2 =	100	lbs				Mmax =	325	ft-lbs		
Ar = 1.5 x (Vm) / (Fv x Fcv x C _D) =							0.86	in^2		
Sr = 12 x Mm / (Fb x Fcb x C _D) =							4.34	in^3		
Ir = Maximum defl. / (E(net) x Allw. defl) =							6.34	in^4		

Check uniform load.

Simply Supported Beam, one U.L. (SB1)

U.L. =			^			L			^		
L = 6.5 ft			R1						R2		
w = 50 plf											
Adj Fact =	0.97		Fv =	180	psi		Net Fv =	175	psi		
Adj Fact =	1.00		Fb =	900	psi		Net Fb =	899	psi		
Adj Fact =	0.90		E =	1600000	psi		Net E =	1440000	psi		
C _D =	1.00										
DELTA L/	360		delta all.	0.22	in						
Cl =	1.00										
BEAM b =	5.5	in	Hole diam. =	0	in						
BEAM d =	2.5	in	# of mem. =	1							
LSL (Y/N)	N										
R1 =	163	lbs				Vmax =	163	lbs			
R2 =	163	lbs				Mmax =	264	ft-lbs			
Ar = 1.5 x (Vm - (d x w)) / (Fv x Fcv x C _D) =							1.31	in^2			
Sr = 12 x Mm / (Fb x Fcb x C _D) =							3.52	in^3			
Ir = Maximum defl. / (E(net) x Allw. defl) =							6.4	in^4			

 * USE 4 x 6 DF #1 PLACED FLAT AND BEAR ON TOP OF THE POSTS. *
 * CONNECT THE CAP TO THE POSTS WITH (4) SIMPSON SDWS22600DB *
 * SCREWS AT EACH POST (2 IN EACH CAP IF WERE SPLICED). *
 * SCREW VERTICALLY INTO THE POST. *

* *****

4.6) CHECK WOOD POSTS.

Check post along side the girder.

Cantilevered Beam (CB5)

U.L. =	psf								
L1 =	0.333333	ft							
L2 =	3.666667	ft							
Adj Fact =	1.00		Fv =	170	psi		Net Fv =	170	psi
Adj Fact =	1.00		Fb =	1200	psi		Net Fb =	1198	psi
Adj Fact =	1.00		E =	1600000	psi		Net E =	1600000	psi
C _D =	1.00								
DELTA L/	360		delta all.	0.12	in				
CI =	1.00								
BEAM b =	5.5	in	Hole diam. =	0	in				
BEAM d =	5.5	in	# of mem. =	1					
LSL (Y/N)	N								

LOADING	Load @ L (lbs)	Load @ R (lbs)	Starts @ (ft)	Ends @ (ft)
Uni. Load 1	0	-	0.00	0.33
Uni. Load 2	0	-	0.33	0.33
Uni. Load 3	0	-	0.33	4.00
Tria. Ld. 1	0	0	0.00	0.00
Tria. Ld. 2	0	0	0.00	0.00
Tria. Ld. 3	0	0	0.00	0.00
Point Ld. 1	0	-	0.00	-
Point Ld. 2	0	-	1.33	-
Point Ld. 3	200	-	4.00	-

R1 =	-2200	lbs	Vmax =	2200	lbs (for design -d*w)		
R2 =	2400	lbs	Mmax =	367	lb-ft	@ X from R1 =	0.17 ft
			dmax =	0	in	@ X from R1 =	4.00 ft

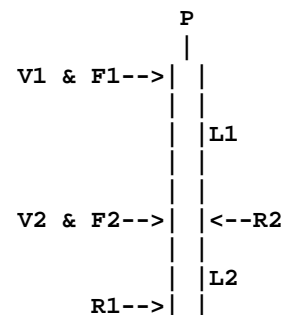
Ar = 1.5 x (Vm - (d x w)) / (Fv x Fcv x C _D) =	19.41	in^2
Sr = 12 x Mm / (Fb x Fcb x C _D) =	3.67	in^3
Ir = Maximum defl. / (E(net) x Allw. defl) =	31.7	in^4

Number of SDS screws req. in steel plate = 5.71

Check support for posts as cant. frame.

Lateral load (V1) =	375	lbs					
Lateral load (V2) =	-375	lbs					
Number of posts (N) =	1						
Cant. length of post (L1) =	4	ft					
Backspan length of post (L2) =	4	ft					
Axial load on post (P) =	0	lbs					
Distance between posts =	6.5	ft					

POST DATA	F1 =	375	lbs	F2 =	-375	lbs
	Moment =	1500	ft-lbs			
	R1 =	375	lbs			
	R2 =	375	lbs			



Adj Fact = 1.00	Fv = 180	psi	Net Fv = 180	psi
Adj Fact = 1.00	Fb = 900	psi	Net Fb = 1167	psi
Adj Fact = 1.00	E = 1600000	psi	Net E = 1600000	psi
Adj Fact = 1.00	Fc = 1350	psi	Fc" = 1350	psi
C _D lat = 1.00				
C _D vert = 1.00				
DELTA L/ 160	delta all. 0.30	in		
CI = 1.00				
BEAM b = 3.5	in	Hole diam. = 0	in	
BEAM d = 5.5	in	# of mem. = 1		

BEAM ANALYSIS

Ar = 1.5 x Vm / (Fv x Fcv x C _D) =	3.13	in^2
Sr = 12 x Mm / (Fb x Fcb x C _D) =	15.43	in^3
Ir = Maximum defl. / (E(net) x Allw. defl) =	28.8	in^4

COLUMN ANALYSIS

Le/d = 15.57	
Fce = (Kce*E')/(Le/d)^2 = 1981	psi
c' = 0.8	
Fc' = Fc"[(1+(Fce/Fc"))/2c'-(((1+(Fce/Fc"))/2c')^2-(Fce/Fc'')/c')^1/2]	
= 1086.20	

MAXIMUM LOAD = 20909	lbs	Width req. = 0.00	in.
% of MAX. LOAD = 0%	(ok)		

CHECK COMBINED STRESSES

RB = (Le*d/b^2)^1/2 = 6.200132	fc = 0	psi	(ok)
Kbe = 0.438	fb = 1020	psi	(ok)
Fbe = Kce*E'/RB^2 = 18230.24			
(fc/Fc')^2 + fb/(Fb(1-(fc/Fce)) <= 1 = 0.87 (ok)			

LOADS

Internal lateral load = 375	lbs
External lateral load = 0	lbs

>>> LOAD SUMMARY <<<

Lateral load into top of post = 375	lbs
Lateral load into tie = 750	lbs
Lateral load into bottom of post = 375	lbs

Angle on Brace = 31.61	deg.
Tension on brace = 440	lbs

Number of SDS screws req. in 2x = 1.30

```

* *****
* CONTINUOUS POSTS:
* USE 6 x 6 DF #1 POSTS RUN CONTINUOUS FROM FOOTING TO TOP
* RAILING CAP AT ALL LOCATIONS.
* CONNECT THE POSTS TO THE HUNG GIRDERS WITH MSTA18 ON
* EACH SIDE AT MID SPAN AND MSTA12 ON EACH SIDE AT ENDS.
* DIAGONAL BRACE BETWEEN THE POSTS BELOW THE JOIST. USE 2 x 6
* DF BRACES. CONNECT THE BRACES TO EACH POST WITH (4) SDWS22400DB
* SCREWS.
* SEE DETAIL 4.6.
* *****

```


4.7) GUARD RAIL INFILL PANELS.

```

* *****
* USE A 4 x 6 DF #2 BOTTOM PLATE FOR THE INFILL PANELS. PLACE THE
* CENTERLINE OF THE PLATE 4" ABOVE THE DECKING.
* CONNECT THE 4 x 6 TO THE 6 x 6 POSTS WITH (2) SDS25800 SCREWS AT
* EACH END. SEE DETAIL 4.7-A.
*
* USE McNICHOLS 3" SQUARE OPENING WIRE MESH 0.25" WIRE, SQUARE WEAVE
* PLAIN STEEL WIRE MESH BETWEEN THE TOP CAP AND BOTTOM PLATE AND
* BETWEEN THE POSTS.
* SANDWICH THE WIRE MESH BETWEEN 1.25" x 1.25" x 1/8" A36 STEEL ANGLE ON
* BOTH SIDES OF THE MESH ON ALL SIDES. CONNECT THE ANGLE TO THE WOOD
* MEMBERS WITH #8 x 1.5" SCREWS AT 12" OC WITH ONE SCREW 1" FROM THE
* END OF THE STEEL ANGLES. USE 3/16" DIAM. HOLES FOR THE SCREWS.
* SEE DETAIL 4.7-B.
* *****

```

5) STAIRS.

5.1) TREADS

Uniform load.

Simply Supported Beam, one U.L. (SB1)

U.L. =	205	psf				^	L	^
L =	4	ft				R1		R2
w =	205	plf						
Adj Fact =	1.00		Fv =	180	psi	Net Fv = 207 psi		
Adj Fact =	1.00		Fb =	900	psi	Net Fb = 1035 psi		
Adj Fact =	1.00		E =	1600000	psi	Net E = 1600000 psi		
C _D =	1.15							
DELTA L/	360		delta all.	0.13	in			
Cl =	1.00							
BEAM b =	11.25	in	Hole diam. =	0	in			
BEAM d =	3.5	in	# of mem. =	1				
LSL (Y/N)	N							
			R1 =	410	lbs	Vmax =	410	lbs
			R2 =	410	lbs	Mmax =	410	ft-lbs
Ar = 1.5 x (Vm - (d x w)) / (Fv x Fcv x C _D) =						2.54	in^2	
Sr = 12 x Mm / (Fb x Fcb x C _D) =						4.75	in^3	
Ir = Maximum defl. / (E(net) x Allw. defl) =						5.5	in^4	

Point load.

Simply Supported Beam, one P.L. (SB3)

U.L. =		psf				^	(x)	L	^	
L =	4	ft				R1			R2	
p =	300	lbs								
x =	2	ft (from R1)								
Adj Fact =	1.00		Fv =	180	psi			Net Fv =	180	psi
Adj Fact =	1.00		Fb =	900	psi			Net Fb =	899	psi
Adj Fact =	1.00		E =	1600000	psi			Net E =	1600000	psi
C _D =	1.00									
DELTA L/	360		delta all.	0.13	in					
Cl =	1.00									
BEAM b =	5.5	in	Hole diam. =	0	in					
BEAM d =	3.5	in	# of mem. =	1						
LSL (Y/N)	N									
			R1 =	150	lbs	Vmax =	150	lbs		
			R2 =	150	lbs	Mmax =	300	ft-lbs		
Ar = 1.5 x (Vm) / (Fv x Fcv x C _D) =								1.25	in^2	
Sr = 12 x Mm / (Fb x Fcb x C _D) =								4.00	in^3	
Ir = Maximum defl. / (E(net) x Allw. defl) =								3.2	in^4	

* *****

* USE 11.75" WIDE STEEL GRATING TREADS WITH 1.5" x 3/16" BEARING

* BARS SPACED AT 11/16" OC WITH CROSS BARS AT 4" OC. (SlipNOT GRATING TREAD

* 11-4 OR EQUAL. SEE ATTACHED DETAIL SHEET).

* CONNECT THE TREADS TO THE STRINGERS WITH (2) 3/8" DIAM. X 3" LAGS

* AT EACH END.

* PAINT A 3" WIDE YELLOW STRIPE ACROSS THE FULL WIDTH OF THE NOSE END OF

* THE BOTTOM TREAD AND THE FULL WIDTH OF THE STAIRS AT THE EDGE OF THE

* UPPER LANDING.

* SEE DETAIL 5.1.

* *****

5.2) STAIR STRINGERS.

Simply Supported Beam, one U.L. (SB1)

U.L. =	205	psf				^	L		^
L =	6	ft				R1			R2
w =	512	plf							
Adj Fact =	0.97		Fv =	180	psi		Net Fv =	201	psi
Adj Fact =	1.00		Fb =	900	psi		Net Fb =	1123	psi
Adj Fact =	0.90		E =	1600000	psi		Net E =	1440000	psi
C _D =	1.15								
DELTA L/	360		delta all.	0.20	in				
CI =	0.99								
BEAM b =	3.5	in	Hole diam. =	0	in				
BEAM d =	11.25	in	# of mem. =	1					
LSL (Y/N)	N								
R1 =	1537	lbs			Vmax =	1537	lbs		
R2 =	1537	lbs			Mmax =	2306	ft-lbs		
Ar = 1.5 x (Vm - (d x w)) / (Fv x Fcv x C _D) =							7.90	in^2	
Sr = 12 x Mm / (Fb x Fcb x C _D) =							24.65	in^3	
Ir = Maximum defl. / (E(net) x Allw. defl) =							51.9	in^4	

* *****
 * USE 4 x 12 DF #2. PLACE ALONG SIDE THE CONT. POSTS AND CONNECT WITH *
 * (4) SDWS22800DB SCREWS OR BEAR ON THE SUPPORT AND CONNECT WITH *
 * (2) A35 CLIPS. *
 * AT THE LOWER END OF THE LOWER SET OF STAIRS BEAR THE STRINGERS *
 * ON (2) 2 x 6 RW PLATES. *
 * *****

5.3) WOOD RAILING POSTS AT BOTTOM OF THE STAIRS.

Cantilevered Beam (CB5)

U.L. =		psf				^	L1	^	L2	
L1 =	0.67	ft				R1				
L2 =	3	ft								
Adj Fact =	0.97		Fv =	180	psi		Net Fv =	175	psi	
Adj Fact =	1.00		Fb =	900	psi		Net Fb =	1348	psi	
Adj Fact =	0.90		E =	1600000	psi		Net E =	1440000	psi	
C _D =	1.00									
DELTA L/	160		delta all.	0.23	in					
CI =	1.00									
BEAM b =	3.5	in	Hole diam. =	0	in					
BEAM d =	3.5	in	# of mem. =	1						
LSL (Y/N)	N									
LOADING		Load @ L	Load @ R		Starts @		Ends @			
		(lbs)	(lbs)		(ft)		(ft)			
Uni. Load 1		0	-		0.00		0.67			
Uni. Load 2		0	-		0.67		0.67			
Uni. Load 3		0	-		0.67		3.67			
Tria. Ld. 1		0	0		0.00		0.00			
Tria. Ld. 2		0	0		0.00		0.00			
Tria. Ld. 3		0	0		0.00		0.00			
Point Ld. 1		0	-		0.00		-			
Point Ld. 2		0	-		0.00		-			
Point Ld. 3		200	-		3.67		-			

R1 =	-896	lbs	Vmax =	896	lbs (for design -d*w)		
R2 =	1096	lbs	Mmax =	300	lb-ft	@ X from R1 =	0.34 ft
			dmax =	0	in	@ X from R1 =	3.67 ft

Ar = 1.5 x (Vm - (d x w)) / (Fv x Fcv x C _D) =	7.69	in^2
Sr = 12 x Mm / (Fb x Fcb x C _D) =	2.67	in^3
Ir = Maximum defl. / (E(net) x Allw. defl) =	11.7	in^4

* *****
 * USE 6 x 6 DF POSTS AT EACH END OF THE STRINGER. CONNECT THE *
 * POSTS TO THE SIDE OF THE STRINGER WITH (2) 1/2" DIAM. M. BOLTS *
 * WITH 2" x 2" x 9/64" THICK WASHERS. SEE DETAIL 5.1. *
 * *****

5.4) RAILING TOP CAP.

Check point load.

Simply Supported Beam, one P.L. (SB3)

			P					
U.L. =	psf		^	(x)	L	^		
L =	6.5	ft	R1				R2	
p =	200	lbs						
x =	3.25	ft (from R1)						
Adj Fact =	0.97		Fv =	180	psi	Net Fv =	175	psi
Adj Fact =	1.00		Fb =	900	psi	Net Fb =	1347	psi
Adj Fact =	0.90		E =	1600000	psi	Net E =	1440000	psi
C _D =	1.00							
DELTA L/	360		delta all.	0.22	in			
CI =	1.00							
BEAM b =	3.5	in	Hole diam. =	0	in			
BEAM d =	3.5	in	# of mem. =	1				
LSL (Y/N)	N							
			Vmax =	100	lbs			
R1 =	100	lbs	Mmax =	325	ft-lbs			
R2 =	100	lbs						

Ar = 1.5 x (Vm) / (Fv x Fcv x C _D) =	0.86	in^2
Sr = 12 x Mm / (Fb x Fcb x C _D) =	2.90	in^3
Ir = Maximum defl. / (E(net) x Allw. defl) =	6.34	in^4

Check uniform load.

Simply Supported Beam, one U.L. (SB1)

			-----w-----					
U.L. =	psf		^		L	^		
L =	6	ft	R1				R2	
w =	50	plf						
Adj Fact =	0.97		Fv =	180	psi	Net Fv =	175	psi
Adj Fact =	1.00		Fb =	900	psi	Net Fb =	1346	psi
Adj Fact =	0.90		E =	1600000	psi	Net E =	1440000	psi
C _D =	1.00							
DELTA L/	360		delta all.	0.20	in			
CI =	1.00							
BEAM b =	3.5	in	Hole diam. =	0	in			
BEAM d =	3.5	in	# of mem. =	1				
LSL (Y/N)	N							
			Vmax =	150	lbs			
R1 =	150	lbs	Mmax =	225	ft-lbs			
R2 =	150	lbs						

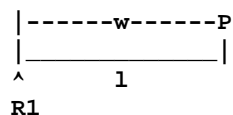
$$\begin{aligned} Ar &= 1.5 \times (V_m - (d \times w)) / (F_v \times F_{cv} \times C_D) = & 1.16 & \text{in}^2 \\ Sr &= 12 \times M_m / (F_b \times F_{cb} \times C_D) = & 2.01 & \text{in}^3 \\ Ir &= \text{Maximum defl.} / (E(\text{net}) \times \text{Allw. defl}) = & 5.1 & \text{in}^4 \end{aligned}$$

* *****
 * USE 4 x 6 DF #2 BEAR ON TOP OF THE POSTS. *
 * CONNECT THE CAP TO THE POSTS WITH (4) 6" LONG SIMPSON SDWS *
 * SCREWS AT EACH POST (2 IN EACH CAP WERE SPLICED). *
 * SCREW VERTICALLY INTO THE POST. SEE DETAILS 5.1 & 4.7-A & 4.7-B, (SIMILAR). *
 * *****

5.5) GUARD RAIL INFILL PANELS.

* *****
 * USE A 4 x 6 DF #2 BOTTOM PLATE FOR THE INFILL PANELS. PLACE THE *
 * CENTERLINE OF THE PLATE 4" ABOVE THE STRINGER. *
 * CONNECT THE 4 x 6 TO THE 6 x 6 POSTS WITH (2) SDS25800 SCREWS AT *
 * EACH END. SEE DETAILS 5.1 & 4.7-A (SIMILAR). *
 * *
 * USE McNICHOLS 3" SQUARE OPENING WIRE MESH 0.25" WIRE, SQUARE WEAVE *
 * PLAIN STEEL WIRE MESH BETWEEN THE TOP CAP AND BOTTOM PLATE AND *
 * BETWEEN THE POSTS. *
 * SANDWICH THE WIRE MESH BETWEEN 1.25" x 1.25" x 1/8" A36 STEEL ANGLE ON *
 * BOTH SIDES OF THE MESH ON ALL SIDES. CONNECT THE ANGLE TO THE WOOD *
 * MEMBERS WITH #8 x 1.5" SCREWS AT 12" OC WITH ONE SCREW 1" FROM THE *
 * END OF THE STEEL ANGLES. USE 3/16" DIAM. HOLES FOR THE SCREWS. *
 * SEE DETAILS 5.1 & 4.7-B (SIMILAR). *
 * *****

5.6) POSTS AND CONNECTION FROM THE HAND RAIL TO THE FDN.



$$\begin{aligned} w &= 0 & \text{plf} \\ P &= 200 & \text{lbs} \\ l &= 3 & \text{ft} \\ b &= 4 & \text{in} \\ d &= 4 & \text{in} \end{aligned}$$

$$\text{N.A.} = 2 \text{ in}$$

$$\text{Distance from N.A. to T} = 2.00 \text{ in}$$

$$\text{Distance from N.A. to C} = 1.33 \text{ in}$$

$$\text{Resisting moment arm} = 3.33 \text{ in}$$

$$\text{Lateral moment} = 600 \text{ ft-lbs}$$

$$T = C = 2160 \text{ lbs} \quad f'c = 540 \text{ psi}$$

$$\text{Allowable load on } 3/8 \text{ in diam. Titen HD}$$

$$\begin{aligned} \text{Tension} &= 1075 \text{ lbs} \\ \text{Shear} &= 1585 \text{ lbs} \\ \text{LDF} &= 1 \end{aligned}$$

$$\begin{aligned} \text{Number of tension bolts required} &= 2.0 \text{ bolts} \\ \text{Number of shear bolts required} &= 1.4 \text{ bolts} \end{aligned}$$

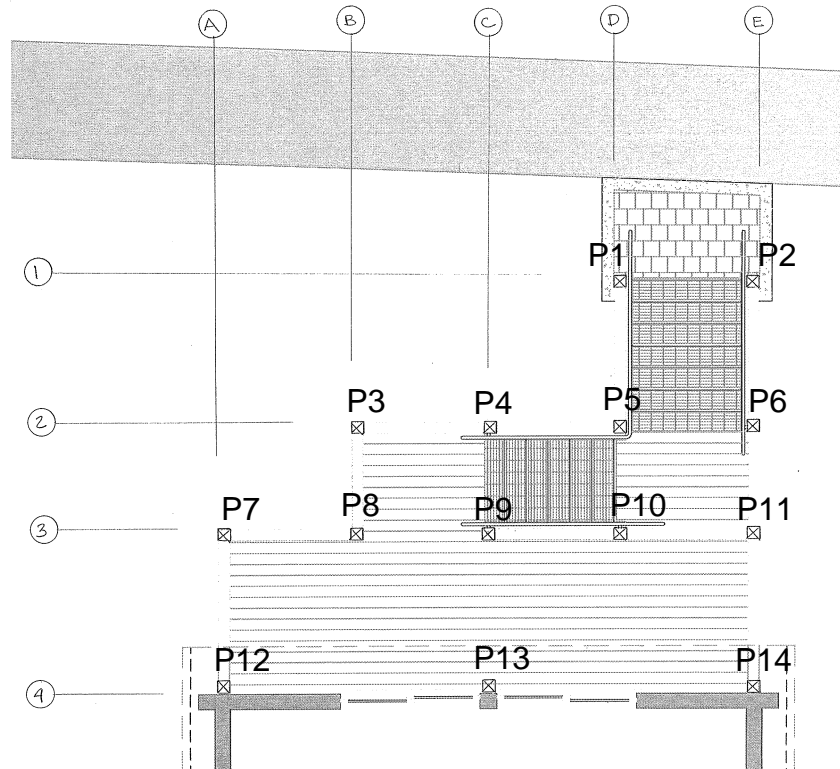
$$\text{Allowable load on } 3/16\text{'s in fillet weld} = 2784 \text{ lbs/in}$$

$$\text{Length of fillet weld required} = 0.8 \text{ in}$$

```

* *****
* USE 1.5" DIAM. SCH 40 POSTS. WELD THE POSTS TO THE BASE WITH 3/16"
* FILLET WELD ALL AROUND.
* USE 1/4" THICK STEEL BASE CONNECTED TO THE SLAB WITH (4) 3/8" DIAM.
* x 3" TITEN-HD ANCHORS.
* SEE DETAIL 5.1 & 5.6
* *****

```



6A) PIERS

PIER	LOADS (lbs)					TOTAL	PIER TYPE	POST	POST BASE
P1	1537	0	0	0	0	1537	16	Stringer	(2) 2x6 RW Plate
P2	1537	0	0	0	0	1537	16	Stringer	(2) 2x6 RW Plate
P3	1384	0	0	0	0	1384	16	6x6	CBSQ66-SDS2
P4	2511	0	0	0	0	2511	16	6x6	CBSQ66-SDS2
P5	4061	0	0	0	0	4061	18	6x6	CBSQ66-SDS2
P6	2934	0	0	0	0	2934	16	6x6	CBSQ66-SDS2
P7	1832	0	0	0	0	1832	16	6x6	CB66 (E)
P8	4932	0	0	0	0	4932	20	6x6	CBSQ66-SDS2
P9	6060	0	0	0	0	6060	22	6x6	CB66 (E)
P10	6060	0	0	0	0	6060	22	6x6	CBSQ66-SDS2
P11	3100	0	0	0	0	3100	16	6x6	CB66 (E)
P12	3664	0	0	0	0	3664	18	6x6	CB66 (E)
P13	7328	0	0	0	0	7328	24	6x6	CB66 (E)
P14	3664	0	0	0	0	3664	18	6x6	CB66 (E)
P15	0	0	0	0	0	0	-	-	-

6B) FOOTINGS

FOOTING	LOADS (plf)					TOTAL	FOOT TYPE	STUD WALL
F1	0	0	0	0	0	0	-	-
F2	0	0	0	0	0	0	-	-
F3	0	0	0	0	0	0	-	-
F4	0	0	0	0	0	0	-	-
F5	0	0	0	0	0	0	-	-
F6	0	0	0	0	0	0	-	-
F7	0	0	0	0	0	0	-	-
F8	0	0	0	0	0	0	-	-
F9	0	0	0	0	0	0	-	-
F10	0	0	0	0	0	0	-	-

6) FOUNDATION SCHEDULE

Allowable Bearing Pressure = 2000 psf
 Width Increase = N
 Pilaster or column width = 10 in
 Stem width = 8 in

F'c (concr.) = 2500 psi
 Fy (steel) = 40000 psi
 ρ minimum = 0.0018
 Cover = 3 in

---- PIERS ----

Refer. Number	Load (lbs)	Square Side Length (in)	Depth (in)	Required Reinforcing		
				#4 bars		#5 bars
16	3333	16	10	2	or	2
18	4219	18	10	2	or	2
20	5208	20	10	2	or	2
22	6302	22	10	2	or	2
24	7500	24	10	2	or	2
26	8802	26	10	3	or	3
28	10208	28	10	3	or	3
30	11719	30	10	3	or	3
32	13333	32	10	3	or	3
34	15052	34	10	3	or	3
36	16875	36	10	3	or	3
42	22969	42	10	3	or	3
48	30000	48	10	4	or	4
54	37969	54	10	6	or	4

---- FOOTINGS ----

Refer. Number	Load (plf)	Width (in)	Depth (in)	Required Reinforcing		
				#4 bars		#5 bars
16	2500	16	10	2	or	2
18	2813	18	10	2	or	2
20	3125	20	10	2	or	2
22	3438	22	10	2	or	2
24	3750	24	10	2	or	2
26	4063	26	10	3	or	3
28	4375	28	10	3	or	3
32	5000	32	10	3	or	3
36	5625	36	10	3	or	3

NOTES

- (1) Indicated number of reinforcing bars for PIERS shall be placed in BOTH directions (bars placed perpendicular to each other). Indicated number of reinforcing bars for FOOTINGS shall be placed in the footing in continuous fashion. Use 31" lap on #4 bars and 39" lap on #5 bars. Use one #4 bar 3.5" from top of the stem wall. Use vertical #4 bars at 24" o.c. minimum in stemwall.
- (2) Reinforcing bars shall be placed so there is 3 inches cover from bottom of footing and have 3 inches cover from the edges of footing. Bars shall be spaced uniformly across the area of the footing.
- (3) Pier risers shall be reinforced with two #4 bars vertical, UON.

7) LATERAL ENGINEERING - wind and seismic forces

SEISMIC LOAD DERIVATION =====

Percent of snow load for seismic =	20%	
Number of stories =	1	
Risk Category =	II	(ASCE Table 1.5-1)
Seismic Importance factor, I_e =	1.00	(ASCE Table 1.5-2)
Site class =	D	(ASCE Table 20.3-1)
Spectral response acceleration S_s =	1.31	g USGS web site or (ASCE Figures 22-1 through 22-18)
Spectral response acceleration S_1 =	0.437	g USGS web site or (ASCE Figures 22-1 through 22-18)
Site coefficient F_a =	1.00	(ASCE Table 11.4-1)
Site coefficient F_v =	1.60	(ASCE Table 11.4-2)

Maximum Spectral response acceleration S_{MS} =	1.310	g (ASCE Eq. 11.4-1)
Maximum Spectral response acceleration S_{M1} =	0.699	g (ASCE Eq. 11.4-2)

Design Spectral response acceleration S_{DS} =	0.873	g (ASCE Eq. 11.4-3)
Design Spectral response acceleration S_{D1} =	0.466	g (ASCE Eq. 11.4-4)

Seismic Design Category based on S_{DS} =	D	(ASCE Table 11.6-1)	4
Seismic Design Category based on S_{D1} =	D	(ASCE Table 11.6-2)	4
Seismic Design Category used =	D	OMF>Has Conditions	

Basic Seismic Force-Resisting System used => Heavy Timber Ordinary Braced Frame
(See ASCE Table 12.2-1)

	Alpha	Numeric	
Response Modification Coefficient R =	5.6	5.6	(ASCE Table 12.2-1 or 12.14-1)
System Over-strength factor Ω_o =	2.2	2.2	(ASCE Table 12.2-1 or 12.14-1)
Deflection Amplification Factor C_d =	3.5	3.5	(ASCE Table 12.2-1 or 12.14-1)

Analysis procedure used => ELF Equivalent Lateral Force

Equivalent Lateral Force - **ELF** (See ASCE Sec. 12.8)
Simplified Analysis - **SA** (See ASCE Sec. 12.14)

Coefficient for u. limit on calculated period C_u =	1.4	(ASCE table 12.8-1)
Approximate period parameter C_t =	0.02	(ASCE table 12.8-2)
Approximate period parameter x =	0.75	(ASCE table 12.8-2)
Building h_n =	24	ft
Approximate period T_a =	0.217	(ASCE Eq. 12.8-7)
Upper limit of the structure Period T =	0.304	(ASCE Sec. 12.8.2)
Long-period transition period T_L =	6	(ASCE Figures 22-15 through 22-20)

	Alpha	Numeric	
Seismic Response Coefficient C_s =	0.156	0.156	(ASCE Eq. 12.8-2)

C_s need not be greater than =	0.274	0.274	(ASCE Eq. 12.8-3 & 12.8-4)
C_s shall not be less than =	0.038	0.038	(ASCE Eq. 12.8-5)
If $S_1 \geq 0.6g$ C_s shall not be less than =	0.039	0.039	(ASCE Eq. 12.8-6)

	Alpha	Numeric	
Seismic Response Coefficient C_s Max.=	0.274	0.274	
Seismic Response Coefficient C_s Min.=	0.038	0.038	

Design Seismic Response Coefficient C_s =	0.156	0.156	(Base Shear Design Factor)
	0.111	0.111	(Base Shear Design Factor - For ASD Alt. Load)

STRUCTURE DEAD LOADS (W)

ELEMENT		SNOW LOAD	DESIGN LOAD		DEAD LOAD	AREA (ft²)		TOTAL WEIGHT (lbs)
roof 1		0	0.0		20	0		0
roof 2		0	0.0		20	0		0
roof 3		0	0.0		20	0		0
roof 4		0	0.0		20	0		0
roof 5		0	0.0		20	0		0
floor 1		0	0.0		0	0		0
floor 2		0	0.0		0	0		0
floor 3		0	0.0		0	0		0
floor 4		0	0.0		0	0		0
floor 5		0	0.0		0	0		0
deck 1		195	39.0		10	248		12126
deck 2		0	0.0		10	0		0
deck 3		0	0.0		10	0		0
deck 4		0	0.0		10	0		0
deck 5		0	0.0		10	0		0
	Ext. DL (PSF)	Height (ft)	Length (ft)		Int. DL (PSF)	Height (ft)	Length (ft)	
Walls for Roof 1	15	8	0		10	8	0	0
Walls for Roof 2	15	8	0		10	8	0	0
Walls for Roof 3	15	8	0		10	8	0	0
Walls for Roof 4	15	8	0		10	8	0	0
Walls for Roof 5	15	8	0		10	8	0	0
Walls for Floor 1	15	8	0		10	8	0	0
Walls for Floor 2	15	8	0		10	8	0	0
Walls for Floor 3	15	8	0		10	8	0	0
Walls for Floor 4	15	8	0		10	8	0	0
Walls for Floor 5	15	8	0		10	8	0	0

Total Weight (W) = 12126 lbs

Seismic base shear (Q_E) = $V = C_S \cdot W$ or $V = F_{DS} \cdot W/R$ = $\frac{\text{Alpha (lbs)}}{1891} = \frac{\text{Numeric (lbs)}}{1891}$ (ASCE Eq. 12.8-1)

Design Redundancy Factor (ρ) = 1.00 1.00 See ASCE Section 12.3.4

Seismic Load Effect $E = E_h + E_v$ (ASCE Eq. 12.4-1)

Seismic Load Effect $E = E_h - E_v$ (ASCE Eq. 12.4-2)

Horizontal Earthquake Load $E_h = \rho Q_E / 1.4 = \frac{\text{Alpha}}{1351} = \frac{\text{Numeric}}{1351}$ (ASCE Eq. 12.4-3) for Alt. ASD loads
 Vertical Earthquake factor = $\pm 0.2 \cdot S_{DS} / 1.4 = 0.125$ 0.125 (Ref. ASCE Eq. 12.4-4) for Alt. ASD load

Maximum Seismic Load Effect $E = E_{mh} + E_v$ (ASCE Eq. 12.4-5)

Maximum Seismic Load Effect $E = E_{mh} - E_v$ (ASCE Eq. 12.4-6)

E_{mh} Factor = $\Omega_0 Q_E / W = \frac{\text{Alpha}}{0.343} = \frac{\text{Numeric}}{0.343}$ (Ref. ASCE Eq. 12.4-5)
 E_v Factor = $\pm 0.2 \cdot S_{DS} = 0.175$ 0.175 (Ref. ASCE Eq. 12.4-6)

EARTHQUAKE LOAD AT DIAPHRAGM LEVELS (Alpha & Numeric Gridlines)

Exponent related to structure period (k) = 1.00

Diaphragm Level	Weight (w) lbs	Ave. Height Above Grade (h) - ft.	$w \cdot h^k$	Force at Diaphragm Alpha	Numeric
roof 1	0	1.0	0	0	0
roof 2	0	0.0	0	0	0
roof 3	0	0.0	0	0	0
roof 4	0	0.0	0	0	0
roof 5	0	0.0	0	0	0
floor 1	0	0.0	0	0	0
floor 2	0	0.0	0	0	0
floor 3	0	0.0	0	0	0
floor 4	0	0.0	0	0	0
floor 5	0	0.0	0	0	0
deck 1	12126	7.0	84884	1351	1351
deck 2	0	0.0	0	0	0
deck 3	0	0.0	0	0	0
deck 4	0	0.0	0	0	0
deck 5	0	0.0	0	0	0
12126		Sum $w \cdot h^k$ =		84884	1351
				1351	1351
					lbs