rudow + berry
4032 north miller road suite A-100 scottsdale arizona 85251
structural engineering

Project: Powdercat
Job Number: 17100
Date: May 31, 2017
Book: 1 of 1

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scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
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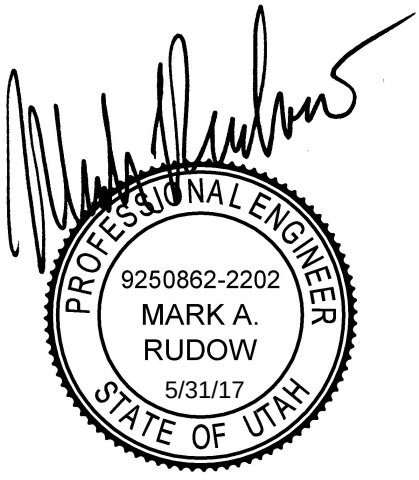

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I. GENERAL:

A. ALL CONSTRUCTION AND TESTING IS TO BE IN STRICT ACCORDANCE WITH THE 2015 INTERNATIONAL BUILDING CODE AND ALL RELATED PUBLICATIONS OF THE I.C.C.

B. ALL ICC REPORTS REFERENCED IN THIS REPORT ARE AVAILABLE FREE OF CHARGE AT HTTP://WWW.ICC-ES.ORG.

C. THE STRUCTURAL DRAWINGS SHOW THE COMPLETED PROJECT. THEY DO NOT INCLUDE COMPONENTS THAT MAY BE NECESSARY FOR CONSTRUCTION SAFETY. THE CONTRACTOR IS RESPONSIBLE FOR SAFETY ON AND AROUND THE JOBSITE DURING CONSTRUCTION.

D. STRUCTURAL NOTES SHALL BE USED ALONG WITH THE SPECIFICATIONS AND DRAWINGS. WHERE THE STRUCTURAL NOTES, STRUCTURAL AND ARCHITECTURAL DRAWINGS OR SPECIFICATIONS DISAGREE, THE CONTRACTOR MAY REQUEST A CLARIFICATION DURING THE BIDDING PERIOD, OTHERWISE THE MORE STRINGENT REQUIREMENTS SHALL CONTROL (AS DETERMINED BY THIS ENGINEER).

E. PROVIDE ALL TEMPORARY BRACING, SHORING, GUYING OR OTHER MEANS TO AVOID EXCESSIVE STRESSES AND TO HOLD STRUCTURAL ELEMENTS IN PLACE DURING CONSTRUCTION.

F. ESTABLISH AND VERIFY ALL OPENINGS AND INSERTS FOR MECHANICAL, ELECTRICAL AND PLUMBING WITH THE APPROPRIATE TRADES, DRAWINGS AND SUBCONTRACTORS PRIOR TO CONSTRUCTION.

G. VERIFY AND COORDINATE ALL DIMENSIONS AND CONDITIONS PRIOR TO STARTING WORK. NOTIFY THE ARCHITECT OF ANY DISCREPANCIES OR INCONSISTENCIES.

H. STRUCTURAL DETAILS: DETAILS ARE APPLICABLE WHERE INDICATED BY SECTION CUT, BY NOTE OR BY DETAIL TITLE. PROVIDE SIMILAR DETAILS AT SIMILAR CONDITIONS UNLESS NOTED OTHERWISE. THE CONTRACTOR MAY REQUEST A CLARIFICATION DURING THE BIDDING PERIOD OTHERWISE THE MORE STRINGENT REQUIREMENTS SHALL CONTROL (AS DETERMINED BY THIS ENGINEER).

I. REFER TO ARCHITECTURAL DRAWINGS FOR ALL SLAB ELEVATIONS AND SLOPES NOT NOTED.

J. ANY ENGINEERING DESIGN PROVIDED BY OTHERS AND SUBMITTED FOR REVIEW SHALL BEAR THE SEAL AND SIGNATURE OF A STRUCTURAL ENGINEER REGISTERED IN UTAH.

K. THE COST OF DESIGN WORK RESULTING FROM ERRORS OR OMISSIONS IN CONSTRUCTION SHALL BE BORNE BY THE CONTRACTOR.

II. DESIGN CRITERIA:

A. BUILDING CODE: WEBER COUNTY, UTAH, 2015 I.B.C.

B. LOADINGS:

1. INTERIOR FLOOR DEAD LOAD FINISH ALLOWANCE = 12 PSF MAX.
2. GROUND SNOW LOAD = 262.5 PSF w/ DRIFTS PER ASCE 7-10
3. ROOF DESIGN SNOW LOAD = 259 PSF
4. TYPICAL FLOOR & STAIR LIVE LOAD = 40

PROFESSIONAL ENGINEER
9250862-2202
MARK A. RUDOW
5/31/17
STATE OF UTAH

PSF (RESIDENTIAL)

5. EXTERIOR TERRACE LIVE LOAD = 60 PSF
6. PROJECT RISK CATEGORY = II

7. WIND LOADS:

   a) ULTIMATE VELOCITY = 115 MPH
   b) ENCLOSED
   c) EXPOSURE = C

8. SEISMIC LOADS:

   a) SOIL SITE CLASS = C
   b) Ss = 0.811, SDS = .635
   c) S1 = 0.269, SD1 = .334
   d) SEISMIC DESIGN CATEGORY = D
   e) R = 6.5, Cd=4, OMEGA = 3 (WOOD SHEAR WALLS)
   f) RHO = 1.3
   g) Ie = 1.00
   h) Cs = 0.0977 ULT, 0.0684 ASD

C. SOIL BEARING ALLOWABLE:

1. PER SOILS INVESTIGATION REPORT BY "INTERMOUNTAIN GEOENVIRONMENTAL SERVICES, INC.", PROJECT NO. 01628-022. REFER TO THIS REPORT FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
2. ALL FOOTINGS ARE TO BE FOUNDED EITHER ON ENTIRELY ON COMPETENT NATIVE SOILS OR ENTIRELY ON COMPACTED FILLS AS DESCRIBED IN THE GEOTECHNICAL REPORT. MIXING OF BEARING MATERIALS IS NOT ALLOWED. THE SUITABLE NATIVE SOILS ARE EXPECTED TO OCCUR AT BETWEEN 2 AND 3 FEET BELOW THE ORIGINAL PRE-ROAD GRADE ON THE SITE.
3. ALLOWABLE NET BEARING PRESSURE ON THESE SOILS IS 2400 PSF AS INDICATED IN THE GEOTECHNICAL REPORT. ALL FOOTING BEARING MATERIALS, WIDTHS AND DEPTHS ARE TO BE VERIFIED BY THE GEOTECHNICAL SPECIAL INSPECTOR.
4. IN ADDITION TO THE ABOVE REQUIREMENTS, ALL FOOTINGS EXPOSED TO THE EXTERIOR ARE TO BE FOUNDED AT NOT LESS THAN 3'-6" BELOW FINAL EXTERIOR GRADE FOR FROST COVERAGE. FOOTING ELEVATIONS INDICATED ARE BASED ON THE ASSUMED FINAL GRADES AT THE PERIMETER OF THE BUILDING. CONTRACTOR SHALL VERIFY THAT SUFFICIENT COVERAGE IS PROVIDED AT ALL FOUNDATIONS AND SHALL ADJUST FOOTING ELEVATIONS IF REQUIRED. ANY CHANGE IN FOOTING ELEVATION OF MORE THAN 8" MUST RECEIVE PRIOR APPROVAL FROM THIS ENGINEER.
5. ALL FOOTINGS ARE TO BE FOUNDED AT THE LOWER OF THE ABOVE TWO PARAGRAPH REQUIREMENTS, BUT AT DEPTHS NOT LESS THAN INDICATED ON THE STRUCTURAL DRAWINGS. IF ANY FOOTING NEEDS TO BE LOWERED BELOW THE DEPTHS INDICATED ON THE STRUCTURAL DRAWINGS, NOTIFY THIS ENGINEER FOR FURTHER RECOMMENDATIONS PRIOR TO PROCEEDING WITH ANY FOUNDATION INSTALLATION.

6. ALL SLABS ON GRADE ARE TO BEAR ON THE ASSEMBLIES NOTED ON THE STRUCTURAL AND ARCHITECTURAL DRAWINGS AND ON PREPARED SUBGRADE IN ACCORDANCE WITH THE GEOTECHNICAL REPORT.

III. MATERIALS AND EXECUTION:

A. CONCRETE:

1. ALL CONCRETE CONSTRUCTION SHALL COMPLY WITH ACI 301, LATEST ADOPTION.

2. CONCRETE MATERIAL PROPERTIES: HIGH-RANGE WATER REDUCERS ARE NOT PERMITTED IN ANY CONCRETE USED IN FLATWORK (SLABS ON GRADE, TOPPING SLABS, ETC.). 28-DAY COMPRESSIVE STRENGTHS ARE TO BE AS FOLLOWS.

a)	SPREAD FOOTINGS	3000 PSI.
b)	SLABS ON GRADE:	4000 PSI.
c)	CONCRETE WALLS:	4000 PSI.

3. AGGREGATE SIZE: 1" MAXIMUM FOR FOOTINGS, 3/4" MAXIMUM FOR ALL OTHER CONCRETE.

4. SLUMP: 4" PLUS OR MINUS 1" FOR ALL CONCRETE UNLESS HISTORICAL DATA SHOWS ACCEPTABLE PERFORMANCE AT A DIFFERENT SLUMP (SUBJECT TO APPROVAL BY THE STRUCTURAL ENGINEER).

5. CAST IN PLACE CONCRETE:

a) SPACING OF CONSTRUCTION JOINTS OR CONTROL JOINTS IN WALLS EXPOSED TO VIEW SHALL NOT EXCEED 40 FEET UNLESS SPECIFICALLY NOTED OTHERWISE ON THE DRAWINGS.

b) PROVIDE EXTRA REINFORCING AROUND ALL OPENINGS EXCEEDING 24 INCHES SQUARE OR ROUND IN ALL SLABS AND WALLS EQUAL TO TWO #5 BARS ON FOUR SIDES (ONE BAR EACH FACE)AND EXTEND TWO FEET BEYOND THE OPENING.

c) COORDINATE CHAMFER SIZE ON ALL EXPOSED CORNERS OF CONCRETE WITH THE ARCHITECT. OMIT CHAMFER WHERE INDICATED ON THE ARCHITECTURAL DRAWINGS OR IN THE SPECIFICATIONS.

d) PROVIDE CLASS B LAP SPLICES FOR ALL REINFORCING UNLESS NOTED OTHERWISE.

e) PROVIDE ISOLATION JOINTS AROUND ALL COLUMNS AT ALL SLAB ON GRADE AREAS.

f) PROVIDE CORNER BARS AT ALL WALL CORNER AND TEE CONDITIONS WITH CLASS B LAPS PER ACI.

g) FOLLOW ACI 306R REQUIREMENTS FOR COLD WEATHER CONCRETING AND 305R REQUIREMENTS FOR HOT WEATHER CONCRETING AS REQUIRED.

h) DO NOT BACKFILL AGAINST RETAINING WALLS UNTIL ALL SLAB-ON-GRADE, FOOTING AND WALL CONCRETE HAS REACHED FULL DESIGN STRENGTH. SEE PLANS FOR ADDITIONAL REQUIREMENTS.

i) SLAB ON GRADE JOINTING: ALL SLABS ON GRADE ARE TO BE JOINTED AT NO MORE THAN 10'-0" EA. WAY USING JOINTS AS PER DETAIL 1/S0.11. IN ADDITION, NO SECTION OF CONCRETE SHALL HAVE AN ASPECT RATIO OF GREATER THAN 1 1/2:1. PROVIDE (2) #4 x 4'-0" MID-HEIGHT SLAB BARS ADJACENT TO ALL DISCONTINUOUS JOINT LOCATIONS, AND AT ANY WALL OR PILASTER CORNERS NOT INTERSECTED BY JOINTS. SUBMIT COMPLETE JOINT LAYOUT PLAN TO THE ARCHITECT FOR PRIOR REVIEW.

6. CONCRETE TESTING REQUIREMENTS:

a) ALL CONCRETE MATERIALS SHALL BE TESTED IN ACCORDANCE WITH THE APPROPRIATE STANDARDS AND CRITERIA FOR THE MATERIAL IN CHAPTER 3 OF ACI 301.

b) OBTAIN AT LEAST ONE COMPOSITE SAMPLE FOR EACH 100 CUBIC YARDS, OR FRACTION THEREOF, OF EACH CONCRETE MIXTURE PLACED IN ANY ONE DAY.

c) CONDUCT STRENGTH TESTS OF CONCRETE DURING CONSTRUCTION IN ACCORDANCE WITH THE FOLLOWING PROCEDURES:

(1) MOLD AND CURE THREE CYLINDERS FROM EACH SAMPLE IN ACCORDANCE WITH ASTM C 31/C 31M. RECORD ANY DEVIATIONS FROM THE ASTM REQUIREMENTS IN THE TEST REPORT.

(2) DETERMINE SLUMP OF EACH COMPOSITE SAMPLE TAKEN.

(3) DETERMINE TEMPERATURE OF EACH COMPOSITE SAMPLE TAKEN.

(4) TEST CYLINDERS IN ACCORDANCE WITH ASTM C 39. TEST ONE SPECIMEN AT 7 DAYS FOR INFORMATION, AND TWO SPECIMENS AT 28 DAYS FOR ACCEPTANCE, UNLESS OTHERWISE SPECIFIED. THE COMPRESSIVE STRENGTH TEST RESULTS FOR ACCEPTANCE SHALL BE THE AVERAGE OF THE COMPRESSIVE STRENGTHS FROM THE TWO SPECIMENS TESTED AT 28 DAYS.

(5) SUBMIT TEST REPORTS TO THIS ENGINEER AFTER EACH COMPRESSIVE STRENGTH TEST. REPORT SHALL INCLUDE SLUMP AND TEMPERATURE READINGS TAKEN AT TIME OF SAMPLING.

7. BASEPLATE GROUT: GROUT FOR USE UNDER BASE PLATES AND BEARING PLATES IS TO BE HIGH-STRENGTH, NON-METALLIC, NON-SHRINK GROUT. MINIMUM COMPRESSIVE STRENGTH AT 3 DAYS IS TO BE 3000 PSI. GROUT MAY BE INSTALLED EITHER AS A DRYPACK OR FLOWABLE MIXTURE, BUT SHALL BE DRYPACKED AT ALL EXPOSED CONDITIONS. EDGES OF GROUT AT EXPOSED CONDITIONS SHALL BE CUT AT A 15 DEGREE ANGLE FROM VERTICAL SUCH THAT THE GROUT IS THE SAME WIDTH AT THE STEEL PLATE AT THE TOP AND WIDER AT THE BOTTOM.

8. REINFORCING STEEL:

a) ALL BARS #4 AND LARGER TO BE ASTM A 615, GRADE 60. ALL #2 AND #3 BARS TO BE ASTM A 615, GRADE 40. DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH ACI-301, LATEST ADOPTION.
b) WELDED WIRE FABRIC TO BE IN ACCORDANCE WITH ASTM A 185.
c) ALL BARS INDICATED ON THE PLANS TO BE WELDED SHALL CONFORM TO ASTM A 706 (GRADE 60).
d) MINIMUM CONCRETE COVER FOR REINFORCING BARS TO FACE OF BARS INCLUDING TIES:

(1) CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH: 3"
(2) CONCRETE EXPOSED TO EARTH OR WEATHER:

#6 BARS AND LARGER: 2"
#5 BARS AND SMALLER: 1-1/2"

B. STRUCTURAL AND MISCELLANEOUS STEEL:

1. MATERIAL PROPERTIES:

a) TO BE ASTM A 36 UNLESS NOTED OTHERWISE.
b) ALL WIDE-FLANGE SHAPES ARE TO BE ASTM A992 - GRADE 50.
c) PIPE IS TO BE ASTM A 501, Fy = 36 KSI OR ASTM A 53, TYPE E OR TYPE S, GRADE B, Fy = 35 KSI.
d) SQUARE OR RECTANGULAR TUBES ARE TO BE ASTM A 500, GRADE B, Fy = 46 KSI.
e) ALL STEEL IS TO BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH A.I.S.C. SPECIFICATIONS, LATEST ADOPTION.

2. WELDING:

a) FOR STRUCTURAL STEEL TO BE IN ACCORDANCE WITH A.W.S. REQUIREMENTS FOR E70XX ELECTRODES.
b) ALL FILLET WELDS UP TO 5/16" SHALL BE MADE AS SINGLE PASS WELDS. ALL MULTI-PASS WELDS REQUIRE VISUAL INSPECTION FOR EACH WELD PASS PRIOR TO INSTALLING SUBSEQUENT PASSES. MULTI-PASS WELDS THAT HAVE NOT BEEN PROPERLY INSPECTED WILL BE REJECTED.
c) ALL WELD BACKER BARS AND/OR ERECTION AIDS ARE TO BE REMOVED AT CONDITIONS THAT ARE EXPOSED TO VIEW. BACKER BARS ARE TO BE REMOVED WHEN AWS WELD TYPE REQUIRES BACK-GOUGING. EXPOSED SURFACES SHALL BE GROUND SMOOTH WITH ANY HOLES OR GOUGES FILLED AND GROUND SMOOTH.

3. BOLTS AND OTHER FASTENERS:

a) ALL BOLTS AT STEEL TO STEEL CONNECTIONS TO BE ASTM A 325-N UNLESS NOTED OTHERWISE. ALL BOLTS ARE TO BE TIGHTENED TO A SNUG-TIGHT CONDITION UNLESS NOTED OTHERWISE.
b) ALL BOLTS AT WOOD TO STEEL OR WOOD TO WOOD CONNECTIONS TO BE ASTM A 307 UNLESS NOTED OTHERWISE.
c) TYPICAL ANCHOR RODS SHALL BE ASTM F1554, GRADE 36, U.N.O
d) ADHESIVE ANCHORS FOR ATTACHMENT TO CONCRETE ARE TO BE ASTM F1554, GRADE 36, THREADED RODS WITH SIMPSON "SET-XP" ADHESIVE, INSTALLED IN ACCORDANCE WITH ICC ESR-2508. DRILLED HOLE DIMENSIONS ARE TO BE AS FOLLOWS IN EXISTING CONCRETE UNLESS NOTED OTHERWISE. HOLE DEPTH IS MEASURED FROM THE OUTSIDE FACE OF THE CONCRETE. ALL CONCRETE SHALL BE AT ITS SPECIFIED DESIGN STRENGTH AT THE TIME OF INSTALLATION.

ROD DIA./BAR SIZE	DRILL BIT DIA.	HOLE DEPTH
1/2"	5/8"	4"
5/8"	3/4"	5"
#4	5/8"	4"
#5	3/4"	5"

4. HEADED STUD SHEAR CONNECTORS: TO BE ASTM A 108. ALL HEADED STUDS ARE TO BE BY "NELSON STUD WELDING" OR APPROVED EQUAL AND ARE TO BE FLASH WELDED TO THE SUPPORTING STEEL USING AN ELECTRIC ARC WELDING PROCESS.

C. WOOD:

1. DIMENSIONAL LUMBER: ALL TO BE GRADE STAMPED PER W.C.L.B. RULES.

a) ALL STUDS, JOISTS, BEAMS, PLATES, HEADERS AND OTHER LUMBER TO BE D.FIR/LARCH #2 UNLESS OTHERWISE NOTED.
b) 4x, 6x AND 8x POSTS TO BE D.FIR/LARCH NO.1.
c) ALL WOOD PLATES IN CONTACT WITH STEM WALLS OR SLABS ON GRADE ARE TO BE PRESSURE TREATED.

2. RIMBOARD: TO BE 1-1/2" THICK LSL OR LVL RIMBOARD BY REDBUILT OR OTHER PRE-APPROVED EQUAL WITH DEPTH AS INDICATED. USE 2.0E REDLAM LVL WHERE 3-1/2" THICKNESS IS INDICATED.

3. GLU-LAMS:

a) SHALL BE MANUFACTURED IN ACCORDANCE WITH ANSI/AITC A190.1, CURRENT EDITION.
b) ALL MEMBERS SHALL BE GRADE-STAMPED WITH AN AITC QUALITY MARK, AND SHALL MEET THE REQUIREMENTS OF D.FIR/LARCH COMBINATION 24F-V8 FOR MULTI-SPANS AND CANTILEVERED MEMBERS, AND D.FIR/LARCH COMBINATION 24F-V4 FOR SINGLE SPAN MEMBERS.

c) ALL GLULAM MEMBERS SHALL BE CONSTRUCTED WITH EXTERIOR-GRADE ADHESIVES.

4. SHEATHING:

a) ALL SHEATHING TO BE APA RATED PLYWOOD APPROPRIATE TO THE SPAN LENGTHS AND DIRECTIONS INDICATED ON THE DRAWINGS. SHEATHING LAY-UP TO BE WITH FACE GRAIN OR STRONG DIRECTION PERPENDICULAR TO SUPPORTS EXCEPT WHERE SPECIFICALLY SHOWN OTHERWISE. ALL SINGLE SPAN CONDITIONS ARE TO HAVE 2X4 BLOCKING ACROSS THE SPAN AT 24" O.C. MAX.

b) ROOF SHEATHING TO BE 3/4" PERFORMANCE CATEGORY, APA RATED SHEATHING, EXPOSURE 1, WITH A SPAN RATING OF 48/24. NAIL WITH 10d NAILS AT 6" O.C. AT ALL EDGE SUPPORTS AND WITH 10d NAILS AT 12" O.C. AT ALL INTERMEDIATE SUPPORTS UNLESS NOTED OTHERWISE.

c) FLOOR SHEATHING AT TERRACES TO BE 1-1/8" PERFORMANCE CATEGORY, T&G, APA RATED 48" O.C., STURDI-I-FLOOR SHEATHING, EXPOSURE 1. NAIL WITH 10d NAILS AT 6" O.C. AT ALL EDGE SUPPORTS AND WITH 10d NAILS AT 10" O.C. AT ALL INTERMEDIATE SUPPORTS UNLESS NOTED OTHERWISE.

d) ALL OTHER FLOOR SHEATHING TO BE WARMBOARD AS DESCRIBED BELOW.

e) ALL ROOF AND FLOOR SHEATHING IS TO BE LAID UP IN RUNNING BOND WITH STRENGTH AXIS PERPENDICULAR TO SUPPORTS. ROTATE PANEL DIRECTION AS REQUIRED TO REFLECT FRAMING DIRECTION CHANGES.

f) IN ADDITION TO THE NAILING REQUIREMENTS INDICATED, ALL FLOOR SHEATHING CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE "APA GLUED FLOOR SYSTEM" AS DESCRIBED IN APA PUBLICATION E30, "ENGINEERED WOOD CONSTRUCTION GUIDE" AVAILABLE AT http://www.apawood.org/. ALL PANEL EDGES AND PANEL CONTACT WITH SUPPORTS SHALL BE GLUED AS DESCRIBED.

g) FOR ALL WALLS OR PORTIONS OF WALLS NOTED TO BE SHEARWALLS, TO BE 1/2" OR 5/8" PERFORMANCE CATEGORY (THICKNESS AS INDICATED), APA RATED SHEATHING WITH 32/16 SPAN RATING, EXPOSURE 1, INSTALLED ON ONE OR TWO SIDES OF THE WALL AS INDICATED. FULLY BLOCK AND NAIL ALL PANEL EDGES. NAIL AS INDICATED IN THE SHEAR WALL SCHEDULE.

5. WARMBOARD SHEATHING:

a) TO BE 1-1/8" THICK WARMBOARD-S RADIANT FLOOR HEATING PANELS BY WARMBOARD INC. MANUFACTURED AND INSTALLED IN ACCORDANCE WITH ICC ESR-1421.

b) ALL SHEATHING IS TO BE LAID UP IN RUNNING BOND WITH STRENGTH AXIS PERPENDICULAR TO SUPPORTS. ROTATE PANEL DIRECTION AS REQUIRED TO REFLECT FRAMING DIRECTION CHANGES.

c) AT ALL SHEATHING EAST OF GRID C, BLOCK AND NAIL ALL PANEL EDGES WITH 3" NOMINAL BLOCKING. NAIL WITH 10d NAILS AT 6"

O.C. AT ALL EDGE SUPPORTS AND WITH 10d NAILS AT 12" O.C. AT ALL INTERMEDIATE SUPPORTS UNLESS NOTED OTHERWISE.

d) WHERE PANEL EDGES ABUT ON I-JOISTS AND OTHER FRAMING, STAGGER NAILS ON OPPOSING PANEL EDGES AND MAINTAIN MINIMUM 3/8 EDGE DISTANCE TO PANEL EDGE AND TO EDGE OF JOIST CHORD BELOW SHEATHING.

e) IN ADDITION TO THE NAILING REQUIREMENTS INDICATED, ALL WARMBOARD FLOOR SHEATHING CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE "APA GLUED FLOOR SYSTEM" AS DESCRIBED IN APA PUBLICATION E30, "ENGINEERED WOOD CONSTRUCTION GUIDE" AVAILABLE AT http://www.apawood.org/. ALL PANEL EDGES AND PANEL CONTACT WITH SUPPORTS SHALL BE GLUED AS DESCRIBED.

6. <u>PLYWOOD WEB I JOISTS:</u>

a) TO BE DETAILED AND FABRICATED BY REDBUILT OR PRE-APPROVED EQUAL, AND ARE TO HAVE THE APPROVAL OF ICC.

b) JOISTS HAVE BEEN SIZED BY THIS ENGINEER AND MANUFACTURER CALCULATIONS ARE NOT REQUIRED IF THE SPECIFIC PRODUCTS INDICATED ARE SUPPLIED.

c) IF AN ALTERNATE MANUFACTURER'S PRODUCT IS TO BE SUBMITTED FOR REVIEW, FURNISH MANUFACTURER'S PUBLISHED TECHNICAL INFO, AND A TABLE THAT SHOWS THAT THE PROPOSED PRODUCT VALUES FOR EACH JOIST TYPE MEET OR EXCEED THOSE FOR THE REDBUILT PRODUCT SPECIFIED. THE TABLE SHALL INCLUDE THE FOLLOWING ITEMS FOR EACH REDBUILT AND PROPOSED ALTERNATE JOIST TYPE.

(1) UNFACTORED RESISTING MOMENT
(2) UNFACOTRED RESISTING SHEAR
(3) MOMENT OF INERTIA OF BARE JOIST PRODUCT.

SUBMITTALS THAT DO NOT INCLUDE THE TABLE AS DESCRIBED WILL BE REJECTED.

d) LUMBER USED IN THE JOIST TOP FLANGES IS TO BE OF A WOOD SPECIES HAVING A SPECIFIC GRAVITY OF NOT LESS THAN 0.5.

e) DOUBLE JOISTS ARE TO BE CONNECTED TOGETHER PER MANUFACTURER'S TYPICAL DETAIL. INCLUDE THIS DETAIL ON THE SHOP DRAWING SUBMITTAL.

f) <u>SUBMITTALS:</u> SHOP DRAWINGS SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW BY THE ENGINEER PRIOR TO FABRICATION.

7. <u>PREFABRICATED WOOD ROOF TRUSSES:</u>

a) TO BE "GANG-NAIL" OR "ALPINE" OR APPROVED EQUAL DESIGNED, DETAILED AND FABRICATED IN ACCORDANCE WITH THE NATIONAL FOREST PRODUCTS ASSOCIATION "NATIONAL DESIGN

SPECIFICATION FOR WOOD CONSTRUCTION", AND THE TRUSS PLATE INSTITUTE "NATIONAL DESIGN STANDARD FOR METAL PLATE CONNECTED WOOD TRUSS CONSTRUCTION ", LATEST ADOPTIONS.

b) DESIGN REQUIREMENTS:

(1) TRUSS TOP CHORDS ARE TO BE DESIGNED FOR THE SNOW LOADS INDICATED ABOVE AND FOR A SUPERIMPOSED DEAD LOAD OF NOT LESS THAN 12 PSF.
(2) TRUSS BOTTOM CHORDS ARE TO BE DESIGNED FOR A SUPERIMPOSED DEAD LOAD OF NOT LESS THAN 8 PSF.
(3) THE MAXIMUM ALLOWABLE STRESS INCREASE FOR DURATION OF LOAD IS TO BE 15%.
(4) TRUSS DEFLECTION TO BE LIMITED TO L/180 FOR TOTAL LOAD AND L/240 FOR LIVE LOAD.
(5) TRUSS DEPTH TO BE 24" WITH BEARING CONDITIONS AS SHOWN EXCEPT WHERE NOTED OTHERWISE.
(6) PROVIDE CONTINUOUS TRUSS BLOCKING PANELS AS DETAILED WITH HORIZONTAL SEISMIC LOAD TRANSFER CAPACITY NOTED ON THE DETAILS.

c) SUBMITTALS:

(1) COMPLETE DESIGN CALCULATIONS SHALL BE FURNISHED TO THE ENGINEER FOR EACH TRUSS. CALCULATIONS MUST BE PREPARED AND SEALED BY A STRUCTURAL ENGINEER REGISTERED IN THE STATE OF UTAH. UNSEALED SUBMITTALS WILL BE REJECTED.
(2) SHOP DRAWINGS SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW BY THE ENGINEER PRIOR TO FABRICATION.
(3) THE TRUSS MANUFACTURER SHALL PROVIDE WRITTEN CERTIFICATION THAT THE TRUSS QUALITY IS IN CONFORMANCE WITH THE QUALITY CRITERIA DESCRIBED IN ANSI/TPI-1, LATEST ADOPTION, PUBLISHED BY THE TRUSS PLATE INSTITUTE.
(4) THE TRUSS MANUFACTURER SHALL HAVE A QUALITY ASSURANCE PROGRAM IN ACCORDANCE WITH CHAPTER 3 OF ANSI/TPI-1, LATEST EDITION, AND PROVIDE WRITTEN CERTIFICATION OF COMPLIANCE.

d) GENERAL:

(1) ALL TRUSSES AND RELATED BRACING SHALL BE SIZED AND DETAILED TO FIT THE DIMENSIONS AND LOADS INDICATED ON THE PLANS.
(2) LUMBER USED FOR CHORDS AND WEBS SHALL HAVE A MAXIMUM MOISTURE CONTENT BELOW 19% AT THE TIME OF FABRICATION.

(3) LUMBER USED FOR CHORDS AND WEBS THAT ARE TO RECEIVE PLYWOOD SHEATHING ARE TO BE OF WOOD SPECIES HAVING A SPECIFIC GRAVITY OF NOT LESS THAN 0.5.

(4) ALL TRUSS MEMBERS SHALL MEET OR EXCEED VISUAL REQUIREMENTS FOR NO. 2 GRADE. NO WANE SHALL BE PERMITTED IN THE CONNECTION AREA.

(5) DESIGN LATERAL RESISTANCE VALUES FOR TRUSS PLATES AND METAL WEBS SHALL BE 80% OF TPI ALLOWABLE LOAD VALUES.

(6) THE HANKINSON FORMULA OR STRAIGHT LINE INTERPOLATION SHALL BE USED TO DETERMINE LATERAL RESISTANCE VALUES FOR PLATE TO WOOD GRAIN ANGLES BETWEEN 0 AND 90 DEGREES.

(7) TRUSS PLATES SHALL BE SIZED SO THAT THEY CAN BE CENTERED BOTH HORIZONTALLY AND VERTICALLY ON THE JOINT UNLESS THE CHORD DEPTH OR THE TRUSS GEOMETRY PROHIBITS SUCH PLACEMENT.

(8) EVERY TRUSS PLATE SHALL BE FULLY EMBEDDED INTO THE UNDERLYING WOOD ACROSS THE ENTIRE CONTACT AREA.

(9) ALL TRUSSES SHALL BE ERECTED AND BRACED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND IN ACCORDANCE WITH TRUSS PLATE INSTITUTE RECOMMENDATIONS.

8. <u>WOOD NAILING SCHEDULE (U.N.O. ON PLANS):</u>

a) JOIST TO SILL OR GIRDER, TOENAIL 3-8d
b) SOLE PLATE TO JOIST OR BLOCKING, FACE NAIL 2-16d
c) TOP PLATE TO STUD, END NAIL 2-16d
d) 2x STUD TO PLATE, TOENAIL 4-8d or FACE NAIL 2-16d
e) 3x STUD TO 3x PLATE, TOENAIL 4-10d OR FACE NAIL 3-20d
f) DOUBLE STUDS, FACE NAIL 16d @ 24" O.C.
g) DOUBLED TOP PLATES, FACE NAIL 16d @ 16" O.C.
h) TOP PLATES, LAPS AND INTERSECTIONS, FACE NAIL 2-16d
i) CONTINUOUS HEADER TO STUD, TOENAIL 4-8d
j) BUILT UP CORNER STUDS, 16d @ 24" O.C.
k) BUILT-UP GIRDERS AND BEAMS, 20d @ 32"O.C. AT TOP AND BOTTOM AND STAGGERED 2-20d AT EACH END & SPLICE
l) RIMBOARD TO I-JOIST, 10d FACE NAIL TO T&B JOIST CHORD

9. <u>LAG SCREW INSTALLATION:</u>

a) ALL LAG SCREWS REQUIRE PRE-DRILLING OF HOLES.
b) LAG SCREWS SHALL BE INSTALLED INTO PROPERLY SIZED LEAD AND CLEARANCE HOLES PER N.F.P.A. "NATIONAL DESIGN SPECIFICATION" REQUIREMENTS AS FOLLOWS.
c) THE CLEARANCE HOLE FOR THE SHANK SHALL HAVE THE SAME DIAMETER AS THE SHANK AND THE SAME DEPTH OF PENETRATION AS THE LENGTH OF UNTHREADED SHANK.
d) THE LEAD HOLE FOR THE THREADED PORTION SHALL HAVE A DIAMETER EQUAL TO 40 TO 70 PERCENT OF THE SHANK DIAMETER

AND A LENGTH EQUAL TO AT LEAST THE LENGTH OF THE THREADED PORTION.

e) THE THREADED PORTION OF THE SCREW SHALL BE INSERTED IN ITS LEAD HOLE BY TURNING WITH A WRENCH, NOT BY DRIVING WITH A HAMMER.

f) SOAP OR OTHER LUBRICANT SHALL BE USED ON THE SCREWS OR IN THE LEAD HOLE TO FACILITATE INSERTION AND PREVENT DAMAGE TO THE SCREW.

10. WOOD CONNECTORS:

a) UNLESS NOTED OTHERWISE, ALL NAILS ARE TO BE COMMON NAILS PER ASTM F1667 WITH ASTM A153 HOT-DIP GALVANIZED FINISH. NAILS IN CONTACT WITH TREATED LUMBER ARE TO BE G185 HOT-DIP GALVANIZED OR STAINLESS STEEL.

b) LAG SCREWS SHALL MEET THE MINIMUM REQUIREMENTS OF ASTM A307, LOW-CARBON STEEL EXTERNALLY AND INTERNALLY THREADED STANDARD FASTENERS.

c) ALL LUMBER CONNECTORS SPECIFIED AS "SIMPSON" TYPE TO BE MANUFACTURED BY "SIMPSON STRONG-TIE COMPANY, INC." OR PRE-APPROVED EQUAL. INSTALL CONNECTORS USING MAXIMUM SIZE AND NUMBER OF FASTENERS PER MANUFACTURER'S LITERATURE UNLESS NOTED OTHERWISE. INSTALL SDS SCREWS PER MANUFACTURER'S RECOMMENDATIONS.

D. SHOP DRAWINGS:

1. SHOP DRAWINGS ARE TO BE SUBMITTED FOR ALL STRUCTURAL ITEMS AND AS REQUIRED BY THE SPECIFICATIONS. CONTRACT DRAWINGS SHALL NOT BE REPRODUCED FOR USE AS SHOP DRAWINGS.
2. CONTRACTOR SHALL THOROUGHLY REVIEW ALL SHOP DRAWINGS PRIOR TO SUBMITTAL TO THE DESIGN TEAM AND SHALL INCLUDE HIS REVIEW STAMP ON THE SUBMITTAL. ALL INFORMATION NOT IN ACCORDANCE WITH THE CONTRACT DOCUMENTS SHALL BE SO NOTED ON THE SUBMITTAL BY THE CONTRACTOR DURING HIS REVIEW. IF DEFICIENCIES ARE SUBSTANTIAL, THE SUBMITTAL SHALL BE RETURNED TO THE SUBCONTRACTOR FOR REVISIONS PRIOR TO SUBMITTING IT TO THE DESIGN TEAM.
3. ANY CHANGE FROM THE CONTRACT DOCUMENTS SHALL BE CLEARLY NOTED BY THE SUBMITTING PARTY WITH CLOUDS AND SPECIFIC REQUEST FOR APPROVAL. ANY CHANGES NOT NOTED AND CLOUDED SHALL BE CONSIDERED AS NOT APPROVED UNLESS SPECIFICALLY NOTED OTHERWISE BY THIS ENGINEER. THE SHOP DRAWING STAMP SHALL NOT BE CONSIDERED TO BE IMPLIED APPROVAL OF ANY CHANGES.
4. SHOP DRAWINGS SHALL NOT REPLACE THE CONTRACT DOCUMENTS. ITEMS OMITTED AND/OR SHOWN INCORRECTLY AND NOT NOTED BY THE REVIEWER ARE NOT TO BE CONSIDERED TO BE CHANGES TO THE CONTRACT DOCUMENTS. SHOP DRAWING REVIEW IS INTENDED AS AN AID TO THE CONTRACTOR IN HIS OBTAINING CORRECT SHOP DRAWINGS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT ALL ITEMS ARE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

5. ANY ENGINEERING DESIGN PERFORMED BY OTHERS AND SUBMITTED FOR REVIEW SHALL BEAR THE SEAL AND SIGNATURE OF A STRUCTURAL ENGINEER REGISTERED IN THE STATE OF UTAH. COMPLETE DESIGN CALCULATIONS FOR EACH ITEM SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW BY THE ENGINEER. THE ADEQUACY AND ACCURACY OF THE DESIGNS AND LAYOUTS PERFORMED BY OTHERS RESTS WITH THE DESIGNING AND/OR SUBMITTING PARTY.

E. STRUCTURAL STEEL ERECTOR AND FABRICATOR CERTIFICATION REQUIREMENTS:

1. THE STEEL FABRICATOR FOR THIS PROJECT SHALL HAVE AISC BUILDING STANDARD [STD] CERTIFICATION. EVIDENCE OF CERTIFICATION SHALL BE SUBMITTED TO THIS ENGINEER FOR REVIEW, AND APPROVAL SHALL BE OBTAINED PRIOR TO PROCEEDING WITH ANY DETAILING OF STEEL OR FABRICATION.
2. THE STEEL ERECTOR FOR THIS PROJECT SHALL HAVE AISC CATEGORY "CSE" CERTIFICATION. AN ALTERNATE CERTIFICATION WITH ANOTHER RECOGNIZED AUTHORITY MAY BE SUBMITTED FOR REVIEW AND APPROVAL ALONG WITH EVIDENCE OF THE SUCCESSFUL COMPLETION OF NOT LESS THAN THREE PROJECTS OF SIMILAR SCOPE IN THE PAST FIVE YEARS. ACCEPTABILITY OF THE ALTERNATE CERTIFICATION AND EXPERIENCE WILL BE DETERMINED BY THIS ENGINEER. NO STEEL ERECTION SHALL PROCEED PRIOR TO RECEIVING APPROVAL.

F. SPECIAL INSPECTION:

1. ALL SPECIAL STRUCTURAL INSPECTION SHALL BE PERFORMED IN ACCORDANCE WITH IBC CHAPTER 17 AND AS DESCRIBED IN THE STATEMENT OF SPECIAL INSPECTIONS (SOSI) ON SHEET S0.13. THE PROJECT OWNER OR HIS AGENT SHALL ENGAGE A QUALIFIED INSPECTION AGENCY OR AGENCIES TO PERFORM THE INSPECTIONS THAT ARE LISTED. ALL STRUCTURAL INSPECTORS TO BE ENGAGED SHALL BE COMPETENT AND HAVE ADEQUATE TRAINING OR EXPERIENCE AS REQUIRED BY THE SOSI, AND SHALL BE PRE-APPROVED AS INDICATED.
2. STRUCTURAL INSPECTORS OF ALL STRUCTURAL WELDING SHALL BE WELDING INSPECTORS (WI) OR SENIOR WELDING INSPECTORS (SWI) AS DEFINED IN AWS B5.1, OR SHALL BE QUALIFIED UNDER THE PROVISIONS OF AWS D1.1, SECTION 6.1.4. WRITTEN EVIDENCE OF THESE QUALIFICATIONS SHALL BE SUBMITTED TO THIS ENGINEER FOR PRIOR REVIEW AND APPROVAL.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SCHEDULING AND MONITORING OF ALL SPECIAL INSPECTIONS. REASONABLE ADVANCE NOTICE SHALL BE GIVEN TO THE SPECIAL INSPECTOR, STRUCTURAL SPECIAL INSPECTION COORDINATOR, AND/OR THE INSPECTION AGENCY. NO PERTINENT WORK SHALL PROCEED OR BE COVERED UP BY OTHER WORK UNTIL SPECIAL INSPECTION HAS TAKEN PLACE AND HAS INDICATED COMPLIANCE. COPIES OF ALL WRITTEN SPECIAL INSPECTION REPORTS SHALL BE PROMPTLY FORWARDED TO THIS ENGINEER BY THE INSPECTING AGENCY.

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

G. DEFERRED SUBMITTALS: IN ACCORDANCE WITH IBC SECTION 107.3.4.1, THE CALCULATION AND SHOP DRAWING SUBMITTAL FOR THE FOLLOWING LISTED ITEMS SHALL BE DEFERRED UNTIL AFTER ISSUANCE OF THE BUILDING PERMIT BUT PRIOR TO THEIR INSTALLATION. THE SUBMITTAL IS TO BE REVIEWED BY THIS ENGINEER. AFTER THE APPROVAL HAS BEEN PROVIDED BY THIS ENGINEER, THE CONTRACTOR SHALL FORWARD COPIES OF THE APPROVED SUBMITTAL TO WEBER COUNTY FOR REVIEW AND APPROVAL PRIOR TO INSTALLATION OF THE ITEM.

1. PREFABRICATED WOOD ROOF TRUSSES

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

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ROOF LOADS

ROOFING	—	3.0 PSF
3/4" CEM. BD	—	4.8 PSF
2 1/2" RIGID INSUL	—	1.0 PSF
3/4" OSB	—	2.2 PSF
TRUSSES	—	4.0 PSF
5/8" OSB	—	2.4 PSF
SYNTHETIC STUCCO	—	1.0 PSF
MISC & MEP	—	5.0 PSF
		24.0 PSF DL

SNOW LOAD PER FOLLOWING

TYPICAL FLOOR

3/4" STONE & SET	—	12.0 PSF
1 1/2" WARM BOARD	—	3.0 PSF
JOISTS	—	2.0 PSF
5/8" CUP BOARD	—	2.2 PSF
MISC & MEP	—	4.0 PSF
		25.0 PSF DL
		40.0 PSF LL

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TERRACE FLOOR

WOOD TILES	—	8.0 PSF
SNOW MELT	—	2.0 PSF
5" INSUL.	—	2.0 PSF
MISC.	—	2.0 PSF
1½" SHT'G.	—	3.0 PSF
JOISTS	—	3.2 PSF
5/8" GYP	—	2.8 PSF
MISC & MAE	—	4.4 PSF

28.0 PSF DL

60.0 PSF LL OR SNOW

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POWDERCAT / CCNL

SNOW LOADS

ELEV = 8610 MAX ⇒ p_g = 202.5 (PER WEBER CO.)

C_e = 0.9 (EXPOSURE C, FULLY EXPOSED)

C_t = 1.0 $\quad \gamma = .13(202.5) + 14 = 40 \Rightarrow$ 30 PCF MAX

I_s = 1.0 $\quad h_b = \frac{22}{30} = 1.47$ FT

$p_f = 202.5(0.9)(1.0)(1.0) = 236$ PSF

C_s = 0.95 (10° ± PRIMARY SLOPE, SLIPPERY SURFACE)

$p_s = 236(0.95) = 224$ PSF

ROOF OVERHANGS: ROOF R ≥ 30 ⇒ USE p_s

ROOF SLOPE VARIES: S ≈ 8

UNBALANCED SNOW LOADS

ROOF SLOPE ≈ 10° MAX ⇒ USE UNBALANCED SNOW

$p_{WINDWARD} = 0.3(224) = 67$ PSF

$p_{LEEWARD} = 224$ PSF

PLUS = $h_d \gamma / \sqrt{S}$

WIND TOWARDS SOUTH: $h_d = 0.43(21)^{\frac{1}{3}}(202.5)^{\frac{1}{4}} - 1.5 = 3.32$ FT

WIND TOWARDS NORTH: h_d = SAME

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t (480) 946-8171
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WIND TOWARDS SOUTH: $q_{\perp} = 3.32(30)/(8)^{\frac{1}{2}} = 35$ PSF

$W_{\perp} = \frac{8(3.32)(8)^{\frac{1}{2}}}{3} = 25'-0'' > 21'-0''$

$q_{LEEWARD} = 224 + 35 = 259$ PSF
$(h = 8.63$ FT$)$

WIND TOWARDS NORTH: $q_{\perp} = 3.32(30)/(8)^{\frac{1}{2}} = 35$ PSF

$W_{\perp} = 8(3.32)(8)^{\frac{1}{2}}/3 = 25'-0'' > 21'-0''$

$q_{LEEWARD} = 224 + 35 = 259$ PSF
$(h = 8.63$ FT$)$

FOR E-W SAWTOOTH DIRECTION:

$q_{RIDGE} = \frac{236}{2} = 118$ PSF $\Rightarrow h = \frac{118}{30} = 3.93$ FT

$q_{VALLEY} = \frac{2(236)}{0.9} = 524$ PSF $\Rightarrow h = \frac{524}{30} = 17.5$ FT

MAX HT DIFF FROM RIDGE TO VALLEY = 4'-4"
MIN HT DIFF FROM = 3'-1"

REDUCE VALLEY SNOW PER 7.6.3.

$q_{VALLEY\ (MAX)} = (3.93 + 4.33)(30) = 248$ PSF

N-S SNOW CONTROLS

USE 259 PSF SNOW FOR ROOF DESIGN

rudow + berry
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scottsdale, arizona 85251
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SNOW DRIFT AT TERRACES

TERRACE WIDTH = 13' MAX

ROOF WIDTH = 42' ±

P_f = 236 PSF

γ = 30 PCF $\quad h_b$ = 7.47 FT

LEEWARD DRIFT:

$$h_d = 0.43(42)^{\frac{1}{3}}(236+10)^{\frac{1}{4}} - 1.5 = 4.58 \text{ FT}$$ CONTROLS

WINDWARD DRIFT:

$$h_d = \frac{3}{4}\left[.43(13)^{\frac{1}{3}}(236)^{\frac{1}{4}} - 1.5\right] = 1.96 \text{ FT}$$

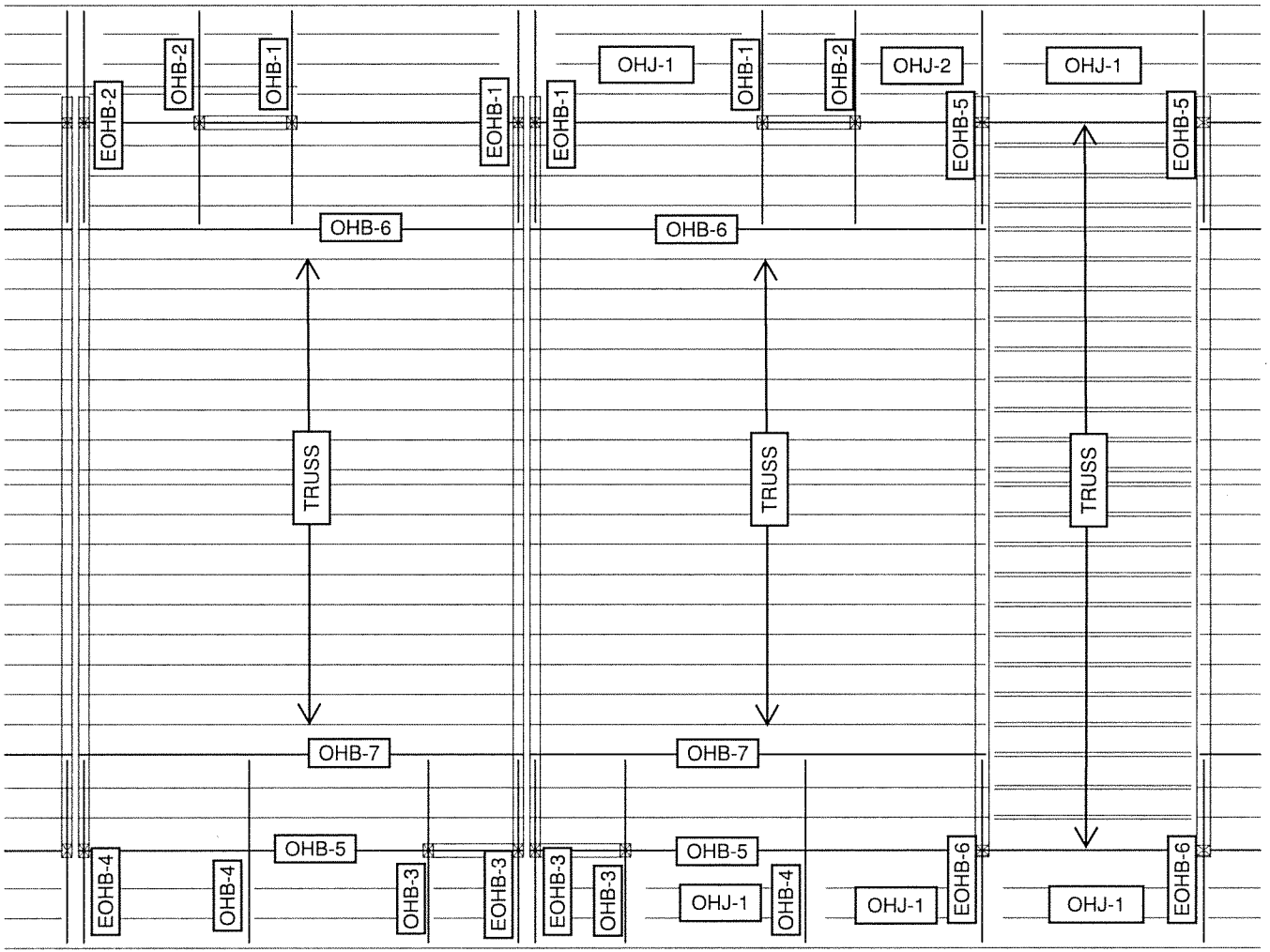
$$w_d = 4(4.58) = 18.32 \text{ FT}$$

$q_{max} = (7.47 + 4.58)30 = 362$ PSF AT GLASS

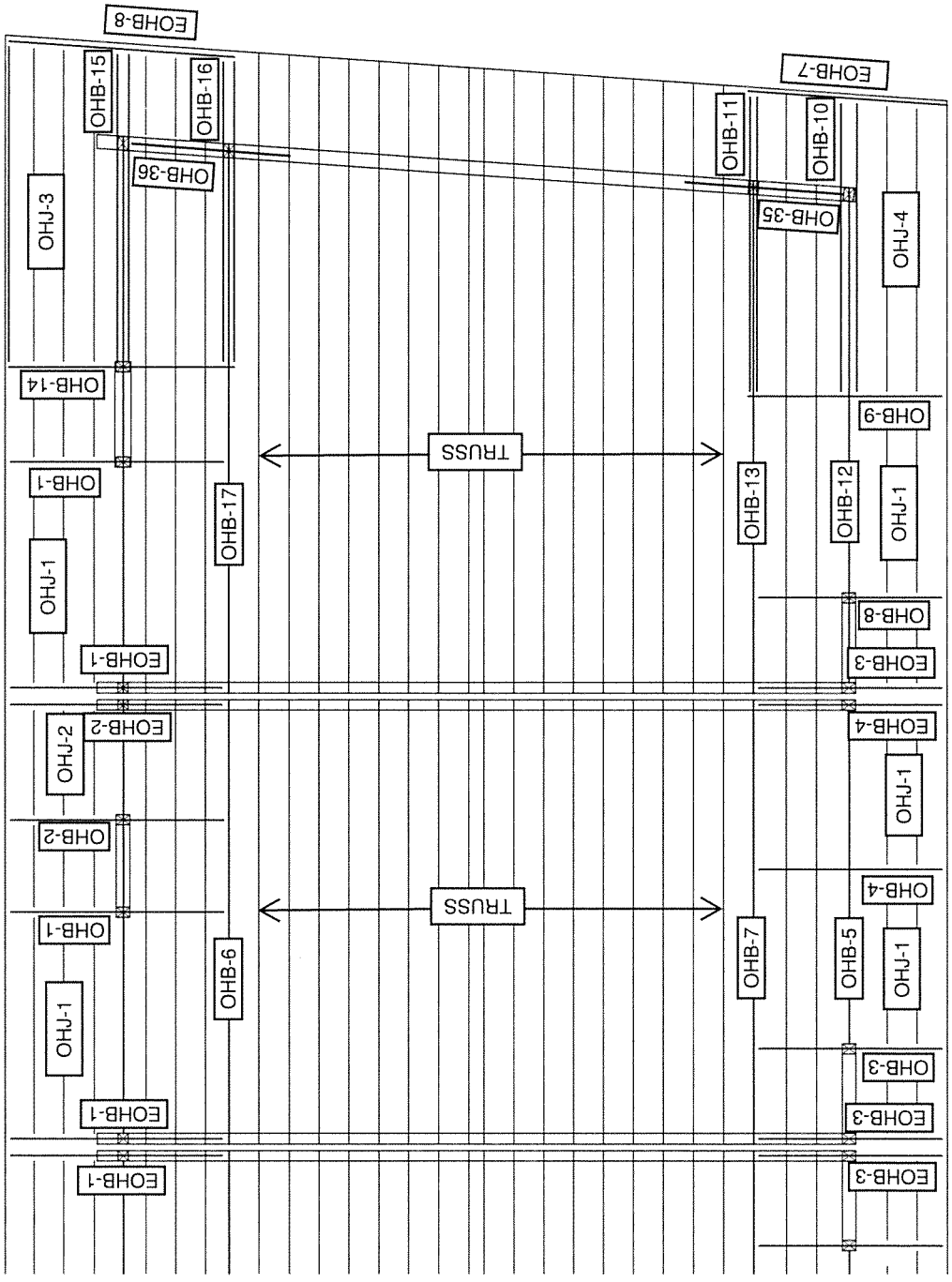
$q_{MIN} = 236$ PSF @ 18.32' FROM GLASS

AT 11' FROM GLASS $q = 286$ PSF

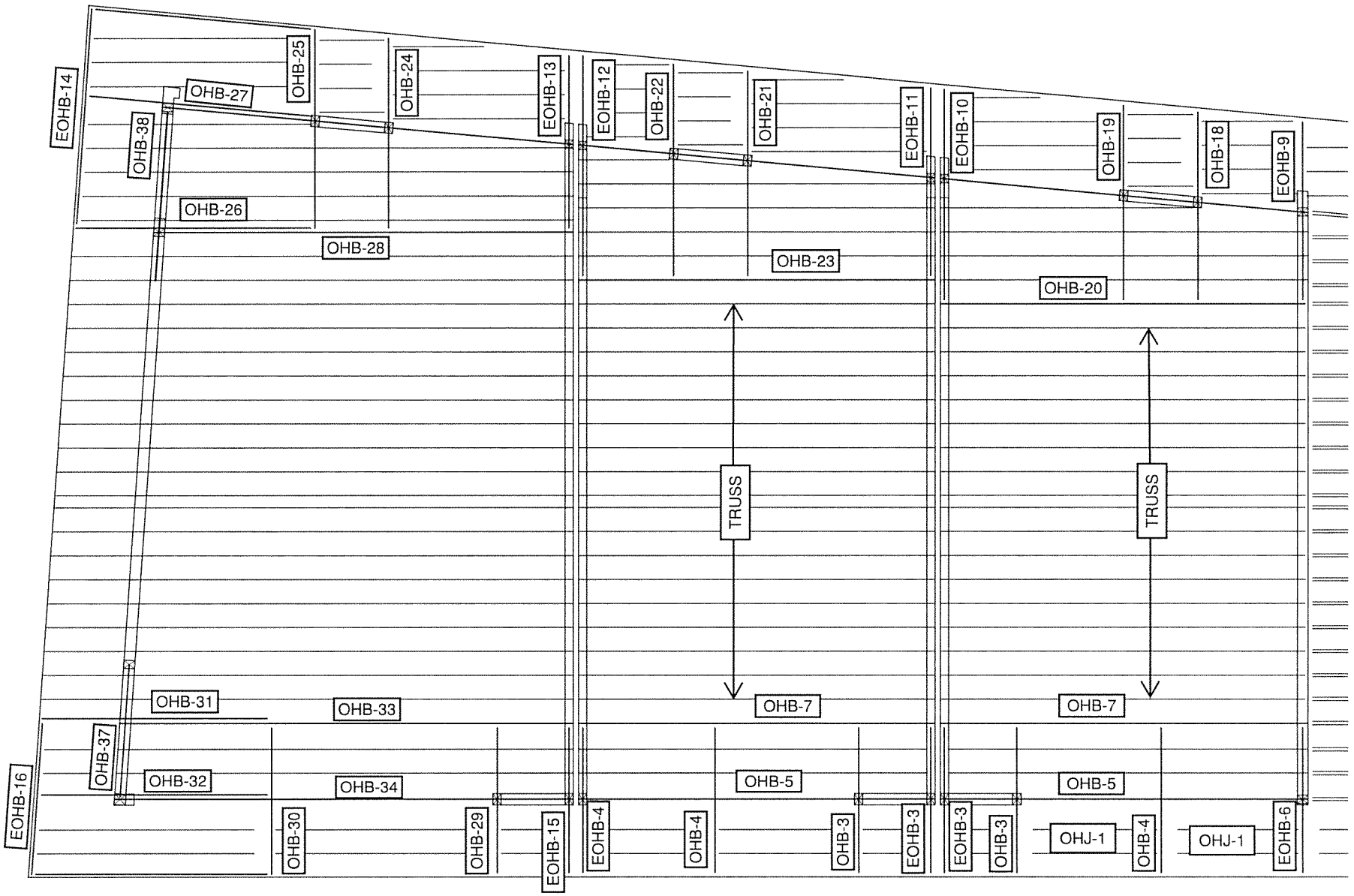
AT 13' FROM GLASS $q = 272$ PSF



TYPICAL 20 FOOT UNIT - ROOF FRAMING KEY PLAN



EAST UNIT #133 - ROOF FRAMING KEY PLAN



WEST UNIT #124-#126 - ROOF FRAMING KEY PLAN

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
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checked by: date:

CCW

ROOF FRAMING

DL = 24 PSF
SL = 259 PSF (WORST ~~CASE~~)

OHJ-1 MAX SPAN = 9'-8"
W = 1.33 (24 + 259) = 32D + 345 SL

OHJ-2 MAX SPAN = 5'-2"
W = 32D + 345 SL

OHB-1 SPAN = 5.00' CANT = 5.20'
W = 7(24 + 259) = 168D + 1813 SL

OHB-2 SPAN = 5.00' CANT = 5.20'
W = ½(9.07)(24 + 259) = 116D + 1252 SL

OHB-3 SPAN = 4'-6" CANT = 4'-4"
W = ½(11.83)(24 + 259) = 142D + 1532 SL

OHB-4 SPAN = 4'-6" CANT = 4'-4"
W = ½(15.83)(24 + 259) = 190D + 2050 SL

OHB-5 SPANS = 3-10, 15-3 TYP
= 3-10, 15-10, 9-9 @ ~~BREEZEWAY~~

P = R_{OHB4} = 1811# D + 17160# SL @ MID SPAN 2

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 23

Printed: 19 MAY 2017, 8:21AM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357 Licensee : RUDOW & BERRY

Description : Typical Unit Roof Framing - OHJ-1 - 3x10 @ 16" O.C. D.Fir #1

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

Wood Species : Douglas Fir - Larch
Wood Grade : No.1

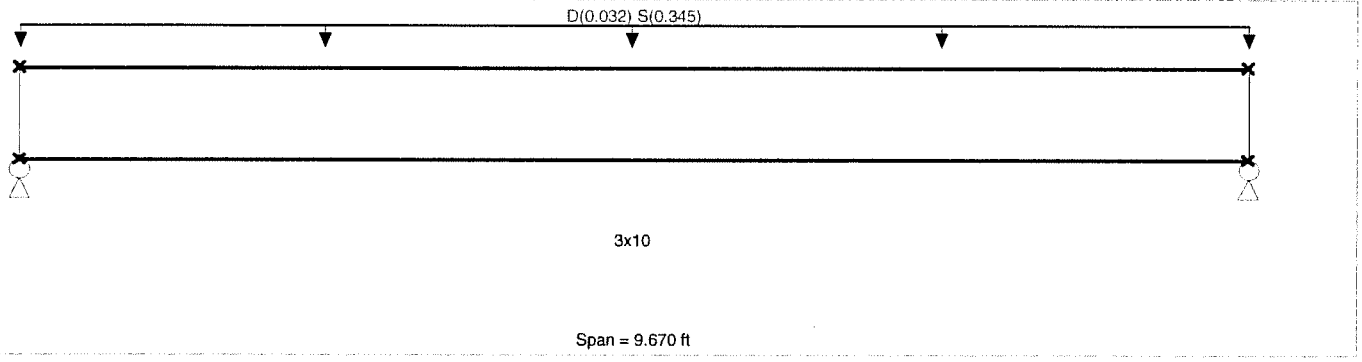
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	1,000.0 psi
Fb - Compr	1,000.0 psi
Fc - Prll	1,500.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,700.0 ksi
Eminbend - xx	620.0 ksi
Density	31.20 pcf

Repetitive Member Stress Increase



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.0320, S = 0.3450 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	1.020 : 1	Maximum Shear Stress Ratio	=	0.484 : 1
Section used for this span		3x10	Section used for this span		3x10
fb : Actual	=	1,483.25 psi	fv : Actual	=	100.11 psi
FB : Allowable	=	1,454.75 psi	Fv : Allowable	=	207.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	4.835 ft	Location of maximum on span	=	8.929 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.244 in	Ratio =	476 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.266 in	Ratio =	435 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.111	0.052	0.90	1.100	1.00	1.15	1.00	1.00	1.00	0.37	125.90	1138.50	0.13	8.50	162.00
+D+L+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.100	0.047	1.00	1.100	1.00	1.15	1.00	1.00	1.00	0.37	125.90	1265.00	0.13	8.50	180.00
+D+Lr+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.080	0.038	1.25	1.100	1.00	1.15	1.00	1.00	1.00	0.37	125.90	1581.25	0.13	8.50	225.00
+D+S+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	1.020	0.484	1.15	1.100	1.00	1.15	1.00	1.00	1.00	4.41	1,483.25	1454.75	1.54	100.11	207.00
+D+0.750Lr+0.750L+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.080	0.038	1.25	1.100	1.00	1.15	1.00	1.00	1.00	0.37	125.90	1581.25	0.13	8.50	225.00
+D+0.750L+0.750S+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.786	0.373	1.15	1.100	1.00	1.15	1.00	1.00	1.00	3.40	1,143.91	1454.75	1.19	77.21	207.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 19 MAY 2017, 8:21AM

Wood Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Typical Unit Roof Framing - OHJ-1 - 3x10 @ 16" O.C. D.Fir #1

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+W+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.062	0.030	1.60	1.100	1.00	1.15	1.00	1.00	1.00	0.37	125.90	2024.00	0.13	8.50	288.00
+D+E+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.062	0.030	1.60	1.100	1.00	1.15	1.00	1.00	1.00	0.37	125.90	2024.00	0.13	8.50	288.00
+D+0.750Lr+0.750L+0.750W+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.062	0.030	1.60	1.100	1.00	1.15	1.00	1.00	1.00	0.37	125.90	2024.00	0.13	8.50	288.00
+D+0.750L+0.750S+0.750W+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.565	0.268	1.60	1.100	1.00	1.15	1.00	1.00	1.00	3.40	1,143.91	2024.00	1.19	77.21	288.00
+D+0.750L+0.750S+0.750E+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.565	0.268	1.60	1.100	1.00	1.15	1.00	1.00	1.00	3.40	1,143.91	2024.00	1.19	77.21	288.00
+0.60D+W+0.60H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.037	0.018	1.60	1.100	1.00	1.15	1.00	1.00	1.00	0.22	75.54	2024.00	0.08	5.10	288.00
+0.60D+E+0.60H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.037	0.018	1.60	1.100	1.00	1.15	1.00	1.00	1.00	0.22	75.54	2024.00	0.08	5.10	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.2661	4.870		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.823	1.823
Overall MINimum	0.093	0.093
+D+H	0.155	0.155
+D+L+H	0.155	0.155
+D+Lr+H	0.155	0.155
+D+S+H	1.823	1.823
+D+0.750Lr+0.750L+H	0.155	0.155
+D+0.750L+0.750S+H	1.406	1.406
+D+W+H	0.155	0.155
+D+E+H	0.155	0.155
+D+0.750Lr+0.750L+0.750W+H	0.155	0.155
+D+0.750L+0.750S+0.750W+H	1.406	1.406
+D+0.750L+0.750S+0.750E+H	1.406	1.406
+0.60D+W+0.60H	0.093	0.093
+0.60D+E+0.60H	0.093	0.093
D Only	0.155	0.155
Lr Only		
L Only		
S Only	1.668	1.668
W Only		
E Only		
H Only		

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
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Wood Beam

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Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Typical Unit Roof Framing - OHJ-2 - 2x10 @ 16" O.C. D.Fir #1

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

Wood Species : Douglas Fir - Larch
Wood Grade : No.1

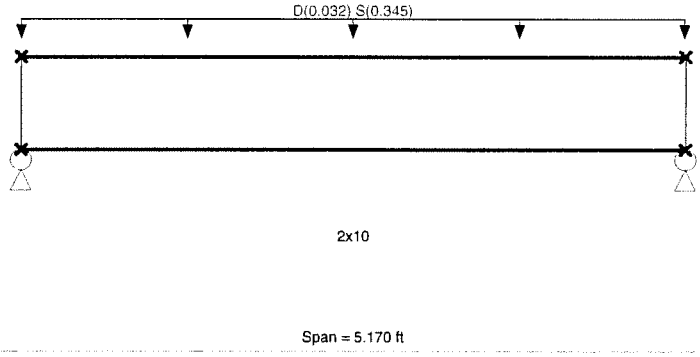
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	1,000.0 psi
Fb - Compr	1,000.0 psi
Fc - Prll	1,500.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,700.0 ksi
Eminbend - xx	620.0 ksi
Density	31.20 pcf

Repetitive Member Stress Increase



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.0320, S = 0.3450 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.486 : 1	Maximum Shear Stress Ratio	=	0.360 : 1
Section used for this span		2x10	Section used for this span		2x10
fb : Actual	=	706.63 psi	fv : Actual	=	74.60 psi
FB : Allowable	=	1,454.75 psi	Fv : Allowable	=	207.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	2.585 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.033 in	Ratio =	1870 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.036 in	Ratio =	1711 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 5.170 ft	1	0.053	0.039	0.90	1.100	1.00	1.15	1.00	1.00	1.00	0.11	59.98	1138.50	0.06	6.33	162.00
+D+L+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.170 ft	1	0.047	0.035	1.00	1.100	1.00	1.15	1.00	1.00	1.00	0.11	59.98	1265.00	0.06	6.33	180.00
+D+Lr+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.170 ft	1	0.038	0.028	1.25	1.100	1.00	1.15	1.00	1.00	1.00	0.11	59.98	1581.25	0.06	6.33	225.00
+D+S+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.170 ft	1	0.486	0.360	1.15	1.100	1.00	1.15	1.00	1.00	1.00	1.26	706.63	1454.75	0.69	74.60	207.00
+D+0.750Lr+0.750L+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.170 ft	1	0.038	0.028	1.25	1.100	1.00	1.15	1.00	1.00	1.00	0.11	59.98	1581.25	0.06	6.33	225.00
+D+0.750L+0.750S+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.170 ft	1	0.375	0.278	1.15	1.100	1.00	1.15	1.00	1.00	1.00	0.97	544.96	1454.75	0.53	57.53	207.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 26

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Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Typical Unit Roof Framing - OHJ-2 - 2x10 @ 16" O.C. D.Fir #1

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+W+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.170 ft	1	0.030	0.022	1.60	1.100	1.00	1.15	1.00	1.00	1.00	0.11	59.98	2024.00	0.06	6.33	288.00
+D+E+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.170 ft	1	0.030	0.022	1.60	1.100	1.00	1.15	1.00	1.00	1.00	0.11	59.98	2024.00	0.06	6.33	288.00
+D+0.750Lr+0.750L+0.750W+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.170 ft	1	0.030	0.022	1.60	1.100	1.00	1.15	1.00	1.00	1.00	0.11	59.98	2024.00	0.06	6.33	288.00
+D+0.750L+0.750S+0.750W+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.170 ft	1	0.269	0.200	1.60	1.100	1.00	1.15	1.00	1.00	1.00	0.97	544.96	2024.00	0.53	57.53	288.00
+D+0.750L+0.750S+0.750E+H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.170 ft	1	0.269	0.200	1.60	1.100	1.00	1.15	1.00	1.00	1.00	0.97	544.96	2024.00	0.53	57.53	288.00
+0.60D+W+0.60H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.170 ft	1	0.018	0.013	1.60	1.100	1.00	1.15	1.00	1.00	1.00	0.06	35.99	2024.00	0.04	3.80	288.00
+0.60D+E+0.60H					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.170 ft	1	0.018	0.013	1.60	1.100	1.00	1.15	1.00	1.00	1.00	0.06	35.99	2024.00	0.04	3.80	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.0362	2.604		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.975	0.975
Overall MINimum	0.050	0.050
+D+H	0.083	0.083
+D+L+H	0.083	0.083
+D+Lr+H	0.083	0.083
+D+S+H	0.975	0.975
+D+0.750Lr+0.750L+H	0.083	0.083
+D+0.750L+0.750S+H	0.752	0.752
+D+W+H	0.083	0.083
+D+E+H	0.083	0.083
+D+0.750Lr+0.750L+0.750W+H	0.083	0.083
+D+0.750L+0.750S+0.750W+H	0.752	0.752
+D+0.750L+0.750S+0.750E+H	0.752	0.752
+0.60D+W+0.60H	0.050	0.050
+0.60D+E+0.60H	0.050	0.050
D Only	0.083	0.083
Lr Only		
L Only		
S Only	0.892	0.892
W Only		
E Only		
H Only		

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Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 19 MAY 2017, 8:21AM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - OHB-1 - HSS8x4x1/4

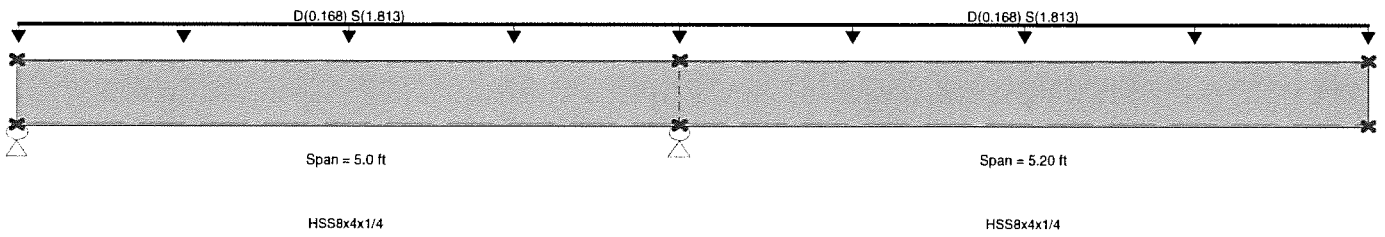
CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.1680, S = 1.813 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.1680, S = 1.813 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.886 : 1	Maximum Shear Stress Ratio =	0.185 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	27.040 k-ft	Va : Applied	10.408 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	5.000ft	Location of maximum on span	5.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.461 in	Ratio =	270 >=240.
Max Upward Transient Deflection	-0.036 in	Ratio =	1,688 >=240.
Max Downward Total Deflection	0.508 in	Ratio =	246 >=180
Max Upward Total Deflection	-0.039 in	Ratio =	1530 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 5.00 ft	1	0.083	0.017		-2.53	2.53	50.98	30.53	2.26	1.00	0.97	93.90	56.23
Dsgn. L = 5.20 ft	2	0.083	0.017		-2.53	2.53	50.98	30.53	1.00	1.00	0.97	93.90	56.23
+D+L+H													
Dsgn. L = 5.00 ft	1	0.083	0.017		-2.53	2.53	50.98	30.53	2.26	1.00	0.97	93.90	56.23
Dsgn. L = 5.20 ft	2	0.083	0.017		-2.53	2.53	50.98	30.53	1.00	1.00	0.97	93.90	56.23
+D+Lr+H													
Dsgn. L = 5.00 ft	1	0.083	0.017		-2.53	2.53	50.98	30.53	2.26	1.00	0.97	93.90	56.23
Dsgn. L = 5.20 ft	2	0.083	0.017		-2.53	2.53	50.98	30.53	1.00	1.00	0.97	93.90	56.23
+D+S+H													
Dsgn. L = 5.00 ft	1	0.886	0.185		-27.04	27.04	50.98	30.53	2.26	1.00	10.41	93.90	56.23
Dsgn. L = 5.20 ft	2	0.886	0.185		-27.04	27.04	50.98	30.53	1.00	1.00	10.40	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 5.00 ft	1	0.083	0.017		-2.53	2.53	50.98	30.53	2.26	1.00	0.97	93.90	56.23
Dsgn. L = 5.20 ft	2	0.083	0.017		-2.53	2.53	50.98	30.53	1.00	1.00	0.97	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 5.00 ft	1	0.685	0.143		-20.91	20.91	50.98	30.53	2.26	1.00	8.05	93.90	56.23
Dsgn. L = 5.20 ft	2	0.685	0.143		-20.91	20.91	50.98	30.53	1.00	1.00	8.04	93.90	56.23
+D+W+H													
Dsgn. L = 5.00 ft	1	0.083	0.017		-2.53	2.53	50.98	30.53	2.26	1.00	0.97	93.90	56.23
Dsgn. L = 5.20 ft	2	0.083	0.017		-2.53	2.53	50.98	30.53	1.00	1.00	0.97	93.90	56.23
+D+E+H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Steel Beam

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - OHB-1 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 5.00 ft	1	0.083	0.017		-2.53	2.53	50.98	30.53	2.26	1.00	0.97	93.90	56.23
Dsgn. L = 5.20 ft	2	0.083	0.017		-2.53	2.53	50.98	30.53	1.00	1.00	0.97	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 5.00 ft	1	0.083	0.017		-2.53	2.53	50.98	30.53	2.26	1.00	0.97	93.90	56.23
Dsgn. L = 5.20 ft	2	0.083	0.017		-2.53	2.53	50.98	30.53	1.00	1.00	0.97	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 5.00 ft	1	0.685	0.143		-20.91	20.91	50.98	30.53	2.26	1.00	8.05	93.90	56.23
Dsgn. L = 5.20 ft	2	0.685	0.143		-20.91	20.91	50.98	30.53	1.00	1.00	8.04	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 5.00 ft	1	0.685	0.143		-20.91	20.91	50.98	30.53	2.26	1.00	8.05	93.90	56.23
Dsgn. L = 5.20 ft	2	0.685	0.143		-20.91	20.91	50.98	30.53	1.00	1.00	8.04	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 5.00 ft	1	0.050	0.010		-1.52	1.52	50.98	30.53	2.26	1.00	0.58	93.90	56.23
Dsgn. L = 5.20 ft	2	0.050	0.010		-1.52	1.52	50.98	30.53	1.00	1.00	0.58	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 5.00 ft	1	0.050	0.010		-1.52	1.52	50.98	30.53	2.26	1.00	0.58	93.90	56.23
Dsgn. L = 5.20 ft	2	0.050	0.010		-1.52	1.52	50.98	30.53	1.00	1.00	0.58	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0392	3.140
+D+S+H	2	0.5082	5.200		0.0000	3.140

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-0.408	20.808	
Overall MINimum	-0.023	1.167	
+D+H	-0.038	1.946	
+D+L+H	-0.038	1.946	
+D+Lr+H	-0.038	1.946	
+D+S+H	-0.408	20.808	
+D+0.750Lr+0.750L+H	-0.038	1.946	
+D+0.750L+0.750S+H	-0.316	16.093	
+D+W+H	-0.038	1.946	
+D+E+H	-0.038	1.946	
+D+0.750Lr+0.750L+0.750W+H	-0.038	1.946	
+D+0.750L+0.750S+0.750W+H	-0.316	16.093	
+D+0.750L+0.750S+0.750E+H	-0.316	16.093	
+0.60D+W+0.60H	-0.023	1.167	
+0.60D+E+0.60H	-0.023	1.167	
D Only	-0.038	1.946	
Lr Only			
L Only			
S Only	-0.370	18.862	
W Only			
E Only			
H Only			

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Steel Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - OHB-2 - HSS8x4x1/4

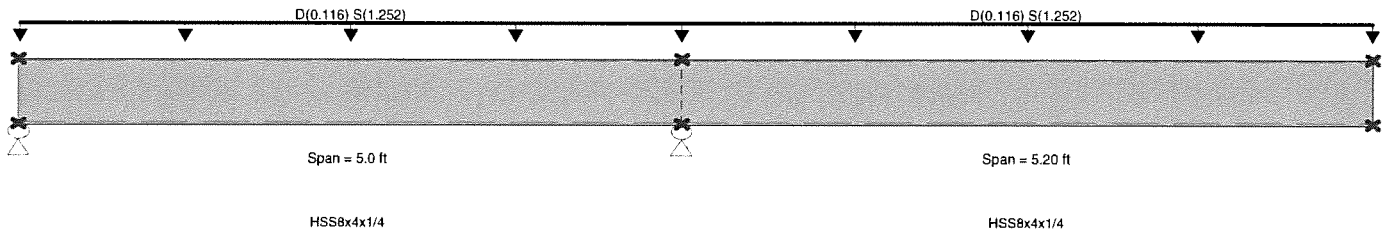
CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.1160, S = 1.252 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.1160, S = 1.252 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.614 : 1	Maximum Shear Stress Ratio =	0.128 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	18.753 k-ft	Va : Applied	7.218 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	5.000ft	Location of maximum on span	5.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.318 in	Ratio =	392 >=240.
Max Upward Transient Deflection	-0.025 in	Ratio =	2,444 >=240.
Max Downward Total Deflection	0.352 in	Ratio =	354 >=180
Max Upward Total Deflection	-0.027 in	Ratio =	2207 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 5.00 ft	1	0.060	0.012		-1.83	1.83	50.98	30.53	2.26	1.00	0.70	93.90	56.23
Dsgn. L = 5.20 ft	2	0.060	0.012		-1.83	1.83	50.98	30.53	1.00	1.00	0.70	93.90	56.23
+D+L+H													
Dsgn. L = 5.00 ft	1	0.060	0.012		-1.83	1.83	50.98	30.53	2.26	1.00	0.70	93.90	56.23
Dsgn. L = 5.20 ft	2	0.060	0.012		-1.83	1.83	50.98	30.53	1.00	1.00	0.70	93.90	56.23
+D+Lr+H													
Dsgn. L = 5.00 ft	1	0.060	0.012		-1.83	1.83	50.98	30.53	2.26	1.00	0.70	93.90	56.23
Dsgn. L = 5.20 ft	2	0.060	0.012		-1.83	1.83	50.98	30.53	1.00	1.00	0.70	93.90	56.23
+D+S+H													
Dsgn. L = 5.00 ft	1	0.614	0.128		-18.75	18.75	50.98	30.53	2.26	1.00	7.22	93.90	56.23
Dsgn. L = 5.20 ft	2	0.614	0.128		-18.75	18.75	50.98	30.53	1.00	1.00	7.21	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 5.00 ft	1	0.060	0.012		-1.83	1.83	50.98	30.53	2.26	1.00	0.70	93.90	56.23
Dsgn. L = 5.20 ft	2	0.060	0.012		-1.83	1.83	50.98	30.53	1.00	1.00	0.70	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 5.00 ft	1	0.476	0.099		-14.52	14.52	50.98	30.53	2.26	1.00	5.59	93.90	56.23
Dsgn. L = 5.20 ft	2	0.476	0.099		-14.52	14.52	50.98	30.53	1.00	1.00	5.58	93.90	56.23
+D+W+H													
Dsgn. L = 5.00 ft	1	0.060	0.012		-1.83	1.83	50.98	30.53	2.26	1.00	0.70	93.90	56.23
Dsgn. L = 5.20 ft	2	0.060	0.012		-1.83	1.83	50.98	30.53	1.00	1.00	0.70	93.90	56.23
+D+E+H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 19 MAY 2017, 8:21AM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - OHB-2 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 5.00 ft	1	0.060	0.012		-1.83	1.83	50.98	30.53	2.26	1.00	0.70	93.90	56.23
Dsgn. L = 5.20 ft	2	0.060	0.012		-1.83	1.83	50.98	30.53	1.00	1.00	0.70	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 5.00 ft	1	0.060	0.012		-1.83	1.83	50.98	30.53	2.26	1.00	0.70	93.90	56.23
Dsgn. L = 5.20 ft	2	0.060	0.012		-1.83	1.83	50.98	30.53	1.00	1.00	0.70	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 5.00 ft	1	0.476	0.099		-14.52	14.52	50.98	30.53	2.26	1.00	5.59	93.90	56.23
Dsgn. L = 5.20 ft	2	0.476	0.099		-14.52	14.52	50.98	30.53	1.00	1.00	5.58	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 5.00 ft	1	0.476	0.099		-14.52	14.52	50.98	30.53	2.26	1.00	5.59	93.90	56.23
Dsgn. L = 5.20 ft	2	0.476	0.099		-14.52	14.52	50.98	30.53	1.00	1.00	5.58	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 5.00 ft	1	0.036	0.007		-1.10	1.10	50.98	30.53	2.26	1.00	0.42	93.90	56.23
Dsgn. L = 5.20 ft	2	0.036	0.007		-1.10	1.10	50.98	30.53	1.00	1.00	0.42	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 5.00 ft	1	0.036	0.007		-1.10	1.10	50.98	30.53	2.26	1.00	0.42	93.90	56.23
Dsgn. L = 5.20 ft	2	0.036	0.007		-1.10	1.10	50.98	30.53	1.00	1.00	0.42	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0272	3.140
+D+S+H	2	0.3524	5.200		0.0000	3.140

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-0.283	14.431	
Overall MINimum	-0.017	0.843	
+D+H	-0.028	1.405	
+D+L+H	-0.028	1.405	
+D+Lr+H	-0.028	1.405	
+D+S+H	-0.283	14.431	
+D+0.750Lr+0.750L+H	-0.028	1.405	
+D+0.750L+0.750S+H	-0.219	11.174	
+D+W+H	-0.028	1.405	
+D+E+H	-0.028	1.405	
+D+0.750Lr+0.750L+0.750W+H	-0.028	1.405	
+D+0.750L+0.750S+0.750W+H	-0.219	11.174	
+D+0.750L+0.750S+0.750E+H	-0.219	11.174	
+0.60D+W+0.60H	-0.017	0.843	
+0.60D+E+0.60H	-0.017	0.843	
D Only	-0.028	1.405	
Lr Only			
L Only			
S Only	-0.255	13.026	
W Only			
E Only			
H Only			

rudow + berry, inc.
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Project Title: Powdercat
Engineer: MAR
Project Descr:
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Printed: 19 MAY 2017, 8:21AM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - OHB-3 - HSS8x4x1/4

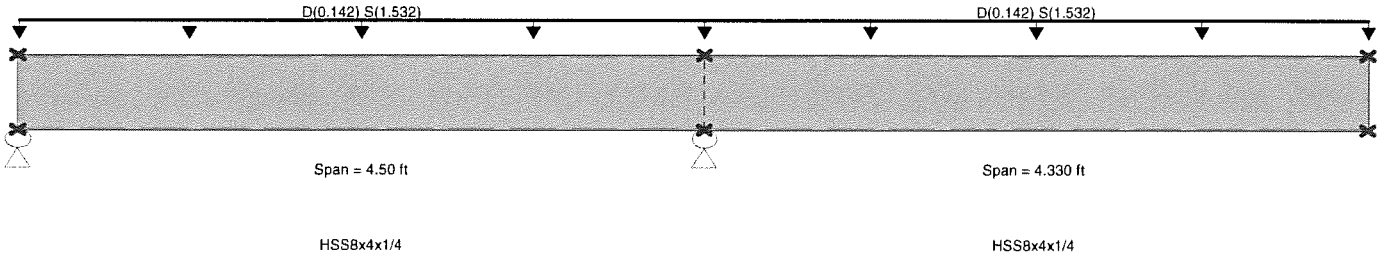
CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.1420, S = 1.532 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.1420, S = 1.532 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.520 : 1	Maximum Shear Stress Ratio =	0.130 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	15.871 k-ft	Va : Applied	7.336 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	4.500ft	Location of maximum on span	4.500 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.190 in	Ratio =	548 >=360
Max Upward Transient Deflection	-0.015 in	Ratio =	3,520 >=360
Max Downward Total Deflection	0.210 in	Ratio =	496 >=180
Max Upward Total Deflection	-0.017 in	Ratio =	3186 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 4.50 ft	1	0.049	0.012	0.00	-1.51	1.51	50.98	30.53	2.40	1.00	0.70	93.90	56.23
Dsgn. L = 4.33 ft	2	0.049	0.012		-1.51	1.51	50.98	30.53	1.00	1.00	0.70	93.90	56.23
+D+L+H													
Dsgn. L = 4.50 ft	1	0.049	0.012	0.00	-1.51	1.51	50.98	30.53	2.40	1.00	0.70	93.90	56.23
Dsgn. L = 4.33 ft	2	0.049	0.012		-1.51	1.51	50.98	30.53	1.00	1.00	0.70	93.90	56.23
+D+Lr+H													
Dsgn. L = 4.50 ft	1	0.049	0.012	0.00	-1.51	1.51	50.98	30.53	2.40	1.00	0.70	93.90	56.23
Dsgn. L = 4.33 ft	2	0.049	0.012		-1.51	1.51	50.98	30.53	1.00	1.00	0.70	93.90	56.23
+D+S+H													
Dsgn. L = 4.50 ft	1	0.520	0.130	0.02	-15.87	15.87	50.98	30.53	2.40	1.00	7.34	93.90	56.23
Dsgn. L = 4.33 ft	2	0.520	0.130		-15.87	15.87	50.98	30.53	1.00	1.00	7.33	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 4.50 ft	1	0.049	0.012	0.00	-1.51	1.51	50.98	30.53	2.40	1.00	0.70	93.90	56.23
Dsgn. L = 4.33 ft	2	0.049	0.012		-1.51	1.51	50.98	30.53	1.00	1.00	0.70	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 4.50 ft	1	0.402	0.101	0.02	-12.28	12.28	50.98	30.53	2.40	1.00	5.68	93.90	56.23
Dsgn. L = 4.33 ft	2	0.402	0.101		-12.28	12.28	50.98	30.53	1.00	1.00	5.67	93.90	56.23
+D+W+H													
Dsgn. L = 4.50 ft	1	0.049	0.012	0.00	-1.51	1.51	50.98	30.53	2.40	1.00	0.70	93.90	56.23
Dsgn. L = 4.33 ft	2	0.049	0.012		-1.51	1.51	50.98	30.53	1.00	1.00	0.70	93.90	56.23
+D+E+H													

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Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Steel Beam

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - OHB-3 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 4.50 ft	1	0.049	0.012	0.00	-1.51	1.51	50.98	30.53	2.40	1.00	0.70	93.90	56.23
Dsgn. L = 4.33 ft	2	0.049	0.012		-1.51	1.51	50.98	30.53	1.00	1.00	0.70	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 4.50 ft	1	0.049	0.012	0.00	-1.51	1.51	50.98	30.53	2.40	1.00	0.70	93.90	56.23
Dsgn. L = 4.33 ft	2	0.049	0.012		-1.51	1.51	50.98	30.53	1.00	1.00	0.70	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 4.50 ft	1	0.402	0.101	0.02	-12.28	12.28	50.98	30.53	2.40	1.00	5.68	93.90	56.23
Dsgn. L = 4.33 ft	2	0.402	0.101		-12.28	12.28	50.98	30.53	1.00	1.00	5.67	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 4.50 ft	1	0.402	0.101	0.02	-12.28	12.28	50.98	30.53	2.40	1.00	5.68	93.90	56.23
Dsgn. L = 4.33 ft	2	0.402	0.101		-12.28	12.28	50.98	30.53	1.00	1.00	5.67	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 4.50 ft	1	0.030	0.007	0.00	-0.91	0.91	50.98	30.53	2.40	1.00	0.42	93.90	56.23
Dsgn. L = 4.33 ft	2	0.030	0.007		-0.91	0.91	50.98	30.53	1.00	1.00	0.42	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 4.50 ft	1	0.030	0.007	0.00	-0.91	0.91	50.98	30.53	2.40	1.00	0.42	93.90	56.23
Dsgn. L = 4.33 ft	2	0.030	0.007		-0.91	0.91	50.98	30.53	1.00	1.00	0.42	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0169	2.880
+D+S+H	2	0.2095	4.330		0.0000	2.880

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.282	14.667	
Overall MINimum	0.016	0.837	
+D+H	0.027	1.395	
+D+L+H	0.027	1.395	
+D+Lr+H	0.027	1.395	
+D+S+H	0.282	14.667	
+D+0.750Lr+0.750L+H	0.027	1.395	
+D+0.750L+0.750S+H	0.218	11.349	
+D+W+H	0.027	1.395	
+D+E+H	0.027	1.395	
+D+0.750Lr+0.750L+0.750W+H	0.027	1.395	
+D+0.750L+0.750S+0.750W+H	0.218	11.349	
+D+0.750L+0.750S+0.750E+H	0.218	11.349	
+0.60D+W+0.60H	0.016	0.837	
+0.60D+E+0.60H	0.016	0.837	
D Only	0.027	1.395	
Lr Only			
L Only			
S Only	0.256	13.272	
W Only			
E Only			
H Only			

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Project Title: Powdercat
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Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - OHB-4 - HSS8x4x1/4

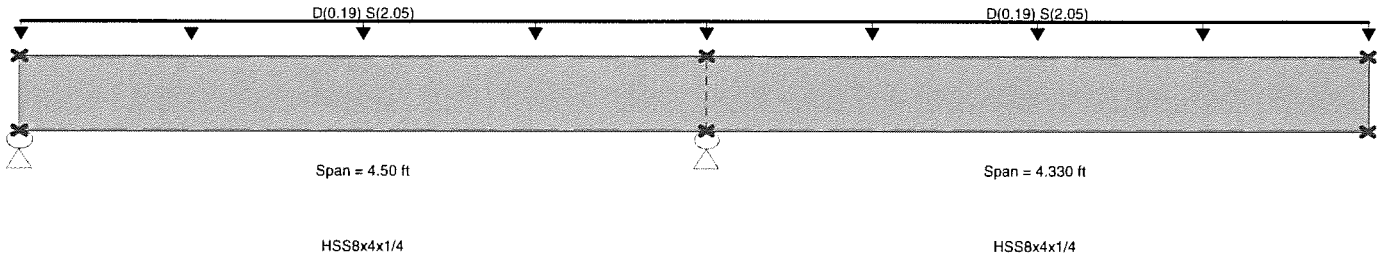
CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.190, S = 2.050 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.190, S = 2.050 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.694 : 1	Maximum Shear Stress Ratio =	0.174 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	21.177 k-ft	Va : Applied	9.789 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	4.500ft	Location of maximum on span	4.500 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.254 in	Ratio =	409 >=360
Max Upward Transient Deflection	-0.021 in	Ratio =	2,631 >=360
Max Downward Total Deflection	0.280 in	Ratio =	372 >=180
Max Upward Total Deflection	-0.023 in	Ratio =	2388 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 4.50 ft	1	0.064	0.016	0.00	-1.96	1.96	50.98	30.53	2.40	1.00	0.91	93.90	56.23
Dsgn. L = 4.33 ft	2	0.064	0.016		-1.96	1.96	50.98	30.53	1.00	1.00	0.91	93.90	56.23
+D+L+H													
Dsgn. L = 4.50 ft	1	0.064	0.016	0.00	-1.96	1.96	50.98	30.53	2.40	1.00	0.91	93.90	56.23
Dsgn. L = 4.33 ft	2	0.064	0.016		-1.96	1.96	50.98	30.53	1.00	1.00	0.91	93.90	56.23
+D+Lr+H													
Dsgn. L = 4.50 ft	1	0.064	0.016	0.00	-1.96	1.96	50.98	30.53	2.40	1.00	0.91	93.90	56.23
Dsgn. L = 4.33 ft	2	0.064	0.016		-1.96	1.96	50.98	30.53	1.00	1.00	0.91	93.90	56.23
+D+S+H													
Dsgn. L = 4.50 ft	1	0.694	0.174	0.03	-21.18	21.18	50.98	30.53	2.40	1.00	9.79	93.90	56.23
Dsgn. L = 4.33 ft	2	0.694	0.174		-21.18	21.18	50.98	30.53	1.00	1.00	9.78	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 4.50 ft	1	0.064	0.016	0.00	-1.96	1.96	50.98	30.53	2.40	1.00	0.91	93.90	56.23
Dsgn. L = 4.33 ft	2	0.064	0.016		-1.96	1.96	50.98	30.53	1.00	1.00	0.91	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 4.50 ft	1	0.536	0.135	0.02	-16.37	16.37	50.98	30.53	2.40	1.00	7.57	93.90	56.23
Dsgn. L = 4.33 ft	2	0.536	0.134		-16.37	16.37	50.98	30.53	1.00	1.00	7.56	93.90	56.23
+D+W+H													
Dsgn. L = 4.50 ft	1	0.064	0.016	0.00	-1.96	1.96	50.98	30.53	2.40	1.00	0.91	93.90	56.23
Dsgn. L = 4.33 ft	2	0.064	0.016		-1.96	1.96	50.98	30.53	1.00	1.00	0.91	93.90	56.23
+D+E+H													

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Steel Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - OHB-4 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 4.50 ft	1	0.064	0.016	0.00	-1.96	1.96	50.98	30.53	2.40	1.00	0.91	93.90	56.23
Dsgn. L = 4.33 ft	2	0.064	0.016		-1.96	1.96	50.98	30.53	1.00	1.00	0.91	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 4.50 ft	1	0.064	0.016	0.00	-1.96	1.96	50.98	30.53	2.40	1.00	0.91	93.90	56.23
Dsgn. L = 4.33 ft	2	0.064	0.016		-1.96	1.96	50.98	30.53	1.00	1.00	0.91	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 4.50 ft	1	0.536	0.135	0.02	-16.37	16.37	50.98	30.53	2.40	1.00	7.57	93.90	56.23
Dsgn. L = 4.33 ft	2	0.536	0.134		-16.37	16.37	50.98	30.53	1.00	1.00	7.56	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 4.50 ft	1	0.536	0.135	0.02	-16.37	16.37	50.98	30.53	2.40	1.00	7.57	93.90	56.23
Dsgn. L = 4.33 ft	2	0.536	0.134		-16.37	16.37	50.98	30.53	1.00	1.00	7.56	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 4.50 ft	1	0.039	0.010	0.00	-1.18	1.18	50.98	30.53	2.40	1.00	0.54	93.90	56.23
Dsgn. L = 4.33 ft	2	0.039	0.010		-1.18	1.18	50.98	30.53	1.00	1.00	0.54	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 4.50 ft	1	0.039	0.010	0.00	-1.18	1.18	50.98	30.53	2.40	1.00	0.54	93.90	56.23
Dsgn. L = 4.33 ft	2	0.039	0.010		-1.18	1.18	50.98	30.53	1.00	1.00	0.54	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0226	2.880
+D+S+H	2	0.2796	4.330		0.0000	2.880

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.377	19.570	
Overall MINimum	0.021	1.086	
+D+H	0.035	1.811	
+D+L+H	0.035	1.811	
+D+Lr+H	0.035	1.811	
+D+S+H	0.377	19.570	
+D+0.750Lr+0.750L+H	0.035	1.811	
+D+0.750L+0.750S+H	0.291	15.130	
+D+W+H	0.035	1.811	
+D+E+H	0.035	1.811	
+D+0.750Lr+0.750L+0.750W+H	0.035	1.811	
+D+0.750L+0.750S+0.750W+H	0.291	15.130	
+D+0.750L+0.750S+0.750E+H	0.291	15.130	
+0.60D+W+0.60H	0.021	1.086	
+0.60D+E+0.60H	0.021	1.086	
D Only	0.035	1.811	
Lr Only			
L Only			
S Only	0.342	17.760	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed 23 MAY 2017, 5:56PM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - OHB-5 - 8 3/4 x 15 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

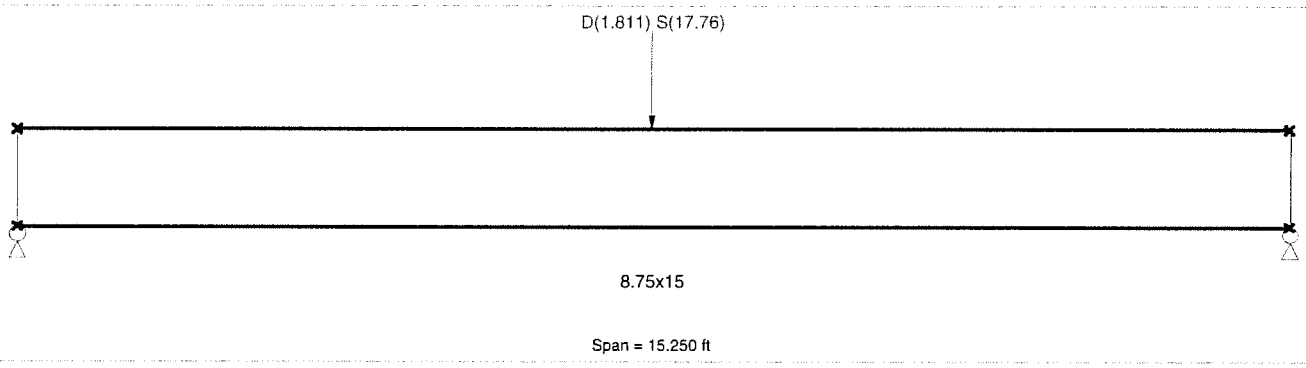
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Point Load : D = 1.811, S = 17.760 k @ 7.620 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	1.044 : 1	Maximum Shear Stress Ratio	=	0.374 : 1
Section used for this span		8.75x15	Section used for this span		8.75x15
fb : Actual	=	2,757.20 psi	fv : Actual	=	113.99 psi
FB : Allowable	=	2,641.69 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	7.625 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.515 in	Ratio =	355 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.575 in	Ratio =	318 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.137	0.052	0.90	0.957	1.00	1.00	1.00	1.00	1.00	7.73	282.57	2067.41	1.09	12.44	238.50
+D+L+H					0.957	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.123	0.047	1.00	0.957	1.00	1.00	1.00	1.00	1.00	7.73	282.57	2297.12	1.09	12.44	265.00
+D+Lr+H					0.957	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.098	0.038	1.25	0.957	1.00	1.00	1.00	1.00	1.00	7.73	282.57	2871.40	1.09	12.44	331.25
+D+S+H					0.957	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	1.044	0.374	1.15	0.957	1.00	1.00	1.00	1.00	1.00	75.39	2,757.20	2641.69	9.97	113.99	304.75
+D+0.750Lr+0.750L+H					0.957	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.098	0.038	1.25	0.957	1.00	1.00	1.00	1.00	1.00	7.73	282.57	2871.40	1.09	12.44	331.25
+D+0.750L+0.750S+H					0.957	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 23 MAY 2017, 5:56PM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — **Licensee : RUDOW & BERRY**

Description : Typical Unit - OHB-5 - 8 3/4 x 15 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 15.250 ft	1	0.810	0.291	1.15	0.957	1.00	1.00	1.00	1.00	1.00	58.48	2,138.54	2641.69	7.75	88.60	304.75
+D+W+H					0.957	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.077	0.029	1.60	0.957	1.00	1.00	1.00	1.00	1.00	7.73	282.57	3675.39	1.09	12.44	424.00
+D+E+H					0.957	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.077	0.029	1.60	0.957	1.00	1.00	1.00	1.00	1.00	7.73	282.57	3675.39	1.09	12.44	424.00
+D+0.750Lr+0.750L+0.750W+H					0.957	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.077	0.029	1.60	0.957	1.00	1.00	1.00	1.00	1.00	7.73	282.57	3675.39	1.09	12.44	424.00
+D+0.750L+0.750S+0.750W+H					0.957	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.582	0.209	1.60	0.957	1.00	1.00	1.00	1.00	1.00	58.48	2,138.54	3675.39	7.75	88.60	424.00
+D+0.750L+0.750S+0.750E+H					0.957	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.582	0.209	1.60	0.957	1.00	1.00	1.00	1.00	1.00	58.48	2,138.54	3675.39	7.75	88.60	424.00
+0.60D+W+0.60H					0.957	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.046	0.018	1.60	0.957	1.00	1.00	1.00	1.00	1.00	4.64	169.54	3675.39	0.65	7.46	424.00
+0.60D+E+0.60H					0.957	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.046	0.018	1.60	0.957	1.00	1.00	1.00	1.00	1.00	4.64	169.54	3675.39	0.65	7.46	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.5750	7.625		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	10.009	9.996
Overall MINimum	0.674	0.673
+D+H	1.123	1.122
+D+L+H	1.123	1.122
+D+Lr+H	1.123	1.122
+D+S+H	10.009	9.996
+D+0.750Lr+0.750L+H	1.123	1.122
+D+0.750L+0.750S+H	7.787	7.777
+D+W+H	1.123	1.122
+D+E+H	1.123	1.122
+D+0.750Lr+0.750L+0.750W+H	1.123	1.122
+D+0.750L+0.750S+0.750W+H	7.787	7.777
+D+0.750L+0.750S+0.750E+H	7.787	7.777
+0.60D+W+0.60H	0.674	0.673
+0.60D+E+0.60H	0.674	0.673
D Only	1.123	1.122
Lr Only		
L Only		
S Only	8.886	8.874
W Only		
E Only		
H Only		

rudow + berry, inc.
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Project Title: Powdercat
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Project Descr:
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Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - OHB-5-@-Breezeway - 8 3/4 x 15 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

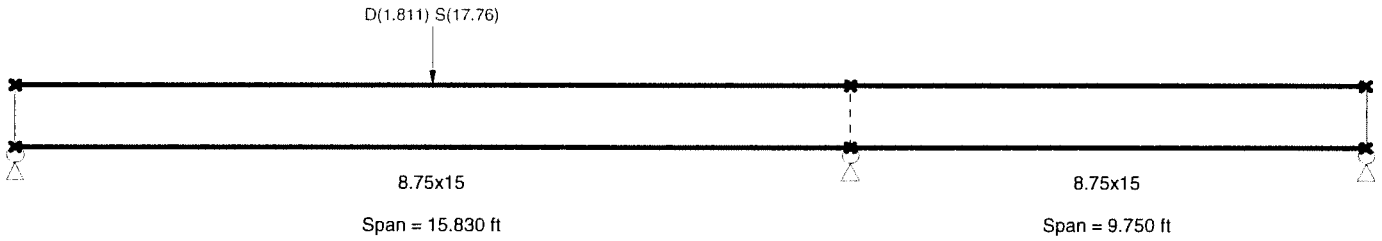
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Load for Span Number 1
Point Load : D = 1.811, S = 17.760 k @ 7.917 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.829 : 1	Maximum Shear Stress Ratio	=	0.461 : 1
Section used for this span		8.75x15	Section used for this span		8.75x15
fb : Actual	=	2,182.49 psi	fv : Actual	=	140.48 psi
FB : Allowable	=	2,631.85 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	7.871 ft	Location of maximum on span	=	14.592 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.378 in	Ratio =	502 >=240.
Max Upward Transient Deflection	-0.079 in	Ratio =	1485 >=240.
Max Downward Total Deflection	0.422 in	Ratio =	450 >=180
Max Upward Total Deflection	-0.087 in	Ratio =	1342 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 15.830 ft	1	0.107	0.065	0.90	0.954	1.00	1.00	1.00	1.00	1.00	6.02	220.30	2059.71	1.35	15.41	238.50
Length = 9.750 ft	2	0.088	0.065	0.90	1.000	1.00	1.00	1.00	1.00	1.00	4.01	146.53	1665.00	0.52	15.41	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.830 ft	1	0.096	0.058	1.00	0.954	1.00	1.00	1.00	1.00	1.00	6.02	220.30	2288.56	1.35	15.41	265.00
Length = 9.750 ft	2	0.079	0.058	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.01	146.53	1850.00	0.52	15.41	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.830 ft	1	0.077	0.047	1.25	0.954	1.00	1.00	1.00	1.00	1.00	6.02	220.30	2860.70	1.35	15.41	331.25
Length = 9.750 ft	2	0.063	0.047	1.25	1.000	1.00	1.00	1.00	1.00	1.00	4.01	146.53	2312.50	0.52	15.41	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
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scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 23 MAY 2017, 5:56PM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - OHB-5-@-Breezeway - 8 3/4 x 15 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
Length = 15.830 ft	1	0.829	0.461	1.15	0.954	1.00	1.00	1.00	1.00	1.00	59.68	2,182.49	2631.85	12.29	140.48	304.75
Length = 9.750 ft	2	0.630	0.461	1.15	1.000	1.00	1.00	1.00	1.00	1.00	36.63	1,339.65	2127.50	3.86	140.48	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.830 ft	1	0.077	0.047	1.25	0.954	1.00	1.00	1.00	1.00	1.00	6.02	220.30	2860.70	1.35	15.41	331.25
Length = 9.750 ft	2	0.063	0.047	1.25	1.000	1.00	1.00	1.00	1.00	1.00	4.01	146.53	2312.50	0.52	15.41	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.830 ft	1	0.643	0.358	1.15	0.954	1.00	1.00	1.00	1.00	1.00	46.26	1,691.94	2631.85	9.56	109.21	304.75
Length = 9.750 ft	2	0.489	0.358	1.15	1.000	1.00	1.00	1.00	1.00	1.00	28.48	1,041.37	2127.50	3.03	109.21	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.830 ft	1	0.060	0.036	1.60	0.954	1.00	1.00	1.00	1.00	1.00	6.02	220.30	3661.70	1.35	15.41	424.00
Length = 9.750 ft	2	0.050	0.036	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.01	146.53	2960.00	0.52	15.41	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.830 ft	1	0.060	0.036	1.60	0.954	1.00	1.00	1.00	1.00	1.00	6.02	220.30	3661.70	1.35	15.41	424.00
Length = 9.750 ft	2	0.050	0.036	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.01	146.53	2960.00	0.52	15.41	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.830 ft	1	0.060	0.036	1.60	0.954	1.00	1.00	1.00	1.00	1.00	6.02	220.30	3661.70	1.35	15.41	424.00
Length = 9.750 ft	2	0.050	0.036	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.01	146.53	2960.00	0.52	15.41	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.830 ft	1	0.462	0.258	1.60	0.954	1.00	1.00	1.00	1.00	1.00	46.26	1,691.94	3661.70	9.56	109.21	424.00
Length = 9.750 ft	2	0.352	0.258	1.60	1.000	1.00	1.00	1.00	1.00	1.00	28.48	1,041.37	2960.00	3.03	109.21	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.830 ft	1	0.462	0.258	1.60	0.954	1.00	1.00	1.00	1.00	1.00	46.26	1,691.94	3661.70	9.56	109.21	424.00
Length = 9.750 ft	2	0.352	0.258	1.60	1.000	1.00	1.00	1.00	1.00	1.00	28.48	1,041.37	2960.00	3.03	109.21	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.830 ft	1	0.036	0.022	1.60	0.954	1.00	1.00	1.00	1.00	1.00	3.61	132.18	3661.70	0.81	9.25	424.00
Length = 9.750 ft	2	0.030	0.022	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.40	87.92	2960.00	0.31	9.25	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.830 ft	1	0.036	0.022	1.60	0.954	1.00	1.00	1.00	1.00	1.00	3.61	132.18	3661.70	0.81	9.25	424.00
Length = 9.750 ft	2	0.030	0.022	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.40	87.92	2960.00	0.31	9.25	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.4218	7.517		0.0000	0.000
	2	0.0000	7.517	+D+S+H	-0.0871	4.140

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	7.694	16.223	-3.618
Overall MINimum	0.526	1.160	-0.163
+D+H	0.877	1.934	-0.272
+D+L+H	0.877	1.934	-0.272
+D+Lr+H	0.877	1.934	-0.272
+D+S+H	7.694	16.223	-3.618
+D+0.750Lr+0.750L+H	0.877	1.934	-0.272
+D+0.750L+0.750S+H	5.990	12.650	-2.782
+D+W+H	0.877	1.934	-0.272
+D+E+H	0.877	1.934	-0.272
+D+0.750Lr+0.750L+0.750W+H	0.877	1.934	-0.272
+D+0.750L+0.750S+0.750W+H	5.990	12.650	-2.782
+D+0.750L+0.750S+0.750E+H	5.990	12.650	-2.782
+0.60D+W+0.60H	0.526	1.160	-0.163
+0.60D+E+0.60H	0.526	1.160	-0.163
D Only	0.877	1.934	-0.272
Lr Only			
L Only			
S Only	6.817	14.289	-3.346
W Only			
E Only			
H Only			

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

OHB-6 SPAN = 19'-9" MAX

$P_1 = R_{OHB1} = -38^{\#}D - 310^{\#}SL$ @ x = 10'-0½"

$P_2 = R_{OHB2} = -28^{\#}D - 255^{\#}SL$ @ x = 14'-0"

$W = .67(24 + 259) = 160D + 173SL$

OHB-7 SPAN = 19'-9" MAX.

$P_1 = R_{OHB3} = 270D + 256SL$ @ x = 3'-10"

$P_2 = R_{OHB4} = 350D + 342SL$ @ x = 11'-9"

$W = 160D + 173SL$

EOHB-1 SPAN = 5.10' CANT = 5.20'

$W = 5.15(24 + 259) = 132D + 1425SL$

EOHB-2 SPAN = 5.10' CANT = 5.20'

$W = 3(24 + 259) = 72D + 777SL$

EOHB-3 SPAN = 4.6 CANT = 4.4

$W = 2(24 + 259) = 48D + 518SL$

EOHB-4 SPAN = 4.6 CANT = 4.4

$W = 4.25(24 + 259) = 102D + 1101SL$

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 19 MAY 2017, 8:22AM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - OHB-6 - 3 1/8 x 15 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

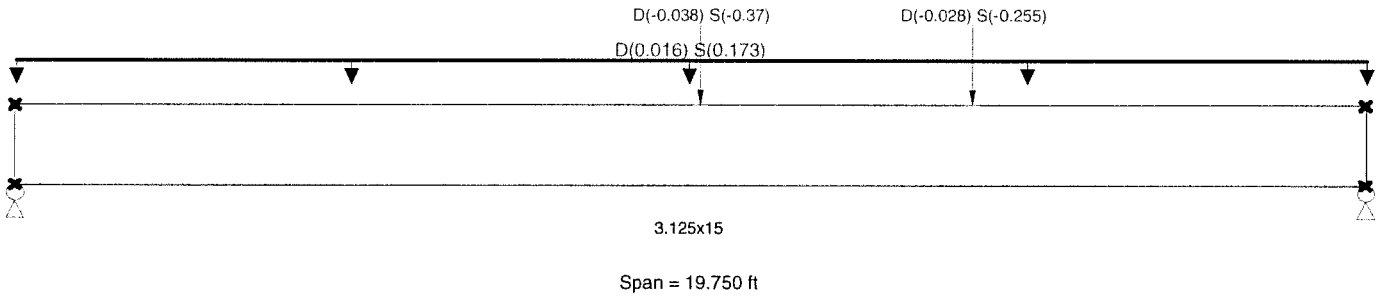
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Completely Unbraced

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Point Load : D = -0.0380, S = -0.370 k @ 10.040 ft
Point Load : D = -0.0280, S = -0.2550 k @ 14.020 ft
Uniform Load : D = 0.0160, S = 0.1730 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.505 : 1	Maximum Shear Stress Ratio	=	0.151 : 1
Section used for this span		3.125x15	Section used for this span		3.125x15
fb : Actual	=	729.02 psi	fv : Actual	=	46.08 psi
FB : Allowable	=	1,443.64 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	8.433 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.277 in	Ratio =	856 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.323 in	Ratio =	733 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.075	0.027	0.90	1.000	1.00	1.00	1.00	1.00	0.65	1.02	104.89	1395.45	0.20	6.38	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	0.65			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.074	0.024	1.00	1.000	1.00	1.00	1.00	1.00	0.59	1.02	104.89	1419.94	0.20	6.38	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	0.59			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.072	0.019	1.25	1.000	1.00	1.00	1.00	1.00	0.48	1.02	104.89	1454.37	0.20	6.38	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	0.48			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.505	0.151	1.15	1.000	1.00	1.00	1.00	1.00	0.52	7.12	729.02	1443.64	1.44	46.08	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	0.52			0.00	0.00	0.00	0.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Typical Unit - OHB-6 - 3 1/8 x 15 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 19.750 ft	1	0.072	0.019	1.25	1.000	1.00	1.00	1.00	1.00	0.48	1.02	104.89	1454.37	0.20	6.38	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	0.48			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.397	0.119	1.15	1.000	1.00	1.00	1.00	1.00	0.52	5.60	572.94	1443.64	1.13	36.15	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	0.52			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.071	0.015	1.60	1.000	1.00	1.00	1.00	1.00	0.38	1.02	104.89	1476.67	0.20	6.38	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	0.38			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.071	0.015	1.60	1.000	1.00	1.00	1.00	1.00	0.38	1.02	104.89	1476.67	0.20	6.38	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	0.38			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.071	0.015	1.60	1.000	1.00	1.00	1.00	1.00	0.38	1.02	104.89	1476.67	0.20	6.38	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	0.38			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.388	0.085	1.60	1.000	1.00	1.00	1.00	1.00	0.38	5.60	572.94	1476.67	1.13	36.15	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	0.38			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.388	0.085	1.60	1.000	1.00	1.00	1.00	1.00	0.38	5.60	572.94	1476.67	1.13	36.15	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	0.38			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.043	0.009	1.60	1.000	1.00	1.00	1.00	1.00	0.38	0.61	62.94	1476.67	0.12	3.83	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	0.38			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.043	0.009	1.60	1.000	1.00	1.00	1.00	1.00	0.38	0.61	62.94	1476.67	0.12	3.83	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.3231	9.803		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.684	1.558
Overall MINimum	0.139	0.131
+D+H	0.231	0.219
+D+L+H	0.231	0.219
+D+Lr+H	0.231	0.219
+D+S+H	1.684	1.558
+D+0.750Lr+0.750L+H	0.231	0.219
+D+0.750L+0.750S+H	1.321	1.224
+D+W+H	0.231	0.219
+D+E+H	0.231	0.219
+D+0.750Lr+0.750L+0.750W+H	0.231	0.219
+D+0.750L+0.750S+0.750W+H	1.321	1.224
+D+0.750L+0.750S+0.750E+H	1.321	1.224
+0.60D+W+0.60H	0.139	0.131
+0.60D+E+0.60H	0.139	0.131
D Only	0.231	0.219
Lr Only		
L Only		
S Only	1.452	1.339
W Only		
E Only		
H Only		

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Licensee : RUDOW & BERRY

Wood Beam

Lic. # : KW-06002357

Description : Typical Unit - OHB-7 - 3 1/8 x 15 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

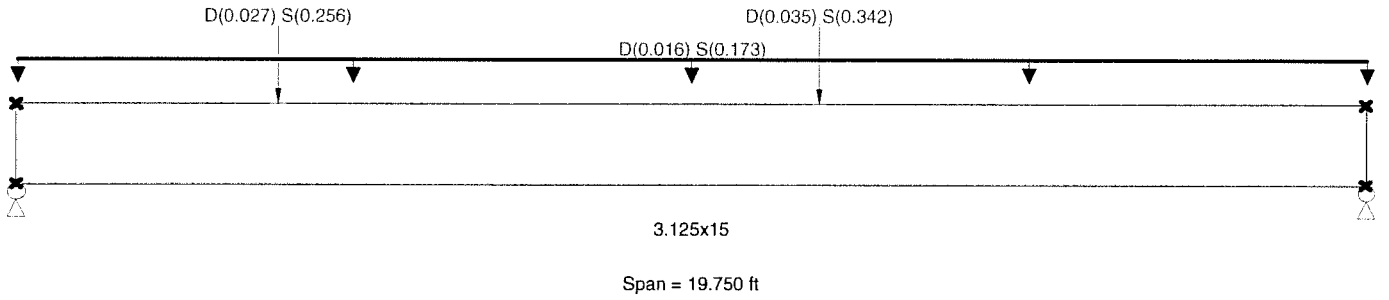
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Completely Unbraced

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Point Load : D = 0.0270, S = 0.2560 k @ 3.830 ft
Point Load : D = 0.0350, S = 0.3420 k @ 11.750 ft
Uniform Load : D = 0.0160, S = 0.1730 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.836 : 1	Maximum Shear Stress Ratio	=	0.221 : 1
Section used for this span		3.125x15	Section used for this span		3.125x15
fb : Actual	=	1,206.72 psi	fv : Actual	=	67.31 psi
FB : Allowable	=	1,443.64 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	10.380 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.459 in	Ratio =	516 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.524 in	Ratio =	452 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.108	0.035	0.90	1.000	1.00	1.00	1.00	1.00	0.65	1.47	150.38	1395.45	0.26	8.39	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	0.65			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.106	0.032	1.00	1.000	1.00	1.00	1.00	1.00	0.59	1.47	150.38	1419.94	0.26	8.39	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	0.59			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.103	0.025	1.25	1.000	1.00	1.00	1.00	1.00	0.48	1.47	150.38	1454.37	0.26	8.39	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	0.48			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.836	0.221	1.15	1.000	1.00	1.00	1.00	1.00	0.52	11.78	1,206.72	1443.64	2.10	67.31	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	0.52			0.00	0.00	0.00	0.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Typical Unit - OHB-7 - 3 1/8 x 15 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 19.750 ft	1	0.103	0.025	1.25	1.000	1.00	1.00	1.00	1.00	0.48	1.47	150.38	1454.37	0.26	8.39	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	0.48			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.653	0.173	1.15	1.000	1.00	1.00	1.00	1.00	0.52	9.21	942.63	1443.64	1.64	52.58	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	0.52			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.102	0.020	1.60	1.000	1.00	1.00	1.00	1.00	0.38	1.47	150.38	1476.67	0.26	8.39	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	0.38			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.102	0.020	1.60	1.000	1.00	1.00	1.00	1.00	0.38	1.47	150.38	1476.67	0.26	8.39	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	0.38			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.102	0.020	1.60	1.000	1.00	1.00	1.00	1.00	0.38	1.47	150.38	1476.67	0.26	8.39	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	0.38			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.638	0.124	1.60	1.000	1.00	1.00	1.00	1.00	0.38	9.21	942.63	1476.67	1.64	52.58	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	0.38			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.638	0.124	1.60	1.000	1.00	1.00	1.00	1.00	0.38	9.21	942.63	1476.67	1.64	52.58	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	0.38			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.061	0.012	1.60	1.000	1.00	1.00	1.00	1.00	0.38	0.88	90.23	1476.67	0.16	5.03	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	0.38			0.00	0.00	0.00	0.00
Length = 19.750 ft	1	0.061	0.012	1.60	1.000	1.00	1.00	1.00	1.00	0.38	0.88	90.23	1476.67	0.16	5.03	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.5242	9.947		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.347	2.246
Overall MINimum	0.177	0.171
+D+H	0.294	0.284
+D+L+H	0.294	0.284
+D+Lr+H	0.294	0.284
+D+S+H	2.347	2.246
+D+0.750Lr+0.750L+H	0.294	0.284
+D+0.750L+0.750S+H	1.834	1.755
+D+W+H	0.294	0.284
+D+E+H	0.294	0.284
+D+0.750Lr+0.750L+0.750W+H	0.294	0.284
+D+0.750L+0.750S+0.750W+H	1.834	1.755
+D+0.750L+0.750S+0.750E+H	1.834	1.755
+0.60D+W+0.60H	0.177	0.171
+0.60D+E+0.60H	0.177	0.171
D Only	0.294	0.284
Lr Only		
L Only		
S Only	2.053	1.961
W Only		
E Only		
H Only		

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Project Title: Powdercat
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Printed: 19 MAY 2017, 8.22AM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - EOHB-1 - HSS8x4x1/4

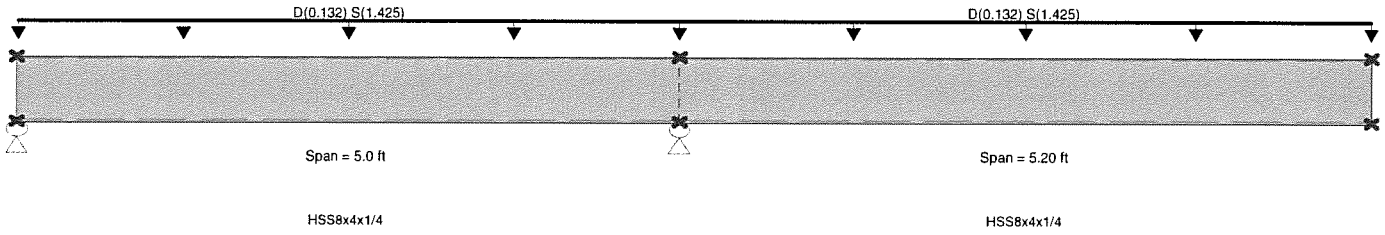
CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.1320, S = 1.425 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.1320, S = 1.425 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.698 : 1	Maximum Shear Stress Ratio =	0.146 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	21.308 k-ft	Va : Applied	8.202 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	5.000ft	Location of maximum on span	5.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.362 in	Ratio =	344 >=240.
Max Upward Transient Deflection	-0.028 in	Ratio =	2,147 >=240.
Max Downward Total Deflection	0.400 in	Ratio =	312 >=180
Max Upward Total Deflection	-0.031 in	Ratio =	1942 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 5.00 ft	1	0.067	0.014		-2.04	2.04	50.98	30.53	2.26	1.00	0.79	93.90	56.23
Dsgn. L = 5.20 ft	2	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.79	93.90	56.23
+D+L+H													
Dsgn. L = 5.00 ft	1	0.067	0.014		-2.04	2.04	50.98	30.53	2.26	1.00	0.79	93.90	56.23
Dsgn. L = 5.20 ft	2	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.79	93.90	56.23
+D+Lr+H													
Dsgn. L = 5.00 ft	1	0.067	0.014		-2.04	2.04	50.98	30.53	2.26	1.00	0.79	93.90	56.23
Dsgn. L = 5.20 ft	2	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.79	93.90	56.23
+D+S+H													
Dsgn. L = 5.00 ft	1	0.698	0.146		-21.31	21.31	50.98	30.53	2.26	1.00	8.20	93.90	56.23
Dsgn. L = 5.20 ft	2	0.698	0.146		-21.31	21.31	50.98	30.53	1.00	1.00	8.20	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 5.00 ft	1	0.067	0.014		-2.04	2.04	50.98	30.53	2.26	1.00	0.79	93.90	56.23
Dsgn. L = 5.20 ft	2	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.79	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 5.00 ft	1	0.540	0.113		-16.49	16.49	50.98	30.53	2.26	1.00	6.35	93.90	56.23
Dsgn. L = 5.20 ft	2	0.540	0.113		-16.49	16.49	50.98	30.53	1.00	1.00	6.34	93.90	56.23
+D+W+H													
Dsgn. L = 5.00 ft	1	0.067	0.014		-2.04	2.04	50.98	30.53	2.26	1.00	0.79	93.90	56.23
Dsgn. L = 5.20 ft	2	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.79	93.90	56.23
+D+E+H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 19 MAY 2017, 8:22AM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - EOHB-1 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 5.00 ft	1	0.067	0.014		-2.04	2.04	50.98	30.53	2.26	1.00	0.79	93.90	56.23
Dsgn. L = 5.20 ft	2	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.79	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 5.00 ft	1	0.067	0.014		-2.04	2.04	50.98	30.53	2.26	1.00	0.79	93.90	56.23
Dsgn. L = 5.20 ft	2	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.79	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 5.00 ft	1	0.540	0.113		-16.49	16.49	50.98	30.53	2.26	1.00	6.35	93.90	56.23
Dsgn. L = 5.20 ft	2	0.540	0.113		-16.49	16.49	50.98	30.53	1.00	1.00	6.34	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 5.00 ft	1	0.540	0.113		-16.49	16.49	50.98	30.53	2.26	1.00	6.35	93.90	56.23
Dsgn. L = 5.20 ft	2	0.540	0.113		-16.49	16.49	50.98	30.53	1.00	1.00	6.34	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 5.00 ft	1	0.040	0.008		-1.23	1.23	50.98	30.53	2.26	1.00	0.47	93.90	56.23
Dsgn. L = 5.20 ft	2	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 5.00 ft	1	0.040	0.008		-1.23	1.23	50.98	30.53	2.26	1.00	0.47	93.90	56.23
Dsgn. L = 5.20 ft	2	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0309	3.140
+D+S+H	2	0.4005	5.200		0.0000	3.140

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-0.322	16.397	
Overall MINimum	-0.018	0.943	
+D+H	-0.031	1.571	
+D+L+H	-0.031	1.571	
+D+Lr+H	-0.031	1.571	
+D+S+H	-0.322	16.397	
+D+0.750Lr+0.750L+H	-0.031	1.571	
+D+0.750L+0.750S+H	-0.249	12.690	
+D+W+H	-0.031	1.571	
+D+E+H	-0.031	1.571	
+D+0.750Lr+0.750L+0.750W+H	-0.031	1.571	
+D+0.750L+0.750S+0.750W+H	-0.249	12.690	
+D+0.750L+0.750S+0.750E+H	-0.249	12.690	
+0.60D+W+0.60H	-0.018	0.943	
+0.60D+E+0.60H	-0.018	0.943	
D Only	-0.031	1.571	
Lr Only			
L Only			
S Only	-0.291	14.826	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
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Engineer: MAR
Project Descr:
Project ID: 16126

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Steel Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - EOHB-2 - HSS8x4x1/4

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

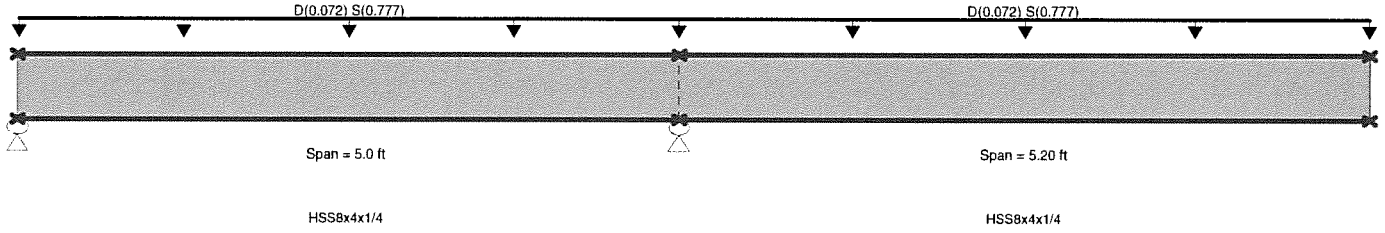
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.0720, S = 0.7770 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.0720, S = 0.7770 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.384 : 1**	Maximum Shear Stress Ratio =	**0.080 : 1**
Section used for this span	**HSS8x4x1/4**	Section used for this span	**HSS8x4x1/4**
Ma : Applied	11.736 k-ft	Va : Applied	4.517 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	5.000ft	Location of maximum on span	5.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.197 in	Ratio =	632 >=240.
Max Upward Transient Deflection	-0.015 in	Ratio =	3,939 >=240.
Max Downward Total Deflection	0.221 in	Ratio =	566 >=180
Max Upward Total Deflection	-0.017 in	Ratio =	3526 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 5.00 ft	1	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
Dsgn. L = 5.20 ft	2	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
+D+L+H													
Dsgn. L = 5.00 ft	1	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
Dsgn. L = 5.20 ft	2	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
+D+Lr+H													
Dsgn. L = 5.00 ft	1	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
Dsgn. L = 5.20 ft	2	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
+D+S+H													
Dsgn. L = 5.00 ft	1	0.384	0.080		-11.74	11.74	50.98	30.53	1.00	1.00	4.52	93.90	56.23
Dsgn. L = 5.20 ft	2	0.384	0.080		-11.74	11.74	50.98	30.53	1.00	1.00	4.51	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 5.00 ft	1	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
Dsgn. L = 5.20 ft	2	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 5.00 ft	1	0.298	0.062		-9.11	9.11	50.98	30.53	1.00	1.00	3.51	93.90	56.23
Dsgn. L = 5.20 ft	2	0.298	0.062		-9.11	9.11	50.98	30.53	1.00	1.00	3.50	93.90	56.23
+D+W+H													

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Steel Beam

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - EOHB-2 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 5.00 ft	1	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
Dsgn. L = 5.20 ft	2	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
+D+E+H													
Dsgn. L = 5.00 ft	1	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
Dsgn. L = 5.20 ft	2	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 5.00 ft	1	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
Dsgn. L = 5.20 ft	2	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 5.00 ft	1	0.298	0.062		-9.11	9.11	50.98	30.53	1.00	1.00	3.51	93.90	56.23
Dsgn. L = 5.20 ft	2	0.298	0.062		-9.11	9.11	50.98	30.53	1.00	1.00	3.50	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 5.00 ft	1	0.298	0.062		-9.11	9.11	50.98	30.53	1.00	1.00	3.51	93.90	56.23
Dsgn. L = 5.20 ft	2	0.298	0.062		-9.11	9.11	50.98	30.53	1.00	1.00	3.50	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 5.00 ft	1	0.024	0.005		-0.74	0.74	50.98	30.53	1.00	1.00	0.28	93.90	56.23
Dsgn. L = 5.20 ft	2	0.024	0.005		-0.74	0.74	50.98	30.53	1.00	1.00	0.28	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 5.00 ft	1	0.024	0.005		-0.74	0.74	50.98	30.53	1.00	1.00	0.28	93.90	56.23
Dsgn. L = 5.20 ft	2	0.024	0.005		-0.74	0.74	50.98	30.53	1.00	1.00	0.28	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0170	3.140
+D+S+H	2	0.2206	5.200		0.0000	3.140

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-0.177	9.031	
Overall MINimum	-0.011	0.568	
+D+H	-0.019	0.947	
+D+L+H	-0.019	0.947	
+D+Lr+H	-0.019	0.947	
+D+S+H	-0.177	9.031	
+D+0.750Lr+0.750L+H	-0.019	0.947	
+D+0.750L+0.750S+H	-0.137	7.010	
+D+W+H	-0.019	0.947	
+D+E+H	-0.019	0.947	
+D+0.750Lr+0.750L+0.750W+H	-0.019	0.947	
+D+0.750L+0.750S+0.750W+H	-0.137	7.010	
+D+0.750L+0.750S+0.750E+H	-0.137	7.010	
+0.60D+W+0.60H	-0.011	0.568	
+0.60D+E+0.60H	-0.011	0.568	
D Only	-0.019	0.947	
Lr Only			
L Only			
S Only	-0.159	8.084	
W Only			
E Only			
H Only			

rudow + berry, inc.
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scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 19 MAY 2017, 8:22AM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - EOHB-3 - HSS8x4x1/4

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

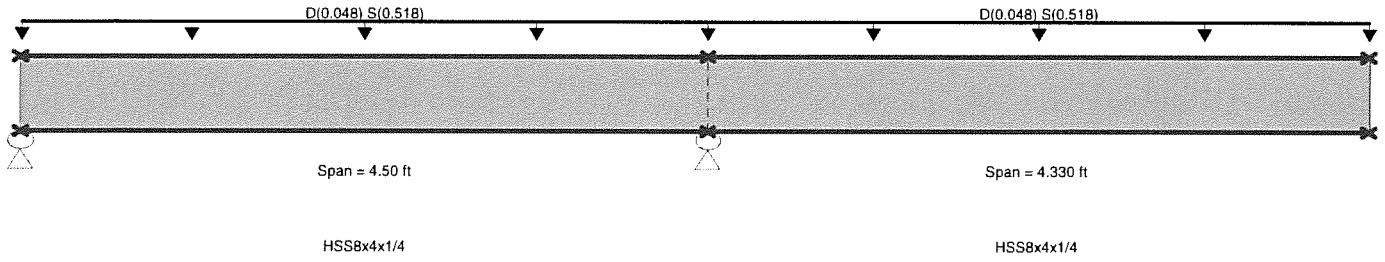
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.0480, S = 0.5180 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.0480, S = 0.5180 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.180 : 1	Maximum Shear Stress Ratio =	0.045 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	5.484 k-ft	Va : Applied	2.535 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	4.500ft	Location of maximum on span	4.500 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.064 in	Ratio =	1,621 >=240.
Max Upward Transient Deflection	-0.005 in	Ratio =	10,412 >=240.
Max Downward Total Deflection	0.072 in	Ratio =	1435 >=180
Max Upward Total Deflection	-0.006 in	Ratio =	9220 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 4.50 ft	1	0.021	0.005	0.00	-0.63	0.63	50.98	30.53	1.00	1.00	0.29	93.90	56.23
Dsgn. L = 4.33 ft	2	0.021	0.005		-0.63	0.63	50.98	30.53	1.00	1.00	0.29	93.90	56.23
+D+L+H													
Dsgn. L = 4.50 ft	1	0.021	0.005	0.00	-0.63	0.63	50.98	30.53	1.00	1.00	0.29	93.90	56.23
Dsgn. L = 4.33 ft	2	0.021	0.005		-0.63	0.63	50.98	30.53	1.00	1.00	0.29	93.90	56.23
+D+Lr+H													
Dsgn. L = 4.50 ft	1	0.021	0.005	0.00	-0.63	0.63	50.98	30.53	1.00	1.00	0.29	93.90	56.23
Dsgn. L = 4.33 ft	2	0.021	0.005		-0.63	0.63	50.98	30.53	1.00	1.00	0.29	93.90	56.23
+D+S+H													
Dsgn. L = 4.50 ft	1	0.180	0.045	0.01	-5.48	5.48	50.98	30.53	1.00	1.00	2.54	93.90	56.23
Dsgn. L = 4.33 ft	2	0.180	0.045		-5.48	5.48	50.98	30.53	1.00	1.00	2.53	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 4.50 ft	1	0.021	0.005	0.00	-0.63	0.63	50.98	30.53	1.00	1.00	0.29	93.90	56.23
Dsgn. L = 4.33 ft	2	0.021	0.005		-0.63	0.63	50.98	30.53	1.00	1.00	0.29	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 4.50 ft	1	0.140	0.035	0.01	-4.27	4.27	50.98	30.53	1.00	1.00	1.97	93.90	56.23
Dsgn. L = 4.33 ft	2	0.140	0.035		-4.27	4.27	50.98	30.53	1.00	1.00	1.97	93.90	56.23
+D+W+H													

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Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - EOHB-3 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 4.50 ft	1	0.021	0.005	0.00	-0.63	0.63	50.98	30.53	1.00	1.00	0.29	93.90	56.23
Dsgn. L = 4.33 ft	2	0.021	0.005		-0.63	0.63	50.98	30.53	1.00	1.00	0.29	93.90	56.23
+D+E+H													
Dsgn. L = 4.50 ft	1	0.021	0.005	0.00	-0.63	0.63	50.98	30.53	1.00	1.00	0.29	93.90	56.23
Dsgn. L = 4.33 ft	2	0.021	0.005		-0.63	0.63	50.98	30.53	1.00	1.00	0.29	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 4.50 ft	1	0.021	0.005	0.00	-0.63	0.63	50.98	30.53	1.00	1.00	0.29	93.90	56.23
Dsgn. L = 4.33 ft	2	0.021	0.005		-0.63	0.63	50.98	30.53	1.00	1.00	0.29	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 4.50 ft	1	0.140	0.035	0.01	-4.27	4.27	50.98	30.53	1.00	1.00	1.97	93.90	56.23
Dsgn. L = 4.33 ft	2	0.140	0.035		-4.27	4.27	50.98	30.53	1.00	1.00	1.97	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 4.50 ft	1	0.140	0.035	0.01	-4.27	4.27	50.98	30.53	1.00	1.00	1.97	93.90	56.23
Dsgn. L = 4.33 ft	2	0.140	0.035		-4.27	4.27	50.98	30.53	1.00	1.00	1.97	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 4.50 ft	1	0.012	0.003	0.00	-0.38	0.38	50.98	30.53	1.00	1.00	0.17	93.90	56.23
Dsgn. L = 4.33 ft	2	0.012	0.003		-0.38	0.38	50.98	30.53	1.00	1.00	0.17	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 4.50 ft	1	0.012	0.003	0.00	-0.38	0.38	50.98	30.53	1.00	1.00	0.17	93.90	56.23
Dsgn. L = 4.33 ft	2	0.012	0.003		-0.38	0.38	50.98	30.53	1.00	1.00	0.17	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0059	2.880
+D+S+H	2	0.0724	4.330		0.0000	2.880

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.098	5.068	
Overall MINimum	0.007	0.348	
+D+H	0.011	0.581	
+D+L+H	0.011	0.581	
+D+Lr+H	0.011	0.581	
+D+S+H	0.098	5.068	
+D+0.750Lr+0.750L+H	0.011	0.581	
+D+0.750L+0.750S+H	0.076	3.946	
+D+W+H	0.011	0.581	
+D+E+H	0.011	0.581	
+D+0.750Lr+0.750L+0.750W+H	0.011	0.581	
+D+0.750L+0.750S+0.750W+H	0.076	3.946	
+D+0.750L+0.750S+0.750E+H	0.076	3.946	
+0.60D+W+0.60H	0.007	0.348	
+0.60D+E+0.60H	0.007	0.348	
D Only	0.011	0.581	
Lr Only			
L Only			
S Only	0.086	4.488	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 19 MAY 2017, 8.22AM

Steel Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Typical Unit - EOHB-4 - HSS8x4x1/4

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

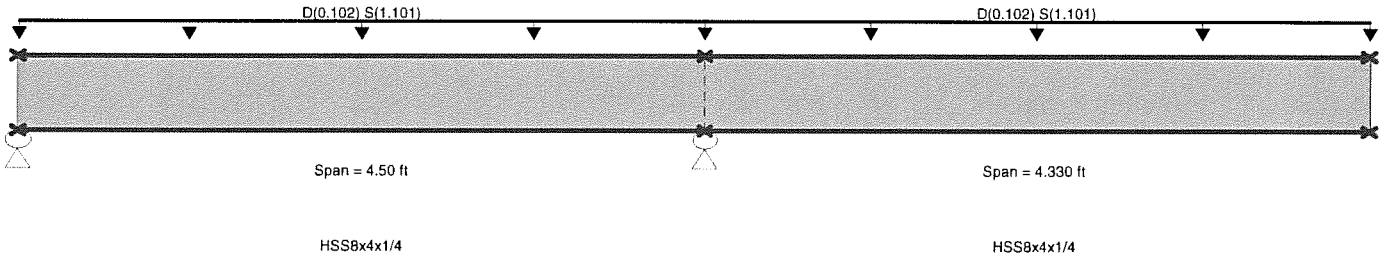
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.1020, S = 1.101 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.1020, S = 1.101 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.375 : 1	Maximum Shear Stress Ratio =	0.094 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	11.456 k-ft	Va : Applied	5.295 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	4.500ft	Location of maximum on span	4.500 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.136 in	Ratio =	762 >=240.
Max Upward Transient Deflection	-0.011 in	Ratio =	4,899 >=240.
Max Downward Total Deflection	0.151 in	Ratio =	687 >=180
Max Upward Total Deflection	-0.012 in	Ratio =	4414 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 4.50 ft	1	0.037	0.009	0.00	-1.13	1.13	50.98	30.53	1.00	1.00	0.52	93.90	56.23
Dsgn. L = 4.33 ft	2	0.037	0.009		-1.13	1.13	50.98	30.53	1.00	1.00	0.52	93.90	56.23
+D+L+H													
Dsgn. L = 4.50 ft	1	0.037	0.009	0.00	-1.13	1.13	50.98	30.53	1.00	1.00	0.52	93.90	56.23
Dsgn. L = 4.33 ft	2	0.037	0.009		-1.13	1.13	50.98	30.53	1.00	1.00	0.52	93.90	56.23
+D+Lr+H													
Dsgn. L = 4.50 ft	1	0.037	0.009	0.00	-1.13	1.13	50.98	30.53	1.00	1.00	0.52	93.90	56.23
Dsgn. L = 4.33 ft	2	0.037	0.009		-1.13	1.13	50.98	30.53	1.00	1.00	0.52	93.90	56.23
+D+S+H													
Dsgn. L = 4.50 ft	1	0.375	0.094	0.02	-11.46	11.46	50.98	30.53	1.00	1.00	5.30	93.90	56.23
Dsgn. L = 4.33 ft	2	0.375	0.094		-11.46	11.46	50.98	30.53	1.00	1.00	5.29	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 4.50 ft	1	0.037	0.009	0.00	-1.13	1.13	50.98	30.53	1.00	1.00	0.52	93.90	56.23
Dsgn. L = 4.33 ft	2	0.037	0.009		-1.13	1.13	50.98	30.53	1.00	1.00	0.52	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 4.50 ft	1	0.291	0.073	0.01	-8.88	8.88	50.98	30.53	1.00	1.00	4.10	93.90	56.23
Dsgn. L = 4.33 ft	2	0.291	0.073		-8.88	8.88	50.98	30.53	1.00	1.00	4.10	93.90	56.23
+D+W+H													

rudow + berry, inc.
4021 north 75th street, #101
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480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 51

Printed: 19 MAY 2017, 8:22AM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357 Licensee : RUDOW & BERRY

Description : Typical Unit - EOHB-4 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 4.50 ft	1	0.037	0.009	0.00	-1.13	1.13	50.98	30.53	1.00	1.00	0.52	93.90	56.23
Dsgn. L = 4.33 ft	2	0.037	0.009		-1.13	1.13	50.98	30.53	1.00	1.00	0.52	93.90	56.23
+D+E+H													
Dsgn. L = 4.50 ft	1	0.037	0.009	0.00	-1.13	1.13	50.98	30.53	1.00	1.00	0.52	93.90	56.23
Dsgn. L = 4.33 ft	2	0.037	0.009		-1.13	1.13	50.98	30.53	1.00	1.00	0.52	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 4.50 ft	1	0.037	0.009	0.00	-1.13	1.13	50.98	30.53	1.00	1.00	0.52	93.90	56.23
Dsgn. L = 4.33 ft	2	0.037	0.009		-1.13	1.13	50.98	30.53	1.00	1.00	0.52	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 4.50 ft	1	0.291	0.073	0.01	-8.88	8.88	50.98	30.53	1.00	1.00	4.10	93.90	56.23
Dsgn. L = 4.33 ft	2	0.291	0.073		-8.88	8.88	50.98	30.53	1.00	1.00	4.10	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 4.50 ft	1	0.291	0.073	0.01	-8.88	8.88	50.98	30.53	1.00	1.00	4.10	93.90	56.23
Dsgn. L = 4.33 ft	2	0.291	0.073		-8.88	8.88	50.98	30.53	1.00	1.00	4.10	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 4.50 ft	1	0.022	0.006	0.00	-0.68	0.68	50.98	30.53	1.00	1.00	0.31	93.90	56.23
Dsgn. L = 4.33 ft	2	0.022	0.006		-0.68	0.68	50.98	30.53	1.00	1.00	0.31	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 4.50 ft	1	0.022	0.006	0.00	-0.68	0.68	50.98	30.53	1.00	1.00	0.31	93.90	56.23
Dsgn. L = 4.33 ft	2	0.022	0.006		-0.68	0.68	50.98	30.53	1.00	1.00	0.31	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0122	2.880
+D+S+H	2	0.1512	4.330		0.0000	2.880

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.204	10.587	
Overall MINimum	0.012	0.629	
+D+H	0.020	1.048	
+D+L+H	0.020	1.048	
+D+Lr+H	0.020	1.048	
+D+S+H	0.204	10.587	
+D+0.750Lr+0.750L+H	0.020	1.048	
+D+0.750L+0.750S+H	0.158	8.202	
+D+W+H	0.020	1.048	
+D+E+H	0.020	1.048	
+D+0.750Lr+0.750L+0.750W+H	0.020	1.048	
+D+0.750L+0.750S+0.750W+H	0.158	8.202	
+D+0.750L+0.750S+0.750E+H	0.158	8.202	
+0.60D+W+0.60H	0.012	0.629	
+0.60D+E+0.60H	0.012	0.629	
D Only	0.020	1.048	
Lr Only			
L Only			
S Only	0.184	9.538	
W Only			
E Only			
H Only			

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

EOHB-5 SPAN = 5' CANT = 5.20'

$W = \frac{1}{2}(15.42)(24+259) = 1850 + 1997$ SL

EOHB-6 SPAN = 4'-6" CANT = 4'-4"

$W = \frac{1}{2}(17.67)(24+259) = 2120 + 2288$ SL

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Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 53

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Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Typical Unit - EOHB-5 - HSS8x4x1/4

CODE REFERENCES

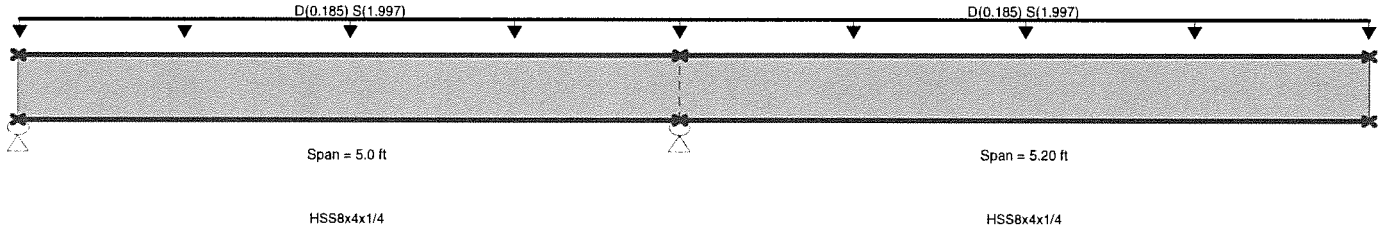
Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	46.0 ksi
Beam Bracing :	Beam bracing is defined Beam-by-Beam	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.1850, S = 1.997 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.1850, S = 1.997 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.975 : 1	Maximum Shear Stress Ratio =	0.204 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	29.758 k-ft	Va : Applied	11.454 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	5.000ft	Location of maximum on span	5.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.507 in	Ratio =	245 >=240.
Max Upward Transient Deflection	-0.039 in	Ratio =	1,532 >=240.
Max Downward Total Deflection	0.559 in	Ratio =	223 >=180
Max Upward Total Deflection	-0.043 in	Ratio =	1391 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 5.00 ft	1	0.090	0.019		-2.76	2.76	50.98	30.53	1.00	1.00	1.06	93.90	56.23
Dsgn. L = 5.20 ft	2	0.090	0.019		-2.76	2.76	50.98	30.53	1.00	1.00	1.06	93.90	56.23
+D+L+H													
Dsgn. L = 5.00 ft	1	0.090	0.019		-2.76	2.76	50.98	30.53	1.00	1.00	1.06	93.90	56.23
Dsgn. L = 5.20 ft	2	0.090	0.019		-2.76	2.76	50.98	30.53	1.00	1.00	1.06	93.90	56.23
+D+Lr+H													
Dsgn. L = 5.00 ft	1	0.090	0.019		-2.76	2.76	50.98	30.53	1.00	1.00	1.06	93.90	56.23
Dsgn. L = 5.20 ft	2	0.090	0.019		-2.76	2.76	50.98	30.53	1.00	1.00	1.06	93.90	56.23
+D+S+H													
Dsgn. L = 5.00 ft	1	0.975	0.204		-29.76	29.76	50.98	30.53	1.00	1.00	11.45	93.90	56.23
Dsgn. L = 5.20 ft	2	0.975	0.204		-29.76	29.76	50.98	30.53	1.00	1.00	11.45	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 5.00 ft	1	0.090	0.019		-2.76	2.76	50.98	30.53	1.00	1.00	1.06	93.90	56.23
Dsgn. L = 5.20 ft	2	0.090	0.019		-2.76	2.76	50.98	30.53	1.00	1.00	1.06	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 5.00 ft	1	0.754	0.157		-23.01	23.01	50.98	30.53	1.00	1.00	8.86	93.90	56.23
Dsgn. L = 5.20 ft	2	0.754	0.157		-23.01	23.01	50.98	30.53	1.00	1.00	8.85	93.90	56.23
+D+W+H													

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Licensee : RUDOW & BERRY

Steel Beam

Lic. # : KW-06002357

Description : Typical Unit - EOHB-5 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 5.00 ft	1	0.090	0.019		-2.76	2.76	50.98	30.53	1.00	1.00	1.06	93.90	56.23
Dsgn. L = 5.20 ft	2	0.090	0.019		-2.76	2.76	50.98	30.53	1.00	1.00	1.06	93.90	56.23
+D+E+H													
Dsgn. L = 5.00 ft	1	0.090	0.019		-2.76	2.76	50.98	30.53	1.00	1.00	1.06	93.90	56.23
Dsgn. L = 5.20 ft	2	0.090	0.019		-2.76	2.76	50.98	30.53	1.00	1.00	1.06	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 5.00 ft	1	0.090	0.019		-2.76	2.76	50.98	30.53	1.00	1.00	1.06	93.90	56.23
Dsgn. L = 5.20 ft	2	0.090	0.019		-2.76	2.76	50.98	30.53	1.00	1.00	1.06	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 5.00 ft	1	0.754	0.157		-23.01	23.01	50.98	30.53	1.00	1.00	8.86	93.90	56.23
Dsgn. L = 5.20 ft	2	0.754	0.157		-23.01	23.01	50.98	30.53	1.00	1.00	8.85	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 5.00 ft	1	0.754	0.157		-23.01	23.01	50.98	30.53	1.00	1.00	8.86	93.90	56.23
Dsgn. L = 5.20 ft	2	0.754	0.157		-23.01	23.01	50.98	30.53	1.00	1.00	8.85	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 5.00 ft	1	0.054	0.011		-1.66	1.66	50.98	30.53	1.00	1.00	0.64	93.90	56.23
Dsgn. L = 5.20 ft	2	0.054	0.011		-1.66	1.66	50.98	30.53	1.00	1.00	0.64	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 5.00 ft	1	0.054	0.011		-1.66	1.66	50.98	30.53	1.00	1.00	0.64	93.90	56.23
Dsgn. L = 5.20 ft	2	0.054	0.011		-1.66	1.66	50.98	30.53	1.00	1.00	0.64	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0431	3.140
+D+S+H	2	0.5593	5.200		0.0000	3.140

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-0.449	22.899	
Overall MINimum	-0.025	1.274	
+D+H	-0.042	2.123	
+D+L+H	-0.042	2.123	
+D+Lr+H	-0.042	2.123	
+D+S+H	-0.449	22.899	
+D+0.750Lr+0.750L+H	-0.042	2.123	
+D+0.750L+0.750S+H	-0.347	17.705	
+D+W+H	-0.042	2.123	
+D+E+H	-0.042	2.123	
+D+0.750Lr+0.750L+0.750W+H	-0.042	2.123	
+D+0.750L+0.750S+0.750W+H	-0.347	17.705	
+D+0.750L+0.750S+0.750E+H	-0.347	17.705	
+0.60D+W+0.60H	-0.025	1.274	
+0.60D+E+0.60H	-0.025	1.274	
D Only	-0.042	2.123	
Lr Only			
L Only			
S Only	-0.407	20.777	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed: 19 MAY 2017, 8:22AM
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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Steel Beam

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Typical Unit - EOHB-6 - HSS8x4x1/4

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

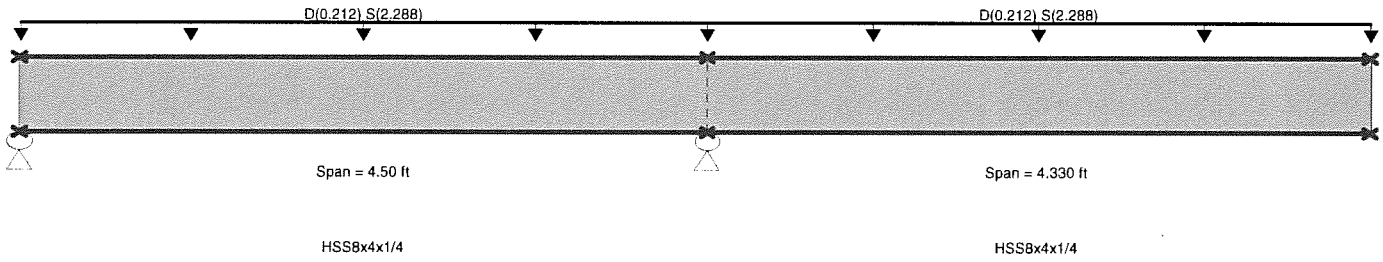
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.2120, S = 2.288 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.2120, S = 2.288 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.774 : 1	Maximum Shear Stress Ratio =	0.194 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	23.614 k-ft	Va : Applied	10.915 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	4.500ft	Location of maximum on span	4.500 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.283 in	Ratio =	367 >=240.
Max Upward Transient Deflection	-0.023 in	Ratio =	2,357 >=240.
Max Downward Total Deflection	0.312 in	Ratio =	333 >=180
Max Upward Total Deflection	-0.025 in	Ratio =	2141 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 4.50 ft	1	0.071	0.018	0.00	-2.17	2.17	50.98	30.53	1.00	1.00	1.00	93.90	56.23
Dsgn. L = 4.33 ft	2	0.071	0.018		-2.17	2.17	50.98	30.53	1.00	1.00	1.00	93.90	56.23
+D+L+H													
Dsgn. L = 4.50 ft	1	0.071	0.018	0.00	-2.17	2.17	50.98	30.53	1.00	1.00	1.00	93.90	56.23
Dsgn. L = 4.33 ft	2	0.071	0.018		-2.17	2.17	50.98	30.53	1.00	1.00	1.00	93.90	56.23
+D+Lr+H													
Dsgn. L = 4.50 ft	1	0.071	0.018	0.00	-2.17	2.17	50.98	30.53	1.00	1.00	1.00	93.90	56.23
Dsgn. L = 4.33 ft	2	0.071	0.018		-2.17	2.17	50.98	30.53	1.00	1.00	1.00	93.90	56.23
+D+S+H													
Dsgn. L = 4.50 ft	1	0.774	0.194	0.04	-23.61	23.61	50.98	30.53	1.00	1.00	10.92	93.90	56.23
Dsgn. L = 4.33 ft	2	0.774	0.194		-23.61	23.61	50.98	30.53	1.00	1.00	10.91	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 4.50 ft	1	0.071	0.018	0.00	-2.17	2.17	50.98	30.53	1.00	1.00	1.00	93.90	56.23
Dsgn. L = 4.33 ft	2	0.071	0.018		-2.17	2.17	50.98	30.53	1.00	1.00	1.00	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 4.50 ft	1	0.598	0.150	0.03	-18.25	18.25	50.98	30.53	1.00	1.00	8.44	93.90	56.23
Dsgn. L = 4.33 ft	2	0.598	0.150		-18.25	18.25	50.98	30.53	1.00	1.00	8.43	93.90	56.23
+D+W+H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 5b

Printed: 19 MAY 2017, 8:22AM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Typical Unit - EOHB-6 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 4.50 ft	1	0.071	0.018	0.00	-2.17	2.17	50.98	30.53	1.00	1.00	1.00	93.90	56.23
Dsgn. L = 4.33 ft	2	0.071	0.018		-2.17	2.17	50.98	30.53	1.00	1.00	1.00	93.90	56.23
+D+E+H													
Dsgn. L = 4.50 ft	1	0.071	0.018	0.00	-2.17	2.17	50.98	30.53	1.00	1.00	1.00	93.90	56.23
Dsgn. L = 4.33 ft	2	0.071	0.018		-2.17	2.17	50.98	30.53	1.00	1.00	1.00	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 4.50 ft	1	0.071	0.018	0.00	-2.17	2.17	50.98	30.53	1.00	1.00	1.00	93.90	56.23
Dsgn. L = 4.33 ft	2	0.071	0.018		-2.17	2.17	50.98	30.53	1.00	1.00	1.00	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 4.50 ft	1	0.598	0.150	0.03	-18.25	18.25	50.98	30.53	1.00	1.00	8.44	93.90	56.23
Dsgn. L = 4.33 ft	2	0.598	0.150		-18.25	18.25	50.98	30.53	1.00	1.00	8.43	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 4.50 ft	1	0.598	0.150	0.03	-18.25	18.25	50.98	30.53	1.00	1.00	8.44	93.90	56.23
Dsgn. L = 4.33 ft	2	0.598	0.150		-18.25	18.25	50.98	30.53	1.00	1.00	8.43	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 4.50 ft	1	0.043	0.011	0.00	-1.30	1.30	50.98	30.53	1.00	1.00	0.60	93.90	56.23
Dsgn. L = 4.33 ft	2	0.043	0.011		-1.30	1.30	50.98	30.53	1.00	1.00	0.60	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 4.50 ft	1	0.043	0.011	0.00	-1.30	1.30	50.98	30.53	1.00	1.00	0.60	93.90	56.23
Dsgn. L = 4.33 ft	2	0.043	0.011		-1.30	1.30	50.98	30.53	1.00	1.00	0.60	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0252	2.880
+D+S+H	2	0.3117	4.330		0.0000	2.880

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.420	21.823	
Overall MINimum	0.023	1.201	
+D+H	0.039	2.001	
+D+L+H	0.039	2.001	
+D+Lr+H	0.039	2.001	
+D+S+H	0.420	21.823	
+D+0.750Lr+0.750L+H	0.039	2.001	
+D+0.750L+0.750S+H	0.325	16.867	
+D+W+H	0.039	2.001	
+D+E+H	0.039	2.001	
+D+0.750Lr+0.750L+0.750W+H	0.039	2.001	
+D+0.750L+0.750S+0.750W+H	0.325	16.867	
+D+0.750L+0.750S+0.750E+H	0.325	16.867	
+0.60D+W+0.60H	0.023	1.201	
+0.60D+E+0.60H	0.023	1.201	
D Only	0.039	2.001	
Lr Only			
L Only			
S Only	0.382	19.821	
W Only			
E Only			
H Only			

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

OHB-8 SPAN = 4'-0" CANT = 4'-4"

$W = \frac{1}{2}(12.92)(24+259) = 1550\#D + 1673\#SL$

OHB-9 SPAN = 4'-0 CANT = 4'-4"

$W_1 = \frac{1}{2}(18)(24+259) = 2160\#D + 2331\#SL$

$W_2 = \frac{1}{2}(17.83)(\ \ \ ) = 2140\#D + 2309\#SL$

$W_3 = \frac{1}{2}(22)(\ \ \ ) = 2640\#D + 2849\#SL$

$W_4 = \frac{1}{2}(21.83)(\ \ \ ) = 2620\#D + 2827\#SL$

EOHB-7 SPAN = 4'-0" CANT = 4'-4"

$W_{SPAN} = 2.33(24+259) = 560\#D + 604\#SL$

$W_{CANT} = 6.67(\ \ \ ) = 1600\#D + 1727\#SL$

OHB-10 SPAN = 8'-11" CANT = 4'-3"

$P_{EOHB} = R_{EOHB7} = 1287\#D + 12435\#SL$

OHB-11 SPAN = 9'-2" CANT = 4'-3"

$P_{EOHB} = R_{EOHB7} = -2058\#D - 2239\#SL$

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4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 133 Roof Framing - OHJ-3 - 3 1/8 x 9 GLB @ 16" O.C.

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

Wood Species : DF/DF
Wood Grade : 24F - V4

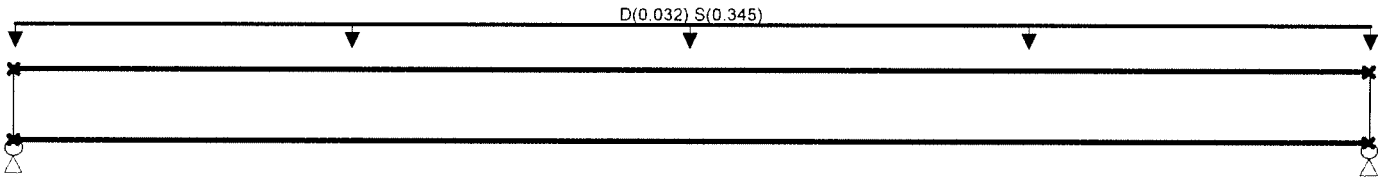
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf

Repetitive Member Stress Increase



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.0320, S = 0.3450 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.885 : 1	Maximum Shear Stress Ratio	=	0.397 : 1
Section used for this span		3.125x9	Section used for this span		3.125x9
fb : Actual	=	2,442.96 psi	fv : Actual	=	120.86 psi
FB : Allowable	=	2,760.00 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	6.750 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.759 in	Ratio =	213 >=210.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <210.0
Max Downward Total Deflection	0.829 in	Ratio =	195 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.096	0.043	0.90	1.000	1.00	1.15	1.00	1.00	1.00	0.73	207.36	2160.00	0.19	10.26	238.50
Length = 0.04927 ft	1	0.001	0.043	0.90	1.000	1.00	1.15	1.00	1.00	1.00	0.01	3.02	2160.00	0.19	10.26	238.50
+D+L+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.086	0.039	1.00	1.000	1.00	1.15	1.00	1.00	1.00	0.73	207.36	2400.00	0.19	10.26	265.00
Length = 0.04927 ft	1	0.001	0.039	1.00	1.000	1.00	1.15	1.00	1.00	1.00	0.01	3.02	2400.00	0.19	10.26	265.00
+D+Lr+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.069	0.031	1.25	1.000	1.00	1.15	1.00	1.00	1.00	0.73	207.36	3000.00	0.19	10.26	331.25
Length = 0.04927 ft	1	0.001	0.031	1.25	1.000	1.00	1.15	1.00	1.00	1.00	0.01	3.02	3000.00	0.19	10.26	331.25
+D+S+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.885	0.397	1.15	1.000	1.00	1.15	1.00	1.00	1.00	8.59	2,442.96	2760.00	2.27	120.86	304.75
Length = 0.04927 ft	1	0.013	0.397	1.15	1.000	1.00	1.15	1.00	1.00	1.00	0.12	35.53	2760.00	2.27	120.86	304.75

rudow + berry, inc.
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scottsdale, arizona 85251
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Project Title: Powdercat
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Project Descr:
Project ID: 16126

Printed: 31 MAY 2017, 4:30PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 133 Roof Framing - OHJ-3 - 3 1/8 x 9 GLB @ 16" O.C.

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750Lr+0.750L+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.069	0.031	1.25	1.000	1.00	1.15	1.00	1.00	1.00	0.73	207.36	3000.00	0.19	10.26	331.25
Length = 0.04927 ft	1	0.001	0.031	1.25	1.000	1.00	1.15	1.00	1.00	1.00	0.01	3.02	3000.00	0.19	10.26	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.683	0.306	1.15	1.000	1.00	1.15	1.00	1.00	1.00	6.62	1,884.06	2760.00	1.75	93.21	304.75
Length = 0.04927 ft	1	0.010	0.306	1.15	1.000	1.00	1.15	1.00	1.00	1.00	0.10	27.40	2760.00	1.75	93.21	304.75
+D+W+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.054	0.024	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.73	207.36	3840.00	0.19	10.26	424.00
Length = 0.04927 ft	1	0.001	0.024	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.01	3.02	3840.00	0.19	10.26	424.00
+D+E+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.054	0.024	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.73	207.36	3840.00	0.19	10.26	424.00
Length = 0.04927 ft	1	0.001	0.024	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.01	3.02	3840.00	0.19	10.26	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.054	0.024	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.73	207.36	3840.00	0.19	10.26	424.00
Length = 0.04927 ft	1	0.001	0.024	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.01	3.02	3840.00	0.19	10.26	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.491	0.220	1.60	1.000	1.00	1.15	1.00	1.00	1.00	6.62	1,884.06	3840.00	1.75	93.21	424.00
Length = 0.04927 ft	1	0.007	0.220	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.10	27.40	3840.00	1.75	93.21	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.491	0.220	1.60	1.000	1.00	1.15	1.00	1.00	1.00	6.62	1,884.06	3840.00	1.75	93.21	424.00
Length = 0.04927 ft	1	0.007	0.220	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.10	27.40	3840.00	1.75	93.21	424.00
+0.60D+W+0.60H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.032	0.015	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.44	124.42	3840.00	0.12	6.16	424.00
Length = 0.04927 ft	1	0.000	0.015	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.01	1.81	3840.00	0.12	6.16	424.00
+0.60D+E+0.60H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.451 ft	1	0.032	0.015	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.44	124.42	3840.00	0.12	6.16	424.00
Length = 0.04927 ft	1	0.000	0.015	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.01	1.81	3840.00	0.12	6.16	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.8293	6.799		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.545	2.545
Overall MINimum	0.130	0.130
+D+H	0.216	0.216
+D+L+H	0.216	0.216
+D+Lr+H	0.216	0.216
+D+S+H	2.545	2.545
+D+0.750Lr+0.750L+H	0.216	0.216
+D+0.750L+0.750S+H	1.963	1.963
+D+W+H	0.216	0.216
+D+E+H	0.216	0.216
+D+0.750Lr+0.750L+0.750W+H	0.216	0.216
+D+0.750L+0.750S+0.750W+H	1.963	1.963
+D+0.750L+0.750S+0.750E+H	1.963	1.963
+0.60D+W+0.60H	0.130	0.130
+0.60D+E+0.60H	0.130	0.130
D Only	0.216	0.216
Lr Only		
L Only		
S Only	2.329	2.329
W Only		
E Only		
H Only		

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

L6D

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Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

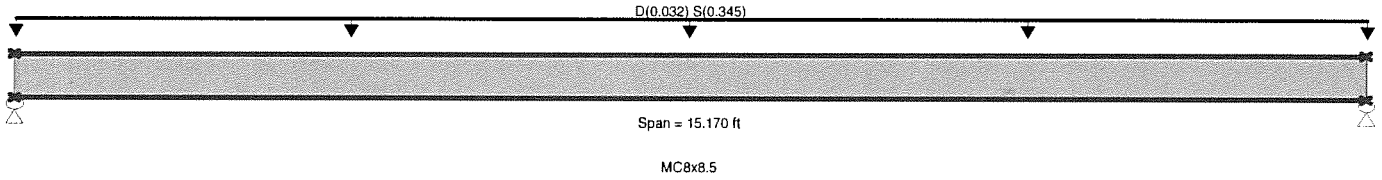
Description : Unit 133 Roof Framing - OHJ-3 @ Edge - MC8x8.5

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	36.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0320, S = 0.3450 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.869 : 1**	Maximum Shear Stress Ratio =	**0.154 : 1**
Section used for this span	**MC8x8.5**	Section used for this span	**MC8x8.5**
Ma : Applied	10.845 **k-ft**	Va : Applied	2.860 k
Mn / Omega : Allowable	12.485 **k-ft**	Vn/Omega : Allowable	18.522 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	7.585ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.611 in	Ratio =	297 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.668 in	Ratio =	273 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 15.17 ft	1	0.074	0.013	0.92		0.92	20.85	12.49	1.00	1.00	0.24	30.93	18.52
+D+L+H													
Dsgn. L = 15.17 ft	1	0.074	0.013	0.92		0.92	20.85	12.49	1.00	1.00	0.24	30.93	18.52
+D+Lr+H													
Dsgn. L = 15.17 ft	1	0.074	0.013	0.92		0.92	20.85	12.49	1.00	1.00	0.24	30.93	18.52
+D+S+H													
Dsgn. L = 15.17 ft	1	0.869	0.154	10.84		10.84	20.85	12.49	1.00	1.00	2.86	30.93	18.52
+D+0.750Lr+0.750L+H													
Dsgn. L = 15.17 ft	1	0.074	0.013	0.92		0.92	20.85	12.49	1.00	1.00	0.24	30.93	18.52
+D+0.750L+0.750S+H													
Dsgn. L = 15.17 ft	1	0.670	0.119	8.36		8.36	20.85	12.49	1.00	1.00	2.21	30.93	18.52
+D+W+H													
Dsgn. L = 15.17 ft	1	0.074	0.013	0.92		0.92	20.85	12.49	1.00	1.00	0.24	30.93	18.52
+D+E+H													
Dsgn. L = 15.17 ft	1	0.074	0.013	0.92		0.92	20.85	12.49	1.00	1.00	0.24	30.93	18.52
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 15.17 ft	1	0.074	0.013	0.92		0.92	20.85	12.49	1.00	1.00	0.24	30.93	18.52
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 15.17 ft	1	0.670	0.119	8.36		8.36	20.85	12.49	1.00	1.00	2.21	30.93	18.52
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 15.17 ft	1	0.670	0.119	8.36		8.36	20.85	12.49	1.00	1.00	2.21	30.93	18.52
+0.60D+W+0.60H													
Dsgn. L = 15.17 ft	1	0.044	0.008	0.55		0.55	20.85	12.49	1.00	1.00	0.15	30.93	18.52
+0.60D+E+0.60H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 L01

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Steel Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357 Licensee : RUDOW & BERRY

Description : Unit 133 Roof Framing - OHJ-3 @ Edge - MC8x8.5

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 15.17 ft	1	0.044	0.008	0.55		0.55	20.85	12.49	1.00	1.00	0.15	30.93	18.52

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.6679	7.628		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.860	2.860
Overall MINimum	0.146	0.146
+D+H	0.243	0.243
+D+L+H	0.243	0.243
+D+Lr+H	0.243	0.243
+D+S+H	2.860	2.860
+D+0.750Lr+0.750L+H	0.243	0.243
+D+0.750L+0.750S+H	2.205	2.205
+D+W+H	0.243	0.243
+D+E+H	0.243	0.243
+D+0.750Lr+0.750L+0.750W+H	0.243	0.243
+D+0.750L+0.750S+0.750W+H	2.205	2.205
+D+0.750L+0.750S+0.750E+H	2.205	2.205
+0.60D+W+0.60H	0.146	0.146
+0.60D+E+0.60H	0.146	0.146
D Only	0.243	0.243
Lr Only		
L Only		
S Only	2.617	2.617
W Only		
E Only		
H Only		

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Project Title: Powdercat
Engineer: MAR
Project Descr:
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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Wood Beam

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 133 Roof Framing - OHJ-4 - 3 1/8 x 9 GLB @ 16" O.C.

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

Wood Species : DF/DF
Wood Grade : 24F - V4

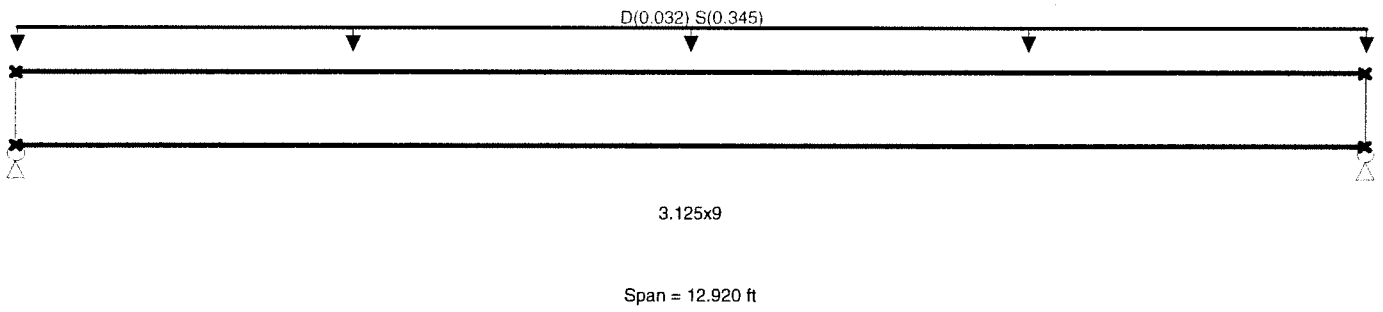
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf

Repetitive Member Stress Increase



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.0320, S = 0.3450 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.811 : 1	Maximum Shear Stress Ratio	=	0.380 : 1
Section used for this span		3.125x9	Section used for this span		3.125x9
fb : Actual	=	2,237.56 psi	fv : Actual	=	115.67 psi
FB : Allowable	=	2,760.00 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	6.460 ft	Location of maximum on span	=	12.213 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.637 in	Ratio =	243 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.696 in	Ratio =	222 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.920 ft	1	0.088	0.041	0.90	1.000	1.00	1.15	1.00	1.00	1.00	0.67	189.93	2160.00	0.18	9.82	238.50
+D+L+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.920 ft	1	0.079	0.037	1.00	1.000	1.00	1.15	1.00	1.00	1.00	0.67	189.93	2400.00	0.18	9.82	265.00
+D+Lr+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.920 ft	1	0.063	0.030	1.25	1.000	1.00	1.15	1.00	1.00	1.00	0.67	189.93	3000.00	0.18	9.82	331.25
+D+S+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.920 ft	1	0.811	0.380	1.15	1.000	1.00	1.15	1.00	1.00	1.00	7.87	2,237.56	2760.00	2.17	115.67	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.920 ft	1	0.063	0.030	1.25	1.000	1.00	1.15	1.00	1.00	1.00	0.67	189.93	3000.00	0.18	9.82	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.920 ft	1	0.625	0.293	1.15	1.000	1.00	1.15	1.00	1.00	1.00	6.07	1,725.65	2760.00	1.67	89.21	304.75

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4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Wood Beam

Lic. # : KW-06002357

Licensee : RUDOW & BERRY

Description : Unit 133 Roof Framing - OHJ-4 - 3 1/8 x 9 GLB @ 16" O.C.

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+W+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.920 ft	1	0.049	0.023	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.67	189.93	3840.00	0.18	9.82	424.00
+D+E+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.920 ft	1	0.049	0.023	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.67	189.93	3840.00	0.18	9.82	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.920 ft	1	0.049	0.023	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.67	189.93	3840.00	0.18	9.82	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.920 ft	1	0.449	0.210	1.60	1.000	1.00	1.15	1.00	1.00	1.00	6.07	1,725.65	3840.00	1.67	89.21	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.920 ft	1	0.449	0.210	1.60	1.000	1.00	1.15	1.00	1.00	1.00	6.07	1,725.65	3840.00	1.67	89.21	424.00
+0.60D+W+0.60H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.920 ft	1	0.030	0.014	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.40	113.96	3840.00	0.11	5.89	424.00
+0.60D+E+0.60H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.920 ft	1	0.030	0.014	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.40	113.96	3840.00	0.11	5.89	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.6957	6.507		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.435	2.435
Overall MINimum	0.124	0.124
+D+H	0.207	0.207
+D+L+H	0.207	0.207
+D+Lr+H	0.207	0.207
+D+S+H	2.435	2.435
+D+0.750Lr+0.750L+H	0.207	0.207
+D+0.750L+0.750S+H	1.878	1.878
+D+W+H	0.207	0.207
+D+E+H	0.207	0.207
+D+0.750Lr+0.750L+0.750W+H	0.207	0.207
+D+0.750L+0.750S+0.750W+H	1.878	1.878
+D+0.750L+0.750S+0.750E+H	1.878	1.878
+0.60D+W+0.60H	0.124	0.124
+0.60D+E+0.60H	0.124	0.124
D Only	0.207	0.207
Lr Only		
L Only		
S Only	2.229	2.229
W Only		
E Only		
H Only		

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 64

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Steel Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

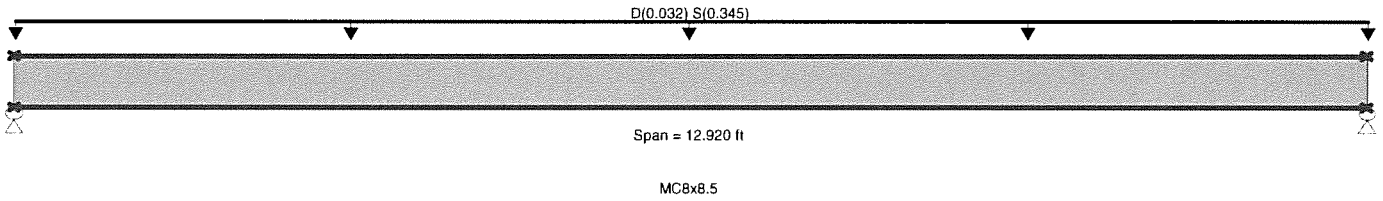
Description : Unit 133 Roof Framing - OHJ-4 @ Edge - MC8x8.5

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	36.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0320, S = 0.3450 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.630 : 1	Maximum Shear Stress Ratio =	0.131 : 1
Section used for this span	MC8x8.5	Section used for this span	MC8x8.5
Ma : Applied	7.866 k-ft	Va : Applied	2.435 k
Mn / Omega : Allowable	12.485 k-ft	Vn/Omega : Allowable	18.522 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	6.460ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.321 in	Ratio =	482 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.351 in	Ratio =	441 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 12.92 ft	1	0.053	0.011	0.67		0.67	20.85	12.49	1.00	1.00	0.21	30.93	18.52
+D+L+H													
Dsgn. L = 12.92 ft	1	0.053	0.011	0.67		0.67	20.85	12.49	1.00	1.00	0.21	30.93	18.52
+D+Lr+H													
Dsgn. L = 12.92 ft	1	0.053	0.011	0.67		0.67	20.85	12.49	1.00	1.00	0.21	30.93	18.52
+D+S+H													
Dsgn. L = 12.92 ft	1	0.630	0.131	7.87		7.87	20.85	12.49	1.00	1.00	2.44	30.93	18.52
+D+0.750Lr+0.750L+H													
Dsgn. L = 12.92 ft	1	0.053	0.011	0.67		0.67	20.85	12.49	1.00	1.00	0.21	30.93	18.52
+D+0.750L+0.750S+H													
Dsgn. L = 12.92 ft	1	0.486	0.101	6.07		6.07	20.85	12.49	1.00	1.00	1.88	30.93	18.52
+D+W+H													
Dsgn. L = 12.92 ft	1	0.053	0.011	0.67		0.67	20.85	12.49	1.00	1.00	0.21	30.93	18.52
+D+E+H													
Dsgn. L = 12.92 ft	1	0.053	0.011	0.67		0.67	20.85	12.49	1.00	1.00	0.21	30.93	18.52
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 12.92 ft	1	0.053	0.011	0.67		0.67	20.85	12.49	1.00	1.00	0.21	30.93	18.52
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 12.92 ft	1	0.486	0.101	6.07		6.07	20.85	12.49	1.00	1.00	1.88	30.93	18.52
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 12.92 ft	1	0.486	0.101	6.07		6.07	20.85	12.49	1.00	1.00	1.88	30.93	18.52
+0.60D+W+0.60H													
Dsgn. L = 12.92 ft	1	0.032	0.007	0.40		0.40	20.85	12.49	1.00	1.00	0.12	30.93	18.52
+0.60D+E+0.60H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 05

Printed: 19 MAY 2017, 8:22AM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 133 Roof Framing - OHJ-4 @ Edge - MC8x8.5

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 12.92 ft	1	0.032	0.007	0.40		0.40	20.85	12.49	1.00	1.00	0.12	30.93	18.52

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.3514	6.497		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.435	2.435
Overall MINimum	0.124	0.124
+D+H	0.207	0.207
+D+L+H	0.207	0.207
+D+Lr+H	0.207	0.207
+D+S+H	2.435	2.435
+D+0.750Lr+0.750L+H	0.207	0.207
+D+0.750L+0.750S+H	1.878	1.878
+D+W+H	0.207	0.207
+D+E+H	0.207	0.207
+D+0.750Lr+0.750L+0.750W+H	0.207	0.207
+D+0.750L+0.750S+0.750W+H	1.878	1.878
+D+0.750L+0.750S+0.750E+H	1.878	1.878
+0.60D+W+0.60H	0.124	0.124
+0.60D+E+0.60H	0.124	0.124
D Only	0.207	0.207
Lr Only		
L Only		
S Only	2.229	2.229
W Only		
E Only		
H Only		

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Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357

Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-8 - HSS8x4x1/4

CODE REFERENCES

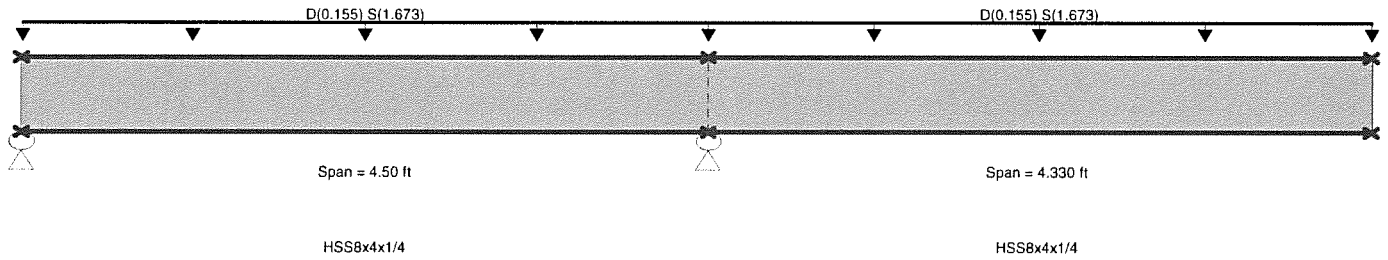
Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	46.0 ksi
Beam Bracing :	Beam bracing is defined Beam-by-Beam	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.1550, S = 1.673 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.1550, S = 1.673 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.567 : 1	Maximum Shear Stress Ratio =	0.142 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	17.315 k-ft	Va : Applied	8.004 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	4.500ft	Location of maximum on span	4.500 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.207 in	Ratio =	501 >=240.
Max Upward Transient Deflection	-0.017 in	Ratio =	3,224 >=240.
Max Downward Total Deflection	0.229 in	Ratio =	455 >=180
Max Upward Total Deflection	-0.018 in	Ratio =	2920 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 4.50 ft	1	0.053	0.013	0.00	-1.63	1.63	50.98	30.53	1.00	1.00	0.75	93.90	56.23
Dsgn. L = 4.33 ft	2	0.053	0.013		-1.63	1.63	50.98	30.53	1.00	1.00	0.75	93.90	56.23
+D+L+H													
Dsgn. L = 4.50 ft	1	0.053	0.013	0.00	-1.63	1.63	50.98	30.53	1.00	1.00	0.75	93.90	56.23
Dsgn. L = 4.33 ft	2	0.053	0.013		-1.63	1.63	50.98	30.53	1.00	1.00	0.75	93.90	56.23
+D+Lr+H													
Dsgn. L = 4.50 ft	1	0.053	0.013	0.00	-1.63	1.63	50.98	30.53	1.00	1.00	0.75	93.90	56.23
Dsgn. L = 4.33 ft	2	0.053	0.013		-1.63	1.63	50.98	30.53	1.00	1.00	0.75	93.90	56.23
+D+S+H													
Dsgn. L = 4.50 ft	1	0.567	0.142	0.03	-17.31	17.31	50.98	30.53	1.00	1.00	8.00	93.90	56.23
Dsgn. L = 4.33 ft	2	0.567	0.142		-17.31	17.31	50.98	30.53	1.00	1.00	8.00	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 4.50 ft	1	0.053	0.013	0.00	-1.63	1.63	50.98	30.53	1.00	1.00	0.75	93.90	56.23
Dsgn. L = 4.33 ft	2	0.053	0.013		-1.63	1.63	50.98	30.53	1.00	1.00	0.75	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 4.50 ft	1	0.439	0.110	0.02	-13.39	13.39	50.98	30.53	1.00	1.00	6.19	93.90	56.23
Dsgn. L = 4.33 ft	2	0.439	0.110		-13.39	13.39	50.98	30.53	1.00	1.00	6.19	93.90	56.23
+D+W+H													

rudow + berry, inc.
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scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 19 MAY 2017, 8:22AM

Steel Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-8 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 4.50 ft	1	0.053	0.013	0.00	-1.63	1.63	50.98	30.53	1.00	1.00	0.75	93.90	56.23
Dsgn. L = 4.33 ft	2	0.053	0.013		-1.63	1.63	50.98	30.53	1.00	1.00	0.75	93.90	56.23
+D+E+H													
Dsgn. L = 4.50 ft	1	0.053	0.013	0.00	-1.63	1.63	50.98	30.53	1.00	1.00	0.75	93.90	56.23
Dsgn. L = 4.33 ft	2	0.053	0.013		-1.63	1.63	50.98	30.53	1.00	1.00	0.75	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 4.50 ft	1	0.053	0.013	0.00	-1.63	1.63	50.98	30.53	1.00	1.00	0.75	93.90	56.23
Dsgn. L = 4.33 ft	2	0.053	0.013		-1.63	1.63	50.98	30.53	1.00	1.00	0.75	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 4.50 ft	1	0.439	0.110	0.02	-13.39	13.39	50.98	30.53	1.00	1.00	6.19	93.90	56.23
Dsgn. L = 4.33 ft	2	0.439	0.110		-13.39	13.39	50.98	30.53	1.00	1.00	6.19	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 4.50 ft	1	0.439	0.110	0.02	-13.39	13.39	50.98	30.53	1.00	1.00	6.19	93.90	56.23
Dsgn. L = 4.33 ft	2	0.439	0.110		-13.39	13.39	50.98	30.53	1.00	1.00	6.19	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 4.50 ft	1	0.032	0.008	0.00	-0.98	0.98	50.98	30.53	1.00	1.00	0.45	93.90	56.23
Dsgn. L = 4.33 ft	2	0.032	0.008		-0.98	0.98	50.98	30.53	1.00	1.00	0.45	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 4.50 ft	1	0.032	0.008	0.00	-0.98	0.98	50.98	30.53	1.00	1.00	0.45	93.90	56.23
Dsgn. L = 4.33 ft	2	0.032	0.008		-0.98	0.98	50.98	30.53	1.00	1.00	0.45	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0185	2.880
+D+S+H	2	0.2286	4.330		0.0000	2.880

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.308	16.001	
Overall MINimum	0.017	0.905	
+D+H	0.029	1.508	
+D+L+H	0.029	1.508	
+D+Lr+H	0.029	1.508	
+D+S+H	0.308	16.001	
+D+0.750Lr+0.750L+H	0.029	1.508	
+D+0.750L+0.750S+H	0.238	12.378	
+D+W+H	0.029	1.508	
+D+E+H	0.029	1.508	
+D+0.750Lr+0.750L+0.750W+H	0.029	1.508	
+D+0.750L+0.750S+0.750W+H	0.238	12.378	
+D+0.750L+0.750S+0.750E+H	0.238	12.378	
+0.60D+W+0.60H	0.017	0.905	
+0.60D+E+0.60H	0.017	0.905	
D Only	0.029	1.508	
Lr Only			
L Only			
S Only	0.279	14.494	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed 23 MAY 2017, 5:06PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-9 - HSS8x4x3/8

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

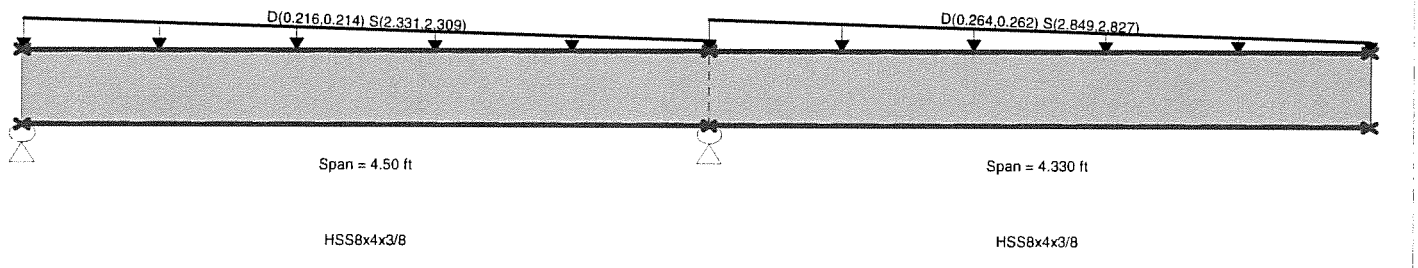
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Varying Uniform Load : D(S,E) = 0.2160->0.2140, S(S,E) = 2.331->2.309 k/ft, Extent = 0.0 -->> 4.50 ft, Trib Width = 1.0 ft
Load for Span Number 2
Varying Uniform Load : D(S,E) = 0.2640->0.2620, S(S,E) = 2.849->2.827 k/ft, Extent = 0.0 -->> 4.330 ft, Trib Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.679 : 1	Maximum Shear Stress Ratio =	0.169 : 1
Section used for this span	HSS8x4x3/8	Section used for this span	HSS8x4x3/8
Ma : Applied	29.290 k-ft	Va : Applied	13.546 k
Mn / Omega : Allowable	43.154 k-ft	Vn/Omega : Allowable	80.208 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	4.500ft	Location of maximum on span	4.500 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.262 in	Ratio =	395 >=240.
Max Upward Transient Deflection	-0.023 in	Ratio =	2,334 >=240.
Max Downward Total Deflection	0.289 in	Ratio =	359 >=180
Max Upward Total Deflection	-0.025 in	Ratio =	2120 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 4.50 ft	1	0.063	0.016		-2.72	2.72	72.07	43.15	1.00	1.00	1.26	133.95	80.21
Dsgn. L = 4.33 ft	2	0.063	0.016		-2.72	2.72	72.07	43.15	1.00	1.00	1.26	133.95	80.21
+D+L+H													
Dsgn. L = 4.50 ft	1	0.063	0.016		-2.72	2.72	72.07	43.15	1.00	1.00	1.26	133.95	80.21
Dsgn. L = 4.33 ft	2	0.063	0.016		-2.72	2.72	72.07	43.15	1.00	1.00	1.26	133.95	80.21
+D+Lr+H													
Dsgn. L = 4.50 ft	1	0.063	0.016		-2.72	2.72	72.07	43.15	1.00	1.00	1.26	133.95	80.21
Dsgn. L = 4.33 ft	2	0.063	0.016		-2.72	2.72	72.07	43.15	1.00	1.00	1.26	133.95	80.21
+D+S+H													
Dsgn. L = 4.50 ft	1	0.679	0.169		-29.29	29.29	72.07	43.15	1.00	1.00	13.55	133.95	80.21
Dsgn. L = 4.33 ft	2	0.679	0.169		-29.29	29.29	72.07	43.15	1.00	1.00	13.55	133.95	80.21
+D+0.750Lr+0.750L+H													
Dsgn. L = 4.50 ft	1	0.063	0.016		-2.72	2.72	72.07	43.15	1.00	1.00	1.26	133.95	80.21
Dsgn. L = 4.33 ft	2	0.063	0.016		-2.72	2.72	72.07	43.15	1.00	1.00	1.26	133.95	80.21
+D+0.750L+0.750S+H													
Dsgn. L = 4.50 ft	1	0.525	0.131		-22.65	22.65	72.07	43.15	1.00	1.00	10.47	133.95	80.21
Dsgn. L = 4.33 ft	2	0.525	0.131		-22.65	22.65	72.07	43.15	1.00	1.00	10.47	133.95	80.21
+D+W+H													

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480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

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Steel Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357

Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-9 - HSS8x4x3/8

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 4.50 ft	1	0.063	0.016		-2.72	2.72	72.07	43.15	1.00	1.00	1.26	133.95	80.21
Dsgn. L = 4.33 ft	2	0.063	0.016		-2.72	2.72	72.07	43.15	1.00	1.00	1.26	133.95	80.21
+D+E+H													
Dsgn. L = 4.50 ft	1	0.063	0.016		-2.72	2.72	72.07	43.15	1.00	1.00	1.26	133.95	80.21
Dsgn. L = 4.33 ft	2	0.063	0.016		-2.72	2.72	72.07	43.15	1.00	1.00	1.26	133.95	80.21
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 4.50 ft	1	0.063	0.016		-2.72	2.72	72.07	43.15	1.00	1.00	1.26	133.95	80.21
Dsgn. L = 4.33 ft	2	0.063	0.016		-2.72	2.72	72.07	43.15	1.00	1.00	1.26	133.95	80.21
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 4.50 ft	1	0.525	0.131		-22.65	22.65	72.07	43.15	1.00	1.00	10.47	133.95	80.21
Dsgn. L = 4.33 ft	2	0.525	0.131		-22.65	22.65	72.07	43.15	1.00	1.00	10.47	133.95	80.21
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 4.50 ft	1	0.525	0.131		-22.65	22.65	72.07	43.15	1.00	1.00	10.47	133.95	80.21
Dsgn. L = 4.33 ft	2	0.525	0.131		-22.65	22.65	72.07	43.15	1.00	1.00	10.47	133.95	80.21
+0.60D+W+0.60H													
Dsgn. L = 4.50 ft	1	0.038	0.009		-1.63	1.63	72.07	43.15	1.00	1.00	0.75	133.95	80.21
Dsgn. L = 4.33 ft	2	0.038	0.009		-1.63	1.63	72.07	43.15	1.00	1.00	0.75	133.95	80.21
+0.60D+E+0.60H													
Dsgn. L = 4.50 ft	1	0.038	0.009		-1.63	1.63	72.07	43.15	1.00	1.00	0.75	133.95	80.21
Dsgn. L = 4.33 ft	2	0.038	0.009		-1.63	1.63	72.07	43.15	1.00	1.00	0.75	133.95	80.21

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0255	2.808
+D+S+H	2	0.2893	4.330		0.0000	2.808

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-0.734	25.812	
Overall MINimum	-0.035	1.444	
+D+H	-0.058	2.407	
+D+L+H	-0.058	2.407	
+D+Lr+H	-0.058	2.407	
+D+S+H	-0.734	25.812	
+D+0.750Lr+0.750L+H	-0.058	2.407	
+D+0.750L+0.750S+H	-0.565	19.961	
+D+W+H	-0.058	2.407	
+D+E+H	-0.058	2.407	
+D+0.750Lr+0.750L+0.750W+H	-0.058	2.407	
+D+0.750L+0.750S+0.750W+H	-0.565	19.961	
+D+0.750L+0.750S+0.750E+H	-0.565	19.961	
+0.60D+W+0.60H	-0.035	1.444	
+0.60D+E+0.60H	-0.035	1.444	
D Only	-0.058	2.407	
Lr Only			
L Only			
S Only	-0.676	23.405	
W Only			
E Only			
H Only			

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Project Descr:
Project ID: 16126

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Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 133 - EOHB-7 - HSS8x2x1/4

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

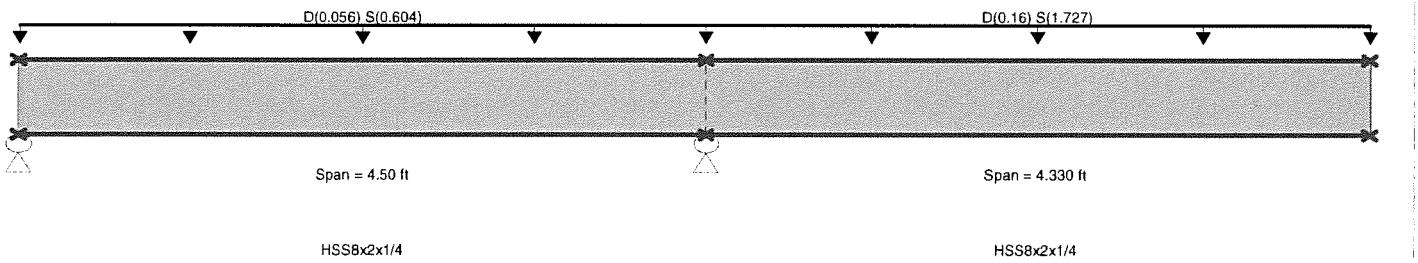
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.0560, S = 0.6040 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.160, S = 1.727 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.803 : 1	Maximum Shear Stress Ratio =	0.147 : 1
Section used for this span	HSS8x2x1/4	Section used for this span	HSS8x2x1/4
Ma : Applied	17.836 k-ft	Va : Applied	8.238 k
Mn / Omega : Allowable	22.220 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	4.500 ft	Location of maximum on span	4.500 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.357 in	Ratio =	290 >=240.
Max Upward Transient Deflection	-0.038 in	Ratio =	1,434 >=240.
Max Downward Total Deflection	0.393 in	Ratio =	264 >=180
Max Upward Total Deflection	-0.041 in	Ratio =	1306 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 4.50 ft	1	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
Dsgn. L = 4.33 ft	2	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
+D+L+H													
Dsgn. L = 4.50 ft	1	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
Dsgn. L = 4.33 ft	2	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
+D+Lr+H													
Dsgn. L = 4.50 ft	1	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
Dsgn. L = 4.33 ft	2	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
+D+S+H													
Dsgn. L = 4.50 ft	1	0.803	0.147		-17.84	17.84	37.11	22.22	1.00	1.00	8.24	93.90	56.23
Dsgn. L = 4.33 ft	2	0.803	0.147		-17.84	17.84	37.11	22.22	1.00	1.00	8.24	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 4.50 ft	1	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
Dsgn. L = 4.33 ft	2	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 4.50 ft	1	0.621	0.113		-13.79	13.79	37.11	22.22	1.00	1.00	6.37	93.90	56.23
Dsgn. L = 4.33 ft	2	0.621	0.113		-13.79	13.79	37.11	22.22	1.00	1.00	6.37	93.90	56.23
+D+W+H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 133 - EOHB-7 - HSS8x2x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 4.50 ft	1	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
Dsgn. L = 4.33 ft	2	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
+D+E+H													
Dsgn. L = 4.50 ft	1	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
Dsgn. L = 4.33 ft	2	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 4.50 ft	1	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
Dsgn. L = 4.33 ft	2	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 4.50 ft	1	0.621	0.113		-13.79	13.79	37.11	22.22	1.00	1.00	6.37	93.90	56.23
Dsgn. L = 4.33 ft	2	0.621	0.113		-13.79	13.79	37.11	22.22	1.00	1.00	6.37	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 4.50 ft	1	0.621	0.113		-13.79	13.79	37.11	22.22	1.00	1.00	6.37	93.90	56.23
Dsgn. L = 4.33 ft	2	0.621	0.113		-13.79	13.79	37.11	22.22	1.00	1.00	6.37	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 4.50 ft	1	0.044	0.008		-0.99	0.99	37.11	22.22	1.00	1.00	0.46	93.90	56.23
Dsgn. L = 4.33 ft	2	0.044	0.008		-0.99	0.99	37.11	22.22	1.00	1.00	0.46	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 4.50 ft	1	0.044	0.008		-0.99	0.99	37.11	22.22	1.00	1.00	0.46	93.90	56.23
Dsgn. L = 4.33 ft	2	0.044	0.008		-0.99	0.99	37.11	22.22	1.00	1.00	0.46	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0414	2.682
+D+S+H	2	0.3933	4.330		0.0000	2.682

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-2.443	13.722	
Overall MINimum	-0.123	0.772	
+D+H	-0.205	1.287	
+D+L+H	-0.205	1.287	
+D+Lr+H	-0.205	1.287	
+D+S+H	-2.443	13.722	
+D+0.750Lr+0.750L+H	-0.205	1.287	
+D+0.750L+0.750S+H	-1.884	10.613	
+D+W+H	-0.205	1.287	
+D+E+H	-0.205	1.287	
+D+0.750Lr+0.750L+0.750W+H	-0.205	1.287	
+D+0.750L+0.750S+0.750W+H	-1.884	10.613	
+D+0.750L+0.750S+0.750E+H	-1.884	10.613	
+0.60D+W+0.60H	-0.123	0.772	
+0.60D+E+0.60H	-0.123	0.772	
D Only	-0.205	1.287	
Lr Only			
L Only			
S Only	-2.239	12.435	
W Only			
E Only			
H Only			

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Steel Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-10 - W8x48

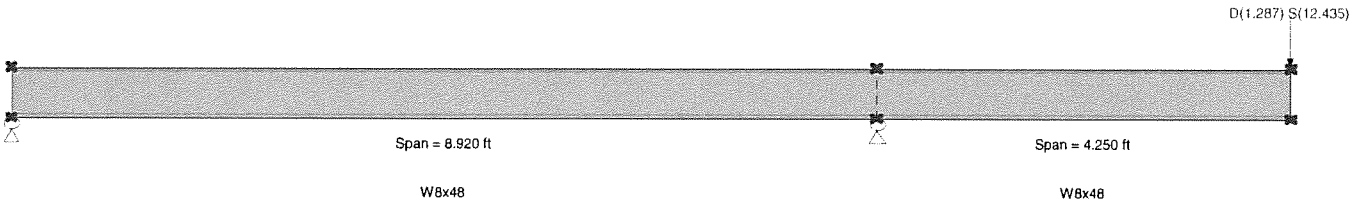
CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load(s) for Span Number 2
Point Load : D = 1.287, S = 12.435 k @ 4.250 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.481 : 1	Maximum Shear Stress Ratio =	0.205 : 1
Section used for this span	W8x48	Section used for this span	W8x48
Ma : Applied	58.752 k-ft	Va : Applied	13.926 k
Mn / Omega : Allowable	122.255 k-ft	Vn/Omega : Allowable	68.0 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	8.920ft	Location of maximum on span	8.920 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.319 in	Ratio =	319 >=240.
Max Upward Transient Deflection	-0.088 in	Ratio =	1,219 >=240.
Max Downward Total Deflection	0.352 in	Ratio =	289 >=180
Max Upward Total Deflection	-0.096 in	Ratio =	1111 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 8.92 ft	1	0.048	0.022		-5.90	5.90	204.17	122.26	1.83	1.00	1.49	102.00	68.00
Dsgn. L = 4.25 ft	2	0.048	0.022		-5.90	5.90	204.17	122.26	1.00	1.00	1.49	102.00	68.00
+D+L+H													
Dsgn. L = 8.92 ft	1	0.048	0.022		-5.90	5.90	204.17	122.26	1.83	1.00	1.49	102.00	68.00
Dsgn. L = 4.25 ft	2	0.048	0.022		-5.90	5.90	204.17	122.26	1.00	1.00	1.49	102.00	68.00
+D+Lr+H													
Dsgn. L = 8.92 ft	1	0.048	0.022		-5.90	5.90	204.17	122.26	1.83	1.00	1.49	102.00	68.00
Dsgn. L = 4.25 ft	2	0.048	0.022		-5.90	5.90	204.17	122.26	1.00	1.00	1.49	102.00	68.00
+D+S+H													
Dsgn. L = 8.92 ft	1	0.481	0.205		-58.75	58.75	204.17	122.26	1.68	1.00	13.93	102.00	68.00
Dsgn. L = 4.25 ft	2	0.481	0.205		-58.75	58.75	204.17	122.26	1.00	1.00	13.93	102.00	68.00
+D+0.750Lr+0.750L+H													
Dsgn. L = 8.92 ft	1	0.048	0.022		-5.90	5.90	204.17	122.26	1.83	1.00	1.49	102.00	68.00
Dsgn. L = 4.25 ft	2	0.048	0.022		-5.90	5.90	204.17	122.26	1.00	1.00	1.49	102.00	68.00
+D+0.750L+0.750S+H													
Dsgn. L = 8.92 ft	1	0.372	0.159		-45.54	45.54	204.17	122.26	1.69	1.00	10.82	102.00	68.00
Dsgn. L = 4.25 ft	2	0.372	0.159		-45.54	45.54	204.17	122.26	1.00	1.00	10.82	102.00	68.00
+D+W+H													
Dsgn. L = 8.92 ft	1	0.048	0.022		-5.90	5.90	204.17	122.26	1.83	1.00	1.49	102.00	68.00
Dsgn. L = 4.25 ft	2	0.048	0.022		-5.90	5.90	204.17	122.26	1.00	1.00	1.49	102.00	68.00
+D+E+H													
Dsgn. L = 8.92 ft	1	0.048	0.022		-5.90	5.90	204.17	122.26	1.83	1.00	1.49	102.00	68.00
Dsgn. L = 4.25 ft	2	0.048	0.022		-5.90	5.90	204.17	122.26	1.00	1.00	1.49	102.00	68.00

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Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-10 - W8x48

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 8.92 ft	1	0.048	0.022		-5.90	5.90	204.17	122.26	1.83	1.00	1.49	102.00	68.00
Dsgn. L = 4.25 ft	2	0.048	0.022		-5.90	5.90	204.17	122.26	1.00	1.00	1.49	102.00	68.00
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 8.92 ft	1	0.372	0.159		-45.54	45.54	204.17	122.26	1.69	1.00	10.82	102.00	68.00
Dsgn. L = 4.25 ft	2	0.372	0.159		-45.54	45.54	204.17	122.26	1.00	1.00	10.82	102.00	68.00
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 8.92 ft	1	0.372	0.159		-45.54	45.54	204.17	122.26	1.69	1.00	10.82	102.00	68.00
Dsgn. L = 4.25 ft	2	0.372	0.159		-45.54	45.54	204.17	122.26	1.00	1.00	10.82	102.00	68.00
+0.60D+W+0.60H													
Dsgn. L = 8.92 ft	1	0.029	0.013		-3.54	3.54	204.17	122.26	1.83	1.00	0.89	102.00	68.00
Dsgn. L = 4.25 ft	2	0.029	0.013		-3.54	3.54	204.17	122.26	1.00	1.00	0.89	102.00	68.00
+0.60D+E+0.60H													
Dsgn. L = 8.92 ft	1	0.029	0.013		-3.54	3.54	204.17	122.26	1.83	1.00	0.89	102.00	68.00
Dsgn. L = 4.25 ft	2	0.029	0.013		-3.54	3.54	204.17	122.26	1.00	1.00	0.89	102.00	68.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0964	5.174
+D+S+H	2	0.3525	4.250		0.0000	5.174

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-6.372	20.727	
Overall MINimum	-0.269	1.420	
+D+H	-0.448	2.367	
+D+L+H	-0.448	2.367	
+D+Lr+H	-0.448	2.367	
+D+S+H	-6.372	20.727	
+D+0.750Lr+0.750L+H	-0.448	2.367	
+D+0.750L+0.750S+H	-4.891	16.137	
+D+W+H	-0.448	2.367	
+D+E+H	-0.448	2.367	
+D+0.750Lr+0.750L+0.750W+H	-0.448	2.367	
+D+0.750L+0.750S+0.750W+H	-4.891	16.137	
+D+0.750L+0.750S+0.750E+H	-4.891	16.137	
+0.60D+W+0.60H	-0.269	1.420	
+0.60D+E+0.60H	-0.269	1.420	
D Only	-0.448	2.367	
Lr Only			
L Only			
S Only	-5.925	18.360	
W Only			
E Only			
H Only			

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Lic. # : KW-06002357
Licensee : RUDOW & BERRY

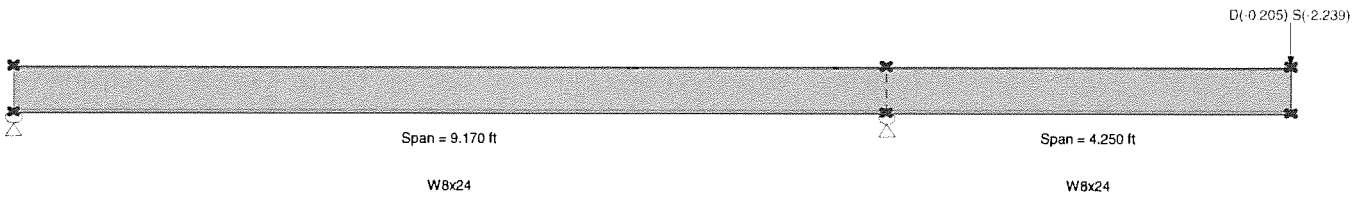
Description : Unit 133 - OHB-11 - W8x24

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Completely Unbraced	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load(s) for Span Number 2
Point Load : D = -0.2050, S = -2.239 k @ 4.250 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.176 : 1	Maximum Shear Stress Ratio =	0.063 : 1
Section used for this span	W8x24	Section used for this span	W8x24
Ma : Applied	10.170 k-ft	Va : Applied	2.444 k
Mn / Omega : Allowable	57.635 k-ft	Vn/Omega : Allowable	38.857 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	9.170ft	Location of maximum on span	4.233 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 2

Maximum Deflection

Max Downward Transient Deflection	0.037 in	Ratio =	2,959 >=240.
Max Upward Transient Deflection	-0.130 in	Ratio =	783 >=240.
Max Downward Total Deflection	0.041 in	Ratio =	2665 >=180
Max Upward Total Deflection	-0.142 in	Ratio =	719 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 9.17 ft	1	0.012	0.005	0.69		0.69	96.25	57.63	1.20	1.00	0.18	58.29	38.86
Dsgn. L = 4.25 ft	2	0.011	0.005	0.65		0.65	96.25	57.63	1.00	1.00	0.20	58.29	38.86
+D+L+H													
Dsgn. L = 9.17 ft	1	0.012	0.005	0.69		0.69	96.25	57.63	1.20	1.00	0.18	58.29	38.86
Dsgn. L = 4.25 ft	2	0.011	0.005	0.65		0.65	96.25	57.63	1.00	1.00	0.20	58.29	38.86
+D+Lr+H													
Dsgn. L = 9.17 ft	1	0.012	0.005	0.69		0.69	96.25	57.63	1.20	1.00	0.18	58.29	38.86
Dsgn. L = 4.25 ft	2	0.011	0.005	0.65		0.65	96.25	57.63	1.00	1.00	0.20	58.29	38.86
+D+S+H													
Dsgn. L = 9.17 ft	1	0.176	0.060	10.17		10.17	96.25	57.63	1.62	1.00	2.34	58.29	38.86
Dsgn. L = 4.25 ft	2	0.176	0.063	10.17		10.17	96.25	57.63	1.00	1.00	2.44	58.29	38.86
+D+0.750Lr+0.750L+H													
Dsgn. L = 9.17 ft	1	0.012	0.005	0.69		0.69	96.25	57.63	1.20	1.00	0.18	58.29	38.86
Dsgn. L = 4.25 ft	2	0.011	0.005	0.65		0.65	96.25	57.63	1.00	1.00	0.20	58.29	38.86
+D+0.750L+0.750S+H													
Dsgn. L = 9.17 ft	1	0.135	0.046	7.79		7.79	96.25	57.63	1.61	1.00	1.78	58.29	38.86
Dsgn. L = 4.25 ft	2	0.135	0.048	7.79		7.79	96.25	57.63	1.00	1.00	1.88	58.29	38.86
+D+W+H													
Dsgn. L = 9.17 ft	1	0.012	0.005	0.69		0.69	96.25	57.63	1.20	1.00	0.18	58.29	38.86
Dsgn. L = 4.25 ft	2	0.011	0.005	0.65		0.65	96.25	57.63	1.00	1.00	0.20	58.29	38.86
+D+E+H													
Dsgn. L = 9.17 ft	1	0.012	0.005	0.69		0.69	96.25	57.63	1.20	1.00	0.18	58.29	38.86
Dsgn. L = 4.25 ft	2	0.011	0.005	0.65		0.65	96.25	57.63	1.00	1.00	0.20	58.29	38.86

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed: 19 MAY 2017, 8:22AM
File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Steel Beam

Lic. # : KW-06002357

Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-11 - W8x24

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 9.17 ft	1	0.012	0.005	0.69		0.69	96.25	57.63	1.20	1.00	0.18	58.29	38.86
Dsgn. L = 4.25 ft	2	0.011	0.005	0.65		0.65	96.25	57.63	1.00	1.00	0.20	58.29	38.86
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 9.17 ft	1	0.135	0.046	7.79		7.79	96.25	57.63	1.61	1.00	1.78	58.29	38.86
Dsgn. L = 4.25 ft	2	0.135	0.048	7.79		7.79	96.25	57.63	1.00	1.00	1.88	58.29	38.86
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 9.17 ft	1	0.135	0.046	7.79		7.79	96.25	57.63	1.61	1.00	1.78	58.29	38.86
Dsgn. L = 4.25 ft	2	0.135	0.048	7.79		7.79	96.25	57.63	1.00	1.00	1.88	58.29	38.86
+0.60D+W+0.60H													
Dsgn. L = 9.17 ft	1	0.007	0.003	0.41		0.41	96.25	57.63	1.20	1.00	0.11	58.29	38.86
Dsgn. L = 4.25 ft	2	0.007	0.003	0.39		0.39	96.25	57.63	1.00	1.00	0.12	58.29	38.86
+0.60D+E+0.60H													
Dsgn. L = 9.17 ft	1	0.007	0.003	0.41		0.41	96.25	57.63	1.20	1.00	0.11	58.29	38.86
Dsgn. L = 4.25 ft	2	0.007	0.003	0.39		0.39	96.25	57.63	1.00	1.00	0.12	58.29	38.86

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.0413	5.282		0.0000	0.000
	2	0.0000	5.282	+D+S+H	-0.1418	4.250

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	1.219	-3.341	
Overall MINimum	0.109	-0.039	
+D+H	0.181	-0.064	
+D+L+H	0.181	-0.064	
+D+Lr+H	0.181	-0.064	
+D+S+H	1.219	-3.341	
+D+0.750Lr+0.750L+H	0.181	-0.064	
+D+0.750L+0.750S+H	0.960	-2.522	
+D+W+H	0.181	-0.064	
+D+E+H	0.181	-0.064	
+D+0.750Lr+0.750L+0.750W+H	0.181	-0.064	
+D+0.750L+0.750S+0.750W+H	0.960	-2.522	
+D+0.750L+0.750S+0.750E+H	0.960	-2.522	
+0.60D+W+0.60H	0.109	-0.039	
+0.60D+E+0.60H	0.109	-0.039	
D Only	0.181	-0.064	
Lr Only			
L Only			
S Only	1.038	-3.277	
W Only			
E Only			
H Only			

OHB-12

SPAN 1 = 4-0   SPAN 2 = 17-10

$P_1 = R_{OHB9} + 2 * R_{OHB10} = (2324 + 23405) - 2(224D + 2462)$
$= 1886D + 18481SL$ @ x = 8'-11" SPAN 2

OHB-13   SPAN = 22'-1"

$W = .61(24 + 259) = 16D + 173SL$

$P_2 = R_{OHB9} + 2(R_{OHB11}) = (-60 - 616) + 2(78 + 519) = 96D + 362SL$
@ x = 12'-11"

$P_1 = R_{OHB8} = 29D + 279SL$ @ x = 4'-0"

OHB-14   SPAN = 5-0   CANT = 5.20'

$W_{SPAN} = \frac{1}{2}(13.92)(24 + 259) = 167D + 1802SL$

$W_{CANT} = \frac{1}{2}(18.42)(\ \ "\ \ ) = 221D + 2385SL$

EOHB-8   SPAN = 5'-0"   CANT = 5.20'

$W_{SPAN} = 2.33(24 + 259) = 56D + 604SL$

$W_{CANT} = 7.42(\ \ "\ \ ) = 178D + 1921SL$

OHB-15   SPAN = 9'-11"   CANT = 4'-3"

$P_{END} = R_{EOHB8} = 1833D + 16694SL$

OHB-16   SPAN = 9'-6"   CANT = 4'-3"

$P_{END} = R_{EOHB8} = -347D - 3684SL$

rudow + berry, inc.
4021 north 75th street, #101
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Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 77

Printed: 23 MAY 2017, 5:57PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

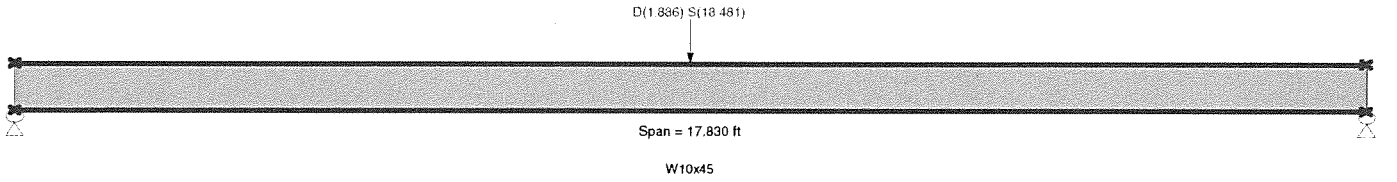
Description : Unit 133 - OHB-12 - W10x45

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load(s) for Span Number 1
Point Load : D = 1.886, S = 18.481 k @ 8.920 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.675 : 1	Maximum Shear Stress Ratio =	0.150 : 1
Section used for this span	W10x45	Section used for this span	W10x45
Ma : Applied	92.523 k-ft	Va : Applied	10.590 k
Mn / Omega : Allowable	136.976 k-ft	Vn/Omega : Allowable	70.70 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	8.915 ft	Location of maximum on span	17.830 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.526 in	Ratio =	406 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.595 in	Ratio =	360 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 17.83 ft	1	0.074	0.019	10.19		10.19	228.75	136.98	1.00	1.00	1.34	106.05	70.70
+D+L+H													
Dsgn. L = 17.83 ft	1	0.074	0.019	10.19		10.19	228.75	136.98	1.00	1.00	1.34	106.05	70.70
+D+Lr+H													
Dsgn. L = 17.83 ft	1	0.074	0.019	10.19		10.19	228.75	136.98	1.00	1.00	1.34	106.05	70.70
+D+S+H													
Dsgn. L = 17.83 ft	1	0.675	0.150	92.52		92.52	228.75	136.98	1.00	1.00	10.59	106.05	70.70
+D+0.750Lr+0.750L+H													
Dsgn. L = 17.83 ft	1	0.074	0.019	10.19		10.19	228.75	136.98	1.00	1.00	1.34	106.05	70.70
+D+0.750L+0.750S+H													
Dsgn. L = 17.83 ft	1	0.525	0.117	71.94		71.94	228.75	136.98	1.00	1.00	8.28	106.05	70.70
+D+W+H													
Dsgn. L = 17.83 ft	1	0.074	0.019	10.19		10.19	228.75	136.98	1.00	1.00	1.34	106.05	70.70
+D+E+H													
Dsgn. L = 17.83 ft	1	0.074	0.019	10.19		10.19	228.75	136.98	1.00	1.00	1.34	106.05	70.70
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 17.83 ft	1	0.074	0.019	10.19		10.19	228.75	136.98	1.00	1.00	1.34	106.05	70.70
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 17.83 ft	1	0.525	0.117	71.94		71.94	228.75	136.98	1.00	1.00	8.28	106.05	70.70
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 17.83 ft	1	0.525	0.117	71.94		71.94	228.75	136.98	1.00	1.00	8.28	106.05	70.70
+0.60D+W+0.60H													
Dsgn. L = 17.83 ft	1	0.045	0.011	6.11		6.11	228.75	136.98	1.00	1.00	0.81	106.05	70.70

rudow + berry, inc.
4021 north 75th street, #101
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Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 23 MAY 2017, 5:57PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-12 - W10x45

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+0.60D+E+0.60H													
Dsgn. L = 17.83 ft	1	0.045	0.011	6.11		6.11	228.75	136.98	1.00	1.00	0.81	106.05	70.70

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.5946	8.966		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	10.579	10.590
Overall MINimum	0.806	0.807
+D+H	1.344	1.345
+D+L+H	1.344	1.345
+D+Lr+H	1.344	1.345
+D+S+H	10.579	10.590
+D+0.750Lr+0.750L+H	1.344	1.345
+D+0.750L+0.750S+H	8.270	8.279
+D+W+H	1.344	1.345
+D+E+H	1.344	1.345
+D+0.750Lr+0.750L+0.750W+H	1.344	1.345
+D+0.750L+0.750S+0.750W+H	8.270	8.279
+D+0.750L+0.750S+0.750E+H	8.270	8.279
+0.60D+W+0.60H	0.806	0.807
+0.60D+E+0.60H	0.806	0.807
D Only	1.344	1.345
Lr Only		
L Only		
S Only	9.235	9.246
W Only		
E Only		
H Only		

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Wood Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-13 - 5 1/8 x 15 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination ASCE 7-10 w/ ASD Wind & EQ

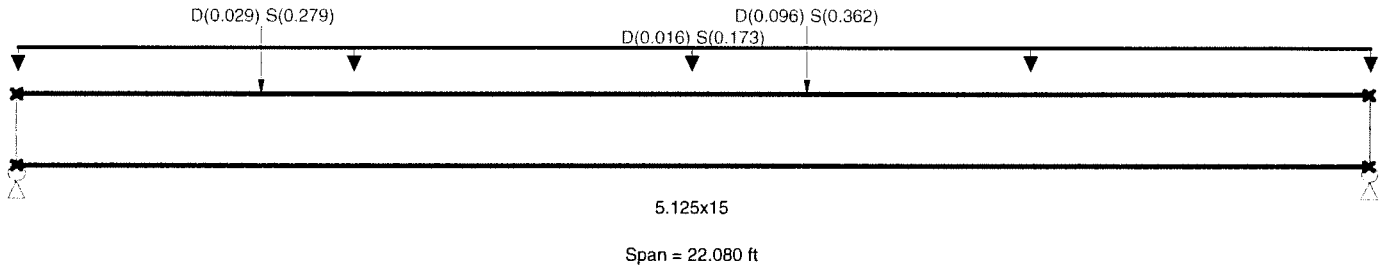
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0160, S = 0.1730 , Tributary Width = 1.0 ft
Point Load : D = 0.0960, S = 0.3620 k @ 12.920 ft
Point Load : D = 0.0290, S = 0.2790 k @ 4.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.355 : 1	Maximum Shear Stress Ratio	=	0.158 : 1
Section used for this span		5.125x15	Section used for this span		5.125x15
fb : Actual	=	954.71 psi	fv : Actual	=	48.08 psi
FB : Allowable	=	2,685.59 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	11.685 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.433 in	Ratio =	612 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.516 in	Ratio =	513 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 22.080 ft	1	0.074	0.031	0.90	0.973	1.00	1.00	1.00	1.00	1.00	2.51	156.48	2101.77	0.38	7.50	238.50
+D+L+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.080 ft	1	0.067	0.028	1.00	0.973	1.00	1.00	1.00	1.00	1.00	2.51	156.48	2335.30	0.38	7.50	265.00
+D+Lr+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.080 ft	1	0.054	0.023	1.25	0.973	1.00	1.00	1.00	1.00	1.00	2.51	156.48	2919.12	0.38	7.50	331.25
+D+S+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.080 ft	1	0.355	0.158	1.15	0.973	1.00	1.00	1.00	1.00	1.00	15.29	954.71	2685.59	2.46	48.08	304.75
+D+0.750Lr+0.750L+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

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Project Title: Powdercat
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Printed: 19 MAY 2017, 8:22AM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357

Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-13 - 5 1/8 x 15 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 22.080 ft	1	0.054	0.023	1.25	0.973	1.00	1.00	1.00	1.00	1.00	2.51	156.48	2919.12	0.38	7.50	331.25
+D+0.750L+0.750S+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.080 ft	1	0.281	0.124	1.15	0.973	1.00	1.00	1.00	1.00	1.00	12.09	755.11	2685.59	1.94	37.94	304.75
+D+W+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.080 ft	1	0.042	0.018	1.60	0.973	1.00	1.00	1.00	1.00	1.00	2.51	156.48	3736.48	0.38	7.50	424.00
+D+E+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.080 ft	1	0.042	0.018	1.60	0.973	1.00	1.00	1.00	1.00	1.00	2.51	156.48	3736.48	0.38	7.50	424.00
+D+0.750Lr+0.750L+0.750W+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.080 ft	1	0.042	0.018	1.60	0.973	1.00	1.00	1.00	1.00	1.00	2.51	156.48	3736.48	0.38	7.50	424.00
+D+0.750L+0.750S+0.750W+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.080 ft	1	0.202	0.089	1.60	0.973	1.00	1.00	1.00	1.00	1.00	12.09	755.11	3736.48	1.94	37.94	424.00
+D+0.750L+0.750S+0.750E+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.080 ft	1	0.202	0.089	1.60	0.973	1.00	1.00	1.00	1.00	1.00	12.09	755.11	3736.48	1.94	37.94	424.00
+0.60D+W+0.60H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.080 ft	1	0.025	0.011	1.60	0.973	1.00	1.00	1.00	1.00	1.00	1.50	93.89	3736.48	0.23	4.50	424.00
+0.60D+E+0.60H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.080 ft	1	0.025	0.011	1.60	0.973	1.00	1.00	1.00	1.00	1.00	1.50	93.89	3736.48	0.23	4.50	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.5164	11.121		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.713	2.594
Overall MINimum	0.254	0.253
+D+H	0.424	0.422
+D+L+H	0.424	0.422
+D+Lr+H	0.424	0.422
+D+S+H	2.713	2.594
+D+0.750Lr+0.750L+H	0.424	0.422
+D+0.750L+0.750S+H	2.141	2.051
+D+W+H	0.424	0.422
+D+E+H	0.424	0.422
+D+0.750Lr+0.750L+0.750W+H	0.424	0.422
+D+0.750L+0.750S+0.750W+H	2.141	2.051
+D+0.750L+0.750S+0.750E+H	2.141	2.051
+0.60D+W+0.60H	0.254	0.253
+0.60D+E+0.60H	0.254	0.253
D Only	0.424	0.422
Lr Only		
L Only		
S Only	2.289	2.172
W Only		
E Only		
H Only		

rudow + berry, inc.
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scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Steel Beam

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-14 - HSS8x4x3/8

CODE REFERENCES

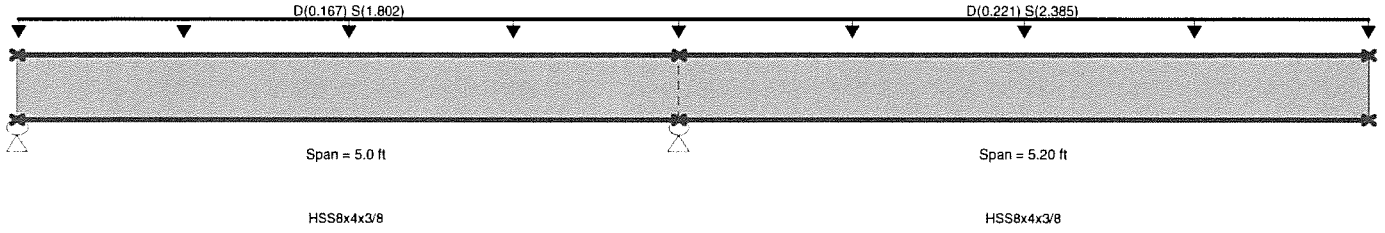
Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	46.0 ksi
Beam Bracing :	Beam bracing is defined Beam-by-Beam	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.1670, S = 1.802 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.2210, S = 2.385 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.825 : 1**	Maximum Shear Stress Ratio =	**0.171 : 1**
Section used for this span	**HSS8x4x3/8**	Section used for this span	**HSS8x4x3/8**
Ma : Applied	35.605 k-ft	Va : Applied	13.694 k
Mn / Omega : Allowable	43.154 k-ft	Vn/Omega : Allowable	80.208 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	5.000ft	Location of maximum on span	5.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.455 in	Ratio =	274 >=240.
Max Upward Transient Deflection	-0.038 in	Ratio =	1,563 >=240.
Max Downward Total Deflection	0.502 in	Ratio =	249 >=180
Max Upward Total Deflection	-0.042 in	Ratio =	1417 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 5.00 ft	1	0.078	0.016		-3.36	3.36	72.07	43.15	1.00	1.00	1.29	133.95	80.21
Dsgn. L = 5.20 ft	2	0.078	0.016		-3.36	3.36	72.07	43.15	1.00	1.00	1.29	133.95	80.21
+D+L+H													
Dsgn. L = 5.00 ft	1	0.078	0.016		-3.36	3.36	72.07	43.15	1.00	1.00	1.29	133.95	80.21
Dsgn. L = 5.20 ft	2	0.078	0.016		-3.36	3.36	72.07	43.15	1.00	1.00	1.29	133.95	80.21
+D+Lr+H													
Dsgn. L = 5.00 ft	1	0.078	0.016		-3.36	3.36	72.07	43.15	1.00	1.00	1.29	133.95	80.21
Dsgn. L = 5.20 ft	2	0.078	0.016		-3.36	3.36	72.07	43.15	1.00	1.00	1.29	133.95	80.21
+D+S+H													
Dsgn. L = 5.00 ft	1	0.825	0.171		-35.60	35.60	72.07	43.15	1.00	1.00	13.69	133.95	80.21
Dsgn. L = 5.20 ft	2	0.825	0.171		-35.60	35.60	72.07	43.15	1.00	1.00	13.69	133.95	80.21
+D+0.750Lr+0.750L+H													
Dsgn. L = 5.00 ft	1	0.078	0.016		-3.36	3.36	72.07	43.15	1.00	1.00	1.29	133.95	80.21
Dsgn. L = 5.20 ft	2	0.078	0.016		-3.36	3.36	72.07	43.15	1.00	1.00	1.29	133.95	80.21
+D+0.750L+0.750S+H													
Dsgn. L = 5.00 ft	1	0.638	0.132		-27.54	27.54	72.07	43.15	1.00	1.00	10.59	133.95	80.21
Dsgn. L = 5.20 ft	2	0.638	0.132		-27.54	27.54	72.07	43.15	1.00	1.00	10.59	133.95	80.21
+D+W+H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 82

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Steel Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-14 - HSS8x4x3/8

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 5.00 ft	1	0.078	0.016		-3.36	3.36	72.07	43.15	1.00	1.00	1.29	133.95	80.21
Dsgn. L = 5.20 ft	2	0.078	0.016		-3.36	3.36	72.07	43.15	1.00	1.00	1.29	133.95	80.21
+D+E+H													
Dsgn. L = 5.00 ft	1	0.078	0.016		-3.36	3.36	72.07	43.15	1.00	1.00	1.29	133.95	80.21
Dsgn. L = 5.20 ft	2	0.078	0.016		-3.36	3.36	72.07	43.15	1.00	1.00	1.29	133.95	80.21
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 5.00 ft	1	0.078	0.016		-3.36	3.36	72.07	43.15	1.00	1.00	1.29	133.95	80.21
Dsgn. L = 5.20 ft	2	0.078	0.016		-3.36	3.36	72.07	43.15	1.00	1.00	1.29	133.95	80.21
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 5.00 ft	1	0.638	0.132		-27.54	27.54	72.07	43.15	1.00	1.00	10.59	133.95	80.21
Dsgn. L = 5.20 ft	2	0.638	0.132		-27.54	27.54	72.07	43.15	1.00	1.00	10.59	133.95	80.21
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 5.00 ft	1	0.638	0.132		-27.54	27.54	72.07	43.15	1.00	1.00	10.59	133.95	80.21
Dsgn. L = 5.20 ft	2	0.638	0.132		-27.54	27.54	72.07	43.15	1.00	1.00	10.59	133.95	80.21
+0.60D+W+0.60H													
Dsgn. L = 5.00 ft	1	0.047	0.010		-2.02	2.02	72.07	43.15	1.00	1.00	0.78	133.95	80.21
Dsgn. L = 5.20 ft	2	0.047	0.010		-2.02	2.02	72.07	43.15	1.00	1.00	0.78	133.95	80.21
+0.60D+E+0.60H													
Dsgn. L = 5.00 ft	1	0.047	0.010		-2.02	2.02	72.07	43.15	1.00	1.00	0.78	133.95	80.21
Dsgn. L = 5.20 ft	2	0.047	0.010		-2.02	2.02	72.07	43.15	1.00	1.00	0.78	133.95	80.21

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0423	3.060
+D+S+H	2	0.5020	5.200		0.0000	3.060

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-2.130	25.806	
Overall MINimum	-0.111	1.470	
+D+H	-0.186	2.450	
+D+L+H	-0.186	2.450	
+D+Lr+H	-0.186	2.450	
+D+S+H	-2.130	25.806	
+D+0.750Lr+0.750L+H	-0.186	2.450	
+D+0.750L+0.750S+H	-1.644	19.967	
+D+W+H	-0.186	2.450	
+D+E+H	-0.186	2.450	
+D+0.750Lr+0.750L+0.750W+H	-0.186	2.450	
+D+0.750L+0.750S+0.750W+H	-1.644	19.967	
+D+0.750L+0.750S+0.750E+H	-1.644	19.967	
+0.60D+W+0.60H	-0.111	1.470	
+0.60D+E+0.60H	-0.111	1.470	
D Only	-0.186	2.450	
Lr Only			
L Only			
S Only	-1.944	23.356	
W Only			
E Only			
H Only			

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Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 83

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Steel Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — **Licensee : RUDOW & BERRY**

Description : Unit 133 - EOHB-8 - HSS8x4x3/8

CODE REFERENCES

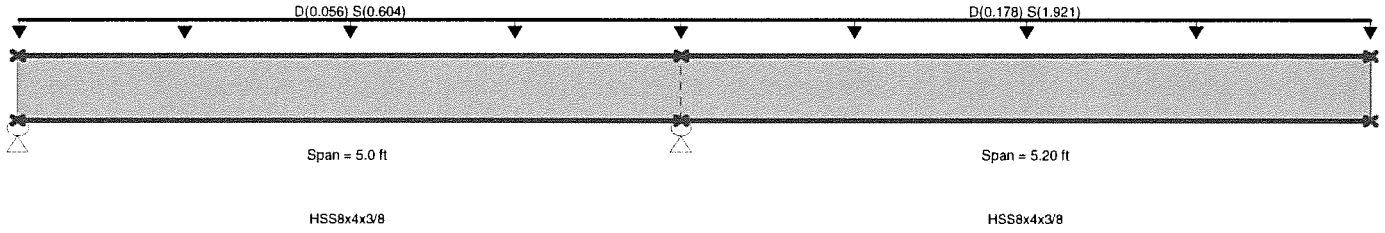
Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	46.0 ksi
Beam Bracing :	Beam bracing is defined Beam-by-Beam	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.0560, S = 0.6040 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.1780, S = 1.921 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.666 : 1	Maximum Shear Stress Ratio =	0.138 : 1
Section used for this span	HSS8x4x3/8	Section used for this span	HSS8x4x3/8
Ma : Applied	28.750 k-ft	Va : Applied	11.058 k
Mn / Omega : Allowable	43.154 k-ft	Vn/Omega : Allowable	80.208 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	5.000ft	Location of maximum on span	5.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.390 in	Ratio =	320 >=240.
Max Upward Transient Deflection	-0.038 in	Ratio =	1,593 >=240.
Max Downward Total Deflection	0.431 in	Ratio =	290 >=180
Max Upward Total Deflection	-0.042 in	Ratio =	1445 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 5.00 ft	1	0.064	0.013		-2.78	2.78	72.07	43.15	1.00	1.00	1.07	133.95	80.21
Dsgn. L = 5.20 ft	2	0.064	0.013		-2.78	2.78	72.07	43.15	1.00	1.00	1.07	133.95	80.21
+D+L+H													
Dsgn. L = 5.00 ft	1	0.064	0.013		-2.78	2.78	72.07	43.15	1.00	1.00	1.07	133.95	80.21
Dsgn. L = 5.20 ft	2	0.064	0.013		-2.78	2.78	72.07	43.15	1.00	1.00	1.07	133.95	80.21
+D+Lr+H													
Dsgn. L = 5.00 ft	1	0.064	0.013		-2.78	2.78	72.07	43.15	1.00	1.00	1.07	133.95	80.21
Dsgn. L = 5.20 ft	2	0.064	0.013		-2.78	2.78	72.07	43.15	1.00	1.00	1.07	133.95	80.21
+D+S+H													
Dsgn. L = 5.00 ft	1	0.666	0.138		-28.75	28.75	72.07	43.15	1.00	1.00	11.06	133.95	80.21
Dsgn. L = 5.20 ft	2	0.666	0.138		-28.75	28.75	72.07	43.15	1.00	1.00	11.06	133.95	80.21
+D+0.750Lr+0.750L+H													
Dsgn. L = 5.00 ft	1	0.064	0.013		-2.78	2.78	72.07	43.15	1.00	1.00	1.07	133.95	80.21
Dsgn. L = 5.20 ft	2	0.064	0.013		-2.78	2.78	72.07	43.15	1.00	1.00	1.07	133.95	80.21
+D+0.750L+0.750S+H													
Dsgn. L = 5.00 ft	1	0.516	0.107		-22.26	22.26	72.07	43.15	1.00	1.00	8.56	133.95	80.21
Dsgn. L = 5.20 ft	2	0.516	0.107		-22.26	22.26	72.07	43.15	1.00	1.00	8.56	133.95	80.21
+D+W+H													

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4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

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Steel Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357

Licensee : RUDOW & BERRY

Description : Unit 133 - EOHB-8 - HSS8x4x3/8

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 5.00 ft	1	0.064	0.013		-2.78	2.78	72.07	43.15	1.00	1.00	1.07	133.95	80.21
Dsgn. L = 5.20 ft	2	0.064	0.013		-2.78	2.78	72.07	43.15	1.00	1.00	1.07	133.95	80.21
+D+E+H													
Dsgn. L = 5.00 ft	1	0.064	0.013		-2.78	2.78	72.07	43.15	1.00	1.00	1.07	133.95	80.21
Dsgn. L = 5.20 ft	2	0.064	0.013		-2.78	2.78	72.07	43.15	1.00	1.00	1.07	133.95	80.21
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 5.00 ft	1	0.064	0.013		-2.78	2.78	72.07	43.15	1.00	1.00	1.07	133.95	80.21
Dsgn. L = 5.20 ft	2	0.064	0.013		-2.78	2.78	72.07	43.15	1.00	1.00	1.07	133.95	80.21
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 5.00 ft	1	0.516	0.107		-22.26	22.26	72.07	43.15	1.00	1.00	8.56	133.95	80.21
Dsgn. L = 5.20 ft	2	0.516	0.107		-22.26	22.26	72.07	43.15	1.00	1.00	8.56	133.95	80.21
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 5.00 ft	1	0.516	0.107		-22.26	22.26	72.07	43.15	1.00	1.00	8.56	133.95	80.21
Dsgn. L = 5.20 ft	2	0.516	0.107		-22.26	22.26	72.07	43.15	1.00	1.00	8.56	133.95	80.21
+0.60D+W+0.60H													
Dsgn. L = 5.00 ft	1	0.039	0.008		-1.67	1.67	72.07	43.15	1.00	1.00	0.64	133.95	80.21
Dsgn. L = 5.20 ft	2	0.039	0.008		-1.67	1.67	72.07	43.15	1.00	1.00	0.64	133.95	80.21
+0.60D+E+0.60H													
Dsgn. L = 5.00 ft	1	0.039	0.008		-1.67	1.67	72.07	43.15	1.00	1.00	0.64	133.95	80.21
Dsgn. L = 5.20 ft	2	0.039	0.008		-1.67	1.67	72.07	43.15	1.00	1.00	0.64	133.95	80.21

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0415	2.960
+D+S+H	2	0.4308	5.200		0.0000	2.960

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-4.031	18.526	
Overall MINimum	-0.208	1.100	
+D+H	-0.347	1.833	
+D+L+H	-0.347	1.833	
+D+Lr+H	-0.347	1.833	
+D+S+H	-4.031	18.526	
+D+0.750Lr+0.750L+H	-0.347	1.833	
+D+0.750L+0.750S+H	-3.110	14.353	
+D+W+H	-0.347	1.833	
+D+E+H	-0.347	1.833	
+D+0.750Lr+0.750L+0.750W+H	-0.347	1.833	
+D+0.750L+0.750S+0.750W+H	-3.110	14.353	
+D+0.750L+0.750S+0.750E+H	-3.110	14.353	
+0.60D+W+0.60H	-0.208	1.100	
+0.60D+E+0.60H	-0.208	1.100	
D Only	-0.347	1.833	
Lr Only			
L Only			
S Only	-3.684	16.694	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 23 MAY 2017, 4:43PM

Steel Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-15 - W8x58

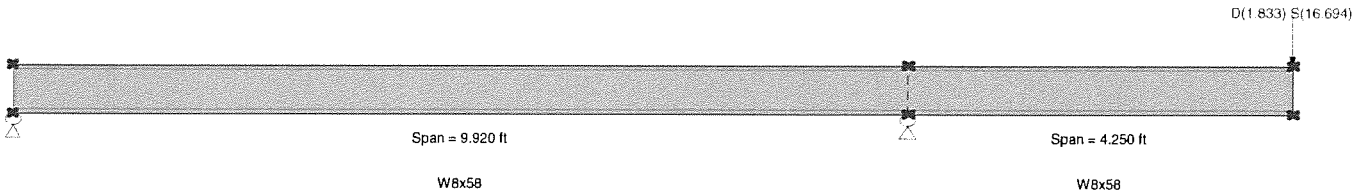
CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load(s) for Span Number 2
Point Load : D = 1.833, S = 16.694 k @ 4.250 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.531 : 1	Maximum Shear Stress Ratio =	0.210 : 1
Section used for this span	W8x58	Section used for this span	W8x58
Ma : Applied	79.264 k-ft	Va : Applied	18.774 k
Mn / Omega : Allowable	149.202 k-ft	Vn/Omega : Allowable	89.250 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	9.920ft	Location of maximum on span	9.920 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.372 in	Ratio =	274 >=240.
Max Upward Transient Deflection	-0.118 in	Ratio =	1,011 >=240.
Max Downward Total Deflection	0.413 in	Ratio =	247 >=180
Max Upward Total Deflection	-0.130 in	Ratio =	919 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 9.92 ft	1	0.056	0.023		-8.31	8.31	249.17	149.20	1.85	1.00	2.08	133.88	89.25
Dsgn. L = 4.25 ft	2	0.056	0.023		-8.31	8.31	249.17	149.20	1.00	1.00	2.08	133.88	89.25
+D+L+H													
Dsgn. L = 9.92 ft	1	0.056	0.023		-8.31	8.31	249.17	149.20	1.85	1.00	2.08	133.88	89.25
Dsgn. L = 4.25 ft	2	0.056	0.023		-8.31	8.31	249.17	149.20	1.00	1.00	2.08	133.88	89.25
+D+Lr+H													
Dsgn. L = 9.92 ft	1	0.056	0.023		-8.31	8.31	249.17	149.20	1.85	1.00	2.08	133.88	89.25
Dsgn. L = 4.25 ft	2	0.056	0.023		-8.31	8.31	249.17	149.20	1.00	1.00	2.08	133.88	89.25
+D+S+H													
Dsgn. L = 9.92 ft	1	0.531	0.210		-79.26	79.26	249.17	149.20	1.68	1.00	18.77	133.88	89.25
Dsgn. L = 4.25 ft	2	0.531	0.210		-79.26	79.26	249.17	149.20	1.00	1.00	18.77	133.88	89.25
+D+0.750Lr+0.750L+H													
Dsgn. L = 9.92 ft	1	0.056	0.023		-8.31	8.31	249.17	149.20	1.85	1.00	2.08	133.88	89.25
Dsgn. L = 4.25 ft	2	0.056	0.023		-8.31	8.31	249.17	149.20	1.00	1.00	2.08	133.88	89.25
+D+0.750L+0.750S+H													
Dsgn. L = 9.92 ft	1	0.412	0.164		-61.53	61.53	249.17	149.20	1.69	1.00	14.60	133.88	89.25
Dsgn. L = 4.25 ft	2	0.412	0.164		-61.53	61.53	249.17	149.20	1.00	1.00	14.60	133.88	89.25
+D+W+H													
Dsgn. L = 9.92 ft	1	0.056	0.023		-8.31	8.31	249.17	149.20	1.85	1.00	2.08	133.88	89.25
Dsgn. L = 4.25 ft	2	0.056	0.023		-8.31	8.31	249.17	149.20	1.00	1.00	2.08	133.88	89.25
+D+E+H													
Dsgn. L = 9.92 ft	1	0.056	0.023		-8.31	8.31	249.17	149.20	1.85	1.00	2.08	133.88	89.25
Dsgn. L = 4.25 ft	2	0.056	0.023		-8.31	8.31	249.17	149.20	1.00	1.00	2.08	133.88	89.25

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 80

Printed: 23 MAY 2017, 4:43PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-15 - W8x58

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 9.92 ft	1	0.056	0.023		-8.31	8.31	249.17	149.20	1.85	1.00	2.08	133.88	89.25
Dsgn. L = 4.25 ft	2	0.056	0.023		-8.31	8.31	249.17	149.20	1.00	1.00	2.08	133.88	89.25
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 9.92 ft	1	0.412	0.164		-61.53	61.53	249.17	149.20	1.69	1.00	14.60	133.88	89.25
Dsgn. L = 4.25 ft	2	0.412	0.164		-61.53	61.53	249.17	149.20	1.00	1.00	14.60	133.88	89.25
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 9.92 ft	1	0.412	0.164		-61.53	61.53	249.17	149.20	1.69	1.00	14.60	133.88	89.25
Dsgn. L = 4.25 ft	2	0.412	0.164		-61.53	61.53	249.17	149.20	1.00	1.00	14.60	133.88	89.25
+0.60D+W+0.60H													
Dsgn. L = 9.92 ft	1	0.033	0.014		-4.99	4.99	249.17	149.20	1.85	1.00	1.25	133.88	89.25
Dsgn. L = 4.25 ft	2	0.033	0.014		-4.99	4.99	249.17	149.20	1.00	1.00	1.25	133.88	89.25
+0.60D+E+0.60H													
Dsgn. L = 9.92 ft	1	0.033	0.014		-4.99	4.99	249.17	149.20	1.85	1.00	1.25	133.88	89.25
Dsgn. L = 4.25 ft	2	0.033	0.014		-4.99	4.99	249.17	149.20	1.00	1.00	1.25	133.88	89.25

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.1296	5.754
+D+S+H	2	0.4126	4.250		0.0000	5.754

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-7.703	27.051	
Overall MINimum	-0.330	1.923	
+D+H	-0.550	3.205	
+D+L+H	-0.550	3.205	
+D+Lr+H	-0.550	3.205	
+D+S+H	-7.703	27.051	
+D+0.750Lr+0.750L+H	-0.550	3.205	
+D+0.750L+0.750S+H	-5.915	21.090	
+D+W+H	-0.550	3.205	
+D+E+H	-0.550	3.205	
+D+0.750Lr+0.750L+0.750W+H	-0.550	3.205	
+D+0.750L+0.750S+0.750W+H	-5.915	21.090	
+D+0.750L+0.750S+0.750E+H	-5.915	21.090	
+0.60D+W+0.60H	-0.330	1.923	
+0.60D+E+0.60H	-0.330	1.923	
D Only	-0.550	3.205	
Lr Only			
L Only			
S Only	-7.152	23.846	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed 19 MAY 2017, 8:22AM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-16 - W8x24

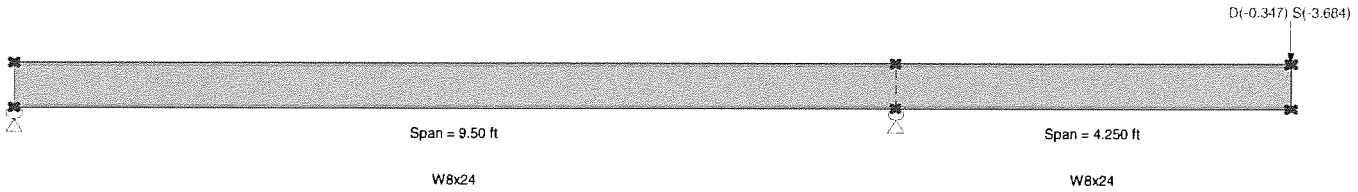
CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 36.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load(s) for Span Number 2
Point Load : D = -0.3470, S = -3.684 k @ 4.250 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.408 : 1	Maximum Shear Stress Ratio =	0.144 : 1
Section used for this span	W8x24	Section used for this span	W8x24
Ma : Applied	16.915 k-ft	Va : Applied	4.031 k
Mn / Omega : Allowable	41.497 k-ft	Vn/Omega : Allowable	27.977 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	9.500ft	Location of maximum on span	4.233 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 2

Maximum Deflection

Max Downward Transient Deflection	0.066 in	Ratio =	1,736 >=240.
Max Upward Transient Deflection	-0.220 in	Ratio =	464 >=240.
Max Downward Total Deflection	0.073 in	Ratio =	1568 >=180
Max Upward Total Deflection	-0.240 in	Ratio =	425 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 9.50 ft	1	0.030	0.009	1.26		1.26	69.30	41.50	1.34	1.00	0.25	41.97	27.98
Dsgn. L = 4.25 ft	2	0.030	0.012	1.26		1.26	69.30	41.50	1.00	1.00	0.35	41.97	27.98
+D+L+H													
Dsgn. L = 9.50 ft	1	0.030	0.009	1.26		1.26	69.30	41.50	1.34	1.00	0.25	41.97	27.98
Dsgn. L = 4.25 ft	2	0.030	0.012	1.26		1.26	69.30	41.50	1.00	1.00	0.35	41.97	27.98
+D+Lr+H													
Dsgn. L = 9.50 ft	1	0.030	0.009	1.26		1.26	69.30	41.50	1.34	1.00	0.25	41.97	27.98
Dsgn. L = 4.25 ft	2	0.030	0.012	1.26		1.26	69.30	41.50	1.00	1.00	0.35	41.97	27.98
+D+S+H													
Dsgn. L = 9.50 ft	1	0.408	0.140	16.92		16.92	69.30	41.50	1.64	1.00	3.93	41.97	27.98
Dsgn. L = 4.25 ft	2	0.408	0.144	16.92		16.92	69.30	41.50	1.00	1.00	4.03	41.97	27.98
+D+0.750Lr+0.750L+H													
Dsgn. L = 9.50 ft	1	0.030	0.009	1.26		1.26	69.30	41.50	1.34	1.00	0.25	41.97	27.98
Dsgn. L = 4.25 ft	2	0.030	0.012	1.26		1.26	69.30	41.50	1.00	1.00	0.35	41.97	27.98
+D+0.750L+0.750S+H													
Dsgn. L = 9.50 ft	1	0.313	0.108	13.00		13.00	69.30	41.50	1.63	1.00	3.01	41.97	27.98
Dsgn. L = 4.25 ft	2	0.313	0.111	13.00		13.00	69.30	41.50	1.00	1.00	3.11	41.97	27.98
+D+W+H													
Dsgn. L = 9.50 ft	1	0.030	0.009	1.26		1.26	69.30	41.50	1.34	1.00	0.25	41.97	27.98
Dsgn. L = 4.25 ft	2	0.030	0.012	1.26		1.26	69.30	41.50	1.00	1.00	0.35	41.97	27.98
+D+E+H													
Dsgn. L = 9.50 ft	1	0.030	0.009	1.26		1.26	69.30	41.50	1.34	1.00	0.25	41.97	27.98
Dsgn. L = 4.25 ft	2	0.030	0.012	1.26		1.26	69.30	41.50	1.00	1.00	0.35	41.97	27.98

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 88

Printed: 19 MAY 2017, 8:22AM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-16 - W8x24

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 9.50 ft	1	0.030	0.009	1.26		1.26	69.30	41.50	1.34	1.00	0.25	41.97	27.98
Dsgn. L = 4.25 ft	2	0.030	0.012	1.26		1.26	69.30	41.50	1.00	1.00	0.35	41.97	27.98
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 9.50 ft	1	0.313	0.108	13.00		13.00	69.30	41.50	1.63	1.00	3.01	41.97	27.98
Dsgn. L = 4.25 ft	2	0.313	0.111	13.00		13.00	69.30	41.50	1.00	1.00	3.11	41.97	27.98
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 9.50 ft	1	0.313	0.108	13.00		13.00	69.30	41.50	1.63	1.00	3.01	41.97	27.98
Dsgn. L = 4.25 ft	2	0.313	0.111	13.00		13.00	69.30	41.50	1.00	1.00	3.11	41.97	27.98
+0.60D+W+0.60H													
Dsgn. L = 9.50 ft	1	0.018	0.005	0.75		0.75	69.30	41.50	1.34	1.00	0.15	41.97	27.98
Dsgn. L = 4.25 ft	2	0.018	0.007	0.75		0.75	69.30	41.50	1.00	1.00	0.21	41.97	27.98
+0.60D+E+0.60H													
Dsgn. L = 9.50 ft	1	0.018	0.005	0.75		0.75	69.30	41.50	1.34	1.00	0.15	41.97	27.98
Dsgn. L = 4.25 ft	2	0.018	0.007	0.75		0.75	69.30	41.50	1.00	1.00	0.21	41.97	27.98

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.0727	5.472		0.0000	0.000
	2	0.0000	5.472	+D+S+H	-0.2400	4.250

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	1.895	-5.596	
Overall MINimum	0.148	-0.158	
+D+H	0.246	-0.263	
+D+L+H	0.246	-0.263	
+D+Lr+H	0.246	-0.263	
+D+S+H	1.895	-5.596	
+D+0.750Lr+0.750L+H	0.246	-0.263	
+D+0.750L+0.750S+H	1.483	-4.263	
+D+W+H	0.246	-0.263	
+D+E+H	0.246	-0.263	
+D+0.750Lr+0.750L+0.750W+H	0.246	-0.263	
+D+0.750L+0.750S+0.750W+H	1.483	-4.263	
+D+0.750L+0.750S+0.750E+H	1.483	-4.263	
+0.60D+W+0.60H	0.148	-0.158	
+0.60D+E+0.60H	0.148	-0.158	
D Only	0.246	-0.263	
Lr Only			
L Only			
S Only	1.648	-5.332	
W Only			
E Only			
H Only			

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

OHB-17

SPAN = 23'-8"

$W = \frac{2}{3}(24+24) = 160 + 173\,SL$

$P_1 = R_{OHB1L} = -380 - 370\,SL$ @ x = 10'-0"

$P_2 = R_{OHB14} + 2(R_{OHB16}) = (-186 - 1944) + 2(110 + 824)$

$= 340 - 2966\,SL$ @ x = 14'-2"

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 90

Printed: 19 MAY 2017, 8:22AM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357 Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-17 - 5 1/8 x 15 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

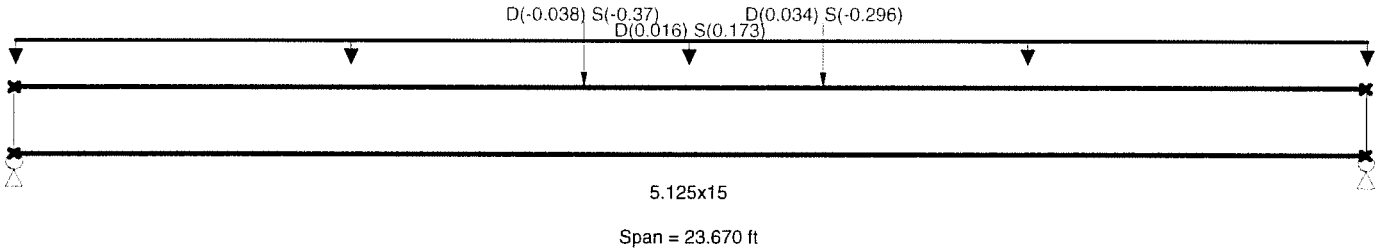
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0160, S = 0.1730 , Tributary Width = 1.0 ft
Point Load : D = -0.0380, S = -0.370 k @ 10.0 ft
Point Load : D = 0.0340, S = -0.2960 k @ 14.170 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.261 : 1	Maximum Shear Stress Ratio	=	0.119 : 1
Section used for this span		5.125x15	Section used for this span		5.125x15
fb : Actual	=	694.90 psi	fv : Actual	=	36.21 psi
FB : Allowable	=	2,666.98 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	12.181 ft	Location of maximum on span	=	22.461 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.356 in	Ratio =	798 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.444 in	Ratio =	639 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.068	0.029	0.90	0.966	1.00	1.00	1.00	1.00	1.00	2.27	141.86	2087.20	0.35	6.85	238.50
+D+L+H					0.966	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.061	0.026	1.00	0.966	1.00	1.00	1.00	1.00	1.00	2.27	141.86	2319.12	0.35	6.85	265.00
+D+Lr+H					0.966	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.049	0.021	1.25	0.966	1.00	1.00	1.00	1.00	1.00	2.27	141.86	2898.89	0.35	6.85	331.25
+D+S+H					0.966	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.261	0.119	1.15	0.966	1.00	1.00	1.00	1.00	1.00	11.13	694.90	2666.98	1.86	36.21	304.75
+D+0.750Lr+0.750L+H					0.966	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 91

Printed 19 MAY 2017, 8:22AM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-17 - 5 1/8 x 15 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 23.670 ft	1	0.049	0.021	1.25	0.966	1.00	1.00	1.00	1.00	1.00	2.27	141.86	2898.89	0.35	6.85	331.25
+D+0.750L+0.750S+H					0.966	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.209	0.095	1.15	0.966	1.00	1.00	1.00	1.00	1.00	8.91	556.56	2666.98	1.48	28.87	304.75
+D+W+H					0.966	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.038	0.016	1.60	0.966	1.00	1.00	1.00	1.00	1.00	2.27	141.86	3710.58	0.35	6.85	424.00
+D+E+H					0.966	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.038	0.016	1.60	0.966	1.00	1.00	1.00	1.00	1.00	2.27	141.86	3710.58	0.35	6.85	424.00
+D+0.750Lr+0.750L+0.750W+H					0.966	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.038	0.016	1.60	0.966	1.00	1.00	1.00	1.00	1.00	2.27	141.86	3710.58	0.35	6.85	424.00
+D+0.750L+0.750S+0.750W+H					0.966	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.150	0.068	1.60	0.966	1.00	1.00	1.00	1.00	1.00	8.91	556.56	3710.58	1.48	28.87	424.00
+D+0.750L+0.750S+0.750E+H					0.966	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.150	0.068	1.60	0.966	1.00	1.00	1.00	1.00	1.00	8.91	556.56	3710.58	1.48	28.87	424.00
+0.60D+W+0.60H					0.966	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.023	0.010	1.60	0.966	1.00	1.00	1.00	1.00	1.00	1.36	85.12	3710.58	0.21	4.11	424.00
+0.60D+E+0.60H					0.966	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.023	0.010	1.60	0.966	1.00	1.00	1.00	1.00	1.00	1.36	85.12	3710.58	0.21	4.11	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.4444	11.921		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.093	2.105
Overall MINimum	0.227	0.234
+D+H	0.378	0.391
+D+L+H	0.378	0.391
+D+Lr+H	0.378	0.391
+D+S+H	2.093	2.105
+D+0.750Lr+0.750L+H	0.378	0.391
+D+0.750L+0.750S+H	1.664	1.676
+D+W+H	0.378	0.391
+D+E+H	0.378	0.391
+D+0.750Lr+0.750L+0.750W+H	0.378	0.391
+D+0.750L+0.750S+0.750W+H	1.664	1.676
+D+0.750L+0.750S+0.750E+H	1.664	1.676
+0.60D+W+0.60H	0.227	0.234
+0.60D+E+0.60H	0.227	0.234
D Only	0.378	0.391
Lr Only		
L Only		
S Only	1.715	1.714
W Only		
E Only		
H Only		

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

OHB18 SPAN = 5'-8" CANT = 5'-3"

$W = \frac{1}{2}(9.83)(24+259) = 1180\#_D + 1273\#_S$

OHB19 SPAN = 6'-0" CANT = 5'-3"

$W = \frac{1}{2}(14)(24+259) = 1680\#_D + 1813\#_S$

EOHB9 SPAN = 5'-1" CANT = 5'-3"

$W = \frac{1}{2}(15.5)(24+259) = 1860\#_D + 2007\#_S$

EOHB-10 SPAN = 6'-11" CANT = 5'-3"

$W = \left(\frac{9.83}{2}+.38\right)(24+259) = 1270\#_D + 1370\#_S$

OHB20 SPAN = 19'-8"

$W = .61(24+259) = 168\#_D + 181\#_S$

$P_1 = R_{OHB18L} = 131\#_D + 1415\#_S$ $X = 9'-11"$

$P_2 = R_{OHB19L} = 55\#_D + 515\#_S$ $X = 13'-11"$

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed 23 MAY 2017, 2:13PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 126 - OHB-18 - HSS8x4x1/4

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

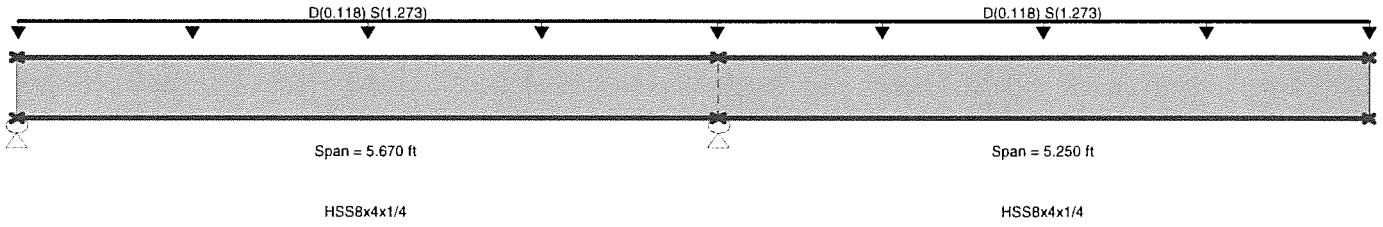
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.1180, S = 1.273 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.1180, S = 1.273 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.637 : 1	Maximum Shear Stress Ratio =	0.132 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	19.432 k-ft	Va : Applied	7.425 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	5.670ft	Location of maximum on span	5.670 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.342 in	Ratio =	368 >=240.
Max Upward Transient Deflection	-0.028 in	Ratio =	2,419 >=240.
Max Downward Total Deflection	0.379 in	Ratio =	333 >=180
Max Upward Total Deflection	-0.031 in	Ratio =	2184 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 5.67 ft	1	0.062	0.013	0.01	-1.89	1.89	50.98	30.53	1.00	1.00	0.72	93.90	56.23
Dsgn. L = 5.25 ft	2	0.062	0.013		-1.89	1.89	50.98	30.53	1.00	1.00	0.72	93.90	56.23
+D+L+H													
Dsgn. L = 5.67 ft	1	0.062	0.013	0.01	-1.89	1.89	50.98	30.53	1.00	1.00	0.72	93.90	56.23
Dsgn. L = 5.25 ft	2	0.062	0.013		-1.89	1.89	50.98	30.53	1.00	1.00	0.72	93.90	56.23
+D+Lr+H													
Dsgn. L = 5.67 ft	1	0.062	0.013	0.01	-1.89	1.89	50.98	30.53	1.00	1.00	0.72	93.90	56.23
Dsgn. L = 5.25 ft	2	0.062	0.013		-1.89	1.89	50.98	30.53	1.00	1.00	0.72	93.90	56.23
+D+S+H													
Dsgn. L = 5.67 ft	1	0.637	0.132	0.12	-19.43	19.43	50.98	30.53	1.00	1.00	7.42	93.90	56.23
Dsgn. L = 5.25 ft	2	0.637	0.132		-19.43	19.43	50.98	30.53	1.00	1.00	7.40	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 5.67 ft	1	0.062	0.013	0.01	-1.89	1.89	50.98	30.53	1.00	1.00	0.72	93.90	56.23
Dsgn. L = 5.25 ft	2	0.062	0.013		-1.89	1.89	50.98	30.53	1.00	1.00	0.72	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 5.67 ft	1	0.493	0.102	0.09	-15.05	15.05	50.98	30.53	1.00	1.00	5.75	93.90	56.23
Dsgn. L = 5.25 ft	2	0.493	0.102		-15.05	15.05	50.98	30.53	1.00	1.00	5.73	93.90	56.23
+D+W+H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed: 23 MAY 2017, 2:13PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 126 - OHB-18 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 5.67 ft	1	0.062	0.013	0.01	-1.89	1.89	50.98	30.53	1.00	1.00	0.72	93.90	56.23
Dsgn. L = 5.25 ft	2	0.062	0.013		-1.89	1.89	50.98	30.53	1.00	1.00	0.72	93.90	56.23
+D+E+H													
Dsgn. L = 5.67 ft	1	0.062	0.013	0.01	-1.89	1.89	50.98	30.53	1.00	1.00	0.72	93.90	56.23
Dsgn. L = 5.25 ft	2	0.062	0.013		-1.89	1.89	50.98	30.53	1.00	1.00	0.72	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 5.67 ft	1	0.062	0.013	0.01	-1.89	1.89	50.98	30.53	1.00	1.00	0.72	93.90	56.23
Dsgn. L = 5.25 ft	2	0.062	0.013		-1.89	1.89	50.98	30.53	1.00	1.00	0.72	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 5.67 ft	1	0.493	0.102	0.09	-15.05	15.05	50.98	30.53	1.00	1.00	5.75	93.90	56.23
Dsgn. L = 5.25 ft	2	0.493	0.102		-15.05	15.05	50.98	30.53	1.00	1.00	5.73	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 5.67 ft	1	0.493	0.102	0.09	-15.05	15.05	50.98	30.53	1.00	1.00	5.75	93.90	56.23
Dsgn. L = 5.25 ft	2	0.493	0.102		-15.05	15.05	50.98	30.53	1.00	1.00	5.73	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 5.67 ft	1	0.037	0.008	0.01	-1.13	1.13	50.98	30.53	1.00	1.00	0.43	93.90	56.23
Dsgn. L = 5.25 ft	2	0.037	0.008		-1.13	1.13	50.98	30.53	1.00	1.00	0.43	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 5.67 ft	1	0.037	0.008	0.01	-1.13	1.13	50.98	30.53	1.00	1.00	0.43	93.90	56.23
Dsgn. L = 5.25 ft	2	0.037	0.008		-1.13	1.13	50.98	30.53	1.00	1.00	0.43	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0311	3.674
+D+S+H	2	0.3787	5.250		0.0000	3.674

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.570	14.827	
Overall MINimum	0.033	0.865	
+D+H	0.055	1.441	
+D+L+H	0.055	1.441	
+D+Lr+H	0.055	1.441	
+D+S+H	0.570	14.827	
+D+0.750Lr+0.750L+H	0.055	1.441	
+D+0.750L+0.750S+H	0.442	11.481	
+D+W+H	0.055	1.441	
+D+E+H	0.055	1.441	
+D+0.750Lr+0.750L+0.750W+H	0.055	1.441	
+D+0.750L+0.750S+0.750W+H	0.442	11.481	
+D+0.750L+0.750S+0.750E+H	0.442	11.481	
+0.60D+W+0.60H	0.033	0.865	
+0.60D+E+0.60H	0.033	0.865	
D Only	0.055	1.441	
Lr Only			
L Only			
S Only	0.515	13.386	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed 23 MAY 2017, 2:14PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 126 - OHB-19 - HSS8x4x1/4

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

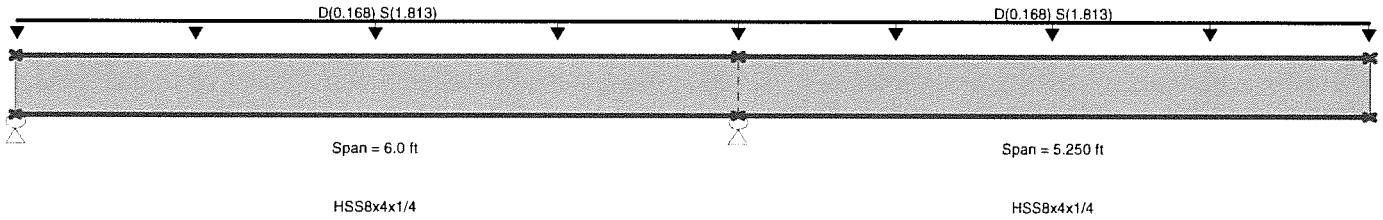
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.1680, S = 1.813 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.1680, S = 1.813 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.903 : 1	Maximum Shear Stress Ratio =	0.188 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	27.563 k-ft	Va : Applied	10.594 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	6.000 ft	Location of maximum on span	6.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.488 in	Ratio =	257 >=240.
Max Upward Transient Deflection	-0.041 in	Ratio =	1,767 >=240.
Max Downward Total Deflection	0.539 in	Ratio =	234 >=180
Max Upward Total Deflection	-0.045 in	Ratio =	1603 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 6.00 ft	1	0.084	0.018	0.05	-2.58	2.58	50.98	30.53	1.00	1.00	0.99	93.90	56.23
Dsgn. L = 5.25 ft	2	0.084	0.017		-2.58	2.58	50.98	30.53	1.00	1.00	0.98	93.90	56.23
+D+L+H													
Dsgn. L = 6.00 ft	1	0.084	0.018	0.05	-2.58	2.58	50.98	30.53	1.00	1.00	0.99	93.90	56.23
Dsgn. L = 5.25 ft	2	0.084	0.017		-2.58	2.58	50.98	30.53	1.00	1.00	0.98	93.90	56.23
+D+Lr+H													
Dsgn. L = 6.00 ft	1	0.084	0.018	0.05	-2.58	2.58	50.98	30.53	1.00	1.00	0.99	93.90	56.23
Dsgn. L = 5.25 ft	2	0.084	0.017		-2.58	2.58	50.98	30.53	1.00	1.00	0.98	93.90	56.23
+D+S+H													
Dsgn. L = 6.00 ft	1	0.903	0.188	0.49	-27.56	27.56	50.98	30.53	1.00	1.00	10.59	93.90	56.23
Dsgn. L = 5.25 ft	2	0.903	0.187		-27.56	27.56	50.98	30.53	1.00	1.00	10.50	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 6.00 ft	1	0.084	0.018	0.05	-2.58	2.58	50.98	30.53	1.00	1.00	0.99	93.90	56.23
Dsgn. L = 5.25 ft	2	0.084	0.017		-2.58	2.58	50.98	30.53	1.00	1.00	0.98	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 6.00 ft	1	0.698	0.146	0.38	-21.32	21.32	50.98	30.53	1.00	1.00	8.19	93.90	56.23
Dsgn. L = 5.25 ft	2	0.698	0.144		-21.32	21.32	50.98	30.53	1.00	1.00	8.12	93.90	56.23
+D+W+H													

rudow + berry, inc.
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480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 23 MAY 2017, 2:14PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 126 - OHB-19 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 6.00 ft	1	0.084	0.018	0.05	-2.58	2.58	50.98	30.53	1.00	1.00	0.99	93.90	56.23
Dsgn. L = 5.25 ft	2	0.084	0.017		-2.58	2.58	50.98	30.53	1.00	1.00	0.98	93.90	56.23
+D+E+H													
Dsgn. L = 6.00 ft	1	0.084	0.018	0.05	-2.58	2.58	50.98	30.53	1.00	1.00	0.99	93.90	56.23
Dsgn. L = 5.25 ft	2	0.084	0.017		-2.58	2.58	50.98	30.53	1.00	1.00	0.98	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 6.00 ft	1	0.084	0.018	0.05	-2.58	2.58	50.98	30.53	1.00	1.00	0.99	93.90	56.23
Dsgn. L = 5.25 ft	2	0.084	0.017		-2.58	2.58	50.98	30.53	1.00	1.00	0.98	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 6.00 ft	1	0.698	0.146	0.38	-21.32	21.32	50.98	30.53	1.00	1.00	8.19	93.90	56.23
Dsgn. L = 5.25 ft	2	0.698	0.144		-21.32	21.32	50.98	30.53	1.00	1.00	8.12	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 6.00 ft	1	0.698	0.146	0.38	-21.32	21.32	50.98	30.53	1.00	1.00	8.19	93.90	56.23
Dsgn. L = 5.25 ft	2	0.698	0.144		-21.32	21.32	50.98	30.53	1.00	1.00	8.12	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 6.00 ft	1	0.051	0.011	0.03	-1.55	1.55	50.98	30.53	1.00	1.00	0.59	93.90	56.23
Dsgn. L = 5.25 ft	2	0.051	0.010		-1.55	1.55	50.98	30.53	1.00	1.00	0.59	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 6.00 ft	1	0.051	0.011	0.03	-1.55	1.55	50.98	30.53	1.00	1.00	0.59	93.90	56.23
Dsgn. L = 5.25 ft	2	0.051	0.010		-1.55	1.55	50.98	30.53	1.00	1.00	0.59	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0449	3.960
+D+S+H	2	0.5388	5.250		0.0000	3.960

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	1.406	21.094	
Overall MINimum	0.079	1.183	
+D+H	0.131	1.972	
+D+L+H	0.131	1.972	
+D+Lr+H	0.131	1.972	
+D+S+H	1.406	21.094	
+D+0.750Lr+0.750L+H	0.131	1.972	
+D+0.750L+0.750S+H	1.088	16.314	
+D+W+H	0.131	1.972	
+D+E+H	0.131	1.972	
+D+0.750Lr+0.750L+0.750W+H	0.131	1.972	
+D+0.750L+0.750S+0.750W+H	1.088	16.314	
+D+0.750L+0.750S+0.750E+H	1.088	16.314	
+0.60D+W+0.60H	0.079	1.183	
+0.60D+E+0.60H	0.079	1.183	
D Only	0.131	1.972	
Lr Only			
L Only			
S Only	1.275	19.121	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 23 MAY 2017, 2:15PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 126 - EOHB-9 - HSS8x4x1/4

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

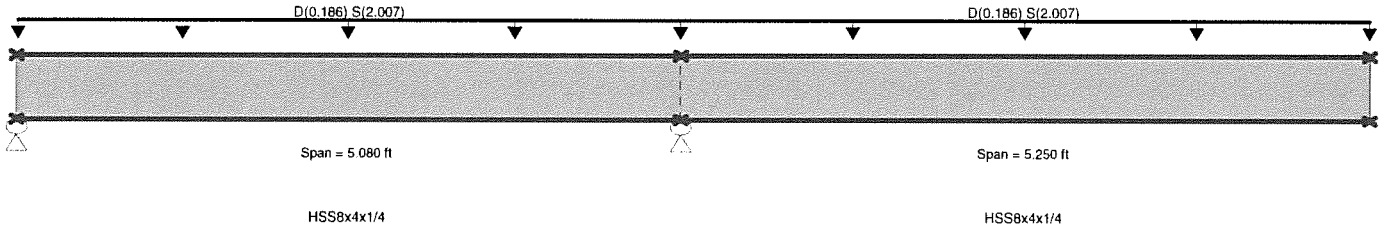
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.1860, S = 2.007 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.1860, S = 2.007 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio =	0.999 : 1	Maximum Shear Stress Ratio =	0.207 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	30.484 k-ft	Va : Applied	11.619 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	5.080ft	Location of maximum on span	5.080 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.531 in	Ratio =	237 <240.0
Max Upward Transient Deflection	-0.041 in	Ratio =	1,482 >=240.
Max Downward Total Deflection	0.585 in	Ratio =	215 >=180
Max Upward Total Deflection	-0.045 in	Ratio =	1345 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 5.08 ft	1	0.093	0.019		-2.83	2.83	50.98	30.53	1.00	1.00	1.08	93.90	56.23
Dsgn. L = 5.25 ft	2	0.093	0.019		-2.83	2.83	50.98	30.53	1.00	1.00	1.08	93.90	56.23
+D+L+H													
Dsgn. L = 5.08 ft	1	0.093	0.019		-2.83	2.83	50.98	30.53	1.00	1.00	1.08	93.90	56.23
Dsgn. L = 5.25 ft	2	0.093	0.019		-2.83	2.83	50.98	30.53	1.00	1.00	1.08	93.90	56.23
+D+Lr+H													
Dsgn. L = 5.08 ft	1	0.093	0.019		-2.83	2.83	50.98	30.53	1.00	1.00	1.08	93.90	56.23
Dsgn. L = 5.25 ft	2	0.093	0.019		-2.83	2.83	50.98	30.53	1.00	1.00	1.08	93.90	56.23
+D+S+H													
Dsgn. L = 5.08 ft	1	0.999	0.207		-30.48	30.48	50.98	30.53	1.00	1.00	11.62	93.90	56.23
Dsgn. L = 5.25 ft	2	0.999	0.207		-30.48	30.48	50.98	30.53	1.00	1.00	11.61	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 5.08 ft	1	0.093	0.019		-2.83	2.83	50.98	30.53	1.00	1.00	1.08	93.90	56.23
Dsgn. L = 5.25 ft	2	0.093	0.019		-2.83	2.83	50.98	30.53	1.00	1.00	1.08	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 5.08 ft	1	0.772	0.160		-23.57	23.57	50.98	30.53	1.00	1.00	8.98	93.90	56.23
Dsgn. L = 5.25 ft	2	0.772	0.160		-23.57	23.57	50.98	30.53	1.00	1.00	8.98	93.90	56.23
+D+W+H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed 23 MAY 2017, 2:15PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 126 - EOHB-9 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 5.08 ft	1	0.093	0.019		-2.83	2.83	50.98	30.53	1.00	1.00	1.08	93.90	56.23
Dsgn. L = 5.25 ft	2	0.093	0.019		-2.83	2.83	50.98	30.53	1.00	1.00	1.08	93.90	56.23
+D+E+H													
Dsgn. L = 5.08 ft	1	0.093	0.019		-2.83	2.83	50.98	30.53	1.00	1.00	1.08	93.90	56.23
Dsgn. L = 5.25 ft	2	0.093	0.019		-2.83	2.83	50.98	30.53	1.00	1.00	1.08	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 5.08 ft	1	0.093	0.019		-2.83	2.83	50.98	30.53	1.00	1.00	1.08	93.90	56.23
Dsgn. L = 5.25 ft	2	0.093	0.019		-2.83	2.83	50.98	30.53	1.00	1.00	1.08	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 5.08 ft	1	0.772	0.160		-23.57	23.57	50.98	30.53	1.00	1.00	8.98	93.90	56.23
Dsgn. L = 5.25 ft	2	0.772	0.160		-23.57	23.57	50.98	30.53	1.00	1.00	8.98	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 5.08 ft	1	0.772	0.160		-23.57	23.57	50.98	30.53	1.00	1.00	8.98	93.90	56.23
Dsgn. L = 5.25 ft	2	0.772	0.160		-23.57	23.57	50.98	30.53	1.00	1.00	8.98	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 5.08 ft	1	0.056	0.011		-1.70	1.70	50.98	30.53	1.00	1.00	0.65	93.90	56.23
Dsgn. L = 5.25 ft	2	0.056	0.011		-1.70	1.70	50.98	30.53	1.00	1.00	0.65	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 5.08 ft	1	0.056	0.011		-1.70	1.70	50.98	30.53	1.00	1.00	0.65	93.90	56.23
Dsgn. L = 5.25 ft	2	0.056	0.011		-1.70	1.70	50.98	30.53	1.00	1.00	0.65	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0453	3.190
+D+S+H	2	0.5847	5.250		0.0000	3.190

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-0.382	23.233	
Overall MINimum	-0.021	1.292	
+D+H	-0.035	2.153	
+D+L+H	-0.035	2.153	
+D+Lr+H	-0.035	2.153	
+D+S+H	-0.382	23.233	
+D+0.750Lr+0.750L+H	-0.035	2.153	
+D+0.750L+0.750S+H	-0.296	17.963	
+D+W+H	-0.035	2.153	
+D+E+H	-0.035	2.153	
+D+0.750Lr+0.750L+0.750W+H	-0.035	2.153	
+D+0.750L+0.750S+0.750W+H	-0.296	17.963	
+D+0.750L+0.750S+0.750E+H	-0.296	17.963	
+0.60D+W+0.60H	-0.021	1.292	
+0.60D+E+0.60H	-0.021	1.292	
D Only	-0.035	2.153	
Lr Only			
L Only			
S Only	-0.347	21.079	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 99

Printed: 23 MAY 2017, 2:15PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 126 - EOHB-10 - HSS8x4x1/4

CODE REFERENCES

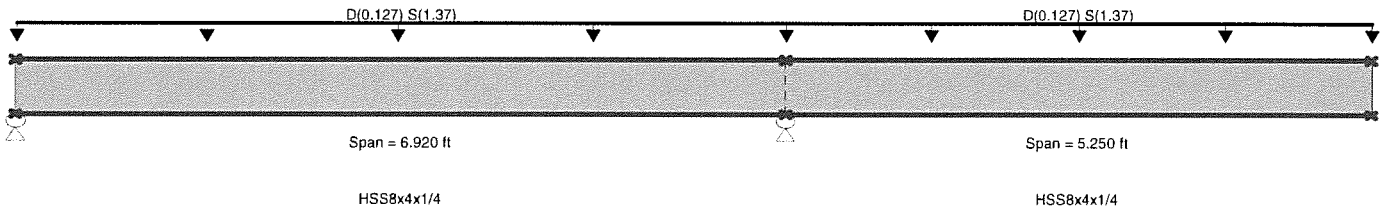
Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	46.0 ksi
Beam Bracing :	Beam bracing is defined Beam-by-Beam	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.1270, S = 1.370 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.1270, S = 1.370 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.684 : 1	Maximum Shear Stress Ratio =	0.147 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	20.893 k-ft	Va : Applied	8.265 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	6.920ft	Location of maximum on span	6.920 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.363 in	Ratio =	346 >=240.
Max Upward Transient Deflection	-0.029 in	Ratio =	2,876 >=240.
Max Downward Total Deflection	0.402 in	Ratio =	313 >=180
Max Upward Total Deflection	-0.032 in	Ratio =	2599 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 6.92 ft	1	0.066	0.014	0.16	-2.01	2.01	50.98	30.53	1.00	1.00	0.80	93.90	56.23
Dsgn. L = 5.25 ft	2	0.066	0.014		-2.01	2.01	50.98	30.53	1.00	1.00	0.77	93.90	56.23
+D+L+H													
Dsgn. L = 6.92 ft	1	0.066	0.014	0.16	-2.01	2.01	50.98	30.53	1.00	1.00	0.80	93.90	56.23
Dsgn. L = 5.25 ft	2	0.066	0.014		-2.01	2.01	50.98	30.53	1.00	1.00	0.77	93.90	56.23
+D+Lr+H													
Dsgn. L = 6.92 ft	1	0.066	0.014	0.16	-2.01	2.01	50.98	30.53	1.00	1.00	0.80	93.90	56.23
Dsgn. L = 5.25 ft	2	0.066	0.014		-2.01	2.01	50.98	30.53	1.00	1.00	0.77	93.90	56.23
+D+S+H													
Dsgn. L = 6.92 ft	1	0.684	0.147	1.63	-20.89	20.89	50.98	30.53	1.00	1.00	8.26	93.90	56.23
Dsgn. L = 5.25 ft	2	0.684	0.142		-20.89	20.89	50.98	30.53	1.00	1.00	7.96	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 6.92 ft	1	0.066	0.014	0.16	-2.01	2.01	50.98	30.53	1.00	1.00	0.80	93.90	56.23
Dsgn. L = 5.25 ft	2	0.066	0.014		-2.01	2.01	50.98	30.53	1.00	1.00	0.77	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 6.92 ft	1	0.530	0.114	1.27	-16.17	16.17	50.98	30.53	1.00	1.00	6.40	93.90	56.23
Dsgn. L = 5.25 ft	2	0.530	0.110		-16.17	16.17	50.98	30.53	1.00	1.00	6.16	93.90	56.23
+D+W+H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 100

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Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357

Licensee : RUDOW & BERRY

Description : Unit 126 - EOHB-10 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 6.92 ft	1	0.066	0.014	0.16	-2.01	2.01	50.98	30.53	1.00	1.00	0.80	93.90	56.23
Dsgn. L = 5.25 ft	2	0.066	0.014		-2.01	2.01	50.98	30.53	1.00	1.00	0.77	93.90	56.23
+D+E+H													
Dsgn. L = 6.92 ft	1	0.066	0.014	0.16	-2.01	2.01	50.98	30.53	1.00	1.00	0.80	93.90	56.23
Dsgn. L = 5.25 ft	2	0.066	0.014		-2.01	2.01	50.98	30.53	1.00	1.00	0.77	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 6.92 ft	1	0.066	0.014	0.16	-2.01	2.01	50.98	30.53	1.00	1.00	0.80	93.90	56.23
Dsgn. L = 5.25 ft	2	0.066	0.014		-2.01	2.01	50.98	30.53	1.00	1.00	0.77	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 6.92 ft	1	0.530	0.114	1.27	-16.17	16.17	50.98	30.53	1.00	1.00	6.40	93.90	56.23
Dsgn. L = 5.25 ft	2	0.530	0.110		-16.17	16.17	50.98	30.53	1.00	1.00	6.16	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 6.92 ft	1	0.530	0.114	1.27	-16.17	16.17	50.98	30.53	1.00	1.00	6.40	93.90	56.23
Dsgn. L = 5.25 ft	2	0.530	0.110		-16.17	16.17	50.98	30.53	1.00	1.00	6.16	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 6.92 ft	1	0.040	0.008	0.09	-1.21	1.21	50.98	30.53	1.00	1.00	0.48	93.90	56.23
Dsgn. L = 5.25 ft	2	0.040	0.008		-1.21	1.21	50.98	30.53	1.00	1.00	0.46	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 6.92 ft	1	0.040	0.008	0.09	-1.21	1.21	50.98	30.53	1.00	1.00	0.48	93.90	56.23
Dsgn. L = 5.25 ft	2	0.040	0.008		-1.21	1.21	50.98	30.53	1.00	1.00	0.46	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0319	4.927
+D+S+H	2	0.4020	5.250		0.0000	4.927

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	2.226	16.224	
Overall MINimum	0.129	0.938	
+D+H	0.214	1.563	
+D+L+H	0.214	1.563	
+D+Lr+H	0.214	1.563	
+D+S+H	2.226	16.224	
+D+0.750Lr+0.750L+H	0.214	1.563	
+D+0.750L+0.750S+H	1.723	12.558	
+D+W+H	0.214	1.563	
+D+E+H	0.214	1.563	
+D+0.750Lr+0.750L+0.750W+H	0.214	1.563	
+D+0.750L+0.750S+0.750W+H	1.723	12.558	
+D+0.750L+0.750S+0.750E+H	1.723	12.558	
+0.60D+W+0.60H	0.129	0.938	
+0.60D+E+0.60H	0.129	0.938	
D Only	0.214	1.563	
Lr Only			
L Only			
S Only	2.012	14.661	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

101

Printed: 23 MAY 2017, 2:21PM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 126 - OHB-20 - 3 1/8 x 15 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

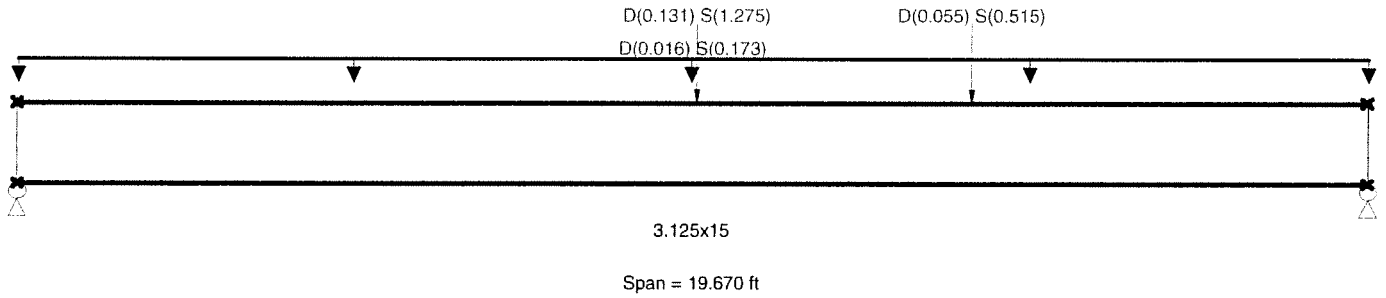
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0160, S = 0.1730 , Tributary Width = 1.0 ft
Point Load : D = 0.1310, S = 1.275 k @ 9.920 ft
Point Load : D = 0.0550, S = 0.5150 k @ 13.920 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.675 : 1	Maximum Shear Stress Ratio	=	0.297 : 1
Section used for this span		3.125x15	Section used for this span		3.125x15
fb : Actual	=	1,862.29 psi	fv : Actual	=	90.50 psi
FB : Allowable	=	2,760.00 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	9.907 ft	Location of maximum on span	=	18.450 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.662 in	Ratio =	356 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.748 in	Ratio =	315 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.670 ft	1	0.098	0.044	0.90							2.07	211.71	2160.00	0.33	10.57	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.670 ft	1	0.088	0.040	1.00							2.07	211.71	2400.00	0.33	10.57	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.670 ft	1	0.071	0.032	1.25							2.07	211.71	3000.00	0.33	10.57	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.670 ft	1	0.675	0.297	1.15							18.19	1,862.29	2760.00	2.83	90.50	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed: 23 MAY 2017, 2:21PM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357

Licensee : RUDOW & BERRY

Description : Unit 126 - OHB-20 - 3 1/8 x 15 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 19.670 ft	1	0.071	0.032	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.07	211.71	3000.00	0.33	10.57	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.670 ft	1	0.525	0.231	1.15	1.000	1.00	1.00	1.00	1.00	1.00	14.16	1,449.64	2760.00	2.20	70.52	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.670 ft	1	0.055	0.025	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.07	211.71	3840.00	0.33	10.57	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.670 ft	1	0.055	0.025	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.07	211.71	3840.00	0.33	10.57	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.670 ft	1	0.055	0.025	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.07	211.71	3840.00	0.33	10.57	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.670 ft	1	0.378	0.166	1.60	1.000	1.00	1.00	1.00	1.00	1.00	14.16	1,449.64	3840.00	2.20	70.52	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.670 ft	1	0.378	0.166	1.60	1.000	1.00	1.00	1.00	1.00	1.00	14.16	1,449.64	3840.00	2.20	70.52	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.670 ft	1	0.033	0.015	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.24	127.03	3840.00	0.20	6.34	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.670 ft	1	0.033	0.015	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.24	127.03	3840.00	0.20	6.34	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.7485	9.979		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.822	3.071
Overall MINimum	0.203	0.217
+D+H	0.338	0.362
+D+L+H	0.338	0.362
+D+Lr+H	0.338	0.362
+D+S+H	2.822	3.071
+D+0.750Lr+0.750L+H	0.338	0.362
+D+0.750L+0.750S+H	2.201	2.394
+D+W+H	0.338	0.362
+D+E+H	0.338	0.362
+D+0.750Lr+0.750L+0.750W+H	0.338	0.362
+D+0.750L+0.750S+0.750W+H	2.201	2.394
+D+0.750L+0.750S+0.750E+H	2.201	2.394
+0.60D+W+0.60H	0.203	0.217
+0.60D+E+0.60H	0.203	0.217
D Only	0.338	0.362
Lr Only		
L Only		
S Only	2.484	2.709
W Only		
E Only		
H Only		

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

OHB-21 SPAN = 6'-7" CANT = 5'-3"

$W = \frac{1}{2}(14.16)(24+259) = 1700\text{ lb} + 1834\text{ lb}$

OHB-22 SPAN = 7'-0" CANT = 5'-3"

$W = \frac{1}{2}(9.08)(24+259) = 1090\text{ lb} + 1176\text{ lb}$

EOHB-11 SPAN = 5-8 CANT = 5-3

$W = 5.142(24+259) = 1300\text{ lb} + 1403\text{ lb}$

EOHB-12 SPAN = 7-5 CANT = 5-3

$W = 2.92(24+259) = 700\text{ lb} + 755\text{ lb}$

OHB-23 SPAN = 19'-3"

$W = 1.67(24+259) = 160\text{ lb} + 173\text{ lb}$

$P_1 = R_{OHB22L} = 1960\text{ lb} + 1801\text{ lb}$ $x = 5'-0"$

$P_2 = R_{OHB21L} = 2260\text{ lb} + 2193\text{ lb}$ $x = 9'-2"$

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed 23 MAY 2017, 2:29PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 125 - OHB-21 - HSS8x4x1/4

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

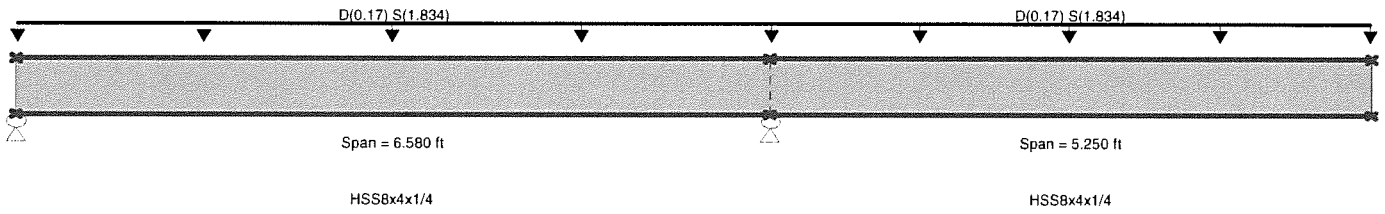
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.170, S = 1.834 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.170, S = 1.834 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.913 : 1	Maximum Shear Stress Ratio =	0.194 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	27.880 k-ft	Va : Applied	10.893 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	6.580ft	Location of maximum on span	6.580 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.491 in	Ratio =	256 >=240.
Max Upward Transient Deflection	-0.040 in	Ratio =	1,954 >=240.
Max Downward Total Deflection	0.542 in	Ratio =	232 >=180
Max Upward Total Deflection	-0.045 in	Ratio =	1772 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 6.58 ft	1	0.085	0.018	0.14	-2.60	2.60	50.98	30.53	1.00	1.00	1.02	93.90	56.23
Dsgn. L = 5.25 ft	2	0.085	0.018		-2.60	2.60	50.98	30.53	1.00	1.00	0.99	93.90	56.23
+D+L+H													
Dsgn. L = 6.58 ft	1	0.085	0.018	0.14	-2.60	2.60	50.98	30.53	1.00	1.00	1.02	93.90	56.23
Dsgn. L = 5.25 ft	2	0.085	0.018		-2.60	2.60	50.98	30.53	1.00	1.00	0.99	93.90	56.23
+D+Lr+H													
Dsgn. L = 6.58 ft	1	0.085	0.018	0.14	-2.60	2.60	50.98	30.53	1.00	1.00	1.02	93.90	56.23
Dsgn. L = 5.25 ft	2	0.085	0.018		-2.60	2.60	50.98	30.53	1.00	1.00	0.99	93.90	56.23
+D+S+H													
Dsgn. L = 6.58 ft	1	0.913	0.194	1.45	-27.88	27.88	50.98	30.53	1.00	1.00	10.89	93.90	56.23
Dsgn. L = 5.25 ft	2	0.913	0.189		-27.88	27.88	50.98	30.53	1.00	1.00	10.62	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 6.58 ft	1	0.085	0.018	0.14	-2.60	2.60	50.98	30.53	1.00	1.00	1.02	93.90	56.23
Dsgn. L = 5.25 ft	2	0.085	0.018		-2.60	2.60	50.98	30.53	1.00	1.00	0.99	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 6.58 ft	1	0.706	0.150	1.12	-21.56	21.56	50.98	30.53	1.00	1.00	8.42	93.90	56.23
Dsgn. L = 5.25 ft	2	0.706	0.146		-21.56	21.56	50.98	30.53	1.00	1.00	8.21	93.90	56.23
+D+W+H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 105

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Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357

Licensee : RUDOW & BERRY

Description : Unit 125 - OHB-21 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 6.58 ft	1	0.085	0.018	0.14	-2.60	2.60	50.98	30.53	1.00	1.00	1.02	93.90	56.23
Dsgn. L = 5.25 ft	2	0.085	0.018		-2.60	2.60	50.98	30.53	1.00	1.00	0.99	93.90	56.23
+D+E+H													
Dsgn. L = 6.58 ft	1	0.085	0.018	0.14	-2.60	2.60	50.98	30.53	1.00	1.00	1.02	93.90	56.23
Dsgn. L = 5.25 ft	2	0.085	0.018		-2.60	2.60	50.98	30.53	1.00	1.00	0.99	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 6.58 ft	1	0.085	0.018	0.14	-2.60	2.60	50.98	30.53	1.00	1.00	1.02	93.90	56.23
Dsgn. L = 5.25 ft	2	0.085	0.018		-2.60	2.60	50.98	30.53	1.00	1.00	0.99	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 6.58 ft	1	0.706	0.150	1.12	-21.56	21.56	50.98	30.53	1.00	1.00	8.42	93.90	56.23
Dsgn. L = 5.25 ft	2	0.706	0.146		-21.56	21.56	50.98	30.53	1.00	1.00	8.21	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 6.58 ft	1	0.706	0.150	1.12	-21.56	21.56	50.98	30.53	1.00	1.00	8.42	93.90	56.23
Dsgn. L = 5.25 ft	2	0.706	0.146		-21.56	21.56	50.98	30.53	1.00	1.00	8.21	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 6.58 ft	1	0.051	0.011	0.08	-1.56	1.56	50.98	30.53	1.00	1.00	0.61	93.90	56.23
Dsgn. L = 5.25 ft	2	0.051	0.011		-1.56	1.56	50.98	30.53	1.00	1.00	0.60	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 6.58 ft	1	0.051	0.011	0.08	-1.56	1.56	50.98	30.53	1.00	1.00	0.61	93.90	56.23
Dsgn. L = 5.25 ft	2	0.051	0.011		-1.56	1.56	50.98	30.53	1.00	1.00	0.60	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0446	4.553
+D+S+H	2	0.5420	5.250		0.0000	4.553

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	2.419	21.514	
Overall MINimum	0.136	1.206	
+D+H	0.226	2.010	
+D+L+H	0.226	2.010	
+D+Lr+H	0.226	2.010	
+D+S+H	2.419	21.514	
+D+0.750Lr+0.750L+H	0.226	2.010	
+D+0.750L+0.750S+H	1.871	16.638	
+D+W+H	0.226	2.010	
+D+E+H	0.226	2.010	
+D+0.750Lr+0.750L+0.750W+H	0.226	2.010	
+D+0.750L+0.750S+0.750W+H	1.871	16.638	
+D+0.750L+0.750S+0.750E+H	1.871	16.638	
+0.60D+W+0.60H	0.136	1.206	
+0.60D+E+0.60H	0.136	1.206	
D Only	0.226	2.010	
Lr Only			
L Only			
S Only	2.193	19.504	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 100

Printed: 23 MAY 2017, 2:29PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 125 - OHB-22 - HSS8x4x1/4

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

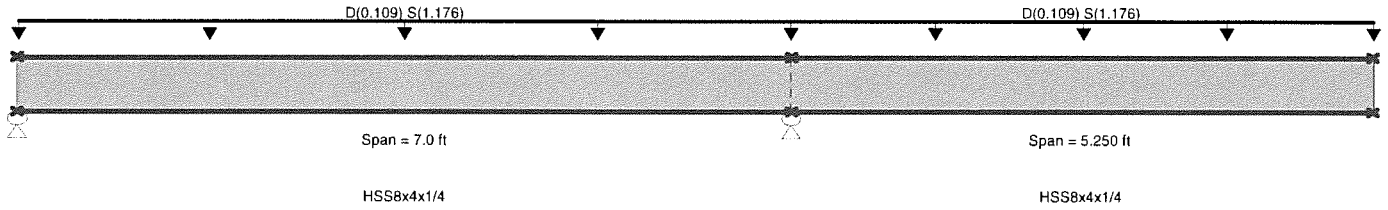
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.1090, S = 1.176 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.1090, S = 1.176 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.589 : 1	Maximum Shear Stress Ratio =	0.127 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	17.971 k-ft	Va : Applied	7.131 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	7.000ft	Location of maximum on span	7.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.311 in	Ratio =	405 >=240.
Max Upward Transient Deflection	-0.024 in	Ratio =	3,438 >=240.
Max Downward Total Deflection	0.345 in	Ratio =	366 >=180
Max Upward Total Deflection	-0.027 in	Ratio =	3101 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 7.00 ft	1	0.058	0.012	0.15	-1.76	1.76	50.98	30.53	1.00	1.00	0.70	93.90	56.23
Dsgn. L = 5.25 ft	2	0.058	0.012		-1.76	1.76	50.98	30.53	1.00	1.00	0.67	93.90	56.23
+D+L+H													
Dsgn. L = 7.00 ft	1	0.058	0.012	0.15	-1.76	1.76	50.98	30.53	1.00	1.00	0.70	93.90	56.23
Dsgn. L = 5.25 ft	2	0.058	0.012		-1.76	1.76	50.98	30.53	1.00	1.00	0.67	93.90	56.23
+D+Lr+H													
Dsgn. L = 7.00 ft	1	0.058	0.012	0.15	-1.76	1.76	50.98	30.53	1.00	1.00	0.70	93.90	56.23
Dsgn. L = 5.25 ft	2	0.058	0.012		-1.76	1.76	50.98	30.53	1.00	1.00	0.67	93.90	56.23
+D+S+H													
Dsgn. L = 7.00 ft	1	0.589	0.127	1.53	-17.97	17.97	50.98	30.53	1.00	1.00	7.13	93.90	56.23
Dsgn. L = 5.25 ft	2	0.589	0.122		-17.97	17.97	50.98	30.53	1.00	1.00	6.85	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 7.00 ft	1	0.058	0.012	0.15	-1.76	1.76	50.98	30.53	1.00	1.00	0.70	93.90	56.23
Dsgn. L = 5.25 ft	2	0.058	0.012		-1.76	1.76	50.98	30.53	1.00	1.00	0.67	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 7.00 ft	1	0.456	0.098	1.18	-13.92	13.92	50.98	30.53	1.00	1.00	5.52	93.90	56.23
Dsgn. L = 5.25 ft	2	0.456	0.094		-13.92	13.92	50.98	30.53	1.00	1.00	5.30	93.90	56.23
+D+W+H													

rudow + berry, inc.
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Project Title: Powdercat
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Project Descr:
Project ID: 16126

Printed: 23 MAY 2017, 2:29PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 125 - OHB-22 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 7.00 ft	1	0.058	0.012	0.15	-1.76	1.76	50.98	30.53	1.00	1.00	0.70	93.90	56.23
Dsgn. L = 5.25 ft	2	0.058	0.012		-1.76	1.76	50.98	30.53	1.00	1.00	0.67	93.90	56.23
+D+E+H													
Dsgn. L = 7.00 ft	1	0.058	0.012	0.15	-1.76	1.76	50.98	30.53	1.00	1.00	0.70	93.90	56.23
Dsgn. L = 5.25 ft	2	0.058	0.012		-1.76	1.76	50.98	30.53	1.00	1.00	0.67	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 7.00 ft	1	0.058	0.012	0.15	-1.76	1.76	50.98	30.53	1.00	1.00	0.70	93.90	56.23
Dsgn. L = 5.25 ft	2	0.058	0.012		-1.76	1.76	50.98	30.53	1.00	1.00	0.67	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 7.00 ft	1	0.456	0.098	1.18	-13.92	13.92	50.98	30.53	1.00	1.00	5.52	93.90	56.23
Dsgn. L = 5.25 ft	2	0.456	0.094		-13.92	13.92	50.98	30.53	1.00	1.00	5.30	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 7.00 ft	1	0.456	0.098	1.18	-13.92	13.92	50.98	30.53	1.00	1.00	5.52	93.90	56.23
Dsgn. L = 5.25 ft	2	0.456	0.094		-13.92	13.92	50.98	30.53	1.00	1.00	5.30	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 7.00 ft	1	0.035	0.007	0.09	-1.06	1.06	50.98	30.53	1.00	1.00	0.42	93.90	56.23
Dsgn. L = 5.25 ft	2	0.035	0.007		-1.06	1.06	50.98	30.53	1.00	1.00	0.40	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 7.00 ft	1	0.035	0.007	0.09	-1.06	1.06	50.98	30.53	1.00	1.00	0.42	93.90	56.23
Dsgn. L = 5.25 ft	2	0.035	0.007		-1.06	1.06	50.98	30.53	1.00	1.00	0.40	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0271	5.040
+D+S+H	2	0.3446	5.250		0.0000	5.040

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	1.997	13.977	
Overall MINimum	0.118	0.823	
+D+H	0.196	1.372	
+D+L+H	0.196	1.372	
+D+Lr+H	0.196	1.372	
+D+S+H	1.997	13.977	
+D+0.750Lr+0.750L+H	0.196	1.372	
+D+0.750L+0.750S+H	1.547	10.826	
+D+W+H	0.196	1.372	
+D+E+H	0.196	1.372	
+D+0.750Lr+0.750L+0.750W+H	0.196	1.372	
+D+0.750L+0.750S+0.750W+H	1.547	10.826	
+D+0.750L+0.750S+0.750E+H	1.547	10.826	
+0.60D+W+0.60H	0.118	0.823	
+0.60D+E+0.60H	0.118	0.823	
D Only	0.196	1.372	
Lr Only			
L Only			
S Only	1.801	12.605	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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Steel Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 125 - EOHB-11 - HSS8x4x1/4

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

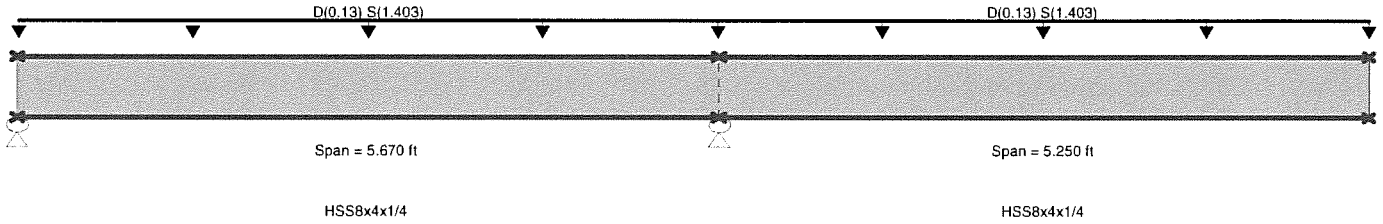
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.130, S = 1.403 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.130, S = 1.403 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.701 : 1	Maximum Shear Stress Ratio =	0.145 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	21.389 k-ft	Va : Applied	8.172 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	5.670ft	Location of maximum on span	5.670 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.377 in	Ratio =	334 >=240.
Max Upward Transient Deflection	-0.031 in	Ratio =	2,195 >=240.
Max Downward Total Deflection	0.417 in	Ratio =	302 >=180
Max Upward Total Deflection	-0.034 in	Ratio =	1985 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 5.67 ft	1	0.067	0.014	0.01	-2.05	2.05	50.98	30.53	1.00	1.00	0.78	93.90	56.23
Dsgn. L = 5.25 ft	2	0.067	0.014		-2.05	2.05	50.98	30.53	1.00	1.00	0.78	93.90	56.23
+D+L+H													
Dsgn. L = 5.67 ft	1	0.067	0.014	0.01	-2.05	2.05	50.98	30.53	1.00	1.00	0.78	93.90	56.23
Dsgn. L = 5.25 ft	2	0.067	0.014		-2.05	2.05	50.98	30.53	1.00	1.00	0.78	93.90	56.23
+D+Lr+H													
Dsgn. L = 5.67 ft	1	0.067	0.014	0.01	-2.05	2.05	50.98	30.53	1.00	1.00	0.78	93.90	56.23
Dsgn. L = 5.25 ft	2	0.067	0.014		-2.05	2.05	50.98	30.53	1.00	1.00	0.78	93.90	56.23
+D+S+H													
Dsgn. L = 5.67 ft	1	0.701	0.145	0.13	-21.39	21.39	50.98	30.53	1.00	1.00	8.17	93.90	56.23
Dsgn. L = 5.25 ft	2	0.701	0.145		-21.39	21.39	50.98	30.53	1.00	1.00	8.15	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 5.67 ft	1	0.067	0.014	0.01	-2.05	2.05	50.98	30.53	1.00	1.00	0.78	93.90	56.23
Dsgn. L = 5.25 ft	2	0.067	0.014		-2.05	2.05	50.98	30.53	1.00	1.00	0.78	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 5.67 ft	1	0.542	0.112	0.10	-16.56	16.56	50.98	30.53	1.00	1.00	6.33	93.90	56.23
Dsgn. L = 5.25 ft	2	0.542	0.112		-16.56	16.56	50.98	30.53	1.00	1.00	6.31	93.90	56.23
+D+W+H													

rudow + berry, inc.
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Engineer: MAR
Project Descr:
Project ID: 16126

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Steel Beam

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 125 - EOHB-11 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 5.67 ft	1	0.067	0.014	0.01	-2.05	2.05	50.98	30.53	1.00	1.00	0.78	93.90	56.23
Dsgn. L = 5.25 ft	2	0.067	0.014		-2.05	2.05	50.98	30.53	1.00	1.00	0.78	93.90	56.23
+D+E+H													
Dsgn. L = 5.67 ft	1	0.067	0.014	0.01	-2.05	2.05	50.98	30.53	1.00	1.00	0.78	93.90	56.23
Dsgn. L = 5.25 ft	2	0.067	0.014		-2.05	2.05	50.98	30.53	1.00	1.00	0.78	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 5.67 ft	1	0.067	0.014	0.01	-2.05	2.05	50.98	30.53	1.00	1.00	0.78	93.90	56.23
Dsgn. L = 5.25 ft	2	0.067	0.014		-2.05	2.05	50.98	30.53	1.00	1.00	0.78	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 5.67 ft	1	0.542	0.112	0.10	-16.56	16.56	50.98	30.53	1.00	1.00	6.33	93.90	56.23
Dsgn. L = 5.25 ft	2	0.542	0.112		-16.56	16.56	50.98	30.53	1.00	1.00	6.31	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 5.67 ft	1	0.542	0.112	0.10	-16.56	16.56	50.98	30.53	1.00	1.00	6.33	93.90	56.23
Dsgn. L = 5.25 ft	2	0.542	0.112		-16.56	16.56	50.98	30.53	1.00	1.00	6.31	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 5.67 ft	1	0.040	0.008	0.01	-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
Dsgn. L = 5.25 ft	2	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 5.67 ft	1	0.040	0.008	0.01	-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
Dsgn. L = 5.25 ft	2	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0343	3.674
+D+S+H	2	0.4169	5.250		0.0000	3.674

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.628	16.320	
Overall MINimum	0.036	0.940	
+D+H	0.060	1.567	
+D+L+H	0.060	1.567	
+D+Lr+H	0.060	1.567	
+D+S+H	0.628	16.320	
+D+0.750Lr+0.750L+H	0.060	1.567	
+D+0.750L+0.750S+H	0.486	12.632	
+D+W+H	0.060	1.567	
+D+E+H	0.060	1.567	
+D+0.750Lr+0.750L+0.750W+H	0.060	1.567	
+D+0.750L+0.750S+0.750W+H	0.486	12.632	
+D+0.750L+0.750S+0.750E+H	0.486	12.632	
+0.60D+W+0.60H	0.036	0.940	
+0.60D+E+0.60H	0.036	0.940	
D Only	0.060	1.567	
Lr Only			
L Only			
S Only	0.567	14.753	
W Only			
E Only			
H Only			

rudow + berry, inc.
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scottsdale, arizona 85251
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Project Descr:

Project ID: 16126 IID

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Steel Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357 Licensee : RUDOW & BERRY

Description : Unit 125 - EOHB-12 - HSS8x4x1/4

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

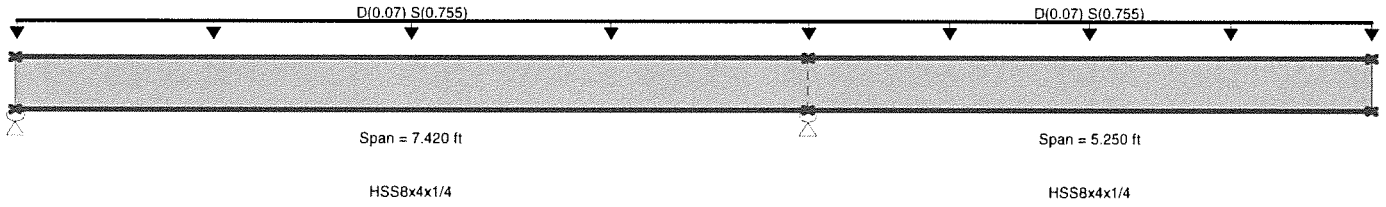
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.070, S = 0.7550 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.070, S = 0.7550 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.381 : 1	Maximum Shear Stress Ratio =	0.084 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	11.632 k-ft	Va : Applied	4.699 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	7.420ft	Location of maximum on span	7.420 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.195 in	Ratio =	645 >=240.
Max Upward Transient Deflection	-0.014 in	Ratio =	6,290 >=240.
Max Downward Total Deflection	0.218 in	Ratio =	578 >=180
Max Upward Total Deflection	-0.016 in	Ratio =	5627 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 7.42 ft	1	0.040	0.009	0.15	-1.23	1.23	50.98	30.53	1.00	1.00	0.50	93.90	56.23
Dsgn. L = 5.25 ft	2	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
+D+L+H													
Dsgn. L = 7.42 ft	1	0.040	0.009	0.15	-1.23	1.23	50.98	30.53	1.00	1.00	0.50	93.90	56.23
Dsgn. L = 5.25 ft	2	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
+D+Lr+H													
Dsgn. L = 7.42 ft	1	0.040	0.009	0.15	-1.23	1.23	50.98	30.53	1.00	1.00	0.50	93.90	56.23
Dsgn. L = 5.25 ft	2	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
+D+S+H													
Dsgn. L = 7.42 ft	1	0.381	0.084	1.45	-11.63	11.63	50.98	30.53	1.00	1.00	4.70	93.90	56.23
Dsgn. L = 5.25 ft	2	0.381	0.079		-11.63	11.63	50.98	30.53	1.00	1.00	4.43	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 7.42 ft	1	0.040	0.009	0.15	-1.23	1.23	50.98	30.53	1.00	1.00	0.50	93.90	56.23
Dsgn. L = 5.25 ft	2	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 7.42 ft	1	0.296	0.065	1.12	-9.03	9.03	50.98	30.53	1.00	1.00	3.65	93.90	56.23
Dsgn. L = 5.25 ft	2	0.296	0.061		-9.03	9.03	50.98	30.53	1.00	1.00	3.44	93.90	56.23
+D+W+H													

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Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 7.42 ft	1	0.040	0.009	0.15	-1.23	1.23	50.98	30.53	1.00	1.00	0.50	93.90	56.23
Dsgn. L = 5.25 ft	2	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
+D+E+H													
Dsgn. L = 7.42 ft	1	0.040	0.009	0.15	-1.23	1.23	50.98	30.53	1.00	1.00	0.50	93.90	56.23
Dsgn. L = 5.25 ft	2	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 7.42 ft	1	0.040	0.009	0.15	-1.23	1.23	50.98	30.53	1.00	1.00	0.50	93.90	56.23
Dsgn. L = 5.25 ft	2	0.040	0.008		-1.23	1.23	50.98	30.53	1.00	1.00	0.47	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 7.42 ft	1	0.296	0.065	1.12	-9.03	9.03	50.98	30.53	1.00	1.00	3.65	93.90	56.23
Dsgn. L = 5.25 ft	2	0.296	0.061		-9.03	9.03	50.98	30.53	1.00	1.00	3.44	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 7.42 ft	1	0.296	0.065	1.12	-9.03	9.03	50.98	30.53	1.00	1.00	3.65	93.90	56.23
Dsgn. L = 5.25 ft	2	0.296	0.061		-9.03	9.03	50.98	30.53	1.00	1.00	3.44	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 7.42 ft	1	0.024	0.005	0.09	-0.74	0.74	50.98	30.53	1.00	1.00	0.30	93.90	56.23
Dsgn. L = 5.25 ft	2	0.024	0.005		-0.74	0.74	50.98	30.53	1.00	1.00	0.28	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 7.42 ft	1	0.024	0.005	0.09	-0.74	0.74	50.98	30.53	1.00	1.00	0.30	93.90	56.23
Dsgn. L = 5.25 ft	2	0.024	0.005		-0.74	0.74	50.98	30.53	1.00	1.00	0.28	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0158	5.580
+D+S+H	2	0.2181	5.250		0.0000	5.580

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	1.564	9.130	
Overall MINimum	0.099	0.578	
+D+H	0.165	0.963	
+D+L+H	0.165	0.963	
+D+Lr+H	0.165	0.963	
+D+S+H	1.564	9.130	
+D+0.750Lr+0.750L+H	0.165	0.963	
+D+0.750L+0.750S+H	1.214	7.088	
+D+W+H	0.165	0.963	
+D+E+H	0.165	0.963	
+D+0.750Lr+0.750L+0.750W+H	0.165	0.963	
+D+0.750L+0.750S+0.750W+H	1.214	7.088	
+D+0.750L+0.750S+0.750E+H	1.214	7.088	
+0.60D+W+0.60H	0.099	0.578	
+0.60D+E+0.60H	0.099	0.578	
D Only	0.165	0.963	
Lr Only			
L Only			
S Only	1.399	8.167	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed: 23 MAY 2017, 2:36PM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 125 - OHB-23 - 3 1/8 x 15 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

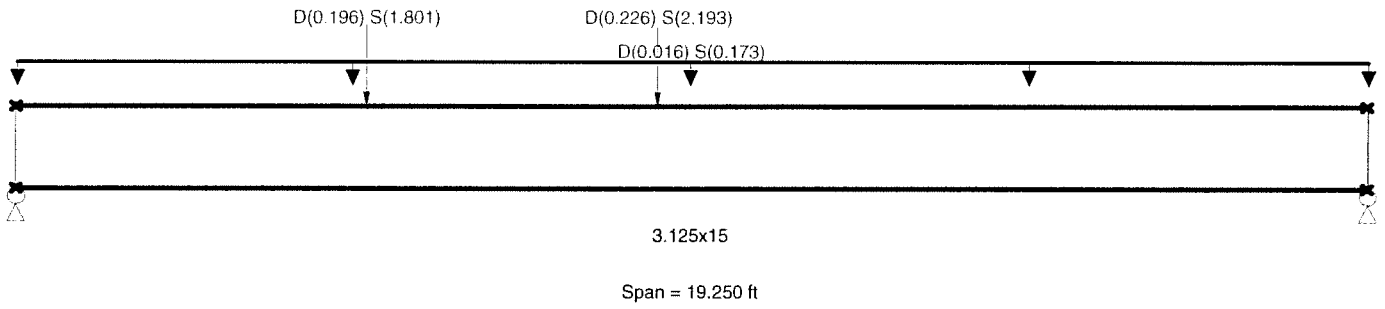
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0160, S = 0.1730 , Tributary Width = 1.0 ft
Point Load : D = 0.1960, S = 1.801 k @ 5.0 ft
Point Load : D = 0.2260, S = 2.193 k @ 9.160 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.966 : 1	Maximum Shear Stress Ratio	=	0.465 : 1
Section used for this span		3.125x15	Section used for this span		3.125x15
fb : Actual	=	2,665.35 psi	fv : Actual	=	141.61 psi
FB : Allowable	=	2,760.00 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	9.133 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.906 in	Ratio =	254 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	1.017 in	Ratio =	227 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.133	0.065	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.81	287.27	2160.00	0.48	15.49	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.120	0.058	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.81	287.27	2400.00	0.48	15.49	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.096	0.047	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.81	287.27	3000.00	0.48	15.49	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.966	0.465	1.15	1.000	1.00	1.00	1.00	1.00	1.00	26.03	2,665.35	2760.00	4.43	141.61	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
4021 north 75th street, #101
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480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed: 23 MAY 2017, 2:36PM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357

Licensee : RUDOW & BERRY

Description : Unit 125 - OHB-23 - 3 1/8 x 15 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 19.250 ft	1	0.096	0.047	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.81	287.27	3000.00	0.48	15.49	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.750	0.361	1.15	1.000	1.00	1.00	1.00	1.00	1.00	20.22	2,070.83	2760.00	3.44	110.08	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.075	0.037	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.81	287.27	3840.00	0.48	15.49	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.075	0.037	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.81	287.27	3840.00	0.48	15.49	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.075	0.037	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.81	287.27	3840.00	0.48	15.49	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.539	0.260	1.60	1.000	1.00	1.00	1.00	1.00	1.00	20.22	2,070.83	3840.00	3.44	110.08	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.539	0.260	1.60	1.000	1.00	1.00	1.00	1.00	1.00	20.22	2,070.83	3840.00	3.44	110.08	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.045	0.022	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.68	172.36	3840.00	0.29	9.29	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.045	0.022	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.68	172.36	3840.00	0.29	9.29	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	1.0174	9.344		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.663	3.587
Overall MINimum	0.309	0.246
+D+H	0.515	0.410
+D+L+H	0.515	0.410
+D+Lr+H	0.515	0.410
+D+S+H	4.663	3.587
+D+0.750Lr+0.750L+H	0.515	0.410
+D+0.750L+0.750S+H	3.626	2.793
+D+W+H	0.515	0.410
+D+E+H	0.515	0.410
+D+0.750Lr+0.750L+0.750W+H	0.515	0.410
+D+0.750L+0.750S+0.750W+H	3.626	2.793
+D+0.750L+0.750S+0.750E+H	3.626	2.793
+0.60D+W+0.60H	0.309	0.246
+0.60D+E+0.60H	0.309	0.246
D Only	0.515	0.410
Lr Only		
L Only		
S Only	4.148	3.176
W Only		
E Only		
H Only		

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

UNIT 124

OHB-24 $SPAN = 5'-9"$ $CANT = 5'-3"$

$W = 7(24+259) = 168\#_D + 1813\#_S$

OHB-25 $SPAN = 6'-2"$ $CANT = 5'-3"$

$W_{CANT} = 8.33(24+259) = 200\#_D + 2158\#_S$

$W_{SPAN} = 6.18(\ \ " \ \ ) = 148\#_D + 1597\#_S$

EOHB-13 $SPAN = 4'-10"$ $CANT = 5'-3"$

$W = 5.38(24+259) = 129\#_D + 1392\#_S$

EOHB-14 $SPAN = 7'-4"$ $CANT = 5'-3"$

$W_{SPAN} = 2.25(24+259) = 54\#_D + 583\#_S$

$W_{CANT} = 6.5(24+259) = 156\#_D + 1684\#_S$

OHB-26 $SPAN = 8'-7"$ $CANT = 4'-8"$

$P_{END} = R_{EOHB14L} = -46\#_D - 1029\#_S$

OHB-27 $SPAN = 8'-2"$ $CANT = 4'-8"$

$P_{END} = R_{EOHB14R} = 1607\#_D + 14144\#_S$

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 23 MAY 2017, 4:24PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-24 - HSS8x4x1/4

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

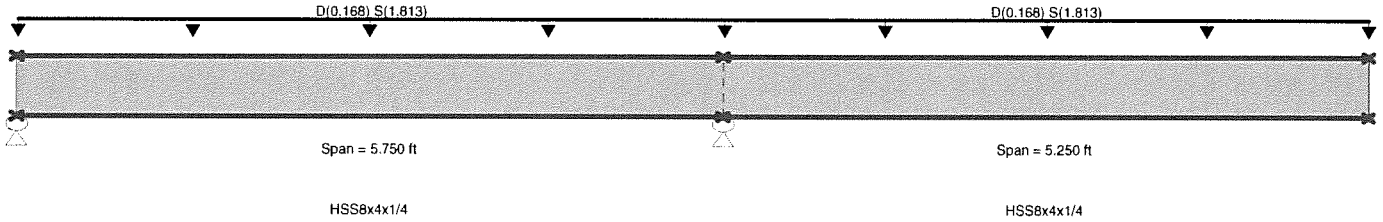
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.1680, S = 1.813 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.1680, S = 1.813 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.903 : 1	Maximum Shear Stress Ratio =	0.188 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	27.563 k-ft	Va : Applied	10.544 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	5.750 ft	Location of maximum on span	5.750 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.488 in	Ratio =	258 >=240.
Max Upward Transient Deflection	-0.040 in	Ratio =	1,712 >=240.
Max Downward Total Deflection	0.538 in	Ratio =	234 >=180
Max Upward Total Deflection	-0.044 in	Ratio =	1553 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 5.75 ft	1	0.084	0.018	0.02	-2.58	2.58	50.98	30.53	1.00	1.00	0.99	93.90	56.23
Dsgn. L = 5.25 ft	2	0.084	0.017		-2.58	2.58	50.98	30.53	1.00	1.00	0.98	93.90	56.23
+D+L+H													
Dsgn. L = 5.75 ft	1	0.084	0.018	0.02	-2.58	2.58	50.98	30.53	1.00	1.00	0.99	93.90	56.23
Dsgn. L = 5.25 ft	2	0.084	0.017		-2.58	2.58	50.98	30.53	1.00	1.00	0.98	93.90	56.23
+D+Lr+H													
Dsgn. L = 5.75 ft	1	0.084	0.018	0.02	-2.58	2.58	50.98	30.53	1.00	1.00	0.99	93.90	56.23
Dsgn. L = 5.25 ft	2	0.084	0.017		-2.58	2.58	50.98	30.53	1.00	1.00	0.98	93.90	56.23
+D+S+H													
Dsgn. L = 5.75 ft	1	0.903	0.188	0.23	-27.56	27.56	50.98	30.53	1.00	1.00	10.54	93.90	56.23
Dsgn. L = 5.25 ft	2	0.903	0.187		-27.56	27.56	50.98	30.53	1.00	1.00	10.50	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 5.75 ft	1	0.084	0.018	0.02	-2.58	2.58	50.98	30.53	1.00	1.00	0.99	93.90	56.23
Dsgn. L = 5.25 ft	2	0.084	0.017		-2.58	2.58	50.98	30.53	1.00	1.00	0.98	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 5.75 ft	1	0.698	0.145	0.18	-21.32	21.32	50.98	30.53	1.00	1.00	8.15	93.90	56.23
Dsgn. L = 5.25 ft	2	0.698	0.144		-21.32	21.32	50.98	30.53	1.00	1.00	8.12	93.90	56.23
+D+W+H													

rudow + berry, inc.
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480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 116

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Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-24 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 5.75 ft	1	0.084	0.018	0.02	-2.58	2.58	50.98	30.53	1.00	1.00	0.99	93.90	56.23
Dsgn. L = 5.25 ft	2	0.084	0.017		-2.58	2.58	50.98	30.53	1.00	1.00	0.98	93.90	56.23
+D+E+H													
Dsgn. L = 5.75 ft	1	0.084	0.018	0.02	-2.58	2.58	50.98	30.53	1.00	1.00	0.99	93.90	56.23
Dsgn. L = 5.25 ft	2	0.084	0.017		-2.58	2.58	50.98	30.53	1.00	1.00	0.98	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 5.75 ft	1	0.084	0.018	0.02	-2.58	2.58	50.98	30.53	1.00	1.00	0.99	93.90	56.23
Dsgn. L = 5.25 ft	2	0.084	0.017		-2.58	2.58	50.98	30.53	1.00	1.00	0.98	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 5.75 ft	1	0.698	0.145	0.18	-21.32	21.32	50.98	30.53	1.00	1.00	8.15	93.90	56.23
Dsgn. L = 5.25 ft	2	0.698	0.144		-21.32	21.32	50.98	30.53	1.00	1.00	8.12	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 5.75 ft	1	0.698	0.145	0.18	-21.32	21.32	50.98	30.53	1.00	1.00	8.15	93.90	56.23
Dsgn. L = 5.25 ft	2	0.698	0.144		-21.32	21.32	50.98	30.53	1.00	1.00	8.12	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 5.75 ft	1	0.051	0.011	0.01	-1.55	1.55	50.98	30.53	1.00	1.00	0.59	93.90	56.23
Dsgn. L = 5.25 ft	2	0.051	0.010		-1.55	1.55	50.98	30.53	1.00	1.00	0.59	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 5.75 ft	1	0.051	0.011	0.01	-1.55	1.55	50.98	30.53	1.00	1.00	0.59	93.90	56.23
Dsgn. L = 5.25 ft	2	0.051	0.010		-1.55	1.55	50.98	30.53	1.00	1.00	0.59	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0444	3.726
+D+S+H	2	0.5378	5.250		0.0000	3.726

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.957	21.044	
Overall MINimum	0.054	1.181	
+D+H	0.089	1.968	
+D+L+H	0.089	1.968	
+D+Lr+H	0.089	1.968	
+D+S+H	0.957	21.044	
+D+0.750Lr+0.750L+H	0.089	1.968	
+D+0.750L+0.750S+H	0.740	16.275	
+D+W+H	0.089	1.968	
+D+E+H	0.089	1.968	
+D+0.750Lr+0.750L+0.750W+H	0.089	1.968	
+D+0.750L+0.750S+0.750W+H	0.740	16.275	
+D+0.750L+0.750S+0.750E+H	0.740	16.275	
+0.60D+W+0.60H	0.054	1.181	
+0.60D+E+0.60H	0.054	1.181	
D Only	0.089	1.968	
Lr Only			
L Only			
S Only	0.867	19.076	
W Only			
E Only			
H Only			

rudow + berry, inc.
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480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed: 23 MAY 2017, 4:57PM
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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Steel Beam

Lic. # : KW-06002357

Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-25 - HSS8x4x3/8

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

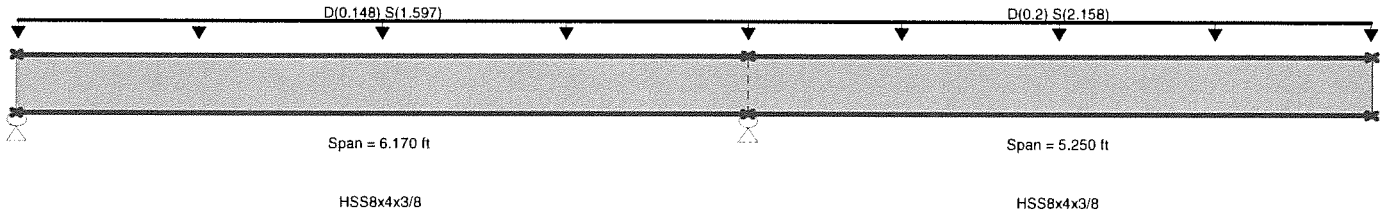
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.1480, S = 1.597 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.20, S = 2.158 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.762 : 1	Maximum Shear Stress Ratio =	0.156 : 1
Section used for this span	HSS8x4x3/8	Section used for this span	HSS8x4x3/8
Ma : Applied	32.875 k-ft	Va : Applied	12.524 k
Mn / Omega : Allowable	43.154 k-ft	Vn/Omega : Allowable	80.208 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	6.170ft	Location of maximum on span	6.170 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.450 in	Ratio =	279 >=240.
Max Upward Transient Deflection	-0.045 in	Ratio =	1,651 >=240.
Max Downward Total Deflection	0.497 in	Ratio =	253 >=180
Max Upward Total Deflection	-0.049 in	Ratio =	1498 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 6.17 ft	1	0.073	0.015	0.00	-3.13	3.13	72.07	43.15	1.00	1.00	1.19	133.95	80.21
Dsgn. L = 5.25 ft	2	0.073	0.015		-3.13	3.13	72.07	43.15	1.00	1.00	1.19	133.95	80.21
+D+L+H													
Dsgn. L = 6.17 ft	1	0.073	0.015	0.00	-3.13	3.13	72.07	43.15	1.00	1.00	1.19	133.95	80.21
Dsgn. L = 5.25 ft	2	0.073	0.015		-3.13	3.13	72.07	43.15	1.00	1.00	1.19	133.95	80.21
+D+Lr+H													
Dsgn. L = 6.17 ft	1	0.073	0.015	0.00	-3.13	3.13	72.07	43.15	1.00	1.00	1.19	133.95	80.21
Dsgn. L = 5.25 ft	2	0.073	0.015		-3.13	3.13	72.07	43.15	1.00	1.00	1.19	133.95	80.21
+D+S+H													
Dsgn. L = 6.17 ft	1	0.762	0.156	0.01	-32.87	32.87	72.07	43.15	1.00	1.00	12.52	133.95	80.21
Dsgn. L = 5.25 ft	2	0.762	0.156		-32.87	32.87	72.07	43.15	1.00	1.00	12.52	133.95	80.21
+D+0.750Lr+0.750L+H													
Dsgn. L = 6.17 ft	1	0.073	0.015	0.00	-3.13	3.13	72.07	43.15	1.00	1.00	1.19	133.95	80.21
Dsgn. L = 5.25 ft	2	0.073	0.015		-3.13	3.13	72.07	43.15	1.00	1.00	1.19	133.95	80.21
+D+0.750L+0.750S+H													
Dsgn. L = 6.17 ft	1	0.590	0.121	0.00	-25.44	25.44	72.07	43.15	1.00	1.00	9.69	133.95	80.21
Dsgn. L = 5.25 ft	2	0.590	0.121		-25.44	25.44	72.07	43.15	1.00	1.00	9.69	133.95	80.21
+D+W+H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed: 23 MAY 2017, 4:57PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-25 - HSS8x4x3/8

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 6.17 ft	1	0.073	0.015	0.00	-3.13	3.13	72.07	43.15	1.00	1.00	1.19	133.95	80.21
Dsgn. L = 5.25 ft	2	0.073	0.015		-3.13	3.13	72.07	43.15	1.00	1.00	1.19	133.95	80.21
+D+E+H													
Dsgn. L = 6.17 ft	1	0.073	0.015	0.00	-3.13	3.13	72.07	43.15	1.00	1.00	1.19	133.95	80.21
Dsgn. L = 5.25 ft	2	0.073	0.015		-3.13	3.13	72.07	43.15	1.00	1.00	1.19	133.95	80.21
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 6.17 ft	1	0.073	0.015	0.00	-3.13	3.13	72.07	43.15	1.00	1.00	1.19	133.95	80.21
Dsgn. L = 5.25 ft	2	0.073	0.015		-3.13	3.13	72.07	43.15	1.00	1.00	1.19	133.95	80.21
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 6.17 ft	1	0.590	0.121	0.00	-25.44	25.44	72.07	43.15	1.00	1.00	9.69	133.95	80.21
Dsgn. L = 5.25 ft	2	0.590	0.121		-25.44	25.44	72.07	43.15	1.00	1.00	9.69	133.95	80.21
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 6.17 ft	1	0.590	0.121	0.00	-25.44	25.44	72.07	43.15	1.00	1.00	9.69	133.95	80.21
Dsgn. L = 5.25 ft	2	0.590	0.121		-25.44	25.44	72.07	43.15	1.00	1.00	9.69	133.95	80.21
+0.60D+W+0.60H													
Dsgn. L = 6.17 ft	1	0.044	0.009	0.00	-1.88	1.88	72.07	43.15	1.00	1.00	0.72	133.95	80.21
Dsgn. L = 5.25 ft	2	0.044	0.009		-1.88	1.88	72.07	43.15	1.00	1.00	0.72	133.95	80.21
+0.60D+E+0.60H													
Dsgn. L = 6.17 ft	1	0.044	0.009	0.00	-1.88	1.88	72.07	43.15	1.00	1.00	0.72	133.95	80.21
Dsgn. L = 5.25 ft	2	0.044	0.009		-1.88	1.88	72.07	43.15	1.00	1.00	0.72	133.95	80.21

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0494	3.924
+D+S+H	2	0.4972	5.250		0.0000	3.924

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.140	23.320	
Overall MINimum	0.020	1.346	
+D+H	0.033	2.244	
+D+L+H	0.033	2.244	
+D+Lr+H	0.033	2.244	
+D+S+H	0.140	23.320	
+D+0.750Lr+0.750L+H	0.033	2.244	
+D+0.750L+0.750S+H	0.113	18.051	
+D+W+H	0.033	2.244	
+D+E+H	0.033	2.244	
+D+0.750Lr+0.750L+0.750W+H	0.033	2.244	
+D+0.750L+0.750S+0.750W+H	0.113	18.051	
+D+0.750L+0.750S+0.750E+H	0.113	18.051	
+0.60D+W+0.60H	0.020	1.346	
+0.60D+E+0.60H	0.020	1.346	
D Only	0.033	2.244	
Lr Only			
L Only			
S Only	0.107	21.076	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed 23 MAY 2017, 4:26PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 124 - EOHB-13 - HSS8x4x1/4

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

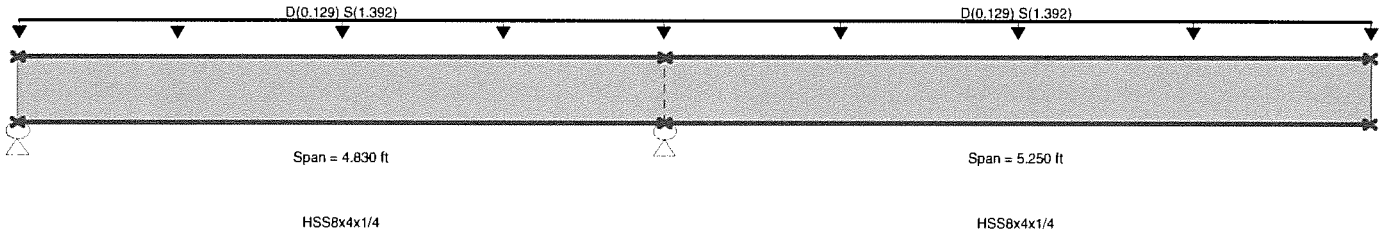
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.1290, S = 1.392 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.1290, S = 1.392 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.695 : 1	Maximum Shear Stress Ratio =	0.144 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	21.223 k-ft	Va : Applied	8.113 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	4.830ft	Location of maximum on span	4.830 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.364 in	Ratio =	346 >=240.
Max Upward Transient Deflection	-0.027 in	Ratio =	2,134 >=240.
Max Downward Total Deflection	0.403 in	Ratio =	313 >=180
Max Upward Total Deflection	-0.030 in	Ratio =	1930 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 4.83 ft	1	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.78	93.90	56.23
Dsgn. L = 5.25 ft	2	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.78	93.90	56.23
+D+L+H													
Dsgn. L = 4.83 ft	1	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.78	93.90	56.23
Dsgn. L = 5.25 ft	2	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.78	93.90	56.23
+D+Lr+H													
Dsgn. L = 4.83 ft	1	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.78	93.90	56.23
Dsgn. L = 5.25 ft	2	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.78	93.90	56.23
+D+S+H													
Dsgn. L = 4.83 ft	1	0.695	0.144		-21.22	21.22	50.98	30.53	1.00	1.00	8.11	93.90	56.23
Dsgn. L = 5.25 ft	2	0.695	0.144		-21.22	21.22	50.98	30.53	1.00	1.00	8.09	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 4.83 ft	1	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.78	93.90	56.23
Dsgn. L = 5.25 ft	2	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.78	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 4.83 ft	1	0.538	0.112		-16.43	16.43	50.98	30.53	1.00	1.00	6.28	93.90	56.23
Dsgn. L = 5.25 ft	2	0.538	0.111		-16.43	16.43	50.98	30.53	1.00	1.00	6.26	93.90	56.23
+D+W+H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 120

Printed: 23 MAY 2017, 4:26PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 124 - EOHB-13 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 4.83 ft	1	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.78	93.90	56.23
Dsgn. L = 5.25 ft	2	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.78	93.90	56.23
+D+E+H													
Dsgn. L = 4.83 ft	1	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.78	93.90	56.23
Dsgn. L = 5.25 ft	2	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.78	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 4.83 ft	1	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.78	93.90	56.23
Dsgn. L = 5.25 ft	2	0.067	0.014		-2.04	2.04	50.98	30.53	1.00	1.00	0.78	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 4.83 ft	1	0.538	0.112		-16.43	16.43	50.98	30.53	1.00	1.00	6.28	93.90	56.23
Dsgn. L = 5.25 ft	2	0.538	0.111		-16.43	16.43	50.98	30.53	1.00	1.00	6.26	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 4.83 ft	1	0.538	0.112		-16.43	16.43	50.98	30.53	1.00	1.00	6.28	93.90	56.23
Dsgn. L = 5.25 ft	2	0.538	0.111		-16.43	16.43	50.98	30.53	1.00	1.00	6.26	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 4.83 ft	1	0.040	0.008		-1.22	1.22	50.98	30.53	1.00	1.00	0.47	93.90	56.23
Dsgn. L = 5.25 ft	2	0.040	0.008		-1.22	1.22	50.98	30.53	1.00	1.00	0.47	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 4.83 ft	1	0.040	0.008		-1.22	1.22	50.98	30.53	1.00	1.00	0.47	93.90	56.23
Dsgn. L = 5.25 ft	2	0.040	0.008		-1.22	1.22	50.98	30.53	1.00	1.00	0.47	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0300	2.995
+D+S+H	2	0.4028	5.250		0.0000	2.995

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-0.675	16.198	
Overall MINimum	-0.039	0.934	
+D+H	-0.065	1.557	
+D+L+H	-0.065	1.557	
+D+Lr+H	-0.065	1.557	
+D+S+H	-0.675	16.198	
+D+0.750Lr+0.750L+H	-0.065	1.557	
+D+0.750L+0.750S+H	-0.522	12.538	
+D+W+H	-0.065	1.557	
+D+E+H	-0.065	1.557	
+D+0.750Lr+0.750L+0.750W+H	-0.065	1.557	
+D+0.750L+0.750S+0.750W+H	-0.522	12.538	
+D+0.750L+0.750S+0.750E+H	-0.522	12.538	
+0.60D+W+0.60H	-0.039	0.934	
+0.60D+E+0.60H	-0.039	0.934	
D Only	-0.065	1.557	
Lr Only			
L Only			
S Only	-0.610	14.641	
W Only			
E Only			
H Only			

rudow + berry, inc.
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Project Title: Powdercat
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Project Descr:
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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Steel Beam

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 124 - EOHB-14 - HSS8x4x3/8

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

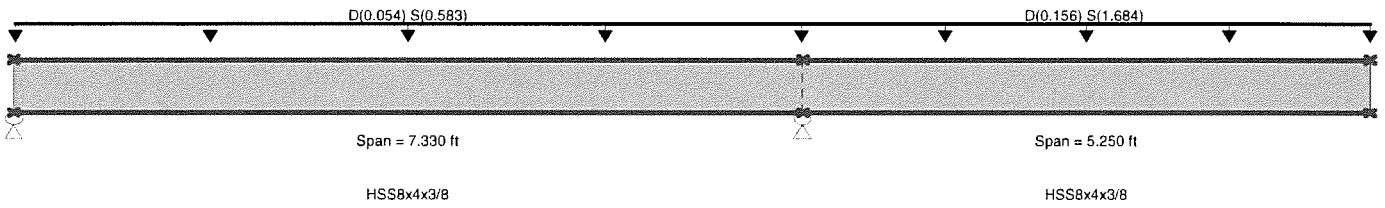
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.0540, S = 0.5830 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.1560, S = 1.684 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.596 : 1	Maximum Shear Stress Ratio =	0.122 : 1
Section used for this span	HSS8x4x3/8	Section used for this span	HSS8x4x3/8
Ma : Applied	25.736 k-ft	Va : Applied	9.804 k
Mn / Omega : Allowable	43.154 k-ft	Vn/Omega : Allowable	80.208 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	7.330ft	Location of maximum on span	7.330 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.413 in	Ratio =	305 >=240.
Max Upward Transient Deflection	-0.060 in	Ratio =	1,463 >=240.
Max Downward Total Deflection	0.457 in	Ratio =	276 >=180
Max Upward Total Deflection	-0.066 in	Ratio =	1332 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 7.33 ft	1	0.059	0.012		-2.53	2.53	72.07	43.15	1.00	1.00	0.96	133.95	80.21
Dsgn. L = 5.25 ft	2	0.059	0.012		-2.53	2.53	72.07	43.15	1.00	1.00	0.96	133.95	80.21
+D+L+H													
Dsgn. L = 7.33 ft	1	0.059	0.012		-2.53	2.53	72.07	43.15	1.00	1.00	0.96	133.95	80.21
Dsgn. L = 5.25 ft	2	0.059	0.012		-2.53	2.53	72.07	43.15	1.00	1.00	0.96	133.95	80.21
+D+Lr+H													
Dsgn. L = 7.33 ft	1	0.059	0.012		-2.53	2.53	72.07	43.15	1.00	1.00	0.96	133.95	80.21
Dsgn. L = 5.25 ft	2	0.059	0.012		-2.53	2.53	72.07	43.15	1.00	1.00	0.96	133.95	80.21
+D+S+H													
Dsgn. L = 7.33 ft	1	0.596	0.122		-25.74	25.74	72.07	43.15	1.00	1.00	9.80	133.95	80.21
Dsgn. L = 5.25 ft	2	0.596	0.122		-25.74	25.74	72.07	43.15	1.00	1.00	9.80	133.95	80.21
+D+0.750Lr+0.750L+H													
Dsgn. L = 7.33 ft	1	0.059	0.012		-2.53	2.53	72.07	43.15	1.00	1.00	0.96	133.95	80.21
Dsgn. L = 5.25 ft	2	0.059	0.012		-2.53	2.53	72.07	43.15	1.00	1.00	0.96	133.95	80.21
+D+0.750L+0.750S+H													
Dsgn. L = 7.33 ft	1	0.462	0.095		-19.93	19.93	72.07	43.15	1.00	1.00	7.59	133.95	80.21
Dsgn. L = 5.25 ft	2	0.462	0.095		-19.93	19.93	72.07	43.15	1.00	1.00	7.59	133.95	80.21
+D+W+H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 122

Printed: 23 MAY 2017, 4:27PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 124 - EOHB-14 - HSS8x4x3/8

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 7.33 ft	1	0.059	0.012		-2.53	2.53	72.07	43.15	1.00	1.00	0.96	133.95	80.21
Dsgn. L = 5.25 ft	2	0.059	0.012		-2.53	2.53	72.07	43.15	1.00	1.00	0.96	133.95	80.21
+D+E+H													
Dsgn. L = 7.33 ft	1	0.059	0.012		-2.53	2.53	72.07	43.15	1.00	1.00	0.96	133.95	80.21
Dsgn. L = 5.25 ft	2	0.059	0.012		-2.53	2.53	72.07	43.15	1.00	1.00	0.96	133.95	80.21
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 7.33 ft	1	0.059	0.012		-2.53	2.53	72.07	43.15	1.00	1.00	0.96	133.95	80.21
Dsgn. L = 5.25 ft	2	0.059	0.012		-2.53	2.53	72.07	43.15	1.00	1.00	0.96	133.95	80.21
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 7.33 ft	1	0.462	0.095		-19.93	19.93	72.07	43.15	1.00	1.00	7.59	133.95	80.21
Dsgn. L = 5.25 ft	2	0.462	0.095		-19.93	19.93	72.07	43.15	1.00	1.00	7.59	133.95	80.21
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 7.33 ft	1	0.462	0.095		-19.93	19.93	72.07	43.15	1.00	1.00	7.59	133.95	80.21
Dsgn. L = 5.25 ft	2	0.462	0.095		-19.93	19.93	72.07	43.15	1.00	1.00	7.59	133.95	80.21
+0.60D+W+0.60H													
Dsgn. L = 7.33 ft	1	0.035	0.007		-1.52	1.52	72.07	43.15	1.00	1.00	0.58	133.95	80.21
Dsgn. L = 5.25 ft	2	0.035	0.007		-1.52	1.52	72.07	43.15	1.00	1.00	0.58	133.95	80.21
+0.60D+E+0.60H													
Dsgn. L = 7.33 ft	1	0.035	0.007		-1.52	1.52	72.07	43.15	1.00	1.00	0.58	133.95	80.21
Dsgn. L = 5.25 ft	2	0.035	0.007		-1.52	1.52	72.07	43.15	1.00	1.00	0.58	133.95	80.21

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0660	4.486
+D+S+H	2	0.4565	5.250		0.0000	4.486

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-1.076	15.751	
Overall MINimum	-0.028	0.964	
+D+H	-0.046	1.607	
+D+L+H	-0.046	1.607	
+D+Lr+H	-0.046	1.607	
+D+S+H	-1.076	15.751	
+D+0.750Lr+0.750L+H	-0.046	1.607	
+D+0.750L+0.750S+H	-0.818	12.215	
+D+W+H	-0.046	1.607	
+D+E+H	-0.046	1.607	
+D+0.750Lr+0.750L+0.750W+H	-0.046	1.607	
+D+0.750L+0.750S+0.750W+H	-0.818	12.215	
+D+0.750L+0.750S+0.750E+H	-0.818	12.215	
+0.60D+W+0.60H	-0.028	0.964	
+0.60D+E+0.60H	-0.028	0.964	
D Only	-0.046	1.607	
Lr Only			
L Only			
S Only	-1.029	14.144	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed: 23 MAY 2017, 4:39PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-26 - W8x24

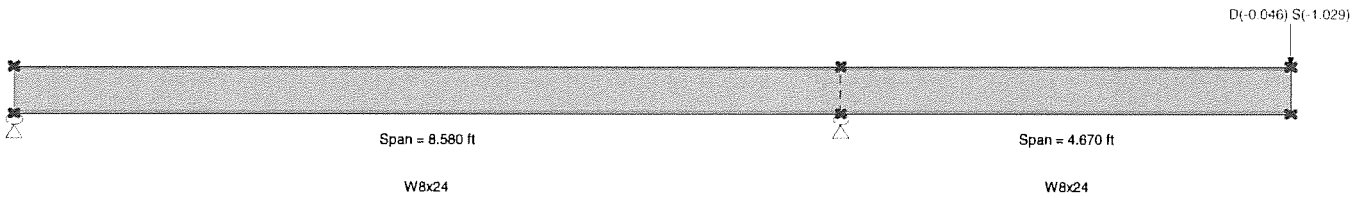
CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load(s) for Span Number 2
Point Load : D = -0.0460, S = -1.029 k @ 4.670 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.083 : 1	Maximum Shear Stress Ratio =	0.028 : 1
Section used for this span	W8x24	Section used for this span	W8x24
Ma : Applied	4.759 k-ft	Va : Applied	1.075 k
Mn / Omega : Allowable	57.635 k-ft	Vn/Omega : Allowable	38.857 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	8.580ft	Location of maximum on span	4.670 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 2

Maximum Deflection

Max Downward Transient Deflection	0.016 in	Ratio =	6,264 >=240.
Max Upward Transient Deflection	-0.071 in	Ratio =	1,571 >=240.
Max Downward Total Deflection	0.017 in	Ratio =	5893 >=180
Max Upward Total Deflection	-0.073 in	Ratio =	1533 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 8.58 ft	1	0.003	0.003	0.20	-0.05	0.20	96.25	57.63	1.16	1.00	0.11	58.29	38.86
Dsgn. L = 4.67 ft	2	0.001	0.002	0.04	-0.05	0.05	96.25	57.63	1.00	1.00	0.07	58.29	38.86
+D+L+H													
Dsgn. L = 8.58 ft	1	0.003	0.003	0.20	-0.05	0.20	96.25	57.63	1.16	1.00	0.11	58.29	38.86
Dsgn. L = 4.67 ft	2	0.001	0.002	0.04	-0.05	0.05	96.25	57.63	1.00	1.00	0.07	58.29	38.86
+D+Lr+H													
Dsgn. L = 8.58 ft	1	0.003	0.003	0.20	-0.05	0.20	96.25	57.63	1.16	1.00	0.11	58.29	38.86
Dsgn. L = 4.67 ft	2	0.001	0.002	0.04	-0.05	0.05	96.25	57.63	1.00	1.00	0.07	58.29	38.86
+D+S+H													
Dsgn. L = 8.58 ft	1	0.083	0.025	4.76		4.76	96.25	57.63	1.58	1.00	0.96	58.29	38.86
Dsgn. L = 4.67 ft	2	0.083	0.028	4.76		4.76	96.25	57.63	1.00	1.00	1.08	58.29	38.86
+D+0.750Lr+0.750L+H													
Dsgn. L = 8.58 ft	1	0.003	0.003	0.20	-0.05	0.20	96.25	57.63	1.16	1.00	0.11	58.29	38.86
Dsgn. L = 4.67 ft	2	0.001	0.002	0.04	-0.05	0.05	96.25	57.63	1.00	1.00	0.07	58.29	38.86
+D+0.750L+0.750S+H													
Dsgn. L = 8.58 ft	1	0.062	0.018	3.56		3.56	96.25	57.63	1.56	1.00	0.71	58.29	38.86
Dsgn. L = 4.67 ft	2	0.062	0.021	3.56		3.56	96.25	57.63	1.00	1.00	0.82	58.29	38.86
+D+W+H													
Dsgn. L = 8.58 ft	1	0.003	0.003	0.20	-0.05	0.20	96.25	57.63	1.16	1.00	0.11	58.29	38.86
Dsgn. L = 4.67 ft	2	0.001	0.002	0.04	-0.05	0.05	96.25	57.63	1.00	1.00	0.07	58.29	38.86
+D+E+H													
Dsgn. L = 8.58 ft	1	0.003	0.003	0.20	-0.05	0.20	96.25	57.63	1.16	1.00	0.11	58.29	38.86
Dsgn. L = 4.67 ft	2	0.001	0.002	0.04	-0.05	0.05	96.25	57.63	1.00	1.00	0.07	58.29	38.86

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

124

Printed: 23 MAY 2017, 4:39PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-26 - W8x24

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 8.58 ft	1	0.003	0.003	0.20	-0.05	0.20	96.25	57.63	1.16	1.00	0.11	58.29	38.86
Dsgn. L = 4.67 ft	2	0.001	0.002	0.04	-0.05	0.05	96.25	57.63	1.00	1.00	0.07	58.29	38.86
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 8.58 ft	1	0.062	0.018	3.56		3.56	96.25	57.63	1.56	1.00	0.71	58.29	38.86
Dsgn. L = 4.67 ft	2	0.062	0.021	3.56		3.56	96.25	57.63	1.00	1.00	0.82	58.29	38.86
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 8.58 ft	1	0.062	0.018	3.56		3.56	96.25	57.63	1.56	1.00	0.71	58.29	38.86
Dsgn. L = 4.67 ft	2	0.062	0.021	3.56		3.56	96.25	57.63	1.00	1.00	0.82	58.29	38.86
+0.60D+W+0.60H													
Dsgn. L = 8.58 ft	1	0.002	0.002	0.12	-0.03	0.12	96.25	57.63	1.16	1.00	0.07	58.29	38.86
Dsgn. L = 4.67 ft	2	0.000	0.001	0.03	-0.03	0.03	96.25	57.63	1.00	1.00	0.04	58.29	38.86
+0.60D+E+0.60H													
Dsgn. L = 8.58 ft	1	0.002	0.002	0.12	-0.03	0.12	96.25	57.63	1.16	1.00	0.07	58.29	38.86
Dsgn. L = 4.67 ft	2	0.000	0.001	0.03	-0.03	0.03	96.25	57.63	1.00	1.00	0.04	58.29	38.86

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.0175	4.908		0.0000	0.000
	2	0.0000	4.908	+D+S+H	-0.0731	4.670

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.658	-1.589	
Overall MINimum	0.058	0.105	
+D+H	0.097	0.175	
+D+L+H	0.097	0.175	
+D+Lr+H	0.097	0.175	
+D+S+H	0.658	-1.415	
+D+0.750Lr+0.750L+H	0.097	0.175	
+D+0.750L+0.750S+H	0.518	-1.017	
+D+W+H	0.097	0.175	
+D+E+H	0.097	0.175	
+D+0.750Lr+0.750L+0.750W+H	0.097	0.175	
+D+0.750L+0.750S+0.750W+H	0.518	-1.017	
+D+0.750L+0.750S+0.750E+H	0.518	-1.017	
+0.60D+W+0.60H	0.058	0.105	
+0.60D+E+0.60H	0.058	0.105	
D Only	0.097	0.175	
Lr Only			
L Only			
S Only	0.560	-1.589	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed: 23 MAY 2017, 4:44PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357

Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-27 - W8x48

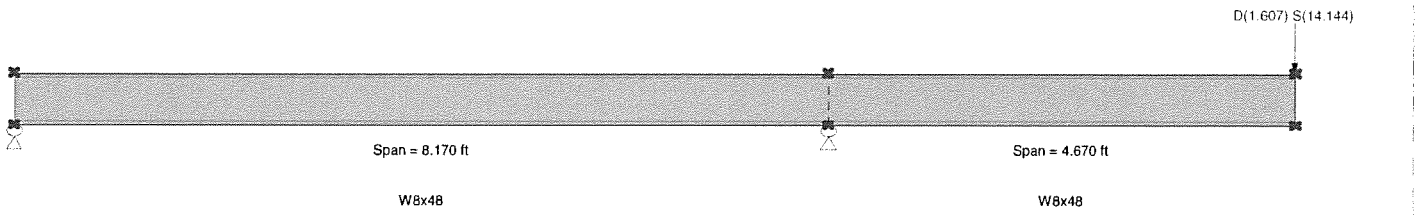
CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load(s) for Span Number 2
Point Load : D = 1.607, S = 14.144 k @ 4.670 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.606 : 1	Maximum Shear Stress Ratio =	0.235 : 1
Section used for this span	W8x48	Section used for this span	W8x48
Ma : Applied	74.081 k-ft	Va : Applied	15.975 k
Mn / Omega : Allowable	122.255 k-ft	Vn/Omega : Allowable	68.0 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	8.170ft	Location of maximum on span	8.170 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.427 in	Ratio =	262 >=240.
Max Upward Transient Deflection	-0.092 in	Ratio =	1,064 >=240.
Max Downward Total Deflection	0.477 in	Ratio =	235 >=180
Max Upward Total Deflection	-0.102 in	Ratio =	958 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 8.17 ft	1	0.066	0.027		-8.03	8.03	204.17	122.26	1.77	1.00	1.83	102.00	68.00
Dsgn. L = 4.67 ft	2	0.066	0.027		-8.03	8.03	204.17	122.26	1.00	1.00	1.83	102.00	68.00
+D+L+H													
Dsgn. L = 8.17 ft	1	0.066	0.027		-8.03	8.03	204.17	122.26	1.77	1.00	1.83	102.00	68.00
Dsgn. L = 4.67 ft	2	0.066	0.027		-8.03	8.03	204.17	122.26	1.00	1.00	1.83	102.00	68.00
+D+Lr+H													
Dsgn. L = 8.17 ft	1	0.066	0.027		-8.03	8.03	204.17	122.26	1.77	1.00	1.83	102.00	68.00
Dsgn. L = 4.67 ft	2	0.066	0.027		-8.03	8.03	204.17	122.26	1.00	1.00	1.83	102.00	68.00
+D+S+H													
Dsgn. L = 8.17 ft	1	0.606	0.235		-74.08	74.08	204.17	122.26	1.68	1.00	15.98	102.00	68.00
Dsgn. L = 4.67 ft	2	0.606	0.235		-74.08	74.08	204.17	122.26	1.00	1.00	15.98	102.00	68.00
+D+0.750Lr+0.750L+H													
Dsgn. L = 8.17 ft	1	0.066	0.027		-8.03	8.03	204.17	122.26	1.77	1.00	1.83	102.00	68.00
Dsgn. L = 4.67 ft	2	0.066	0.027		-8.03	8.03	204.17	122.26	1.00	1.00	1.83	102.00	68.00
+D+0.750L+0.750S+H													
Dsgn. L = 8.17 ft	1	0.471	0.183		-57.57	57.57	204.17	122.26	1.68	1.00	12.44	102.00	68.00
Dsgn. L = 4.67 ft	2	0.471	0.183		-57.57	57.57	204.17	122.26	1.00	1.00	12.44	102.00	68.00
+D+W+H													
Dsgn. L = 8.17 ft	1	0.066	0.027		-8.03	8.03	204.17	122.26	1.77	1.00	1.83	102.00	68.00
Dsgn. L = 4.67 ft	2	0.066	0.027		-8.03	8.03	204.17	122.26	1.00	1.00	1.83	102.00	68.00
+D+E+H													
Dsgn. L = 8.17 ft	1	0.066	0.027		-8.03	8.03	204.17	122.26	1.77	1.00	1.83	102.00	68.00
Dsgn. L = 4.67 ft	2	0.066	0.027		-8.03	8.03	204.17	122.26	1.00	1.00	1.83	102.00	68.00

rudow + berry, inc.
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Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed: 23 MAY 2017, 4:44PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-27 - W8x48

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 8.17 ft	1	0.066	0.027		-8.03	8.03	204.17	122.26	1.77	1.00	1.83	102.00	68.00
Dsgn. L = 4.67 ft	2	0.066	0.027		-8.03	8.03	204.17	122.26	1.00	1.00	1.83	102.00	68.00
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 8.17 ft	1	0.471	0.183		-57.57	57.57	204.17	122.26	1.68	1.00	12.44	102.00	68.00
Dsgn. L = 4.67 ft	2	0.471	0.183		-57.57	57.57	204.17	122.26	1.00	1.00	12.44	102.00	68.00
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 8.17 ft	1	0.471	0.183		-57.57	57.57	204.17	122.26	1.68	1.00	12.44	102.00	68.00
Dsgn. L = 4.67 ft	2	0.471	0.183		-57.57	57.57	204.17	122.26	1.00	1.00	12.44	102.00	68.00
+0.60D+W+0.60H													
Dsgn. L = 8.17 ft	1	0.039	0.016		-4.82	4.82	204.17	122.26	1.77	1.00	1.10	102.00	68.00
Dsgn. L = 4.67 ft	2	0.039	0.016		-4.82	4.82	204.17	122.26	1.00	1.00	1.10	102.00	68.00
+0.60D+E+0.60H													
Dsgn. L = 8.17 ft	1	0.039	0.016		-4.82	4.82	204.17	122.26	1.77	1.00	1.10	102.00	68.00
Dsgn. L = 4.67 ft	2	0.039	0.016		-4.82	4.82	204.17	122.26	1.00	1.00	1.10	102.00	68.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.1024	4.739
+D+S+H	2	0.4770	4.670		0.0000	4.739

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-8.871	25.239	
Overall MINimum	-0.472	1.806	
+D+H	-0.787	3.010	
+D+L+H	-0.787	3.010	
+D+Lr+H	-0.787	3.010	
+D+S+H	-8.871	25.239	
+D+0.750Lr+0.750L+H	-0.787	3.010	
+D+0.750L+0.750S+H	-6.850	19.681	
+D+W+H	-0.787	3.010	
+D+E+H	-0.787	3.010	
+D+0.750Lr+0.750L+0.750W+H	-0.787	3.010	
+D+0.750L+0.750S+0.750W+H	-6.850	19.681	
+D+0.750L+0.750S+0.750E+H	-6.850	19.681	
+0.60D+W+0.60H	-0.472	1.806	
+0.60D+E+0.60H	-0.472	1.806	
D Only	-0.787	3.010	
Lr Only			
L Only			
S Only	-8.085	22.229	
W Only			
E Only			
H Only			

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

OHB-28 SPAN = 22'-10"

$W = .67(24+259) = 166 + 173$

$P_1 = (33 + 107) + (800 + 560) = 1310 + 667$ $x = 8'-8"$

$P_2 = 89 + 867$ $x = 12'-8"$

OHB-29 SPAN = 4'-3" CANT = 4'-4"

$W = 8.25(24+259) = 198 + 2137$

OHB-30 SPAN = 4'-3" CANT = 4'-4"

$W_{SPAN} = 10.42(24+259) = 250 + 2699$

$W_{CANT} = 12.83(24+259) = 308 + 3323$

EOHB-1S SPAN = 4'-3" CANT = 4'-4"

$W = 2.33(24+259) = 56 + 604$

EOHB-1C SPAN = 4'-3" CANT = 4'-4"

$W_{SPAN} = \frac{1}{2}(4.58)(24+259) = 55 + 593$

$W_{CANT} = \frac{1}{2}(13.33)(24+259) = 160 + 1727$

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 128

Printed: 23 MAY 2017, 4:59PM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357 Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-28 - 5 1/8 x 15 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

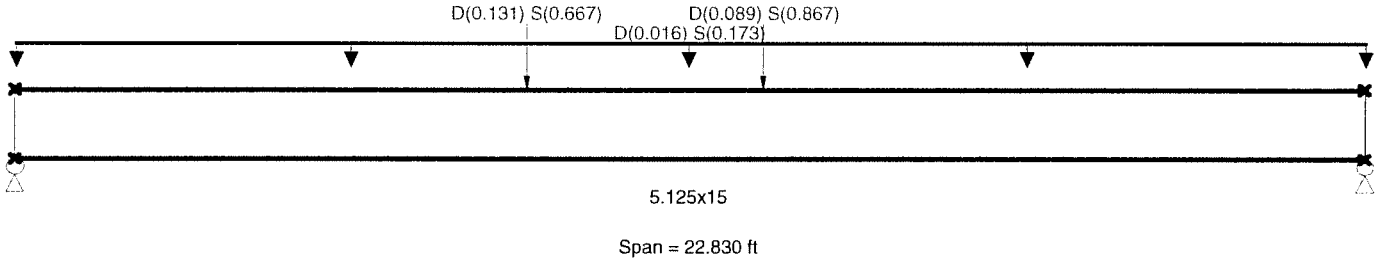
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0160, S = 0.1730 , Tributary Width = 1.0 ft
Point Load : D = 0.1310, S = 0.6670 k @ 8.670 ft
Point Load : D = 0.0890, S = 0.8670 k @ 12.670 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.507 : 1	Maximum Shear Stress Ratio	=	0.193 : 1
Section used for this span		5.125x15	Section used for this span		5.125x15
fb : Actual	=	1,358.11 psi	fv : Actual	=	58.75 psi
FB : Allowable	=	2,676.64 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	11.998 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.653 in	Ratio =	419 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.765 in	Ratio =	358 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 22.830 ft	1	0.094	0.037	0.90	0.970	1.00	1.00	1.00	1.00	1.00	3.15	196.63	2094.76	0.45	8.84	238.50
+D+L+H					0.970	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.830 ft	1	0.084	0.033	1.00	0.970	1.00	1.00	1.00	1.00	1.00	3.15	196.63	2327.51	0.45	8.84	265.00
+D+Lr+H					0.970	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.830 ft	1	0.068	0.027	1.25	0.970	1.00	1.00	1.00	1.00	1.00	3.15	196.63	2909.39	0.45	8.84	331.25
+D+S+H					0.970	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.830 ft	1	0.507	0.193	1.15	0.970	1.00	1.00	1.00	1.00	1.00	21.75	1,358.11	2676.64	3.01	58.75	304.75
+D+0.750Lr+0.750L+H					0.970	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed: 23 MAY 2017, 4:59PM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357

Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-28 - 5 1/8 x 15 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 22.830 ft	1	0.068	0.027	1.25	0.970	1.00	1.00	1.00	1.00	1.00	3.15	196.63	2909.39	0.45	8.84	331.25
+D+0.750L+0.750S+H					0.970	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.830 ft	1	0.399	0.152	1.15	0.970	1.00	1.00	1.00	1.00	1.00	17.10	1,067.54	2676.64	2.37	46.27	304.75
+D+W+H					0.970	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.830 ft	1	0.053	0.021	1.60	0.970	1.00	1.00	1.00	1.00	1.00	3.15	196.63	3724.02	0.45	8.84	424.00
+D+E+H					0.970	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.830 ft	1	0.053	0.021	1.60	0.970	1.00	1.00	1.00	1.00	1.00	3.15	196.63	3724.02	0.45	8.84	424.00
+D+0.750Lr+0.750L+0.750W+H					0.970	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.830 ft	1	0.053	0.021	1.60	0.970	1.00	1.00	1.00	1.00	1.00	3.15	196.63	3724.02	0.45	8.84	424.00
+D+0.750L+0.750S+0.750W+H					0.970	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.830 ft	1	0.287	0.109	1.60	0.970	1.00	1.00	1.00	1.00	1.00	17.10	1,067.54	3724.02	2.37	46.27	424.00
+D+0.750L+0.750S+0.750E+H					0.970	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.830 ft	1	0.287	0.109	1.60	0.970	1.00	1.00	1.00	1.00	1.00	17.10	1,067.54	3724.02	2.37	46.27	424.00
+0.60D+W+0.60H					0.970	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.830 ft	1	0.032	0.013	1.60	0.970	1.00	1.00	1.00	1.00	1.00	1.89	117.98	3724.02	0.27	5.30	424.00
+0.60D+E+0.60H					0.970	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.830 ft	1	0.032	0.013	1.60	0.970	1.00	1.00	1.00	1.00	1.00	1.89	117.98	3724.02	0.27	5.30	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.7652	11.415		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.268	3.181
Overall MINimum	0.296	0.283
+D+H	0.494	0.472
+D+L+H	0.494	0.472
+D+Lr+H	0.494	0.472
+D+S+H	3.268	3.181
+D+0.750Lr+0.750L+H	0.494	0.472
+D+0.750L+0.750S+H	2.574	2.504
+D+W+H	0.494	0.472
+D+E+H	0.494	0.472
+D+0.750Lr+0.750L+0.750W+H	0.494	0.472
+D+0.750L+0.750S+0.750W+H	2.574	2.504
+D+0.750L+0.750S+0.750E+H	2.574	2.504
+0.60D+W+0.60H	0.296	0.283
+0.60D+E+0.60H	0.296	0.283
D Only	0.494	0.472
Lr Only		
L Only		
S Only	2.774	2.709
W Only		
E Only		
H Only		

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed 23 MAY 2017, 5:02PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-29 - HSS8x4x1/4

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

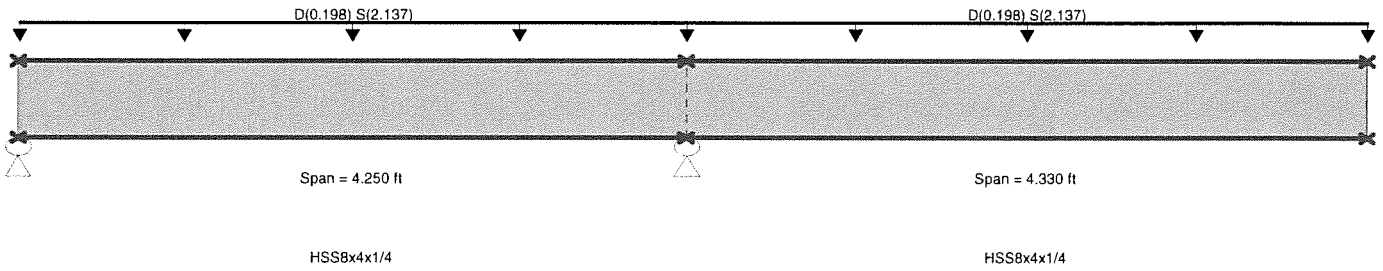
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.1980, S = 2.137 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.1980, S = 2.137 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.723 : 1	Maximum Shear Stress Ratio =	0.181 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	22.068 k-ft	Va : Applied	10.195 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	4.250ft	Location of maximum on span	4.250 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.262 in	Ratio =	396 >=240.
Max Upward Transient Deflection	-0.021 in	Ratio =	2,486 >=240.
Max Downward Total Deflection	0.289 in	Ratio =	360 >=180
Max Upward Total Deflection	-0.023 in	Ratio =	2258 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 4.25 ft	1	0.067	0.017		-2.03	2.03	50.98	30.53	1.00	1.00	0.94	93.90	56.23
Dsgn. L = 4.33 ft	2	0.067	0.017		-2.03	2.03	50.98	30.53	1.00	1.00	0.94	93.90	56.23
+D+L+H													
Dsgn. L = 4.25 ft	1	0.067	0.017		-2.03	2.03	50.98	30.53	1.00	1.00	0.94	93.90	56.23
Dsgn. L = 4.33 ft	2	0.067	0.017		-2.03	2.03	50.98	30.53	1.00	1.00	0.94	93.90	56.23
+D+Lr+H													
Dsgn. L = 4.25 ft	1	0.067	0.017		-2.03	2.03	50.98	30.53	1.00	1.00	0.94	93.90	56.23
Dsgn. L = 4.33 ft	2	0.067	0.017		-2.03	2.03	50.98	30.53	1.00	1.00	0.94	93.90	56.23
+D+S+H													
Dsgn. L = 4.25 ft	1	0.723	0.181		-22.07	22.07	50.98	30.53	1.00	1.00	10.19	93.90	56.23
Dsgn. L = 4.33 ft	2	0.723	0.181		-22.07	22.07	50.98	30.53	1.00	1.00	10.19	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 4.25 ft	1	0.067	0.017		-2.03	2.03	50.98	30.53	1.00	1.00	0.94	93.90	56.23
Dsgn. L = 4.33 ft	2	0.067	0.017		-2.03	2.03	50.98	30.53	1.00	1.00	0.94	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 4.25 ft	1	0.559	0.140		-17.06	17.06	50.98	30.53	1.00	1.00	7.88	93.90	56.23
Dsgn. L = 4.33 ft	2	0.559	0.140		-17.06	17.06	50.98	30.53	1.00	1.00	7.88	93.90	56.23
+D+W+H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed: 23 MAY 2017, 5:02PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357

Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-29 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 4.25 ft	1	0.067	0.017		-2.03	2.03	50.98	30.53	1.00	1.00	0.94	93.90	56.23
Dsgn. L = 4.33 ft	2	0.067	0.017		-2.03	2.03	50.98	30.53	1.00	1.00	0.94	93.90	56.23
+D+E+H													
Dsgn. L = 4.25 ft	1	0.067	0.017		-2.03	2.03	50.98	30.53	1.00	1.00	0.94	93.90	56.23
Dsgn. L = 4.33 ft	2	0.067	0.017		-2.03	2.03	50.98	30.53	1.00	1.00	0.94	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 4.25 ft	1	0.067	0.017		-2.03	2.03	50.98	30.53	1.00	1.00	0.94	93.90	56.23
Dsgn. L = 4.33 ft	2	0.067	0.017		-2.03	2.03	50.98	30.53	1.00	1.00	0.94	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 4.25 ft	1	0.559	0.140		-17.06	17.06	50.98	30.53	1.00	1.00	7.88	93.90	56.23
Dsgn. L = 4.33 ft	2	0.559	0.140		-17.06	17.06	50.98	30.53	1.00	1.00	7.88	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 4.25 ft	1	0.559	0.140		-17.06	17.06	50.98	30.53	1.00	1.00	7.88	93.90	56.23
Dsgn. L = 4.33 ft	2	0.559	0.140		-17.06	17.06	50.98	30.53	1.00	1.00	7.88	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 4.25 ft	1	0.040	0.010		-1.22	1.22	50.98	30.53	1.00	1.00	0.56	93.90	56.23
Dsgn. L = 4.33 ft	2	0.040	0.010		-1.22	1.22	50.98	30.53	1.00	1.00	0.56	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 4.25 ft	1	0.040	0.010		-1.22	1.22	50.98	30.53	1.00	1.00	0.56	93.90	56.23
Dsgn. L = 4.33 ft	2	0.040	0.010		-1.22	1.22	50.98	30.53	1.00	1.00	0.56	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0226	2.669
+D+S+H	2	0.2887	4.330		0.0000	2.669

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-0.190	20.388	
Overall MINimum	-0.011	1.128	
+D+H	-0.018	1.880	
+D+L+H	-0.018	1.880	
+D+Lr+H	-0.018	1.880	
+D+S+H	-0.190	20.388	
+D+0.750Lr+0.750L+H	-0.018	1.880	
+D+0.750L+0.750S+H	-0.147	15.761	
+D+W+H	-0.018	1.880	
+D+E+H	-0.018	1.880	
+D+0.750Lr+0.750L+0.750W+H	-0.018	1.880	
+D+0.750L+0.750S+0.750W+H	-0.147	15.761	
+D+0.750L+0.750S+0.750E+H	-0.147	15.761	
+0.60D+W+0.60H	-0.011	1.128	
+0.60D+E+0.60H	-0.011	1.128	
D Only	-0.018	1.880	
Lr Only			
L Only			
S Only	-0.173	18.508	
W Only			
E Only			
H Only			

rudow + berry, inc.
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scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Steel Beam

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-30 - HSS8x4x3/8

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

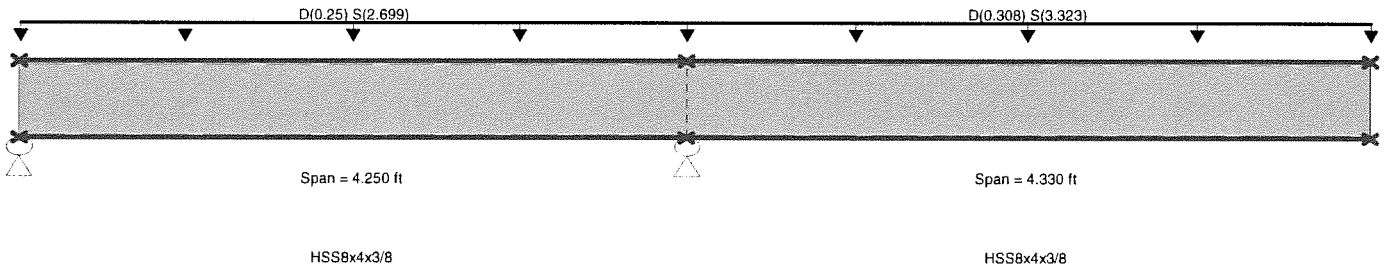
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.250, S = 2.699 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.3080, S = 3.323 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.795 : 1	Maximum Shear Stress Ratio =	0.198 : 1
Section used for this span	HSS8x4x3/8	Section used for this span	HSS8x4x3/8
Ma : Applied	34.296 k-ft	Va : Applied	15.841 k
Mn / Omega : Allowable	43.154 k-ft	Vn/Omega : Allowable	80.208 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	4.250ft	Location of maximum on span	4.250 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.304 in	Ratio =	342 >=240.
Max Upward Transient Deflection	-0.026 in	Ratio =	1,991 >=240.
Max Downward Total Deflection	0.334 in	Ratio =	311 >=180
Max Upward Total Deflection	-0.028 in	Ratio =	1810 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 4.25 ft	1	0.073	0.018		-3.14	3.14	72.07	43.15	1.00	1.00	1.45	133.95	80.21
Dsgn. L = 4.33 ft	2	0.073	0.018		-3.14	3.14	72.07	43.15	1.00	1.00	1.45	133.95	80.21
+D+L+H													
Dsgn. L = 4.25 ft	1	0.073	0.018		-3.14	3.14	72.07	43.15	1.00	1.00	1.45	133.95	80.21
Dsgn. L = 4.33 ft	2	0.073	0.018		-3.14	3.14	72.07	43.15	1.00	1.00	1.45	133.95	80.21
+D+Lr+H													
Dsgn. L = 4.25 ft	1	0.073	0.018		-3.14	3.14	72.07	43.15	1.00	1.00	1.45	133.95	80.21
Dsgn. L = 4.33 ft	2	0.073	0.018		-3.14	3.14	72.07	43.15	1.00	1.00	1.45	133.95	80.21
+D+S+H													
Dsgn. L = 4.25 ft	1	0.795	0.198		-34.30	34.30	72.07	43.15	1.00	1.00	15.84	133.95	80.21
Dsgn. L = 4.33 ft	2	0.795	0.198		-34.30	34.30	72.07	43.15	1.00	1.00	15.84	133.95	80.21
+D+0.750Lr+0.750L+H													
Dsgn. L = 4.25 ft	1	0.073	0.018		-3.14	3.14	72.07	43.15	1.00	1.00	1.45	133.95	80.21
Dsgn. L = 4.33 ft	2	0.073	0.018		-3.14	3.14	72.07	43.15	1.00	1.00	1.45	133.95	80.21
+D+0.750L+0.750S+H													
Dsgn. L = 4.25 ft	1	0.614	0.153		-26.51	26.51	72.07	43.15	1.00	1.00	12.24	133.95	80.21
Dsgn. L = 4.33 ft	2	0.614	0.153		-26.51	26.51	72.07	43.15	1.00	1.00	12.24	133.95	80.21
+D+W+H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed: 23 MAY 2017, 5:03PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357

Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-30 - HSS8x4x3/8

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 4.25 ft	1	0.073	0.018		-3.14	3.14	72.07	43.15	1.00	1.00	1.45	133.95	80.21
Dsgn. L = 4.33 ft	2	0.073	0.018		-3.14	3.14	72.07	43.15	1.00	1.00	1.45	133.95	80.21
+D+E+H													
Dsgn. L = 4.25 ft	1	0.073	0.018		-3.14	3.14	72.07	43.15	1.00	1.00	1.45	133.95	80.21
Dsgn. L = 4.33 ft	2	0.073	0.018		-3.14	3.14	72.07	43.15	1.00	1.00	1.45	133.95	80.21
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 4.25 ft	1	0.073	0.018		-3.14	3.14	72.07	43.15	1.00	1.00	1.45	133.95	80.21
Dsgn. L = 4.33 ft	2	0.073	0.018		-3.14	3.14	72.07	43.15	1.00	1.00	1.45	133.95	80.21
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 4.25 ft	1	0.614	0.153		-26.51	26.51	72.07	43.15	1.00	1.00	12.24	133.95	80.21
Dsgn. L = 4.33 ft	2	0.614	0.153		-26.51	26.51	72.07	43.15	1.00	1.00	12.24	133.95	80.21
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 4.25 ft	1	0.614	0.153		-26.51	26.51	72.07	43.15	1.00	1.00	12.24	133.95	80.21
Dsgn. L = 4.33 ft	2	0.614	0.153		-26.51	26.51	72.07	43.15	1.00	1.00	12.24	133.95	80.21
+0.60D+W+0.60H													
Dsgn. L = 4.25 ft	1	0.044	0.011		-1.89	1.89	72.07	43.15	1.00	1.00	0.87	133.95	80.21
Dsgn. L = 4.33 ft	2	0.044	0.011		-1.89	1.89	72.07	43.15	1.00	1.00	0.87	133.95	80.21
+0.60D+E+0.60H													
Dsgn. L = 4.25 ft	1	0.044	0.011		-1.89	1.89	72.07	43.15	1.00	1.00	0.87	133.95	80.21
Dsgn. L = 4.33 ft	2	0.044	0.011		-1.89	1.89	72.07	43.15	1.00	1.00	0.87	133.95	80.21

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0282	2.618
+D+S+H	2	0.3345	4.330		0.0000	2.618

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-1.745	30.236	
Overall MINimum	-0.090	1.669	
+D+H	-0.150	2.782	
+D+L+H	-0.150	2.782	
+D+Lr+H	-0.150	2.782	
+D+S+H	-1.745	30.236	
+D+0.750Lr+0.750L+H	-0.150	2.782	
+D+0.750L+0.750S+H	-1.346	23.373	
+D+W+H	-0.150	2.782	
+D+E+H	-0.150	2.782	
+D+0.750Lr+0.750L+0.750W+H	-0.150	2.782	
+D+0.750L+0.750S+0.750W+H	-1.346	23.373	
+D+0.750L+0.750S+0.750E+H	-1.346	23.373	
+0.60D+W+0.60H	-0.090	1.669	
+0.60D+E+0.60H	-0.090	1.669	
D Only	-0.150	2.782	
Lr Only			
L Only			
S Only	-1.594	27.454	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed 23 MAY 2017, 5:04PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 124 - EOHB-15 - HSS8x4x1/4

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

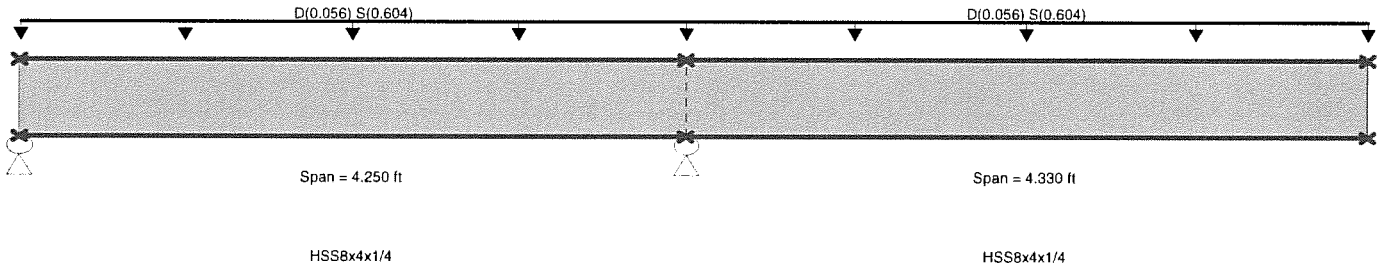
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.0560, S = 0.6040 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.0560, S = 0.6040 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.209 : 1	Maximum Shear Stress Ratio =	0.052 : 1
Section used for this span	HSS8x4x1/4	Section used for this span	HSS8x4x1/4
Ma : Applied	6.365 k-ft	Va : Applied	2.941 k
Mn / Omega : Allowable	30.529 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	4.250ft	Location of maximum on span	4.250 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.074 in	Ratio =	1,402 >=240.
Max Upward Transient Deflection	-0.006 in	Ratio =	8,798 >=240.
Max Downward Total Deflection	0.083 in	Ratio =	1248 >=180
Max Upward Total Deflection	-0.007 in	Ratio =	7827 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 4.25 ft	1	0.023	0.006		-0.70	0.70	50.98	30.53	1.00	1.00	0.32	93.90	56.23
Dsgn. L = 4.33 ft	2	0.023	0.006		-0.70	0.70	50.98	30.53	1.00	1.00	0.32	93.90	56.23
+D+L+H													
Dsgn. L = 4.25 ft	1	0.023	0.006		-0.70	0.70	50.98	30.53	1.00	1.00	0.32	93.90	56.23
Dsgn. L = 4.33 ft	2	0.023	0.006		-0.70	0.70	50.98	30.53	1.00	1.00	0.32	93.90	56.23
+D+Lr+H													
Dsgn. L = 4.25 ft	1	0.023	0.006		-0.70	0.70	50.98	30.53	1.00	1.00	0.32	93.90	56.23
Dsgn. L = 4.33 ft	2	0.023	0.006		-0.70	0.70	50.98	30.53	1.00	1.00	0.32	93.90	56.23
+D+S+H													
Dsgn. L = 4.25 ft	1	0.209	0.052		-6.37	6.37	50.98	30.53	1.00	1.00	2.94	93.90	56.23
Dsgn. L = 4.33 ft	2	0.209	0.052		-6.37	6.37	50.98	30.53	1.00	1.00	2.94	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 4.25 ft	1	0.023	0.006		-0.70	0.70	50.98	30.53	1.00	1.00	0.32	93.90	56.23
Dsgn. L = 4.33 ft	2	0.023	0.006		-0.70	0.70	50.98	30.53	1.00	1.00	0.32	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 4.25 ft	1	0.162	0.041		-4.95	4.95	50.98	30.53	1.00	1.00	2.29	93.90	56.23
Dsgn. L = 4.33 ft	2	0.162	0.041		-4.95	4.95	50.98	30.53	1.00	1.00	2.29	93.90	56.23
+D+W+H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed 23 MAY 2017, 5:04PM
File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Steel Beam

Lic. # : KW-06002357

Licensee : RUDOW & BERRY

Description : Unit 124 - EOHB-15 - HSS8x4x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 4.25 ft	1	0.023	0.006		-0.70	0.70	50.98	30.53	1.00	1.00	0.32	93.90	56.23
Dsgn. L = 4.33 ft	2	0.023	0.006		-0.70	0.70	50.98	30.53	1.00	1.00	0.32	93.90	56.23
+D+E+H													
Dsgn. L = 4.25 ft	1	0.023	0.006		-0.70	0.70	50.98	30.53	1.00	1.00	0.32	93.90	56.23
Dsgn. L = 4.33 ft	2	0.023	0.006		-0.70	0.70	50.98	30.53	1.00	1.00	0.32	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 4.25 ft	1	0.023	0.006		-0.70	0.70	50.98	30.53	1.00	1.00	0.32	93.90	56.23
Dsgn. L = 4.33 ft	2	0.023	0.006		-0.70	0.70	50.98	30.53	1.00	1.00	0.32	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 4.25 ft	1	0.162	0.041		-4.95	4.95	50.98	30.53	1.00	1.00	2.29	93.90	56.23
Dsgn. L = 4.33 ft	2	0.162	0.041		-4.95	4.95	50.98	30.53	1.00	1.00	2.29	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 4.25 ft	1	0.162	0.041		-4.95	4.95	50.98	30.53	1.00	1.00	2.29	93.90	56.23
Dsgn. L = 4.33 ft	2	0.162	0.041		-4.95	4.95	50.98	30.53	1.00	1.00	2.29	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 4.25 ft	1	0.014	0.003		-0.42	0.42	50.98	30.53	1.00	1.00	0.19	93.90	56.23
Dsgn. L = 4.33 ft	2	0.014	0.003		-0.42	0.42	50.98	30.53	1.00	1.00	0.19	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 4.25 ft	1	0.014	0.003		-0.42	0.42	50.98	30.53	1.00	1.00	0.19	93.90	56.23
Dsgn. L = 4.33 ft	2	0.014	0.003		-0.42	0.42	50.98	30.53	1.00	1.00	0.19	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0065	2.669
+D+S+H	2	0.0833	4.330		0.0000	2.669

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-0.055	5.881	
Overall MINimum	-0.004	0.390	
+D+H	-0.006	0.650	
+D+L+H	-0.006	0.650	
+D+Lr+H	-0.006	0.650	
+D+S+H	-0.055	5.881	
+D+0.750Lr+0.750L+H	-0.006	0.650	
+D+0.750L+0.750S+H	-0.043	4.573	
+D+W+H	-0.006	0.650	
+D+E+H	-0.006	0.650	
+D+0.750Lr+0.750L+0.750W+H	-0.006	0.650	
+D+0.750L+0.750S+0.750W+H	-0.043	4.573	
+D+0.750L+0.750S+0.750E+H	-0.043	4.573	
+0.60D+W+0.60H	-0.004	0.390	
+0.60D+E+0.60H	-0.004	0.390	
D Only	-0.006	0.650	
Lr Only			
L Only			
S Only	-0.049	5.231	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed: 23 MAY 2017, 5:06PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 124 - EOHB-16 - HSS8x2x1/4

CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

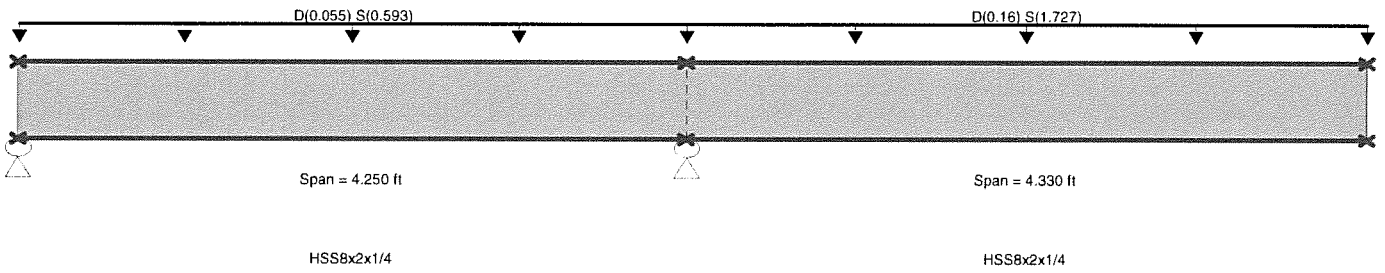
Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined Beam-by-Beam
Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

Span # 1, Fully Braced
Span # 2, Fully Braced



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.0550, S = 0.5930 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.160, S = 1.727 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.803 : 1	Maximum Shear Stress Ratio =	0.147 : 1
Section used for this span	HSS8x2x1/4	Section used for this span	HSS8x2x1/4
Ma : Applied	17.836 k-ft	Va : Applied	8.238 k
Mn / Omega : Allowable	22.220 k-ft	Vn/Omega : Allowable	56.229 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	4.250ft	Location of maximum on span	4.250 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.349 in	Ratio =	298 >=240.
Max Upward Transient Deflection	-0.034 in	Ratio =	1,486 >=240.
Max Downward Total Deflection	0.384 in	Ratio =	271 >=180
Max Upward Total Deflection	-0.038 in	Ratio =	1353 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 4.25 ft	1	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
Dsgn. L = 4.33 ft	2	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
+D+L+H													
Dsgn. L = 4.25 ft	1	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
Dsgn. L = 4.33 ft	2	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
+D+Lr+H													
Dsgn. L = 4.25 ft	1	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
Dsgn. L = 4.33 ft	2	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
+D+S+H													
Dsgn. L = 4.25 ft	1	0.803	0.147		-17.84	17.84	37.11	22.22	1.00	1.00	8.24	93.90	56.23
Dsgn. L = 4.33 ft	2	0.803	0.147		-17.84	17.84	37.11	22.22	1.00	1.00	8.24	93.90	56.23
+D+0.750Lr+0.750L+H													
Dsgn. L = 4.25 ft	1	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
Dsgn. L = 4.33 ft	2	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
+D+0.750L+0.750S+H													
Dsgn. L = 4.25 ft	1	0.621	0.113		-13.79	13.79	37.11	22.22	1.00	1.00	6.37	93.90	56.23
Dsgn. L = 4.33 ft	2	0.621	0.113		-13.79	13.79	37.11	22.22	1.00	1.00	6.37	93.90	56.23
+D+W+H													

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126 137

Printed 23 MAY 2017, 5:06PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 124 - EOHB-16 - HSS8x2x1/4

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 4.25 ft	1	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
Dsgn. L = 4.33 ft	2	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
+D+E+H													
Dsgn. L = 4.25 ft	1	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
Dsgn. L = 4.33 ft	2	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 4.25 ft	1	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
Dsgn. L = 4.33 ft	2	0.074	0.014		-1.65	1.65	37.11	22.22	1.00	1.00	0.76	93.90	56.23
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 4.25 ft	1	0.621	0.113		-13.79	13.79	37.11	22.22	1.00	1.00	6.37	93.90	56.23
Dsgn. L = 4.33 ft	2	0.621	0.113		-13.79	13.79	37.11	22.22	1.00	1.00	6.37	93.90	56.23
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 4.25 ft	1	0.621	0.113		-13.79	13.79	37.11	22.22	1.00	1.00	6.37	93.90	56.23
Dsgn. L = 4.33 ft	2	0.621	0.113		-13.79	13.79	37.11	22.22	1.00	1.00	6.37	93.90	56.23
+0.60D+W+0.60H													
Dsgn. L = 4.25 ft	1	0.044	0.008		-0.99	0.99	37.11	22.22	1.00	1.00	0.46	93.90	56.23
Dsgn. L = 4.33 ft	2	0.044	0.008		-0.99	0.99	37.11	22.22	1.00	1.00	0.46	93.90	56.23
+0.60D+E+0.60H													
Dsgn. L = 4.25 ft	1	0.044	0.008		-0.99	0.99	37.11	22.22	1.00	1.00	0.46	93.90	56.23
Dsgn. L = 4.33 ft	2	0.044	0.008		-0.99	0.99	37.11	22.22	1.00	1.00	0.46	93.90	56.23

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0377	2.516
+D+S+H	2	0.3839	4.330		0.0000	2.516

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-2.787	13.845	
Overall MINimum	-0.142	0.779	
+D+H	-0.237	1.298	
+D+L+H	-0.237	1.298	
+D+Lr+H	-0.237	1.298	
+D+S+H	-2.787	13.845	
+D+0.750Lr+0.750L+H	-0.237	1.298	
+D+0.750L+0.750S+H	-2.149	10.708	
+D+W+H	-0.237	1.298	
+D+E+H	-0.237	1.298	
+D+0.750Lr+0.750L+0.750W+H	-0.237	1.298	
+D+0.750L+0.750S+0.750W+H	-2.149	10.708	
+D+0.750L+0.750S+0.750E+H	-2.149	10.708	
+0.60D+W+0.60H	-0.142	0.779	
+0.60D+E+0.60H	-0.142	0.779	
D Only	-0.237	1.298	
Lr Only			
L Only			
S Only	-2.549	12.547	
W Only			
E Only			
H Only			

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

OHB-31 SPAN = 8'-1" CANT = 4'-8"

$P_{END} = R_{EOHBIGL} = -237^{\#}_{D} - 2549^{\#}_{S}$

OHB-32 SPAN = 8'-5" CANT = 4'-8"

$P_{END} = R_{EOHBIGR} = 1297^{\#}_{D} + 1254^{\#}_{S}$

OHB-33 SPAN = 24'-7"

$W = .67(24+259) = 166_{D} + 173_{S}$

$P_1 = (-150 - 1594) + (202 + 1473) = 52_{D} - 121_{S}$ $x = 8'-2"$

$P_2 = -18_{D} - 173_{S}$ @ $x = 20'-8"$

OHB-34 SPAN = 20'-11", 4'-0"

$P = R_{OHB30R} = 2982^{\#}_{D} + 2745^{\#}_{S}$ @ $x = 8'-5"$

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-31 - W8x24

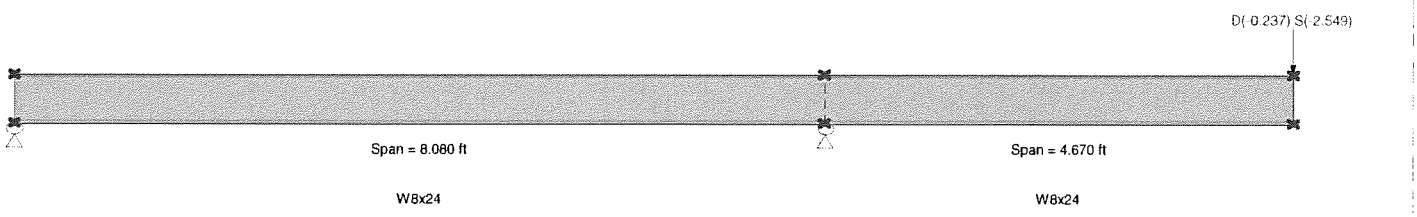
CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load(s) for Span Number 2
Point Load : D = -0.2370, S = -2.549 k @ 4.670 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.221 : 1	Maximum Shear Stress Ratio =	0.072 : 1
Section used for this span	W8x24	Section used for this span	W8x24
Ma : Applied	12.749 k-ft	Va : Applied	2.786 k
Mn / Omega : Allowable	57.635 k-ft	Vn/Omega : Allowable	38.857 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	8.080ft	Location of maximum on span	4.670 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 2

Maximum Deflection

Max Downward Transient Deflection	0.036 in	Ratio =	2,685 >=240.
Max Upward Transient Deflection	-0.170 in	Ratio =	659 >=240.
Max Downward Total Deflection	0.040 in	Ratio =	2448 >=180
Max Upward Total Deflection	-0.184 in	Ratio =	608 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 8.08 ft	1	0.015	0.005	0.85		0.85	96.25	57.63	1.32	1.00	0.20	58.29	38.86
Dsgn. L = 4.67 ft	2	0.015	0.006	0.85		0.85	96.25	57.63	1.00	1.00	0.24	58.29	38.86
+D+L+H													
Dsgn. L = 8.08 ft	1	0.015	0.005	0.85		0.85	96.25	57.63	1.32	1.00	0.20	58.29	38.86
Dsgn. L = 4.67 ft	2	0.015	0.006	0.85		0.85	96.25	57.63	1.00	1.00	0.24	58.29	38.86
+D+Lr+H													
Dsgn. L = 8.08 ft	1	0.015	0.005	0.85		0.85	96.25	57.63	1.32	1.00	0.20	58.29	38.86
Dsgn. L = 4.67 ft	2	0.015	0.006	0.85		0.85	96.25	57.63	1.00	1.00	0.24	58.29	38.86
+D+S+H													
Dsgn. L = 8.08 ft	1	0.221	0.069	12.75		12.75	96.25	57.63	1.64	1.00	2.67	58.29	38.86
Dsgn. L = 4.67 ft	2	0.221	0.072	12.75		12.75	96.25	57.63	1.00	1.00	2.79	58.29	38.86
+D+0.750Lr+0.750L+H													
Dsgn. L = 8.08 ft	1	0.015	0.005	0.85		0.85	96.25	57.63	1.32	1.00	0.20	58.29	38.86
Dsgn. L = 4.67 ft	2	0.015	0.006	0.85		0.85	96.25	57.63	1.00	1.00	0.24	58.29	38.86
+D+0.750L+0.750S+H													
Dsgn. L = 8.08 ft	1	0.170	0.052	9.77		9.77	96.25	57.63	1.63	1.00	2.04	58.29	38.86
Dsgn. L = 4.67 ft	2	0.170	0.055	9.77		9.77	96.25	57.63	1.00	1.00	2.15	58.29	38.86
+D+W+H													
Dsgn. L = 8.08 ft	1	0.015	0.005	0.85		0.85	96.25	57.63	1.32	1.00	0.20	58.29	38.86
Dsgn. L = 4.67 ft	2	0.015	0.006	0.85		0.85	96.25	57.63	1.00	1.00	0.24	58.29	38.86
+D+E+H													
Dsgn. L = 8.08 ft	1	0.015	0.005	0.85		0.85	96.25	57.63	1.32	1.00	0.20	58.29	38.86
Dsgn. L = 4.67 ft	2	0.015	0.006	0.85		0.85	96.25	57.63	1.00	1.00	0.24	58.29	38.86

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

140

Printed: 23 MAY 2017, 5:09PM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357

Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-31 - W8x24

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 8.08 ft	1	0.015	0.005	0.85		0.85	96.25	57.63	1.32	1.00	0.20	58.29	38.86
Dsgn. L = 4.67 ft	2	0.015	0.006	0.85		0.85	96.25	57.63	1.00	1.00	0.24	58.29	38.86
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 8.08 ft	1	0.170	0.052	9.77		9.77	96.25	57.63	1.63	1.00	2.04	58.29	38.86
Dsgn. L = 4.67 ft	2	0.170	0.055	9.77		9.77	96.25	57.63	1.00	1.00	2.15	58.29	38.86
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 8.08 ft	1	0.170	0.052	9.77		9.77	96.25	57.63	1.63	1.00	2.04	58.29	38.86
Dsgn. L = 4.67 ft	2	0.170	0.055	9.77		9.77	96.25	57.63	1.00	1.00	2.15	58.29	38.86
+0.60D+W+0.60H													
Dsgn. L = 8.08 ft	1	0.009	0.003	0.51		0.51	96.25	57.63	1.32	1.00	0.12	58.29	38.86
Dsgn. L = 4.67 ft	2	0.009	0.004	0.51		0.51	96.25	57.63	1.00	1.00	0.14	58.29	38.86
+0.60D+E+0.60H													
Dsgn. L = 8.08 ft	1	0.009	0.003	0.51		0.51	96.25	57.63	1.32	1.00	0.12	58.29	38.86
Dsgn. L = 4.67 ft	2	0.009	0.004	0.51		0.51	96.25	57.63	1.00	1.00	0.14	58.29	38.86

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.0396	4.654		0.0000	0.000
	2	0.0000	4.654	+D+S+H	-0.1842	4.670

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	1.675	-4.155	
Overall MINimum	0.121	-0.080	
+D+H	0.202	-0.133	
+D+L+H	0.202	-0.133	
+D+Lr+H	0.202	-0.133	
+D+S+H	1.675	-4.155	
+D+0.750Lr+0.750L+H	0.202	-0.133	
+D+0.750L+0.750S+H	1.306	-3.149	
+D+W+H	0.202	-0.133	
+D+E+H	0.202	-0.133	
+D+0.750Lr+0.750L+0.750W+H	0.202	-0.133	
+D+0.750L+0.750S+0.750W+H	1.306	-3.149	
+D+0.750L+0.750S+0.750E+H	1.306	-3.149	
+0.60D+W+0.60H	0.121	-0.080	
+0.60D+E+0.60H	0.121	-0.080	
D Only	0.202	-0.133	
Lr Only			
L Only			
S Only	1.473	-4.022	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-32 - W8x48

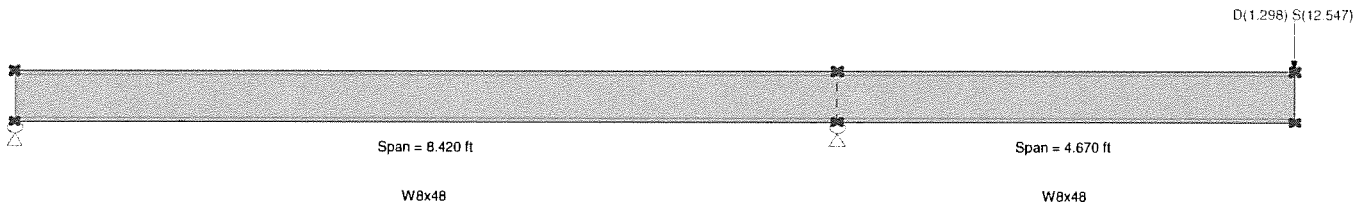
CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load(s) for Span Number 2
Point Load : D = 1.298, S = 12.547 k @ 4.670 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.533 : 1	Maximum Shear Stress Ratio =	0.207 : 1
Section used for this span	W8x48	Section used for this span	W8x48
Ma : Applied	65.180 k-ft	Va : Applied	14.069 k
Mn / Omega : Allowable	122.255 k-ft	Vn/Omega : Allowable	68.0 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	8.420ft	Location of maximum on span	8.420 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.386 in	Ratio =	290 >=240.
Max Upward Transient Deflection	-0.087 in	Ratio =	1,164 >=240.
Max Downward Total Deflection	0.428 in	Ratio =	262 >=180
Max Upward Total Deflection	-0.096 in	Ratio =	1058 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 8.42 ft	1	0.054	0.022		-6.59	6.59	204.17	122.26	1.80	1.00	1.52	102.00	68.00
Dsgn. L = 4.67 ft	2	0.054	0.022		-6.59	6.59	204.17	122.26	1.00	1.00	1.52	102.00	68.00
+D+L+H													
Dsgn. L = 8.42 ft	1	0.054	0.022		-6.59	6.59	204.17	122.26	1.80	1.00	1.52	102.00	68.00
Dsgn. L = 4.67 ft	2	0.054	0.022		-6.59	6.59	204.17	122.26	1.00	1.00	1.52	102.00	68.00
+D+Lr+H													
Dsgn. L = 8.42 ft	1	0.054	0.022		-6.59	6.59	204.17	122.26	1.80	1.00	1.52	102.00	68.00
Dsgn. L = 4.67 ft	2	0.054	0.022		-6.59	6.59	204.17	122.26	1.00	1.00	1.52	102.00	68.00
+D+S+H													
Dsgn. L = 8.42 ft	1	0.533	0.207		-65.18	65.18	204.17	122.26	1.68	1.00	14.07	102.00	68.00
Dsgn. L = 4.67 ft	2	0.533	0.207		-65.18	65.18	204.17	122.26	1.00	1.00	14.07	102.00	68.00
+D+0.750Lr+0.750L+H													
Dsgn. L = 8.42 ft	1	0.054	0.022		-6.59	6.59	204.17	122.26	1.80	1.00	1.52	102.00	68.00
Dsgn. L = 4.67 ft	2	0.054	0.022		-6.59	6.59	204.17	122.26	1.00	1.00	1.52	102.00	68.00
+D+0.750L+0.750S+H													
Dsgn. L = 8.42 ft	1	0.413	0.161		-50.53	50.53	204.17	122.26	1.68	1.00	10.93	102.00	68.00
Dsgn. L = 4.67 ft	2	0.413	0.161		-50.53	50.53	204.17	122.26	1.00	1.00	10.93	102.00	68.00
+D+W+H													
Dsgn. L = 8.42 ft	1	0.054	0.022		-6.59	6.59	204.17	122.26	1.80	1.00	1.52	102.00	68.00
Dsgn. L = 4.67 ft	2	0.054	0.022		-6.59	6.59	204.17	122.26	1.00	1.00	1.52	102.00	68.00
+D+E+H													
Dsgn. L = 8.42 ft	1	0.054	0.022		-6.59	6.59	204.17	122.26	1.80	1.00	1.52	102.00	68.00
Dsgn. L = 4.67 ft	2	0.054	0.022		-6.59	6.59	204.17	122.26	1.00	1.00	1.52	102.00	68.00

rudow + berry, inc.
4021 north 75th street, #101
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Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-32 - W8x48

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 8.42 ft	1	0.054	0.022		-6.59	6.59	204.17	122.26	1.80	1.00	1.52	102.00	68.00
Dsgn. L = 4.67 ft	2	0.054	0.022		-6.59	6.59	204.17	122.26	1.00	1.00	1.52	102.00	68.00
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 8.42 ft	1	0.413	0.161		-50.53	50.53	204.17	122.26	1.68	1.00	10.93	102.00	68.00
Dsgn. L = 4.67 ft	2	0.413	0.161		-50.53	50.53	204.17	122.26	1.00	1.00	10.93	102.00	68.00
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 8.42 ft	1	0.413	0.161		-50.53	50.53	204.17	122.26	1.68	1.00	10.93	102.00	68.00
Dsgn. L = 4.67 ft	2	0.413	0.161		-50.53	50.53	204.17	122.26	1.00	1.00	10.93	102.00	68.00
+0.60D+W+0.60H													
Dsgn. L = 8.42 ft	1	0.032	0.013		-3.95	3.95	204.17	122.26	1.80	1.00	0.91	102.00	68.00
Dsgn. L = 4.67 ft	2	0.032	0.013		-3.95	3.95	204.17	122.26	1.00	1.00	0.91	102.00	68.00
+0.60D+E+0.60H													
Dsgn. L = 8.42 ft	1	0.032	0.013		-3.95	3.95	204.17	122.26	1.80	1.00	0.91	102.00	68.00
Dsgn. L = 4.67 ft	2	0.032	0.013		-3.95	3.95	204.17	122.26	1.00	1.00	0.91	102.00	68.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S+H	-0.0955	4.884
+D+S+H	2	0.4275	4.670		0.0000	4.884

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-7.539	22.012	
Overall MINimum	-0.348	1.504	
+D+H	-0.580	2.506	
+D+L+H	-0.580	2.506	
+D+Lr+H	-0.580	2.506	
+D+S+H	-7.539	22.012	
+D+0.750Lr+0.750L+H	-0.580	2.506	
+D+0.750L+0.750S+H	-5.799	17.136	
+D+W+H	-0.580	2.506	
+D+E+H	-0.580	2.506	
+D+0.750Lr+0.750L+0.750W+H	-0.580	2.506	
+D+0.750L+0.750S+0.750W+H	-5.799	17.136	
+D+0.750L+0.750S+0.750E+H	-5.799	17.136	
+0.60D+W+0.60H	-0.348	1.504	
+0.60D+E+0.60H	-0.348	1.504	
D Only	-0.580	2.506	
Lr Only			
L Only			
S Only	-6.959	19.506	
W Only			
E Only			
H Only			

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 23 MAY 2017, 5:18PM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-33 - 5 1/8 x 15 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

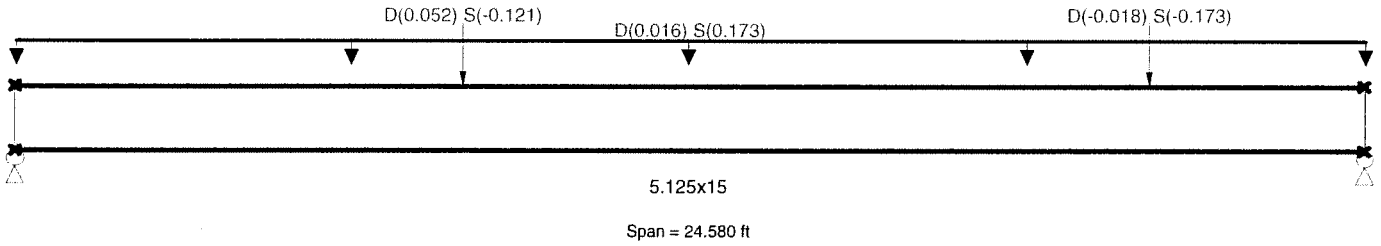
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0160, S = 0.1730 , Tributary Width = 1.0 ft
Point Load : D = 0.0520, S = -0.1210 k @ 8.170 ft
Point Load : D = -0.0180, S = -0.1730 k @ 20.670 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.350 : 1	Maximum Shear Stress Ratio	=	0.142 : 1
Section used for this span		5.125x15	Section used for this span		5.125x15
fb : Actual	=	928.86 psi	fv : Actual	=	43.15 psi
FB : Allowable	=	2,656.94 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	12.290 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.513 in	Ratio =	574 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.624 in	Ratio =	472 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 24.580 ft	1	0.080	0.032	0.90	0.963	1.00	1.00	1.00	1.00	1.00	2.65	165.45	2079.34	0.40	7.71	238.50
+D+L+H					0.963	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.580 ft	1	0.072	0.029	1.00	0.963	1.00	1.00	1.00	1.00	1.00	2.65	165.45	2310.38	0.40	7.71	265.00
+D+Lr+H					0.963	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.580 ft	1	0.057	0.023	1.25	0.963	1.00	1.00	1.00	1.00	1.00	2.65	165.45	2887.98	0.40	7.71	331.25
+D+S+H					0.963	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.580 ft	1	0.350	0.142	1.15	0.963	1.00	1.00	1.00	1.00	1.00	14.88	928.86	2656.94	2.21	43.15	304.75
+D+0.750Lr+0.750L+H					0.963	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 23 MAY 2017, 5:18PM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-33 - 5 1/8 x 15 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 24.580 ft	1	0.057	0.023	1.25	0.963	1.00	1.00	1.00	1.00	1.00	2.65	165.45	2887.98	0.40	7.71	331.25
+D+0.750L+0.750S+H					0.963	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.580 ft	1	0.278	0.113	1.15	0.963	1.00	1.00	1.00	1.00	1.00	11.82	737.93	2656.94	1.76	34.29	304.75
+D+W+H					0.963	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.580 ft	1	0.045	0.018	1.60	0.963	1.00	1.00	1.00	1.00	1.00	2.65	165.45	3696.61	0.40	7.71	424.00
+D+E+H					0.963	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.580 ft	1	0.045	0.018	1.60	0.963	1.00	1.00	1.00	1.00	1.00	2.65	165.45	3696.61	0.40	7.71	424.00
+D+0.750Lr+0.750L+0.750W+H					0.963	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.580 ft	1	0.045	0.018	1.60	0.963	1.00	1.00	1.00	1.00	1.00	2.65	165.45	3696.61	0.40	7.71	424.00
+D+0.750L+0.750S+0.750W+H					0.963	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.580 ft	1	0.200	0.081	1.60	0.963	1.00	1.00	1.00	1.00	1.00	11.82	737.93	3696.61	1.76	34.29	424.00
+D+0.750L+0.750S+0.750E+H					0.963	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.580 ft	1	0.200	0.081	1.60	0.963	1.00	1.00	1.00	1.00	1.00	11.82	737.93	3696.61	1.76	34.29	424.00
+0.60D+W+0.60H					0.963	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.580 ft	1	0.027	0.011	1.60	0.963	1.00	1.00	1.00	1.00	1.00	1.59	99.27	3696.61	0.24	4.63	424.00
+0.60D+E+0.60H					0.963	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.580 ft	1	0.027	0.011	1.60	0.963	1.00	1.00	1.00	1.00	1.00	1.59	99.27	3696.61	0.24	4.63	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.6244	12.290		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.451	2.344
Overall MINimum	0.260	0.242
+D+H	0.433	0.403
+D+L+H	0.433	0.403
+D+Lr+H	0.433	0.403
+D+S+H	2.451	2.344
+D+0.750Lr+0.750L+H	0.433	0.403
+D+0.750L+0.750S+H	1.947	1.859
+D+W+H	0.433	0.403
+D+E+H	0.433	0.403
+D+0.750Lr+0.750L+0.750W+H	0.433	0.403
+D+0.750L+0.750S+0.750W+H	1.947	1.859
+D+0.750L+0.750S+0.750E+H	1.947	1.859
+0.60D+W+0.60H	0.260	0.242
+0.60D+E+0.60H	0.260	0.242
D Only	0.433	0.403
Lr Only		
L Only		
S Only	2.018	1.940
W Only		
E Only		
H Only		

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed 24 MAY 2017, 8:24AM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-34 - W10x54

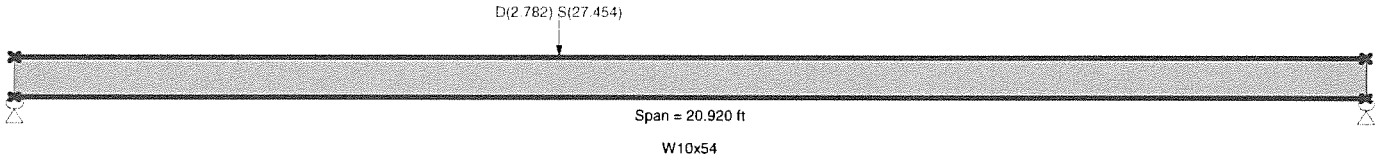
CODE REFERENCES

Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load(s) for Span Number 1
Point Load : D = 2.782, S = 27.454 k @ 8.420 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.932 : 1	Maximum Shear Stress Ratio =	0.249 : 1
Section used for this span	W10x54	Section used for this span	W10x54
Ma : Applied	154.867 k-ft	Va : Applied	18.631 k
Mn / Omega : Allowable	166.168 k-ft	Vn/Omega : Allowable	74.740 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	8.428ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.981 in	Ratio =	255 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	1.110 in	Ratio =	226 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 20.92 ft	1	0.101	0.030	16.83		16.83	277.50	166.17	1.00	1.00	2.23	112.11	74.74
+D+L+H													
Dsgn. L = 20.92 ft	1	0.101	0.030	16.83		16.83	277.50	166.17	1.00	1.00	2.23	112.11	74.74
+D+Lr+H													
Dsgn. L = 20.92 ft	1	0.101	0.030	16.83		16.83	277.50	166.17	1.00	1.00	2.23	112.11	74.74
+D+S+H													
Dsgn. L = 20.92 ft	1	0.932	0.249	154.87		154.87	277.50	166.17	1.00	1.00	18.63	112.11	74.74
+D+0.750Lr+0.750L+H													
Dsgn. L = 20.92 ft	1	0.101	0.030	16.83		16.83	277.50	166.17	1.00	1.00	2.23	112.11	74.74
+D+0.750L+0.750S+H													
Dsgn. L = 20.92 ft	1	0.724	0.194	120.36		120.36	277.50	166.17	1.00	1.00	14.53	112.11	74.74
+D+W+H													
Dsgn. L = 20.92 ft	1	0.101	0.030	16.83		16.83	277.50	166.17	1.00	1.00	2.23	112.11	74.74
+D+E+H													
Dsgn. L = 20.92 ft	1	0.101	0.030	16.83		16.83	277.50	166.17	1.00	1.00	2.23	112.11	74.74
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 20.92 ft	1	0.101	0.030	16.83		16.83	277.50	166.17	1.00	1.00	2.23	112.11	74.74
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 20.92 ft	1	0.724	0.194	120.36		120.36	277.50	166.17	1.00	1.00	14.53	112.11	74.74
+D+0.750L+0.750S+0.750E+H													
Dsgn. L = 20.92 ft	1	0.724	0.194	120.36		120.36	277.50	166.17	1.00	1.00	14.53	112.11	74.74
+0.60D+W+0.60H													
Dsgn. L = 20.92 ft	1	0.061	0.018	10.10		10.10	277.50	166.17	1.00	1.00	1.34	112.11	74.74

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 24 MAY 2017, 8:24AM

Steel Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-34 - W10x54

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
+0.60D+E+0.60H													
Dsgn. L = 20.92 ft	1	0.061	0.018	10.10		10.10	277.50	166.17	1.00	1.00	1.34	112.11	74.74

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	1.1098	9.922		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	18.631	12.734
Overall MINimum	1.336	1.011
+D+H	2.227	1.685
+D+L+H	2.227	1.685
+D+Lr+H	2.227	1.685
+D+S+H	18.631	12.734
+D+0.750Lr+0.750L+H	2.227	1.685
+D+0.750L+0.750S+H	14.530	9.972
+D+W+H	2.227	1.685
+D+E+H	2.227	1.685
+D+0.750Lr+0.750L+0.750W+H	2.227	1.685
+D+0.750L+0.750S+0.750W+H	14.530	9.972
+D+0.750L+0.750S+0.750E+H	14.530	9.972
+0.60D+W+0.60H	1.336	1.011
+0.60D+E+0.60H	1.336	1.011
D Only	2.227	1.685
Lr Only		
L Only		
S Only	16.404	11.050
W Only		
E Only		
H Only		

OHB-35

SPAN = 7'-3"

$W_1 = \frac{1}{2}(13.33)(24+259) = 160D + 1727S$ $x = 0$ TO 3'-10"

$W_2 = 16(24+259) = 384D + 4144S$ $x = 3'\text{-}10"$ TO END

$P = R_{OHB13R} + R_{OHB11R}$

$= (-64 - 3217S) + (420D + 2112S) = 356D - 1105S$ @ $x = 3\text{-}10$

OHB-36   SPAN = 5'-10"

$W = 7(24+259) = 168D + 1813S$ $x = 1'\text{-}6"$ TO END

$P = R_{OHB16R} + R_{OHB17R}$

$= (-263D - 5332S) + (391D + 1714S)$

$= 128D - 3618S$ @ $x = 1'\text{-}6"$

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4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 30 MAY 2017, 2:17PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-35 - 6 3/4 x 10 1/2 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

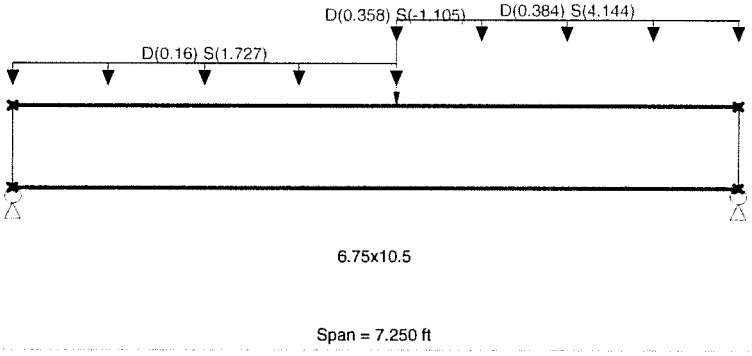
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.160, S = 1.727 k/ft, Extent = 0.0 -->> 3.830 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.3840, S = 4.144 k/ft, Extent = 3.830 -->> 7.250 ft, Tributary Width = 1.0 ft
Point Load : D = 0.3580, S = -1.105 k @ 3.830 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.693 : 1	Maximum Shear Stress Ratio	=	0.655 : 1
Section used for this span		6.75x10.5	Section used for this span		6.75x10.5
fb : Actual	=	1,912.75 psi	fv : Actual	=	199.71 psi
FB : Allowable	=	2,760.00 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	4.313 ft	Location of maximum on span	=	6.377 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.138 in	Ratio =	630 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.157 in	Ratio =	554 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 7.250 ft	1	0.111	0.094	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.49	240.62	2160.00	1.06	22.47	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.250 ft	1	0.100	0.085	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.49	240.62	2400.00	1.06	22.47	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.250 ft	1	0.080	0.068	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.49	240.62	3000.00	1.06	22.47	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.250 ft	1	0.693	0.655	1.15	1.000	1.00	1.00	1.00	1.00	1.00	19.77	1,912.75	2760.00	9.44	199.71	304.75

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 30 MAY 2017, 2:17PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-35 - 6 3/4 x 10 1/2 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.250 ft	1	0.080	0.068	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.49	240.62	3000.00	1.06	22.47	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.250 ft	1	0.541	0.510	1.15	1.000	1.00	1.00	1.00	1.00	1.00	15.43	1,493.22	2760.00	7.34	155.40	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.250 ft	1	0.063	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.49	240.62	3840.00	1.06	22.47	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.250 ft	1	0.063	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.49	240.62	3840.00	1.06	22.47	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.250 ft	1	0.063	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.49	240.62	3840.00	1.06	22.47	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.250 ft	1	0.389	0.367	1.60	1.000	1.00	1.00	1.00	1.00	1.00	15.43	1,493.22	3840.00	7.34	155.40	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.250 ft	1	0.389	0.367	1.60	1.000	1.00	1.00	1.00	1.00	1.00	15.43	1,493.22	3840.00	7.34	155.40	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.250 ft	1	0.038	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.49	144.37	3840.00	0.64	13.48	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.250 ft	1	0.038	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.49	144.37	3840.00	0.64	13.48	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.1570	3.757		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	8.674	13.403
Overall MINimum	0.591	0.846
+D+H	0.985	1.410
+D+L+H	0.985	1.410
+D+Lr+H	0.985	1.410
+D+S+H	8.674	13.403
+D+0.750Lr+0.750L+H	0.985	1.410
+D+0.750L+0.750S+H	6.752	10.405
+D+W+H	0.985	1.410
+D+E+H	0.985	1.410
+D+0.750Lr+0.750L+0.750W+H	0.985	1.410
+D+0.750L+0.750S+0.750W+H	6.752	10.405
+D+0.750L+0.750S+0.750E+H	6.752	10.405
+0.60D+W+0.60H	0.591	0.846
+0.60D+E+0.60H	0.591	0.846
D Only	0.985	1.410
Lr Only		
L Only		
S Only	7.689	11.993
W Only		
E Only		
H Only		

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed 30 MAY 2017, 2:23PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-36 - 6 3/4 x 9 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination ASCE 7-10 w/ ASD Wind & EQ

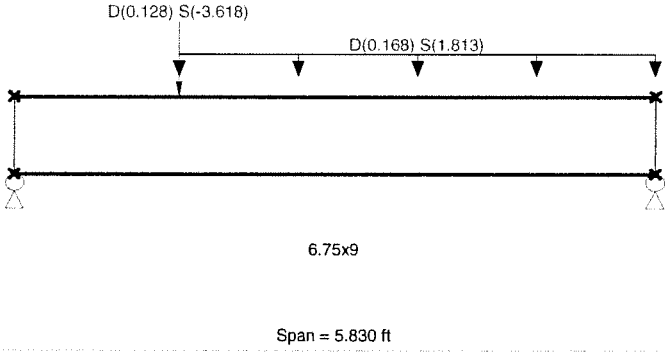
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.1680, S = 1.813 k/ft, Extent = 1.50 -->> 5.830 ft, Tributary Width = 1.0 ft
Point Load : D = 0.1280, S = -3.618 k @ 1.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.246 : 1	Maximum Shear Stress Ratio	=	0.331 : 1
Section used for this span		6.75x9	Section used for this span		6.75x9
fb : Actual	=	678.39 psi	fv : Actual	=	100.76 psi
FB : Allowable	=	2,760.00 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	3.553 ft	Location of maximum on span	=	1.511 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.030 in	Ratio =	2314 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.037 in	Ratio =	1914 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 5.830 ft	1	0.047	0.041	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.77	101.56	2160.00	0.39	9.72	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.830 ft	1	0.042	0.037	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.77	101.56	2400.00	0.39	9.72	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.830 ft	1	0.034	0.029	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.77	101.56	3000.00	0.39	9.72	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.830 ft	1	0.246	0.331	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.15	678.39	2760.00	4.08	100.76	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 30 MAY 2017, 2:23PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 133 - OHB-36 - 6 3/4 x 9 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 5.830 ft	1	0.034	0.029	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.77	101.56	3000.00	0.39	9.72	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.830 ft	1	0.193	0.253	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.05	532.98	2760.00	3.12	77.13	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.830 ft	1	0.026	0.023	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.77	101.56	3840.00	0.39	9.72	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.830 ft	1	0.026	0.023	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.77	101.56	3840.00	0.39	9.72	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.830 ft	1	0.026	0.023	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.77	101.56	3840.00	0.39	9.72	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.830 ft	1	0.139	0.182	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.05	532.98	3840.00	3.12	77.13	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.830 ft	1	0.139	0.182	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.05	532.98	3840.00	3.12	77.13	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.830 ft	1	0.016	0.014	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.46	60.93	3840.00	0.24	5.83	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.830 ft	1	0.016	0.014	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.46	60.93	3840.00	0.24	5.83	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.0365	3.213		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.632	4.533
Overall MINimum	0.228	0.317
+D+H	0.404	0.529
+D+L+H	0.404	0.529
+D+Lr+H	0.404	0.529
+D+S+H	0.632	4.533
+D+0.750Lr+0.750L+H	0.404	0.529
+D+0.750L+0.750S+H	0.575	3.532
+D+W+H	0.404	0.529
+D+E+H	0.404	0.529
+D+0.750Lr+0.750L+0.750W+H	0.404	0.529
+D+0.750L+0.750S+0.750W+H	0.575	3.532
+D+0.750L+0.750S+0.750E+H	0.575	3.532
+0.60D+W+0.60H	0.242	0.317
+0.60D+E+0.60H	0.242	0.317
D Only	0.404	0.529
Lr Only		
L Only		
S Only	0.228	4.004
W Only		
E Only		
H Only		

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

OHB-37 SPAN = 7'-7"

$W_1 = 6.25(24 + 259) = 1500 + 1619s$ $x = 0$ TO 3'-10"

$W_2 = 17.5($ " $) = 4200 + 4533s$ $x = 3'-10"$ TO END

$P = R_{OHB31R} + R_{OHB33L}$

$= (-1333 - 402s) + (4333 + 2018s)$

$= 3000 - 2004s$ @ $x = 3-10$

OHB-38 SPAN = 6'-2"

$W = 6.5(24 + 259) = 1560 + 1684s$

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed 30 MAY 2017, 3:01PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-37 - 6 3/4 x 10 1/2 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination ASCE 7-10 w/ ASD Wind & EQ

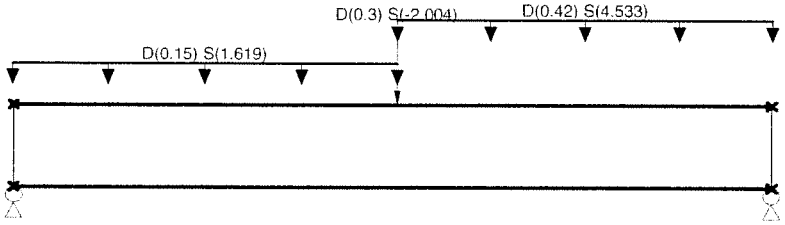
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.150, S = 1.619 k/ft, Extent = 0.0 -->> 3.830 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.420, S = 4.533 k/ft, Extent = 3.830 -->> 7.580 ft, Tributary Width = 1.0 ft
Point Load : D = 0.30, S = -2.004 k @ 3.830 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.782 1	Maximum Shear Stress Ratio	=	0.738 : 1
Section used for this span		6.75x10.5	Section used for this span		6.75x10.5
fb : Actual	=	2,158.19 psi	fv : Actual	=	224.92 psi
FB : Allowable	=	2,760.00 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	4.592 ft	Location of maximum on span	=	6.722 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.168 in	Ratio =	541 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.191 in	Ratio =	476 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.122	0.104	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.72	263.63	2160.00	1.17	24.70	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.110	0.093	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.72	263.63	2400.00	1.17	24.70	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.088	0.075	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.72	263.63	3000.00	1.17	24.70	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.782	0.738	1.15	1.000	1.00	1.00	1.00	1.00	1.00	22.31	2,158.19	2760.00	10.63	224.92	304.75

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed 30 MAY 2017, 3:01PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-37 - 6 3/4 x 10 1/2 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.088	0.075	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.72	263.63	3000.00	1.17	24.70	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.610	0.574	1.15	1.000	1.00	1.00	1.00	1.00	1.00	17.40	1,683.06	2760.00	8.26	174.86	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.069	0.058	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.72	263.63	3840.00	1.17	24.70	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.069	0.058	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.72	263.63	3840.00	1.17	24.70	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.069	0.058	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.72	263.63	3840.00	1.17	24.70	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.438	0.412	1.60	1.000	1.00	1.00	1.00	1.00	1.00	17.40	1,683.06	3840.00	8.26	174.86	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.438	0.412	1.60	1.000	1.00	1.00	1.00	1.00	1.00	17.40	1,683.06	3840.00	8.26	174.86	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.041	0.035	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.63	158.18	3840.00	0.70	14.82	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.580 ft	1	0.041	0.035	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.63	158.18	3840.00	0.70	14.82	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.1910	3.984		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	8.873	14.888
Overall MINimum	0.615	0.924
+D+H	1.026	1.540
+D+L+H	1.026	1.540
+D+Lr+H	1.026	1.540
+D+S+H	8.873	14.888
+D+0.750Lr+0.750L+H	1.026	1.540
+D+0.750L+0.750S+H	6.911	11.551
+D+W+H	1.026	1.540
+D+E+H	1.026	1.540
+D+0.750Lr+0.750L+0.750W+H	1.026	1.540
+D+0.750L+0.750S+0.750W+H	6.911	11.551
+D+0.750L+0.750S+0.750E+H	6.911	11.551
+0.60D+W+0.60H	0.615	0.924
+0.60D+E+0.60H	0.615	0.924
D Only	1.026	1.540
Lr Only		
L Only		
S Only	7.848	13.348
W Only		
E Only		
H Only		

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 30 MAY 2017, 3:03PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-38 - 6 3/4 x 9 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

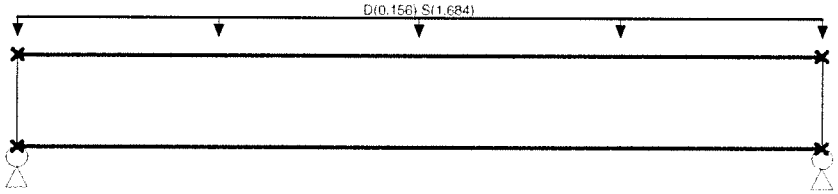
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



6.75x9

Span = 6.170 ft

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.1560, S = 1.684 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.421 : 1	Maximum Shear Stress Ratio	=	0.352 : 1
Section used for this span		6.75x9	Section used for this span		6.75x9
fb : Actual	=	1,161.28 psi	fv : Actual	=	107.16 psi
FB : Allowable	=	2,760.00 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	3.085 ft	Location of maximum on span	=	5.427 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.075 in	Ratio =	989 >=240.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240.0
Max Downward Total Deflection	0.082 in	Ratio =	899 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 6.170 ft	1	0.049	0.041	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.80	106.01	2160.00	0.40	9.78	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.170 ft	1	0.044	0.037	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.80	106.01	2400.00	0.40	9.78	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.170 ft	1	0.035	0.030	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.80	106.01	3000.00	0.40	9.78	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.170 ft	1	0.421	0.352	1.15	1.000	1.00	1.00	1.00	1.00	1.00	8.82	1,161.28	2760.00	4.34	107.16	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.170 ft	1	0.035	0.030	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.80	106.01	3000.00	0.40	9.78	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

156

Printed 30 MAY 2017, 3:03PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Unit 124 - OHB-38 - 6 3/4 x 9 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 6.170 ft	1	0.325	0.272	1.15	1.000	1.00	1.00	1.00	1.00	1.00	6.82	897.46	2760.00	3.35	82.81	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.170 ft	1	0.028	0.023	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.80	106.01	3840.00	0.40	9.78	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.170 ft	1	0.028	0.023	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.80	106.01	3840.00	0.40	9.78	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.170 ft	1	0.028	0.023	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.80	106.01	3840.00	0.40	9.78	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.170 ft	1	0.234	0.195	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.82	897.46	3840.00	3.35	82.81	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.170 ft	1	0.234	0.195	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.82	897.46	3840.00	3.35	82.81	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.170 ft	1	0.017	0.014	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.48	63.60	3840.00	0.24	5.87	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.170 ft	1	0.017	0.014	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.48	63.60	3840.00	0.24	5.87	424.00

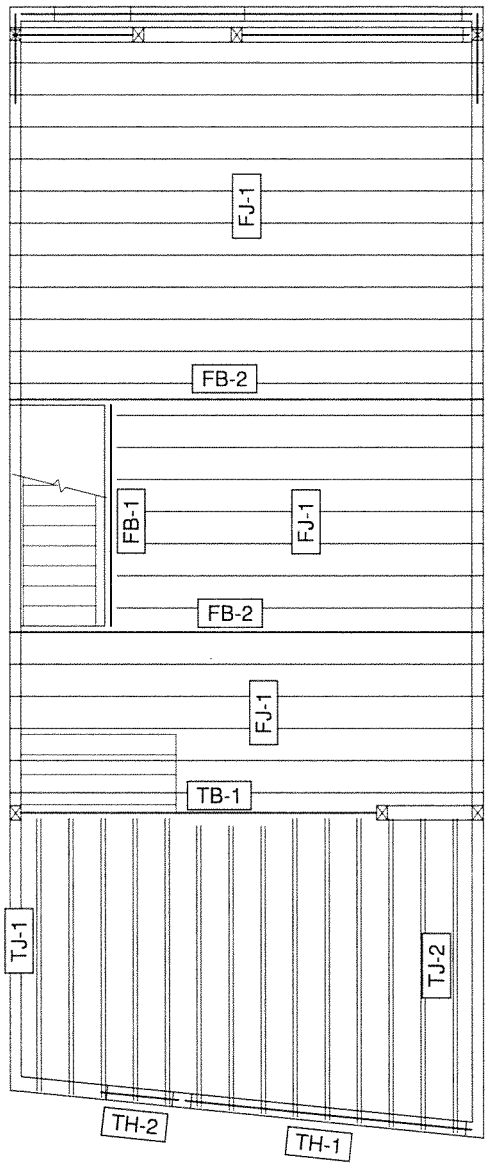
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.0823	3.108		0.0000	0.000

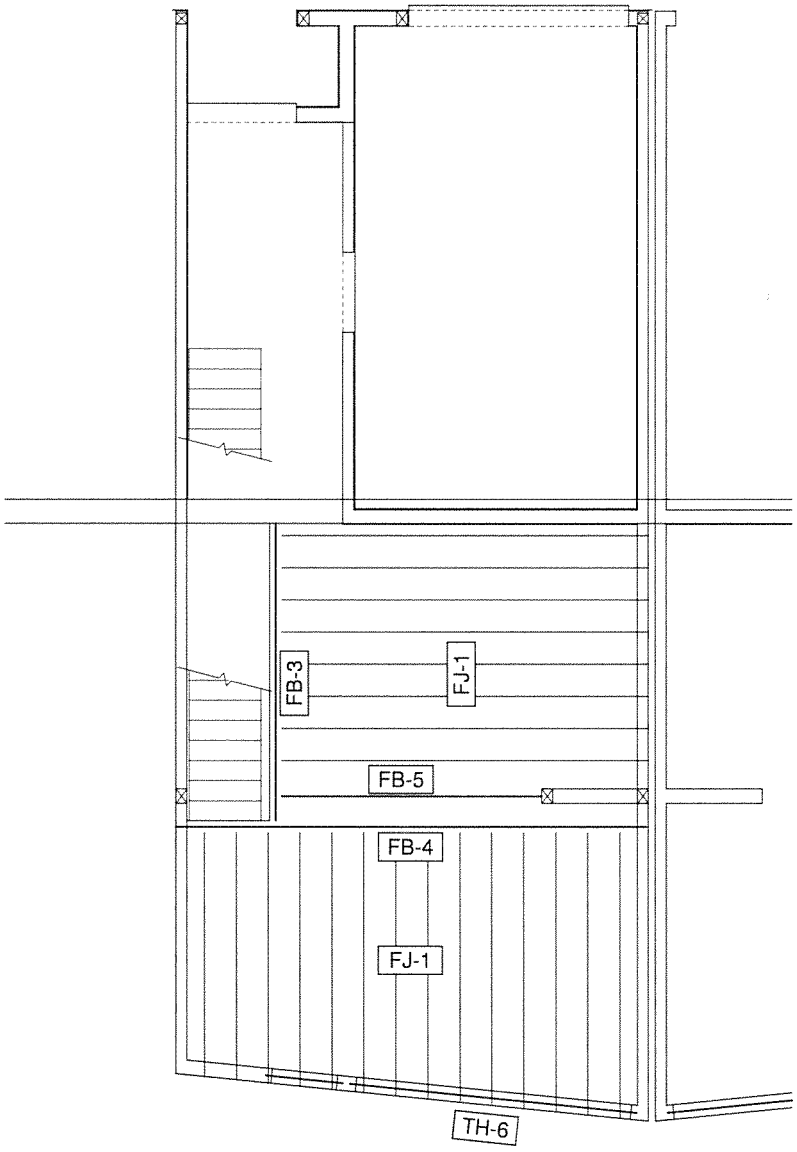
Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

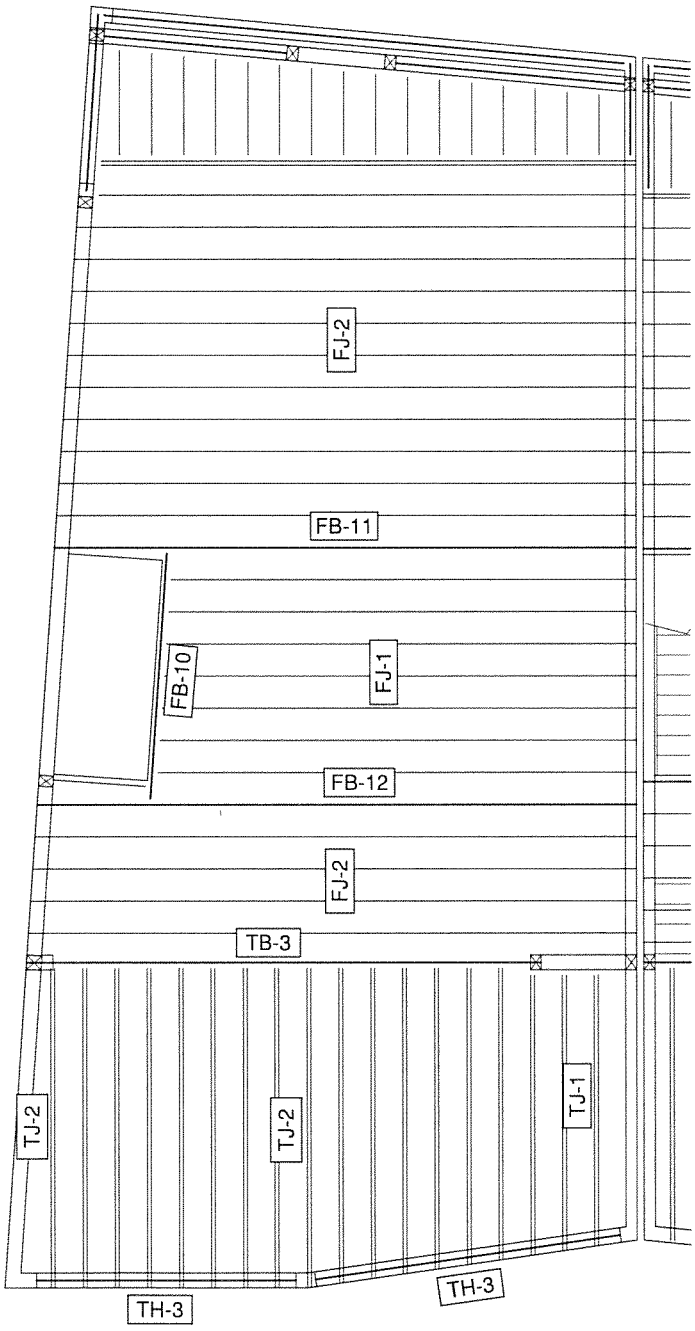
Load Combination	Support 1	Support 2
Overall MAXimum	5.717	5.717
Overall MINimum	0.313	0.313
+D+H	0.522	0.522
+D+L+H	0.522	0.522
+D+Lr+H	0.522	0.522
+D+S+H	5.717	5.717
+D+0.750Lr+0.750L+H	0.522	0.522
+D+0.750L+0.750S+H	4.418	4.418
+D+W+H	0.522	0.522
+D+E+H	0.522	0.522
+D+0.750Lr+0.750L+0.750W+H	0.522	0.522
+D+0.750L+0.750S+0.750W+H	4.418	4.418
+D+0.750L+0.750S+0.750E+H	4.418	4.418
+0.60D+W+0.60H	0.313	0.313
+0.60D+E+0.60H	0.313	0.313
D Only	0.522	0.522
Lr Only		
L Only		
S Only	5.195	5.195
W Only		
E Only		
H Only		



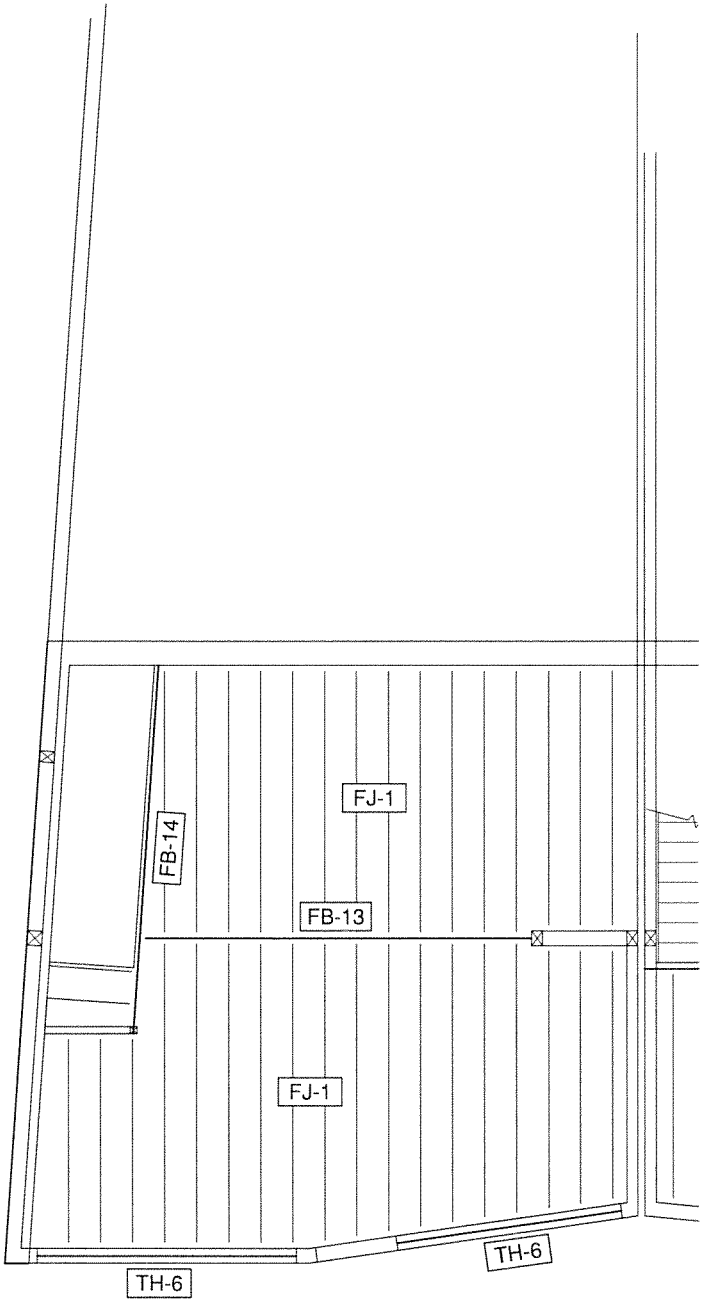
TYPICAL UNIT UPPER LEVEL FRAMING KEY PLAN



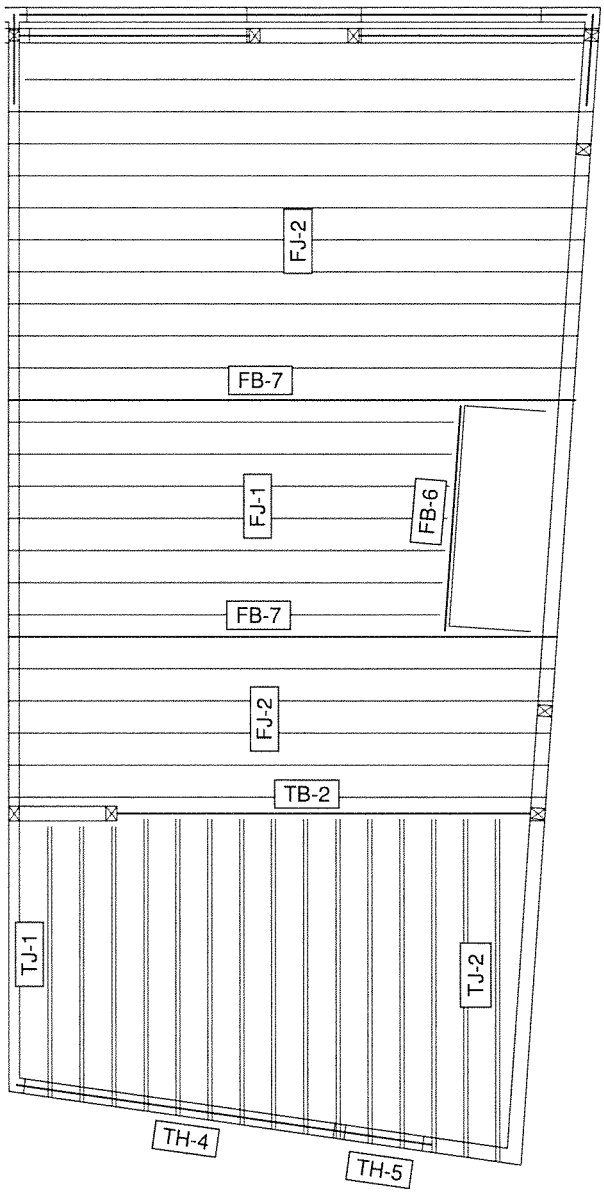
TYPICAL UNIT ENTRY LEVEL FRAMING KEY PLAN



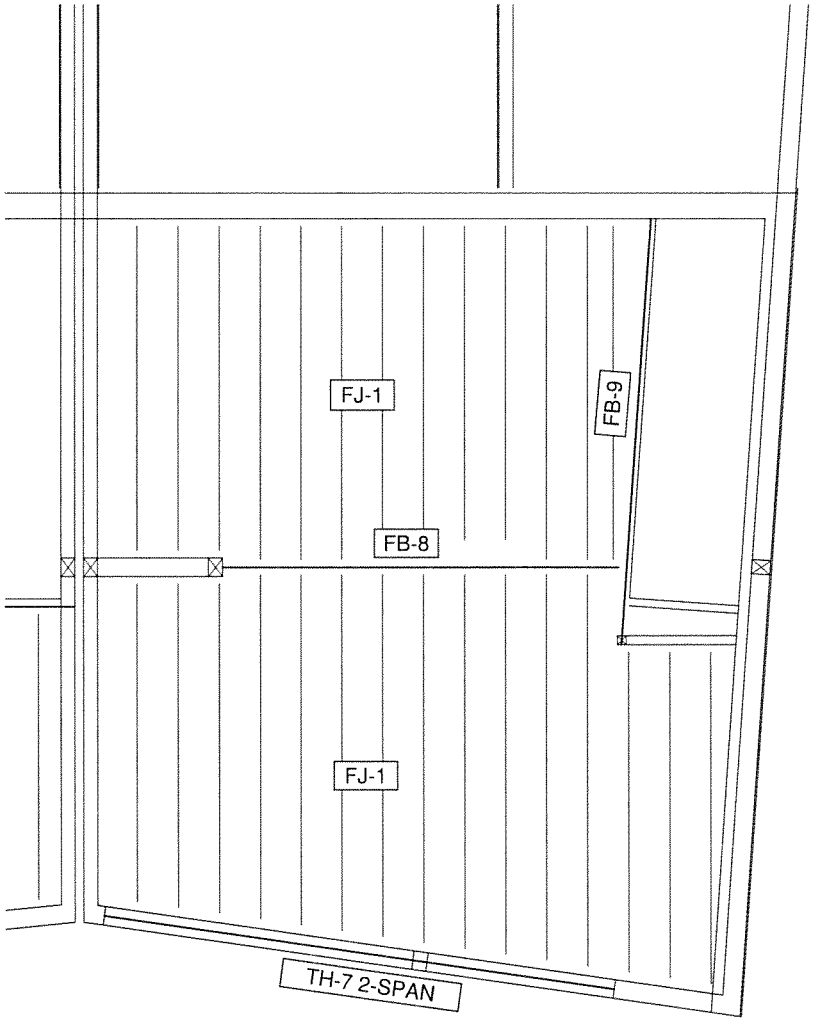
UNIT 124 UPPER LEVEL FRAMING KEY PLAN



UNIT 124 ENTRY LEVEL FRAMING KEY PLAN



UNIT 133 UPPER LEVEL FRAMING KEY PLAN



UNIT 133 ENTRY LEVEL FRAMING KEY PLAN

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

FLOOR FRAMING - TYPICAL UNITS

TYPICAL FLOOR JOISTS (FJ-1)

SPAN = 19'-10" MAX — SEE NEXT SHT

TERRACE JOISTS

LONG EDGE; SPAN = 13'-0" (TJ-1)

$W_L = 1.33(28 + 362) = 37D + 483 SL$

$W_R = 1.33(28 + 272) = 37D + 363 SL$

— SEE NEXT SHTS —

SHORT EDGE; SPAN = 11'-0" (TJ-2)

$W_L = 1.33(28 + 362) = 37D + 483 SL$

$W_R = 1.33(28 + 286) = 37D + 380 SL$

— SEE NEXT SHTS —

BEAM FB1

SPAN = 9'-8"

$W = 8(25 + 40) + 30 = 2300 + 320 L, PLF$

RedSpec™ by RedBuilt™
v7.1.4

Project: Project
Location: Utah
Folder: Folder
Date: 5/7/17 1:26 PM
Designer: MAR
Comment:

Type: Type

14" Red-I45™ @ 16" o.c. with Glued Sheathing

This product meets or exceeds the set design controls for the application and loads listed

DESIGN CONTROLS	%	Design	Allow.	DOL	Combination	Pattern	Pass/Fail
Shear (lb)	44%	859	1960	Floor(100%)	1.0D+1.0L	All Spans	PASS
Positive Moment (ft-lb)	76%	4261	5570	Floor(100%)	1.0D+1.0L	All Spans	PASS

DEFLECTIONS (in)	%	Design	Allow.	Design	Allow.	Combination	Pattern	Pass/Fail
Span Live	67%	0.333	0.496	L / 714	L / 480	1.0D+1.0L	All Spans	PASS
Span Total	55%	0.541	0.992	L / 440	L / 240	1.0D+1.0L	All Spans	PASS

FloorChoice™ Rating: 5.6

Performance rating is based on: 48 oc (1 1/8") sheathing, glued and nailed, simple span, rigid supports. RedSpec has not performed a structural analysis of the sheathing.

SUPPORTS	Support 1	Support 2
Live Reaction, Critical (lb) (DOL%)	529 (100)	529 (100)
Dead Reaction (lb)	331	331
Total Reaction (lb) (DOL%)	859 (100)	859 (100)
Bearing	Bottom	Bottom
Support	Wall	Wall
Req'd Bearing, No Stiffeners (in)	1.75	1.75
Req'd Bearing, Stiffeners (in)	-	-

SPANS AND LOADS

Dimensions represent horizontal design spans.

19'- 10.0"

APPLICATION LOADS

Type	Units	DOL	Live	Dead	Partition	Tributary	Member Type
Uniform	psf	Floor(100%)	40	25	0	16"	Glued Floor Joist

NOTES

- Building code and design methodology: 2015 IBC ASD (US).
- Deflection analysis is based on composite action with 48 oc (1 1/8") sheathing, glued and nailed.
- Continuous lateral support required at top edge. Lateral support at bottom edge shall be per RedBuilt recommendations.

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RedSpec™ by RedBuilt™
v7.1.4

Project: Project
Location: Utah
Folder: Folder
Date: 5/7/17 1:30 PM
Designer: MAR
Comment:

Type: TJ-1

DOUBLE 14" Red-I45™ @ 16" o.c. with Glued Sheathing

This product meets or exceeds the set design controls for the application and loads listed

DESIGN CONTROLS	%	Design	Allow.	DOL	Combination	Pattern	Pass/Fail
Shear (lb)	69%	3120	4508	Snow(115%)	1.0D+1.0S	All Spans	PASS
Positive Moment (ft-lb)	76%	9722	12811	Snow(115%)	1.0D+1.0S	All Spans	PASS

DEFLECTIONS (in)	%	Design	Allow.	Design	Allow.	Combination	Pattern	Pass/Fail
Span Live	67%	0.289	0.433	L / 539	L / 360	1.0D+1.0S	All Spans	PASS
Span Total	49%	0.316	0.650	L / 494	L / 240	1.0D+1.0S	All Spans	PASS

FloorChoice™ Rating: 9.8

Performance rating is based on: 48 oc (1 1/8") sheathing, glued and nailed, 1/2" Gypsum ceiling, simple span, flexible support. RedSpec has not performed a structural analysis of the sheathing.

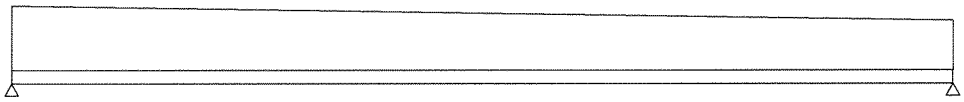
SUPPORTS	Support 1	Support 2
Live Reaction, Critical (lb) (DOL%)	2880 (115)	2619 (115)
Dead Reaction (lb)	240	240
Total Reaction (lb) (DOL%)	3120 (115)	2860 (115)
Bearing	Flush	Bottom
Support	Beam	Wall
Req'd Bearing, No Stiffeners (in)	2.84	2.48
Req'd Bearing, Stiffeners (in)	2.08	1.79

SIMPSON MIU3.5C/14 HANGER (FACE MOUNT)
RALLOW = 3595# ok

HANGERS	Model	Top	Face	Member	Header	Size
Left	BA3.56/14	6-16d	10-16d	2-10dx1.5"	Glulam DF/SP	8.75x34.5

SPANS AND LOADS

Dimensions represent horizontal design spans.



13'- 0.0"

APPLICATION LOADS

Type	Units	DOL	Live	Dead	Partition	Tributary	Member Type
Uniform	psf	Floor(100%)	40	25	0	16"	Glued Floor Joist

ADDITIONAL LOADS

Type	Units	DOL	Live	Dead	Location from left	Application	Comment
Tapered	plf	Snow(115%)	483 to 363	37 to 37	0'-0.0" to 13'-0.0"	Replaces	

NOTES

- Building code and design methodology: 2015 IBC ASD (US).
- Deflection analysis is based on composite action with 48 oc (1 1/8") sheathing, glued and nailed.
- Continuous lateral support required at top edge. Lateral support at bottom edge shall be per RedBuilt recommendations.
- Connect multiple ply members per RedBuilt™ Installation Guidelines.

C:_jobs\17100 CCW Powdercat\ENG\Framing\Powdercat.red

RedSpec™ by RedBuilt™
v7.1.4

Project: Project
Location: Utah
Folder: Folder
Date: 5/7/17 1:31 PM
Designer: MAR
Comment:

Type: TJ-2

DOUBLE 14" Red-I45™ @ 16" o.c. with Glued Sheathing

This product meets or exceeds the set design controls for the application and loads listed

DESIGN CONTROLS	%	Design	Allow.	DOL	Combination	Pattern	Pass/Fail
Shear (lb)	59%	2674	4508	Snow(115%)	1.0D+1.0S	All Spans	PASS
Positive Moment (ft-lb)	55%	7100	12811	Snow(115%)	1.0D+1.0S	All Spans	PASS

DEFLECTIONS (in)	%	Design	Allow.	Design	Allow.	Combination	Pattern	Pass/Fail
Span Live	45%	0.166	0.367	L / 796	L / 360	1.0D+1.0S	All Spans	PASS
Span Total	33%	0.181	0.550	L / 730	L / 240	1.0D+1.0S	All Spans	PASS

FloorChoice™ Rating: 9.9

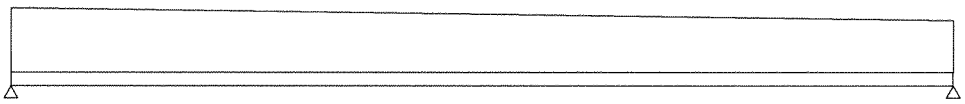
Performance rating is based on: 48 oc (1 1/8") sheathing, glued and nailed, 1/2" Gypsum ceiling, simple span, flexible support. RedSpec has not performed a structural analysis of the sheathing.

SUPPORTS	Support 1	Support 2
Live Reaction, Critical (lb) (DOL%)	2470 (115)	2284 (115)
Dead Reaction (lb)	203	203
Total Reaction (lb) (DOL%)	2674 (115)	2488 (115)
Bearing	Flush	Bottom
Support	Beam	Wall
Req'd Bearing, No Stiffeners (in)	2.22	1.96
Req'd Bearing, Stiffeners (in)	1.75	1.75

HANGERS	Model	Top	Face	Member	Header	Size
Left	BA3.56/14	6-10d	10-10d	2-10dx1.5"	Glulam DF/SP	8.75x34.5

SPANS AND LOADS

Dimensions represent horizontal design spans.



11'- 0.0"

APPLICATION LOADS

Type	Units	DOL	Live	Dead	Partition	Tributary	Member Type
Uniform	psf	Floor(100%)	40	25	0	16"	Glued Floor Joist

ADDITIONAL LOADS

Type	Units	DOL	Live	Dead	Location from left	Application	Comment
Tapered	plf	Snow(115%)	483 to 381.5	37 to 37	0'-0.0" to 11'-0.0"	Replaces	

NOTES

- Building code and design methodology: 2015 IBC ASD (US).
- Deflection analysis is based on composite action with 48 oc (1 1/8") sheathing, glued and nailed.
- Continuous lateral support required at top edge. Lateral support at bottom edge shall be per RedBuilt recommendations.
- Connect multiple ply members per RedBuilt™ Installation Guidelines.

C:_jobs\17100 CCW Powdercat\ENG\Framing\Powdercat.red

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 7 MAY 2017, 3:13PM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : FB-1 - 3 1/8x13 1/2 GLB

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

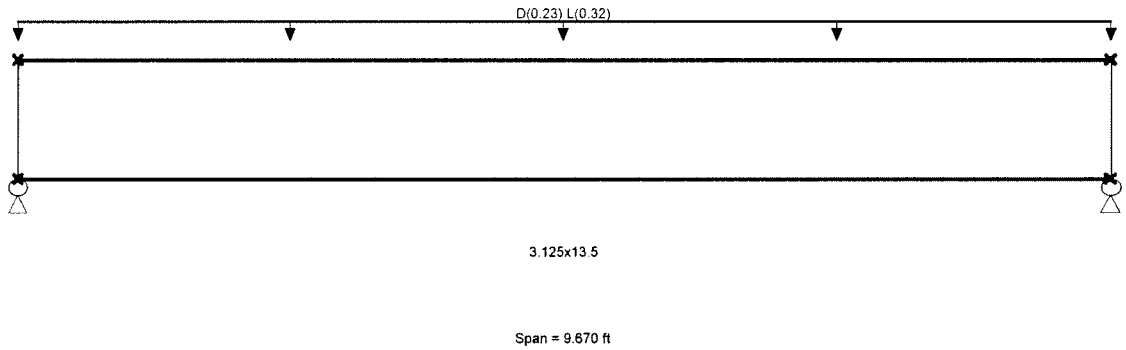
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.230, L = 0.320 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.344 : 1	Maximum Shear Stress Ratio	=	0.281 : 1
Section used for this span		3.125x13.5	Section used for this span		3.125x13.5
fb : Actual	=	826.23 psi	fv : Actual	=	74.37 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	4.835 ft	Location of maximum on span	=	8.576 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.055 in	Ratio =	2113 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.096 in	Ratio =	1209 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.164	0.133	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.80	353.37	2160.00	0.89	31.81	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.344	0.281	1.00	1.000	1.00	1.00	1.00	1.00	1.00	6.54	826.23	2400.00	2.09	74.37	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.118	0.096	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.80	353.37	3000.00	0.89	31.81	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.128	0.104	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.80	353.37	2760.00	0.89	31.81	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.236	0.192	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.60	708.01	3000.00	1.79	63.73	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

Printed: 7 MAY 2017, 3:13PM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : FB-1 - 3 1/8x13 1/2 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 9.670 ft	1	0.257	0.209	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.60	708.01	2760.00	1.79	63.73	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.092	0.075	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.80	353.37	3840.00	0.89	31.81	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.092	0.075	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.80	353.37	3840.00	0.89	31.81	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.184	0.150	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.60	708.01	3840.00	1.79	63.73	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.184	0.150	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.60	708.01	3840.00	1.79	63.73	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.184	0.150	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.60	708.01	3840.00	1.79	63.73	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.055	0.045	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.68	212.02	3840.00	0.54	19.09	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.670 ft	1	0.055	0.045	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.68	212.02	3840.00	0.54	19.09	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0959	4.870		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.703	2.703
Overall MINimum	0.694	0.694
+D+H	1.156	1.156
+D+L+H	2.703	2.703
+D+Lr+H	1.156	1.156
+D+S+H	1.156	1.156
+D+0.750Lr+0.750L+H	2.317	2.317
+D+0.750L+0.750S+H	2.317	2.317
+D+W+H	1.156	1.156
+D+E+H	1.156	1.156
+D+0.750Lr+0.750L+0.750W+H	2.317	2.317
+D+0.750L+0.750S+0.750W+H	2.317	2.317
+D+0.750L+0.750S+0.750E+H	2.317	2.317
+0.60D+W+0.60H	0.694	0.694
+0.60D+E+0.60H	0.694	0.694
D Only	1.156	1.156
Lr Only		
L Only	1.547	1.547
S Only		
W Only		
E Only		
H Only		

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

BEAM FB-2

SPAN = 19'-10"

$W_1 = 1.33(25+40) = 330\text{D} + 53\text{L}$

$P = R_{FB1} = 1156\text{D} + 1547\text{L}$ @ x = 3'-11"

$W_2 = \frac{1}{2}(9.167)(25+40) = 121\text{D} + 193\text{L}$ x = 0 to 3-11

BEAM TB-1

SPAN = 15'-3"

$W_L = .67(25+40) + \frac{1}{1.33}(203+2614) = 169\text{D} + 27\text{L} + 2006\text{S}$

$W_R = .67(25+40) + \frac{1}{1.33}(232+2018) = 191\text{D} + 27\text{L} + 1766\text{S}$

3 FCO

BEAM FB-3

SPAN = 12'-7"

W = 2300 + 320L, PLF (PER FB-1)

FB4

SPAN = 19'-10"

$W_L = \frac{1}{2}(10.92)(25+40) = 137\text{D} + 218\text{L}$

$W_R = \frac{1}{2}(12.75)(\text{"}) = 159\text{D} + 255\text{L}$

$P = R_{FB3} = 1504\text{D} + 2013\text{L}$ @ x = 3-11

$W_2 = 121\text{D} + 193\text{L}$ @ x = 0 to 3-11

rudow + berry, inc.
4021 north 75th street, #101
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480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed 7 MAY 2017, 3:13PM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : FB-2 - 3 1/8x13 1/2 GLB

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

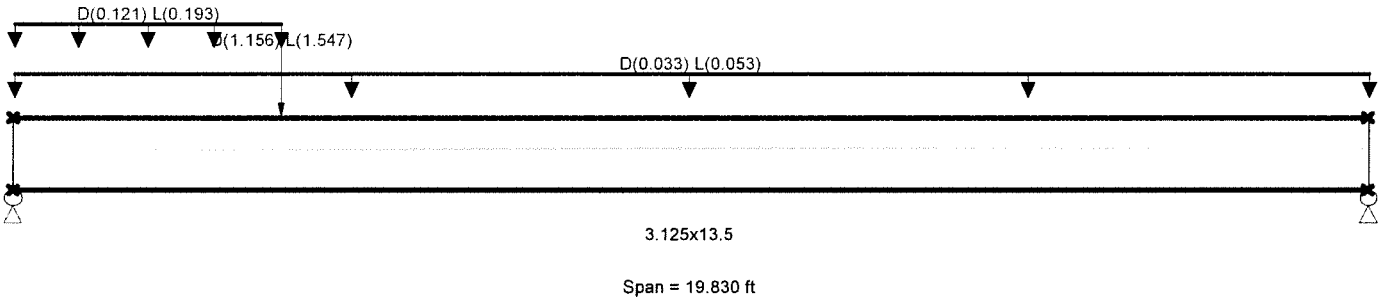
Wood Species : DF/DF
Wood Grade : 24F - V4

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0330, L = 0.0530 , Tributary Width = 1.0 ft
Uniform Load : D = 0.1210, L = 0.1930 k/ft, Extent = 0.0 -->> 3.920 ft, Tributary Width = 1.0 ft
Point Load : D = 1.156, L = 1.547 k @ 3.920 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.706 : 1	Maximum Shear Stress Ratio	=	0.507 : 1
Section used for this span		3.125x13.5	Section used for this span		3.125x13.5
fb : Actual	=	1,693.81 psi	fv : Actual	=	134.30 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	3.980 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.431 in	Ratio =	552 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.754 in	Ratio =	315 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.830 ft	1	0.333	0.238	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.69	719.87	2160.00	1.60	56.73	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.830 ft	1	0.706	0.507	1.00	1.000	1.00	1.00	1.00	1.00	1.00	13.40	1,693.81	2400.00	3.78	134.30	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.830 ft	1	0.240	0.171	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.69	719.87	3000.00	1.60	56.73	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.830 ft	1	0.261	0.186	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.69	719.87	2760.00	1.60	56.73	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
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scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
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Printed: 7 MAY 2017, 3:13PM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : FB-2 - 3 1/8x13 1/2 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 19.830 ft	1	0.483	0.347	1.25	1.000	1.00	1.00	1.00	1.00	1.00	11.47	1,450.32	3000.00	3.23	114.90	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.830 ft	1	0.525	0.377	1.15	1.000	1.00	1.00	1.00	1.00	1.00	11.47	1,450.32	2760.00	3.23	114.90	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.830 ft	1	0.187	0.134	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.69	719.87	3840.00	1.60	56.73	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.830 ft	1	0.187	0.134	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.69	719.87	3840.00	1.60	56.73	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.830 ft	1	0.378	0.271	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.47	1,450.32	3840.00	3.23	114.90	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.830 ft	1	0.378	0.271	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.47	1,450.32	3840.00	3.23	114.90	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.830 ft	1	0.378	0.271	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.47	1,450.32	3840.00	3.23	114.90	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.830 ft	1	0.112	0.080	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.42	431.92	3840.00	0.96	34.04	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.830 ft	1	0.112	0.080	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.42	431.92	3840.00	0.96	34.04	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.7541	9.119		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.221	1.599
Overall MINimum	1.064	0.416
+D+H	1.773	0.693
+D+L+H	4.221	1.599
+D+Lr+H	1.773	0.693
+D+S+H	1.773	0.693
+D+0.750Lr+0.750L+H	3.609	1.373
+D+0.750L+0.750S+H	3.609	1.373
+D+W+H	1.773	0.693
+D+E+H	1.773	0.693
+D+0.750Lr+0.750L+0.750W+H	3.609	1.373
+D+0.750L+0.750S+0.750W+H	3.609	1.373
+D+0.750L+0.750S+0.750E+H	3.609	1.373
+0.60D+W+0.60H	1.064	0.416
+0.60D+E+0.60H	1.064	0.416
D Only	1.773	0.693
Lr Only		
L Only	2.448	0.906
S Only		
W Only		
E Only		
H Only		

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Wood Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : TB-1 - 6 3/4 x 18 GLB

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

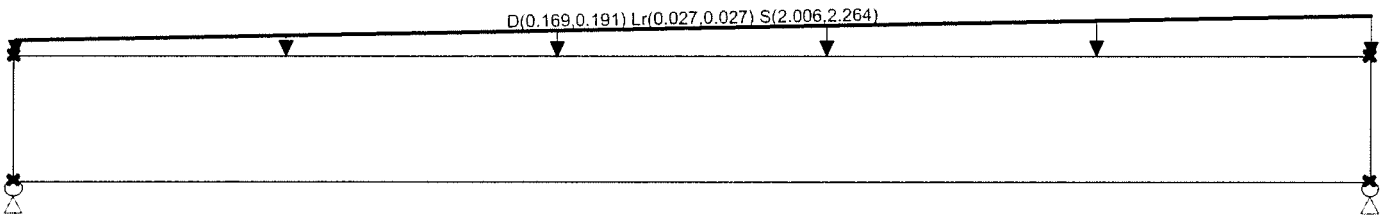
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Completely Unbraced

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Load for Span Number 1
Varying Uniform Load : D(S,E) = 0.1690->0.1910, Lr(S,E) = 0.0270->0.0270, S(S,E) = 2.006->2.264 k/ft, Extent = 0.0 -->> 15.250 ft, Trib Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.842 : 1	Maximum Shear Stress Ratio	=	0.593 : 1
Section used for this span		6.75x18	Section used for this span		6.75x18
fb : Actual	=	2,240.97 psi	fv : Actual	=	180.70 psi
FB : Allowable	=	2,662.16 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	7.681 ft	Location of maximum on span	=	13.803 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.443 in	Ratio =	413 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.485 in	Ratio =	377 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H													0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.095	0.067	0.90	0.965	1.00	1.00	1.00	1.00	0.98	6.00	197.48	2083.43	1.29	15.90	238.50
+D+L+H					0.965	1.00	1.00	1.00	1.00	0.98			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.085	0.060	1.00	0.965	1.00	1.00	1.00	1.00	0.98	6.00	197.48	2314.92	1.29	15.90	265.00
+D+Lr+H					0.965	1.00	1.00	1.00	1.00	0.98			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.077	0.054	1.25	0.965	1.00	1.00	1.00	1.00	0.97	6.78	223.32	2893.65	1.46	17.96	331.25
+D+S+H					0.965	1.00	1.00	1.00	1.00	0.97			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.842	0.593	1.15	0.965	1.00	1.00	1.00	1.00	0.97	68.07	2,240.97	2662.16	14.64	180.70	304.75
+D+0.750Lr+0.750L+H					0.965	1.00	1.00	1.00	1.00	0.97			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.075	0.053	1.25	0.965	1.00	1.00	1.00	1.00	0.97	6.59	216.86	2893.65	1.41	17.45	331.25

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 7 MAY 2017, 3:13PM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : TB-1 - 6 3/4 x 18 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750L+0.750S+H					0.965	1.00	1.00	1.00	1.00	0.97			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.650	0.458	1.15	0.965	1.00	1.00	1.00	1.00	0.97	52.55	1,730.09	2662.16	11.30	139.50	304.75
+D+W+H					0.965	1.00	1.00	1.00	1.00	0.97			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.054	0.038	1.60	0.965	1.00	1.00	1.00	1.00	0.95	6.00	197.48	3657.77	1.29	15.90	424.00
+D+E+H					0.965	1.00	1.00	1.00	1.00	0.95			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.054	0.038	1.60	0.965	1.00	1.00	1.00	1.00	0.95	6.00	197.48	3657.77	1.29	15.90	424.00
+D+0.750Lr+0.750L+0.750W+H					0.965	1.00	1.00	1.00	1.00	0.95			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.059	0.041	1.60	0.965	1.00	1.00	1.00	1.00	0.95	6.59	216.86	3657.77	1.41	17.45	424.00
+D+0.750L+0.750S+0.750W+H					0.965	1.00	1.00	1.00	1.00	0.95			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.473	0.329	1.60	0.965	1.00	1.00	1.00	1.00	0.95	52.55	1,730.09	3657.77	11.30	139.50	424.00
+D+0.750L+0.750S+0.750E+H					0.965	1.00	1.00	1.00	1.00	0.95			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.473	0.329	1.60	0.965	1.00	1.00	1.00	1.00	0.95	52.55	1,730.09	3657.77	11.30	139.50	424.00
+0.60D+W+0.60H					0.965	1.00	1.00	1.00	1.00	0.95			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.032	0.023	1.60	0.965	1.00	1.00	1.00	1.00	0.95	3.60	118.49	3657.77	0.77	9.54	424.00
+0.60D+E+0.60H					0.965	1.00	1.00	1.00	1.00	0.95			0.00	0.00	0.00	0.00
Length = 15.250 ft	1	0.032	0.023	1.60	0.965	1.00	1.00	1.00	1.00	0.95	3.60	118.49	3657.77	0.77	9.54	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.4853	7.681		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	17.497	18.208
Overall MINimum	0.206	0.206
+D+H	1.545	1.601
+D+L+H	1.545	1.601
+D+Lr+H	1.751	1.807
+D+S+H	17.497	18.208
+D+0.750Lr+0.750L+H	1.700	1.756
+D+0.750L+0.750S+H	13.509	14.057
+D+W+H	1.545	1.601
+D+E+H	1.545	1.601
+D+0.750Lr+0.750L+0.750W+H	1.700	1.756
+D+0.750L+0.750S+0.750W+H	13.509	14.057
+D+0.750L+0.750S+0.750E+H	13.509	14.057
+0.60D+W+0.60H	0.927	0.961
+0.60D+E+0.60H	0.927	0.961
D Only	1.545	1.601
Lr Only	0.206	0.206
L Only		
S Only	15.952	16.607
W Only		
E Only		
H Only		

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 8 MAY 2017, 7:35AM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : FB-3 - 3 1/8x13 1/2 GLB

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

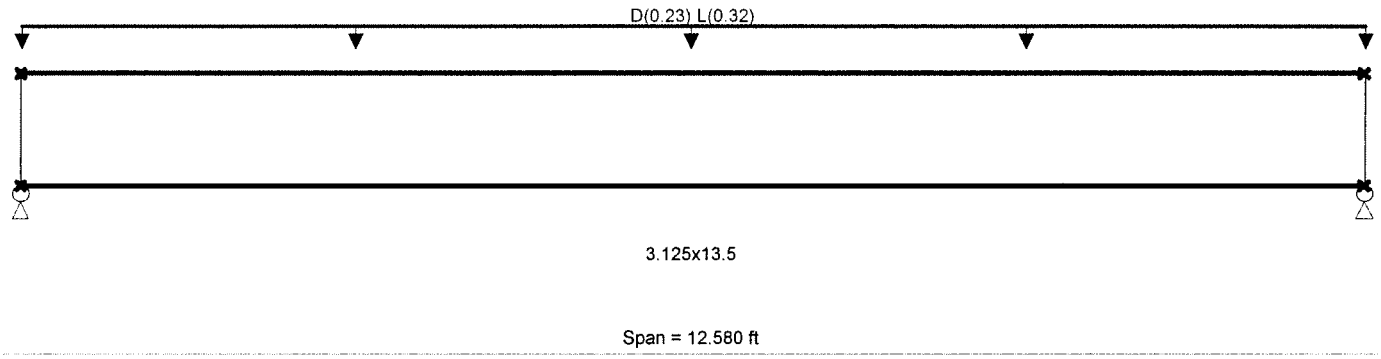
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.230, L = 0.320 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.583 : 1	Maximum Shear Stress Ratio	=	0.389 : 1
Section used for this span		3.125x13.5	Section used for this span		3.125x13.5
fb : Actual	=	1,398.32 psi	fv : Actual	=	103.14 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	6.290 ft	Location of maximum on span	=	11.478 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.157 in	Ratio =	959 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.275 in	Ratio =	549 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1	0.277	0.185	0.90							4.73	598.05	2160.00	1.24	44.11	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1	0.583	0.389	1.00							11.06	1,398.32	2400.00	2.90	103.14	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1	0.199	0.133	1.25							4.73	598.05	3000.00	1.24	44.11	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1	0.217	0.145	1.15							4.73	598.05	2760.00	1.24	44.11	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1	0.399	0.267	1.25							9.48	1,198.25	3000.00	2.49	88.39	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

175

Printed: 8 MAY 2017, 7:35AM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : FB-3 - 3 1/8x13 1/2 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 12.580 ft	1	0.434	0.290	1.15	1.000	1.00	1.00	1.00	1.00	1.00	9.48	1,198.25	2760.00	2.49	88.39	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1	0.156	0.104	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.73	598.05	3840.00	1.24	44.11	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1	0.156	0.104	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.73	598.05	3840.00	1.24	44.11	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1	0.312	0.208	1.60	1.000	1.00	1.00	1.00	1.00	1.00	9.48	1,198.25	3840.00	2.49	88.39	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1	0.312	0.208	1.60	1.000	1.00	1.00	1.00	1.00	1.00	9.48	1,198.25	3840.00	2.49	88.39	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1	0.312	0.208	1.60	1.000	1.00	1.00	1.00	1.00	1.00	9.48	1,198.25	3840.00	2.49	88.39	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1	0.093	0.062	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.84	358.83	3840.00	0.74	26.47	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.580 ft	1	0.093	0.062	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.84	358.83	3840.00	0.74	26.47	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.2748	6.336		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.517	3.517
Overall MINimum	0.903	0.903
+D+H	1.504	1.504
+D+L+H	3.517	3.517
+D+Lr+H	1.504	1.504
+D+S+H	1.504	1.504
+D+0.750Lr+0.750L+H	3.014	3.014
+D+0.750L+0.750S+H	3.014	3.014
+D+W+H	1.504	1.504
+D+E+H	1.504	1.504
+D+0.750Lr+0.750L+0.750W+H	3.014	3.014
+D+0.750L+0.750S+0.750W+H	3.014	3.014
+D+0.750L+0.750S+0.750E+H	3.014	3.014
+0.60D+W+0.60H	0.903	0.903
+0.60D+E+0.60H	0.903	0.903
D Only	1.504	1.504
Lr Only		
L Only	2.013	2.013
S Only		
W Only		
E Only		
H Only		

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

FB5 SPAN = 11-1

$W = 1.33(25+40) = 330 + 53L$

FB6 SPAN = 9'-10"

$W_L = \frac{1}{2}(17.83)(25+40) + 30 = 253D + 35L$

$W_R = \frac{1}{2}(18.15)(\quad 11 \quad) + 30 = 211D + 37OL$

FB7 SPAN = 22'-11"

$W_1 = 1.33(25+40) = 330 + 53L$

$P = R_{FB6R} = 1315\#D + 1197\#L$ @ x = 18'-8"

$W_2 = \frac{1}{2}(10.83)(25+40) = 135D + 21L$ x = 18'-8" TO END

FB2 SPAN = 17'-6"

$W_L = \frac{1}{2}(11.33)(28+28) + \frac{1}{3}(11.33)(302-28) = 159D + 190S$

$W_R = \frac{1}{2}(13.5)(28+28) + \frac{1}{3}(13.5)(302-28) = 189D + 2232S$

$W = .67(25+40) = 17D + 27L$

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed 19 MAY 2017, 8:22AM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : FB-5 - 6x8 D. FIR #2

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

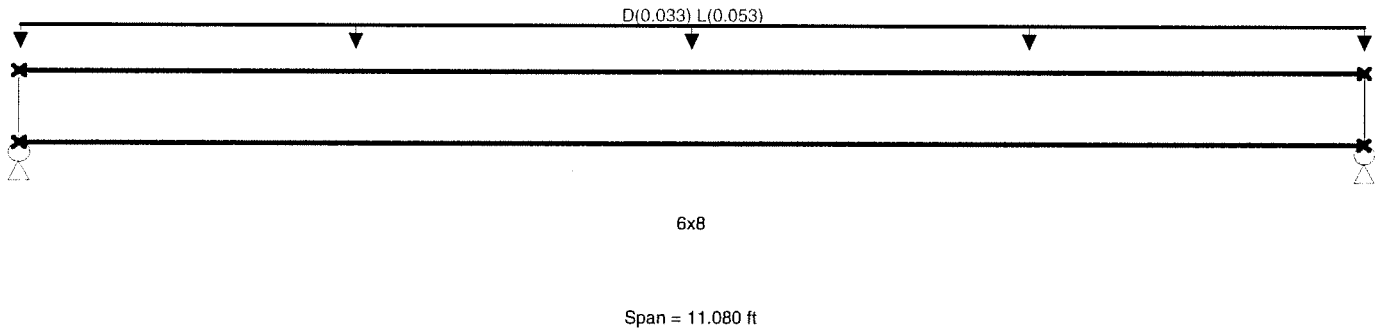
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	875 psi
Fb - Compr	875 psi
Fc - Prll	600 psi
Fc - Perp	625 psi
Fv	170 psi
Ft	425 psi

E : Modulus of Elasticity

Ebend- xx	1300 ksi
Eminbend - xx	470 ksi
Density	31.2 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0330, L = 0.0530 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.387 : 1	Maximum Shear Stress Ratio	=	0.100 : 1
Section used for this span		6x8	Section used for this span		6x8
fb : Actual	=	339.06 psi	fv : Actual	=	17.03 psi
FB : Allowable	=	875.00 psi	Fv : Allowable	=	170.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	5.540 ft	Location of maximum on span	=	10.473 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.072 in	Ratio =	1848 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.129 in	Ratio =	1032 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H													0.00	0.00	0.00	0.00
Length = 11.080 ft	1	0.190	0.049	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.64	149.78	787.50	0.21	7.52	153.00
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.080 ft	1	0.387	0.100	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.46	339.06	875.00	0.47	17.03	170.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.080 ft	1	0.137	0.035	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.64	149.78	1093.75	0.21	7.52	212.50
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.080 ft	1	0.149	0.038	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.64	149.78	1006.25	0.21	7.52	195.50
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.080 ft	1	0.267	0.069	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.25	291.74	1093.75	0.40	14.65	212.50
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Wood Beam

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : FB-5 - 6x8 D. FIR #2

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 11.080 ft	1	0.290	0.075	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.25	291.74	1006.25	0.40	14.65	195.50
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.080 ft	1	0.107	0.028	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.64	149.78	1400.00	0.21	7.52	272.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.080 ft	1	0.107	0.028	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.64	149.78	1400.00	0.21	7.52	272.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.080 ft	1	0.208	0.054	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.25	291.74	1400.00	0.40	14.65	272.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.080 ft	1	0.208	0.054	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.25	291.74	1400.00	0.40	14.65	272.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.080 ft	1	0.208	0.054	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.25	291.74	1400.00	0.40	14.65	272.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.080 ft	1	0.064	0.017	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.39	89.87	1400.00	0.12	4.51	272.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.080 ft	1	0.064	0.017	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.39	89.87	1400.00	0.12	4.51	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.1288	5.580		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.526	0.526
Overall MINimum	0.139	0.139
+D+H	0.232	0.232
+D+L+H	0.526	0.526
+D+Lr+H	0.232	0.232
+D+S+H	0.232	0.232
+D+0.750Lr+0.750L+H	0.453	0.453
+D+0.750L+0.750S+H	0.453	0.453
+D+W+H	0.232	0.232
+D+E+H	0.232	0.232
+D+0.750Lr+0.750L+0.750W+H	0.453	0.453
+D+0.750L+0.750S+0.750W+H	0.453	0.453
+D+0.750L+0.750S+0.750E+H	0.453	0.453
+0.60D+W+0.60H	0.139	0.139
+0.60D+E+0.60H	0.139	0.139
D Only	0.232	0.232
Lr Only		
L Only	0.294	0.294
S Only		
W Only		
E Only		
H Only		

rudow + berry, inc.
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scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : FB-6 - 3 1/8x13 1/2 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

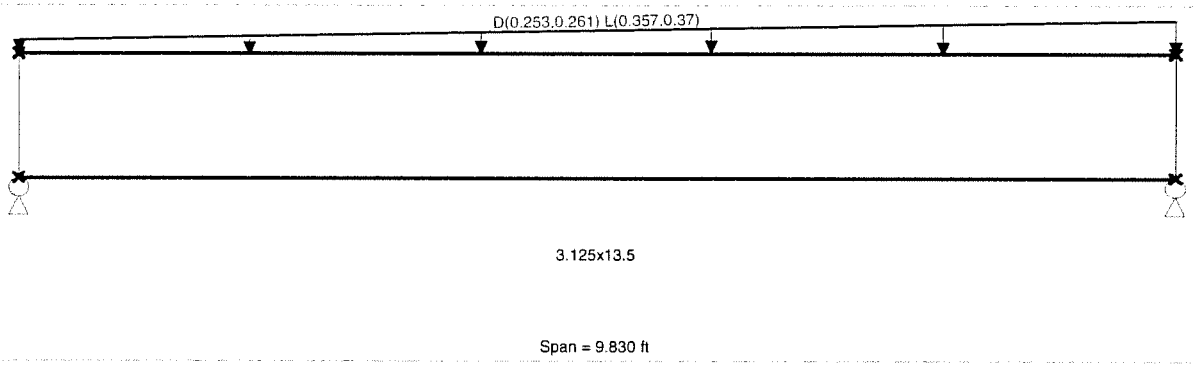
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Load for Span Number 1
Varying Uniform Load : D(S,E) = 0.2530->0.2610, L(S,E) = 0.3570->0.370 k/ft, Extent = 0.0 -->> 9.830 ft, Trib Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.401 : 1	Maximum Shear Stress Ratio	=	0.322 : 1
Section used for this span		3.125x13.5	Section used for this span		3.125x13.5
fb : Actual	=	961.45 psi	fv : Actual	=	85.38 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	4.915 ft	Location of maximum on span	=	8.718 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.067 in	Ratio =	1771 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.115 in	Ratio =	1022 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 9.830 ft	1	0.188	0.151	0.90	1.000	1.00	1.00	1.00	1.00	1.00	3.21	406.39	2160.00	1.01	36.08	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.830 ft	1	0.401	0.322	1.00	1.000	1.00	1.00	1.00	1.00	1.00	7.61	961.45	2400.00	2.40	85.38	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.830 ft	1	0.135	0.109	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.21	406.39	3000.00	1.01	36.08	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.830 ft	1	0.147	0.118	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.21	406.39	2760.00	1.01	36.08	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.830 ft	1	0.274	0.221	1.25	1.000	1.00	1.00	1.00	1.00	1.00	6.51	822.68	3000.00	2.05	73.05	331.25

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : FB-6 - 3 1/8x13 1/2 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.830 ft	1	0.298	0.240	1.15	1.000	1.00	1.00	1.00	1.00	1.00	6.51	822.68	2760.00	2.05	73.05	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.830 ft	1	0.106	0.085	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.21	406.39	3840.00	1.01	36.08	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.830 ft	1	0.106	0.085	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.21	406.39	3840.00	1.01	36.08	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.830 ft	1	0.214	0.172	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.51	822.68	3840.00	2.05	73.05	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.830 ft	1	0.214	0.172	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.51	822.68	3840.00	2.05	73.05	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.830 ft	1	0.214	0.172	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.51	822.68	3840.00	2.05	73.05	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.830 ft	1	0.063	0.051	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.93	243.83	3840.00	0.61	21.65	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.830 ft	1	0.063	0.051	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.93	243.83	3840.00	0.61	21.65	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.1154	4.951		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.077	3.112
Overall MINimum	0.781	0.789
+D+H	1.302	1.315
+D+L+H	3.077	3.112
+D+Lr+H	1.302	1.315
+D+S+H	1.302	1.315
+D+0.750Lr+0.750L+H	2.633	2.663
+D+0.750L+0.750S+H	2.633	2.663
+D+W+H	1.302	1.315
+D+E+H	1.302	1.315
+D+0.750Lr+0.750L+0.750W+H	2.633	2.663
+D+0.750L+0.750S+0.750W+H	2.633	2.663
+D+0.750L+0.750S+0.750E+H	2.633	2.663
+0.60D+W+0.60H	0.781	0.789
+0.60D+E+0.60H	0.781	0.789
D Only	1.302	1.315
Lr Only		
L Only	1.776	1.797
S Only		
W Only		
E Only		
H Only		

rudow + berry, inc.
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Project Title: Powdercat
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Project Descr:
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Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : FB-7 - 5 1/8x13 1/2 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

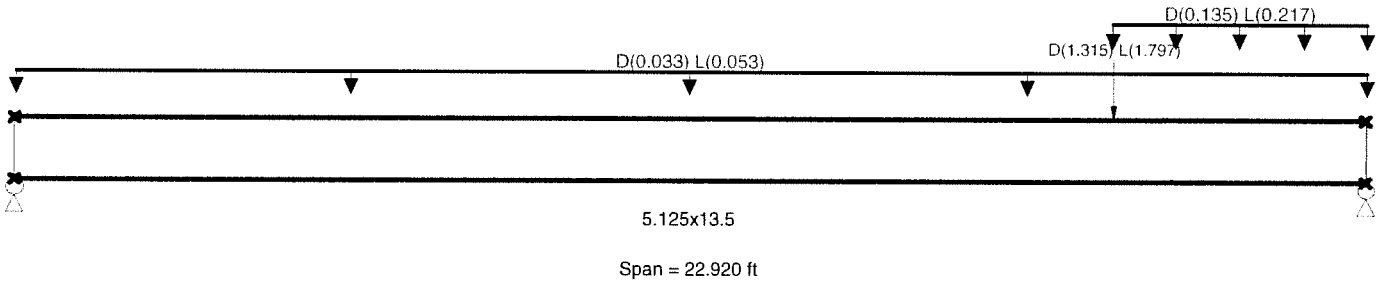
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0330, L = 0.0530 , Tributary Width = 1.0 ft
Uniform Load : D = 0.1350, L = 0.2170 k/ft, Extent = 18.670 -->> 22.920 ft, Tributary Width = 1.0 ft
Point Load : D = 1.315, L = 1.797 k @ 18.670 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.569 : 1	Maximum Shear Stress Ratio	=	0.373 : 1
Section used for this span		5.125x13.5	Section used for this span		5.125x13.5
fb : Actual	=	1,339.01 psi	fv : Actual	=	98.80 psi
FB : Allowable	=	2,351.24 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	18.570 ft	Location of maximum on span	=	21.833 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.456 in	Ratio =	603 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.813 in	Ratio =	338 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 22.920 ft	1	0.272	0.177	0.90	0.980	1.00	1.00	1.00	1.00	1.00	7.47	576.18	2116.11	1.94	42.12	238.50
+D+L+H					0.980	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.920 ft	1	0.569	0.373	1.00	0.980	1.00	1.00	1.00	1.00	1.00	17.37	1,339.01	2351.24	4.56	98.80	265.00
+D+Lr+H					0.980	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.920 ft	1	0.196	0.127	1.25	0.980	1.00	1.00	1.00	1.00	1.00	7.47	576.18	2939.05	1.94	42.12	331.25
+D+S+H					0.980	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.920 ft	1	0.213	0.138	1.15	0.980	1.00	1.00	1.00	1.00	1.00	7.47	576.18	2703.92	1.94	42.12	304.75
+D+0.750Lr+0.750L+H					0.980	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

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Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — **Licensee : RUDOW & BERRY**

Description : FB-7 - 5 1/8x13 1/2 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 22.920 ft	1	0.391	0.255	1.25	0.980	1.00	1.00	1.00	1.00	1.00	14.89	1,147.98	2939.05	3.90	84.63	331.25
+D+0.750L+0.750S+H					0.980	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.920 ft	1	0.425	0.278	1.15	0.980	1.00	1.00	1.00	1.00	1.00	14.89	1,147.98	2703.92	3.90	84.63	304.75
+D+W+H					0.980	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.920 ft	1	0.153	0.099	1.60	0.980	1.00	1.00	1.00	1.00	1.00	7.47	576.18	3761.98	1.94	42.12	424.00
+D+E+H					0.980	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.920 ft	1	0.153	0.099	1.60	0.980	1.00	1.00	1.00	1.00	1.00	7.47	576.18	3761.98	1.94	42.12	424.00
+D+0.750Lr+0.750L+0.750W+H					0.980	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.920 ft	1	0.305	0.200	1.60	0.980	1.00	1.00	1.00	1.00	1.00	14.89	1,147.98	3761.98	3.90	84.63	424.00
+D+0.750L+0.750S+0.750W+H					0.980	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.920 ft	1	0.305	0.200	1.60	0.980	1.00	1.00	1.00	1.00	1.00	14.89	1,147.98	3761.98	3.90	84.63	424.00
+D+0.750L+0.750S+0.750E+H					0.980	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.920 ft	1	0.305	0.200	1.60	0.980	1.00	1.00	1.00	1.00	1.00	14.89	1,147.98	3761.98	3.90	84.63	424.00
+0.60D+W+0.60H					0.980	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.920 ft	1	0.092	0.060	1.60	0.980	1.00	1.00	1.00	1.00	1.00	4.48	345.71	3761.98	1.17	25.27	424.00
+0.60D+E+0.60H					0.980	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.920 ft	1	0.092	0.060	1.60	0.980	1.00	1.00	1.00	1.00	1.00	4.48	345.71	3761.98	1.17	25.27	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.8132	12.380		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.873	5.050
Overall MINimum	0.508	1.285
+D+H	0.847	2.142
+D+L+H	1.873	5.050
+D+Lr+H	0.847	2.142
+D+S+H	0.847	2.142
+D+0.750Lr+0.750L+H	1.617	4.323
+D+0.750L+0.750S+H	1.617	4.323
+D+W+H	0.847	2.142
+D+E+H	0.847	2.142
+D+0.750Lr+0.750L+0.750W+H	1.617	4.323
+D+0.750L+0.750S+0.750W+H	1.617	4.323
+D+0.750L+0.750S+0.750E+H	1.617	4.323
+0.60D+W+0.60H	0.508	1.285
+0.60D+E+0.60H	0.508	1.285
D Only	0.847	2.142
Lr Only		
L Only	1.026	2.908
S Only		
W Only		
E Only		
H Only		

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 19 MAY 2017, 8:22AM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : TB-2 - 6 3/4 x 19.5 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

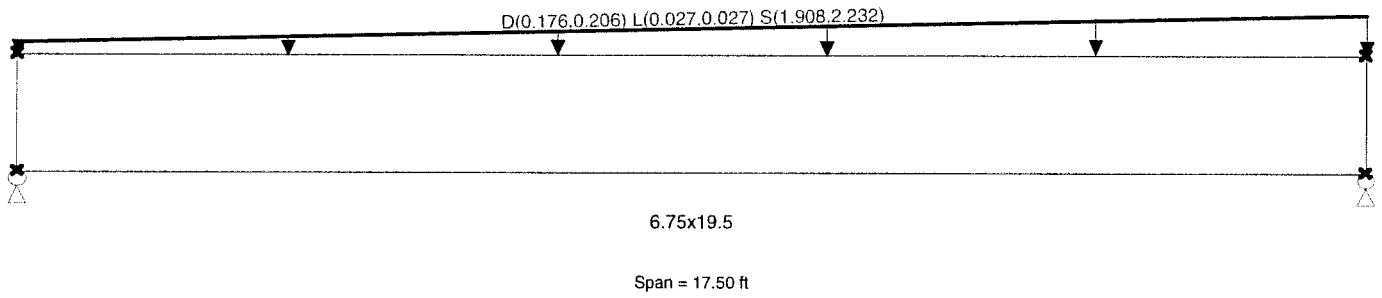
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Completely Unbraced

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Load for Span Number 1
Varying Uniform Load : D(S,E) = 0.1760->0.2060, L(S,E) = 0.0270->0.0270, S(S,E) = 1.908->2.232 k/ft, Extent = 0.0 -->> 17.50 ft, Trib Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	0.944 : 1	Maximum Shear Stress Ratio	=	0.622 : 1
Section used for this span		6.75x19.5	Section used for this span		6.75x19.5
fb : Actual	=	2,459.01 psi	fv : Actual	=	189.60 psi
FB : Allowable	=	2,604.84 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	8.878 ft	Location of maximum on span	=	15.903 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.585 in	Ratio =	358 <360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.647 in	Ratio =	324 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H													0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.116	0.076	0.90	0.944	1.00	1.00	1.00	1.00	0.97	8.40	235.76	2038.57	1.59	18.15	238.50
+D+L+H					0.944	1.00	1.00	1.00	1.00	0.97			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.117	0.077	1.00	0.944	1.00	1.00	1.00	1.00	0.97	9.44	264.75	2265.08	1.79	20.35	265.00
+D+Lr+H					0.944	1.00	1.00	1.00	1.00	0.97			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.083	0.055	1.25	0.944	1.00	1.00	1.00	1.00	0.96	8.40	235.76	2831.35	1.59	18.15	331.25
+D+S+H					0.944	1.00	1.00	1.00	1.00	0.96			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.944	0.622	1.15	0.944	1.00	1.00	1.00	1.00	0.96	87.66	2,459.01	2604.84	16.64	189.60	304.75
+D+0.750Lr+0.750L+H					0.944	1.00	1.00	1.00	1.00	0.96			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.091	0.060	1.25	0.944	1.00	1.00	1.00	1.00	0.96	9.18	257.50	2831.35	1.74	19.80	331.25

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : TB-2 - 6 3/4 x 19.5 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750L+0.750S+H					0.944	1.00	1.00	1.00	1.00	0.96			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.739	0.487	1.15	0.944	1.00	1.00	1.00	1.00	0.96	68.62	1,924.94	2604.84	13.02	148.38	304.75
+D+W+H					0.944	1.00	1.00	1.00	1.00	0.96			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.066	0.043	1.60	0.944	1.00	1.00	1.00	1.00	0.93	8.40	235.76	3571.45	1.59	18.15	424.00
+D+E+H					0.944	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.066	0.043	1.60	0.944	1.00	1.00	1.00	1.00	0.93	8.40	235.76	3571.45	1.59	18.15	424.00
+D+0.750Lr+0.750L+0.750W+H					0.944	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.072	0.047	1.60	0.944	1.00	1.00	1.00	1.00	0.93	9.18	257.50	3571.45	1.74	19.80	424.00
+D+0.750L+0.750S+0.750W+H					0.944	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.539	0.350	1.60	0.944	1.00	1.00	1.00	1.00	0.93	68.62	1,924.94	3571.45	13.02	148.38	424.00
+D+0.750L+0.750S+0.750E+H					0.944	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.539	0.350	1.60	0.944	1.00	1.00	1.00	1.00	0.93	68.62	1,924.94	3571.45	13.02	148.38	424.00
+0.60D+W+0.60H					0.944	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.040	0.026	1.60	0.944	1.00	1.00	1.00	1.00	0.93	5.04	141.46	3571.45	0.96	10.89	424.00
+0.60D+E+0.60H					0.944	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.040	0.026	1.60	0.944	1.00	1.00	1.00	1.00	0.93	5.04	141.46	3571.45	0.96	10.89	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.6473	8.814		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	19.517	20.550
Overall MINimum	0.236	0.236
+D+H	1.877	1.965
+D+L+H	2.113	2.201
+D+Lr+H	1.877	1.965
+D+S+H	19.517	20.550
+D+0.750Lr+0.750L+H	2.054	2.142
+D+0.750L+0.750S+H	15.284	16.080
+D+W+H	1.877	1.965
+D+E+H	1.877	1.965
+D+0.750Lr+0.750L+0.750W+H	2.054	2.142
+D+0.750L+0.750S+0.750W+H	15.284	16.080
+D+0.750L+0.750S+0.750E+H	15.284	16.080
+0.60D+W+0.60H	1.126	1.179
+0.60D+E+0.60H	1.126	1.179
D Only	1.877	1.965
Lr Only		
L Only	0.236	0.236
S Only	17.640	18.585
W Only		
E Only		
H Only		

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : TB-2 - 6 3/4 x 19.5 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

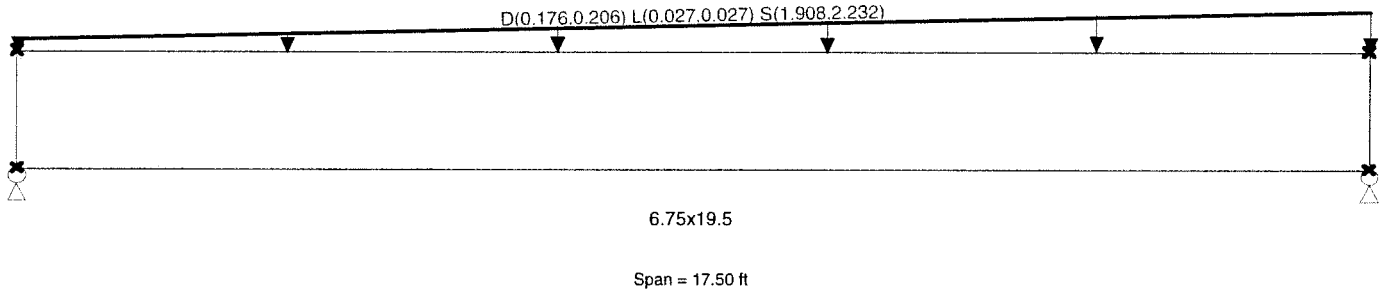
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Completely Unbraced

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Load for Span Number 1
Varying Uniform Load : D(S,E) = 0.1760->0.2060, L(S,E) = 0.0270->0.0270, S(S,E) = 1.908->2.232 k/ft, Extent = 0.0 -->> 17.50 ft, Trib Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	0.944 : 1	Maximum Shear Stress Ratio	=	0.622 : 1
Section used for this span		6.75x19.5	Section used for this span		6.75x19.5
fb : Actual	=	2,459.01 psi	fv : Actual	=	189.60 psi
FB : Allowable	=	2,604.84 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	8.878 ft	Location of maximum on span	=	15.903 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.585 in	Ratio =	358 <360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.647 in	Ratio =	324 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.116	0.076	0.90	0.944	1.00	1.00	1.00	1.00	0.97	8.40	235.76	2038.57	1.59	18.15	238.50
+D+L+H					0.944	1.00	1.00	1.00	1.00	0.97			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.117	0.077	1.00	0.944	1.00	1.00	1.00	1.00	0.97	9.44	264.75	2265.08	1.79	20.35	265.00
+D+Lr+H					0.944	1.00	1.00	1.00	1.00	0.97			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.083	0.055	1.25	0.944	1.00	1.00	1.00	1.00	0.96	8.40	235.76	2831.35	1.59	18.15	331.25
+D+S+H					0.944	1.00	1.00	1.00	1.00	0.96			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.944	0.622	1.15	0.944	1.00	1.00	1.00	1.00	0.96	87.66	2,459.01	2604.84	16.64	189.60	304.75
+D+0.750Lr+0.750L+H					0.944	1.00	1.00	1.00	1.00	0.96			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.091	0.060	1.25	0.944	1.00	1.00	1.00	1.00	0.96	9.18	257.50	2831.35	1.74	19.80	331.25

rudow + berry, inc.
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scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : TB-2 - 6 3/4 x 19.5 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750L+0.750S+H					0.944	1.00	1.00	1.00	1.00	0.96			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.739	0.487	1.15	0.944	1.00	1.00	1.00	1.00	0.96	68.62	1,924.94	2604.84	13.02	148.38	304.75
+D+W+H					0.944	1.00	1.00	1.00	1.00	0.96			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.066	0.043	1.60	0.944	1.00	1.00	1.00	1.00	0.93	8.40	235.76	3571.45	1.59	18.15	424.00
+D+E+H					0.944	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.066	0.043	1.60	0.944	1.00	1.00	1.00	1.00	0.93	8.40	235.76	3571.45	1.59	18.15	424.00
+D+0.750Lr+0.750L+0.750W+H					0.944	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.072	0.047	1.60	0.944	1.00	1.00	1.00	1.00	0.93	9.18	257.50	3571.45	1.74	19.80	424.00
+D+0.750L+0.750S+0.750W+H					0.944	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.539	0.350	1.60	0.944	1.00	1.00	1.00	1.00	0.93	68.62	1,924.94	3571.45	13.02	148.38	424.00
+D+0.750L+0.750S+0.750E+H					0.944	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.539	0.350	1.60	0.944	1.00	1.00	1.00	1.00	0.93	68.62	1,924.94	3571.45	13.02	148.38	424.00
+0.60D+W+0.60H					0.944	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.040	0.026	1.60	0.944	1.00	1.00	1.00	1.00	0.93	5.04	141.46	3571.45	0.96	10.89	424.00
+0.60D+E+0.60H					0.944	1.00	1.00	1.00	1.00	0.93			0.00	0.00	0.00	0.00
Length = 17.50 ft	1	0.040	0.026	1.60	0.944	1.00	1.00	1.00	1.00	0.93	5.04	141.46	3571.45	0.96	10.89	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.6473	8.814		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	19.517	20.550
Overall MINimum	0.236	0.236
+D+H	1.877	1.965
+D+L+H	2.113	2.201
+D+Lr+H	1.877	1.965
+D+S+H	19.517	20.550
+D+0.750Lr+0.750L+H	2.054	2.142
+D+0.750L+0.750S+H	15.284	16.080
+D+W+H	1.877	1.965
+D+E+H	1.877	1.965
+D+0.750Lr+0.750L+0.750W+H	2.054	2.142
+D+0.750L+0.750S+0.750W+H	15.284	16.080
+D+0.750L+0.750S+0.750E+H	15.284	16.080
+0.60D+W+0.60H	1.126	1.179
+0.60D+E+0.60H	1.126	1.179
D Only	1.877	1.965
Lr Only		
L Only	0.236	0.236
S Only	17.640	18.585
W Only		
E Only		
H Only		

rudow + berry, inc.
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480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
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Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : TB-3 - 6 3/4 x 24 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination ASCE 7-10 w/ ASD Wind & EQ

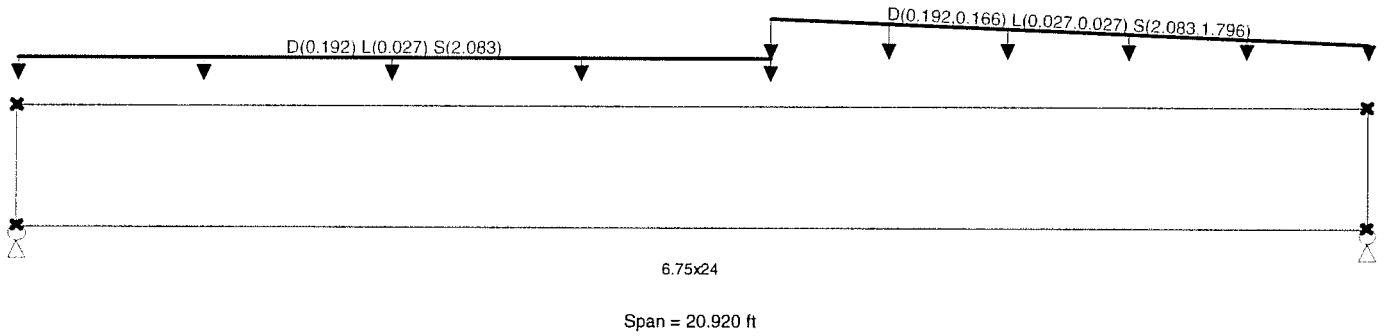
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Completely Unbraced

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.1920, L = 0.0270, S = 2.083 k/ft, Extent = 0.0 -->> 11.670 ft, Tributary Width = 1.0 ft
Varying Uniform Load : D(S,E) = 0.1920->0.1660, L(S,E) = 0.0270->0.0270, S(S,E) = 2.083->1.796 k/ft, Extent = 11.670 -->> 20.920 ft, Trib Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.917 : 1	Maximum Shear Stress Ratio	=	0.588 : 1
Section used for this span		6.75x24	Section used for this span		6.75x24
fb : Actual	=	2,299.14 psi	fv : Actual	=	179.30 psi
FB : Allowable	=	2,506.17 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	10.384 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.632 in	Ratio =	397 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.701 in	Ratio =	357 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H													0.00	0.00	0.00	0.00
Length = 20.920 ft	1	0.116	0.074	0.90	0.908	1.00	1.00	1.00	1.00	0.95	12.24	226.65	1961.35	1.91	17.66	238.50
+D+L+H					0.908	1.00	1.00	1.00	1.00	0.95			0.00	0.00	0.00	0.00
Length = 20.920 ft	1	0.117	0.075	1.00	0.908	1.00	1.00	1.00	1.00	0.94	13.72	254.00	2179.28	2.14	19.78	265.00
+D+Lr+H					0.908	1.00	1.00	1.00	1.00	0.94			0.00	0.00	0.00	0.00
Length = 20.920 ft	1	0.083	0.053	1.25	0.908	1.00	1.00	1.00	1.00	0.91	12.24	226.65	2717.44	1.91	17.66	331.25
+D+S+H					0.908	1.00	1.00	1.00	1.00	0.91			0.00	0.00	0.00	0.00
Length = 20.920 ft	1	0.917	0.588	1.15	0.908	1.00	1.00	1.00	1.00	0.92	124.15	2,299.14	2506.17	19.36	179.30	304.75
+D+0.750Lr+0.750L+H					0.908	1.00	1.00	1.00	1.00	0.92			0.00	0.00	0.00	0.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

188

Printed: 19 MAY 2017, 8:22AM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : TB-3 - 6 3/4 x 24 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 20.920 ft	1	0.091	0.058	1.25	0.908	1.00	1.00	1.00	1.00	0.91	13.35	247.16	2717.44	2.08	19.25	331.25
+D+0.750L+0.750S+H					0.908	1.00	1.00	1.00	1.00	0.91			0.00	0.00	0.00	0.00
Length = 20.920 ft	1	0.719	0.461	1.15	0.908	1.00	1.00	1.00	1.00	0.92	97.28	1,801.53	2506.17	15.17	140.48	304.75
+D+W+H					0.908	1.00	1.00	1.00	1.00	0.92			0.00	0.00	0.00	0.00
Length = 20.920 ft	1	0.071	0.042	1.60	0.908	1.00	1.00	1.00	1.00	0.84	12.24	226.65	3208.71	1.91	17.66	424.00
+D+E+H					0.908	1.00	1.00	1.00	1.00	0.84			0.00	0.00	0.00	0.00
Length = 20.920 ft	1	0.071	0.042	1.60	0.908	1.00	1.00	1.00	1.00	0.84	12.24	226.65	3208.71	1.91	17.66	424.00
+D+0.750Lr+0.750L+0.750W+H					0.908	1.00	1.00	1.00	1.00	0.84			0.00	0.00	0.00	0.00
Length = 20.920 ft	1	0.077	0.045	1.60	0.908	1.00	1.00	1.00	1.00	0.84	13.35	247.16	3208.71	2.08	19.25	424.00
+D+0.750L+0.750S+0.750W+H					0.908	1.00	1.00	1.00	1.00	0.84			0.00	0.00	0.00	0.00
Length = 20.920 ft	1	0.561	0.331	1.60	0.908	1.00	1.00	1.00	1.00	0.84	97.28	1,801.53	3208.71	15.17	140.48	424.00
+D+0.750L+0.750S+0.750E+H					0.908	1.00	1.00	1.00	1.00	0.84			0.00	0.00	0.00	0.00
Length = 20.920 ft	1	0.561	0.331	1.60	0.908	1.00	1.00	1.00	1.00	0.84	97.28	1,801.53	3208.71	15.17	140.48	424.00
+0.60D+W+0.60H					0.908	1.00	1.00	1.00	1.00	0.84			0.00	0.00	0.00	0.00
Length = 20.920 ft	1	0.042	0.025	1.60	0.908	1.00	1.00	1.00	1.00	0.84	7.34	135.99	3208.71	1.14	10.59	424.00
+0.60D+E+0.60H					0.908	1.00	1.00	1.00	1.00	0.84			0.00	0.00	0.00	0.00
Length = 20.920 ft	1	0.042	0.025	1.60	0.908	1.00	1.00	1.00	1.00	0.84	7.34	135.99	3208.71	1.14	10.59	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.7015	10.460		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	23.950	22.929
Overall MINimum	0.282	0.282
+D+H	2.358	2.273
+D+L+H	2.640	2.555
+D+Lr+H	2.358	2.273
+D+S+H	23.950	22.929
+D+0.750Lr+0.750L+H	2.570	2.485
+D+0.750L+0.750S+H	18.764	17.977
+D+W+H	2.358	2.273
+D+E+H	2.358	2.273
+D+0.750Lr+0.750L+0.750W+H	2.570	2.485
+D+0.750L+0.750S+0.750W+H	18.764	17.977
+D+0.750L+0.750S+0.750E+H	18.764	17.977
+0.60D+W+0.60H	1.415	1.364
+0.60D+E+0.60H	1.415	1.364
D Only	2.358	2.273
Lr Only		
L Only	0.282	0.282
S Only	21.593	20.656
W Only		
E Only		
H Only		

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

FB-8 SPAN = 13'-2"

$W_L = \frac{1}{2}(22.83)(25+40) = 785\,D + 457\,L$

$W_R = \frac{1}{2}(24.67)(\quad " \quad) = 308\,D + 493\,L$

FB9 SPAN = 13'-8"

$W = 2.33(25+40) + 30 = 880\,D + 93\,L$

$P = R_{FB8R} = 2078^{\#}D + 3167^{\#}L$ @ x = 2'-5"

FB10 SPAN = 10'-8"

$W_L = \frac{1}{2}(20)(25+40) + 30 = 2800\,D + 400\,L$

$W_R = \frac{1}{2}(19.33)(25+40) + 30 = 2120\,D + 387\,L$

FB-11 SPAN = 23'-8"

$W = 330\,D + 57\,L$

$P = R_{FB10R} = 1514^{\#}D + 2088^{\#}S$ @ x = 4'-3"

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 25 MAY 2017, 9:38AM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : FB-8 - 3 1/8x13 1/2 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

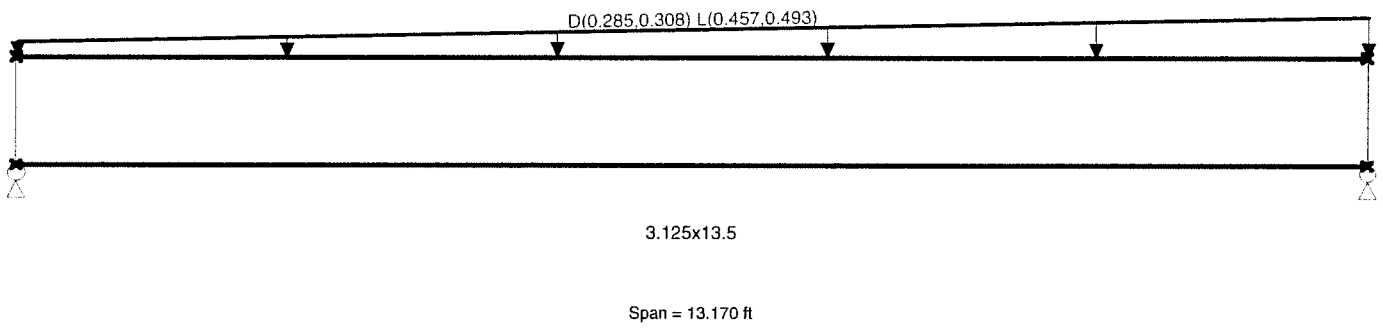
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Load for Span Number 1
Varying Uniform Load : D(S,E) = 0.2850->0.3080, L(S,E) = 0.4570->0.4930 k/ft, Extent = 0.0 -->> 13.170 ft, Trib Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.892 1	Maximum Shear Stress Ratio	=	0.579 : 1
Section used for this span		3.125x13.5	Section used for this span		3.125x13.5
fb : Actual	=	2,139.76 psi	fv : Actual	=	153.33 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	6.633 ft	Location of maximum on span	=	12.064 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.280 in	Ratio =	563 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.461 in	Ratio =	342 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H													0.00	0.00	0.00	0.00
Length = 13.170 ft	1	0.388	0.252	0.90	1.000	1.00	1.00	1.00	1.00	1.00	6.63	837.77	2160.00	1.69	60.03	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.170 ft	1	0.892	0.579	1.00	1.000	1.00	1.00	1.00	1.00	1.00	16.93	2,139.76	2400.00	4.31	153.33	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.170 ft	1	0.279	0.181	1.25	1.000	1.00	1.00	1.00	1.00	1.00	6.63	837.77	3000.00	1.69	60.03	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.170 ft	1	0.304	0.197	1.15	1.000	1.00	1.00	1.00	1.00	1.00	6.63	837.77	2760.00	1.69	60.03	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.170 ft	1	0.605	0.392	1.25	1.000	1.00	1.00	1.00	1.00	1.00	14.35	1,814.26	3000.00	3.66	130.00	331.25

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 25 MAY 2017, 9:38AM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — **Licensee : RUDOW & BERRY**

Description : FB-8 - 3 1/8x13 1/2 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.170 ft	1	0.657	0.427	1.15	1.000	1.00	1.00	1.00	1.00	1.00	14.35	1,814.26	2760.00	3.66	130.00	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.170 ft	1	0.218	0.142	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.63	837.77	3840.00	1.69	60.03	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.170 ft	1	0.218	0.142	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.63	837.77	3840.00	1.69	60.03	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.170 ft	1	0.472	0.307	1.60	1.000	1.00	1.00	1.00	1.00	1.00	14.35	1,814.26	3840.00	3.66	130.00	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.170 ft	1	0.472	0.307	1.60	1.000	1.00	1.00	1.00	1.00	1.00	14.35	1,814.26	3840.00	3.66	130.00	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.170 ft	1	0.472	0.307	1.60	1.000	1.00	1.00	1.00	1.00	1.00	14.35	1,814.26	3840.00	3.66	130.00	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.170 ft	1	0.131	0.085	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.98	502.66	3840.00	1.01	36.02	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.170 ft	1	0.131	0.085	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.98	502.66	3840.00	1.01	36.02	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.4609	6.633		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.076	5.205
Overall MINimum	1.192	1.223
+D+H	1.987	2.038
+D+L+H	5.076	5.205
+D+Lr+H	1.987	2.038
+D+S+H	1.987	2.038
+D+0.750Lr+0.750L+H	4.304	4.413
+D+0.750L+0.750S+H	4.304	4.413
+D+W+H	1.987	2.038
+D+E+H	1.987	2.038
+D+0.750Lr+0.750L+0.750W+H	4.304	4.413
+D+0.750L+0.750S+0.750W+H	4.304	4.413
+D+0.750L+0.750S+0.750E+H	4.304	4.413
+0.60D+W+0.60H	1.192	1.223
+0.60D+E+0.60H	1.192	1.223
D Only	1.987	2.038
Lr Only		
L Only	3.088	3.167
S Only		
W Only		
E Only		
H Only		

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 25 MAY 2017, 9:41AM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : FB-9 - 5 1/8x13 1/2 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

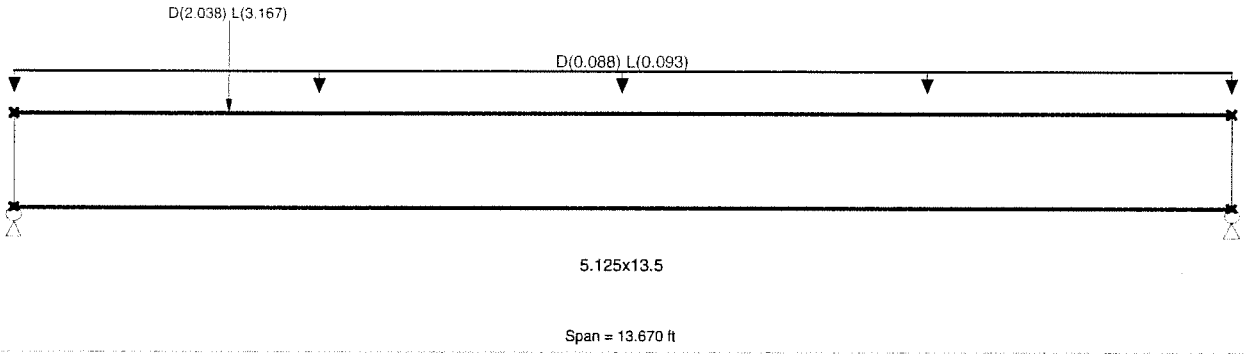
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0880, L = 0.0930 , Tributary Width = 1.0 ft
Point Load : D = 2.038, L = 3.167 k @ 2.420 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.419 : 1	Maximum Shear Stress Ratio	=	0.442 : 1
Section used for this span		5.125x13.5	Section used for this span		5.125x13.5
fb : Actual	=	1,004.63 psi	fv : Actual	=	117.25 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	2.445 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.119 in	Ratio =	1379 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.213 in	Ratio =	769 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 13.670 ft	1	0.196	0.206	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.50	424.25	2160.00	2.27	49.17	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.670 ft	1	0.419	0.442	1.00	1.000	1.00	1.00	1.00	1.00	1.00	13.03	1,004.63	2400.00	5.41	117.25	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.670 ft	1	0.141	0.148	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.50	424.25	3000.00	2.27	49.17	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.670 ft	1	0.154	0.161	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.50	424.25	2760.00	2.27	49.17	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.670 ft	1	0.286	0.303	1.25	1.000	1.00	1.00	1.00	1.00	1.00	11.14	858.75	3000.00	4.62	100.23	331.25

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 25 MAY 2017, 9:41AM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : FB-9 - 5 1/8x13 1/2 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.670 ft	1	0.311	0.329	1.15	1.000	1.00	1.00	1.00	1.00	1.00	11.14	858.75	2760.00	4.62	100.23	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.670 ft	1	0.110	0.116	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.50	424.25	3840.00	2.27	49.17	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.670 ft	1	0.110	0.116	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.50	424.25	3840.00	2.27	49.17	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.670 ft	1	0.224	0.236	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.14	858.75	3840.00	4.62	100.23	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.670 ft	1	0.224	0.236	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.14	858.75	3840.00	4.62	100.23	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.670 ft	1	0.224	0.236	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.14	858.75	3840.00	4.62	100.23	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.670 ft	1	0.066	0.070	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.30	254.55	3840.00	1.36	29.50	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.670 ft	1	0.066	0.070	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.30	254.55	3840.00	1.36	29.50	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.2133	6.286		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.623	2.261
Overall MINimum	1.429	0.639
+D+H	2.381	1.065
+D+L+H	5.623	2.261
+D+Lr+H	2.381	1.065
+D+S+H	2.381	1.065
+D+0.750Lr+0.750L+H	4.813	1.962
+D+0.750L+0.750S+H	4.813	1.962
+D+W+H	2.381	1.065
+D+E+H	2.381	1.065
+D+0.750Lr+0.750L+0.750W+H	4.813	1.962
+D+0.750L+0.750S+0.750W+H	4.813	1.962
+D+0.750L+0.750S+0.750E+H	4.813	1.962
+0.60D+W+0.60H	1.429	0.639
+0.60D+E+0.60H	1.429	0.639
D Only	2.381	1.065
Lr Only		
L Only	3.242	1.196
S Only		
W Only		
E Only		
H Only		

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Licensee : RUDOW & BERRY

Wood Beam

Lic. # : KW-06002357

Description : FB-10 - 3 1/8x13 1/2 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination ASCE 7-10 w/ ASD Wind & EQ

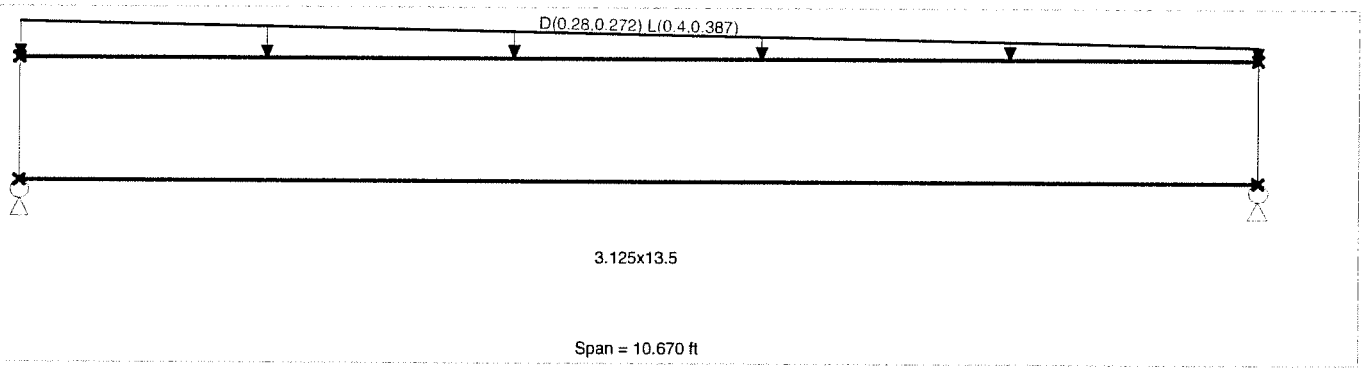
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Load for Span Number 1
Varying Uniform Load : D(S,E) = 0.280->0.2720, L(S,E) = 0.40->0.3870 k/ft, Extent = 0.0 -->> 10.670 ft, Trib Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.509 : 1	Maximum Shear Stress Ratio	=	0.388 : 1
Section used for this span		3.125x13.5	Section used for this span		3.125x13.5
fb : Actual	=	1,220.94 psi	fv : Actual	=	102.72 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	5.335 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.100 in	Ratio =	1279 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.173 in	Ratio =	741 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H													0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.237	0.181	0.90	1.000	1.00	1.00	1.00	1.00	1.00	4.06	512.99	2160.00	1.21	43.15	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.509	0.388	1.00	1.000	1.00	1.00	1.00	1.00	1.00	9.66	1,220.94	2400.00	2.89	102.72	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.171	0.130	1.25	1.000	1.00	1.00	1.00	1.00	1.00	4.06	512.99	3000.00	1.21	43.15	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.186	0.142	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.06	512.99	2760.00	1.21	43.15	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.348	0.265	1.25	1.000	1.00	1.00	1.00	1.00	1.00	8.26	1,043.95	3000.00	2.47	87.83	331.25

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

195

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Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : FB-10 - 3 1/8x13 1/2 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.378	0.288	1.15	1.000	1.00	1.00	1.00	1.00	1.00	8.26	1,043.95	2760.00	2.47	87.83	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.134	0.102	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.06	512.99	3840.00	1.21	43.15	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.134	0.102	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.06	512.99	3840.00	1.21	43.15	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.272	0.207	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.26	1,043.95	3840.00	2.47	87.83	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.272	0.207	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.26	1,043.95	3840.00	2.47	87.83	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.272	0.207	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.26	1,043.95	3840.00	2.47	87.83	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.080	0.061	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.43	307.80	3840.00	0.73	25.89	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.670 ft	1	0.080	0.061	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.43	307.80	3840.00	0.73	25.89	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.1726	5.335		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.639	3.602
Overall MINimum	0.917	0.908
+D+H	1.528	1.514
+D+L+H	3.639	3.602
+D+Lr+H	1.528	1.514
+D+S+H	1.528	1.514
+D+0.750Lr+0.750L+H	3.111	3.080
+D+0.750L+0.750S+H	3.111	3.080
+D+W+H	1.528	1.514
+D+E+H	1.528	1.514
+D+0.750Lr+0.750L+0.750W+H	3.111	3.080
+D+0.750L+0.750S+0.750W+H	3.111	3.080
+D+0.750L+0.750S+0.750E+H	3.111	3.080
+0.60D+W+0.60H	0.917	0.908
+0.60D+E+0.60H	0.917	0.908
D Only	1.528	1.514
Lr Only		
L Only	2.111	2.088
S Only		
W Only		
E Only		
H Only		

rudow + berry, inc.
4021 north 75th street, #101
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480.946.8171

Project Title: Powdercat
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Project Descr:
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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Wood Beam

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : FB-11 - 5 1/8x13 1/2 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

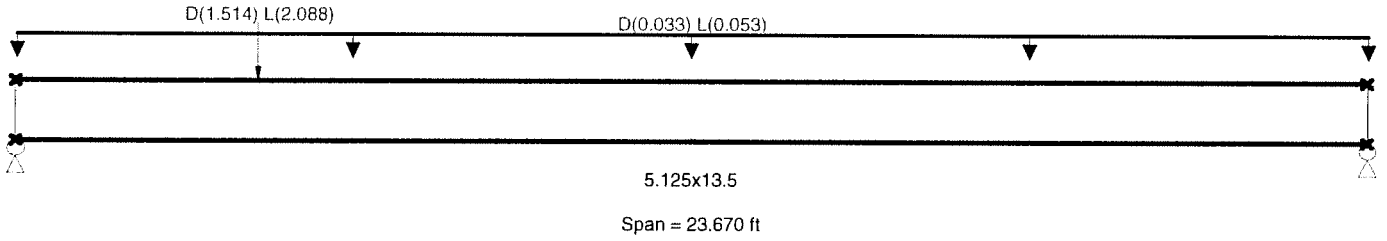
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0330, L = 0.0530 , Tributary Width = 1.0 ft
Point Load : D = 1.514, L = 2.088 k @ 4.250 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.552 1	Maximum Shear Stress Ratio	=	0.330 : 1
Section used for this span		5.125x13.5	Section used for this span		5.125x13.5
fb : Actual	=	1,294.87 psi	fv : Actual	=	87.52 psi
FB : Allowable	=	2,343.68 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	5.442 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.476 in	Ratio =	596 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.857 in	Ratio =	331 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.269	0.160	0.90	0.977	1.00	1.00	1.00	1.00	1.00	7.35	566.43	2109.31	1.76	38.08	238.50
+D+L+H					0.977	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.552	0.330	1.00	0.977	1.00	1.00	1.00	1.00	1.00	16.80	1,294.87	2343.68	4.04	87.52	265.00
+D+Lr+H					0.977	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.193	0.115	1.25	0.977	1.00	1.00	1.00	1.00	1.00	7.35	566.43	2929.60	1.76	38.08	331.25
+D+S+H					0.977	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.210	0.125	1.15	0.977	1.00	1.00	1.00	1.00	1.00	7.35	566.43	2695.23	1.76	38.08	304.75
+D+0.750Lr+0.750L+H					0.977	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.380	0.227	1.25	0.977	1.00	1.00	1.00	1.00	1.00	14.43	1,112.54	2929.60	3.47	75.16	331.25

rudow + berry, inc.
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Project Title: Powdercat
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Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — **Licensee : RUDOW & BERRY**

Description : FB-11 - 5 1/8x13 1/2 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750L+0.750S+H					0.977	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.413	0.247	1.15	0.977	1.00	1.00	1.00	1.00	1.00	14.43	1,112.54	2695.23	3.47	75.16	304.75
+D+W+H					0.977	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.151	0.090	1.60	0.977	1.00	1.00	1.00	1.00	1.00	7.35	566.43	3749.89	1.76	38.08	424.00
+D+E+H					0.977	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.151	0.090	1.60	0.977	1.00	1.00	1.00	1.00	1.00	7.35	566.43	3749.89	1.76	38.08	424.00
+D+0.750Lr+0.750L+0.750W+H					0.977	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.297	0.177	1.60	0.977	1.00	1.00	1.00	1.00	1.00	14.43	1,112.54	3749.89	3.47	75.16	424.00
+D+0.750L+0.750S+0.750W+H					0.977	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.297	0.177	1.60	0.977	1.00	1.00	1.00	1.00	1.00	14.43	1,112.54	3749.89	3.47	75.16	424.00
+D+0.750L+0.750S+0.750E+H					0.977	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.297	0.177	1.60	0.977	1.00	1.00	1.00	1.00	1.00	14.43	1,112.54	3749.89	3.47	75.16	424.00
+0.60D+W+0.60H					0.977	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.091	0.054	1.60	0.977	1.00	1.00	1.00	1.00	1.00	4.41	339.86	3749.89	1.05	22.85	424.00
+0.60D+E+0.60H					0.977	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.670 ft	1	0.091	0.054	1.60	0.977	1.00	1.00	1.00	1.00	1.00	4.41	339.86	3749.89	1.05	22.85	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.8569	10.971		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.150	1.842
Overall MINimum	1.086	0.504
+D+H	1.810	0.840
+D+L+H	4.150	1.842
+D+Lr+H	1.810	0.840
+D+S+H	1.810	0.840
+D+0.750Lr+0.750L+H	3.565	1.591
+D+0.750L+0.750S+H	3.565	1.591
+D+W+H	1.810	0.840
+D+E+H	1.810	0.840
+D+0.750Lr+0.750L+0.750W+H	3.565	1.591
+D+0.750L+0.750S+0.750W+H	3.565	1.591
+D+0.750L+0.750S+0.750E+H	3.565	1.591
+0.60D+W+0.60H	1.086	0.504
+0.60D+E+0.60H	1.086	0.504
D Only	1.810	0.840
Lr Only		
L Only	2.340	1.002
S Only		
W Only		
E Only		
H Only		

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

FB12 SPAN = 24'-5"

$W = 33D + 53L$

$P = R_{FB10L} = 1528^{\#}D + 2111^{\#}S$ @ $x = 4'-3"$

$W = \frac{1}{2}(10.83)(25+40) = 1350D + 217L$ $x = 0$ to $4'-3"$

FB3 SPAN = 20'-11"

$W_L = \frac{2}{3}(25+40) + \frac{1}{2}(12.5)(28+276) + \frac{1}{3}(12.5)(362-276) = 192+27+203$

$x = 0$ to $11'-8"$

$W_R = \frac{2}{3}(25+40) + \frac{1}{2}(10.07)(28+286) + \frac{1}{3}(10.07)(362-286) = 166+22+179$

$x =$ END

FB13 SPAN = 16'-6"

$W_1 = 12.08(25+40) = 3020D + 483L$ $x = 0$ to $7'-4"$

$W_2 = \frac{1}{2}(22.83)(25+40) = 2850D + 457L$ $x = 7'-4"$ TO END

FB14 SPAN = 15'-2"

$W = 30$ PLF DL

$P = R_{FB13L} = 2001D + 3196L$ @ $x = 3'-10"$

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 19 MAY 2017, 8:22AM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : FB-12 - 5 1/8x13 1/2 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

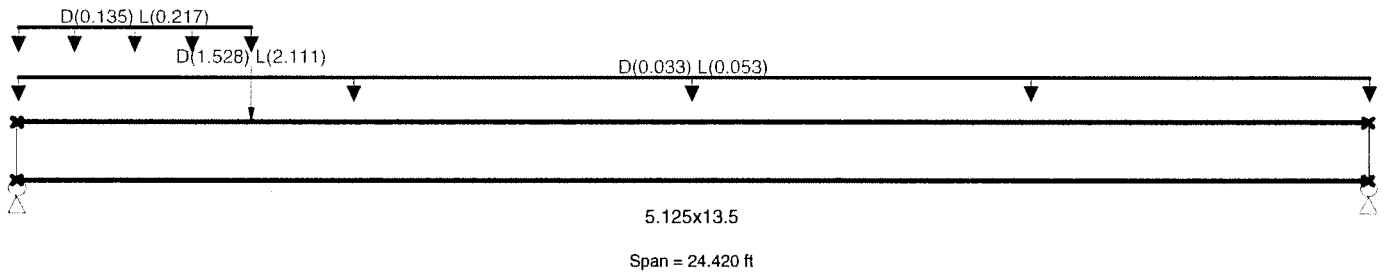
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0330, L = 0.0530 , Tributary Width = 1.0 ft
Uniform Load : D = 0.1350, L = 0.2170 k/ft, Extent = 0.0 -->> 4.250 ft, Tributary Width = 1.0 ft
Point Load : D = 1.528, L = 2.111 k @ 4.250 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.651 : 1	Maximum Shear Stress Ratio	=	0.419 : 1
Section used for this span		5.125x13.5	Section used for this span		5.125x13.5
fb : Actual	=	1,521.39 psi	fv : Actual	=	111.01 psi
FB : Allowable	=	2,336.38 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	4.634 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.592 in	Ratio =	495 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	1.054 in	Ratio =	278 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.420 ft	1	0.311	0.198	0.90	0.973	1.00	1.00	1.00	1.00	1.00	8.47	653.17	2102.74	2.18	47.18	238.50
+D+L+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.420 ft	1	0.651	0.419	1.00	0.973	1.00	1.00	1.00	1.00	1.00	19.74	1,521.39	2336.38	5.12	111.01	265.00
+D+Lr+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.420 ft	1	0.224	0.142	1.25	0.973	1.00	1.00	1.00	1.00	1.00	8.47	653.17	2920.47	2.18	47.18	331.25
+D+S+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.420 ft	1	0.243	0.155	1.15	0.973	1.00	1.00	1.00	1.00	1.00	8.47	653.17	2686.84	2.18	47.18	304.75
+D+0.750Lr+0.750L+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:

Project ID: 16126

200

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Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : FB-12 - 5 1/8x13 1/2 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 24.420 ft	1	0.446	0.287	1.25	0.973	1.00	1.00	1.00	1.00	1.00	16.92	1,303.95	2920.47	4.38	95.05	331.25
+D+0.750L+0.750S+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.420 ft	1	0.485	0.312	1.15	0.973	1.00	1.00	1.00	1.00	1.00	16.92	1,303.95	2686.84	4.38	95.05	304.75
+D+W+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.420 ft	1	0.175	0.111	1.60	0.973	1.00	1.00	1.00	1.00	1.00	8.47	653.17	3738.21	2.18	47.18	424.00
+D+E+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.420 ft	1	0.175	0.111	1.60	0.973	1.00	1.00	1.00	1.00	1.00	8.47	653.17	3738.21	2.18	47.18	424.00
+D+0.750Lr+0.750L+0.750W+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.420 ft	1	0.349	0.224	1.60	0.973	1.00	1.00	1.00	1.00	1.00	16.92	1,303.95	3738.21	4.38	95.05	424.00
+D+0.750L+0.750S+0.750W+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.420 ft	1	0.349	0.224	1.60	0.973	1.00	1.00	1.00	1.00	1.00	16.92	1,303.95	3738.21	4.38	95.05	424.00
+D+0.750L+0.750S+0.750E+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.420 ft	1	0.349	0.224	1.60	0.973	1.00	1.00	1.00	1.00	1.00	16.92	1,303.95	3738.21	4.38	95.05	424.00
+0.60D+W+0.60H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.420 ft	1	0.105	0.067	1.60	0.973	1.00	1.00	1.00	1.00	1.00	5.08	391.90	3738.21	1.31	28.31	424.00
+0.60D+E+0.60H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.420 ft	1	0.105	0.067	1.60	0.973	1.00	1.00	1.00	1.00	1.00	5.08	391.90	3738.21	1.31	28.31	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	1.0535	11.319		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.605	1.997
Overall MINimum	1.423	0.541
+D+H	2.372	0.902
+D+L+H	5.605	1.997
+D+Lr+H	2.372	0.902
+D+S+H	2.372	0.902
+D+0.750Lr+0.750L+H	4.796	1.723
+D+0.750L+0.750S+H	4.796	1.723
+D+W+H	2.372	0.902
+D+E+H	2.372	0.902
+D+0.750Lr+0.750L+0.750W+H	4.796	1.723
+D+0.750L+0.750S+0.750W+H	4.796	1.723
+D+0.750L+0.750S+0.750E+H	4.796	1.723
+0.60D+W+0.60H	1.423	0.541
+0.60D+E+0.60H	1.423	0.541
D Only	2.372	0.902
Lr Only		
L Only	3.233	1.095
S Only		
W Only		
E Only		
H Only		

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : FB-13 - 5 1/8x13 1/2 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

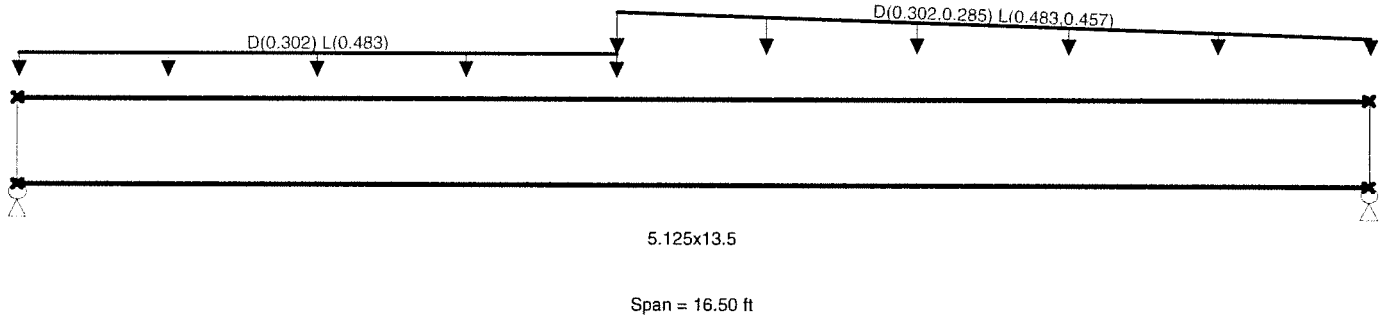
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.3020, L = 0.4830 k/ft, Extent = 0.0 -->> 7.330 ft, Tributary Width = 1.0 ft
Varying Uniform Load : D(S,E) = 0.3020->0.2850, L(S,E) = 0.4830->0.4570 k/ft, Extent = 7.330 -->> 16.50 ft, Trib Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.865 : 1	Maximum Shear Stress Ratio	=	0.466 : 1
Section used for this span		5.125x13.5	Section used for this span		5.125x13.5
fb : Actual	=	2,075.49 psi	fv : Actual	=	123.50 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	8.190 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.423 in	Ratio =	467 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.701 in	Ratio =	282 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 16.50 ft	1	0.381	0.205	0.90	1.000	1.00	1.00	1.00	1.00	1.00	10.67	822.42	2160.00	2.26	48.94	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.50 ft	1	0.865	0.466	1.00	1.000	1.00	1.00	1.00	1.00	1.00	26.92	2,075.49	2400.00	5.70	123.50	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.50 ft	1	0.274	0.148	1.25	1.000	1.00	1.00	1.00	1.00	1.00	10.67	822.42	3000.00	2.26	48.94	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.50 ft	1	0.298	0.161	1.15	1.000	1.00	1.00	1.00	1.00	1.00	10.67	822.42	2760.00	2.26	48.94	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
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Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : FB-13 - 5 1/8x13 1/2 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 16.50 ft	1	0.587	0.317	1.25	1.000	1.00	1.00	1.00	1.00	1.00	22.86	1,762.22	3000.00	4.84	104.86	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.50 ft	1	0.638	0.344	1.15	1.000	1.00	1.00	1.00	1.00	1.00	22.86	1,762.22	2760.00	4.84	104.86	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.50 ft	1	0.214	0.115	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.67	822.42	3840.00	2.26	48.94	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.50 ft	1	0.214	0.115	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.67	822.42	3840.00	2.26	48.94	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.50 ft	1	0.459	0.247	1.60	1.000	1.00	1.00	1.00	1.00	1.00	22.86	1,762.22	3840.00	4.84	104.86	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.50 ft	1	0.459	0.247	1.60	1.000	1.00	1.00	1.00	1.00	1.00	22.86	1,762.22	3840.00	4.84	104.86	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.50 ft	1	0.459	0.247	1.60	1.000	1.00	1.00	1.00	1.00	1.00	22.86	1,762.22	3840.00	4.84	104.86	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.50 ft	1	0.129	0.069	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.40	493.45	3840.00	1.35	29.36	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.50 ft	1	0.129	0.069	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.40	493.45	3840.00	1.35	29.36	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.7012	8.250		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	6.563	6.439
Overall MINimum	1.560	1.531
+D+H	2.601	2.552
+D+L+H	6.563	6.439
+D+Lr+H	2.601	2.552
+D+S+H	2.601	2.552
+D+0.750Lr+0.750L+H	5.573	5.467
+D+0.750L+0.750S+H	5.573	5.467
+D+W+H	2.601	2.552
+D+E+H	2.601	2.552
+D+0.750Lr+0.750L+0.750W+H	5.573	5.467
+D+0.750L+0.750S+0.750W+H	5.573	5.467
+D+0.750L+0.750S+0.750E+H	5.573	5.467
+0.60D+W+0.60H	1.560	1.531
+0.60D+E+0.60H	1.560	1.531
D Only	2.601	2.552
Lr Only		
L Only	3.963	3.888
S Only		
W Only		
E Only		
H Only		

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 19 MAY 2017, 8:22AM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : FB-14 - 5 1/8x13 1/2 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

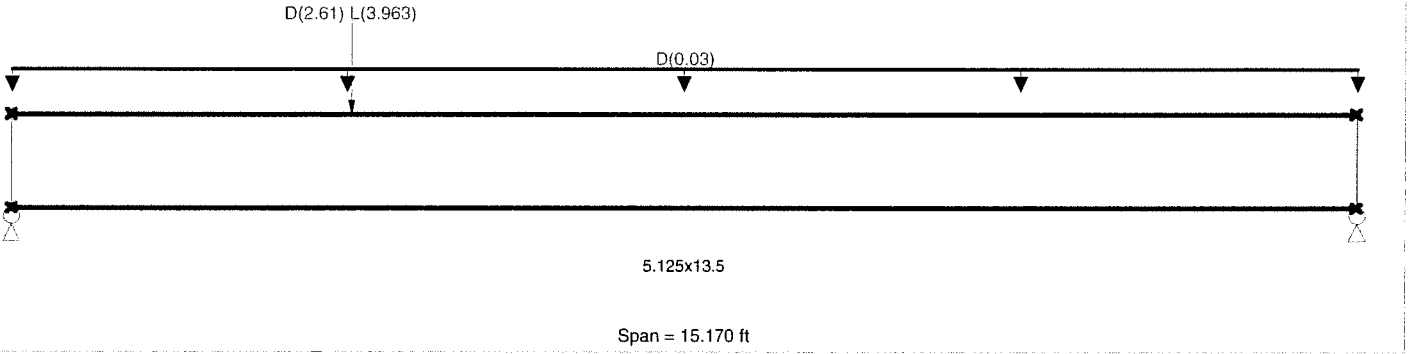
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.030 , Tributary Width = 1.0 ft
Point Load : D = 2.610, L = 3.963 k @ 3.830 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.634 : 1	Maximum Shear Stress Ratio	=	0.426 : 1
Section used for this span		5.125x13.5	Section used for this span		5.125x13.5
fb : Actual	=	1,522.11 psi	fv : Actual	=	112.84 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	3.820 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.187 in	Ratio =	974 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.338 in	Ratio =	538 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.170 ft	1	0.301	0.204	0.90	1.000	1.00	1.00	1.00	1.00	1.00	8.43	649.73	2160.00	2.24	48.62	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.170 ft	1	0.634	0.426	1.00	1.000	1.00	1.00	1.00	1.00	1.00	19.75	1,522.11	2400.00	5.20	112.84	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.170 ft	1	0.217	0.147	1.25	1.000	1.00	1.00	1.00	1.00	1.00	8.43	649.73	3000.00	2.24	48.62	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.170 ft	1	0.235	0.160	1.15	1.000	1.00	1.00	1.00	1.00	1.00	8.43	649.73	2760.00	2.24	48.62	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.170 ft	1	0.435	0.292	1.25	1.000	1.00	1.00	1.00	1.00	1.00	16.92	1,304.02	3000.00	4.46	96.79	331.25

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 19 MAY 2017, 8:22AM

Wood Beam

File = C:_jobs\17100C~1\ENG\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : FB-14 - 5 1/8x13 1/2 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.170 ft	1	0.472	0.318	1.15	1.000	1.00	1.00	1.00	1.00	1.00	16.92	1,304.02	2760.00	4.46	96.79	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.170 ft	1	0.169	0.115	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.43	649.73	3840.00	2.24	48.62	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.170 ft	1	0.169	0.115	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.43	649.73	3840.00	2.24	48.62	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.170 ft	1	0.340	0.228	1.60	1.000	1.00	1.00	1.00	1.00	1.00	16.92	1,304.02	3840.00	4.46	96.79	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.170 ft	1	0.340	0.228	1.60	1.000	1.00	1.00	1.00	1.00	1.00	16.92	1,304.02	3840.00	4.46	96.79	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.170 ft	1	0.340	0.228	1.60	1.000	1.00	1.00	1.00	1.00	1.00	16.92	1,304.02	3840.00	4.46	96.79	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.170 ft	1	0.102	0.069	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.06	389.84	3840.00	1.35	29.17	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.170 ft	1	0.102	0.069	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.06	389.84	3840.00	1.35	29.17	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.3378	6.810		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.255	2.001
Overall MINimum	1.375	0.600
+D+H	2.292	1.000
+D+L+H	5.255	2.001
+D+Lr+H	2.292	1.000
+D+S+H	2.292	1.000
+D+0.750Lr+0.750L+H	4.514	1.751
+D+0.750L+0.750S+H	4.514	1.751
+D+W+H	2.292	1.000
+D+E+H	2.292	1.000
+D+0.750Lr+0.750L+0.750W+H	4.514	1.751
+D+0.750L+0.750S+0.750W+H	4.514	1.751
+D+0.750L+0.750S+0.750E+H	4.514	1.751
+0.60D+W+0.60H	1.375	0.600
+0.60D+E+0.60H	1.375	0.600
D Only	2.292	1.000
Lr Only		
L Only	2.962	1.001
S Only		
W Only		
E Only		
H Only		

SOUTH WALL HEADERS

TH-1 SPAN = 12'-0"

$W = 6(28 + 279) + \frac{1}{2}(12)(83) + 6.33(12)$

$= 244_D + 1840_S$ PLF

$R = 1582_D + 11040_S$

TH-2 SPAN = 3'-0"

$W = 244_D + 1840_S$, PLF

TH3 SPAN = 11'-0"

$W = 244_D + 1840_S$ — USE SAME AS TH-1

TH4 $W_L = 5.33(28 + 286) + \frac{1}{2}(10.67)(76) + 6.33(12)$

$= 225_D + 1660_S$

$W_R = 6.25(28 + 276) + \frac{1}{2}(12.5)(86) + 6.33(12)$

$= 251_D + 1904_S$

SPAN = 13'-4"

TH5 SPAN = 3'-8"

$W = 251_D + 1904_S$

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 30 MAY 2017, 12:06PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : TH-1 - 6 3/4x13 1/2 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

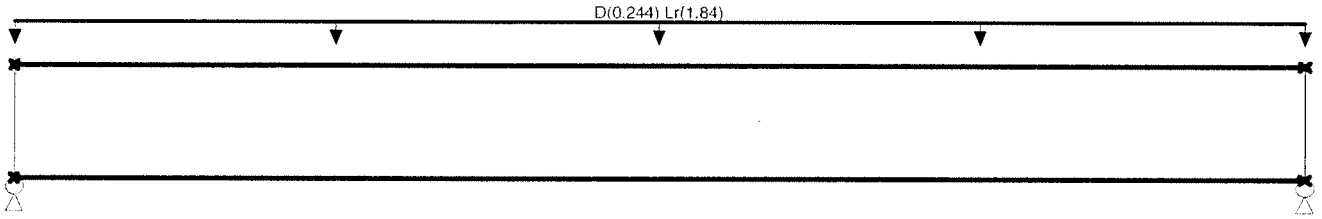
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.2440, Lr = 1.840 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.739 : 1	Maximum Shear Stress Ratio	=	0.513 : 1
Section used for this span		6.75x13.5	Section used for this span		6.75x13.5
fb : Actual	=	2,216.29 psi	fv : Actual	=	169.86 psi
FB : Allowable	=	3,000.00 psi	Fv : Allowable	=	331.25 psi
Load Combination		+D+Lr+H	Load Combination		+D+Lr+H
Location of maximum on span	=	6.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.347 in	Ratio =	415 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.396 in	Ratio =	363 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.129	0.089	0.90	1.000	1.00	1.00	1.00	1.00	1.00	4.75	277.85	2160.00	1.29	21.30	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.116	0.080	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.75	277.85	2400.00	1.29	21.30	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.739	0.513	1.25	1.000	1.00	1.00	1.00	1.00	1.00	37.87	2,216.29	3000.00	10.32	169.86	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.101	0.070	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.75	277.85	2760.00	1.29	21.30	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.577	0.401	1.25	1.000	1.00	1.00	1.00	1.00	1.00	29.59	1,731.68	3000.00	8.06	132.72	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

207

Printed: 30 MAY 2017, 12:06PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : TH-1 - 6 3/4x13 1/2 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 12.0 ft	1	0.101	0.070	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.75	277.85	2760.00	1.29	21.30	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.072	0.050	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.75	277.85	3840.00	1.29	21.30	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.072	0.050	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.75	277.85	3840.00	1.29	21.30	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.451	0.313	1.60	1.000	1.00	1.00	1.00	1.00	1.00	29.59	1,731.68	3840.00	8.06	132.72	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.072	0.050	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.75	277.85	3840.00	1.29	21.30	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.072	0.050	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.75	277.85	3840.00	1.29	21.30	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.043	0.030	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.85	166.71	3840.00	0.78	12.78	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.043	0.030	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.85	166.71	3840.00	0.78	12.78	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.3963	6.044		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	12.622	12.622
Overall MINimum	0.949	0.949
+D+H	1.582	1.582
+D+L+H	1.582	1.582
+D+Lr+H	12.622	12.622
+D+S+H	1.582	1.582
+D+0.750Lr+0.750L+H	9.862	9.862
+D+0.750L+0.750S+H	1.582	1.582
+D+W+H	1.582	1.582
+D+E+H	1.582	1.582
+D+0.750Lr+0.750L+0.750W+H	9.862	9.862
+D+0.750L+0.750S+0.750W+H	1.582	1.582
+D+0.750L+0.750S+0.750E+H	1.582	1.582
+0.60D+W+0.60H	0.949	0.949
+0.60D+E+0.60H	0.949	0.949
D Only	1.582	1.582
Lr Only	11.040	11.040
L Only		
S Only		
W Only		
E Only		
H Only		

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

208

Printed: 30 MAY 2017, 12:08PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : TH-2 - (4)2x8 D.FIR #2

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

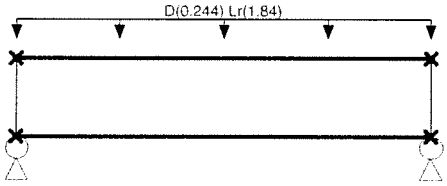
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	900.0 psi
Fb - Compr	900.0 psi
Fc - Prll	1,350.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	575.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.20 pcf



4-2x8

Span = 3.0 ft

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.2440, Lr = 1.840 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.398 : 1	Maximum Shear Stress Ratio	=	0.288 : 1
Section used for this span		4-2x8	Section used for this span		4-2x8
fb : Actual	=	537.67 psi	fv : Actual	=	64.81 psi
FB : Allowable	=	1,350.00 psi	Fv : Allowable	=	225.00 psi
Load Combination		+D+Lr+H	Load Combination		+D+Lr+H
Location of maximum on span	=	1.500 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.011 in	Ratio =	3253 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.013 in	Ratio =	2859 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H													0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.067	0.048	0.90	1.200	1.00	1.00	1.00	1.00	1.00	0.29	65.09	972.00	0.23	7.85	162.00
+D+L+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.060	0.044	1.00	1.200	1.00	1.00	1.00	1.00	1.00	0.29	65.09	1080.00	0.23	7.85	180.00
+D+Lr+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.398	0.288	1.25	1.200	1.00	1.00	1.00	1.00	1.00	2.36	537.67	1350.00	1.88	64.81	225.00
+D+S+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.052	0.038	1.15	1.200	1.00	1.00	1.00	1.00	1.00	0.29	65.09	1242.00	0.23	7.85	207.00
+D+0.750Lr+0.750L+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.311	0.225	1.25	1.200	1.00	1.00	1.00	1.00	1.00	1.84	419.52	1350.00	1.47	50.57	225.00
+D+0.750L+0.750S+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 30 MAY 2017, 12:08PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : TH-2 - (4)2x8 D.FIR #2

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 3.0 ft	1	0.052	0.038	1.15	1.200	1.00	1.00	1.00	1.00	1.00	0.29	65.09	1242.00	0.23	7.85	207.00
+D+W+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.038	0.027	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.29	65.09	1728.00	0.23	7.85	288.00
+D+E+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.038	0.027	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.29	65.09	1728.00	0.23	7.85	288.00
+D+0.750Lr+0.750L+0.750W+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.243	0.176	1.60	1.200	1.00	1.00	1.00	1.00	1.00	1.84	419.52	1728.00	1.47	50.57	288.00
+D+0.750L+0.750S+0.750W+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.038	0.027	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.29	65.09	1728.00	0.23	7.85	288.00
+D+0.750L+0.750S+0.750E+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.038	0.027	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.29	65.09	1728.00	0.23	7.85	288.00
+0.60D+W+0.60H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.023	0.016	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.17	39.05	1728.00	0.14	4.71	288.00
+0.60D+E+0.60H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.023	0.016	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.17	39.05	1728.00	0.14	4.71	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.0126	1.511		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.140	3.140
Overall MINimum	0.228	0.228
+D+H	0.380	0.380
+D+L+H	0.380	0.380
+D+Lr+H	3.140	3.140
+D+S+H	0.380	0.380
+D+0.750Lr+0.750L+H	2.450	2.450
+D+0.750L+0.750S+H	0.380	0.380
+D+W+H	0.380	0.380
+D+E+H	0.380	0.380
+D+0.750Lr+0.750L+0.750W+H	2.450	2.450
+D+0.750L+0.750S+0.750W+H	0.380	0.380
+D+0.750L+0.750S+0.750E+H	0.380	0.380
+0.60D+W+0.60H	0.228	0.228
+0.60D+E+0.60H	0.228	0.228
D Only	0.380	0.380
Lr Only	2.760	2.760
L Only		
S Only		
W Only		
E Only		
H Only		

rudow + berry, inc.
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scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 30 MAY 2017, 12:22PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : TH-4 - 6 3/4x15 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

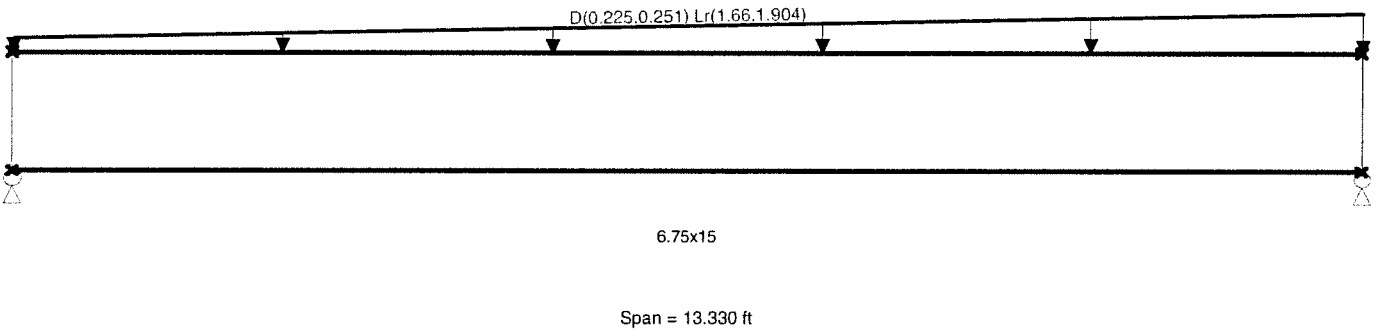
Wood Species : DF/DF
Wood Grade : 24F - V4

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Load for Span Number 1
Varying Uniform Load : D(S,E) = 0.2250->0.2510, Lr(S,E) = 1.660->1.904 k/ft, Extent = 0.0 -->> 13.330 ft, Trib Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.720 : 1	Maximum Shear Stress Ratio	=	0.504 : 1
Section used for this span		6.75x15	Section used for this span		6.75x15
fb : Actual	=	2,150.33 psi	fv : Actual	=	167.06 psi
FB : Allowable	=	2,986.81 psi	Fv : Allowable	=	331.25 psi
Load Combination		+D+Lr+H	Load Combination		+D+Lr+H
Location of maximum on span	=	6.762 ft	Location of maximum on span	=	12.114 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.373 in	Ratio =	429 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.427 in	Ratio =	374 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 13.330 ft	1	0.127	0.089	0.90	0.996	1.00	1.00	1.00	1.00	1.00	5.77	273.73	2150.51	1.43	21.20	238.50
+D+L+H					0.996	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.330 ft	1	0.115	0.080	1.00	0.996	1.00	1.00	1.00	1.00	1.00	5.77	273.73	2389.45	1.43	21.20	265.00
+D+Lr+H					0.996	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.330 ft	1	0.720	0.504	1.25	0.996	1.00	1.00	1.00	1.00	1.00	45.36	2,150.33	2986.81	11.28	167.06	331.25
+D+S+H					0.996	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.330 ft	1	0.100	0.070	1.15	0.996	1.00	1.00	1.00	1.00	1.00	5.77	273.73	2747.87	1.43	21.20	304.75
+D+0.750Lr+0.750L+H					0.996	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.330 ft	1	0.563	0.394	1.25	0.996	1.00	1.00	1.00	1.00	1.00	35.46	1,681.18	2986.81	8.82	130.60	331.25

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 30 MAY 2017, 12:22PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — **Licensee : RUDOW & BERRY**

Description : TH-4 - 6 3/4x15 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750L+0.750S+H					0.996	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.330 ft	1	0.100	0.070	1.15	0.996	1.00	1.00	1.00	1.00	1.00	5.77	273.73	2747.87	1.43	21.20	304.75
+D+W+H					0.996	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.330 ft	1	0.072	0.050	1.60	0.996	1.00	1.00	1.00	1.00	1.00	5.77	273.73	3823.12	1.43	21.20	424.00
+D+E+H					0.996	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.330 ft	1	0.072	0.050	1.60	0.996	1.00	1.00	1.00	1.00	1.00	5.77	273.73	3823.12	1.43	21.20	424.00
+D+0.750Lr+0.750L+0.750W+H					0.996	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.330 ft	1	0.440	0.308	1.60	0.996	1.00	1.00	1.00	1.00	1.00	35.46	1,681.18	3823.12	8.82	130.60	424.00
+D+0.750L+0.750S+0.750W+H					0.996	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.330 ft	1	0.072	0.050	1.60	0.996	1.00	1.00	1.00	1.00	1.00	5.77	273.73	3823.12	1.43	21.20	424.00
+D+0.750L+0.750S+0.750E+H					0.996	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.330 ft	1	0.072	0.050	1.60	0.996	1.00	1.00	1.00	1.00	1.00	5.77	273.73	3823.12	1.43	21.20	424.00
+0.60D+W+0.60H					0.996	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.330 ft	1	0.043	0.030	1.60	0.996	1.00	1.00	1.00	1.00	1.00	3.46	164.24	3823.12	0.86	12.72	424.00
+0.60D+E+0.60H					0.996	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.330 ft	1	0.043	0.030	1.60	0.996	1.00	1.00	1.00	1.00	1.00	3.46	164.24	3823.12	0.86	12.72	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.4270	6.714		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	13.310	13.909
Overall MINimum	1.022	1.057
+D+H	1.704	1.761
+D+L+H	1.704	1.761
+D+Lr+H	13.310	13.909
+D+S+H	1.704	1.761
+D+0.750Lr+0.750L+H	10.408	10.872
+D+0.750L+0.750S+H	1.704	1.761
+D+W+H	1.704	1.761
+D+E+H	1.704	1.761
+D+0.750Lr+0.750L+0.750W+H	10.408	10.872
+D+0.750L+0.750S+0.750W+H	1.704	1.761
+D+0.750L+0.750S+0.750E+H	1.704	1.761
+0.60D+W+0.60H	1.022	1.057
+0.60D+E+0.60H	1.022	1.057
D Only	1.704	1.761
Lr Only	11.606	12.148
L Only		
S Only		
W Only		
E Only		
H Only		

rudow + berry, inc.
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Project Title: Powdercat
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Printed: 30 MAY 2017, 12:21PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : TH-5 - (4)2x8 D.FIR #2

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

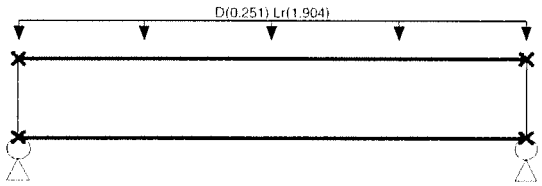
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	900.0 psi
Fb - Compr	900.0 psi
Fc - Prll	1,350.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	575.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.20 pcf



4-2x8

Span = 3.670 ft

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.2510, Lr = 1.904 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.616 : 1	Maximum Shear Stress Ratio	=	0.409 : 1
Section used for this span		4-2x8	Section used for this span		4-2x8
fb : Actual	=	831.94 psi	fv : Actual	=	91.97 psi
FB : Allowable	=	1,350.00 psi	Fv : Allowable	=	225.00 psi
Load Combination		+D+Lr+H	Load Combination		+D+Lr+H
Location of maximum on span	=	1.835 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.026 in	Ratio =	1717 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.029 in	Ratio =	1510 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 3.670 ft	1	0.103	0.068	0.90	1.200	1.00	1.00	1.00	1.00	1.00	0.44	100.10	972.00	0.32	11.07	162.00
+D+L+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1	0.093	0.061	1.00	1.200	1.00	1.00	1.00	1.00	1.00	0.44	100.10	1080.00	0.32	11.07	180.00
+D+Lr+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1	0.616	0.409	1.25	1.200	1.00	1.00	1.00	1.00	1.00	3.64	831.94	1350.00	2.67	91.97	225.00
+D+S+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1	0.081	0.053	1.15	1.200	1.00	1.00	1.00	1.00	1.00	0.44	100.10	1242.00	0.32	11.07	207.00
+D+0.750Lr+0.750L+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1	0.481	0.319	1.25	1.200	1.00	1.00	1.00	1.00	1.00	2.84	648.98	1350.00	2.08	71.74	225.00
+D+0.750L+0.750S+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
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Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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Printed: 30 MAY 2017, 12:21PM

Wood Beam

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : TH-5 - (4)2x8 D.FIR #2

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 3.670 ft	1	0.081	0.053	1.15	1.200	1.00	1.00	1.00	1.00	1.00	0.44	100.10	1242.00	0.32	11.07	207.00
+D+W+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1	0.058	0.038	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.44	100.10	1728.00	0.32	11.07	288.00
+D+E+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1	0.058	0.038	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.44	100.10	1728.00	0.32	11.07	288.00
+D+0.750Lr+0.750L+0.750W+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1	0.376	0.249	1.60	1.200	1.00	1.00	1.00	1.00	1.00	2.84	648.98	1728.00	2.08	71.74	288.00
+D+0.750L+0.750S+0.750W+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1	0.058	0.038	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.44	100.10	1728.00	0.32	11.07	288.00
+D+0.750L+0.750S+0.750E+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1	0.058	0.038	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.44	100.10	1728.00	0.32	11.07	288.00
+0.60D+W+0.60H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1	0.035	0.023	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.26	60.06	1728.00	0.19	6.64	288.00
+0.60D+E+0.60H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.670 ft	1	0.035	0.023	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.26	60.06	1728.00	0.19	6.64	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.0291	1.848		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.972	3.972
Overall MINimum	0.287	0.287
+D+H	0.478	0.478
+D+L+H	0.478	0.478
+D+Lr+H	3.972	3.972
+D+S+H	0.478	0.478
+D+0.750Lr+0.750L+H	3.098	3.098
+D+0.750L+0.750S+H	0.478	0.478
+D+W+H	0.478	0.478
+D+E+H	0.478	0.478
+D+0.750Lr+0.750L+0.750W+H	3.098	3.098
+D+0.750L+0.750S+0.750W+H	0.478	0.478
+D+0.750L+0.750S+0.750E+H	0.478	0.478
+0.60D+W+0.60H	0.287	0.287
+0.60D+E+0.60H	0.287	0.287
D Only	0.478	0.478
Lr Only	3.494	3.494
L Only		
S Only		
W Only		
E Only		
H Only		

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

TH-C SPAN = 11'-9"

$W = 5.15(25+40) + 5.67(12) + 4.33(10)$

$= 249\,D + 220\,L$

TH-1 SPAN 1 = 10'-6"

SPAN 2 = 6'-6"

$W_L = 5.75(25+40) + 112 = 243\,D + 210\,L$

$W_C = 6.08(11) + 112 = 200\,D + 243\,L$

$W_R = 6.50(11) + 112 = 214\,D + 200\,L$

$P = R_{THA+THS} = 2239\#_D + 1564\#_S$ @ x = 2'-9"

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed 30 MAY 2017, 1:53PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : TH-6 - 6 3/4x9 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

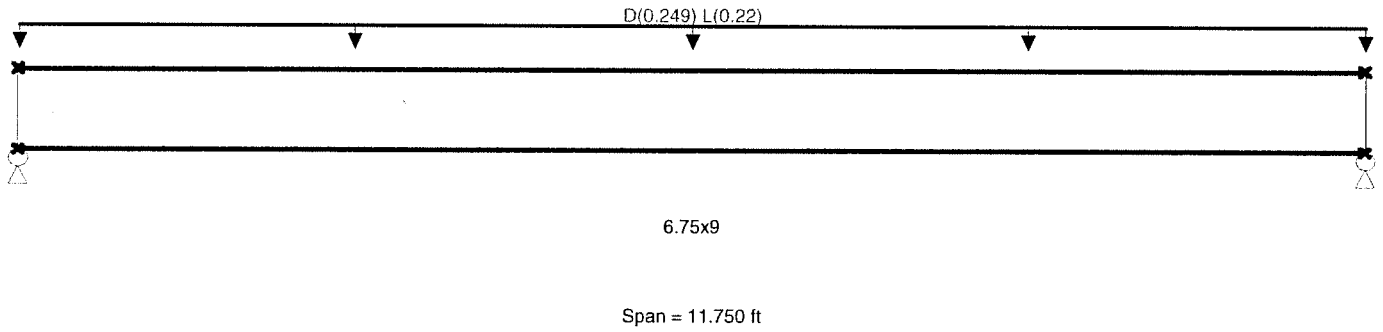
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2400 psi
Fb - Compr	1850 psi
Fc - Prll	1650 psi
Fc - Perp	650 psi
Fv	265 psi
Ft	1100 psi

E : Modulus of Elasticity

Ebend- xx	1800 ksi
Eminbend - xx	950 ksi
Ebend- yy	1600 ksi
Eminbend - yy	850 ksi
Density	31.2 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.2490, L = 0.220 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.457 : 1	Maximum Shear Stress Ratio	=	0.231 : 1
Section used for this span		6.75x9	Section used for this span		6.75x9
fb : Actual	=	1,095.78 psi	fv : Actual	=	61.26 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	5.875 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.129 in	Ratio =	1096 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.282 in	Ratio =	500 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H													0.00	0.00	0.00	0.00
Length = 11.750 ft	1	0.276	0.140	0.90	1.000	1.00	1.00	1.00	1.00	1.00	4.52	595.80	2160.00	1.35	33.31	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.750 ft	1	0.457	0.231	1.00	1.000	1.00	1.00	1.00	1.00	1.00	8.32	1,095.78	2400.00	2.48	61.26	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.750 ft	1	0.199	0.101	1.25	1.000	1.00	1.00	1.00	1.00	1.00	4.52	595.80	3000.00	1.35	33.31	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.750 ft	1	0.216	0.109	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.52	595.80	2760.00	1.35	33.31	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.750 ft	1	0.324	0.164	1.25	1.000	1.00	1.00	1.00	1.00	1.00	7.37	970.78	3000.00	2.20	54.28	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 30 MAY 2017, 1:53PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : TH-6 - 6 3/4x9 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
Length = 11.750 ft	1	0.352	0.178	1.15	1.000	1.00	1.00	1.00	1.00	1.00	7.37	970.78	2760.00	2.20	54.28	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.750 ft	1	0.155	0.079	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.52	595.80	3840.00	1.35	33.31	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.750 ft	1	0.155	0.079	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.52	595.80	3840.00	1.35	33.31	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.750 ft	1	0.253	0.128	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.37	970.78	3840.00	2.20	54.28	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.750 ft	1	0.253	0.128	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.37	970.78	3840.00	2.20	54.28	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.750 ft	1	0.253	0.128	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.37	970.78	3840.00	2.20	54.28	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.750 ft	1	0.093	0.047	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.71	357.48	3840.00	0.81	19.99	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.750 ft	1	0.093	0.047	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.71	357.48	3840.00	0.81	19.99	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.2818	5.918		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.833	2.833
Overall MINimum	0.924	0.924
+D+H	1.540	1.540
+D+L+H	2.833	2.833
+D+Lr+H	1.540	1.540
+D+S+H	1.540	1.540
+D+0.750Lr+0.750L+H	2.510	2.510
+D+0.750L+0.750S+H	2.510	2.510
+D+W+H	1.540	1.540
+D+E+H	1.540	1.540
+D+0.750Lr+0.750L+0.750W+H	2.510	2.510
+D+0.750L+0.750S+0.750W+H	2.510	2.510
+D+0.750L+0.750S+0.750E+H	2.510	2.510
+0.60D+W+0.60H	0.924	0.924
+0.60D+E+0.60H	0.924	0.924
D Only	1.540	1.540
Lr Only		
L Only	1.293	1.293
S Only		
W Only		
E Only		
H Only		

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 30 MAY 2017, 2:01PM
File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Licensee : RUDOW & BERRY

Wood Beam

Lic. # : KW-06002357

Description : TH-7 - 6 3/4x12 GLB

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10 w/ ASD Wind & EQ

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10 w/ ASD Wind & EQ

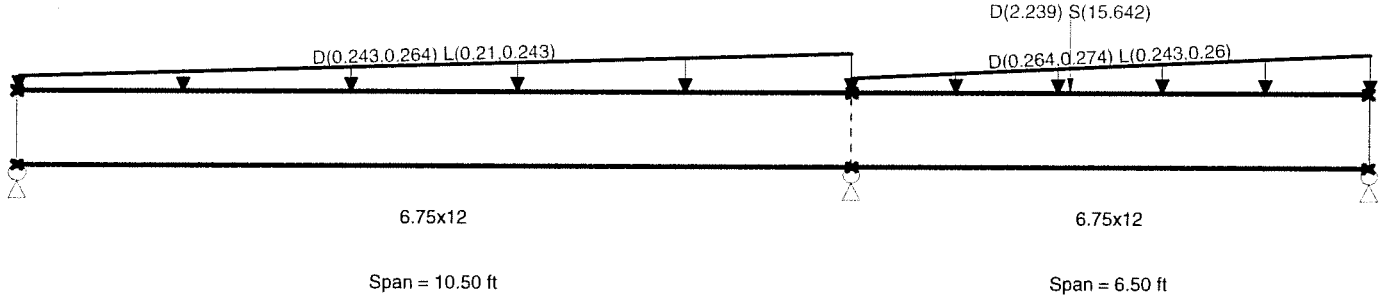
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Load for Span Number 1
Varying Uniform Load : D(S,E) = 0.2430->0.2640, L(S,E) = 0.210->0.2430 k/ft, Extent = 0.0 -->> 10.50 ft, Trib Width = 1.0 ft
Load for Span Number 2
Varying Uniform Load : D(S,E) = 0.2640->0.2740, L(S,E) = 0.2430->0.260 k/ft, Extent = 0.0 -->> 6.50 ft, Trib Width = 1.0 ft
Point Load : D = 2.239, S = 15.642 k @ 2.750 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.622 1	Maximum Shear Stress Ratio	=	0.773 : 1
Section used for this span		6.75x12	Section used for this span		6.75x12
fb : Actual	=	1,717.61 psi	fv : Actual	=	235.66 psi
FB : Allowable	=	2,760.00 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	2.760 ft	Location of maximum on span	=	10.500 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.066 in	Ratio =	1174 >=360
Max Upward Transient Deflection	-0.053 in	Ratio =	2393 >=360
Max Downward Total Deflection	0.075 in	Ratio =	1041 >=240.
Max Upward Total Deflection	-0.040 in	Ratio =	3128 >=240.

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.176	0.198	0.90	1.000	1.00	1.00	1.00	1.00	1.00	3.96	293.48	1665.00	2.55	47.23	238.50
Length = 6.50 ft	2	0.176	0.198	0.90	1.000	1.00	1.00	1.00	1.00	1.00	3.96	293.48	1665.00	2.55	47.23	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.256	0.244	1.00	1.000	1.00	1.00	1.00	1.00	1.00	6.41	474.52	1850.00	3.50	64.72	265.00
Length = 6.50 ft	2	0.256	0.244	1.00	1.000	1.00	1.00	1.00	1.00	1.00	6.41	474.52	1850.00	3.50	64.72	265.00

rudow + berry, inc.
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480.946.8171

Project Title: Powdercat
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Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : TH-7 - 6 3/4x12 GLB

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.127	0.143	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.96	293.48	2312.50	2.55	47.23	331.25
Length = 6.50 ft	2	0.127	0.143	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.96	293.48	2312.50	2.55	47.23	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.398	0.773	1.15	1.000	1.00	1.00	1.00	1.00	1.00	11.44	847.66	2127.50	12.73	235.66	304.75
Length = 6.50 ft	2	0.622	0.773	1.15	1.000	1.00	1.00	1.00	1.00	1.00	23.19	1,717.61	2760.00	12.73	235.66	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.186	0.182	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.80	429.26	2312.50	3.26	60.35	331.25
Length = 6.50 ft	2	0.186	0.182	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.80	429.26	2312.50	3.26	60.35	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.397	0.662	1.15	1.000	1.00	1.00	1.00	1.00	1.00	11.41	844.90	2127.50	10.89	201.67	304.75
Length = 6.50 ft	2	0.483	0.662	1.15	1.000	1.00	1.00	1.00	1.00	1.00	17.99	1,332.82	2760.00	10.89	201.67	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.099	0.111	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.96	293.48	2960.00	2.55	47.23	424.00
Length = 6.50 ft	2	0.099	0.111	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.96	293.48	2960.00	2.55	47.23	424.00
+D+E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.099	0.111	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.96	293.48	2960.00	2.55	47.23	424.00
Length = 6.50 ft	2	0.099	0.111	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.96	293.48	2960.00	2.55	47.23	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.145	0.142	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.80	429.26	2960.00	3.26	60.35	424.00
Length = 6.50 ft	2	0.145	0.142	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.80	429.26	2960.00	3.26	60.35	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.285	0.476	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.41	844.90	2960.00	10.89	201.67	424.00
Length = 6.50 ft	2	0.347	0.476	1.60	1.000	1.00	1.00	1.00	1.00	1.00	17.99	1,332.82	3840.00	10.89	201.67	424.00
+D+0.750L+0.750S+0.750E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.285	0.476	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.41	844.90	2960.00	10.89	201.67	424.00
Length = 6.50 ft	2	0.347	0.476	1.60	1.000	1.00	1.00	1.00	1.00	1.00	17.99	1,332.82	3840.00	10.89	201.67	424.00
+0.60D+W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.059	0.067	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.38	176.09	2960.00	1.53	28.34	424.00
Length = 6.50 ft	2	0.059	0.067	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.38	176.09	2960.00	1.53	28.34	424.00
+0.60D+E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.50 ft	1	0.059	0.067	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.38	176.09	2960.00	1.53	28.34	424.00
Length = 6.50 ft	2	0.059	0.067	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.38	176.09	2960.00	1.53	28.34	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	S Only	-0.0526	6.101
+D+S+H	2	0.0749	3.232		0.0000	6.101

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	1.955	15.534	6.741
Overall MINimum	0.315	2.635	0.451
+D+H	1.027	4.646	1.274
+D+L+H	1.955	7.281	1.725
+D+Lr+H	1.027	4.646	1.274
+D+S+H	0.315	15.534	6.741
+D+0.750Lr+0.750L+H	1.723	6.622	1.612
+D+0.750L+0.750S+H	1.189	14.788	5.712
+D+W+H	1.027	4.646	1.274
+D+E+H	1.027	4.646	1.274
+D+0.750Lr+0.750L+0.750W+H	1.723	6.622	1.612
+D+0.750L+0.750S+0.750W+H	1.189	14.788	5.712
+D+0.750L+0.750S+0.750E+H	1.189	14.788	5.712
+0.60D+W+0.60H	0.616	2.788	0.765
+0.60D+E+0.60H	0.616	2.788	0.765
D Only	1.027	4.646	1.274
Lr Only			
L Only	0.927	2.635	0.451
S Only	-0.713	10.888	5.467

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

Printed: 30 MAY 2017, 2:01PM

Wood Beam

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357
Licensee : RUDOW & BERRY

Description : TH-7 - 6 3/4x12 GLB

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
W Only			
E Only			
H Only			

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

WIND LOADS – COMPONENTS & CLADDING

– REF ASCE 7-10, CH 30, PART 2

$p_{net} = \lambda K_{zt} p_{net30}$

MEAN ROOF H_o = 35 FT $\lambda = 1.45$

$K_{zt} = 1.0$

p_{net30} = +22.7, −24.7 @ Z4
= +22.7, −29.7 @ Z5
} $A = 20\ FT^2$

p_{net} = 1.45(22.7, −24.7) = 32.9 PSF OR −35.8 psf @ Z4
= 1.1(22.7, −29.7) = 32.9 PSF OR −43.1 psf @ Z4

= +19.7 PSF OR −21.5 PSF @ Z4
= +19.7 PSF OR −25.8 PSF @ Z5
} ASD LOADS

a = 0.1(47) = 4.7 FT

WALL STUDS

WIND p = 21.5 PSF @ Z4
= 25.8 PSF @ Z5
= 5 PSF @ INT. WALLS

1) WALLS ON GRID 1 (GRID 13 SIMILAR)

WALL BELOW RF & UL:

MAX HT = 11'-9" @ Z4
= 9'-7" @ Z5

$W = \frac{1}{2}(29.5)^2\left(\frac{1}{24.75}\right)(24 + 259) = 422_D + 4533_S$, PLF

$P_{STUD} = 562^{\#}_D + 6071^{\#}_S$

WALL BELOW EL & BL

MAX HT = 9'-11"

$W = (422_D + 4533_S) + (12.17 \div 2)(25 + 40) + 26.63(12)$
$= 1096_D + 567_L + 4533_S$

$P_{STUD} = 1461^{\#}_D + 756^{\#}_L + 6044^{\#}_S$

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structural engineering
scottsdale, arizona
p 602.946.8171

Project Name: Powdercat
Job Number: 17100

Wall Studs (01) - Exterior Walls - On Grid 1 (Grid 13 Similar)

Grade: D. Fir/Larch #2
Fc = 1350 psi E = 1600 ksi E_{min}' = 580 ksi
Fb = 900 psi RLL C_D = 1.25 Wind C_D = 1.33

Location	Load Case	Size	t (in)	d (in)	d(Fc) (in)	kL_e (ft)	C_F (Fc)	C_F (Fb)	C_D	Cr	P_{STUD} (kips)	Wind (psf)	Trib.W (ft)	kL_e/d (ft)	F_c* (psi)	F_{CE} (psi)	Cp	P_{allow} (kips)	Wind (plf)	M_{max} (ft-k)	Defl. (in)	f_b (psi)	F_b (psi)	Unity Eq'n
On Grid 1 RF-UL	TL	2x8	1.50	7.25	7.25	11.75	1.05	1.20	1.15	1.15	6.63	0.0	1.33	19.45	1630	1260	0.60	10.58	0.0	0.00		0	N/A	0.63
	D + W	2x8	1.50	7.25	7.25	11.75	1.05	1.20	1.15	1.15	0.56	25.8	1.33	19.45	1630	1260	0.60	10.58	34.3	0.59	0.19	541	1428	0.40
	TL + W	2x8	1.50	7.25	7.25	11.75	1.05	1.20	1.15	1.15	5.12	19.4	1.33	19.45	1630	1260	0.60	10.58	25.7	0.44	0.14	406	1428	0.69
On Grid 1 EL-BL	TL	2x8	1.50	7.25	7.25	9.92	1.05	1.20	1.15	1.15	8.26	0.0	1.33	16.42	1630	1768	0.72	12.73	0.0	0.00		0	N/A	0.65
	D + W	2x8	1.50	7.25	7.25	9.92	1.05	1.20	1.15	1.15	1.46	25.8	1.33	16.42	1630	1768	0.72	12.73	34.3	0.42	0.10	385	1428	0.31
	TL + W	2x8	1.50	7.25	7.25	9.92	1.05	1.20	1.15	1.15	7.51	19.4	1.33	16.42	1630	1768	0.72	12.73	25.7	0.32	0.07	289	1428	0.68

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

2) WALLS ON GRIDS 4, 5, 9 & 10

WALL BETWEEN RE & UL

MAX Ht = 17.54 FT @ Z4
= 15.62 FT @ Z5
} WORST CASE AT GRID 5

$W = 14.5(24 + 259) + 8.75(12) = 4530_D + 3756_S$, PLF

$P_{STND} = 604^{\#}_D + 500^{\#}_S$

WALL BETWEEN EL & BL

MAX Ht = 9.92'

$W = (453_D + 375_S) + (9.58 + 2)(25 + 40) + 32.42(12)$
$= 1132_D + 463_L + 375_S$

$P_{STND} = 1509^{\#}_D + 617^{\#}_L + 500^{\#}_S$

rudow + berry, inc.
structural engineering
scottsdale, arizona
p 602.946.8171

Project Name: Powdercat
Job Number: 17100

Wall Studs (02) - Exterior Walls - On Grid 5 (Grids 4, 9, & 10 Similar)

Grade: D. Fir/Larch #2

Fc = 1350 psi E = 1600 ksi E_{min}' = 580 ksi

Fb = 900 psi RLL C_D = 1.25 Wind C_D = 1.33

Location	Load Case	Size	t (in)	d (in)	d(Fc) (in)	kL_e (ft)	C_F (Fc)	C_F (Fb)	C_D	Cr	P_{STUD} (kips)	Wind (psf)	Trib.W (ft)	kL_e/d (ft)	F_c* (psi)	F_{CE} (psi)	Cp	P_{allow} (kips)	Wind (plf)	M_{max} (ft-k)	Defl. (in)	f_b (psi)	F_b (psi)	Unity Eq'n
On Grid 5 RF-UL ZONE 4	TL	(2)2x8	3.00	7.25	7.25	17.54	1.05	1.20	1.15	1.15	5.61	0.0	1.33	29.03	1630	566	0.32	11.26	0.0	0.00		0	N/A	0.50
	D + W	(2)2x8	3.00	7.25	7.25	17.54	1.05	1.20	1.15	1.15	0.60	21.5	1.33	29.03	1630	566	0.32	11.26	28.6	1.10	0.40	502	1428	0.37
	TL + W	(2)2x8	3.00	7.25	7.25	17.54	1.05	1.20	1.15	1.15	4.36	16.1	1.33	29.03	1630	566	0.32	11.26	21.4	0.82	0.30	377	1428	0.56
On Grid 5 RF-UL ZONE 5	TL	(2)2x8	3.00	7.25	7.25	15.62	1.05	1.20	1.15	1.15	5.61	0.0	1.33	25.85	1630	713	0.39	13.77	0.0	0.00		0	N/A	0.41
	D + W	(2)2x8	3.00	7.25	7.25	15.62	1.05	1.20	1.15	1.15	0.60	25.8	1.33	25.85	1630	713	0.39	13.77	34.3	1.05	0.30	478	1428	0.35
	TL + W	(2)2x8	3.00	7.25	7.25	15.62	1.05	1.20	1.15	1.15	4.36	19.4	1.33	25.85	1630	713	0.39	13.77	25.7	0.78	0.23	358	1428	0.45
On Grid 5 EL to BL Zone 5	TL	2x8	1.50	7.25	7.25	9.92	1.05	1.20	1.15	1.15	7.13	0.0	1.33	16.42	1630	1768	0.72	12.73	0.0	0.00		0	N/A	0.56
	D + W	2x8	1.50	7.25	7.25	9.92	1.05	1.20	1.15	1.15	1.51	25.8	1.33	16.42	1630	1768	0.72	12.73	34.3	0.42	0.10	385	1428	0.31
	TL + W	2x8	1.50	7.25	7.25	9.92	1.05	1.20	1.15	1.15	5.27	19.4	1.33	16.42	1630	1768	0.72	12.73	25.7	0.32	0.07	289	1428	0.45

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

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designed by: MAR date: 5/17
checked by: date:

DEMISING WALLS

N-S Demising Walls

Unit	Ht	Roof Trib	UL Trib	EL Trib	RF-UL PSTUD		BF-EL PSTUD			RF-UL		EL-BL		
	(ft)	(ft)	(ft)	(ft)	DL (kips)	SL (kips)	DL (kips)	SL (kips)	LL (kips)	TL	DL+W	TL	DL+W	TL+W
124E	15.51	12.00	12.00	0.00	0.47	4.14	1.11	4.14	0.64	4.61	0.47	5.89	1.11	4.22
125W	15.51	10.00	9.42	2.00	0.40	3.45	1.02	3.45	0.61	3.86	0.40	5.09	1.02	3.61
125E	12.29	10.00	9.42	7.50	0.39	3.45	1.17	3.45	0.90	3.84	0.39	5.53	1.17	3.76
126W	11.79	10.25	9.42	7.50	0.39	3.54	1.18	3.54	0.90	3.93	0.39	5.62	1.18	3.83
127E	12.83	10.25	9.42	7.50	0.40	3.54	1.19	3.54	0.90	3.94	0.40	5.63	1.19	3.84
128W	11.83	10.00	9.42	7.50	0.38	3.45	1.17	3.45	0.90	3.84	0.38	5.52	1.17	3.76
128E	18.01	10.00	9.42	2.00	0.42	3.45	1.05	3.45	0.61	3.87	0.42	5.11	1.05	3.64
129W	16.51	10.00	9.42	2.00	0.41	3.45	1.04	3.45	0.61	3.86	0.41	5.10	1.04	3.63
129E	13.29	10.00	9.42	7.50	0.39	3.45	1.18	3.45	0.90	3.84	0.39	5.54	1.18	3.77
130W	11.79	10.25	9.42	7.50	0.39	3.54	1.18	3.54	0.90	3.93	0.39	5.62	1.18	3.83
131E	12.83	10.25	9.42	7.50	0.40	3.54	1.19	3.54	0.90	3.94	0.40	5.63	1.19	3.84
132W	10.83	10.00	9.42	7.50	0.38	3.45	1.16	3.45	0.90	3.83	0.38	5.51	1.16	3.75
132E	17.01	10.00	9.42	2.00	0.41	3.45	1.04	3.45	0.61	3.86	0.41	5.10	1.04	3.63
133W	15.01	12.00	11.58	0.00	0.46	4.14	1.09	4.14	0.62	4.61	0.46	5.85	1.09	4.20

rudow + berry, inc.
structural engineering
scottsdale, arizona
p 602.946.8171

Project Name: Powdercat
Job Number: 17100

Wall Studs (03) - Demising Walls - RF-UL

Grade: D. Fir/Larch #2
Fc = ### psi E = ### ksi E_{min}' = 580 ksi
Fb = 900 psi RLL C_D = 1.25 Wind C_D = 1.33

Location	Load Case	Size	t (in)	d (in)	d(Fc) (in)	kL_e (ft)	C_F (Fc)	C_F (Fb)	C_D	Cr	P_{STUD} (kips)	Wind (psf)	Trib.W (ft)	kL_e/d (ft)	F_c* (psi)	F_{CE} (psi)	Cp	P_{allow} (kips)	Wind (plf)	M_{max} (ft-k)	Defl. (in)	f_b (psi)	F_b (psi)	Unity Eq'n
Unit 124E RF-UL	TL	(2)2x6	3.00	5.50	5.50	15.51	1.10	1.30	1.15	1.15	4.61	0.0	1.33	33.84	1708	416	0.23	6.48	0.0	0.00		0	N/A	0.71
	D + W	(2)2x6	3.00	5.50	5.50	15.51	1.10	1.30	1.15	1.15	0.47	5.0	1.33	33.84	1708	416	0.23	6.48	6.7	0.20	0.13	159	1547	0.12
	TL + W	(2)2x6	3.00	5.50	5.50	15.51	1.10	1.30	1.15	1.15	3.57	3.8	1.33	33.84	1708	416	0.23	6.48	5.0	0.15	0.10	119	1547	0.46
Unit 125W RF-UL	TL	(2)2x6	3.00	5.50	5.50	15.51	1.10	1.30	1.15	1.15	3.86	0.0	1.33	33.84	1708	416	0.23	6.48	0.0	0.00		0	N/A	0.60
	D + W	(2)2x6	3.00	5.50	5.50	15.51	1.10	1.30	1.15	1.15	0.40	5.0	1.33	33.84	1708	416	0.23	6.48	6.7	0.20	0.13	159	1547	0.11
	TL + W	(2)2x6	3.00	5.50	5.50	15.51	1.10	1.30	1.15	1.15	2.99	3.8	1.33	33.84	1708	416	0.23	6.48	5.0	0.15	0.10	119	1547	0.35
Unit 125E RF-UL	TL	2x6	1.50	5.50	5.50	12.29	1.10	1.30	1.15	1.15	3.84	0.0	1.33	26.81	1708	663	0.35	4.94	0.0	0.00		0	N/A	0.78
	D + W	2x6	1.50	5.50	5.50	12.29	1.10	1.30	1.15	1.15	0.39	5.0	1.33	26.81	1708	663	0.35	4.94	6.7	0.13	0.10	199	1547	0.14
	TL + W	2x6	1.50	5.50	5.50	12.29	1.10	1.30	1.15	1.15	2.98	3.8	1.33	26.81	1708	663	0.35	4.94	5.0	0.09	0.08	149	1547	0.58
Unit 126W RF-UL	TL	2x6	1.50	5.50	5.50	11.79	1.10	1.30	1.15	1.15	3.93	0.0	1.33	25.72	1708	721	0.38	5.30	0.0	0.00		0	N/A	0.74
	D + W	2x6	1.50	5.50	5.50	11.79	1.10	1.30	1.15	1.15	0.39	5.0	1.33	25.72	1708	721	0.38	5.30	6.7	0.12	0.09	183	1547	0.13
	TL + W	2x6	1.50	5.50	5.50	11.79	1.10	1.30	1.15	1.15	3.05	3.8	1.33	25.72	1708	721	0.38	5.30	5.0	0.09	0.07	138	1547	0.51
Unit 127E RF-UL	TL	2x6	1.50	5.50	5.50	12.83	1.10	1.30	1.15	1.15	3.94	0.0	1.33	27.99	1708	608	0.32	4.58	0.0	0.00		0	N/A	0.86
	D + W	2x6	1.50	5.50	5.50	12.83	1.10	1.30	1.15	1.15	0.40	5.0	1.33	27.99	1708	608	0.32	4.58	6.7	0.14	0.12	217	1790	0.14
	TL + W	2x6	1.50	5.50	5.50	12.83	1.10	1.30	1.15	1.15	3.05	3.8	1.33	27.99	1856	613	0.30	4.65	5.0	0.10		163	1682	0.67

rudow + berry, inc.
structural engineering
scottsdale, arizona
p 602.946.8171

Project Name: Powdercat
Job Number: 17100

Wall Studs (04) - Demising Walls - RF-UL

Grade: D. Fir/Larch #2
Fc = ### psi E = ### ksi E_{min}' = 580 ksi
Fb = 900 psi RLL C_D = 1.25 Wind C_D = 1.33

Location	Load Case	Size	t (in)	d (in)	d(Fc) (in)	kL_e (ft)	C_F (Fc)	C_F (Fb)	C_D	Cr	P_{STUD} (kips)	Wind (psf)	Trib.W (ft)	kL_e/d (ft)	F_c* (psi)	F_{CE} (psi)	Cp	P_{allow} (kips)	Wind (plf)	M_{max} (ft-k)	Defl. (in)	f_b (psi)	F_b (psi)	Unity Eq'n
Unit 128W RF-UL	TL	2x6	1.50	5.50	5.50	11.83	1.10	1.30	1.15	1.15	3.84	0.0	1.33	25.81	1708	716	0.37	5.27	0.0	0.00		0	N/A	0.73
	D + W	2x6	1.50	5.50	5.50	11.83	1.10	1.30	1.15	1.15	0.38	5.0	1.33	25.81	1708	716	0.37	5.27	6.7	0.12	0.09	185	1547	0.13
	TL + W	2x6	1.50	5.50	5.50	11.83	1.10	1.30	1.15	1.15	2.97	3.8	1.33	25.81	1708	716	0.37	5.27	5.0	0.09	0.07	138	1547	0.50
Unit 128E RF-UL	TL	(2)2x6	3.00	5.50	5.50	18.01	1.10	1.30	1.15	1.15	3.87	0.0	1.33	39.29	1708	309	0.17	4.89	0.0	0.00		0	N/A	0.79
	D + W	(2)2x6	3.00	5.50	5.50	18.01	1.10	1.30	1.15	1.15	0.42	5.0	1.33	39.29	1708	309	0.17	4.89	6.7	0.27	0.24	214	1547	0.16
	TL + W	(2)2x6	3.00	5.50	5.50	18.01	1.10	1.30	1.15	1.15	3.01	3.8	1.33	39.29	1708	309	0.17	4.89	5.0	0.20	0.18	160	1547	0.63
Unit 129W RF-UL	TL	(2)2x6	3.00	5.50	5.50	16.51	1.10	1.30	1.15	1.15	3.86	0.0	1.33	36.02	1708	367	0.20	5.77	0.0	0.00		0	N/A	0.67
	D + W	(2)2x6	3.00	5.50	5.50	16.51	1.10	1.30	1.15	1.15	0.41	5.0	1.33	36.02	1708	367	0.20	5.77	6.7	0.23	0.17	180	1547	0.13
	TL + W	(2)2x6	3.00	5.50	5.50	16.51	1.10	1.30	1.15	1.15	3.00	3.8	1.33	36.02	1708	367	0.20	5.77	5.0	0.17	0.13	135	1547	0.44
Unit 129E RF-UL	TL	2x6	1.50	5.50	5.50	13.29	1.10	1.30	1.15	1.15	3.84	0.0	1.33	29.00	1708	567	0.31	4.30	0.0	0.00		0	N/A	0.89
	D + W	2x6	1.50	5.50	5.50	13.29	1.10	1.30	1.15	1.15	0.39	5.0	1.33	29.00	1708	567	0.31	4.30	6.7	0.15	0.14	233	1547	0.17
	TL + W	2x6	1.50	5.50	5.50	13.29	1.10	1.30	1.15	1.15	2.98	3.8	1.33	29.00	1708	567	0.31	4.30	5.0	0.11	0.11	175	1547	0.79
Unit 130W RF-UL	TL	2x6	1.50	5.50	5.50	11.79	1.10	1.30	1.15	1.15	3.93	0.0	1.33	25.72	1708	721	0.38	5.30	0.0	0.00		0	N/A	0.74
	D + W	2x6	1.50	5.50	5.50	11.79	1.10	1.30	1.15	1.15	0.39	5.0	1.33	25.72	1708	721	0.38	5.30	6.7	0.12	0.09	183	1790	0.12
	TL + W	2x6	1.50	5.50	5.50	11.79	1.10	1.30	1.15	1.15	3.05	3.8	1.33	25.72	1856	725	0.35	5.40	5.0	0.09		138	1682	0.49

rudow + berry, inc.
structural engineering
scottsdale, arizona
p 602.946.8171

Project Name: Powdercat
Job Number: 17100

Wall Studs (05) - Demising Walls - RF-UL & BL-EL

Grade: D. Fir/Larch #2
Fc = ### psi E = ### ksi E_{min}' = 580 ksi
Fb = 900 psi RLL C_D = 1.25 Wind C_D = 1.33

Location	Load Case	Size	t (in)	d (in)	d(Fc) (in)	kL_e (ft)	C_F (Fc)	C_F (Fb)	C_D	Cr	P_{STUD} (kips)	Wind (psf)	Trib.W (ft)	kL_e/d (ft)	F_c* (psi)	F_{CE} (psi)	Cp	P_{allow} (kips)	Wind (plf)	M_{max} (ft-k)	Defl. (in)	f_b (psi)	F_b (psi)	Unity Eq'n
Unit 131E RF-UL	TL	2x6	1.50	5.50	5.50	12.83	1.10	1.30	1.15	1.15	3.94	0.0	1.33	27.99	1708	608	0.32	4.58	0.0	0.00		0	N/A	0.86
	D + W	2x6	1.50	5.50	5.50	12.83	1.10	1.30	1.15	1.15	0.40	5.0	1.33	27.99	1708	608	0.32	4.58	6.7	0.14	0.12	217	1547	0.16
	TL + W	2x6	1.50	5.50	5.50	12.83	1.10	1.30	1.15	1.15	3.05	3.8	1.33	27.99	1708	608	0.32	4.58	5.0	0.10	0.09	163	1547	0.71
Unit 132W RF-UL	TL	2x6	1.50	5.50	5.50	10.83	1.10	1.30	1.15	1.15	3.83	0.0	1.33	23.63	1708	854	0.43	6.11	0.0	0.00		0	N/A	0.63
	D + W	2x6	1.00	5.50	5.50	10.83	1.10	1.30	1.15	1.15	0.38	5.0	1.33	23.63	1708	854	0.43	4.07	6.7	0.10	0.09	232	1547	0.17
	TL + W	2x6	1.50	5.50	5.50	10.83	1.10	1.30	1.15	1.15	2.97	3.8	1.33	23.63	1708	854	0.43	6.11	5.0	0.07	0.05	116	1547	0.37
Unit 132E RF-UL	TL	(2)2x6	3.00	5.50	5.50	17.01	1.10	1.30	1.15	1.15	3.86	0.0	1.33	37.11	1708	346	0.19	5.45	0.0	0.00		0	N/A	0.71
	D + W	(2)2x6	3.00	5.50	5.50	17.01	1.10	1.30	1.15	1.15	0.41	5.0	1.33	37.11	1708	346	0.19	5.45	6.7	0.24	0.19	191	1547	0.14
	TL + W	(2)2x6	3.00	5.50	5.50	17.01	1.10	1.30	1.15	1.15	3.00	3.8	1.33	37.11	1708	346	0.19	5.45	5.0	0.18	0.14	143	1547	0.50
Unit 133W RF-UL	TL	(2)2x6	3.00	5.50	5.50	15.01	1.10	1.30	1.15	1.15	4.61	0.0	1.33	32.75	1708	445	0.24	6.89	0.0	0.00		0	N/A	0.67
	D + W	(2)2x6	3.00	5.50	5.50	15.01	1.10	1.30	1.15	1.15	0.46	5.0	1.33	32.75	1708	445	0.24	6.89	6.7	0.19	0.11	149	1547	0.11
	TL + W	(2)2x6	3.00	5.50	5.50	15.01	1.10	1.30	1.15	1.15	3.57	3.8	1.33	32.75	1708	445	0.24	6.89	5.0	0.14	0.09	111	1547	0.41
Typical Unit EL-BL	TL	2x6	1.50	5.50	5.50	9.92	1.10	1.30	1.15	1.15	5.89	0.0	1.33	21.64	1708	1018	0.50	7.01	0.0	0.00		0	N/A	0.84
	D + W	2x6	1.50	5.50	5.50	9.92	1.10	1.30	1.15	1.15	1.11	5.0	1.33	21.64	1708	1018	0.50	7.01	6.7	0.08	0.04	130	1790	0.11
	TL + W	2x6	1.50	5.50	5.50	9.92	1.10	1.30	1.15	1.15	4.22	3.8	1.33	21.64	1856	1025	0.47	7.18	5.0	0.06		97	1682	0.46

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

RETAINING WALLS AT BREEZEWAYS

WORST CASE AT GRID 9

MAX RETAINED HT = 606.18 - 596.58 = 9.60 FT

LOADS ON STEM FROM ABOVE

$W = 14.75(24+259) + 9.58(25+40) + 1.83(25+40) + 28(12) = 9150 + 3820SL + 456L$, PLF

EAST RET. WALL (ON GRID 13)

MAX RET. HT = 6.92'

LOADS FROM ABOVE:

$W = 16.33(24+259) + 11(25+40) + 1.83(25+40) + 20.5(12)$

$= 9590 + 4230SL + 513L$

9144

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126 230

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Cantilevered Retaining Wall

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Lic. # : KW-06002357 Licensee : RUDOW & BERRY

Description : Breezeway Ret. Wall w/ Basement Slab in place

Calculations per ACI 318-14, ACI 530-11, IBC 2015, CBC 2016, ASCE 7-10

Criteria

Retained Height	=	9.58 ft
Wall height above soil	=	0.33 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	12.00 in
Water height over heel	=	0.0 ft

Vertical component of active Lateral soil pressure options:
NOT USED for Soil Pressure.
NOT USED for Sliding Resistance.
NOT USED for Overturning Resistance.

Soil Data

Allow Soil Bearing	=	2,400.0 psf
Equivalent Fluid Pressure Method		
Heel Active Pressure	=	35.0 psf/ft
Toe Active Pressure	=	35.0 psf/ft
Passive Pressure	=	320.0 psf/ft
Soil Density, Heel	=	106.00 pcf
Soil Density, Toe	=	106.00 pcf
Friction Coeff btwn Ftg & Soil	=	0.000
Soil height to ignore for passive pressure	=	0.00 in

Surcharge Loads

Surcharge Over Heel	=	100.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 plf
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Wind on Exposed Stem	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Axial Load Applied to Stem

Axial Dead Load	=	975.0 lbs
Axial Live Load	=	3,820.0 lbs
Axial Load Eccentricity	=	0.0 in

Design Summary

Wall Stability Ratios

Overturning	=	1.86	OK
Sliding	=	0.29	OK
Slab Resists All Sliding !			
Total Bearing Load	=	8,739 lbs	
...resultant ecc.	=	3.56 in	
Soil Pressure @ Toe	=	2,369 psf	OK
Soil Pressure @ Heel	=	1,126 psf	OK
Allowable	=	2,400 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	3,258 psf	
ACI Factored @ Heel	=	1,548 psf	
Footing Shear @ Toe	=	49.4 psi	OK
Footing Shear @ Heel	=	3.6 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs Slab Resists All Sliding !

Lateral Sliding Force	=	2,238.2 lbs

Stem Construction

Top Stem

			Stem OK
Design Height Above Ftg	ft =		0.00
Wall Material Above "Ht"	=		Concrete
Thickness	in =		10.00
Rebar Size	=		# 5
Rebar Spacing	in =		10.00
Rebar Placed at	=		User Spec
Design Data			
fb/FB + fa/Fa	=		**0.821**
Total Force @ Section	lbs =		3,047.9
Moment....Actual	ft-l =		10,621.0
Moment.....Allowable	ft-l =		12,932.7
Shear.....Actual	psi =		31.7
Shear.....Allowable	psi =		94.9
Wall Weight	psf =		125.0
Rebar Depth 'd'	in =		8.00
Lap splice if above	in =		18.50
Lap splice if below	in =		7.82
Hook embed into footing	in =		7.82
Concrete Data			
f'c	psi =		4,000.0
Fy	psi =		

Load Factors

Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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Cantilevered Retaining Wall

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Breezeway Ret. Wall w/ Basement Slab in place

Footing Dimensions & Strengths

Toe Width	=	2.67 ft
Heel Width	=	2.33
Total Footing Width	=	5.00
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 3.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	3,258	1,548 psf
Mu' : Upward	=	10,505	1,933 ft-lb
Mu' : Downward	=	1,093	1,753 ft-lb
Mu: Design	=	9,412	181 ft-lb
Actual 1-Way Shear	=	49.41	3.62 psi
Allow 1-Way Shear	=	82.16	82.16 psi

Toe Reinforcing = # 5 @ 10.00 in
Heel Reinforcing = None Spec'd
Key Reinforcing = # 5 @ 16.00 in

Other Acceptable Sizes & Spacings

Toe: #4@ 7.25 in, #5@ 11.25 in, #6@ 15.75 in, #7@ 21.50 in, #8@ 28.25 in, #9@ 35
Heel: Not req'd, Mu < S * Fr
Key: No key defined

Summary of Overturning & Resisting Forces & Moments

		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-lb			.....RESISTING..... Force lbs	Distance ft	Moment ft-lb
Heel Active Pressure	=	1,958.9	3.53	6,908.3	Soil Over Heel	=	1,522.9	4.25	6,472.5
Surcharge over Heel	=	349.3	5.29	1,848.0	Sloped Soil Over Heel	=			
Toe Active Pressure	=	-70.0	0.67	-46.7	Surcharge Over Heel	=	150.0	4.25	637.4
Surcharge Over Toe	=				Adjacent Footing Load	=			
Adjacent Footing Load	=				Axial Dead Load on Stem	=	975.0	3.08	3,006.6
Added Lateral Load	=				* Axial Live Load on Stem	=	3,820.0	3.08	11,779.6
Load @ Stem Above Soil	=				Soil Over Toe	=	282.7	1.33	377.0
					Surcharge Over Toe	=			
					Stem Weight(s)	=	1,238.8	3.08	3,819.9
					Earth @ Stem Transitions	=			
					Footing Weight	=	750.0	2.50	1,875.0
					Key Weight	=			
					Vert. Component	=			
Total	=	2,238.2	**O.T.M.** =	8,709.7	**Total** =		4,919.3 lbs	**R.M.** =	16,188.3

Resisting/Overturning Ratio = **1.86**
Vertical Loads used for Soil Pressure = 8,739.3 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

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4021 north 75th street, #101
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480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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Cantilevered Retaining Wall

File = C:_jobs\17100C~1\ENG\Framing\POWDER~1.EC6
ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28

Lic. # : KW-06002357 — Licensee : RUDOW & BERRY

Description : Ret. Wall on Grid 13 w/ Basement Slab in place

Calculations per ACI 318-14, ACI 530-11, IBC 2015, CBC 2016, ASCE 7-10

Criteria

Retained Height	=	6.92 ft
Wall height above soil	=	3.00 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	12.00 in
Water height over heel	=	0.0 ft

Vertical component of active
Lateral soil pressure options:
NOT USED for Soil Pressure.
NOT USED for Sliding Resistance.
NOT USED for Overturning Resistance.

Soil Data

Allow Soil Bearing	=	2,400.0 psf
Equivalent Fluid Pressure Method		
Heel Active Pressure	=	35.0 psf/ft
Toe Active Pressure	=	35.0 psf/ft
Passive Pressure	=	320.0 psf/ft
Soil Density, Heel	=	106.00 pcf
Soil Density, Toe	=	106.00 pcf
Friction Coeff btwn Ftg & Soil	=	0.000
Soil height to ignore for passive pressure	=	0.00 in

Surcharge Loads

Surcharge Over Heel	=	100.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 plf
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Wind on Exposed Stem	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Axial Load Applied to Stem

Axial Dead Load	=	959.0 lbs
Axial Live Load	=	4,744.0 lbs
Axial Load Eccentricity	=	0.0 in

Design Summary

Wall Stability Ratios

Overturning	=	2.59	OK
Sliding	=	0.50	OK
Slab Resists All Sliding !			
Total Bearing Load	=	8,727 lbs	
...resultant ecc.	=	0.24 in	
Soil Pressure @ Toe	=	2,117 psf	OK
Soil Pressure @ Heel	=	2,247 psf	OK
Allowable	=	2,400 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	3,001 psf	
ACI Factored @ Heel	=	3,184 psf	
Footing Shear @ Toe	=	33.9 psi	OK
Footing Shear @ Heel	=	22.2 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs Slab Resists All Sliding !

Lateral Sliding Force	=	1,288.9 lbs

Stem Construction

Top Stem

		Stem OK
Design Height Above Ftg	ft =	0.00
Wall Material Above "Ht"	=	Concrete
Thickness	in =	10.00
Rebar Size	=	# 5
Rebar Spacing	in =	10.00
Rebar Placed at	=	User Spec
Design Data		
fb/FB + fa/Fa	=	0.336
Total Force @ Section	lbs =	1,678.0
Moment....Actual	ft-l =	4,346.7
Moment.....Allowable	ft-l =	12,932.7
Shear.....Actual	psi =	17.5
Shear.....Allowable	psi =	94.9
Wall Weight	psf =	125.0
Rebar Depth 'd'	in =	8.00
Lap splice if above	in =	18.50
Lap splice if below	in =	6.00
Hook embed into footing	in =	6.00
Concrete Data		
f'c	psi =	4,000.0
Fy	psi =	

Load Factors

Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

rudow + berry, inc.
4021 north 75th street, #101
scottsdale, arizona 85251
480.946.8171

Project Title: Powdercat
Engineer: MAR
Project Descr:
Project ID: 16126

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ENERCALC, INC. 1983-2017, Build:6.17.2.28, Ver:6.17.2.28
Licensee : RUDOW & BERRY

Cantilevered Retaining Wall

Lic. # : KW-06002357

Description : Ret. Wall on Grid 13 w/ Basement Slab in place

Footing Dimensions & Strengths

Toe Width	=	2.00 ft
Heel Width	=	2.00
Total Footing Width	=	4.00
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 3.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	3,001	3,184 psf
Mu' : Upward	=	0	2,172 ft-lb
Mu' : Downward	=	0	830 ft-lb
Mu: Design	=	4,347	1,342 ft-lb
Actual 1-Way Shear	=	33.95	22.16 psi
Allow 1-Way Shear	=	82.16	82.16 psi

Toe Reinforcing = # 5 @ 10.00 in
Heel Reinforcing = None Spec'd
Key Reinforcing = # 5 @ 16.00 in

Other Acceptable Sizes & Spacings

Toe: #4@ 13.25 in, #5@ 20.50 in, #6@ 29.00 in, #7@ 39.25 in, #8@ 48.25 in, #9@ 4
Heel: Not req'd, Mu < S * Fr
Key: No key defined

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-lb		.....RESISTING..... Force lbs	Distance ft	Moment ft-lb
Heel Active Pressure	=	1,097.4	2.64	2,896.9	Soil Over Heel	= 855.6	3.42	2,923.5
Surcharge over Heel	=	261.5	3.96	1,035.3	Sloped Soil Over Heel	=		
Toe Active Pressure	=	-70.0	0.67	-46.7	Surcharge Over Heel	= 116.7	3.42	398.6
Surcharge Over Toe	=				Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on Stem	= 959.0	2.42	2,317.6
Added Lateral Load	=				* Axial Live Load on Stem	= 4,744.0	2.42	11,464.7
Load @ Stem Above Soil	=				Soil Over Toe	= 212.0	1.00	212.0
					Surcharge Over Toe	=		
					Stem Weight(s)	= 1,239.9	2.42	2,996.4
					Earth @ Stem Transitions	=		
					Footing Weight	= 600.0	2.00	1,200.0
					Key Weight	=		
					Vert. Component	=		
Total	=	1,288.9	**O.T.M.** =	3,885.5	**Total** =	3,983.2 lbs	**R.M.** =	10,048.0

Resisting/Overturning Ratio = **2.59**
Vertical Loads used for Soil Pressure = 8,727.2 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

BASEMENT WALL ON GRID B

HT = 9'-11"

58_{MAX} = 9.92(55) = 546 PLF/FT (873 ULT)

M_u(MAX) = 5.51 ^{K}/FT

b=12 d=8 f'c=4 Fy=60

ρ=.0016 A_s = 0.207 IN²/FT

USE 10" WALL W/
#5@14 VERTS (AWAY FACE)

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
rbinc@rbise.com

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

SEISMIC LOADS

LATITUDE = 41.363°
LONGITUDE = -111.745°
} SEE NEXT SHT FOR SUMMARY RPT.

S_{DS} = 0.635
S_{D1} = 0.334
} SDC = "D"

RISK CAT = II I_E = 1.00

RESPONSE MOD. FACTOR: R = 6.5 (WOOD SHEAR WALLS)
C_D = 4 Ω = 3

REDUNDANCY: ρ = 1.3

$C_s = \frac{0.635}{6.5/1.0} = 0.0977$

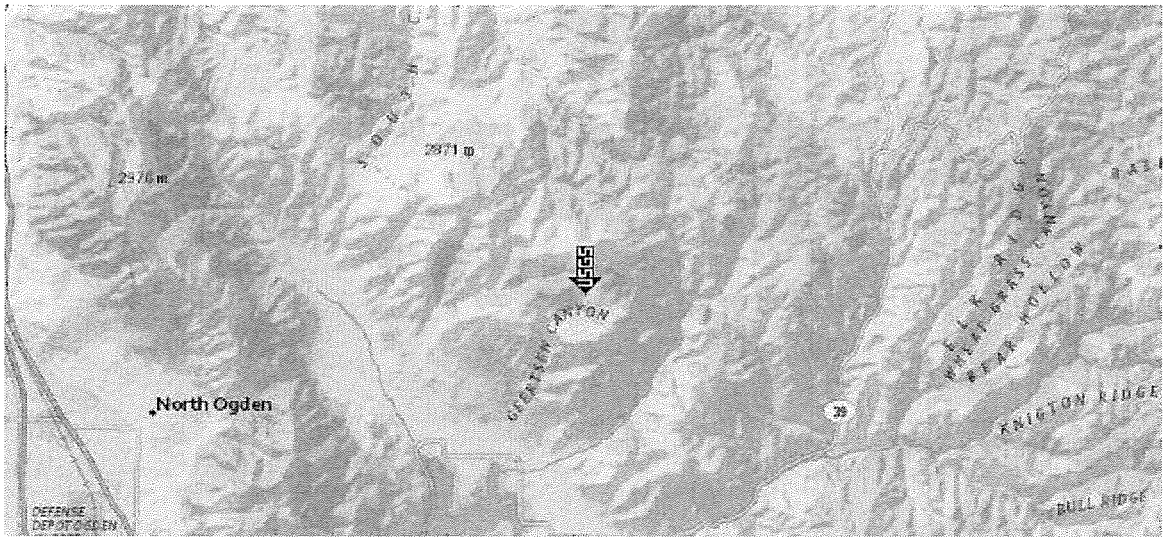
T_L = 8 sec (FIG 22-12)
$T_a = .02(35)^{.75} = 0.29$ sec
$C_{s(MAX)} = \frac{.334}{.29(6.5)} = 0.177$

$V = .0977(1.3)W = 0.127W$ (ULT)
$= 0.089W$ (ASD)

USGS Design Maps Summary Report

User-Specified Input

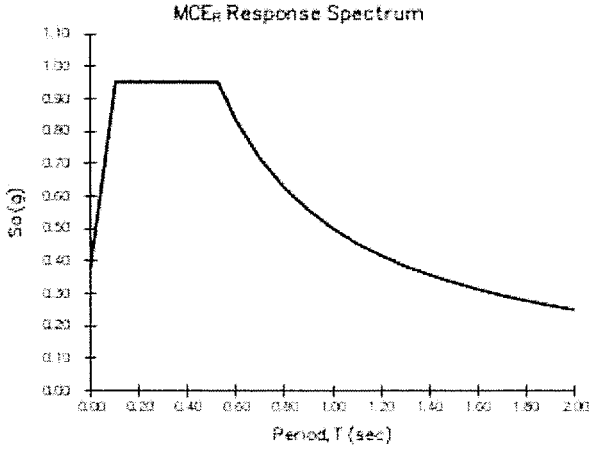
Report Title	Powdercat / Copper Crest West Fri May 5, 2017 17:24:57 UTC
Building Code Reference Document	2012/2015 International Building Code (which utilizes USGS hazard data available in 2008)
Site Coordinates	41.363°N, 111.745°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

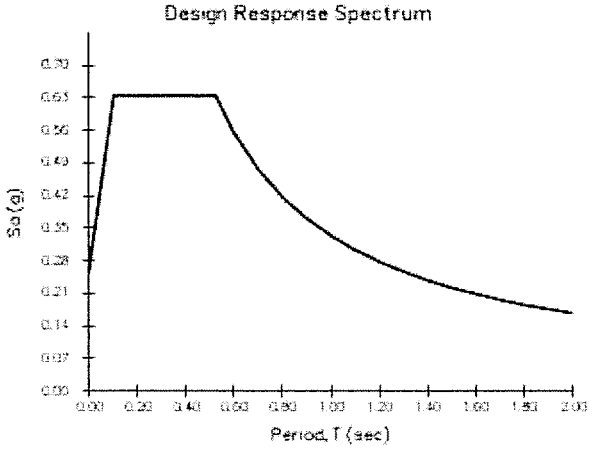


USGS-Provided Output

S_S =	0.811 g	S_{MS} =	0.953 g	S_{DS} =	0.635 g
S_1 =	0.269 g	S_{M1} =	0.501 g	S_{D1} =	0.334 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





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WIND LOADS 2015 IBC, ASCE 7-10

MWFRS ASCE 7-10, CH 28, PART 1

$V = 115$ MPH, EXP = C, ENCLOSED

$K_d = 0.85$ $K_{zt} = 1.0$, $GC_{pi} = \pm 0.18$

RISK CAT = II

MEAN ROOF HT = 36' $\Rightarrow$ $K_z = 1.016$

$q_z = .00256(1.016)(1.0)(.85)(115)^2(0.6) = 17.54$ PSF (ASD)

GC_{pf}: $\theta = 16^\circ \pm$

GC_{pf} = 0.44 @ ZONE 1 0.61 @ 1E
-0.34 @ " 4 -0.50 @ 4E

AT ZONES 1 & 4

WIND p = 17.54(.44 + .18) = 10.87 PSF MAX WINDWARD
" (.34 + .18) = 9.12 PSF MAX LEEWARD
" (.44 + .34) = 13.68 PSF MAX TOTAL

AT ZONES 1E/4E

WIND p = 17.54(.61 + .18) = 14.91 PSF MAX WINDWARD
" (.50 + .18) = 11.93 PSF MAX LEEWARD
" (.61 + .50) = 20.52 PSF MAX TOTAL

$a = 0.10(47) = 4.7$ FT $\leftarrow$ $2a = 9.4$ FT
$= 0.4(36) = 14.4$ FT

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MWFRS (CONT'D)

PARAPETS (AT TERRACES)

MAX HT = 27'

$q_p = .00256(.95)(1.10)(.85)(1.15)^2(1.6) = 16.40$ PSF (ASD)

$P = 1.5(16.4) = 24.6$ PSF WINDWARD

$1.10(11) = 16.4$ PSF LEEWARD

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t (480) 946-8171
f (480) 946-9480

job name:	Powdercat			pg 239 of
job number:	17100			
designed by:	MAR	date:	5/17	
checked by:		date:		

LATERAL ANALYSIS NOTE:

ALL DIAPHRAGMS ARE CONSIDERED TO BE FLEXIBLE DIAPHRAGMS AND SHEAR FORCES ARE DISTRIBUTED ACCORDING TO TRIBUTARY WIDTHS AND AREAS AS APPLICABLE. SOME SHEAR WALLS ARE SLIGHTLY NON-ORTHAGONAL HOWEVER SINCE THESE WALLS ARE AT LESS THAN A 5 DEGREE SLOPE TO THE ORTHAGONAL AXES, THE AMOUNT IS NOT SIGNIFICANT TO THE DISTRIBUTION OF FORCES NOR TO THE PERFORMANCE OF THE SHEAR WALL SYSTEM AS DESIGNED.

Powdercat - CCW
Job # 17100

Seismic Force Calculation										
Unit	124	125	126	127	128	129	130	131	132	133
Roof Area (ft2)	1358	902	1076	1047	838	838	1047	1047	838	1163
UL FLr Area (ft2)	941	730	713	686	667	667	686	686	667	796
UL Ter. Area (ft2)	326	239	245	245	239	239	245	245	239	278
EL Area (ft2)	619	469	482	482	469	469	482	482	469	543
Roof DL (kips)	104.84	69.63	83.07	80.83	64.69	64.69	80.83	80.83	64.69	89.78
UL FLr DL (kips)	28.23	21.90	21.39	20.58	20.01	20.01	20.58	20.58	20.01	23.88
UL Ter. DL (kips)	9.78	7.17	7.35	7.35	7.17	7.17	7.35	7.35	7.17	8.34
EL DL (kips)	18.57	14.07	14.46	14.46	14.07	14.07	14.46	14.46	14.07	16.29
Total DL (kips)	161.42	112.77	126.27	123.22	105.94	105.94	123.22	123.22	105.94	138.29
Roof hi (ft)	34.07	34.60	35.90	35.41	35.71	35.69	35.72	34.76	34.71	33.88
UL hi (ft)	19.83	19.83	19.83	19.83	19.83	19.83	19.83	19.83	19.83	19.83
EL hi (ft)	9.92	9.92	9.92	9.92	9.92	9.92	9.92	9.92	9.92	9.92
Roof Wihi (ft2)	3571.47	2409.21	2982.33	2862.43	2310.37	2309.11	2887.53	2809.76	2245.68	3041.91
UL Wihi (ft2)	753.74	576.46	569.91	553.85	538.98	538.98	553.85	553.85	538.98	638.92
EL Wihi (ft2)	184.21	139.57	143.44	143.44	139.57	139.57	143.44	143.44	139.57	161.60
Sum Wihi (ft2)	4509.42	3125.24	3695.69	3559.73	2988.92	2987.66	3584.83	3507.05	2924.23	3842.43
Roof Cv	0.792	0.771	0.807	0.804	0.773	0.773	0.805	0.801	0.768	0.792
UL Flr Cv	0.124	0.139	0.115	0.115	0.133	0.133	0.114	0.116	0.136	0.123
UL Ter. Cv	0.043	0.045	0.039	0.041	0.048	0.048	0.041	0.042	0.049	0.043
EL Cv	0.041	0.045	0.039	0.040	0.047	0.047	0.040	0.041	0.048	0.042
VTOTAL (lbs)	14366	10037	11238	10966	9429	9429	10966	10966	9429	12308
VRF (lbs)	11378	7737	9069	8818	7288	7287	8833	8786	7241	9744
VUL(Flr) (lbs)	1783	1395	1290	1257	1252	1252	1248	1276	1279	1517
VUL(Ter) (lbs)	618	457	443	449	449	449	446	456	458	530
VEL (lbs)	587	448	436	442	440	440	439	449	450	518
VRF(N Wall) (lbs)	5689	3869	4534	4409	3644	3644	4417	4393	3621	4872
VRF(S Wall) (lbs)	5689	3869	4534	4409	3644	3644	4417	4393	3621	4872
VUL(N Wall) (lbs)	892	697	645	629	626	626	624	638	640	758
VUL(S Wall) (lbs)	1201	926	866	853	850	851	847	866	869	1023
VUL(FS Wall) (lbs)	309	228	222	225	224	224	223	228	229	265
VEL(S Wall) (lbs)	293	224	218	221	220	220	219	224	225	259
VEL(FS Wall) (lbs)	147	112	109	110	110	110	110	112	113	129
VRF(E Wall) (lbs)	6552	3869	4534	4409	3644	3644	4417	4393	3621	4156
VRF(W Wall) (lbs)	4826	3869	4534	4409	3644	3644	4417	4393	3621	5588
VUL(E or W) (lbs)	1201	926	866	853	850	851	847	866	869	1023
VEL(E or W) (lbs)	293	224	218	221	220	220	219	224	225	259

Powdercat - CCW
Job # 17100

N-S Wind Force Calculation										
Unit	124	125	126	127	128	129	130	131	132	133
Eave Ht (ft)	32.96	33.52	34.61	34.43	34.73	34.71	34.70	33.79	33.73	32.92
UL Ht (ft)	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80
EL Ht (ft)	9.90	9.90	9.90	9.90	9.90	9.90	9.90	9.90	9.90	9.90
BL Ht (ft)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unit E-W Width	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00
RF-UL (ft)	13.16	13.72	14.81	14.63	14.93	14.91	14.90	13.99	13.93	13.12
UL-EL (ft)	9.90	9.90	9.90	9.90	9.90	9.90	9.90	9.90	9.90	9.90
EL-BL (ft)	9.90	9.90	9.90	9.90	9.90	9.90	9.90	9.90	9.90	9.90
p(Z1/4) (psf)	13.68	13.68	13.68	13.68	13.68	13.68	13.68	13.68	13.68	13.68
p(Z1E/4E) (psf)	20.52	20.52	20.52	20.52	20.52	20.52	20.52	20.52	20.52	20.52
p(design) (psf)	16.42	16.42	16.42	16.42	16.42	16.42	16.42	16.42	16.42	16.42
wRF (plf)	124	129	138	136	139	139	139	131	131	124
wUL (plf)	173	177	186	185	187	187	187	180	179	173
wEL (plf)	163	163	163	163	163	163	163	163	163	163
1/2 VRF (lbs)	1306	1355	1449	1433	1459	1457	1457	1378	1373	1303
1/2 VUL (lbs)	1815	1863	1958	1941	1967	1966	1965	1886	1881	1811
1/2 VEL (lbs)	1706	1706	1706	1706	1706	1706	1706	1706	1706	1706

Powdercat - CCW
Job # 17100

E-W Wind Force Calculation										
Unit	124	125	126	127	128	129	130	131	132	133
Eave Ht (ft)	11.00		16.83	17.57			16.84	16.11		11.17
Ridge Ht (ft)	13.27		18.77	19.52			18.89	18.25		13.10
Terrace Ppt N	4.83		7.50	4.83			6.50	4.83		8.00
Terrace Ppt S	4.83		4.83	4.83			4.83	4.83		4.83
UL-EL (ft)	9.90		9.90	9.90			9.90	9.90		9.90
EL-BL (ft)	9.90		9.90	9.90			9.90	9.90		9.90
p(Z1/4) (psf)	10.87		10.87	10.87			10.87	10.87		10.87
p(Z1E/4E) (psf)	14.91		14.91	14.91			14.91	14.91		14.91
p(design) (psf)	12.49		12.49	12.49			12.49	12.49		12.49
p(ppt) (psf	24.60		26.60	27.60			30.60	31.60		33.60
wRF(eave) (plf)	81		118	122			118	113		82
wRF(ridge) (plf)	95		130	134			130	126		94
wUL(eave) (plf)	118		154	159			154	150		119
wUL(ridge) (plf)	132		166	171			167	163		131
wUL(Ter N) (plf)	181		261	195			261	214		331
wUL(Ter S) (plf)	181		190	195			210	214		224
wEL (plf)	124		124	124			124	124		124
Roof Width (ft)	34		34	34			34	34		34
UL Width (ft)	34		34	34			34	34		34
UL Ter. Width (ft)	12		12	12			12	12		12
EL RW-SW (ft)	12		12	12			12	12		12
EL SW-FSW (ft)	12		12	12			12	12		12
VRF(N Wall) (lbs)	1500		2101	2180			2108	2035		1500
VRF(S Wall) (lbs)	1500		2101	2180			2108	2035		1500
VUL(N Wall) (lbs)	2126		2728	2806			2735	2662		2126
VUL(S Wall) (lbs)	3210		4295	3977			4299	3948		4110
VUL(FS Wall) (lbs)	1084		1142	1171			1258	1287		1345
VEL(S Wall) (lbs)	1483		1483	1483			1483	1483		1483
VEL(FS Wall) (lbs)	742		742	742			742	742		742

Powdercat - CCW
Job # 17100

Wind/Seismic Shear Wall Load Summary										
Unit	124	125	126	127	128	129	130	131	132	133
Seismic										
VRF(N Wall) (lbs)	5689	3869	4534	4409	3644	3644	4417	4393	3621	4872
VRF(S Wall) (lbs)	5689	3869	4534	4409	3644	3644	4417	4393	3621	4872
VUL(N Wall) (lbs)	892	697	645	629	626	626	624	638	640	758
VUL(S Wall) (lbs)	1201	926	866	853	850	851	847	866	869	1023
VUL(FS Wall) (lbs)	309	228	222	225	224	224	223	228	229	265
VEL(S Wall) (lbs)	293	224	218	221	220	220	219	224	225	259
VEL(FS Wall) (lbs)	147	112	109	110	110	110	110	112	113	129
VRF(W Wall) (lbs)	6552	3869	4534	4409	3644	3644	4417	4393	3621	4156
VRF(E Wall) (lbs)	4826	3869	4534	4409	3644	3644	4417	4393	3621	5588
VUL(E or W) (lbs)	1201	926	866	853	850	851	847	866	869	1023
VEL(E or W) (lbs)	293	224	218	221	220	220	219	224	225	259
N-S Wind										
1/2 VRF (lbs)	1306	1355	1449	1433	1459	1457	1457	1378	1373	1303
1/2 VUL (lbs)	1815	1863	1958	1941	1967	1966	1965	1886	1881	1811
1/2 VEL (lbs)	1706	1706	1706	1706	1706	1706	1706	1706	1706	1706
E-W Wind										
VRF(N Wall) (lbs)	1500	0	2101	2180	0	0	2108	2035	0	1500
VRF(S Wall) (lbs)	1500	0	2101	2180	0	0	2108	2035	0	1500
VUL(N Wall) (lbs)	2126	0	2728	2806	0	0	2735	2662	0	2126
VUL(S Wall) (lbs)	3210	0	4295	3977	0	0	4299	3948	0	4110
VUL(FS Wall) (lbs)	1084	0	1142	1171	0	0	1258	1287	0	1345
VEL(S Wall) (lbs)	1483	0	1483	1483	0	0	1483	1483	0	1483
VEL(FS Wall) (lbs)	742	0	742	742	0	0	742	742	0	742

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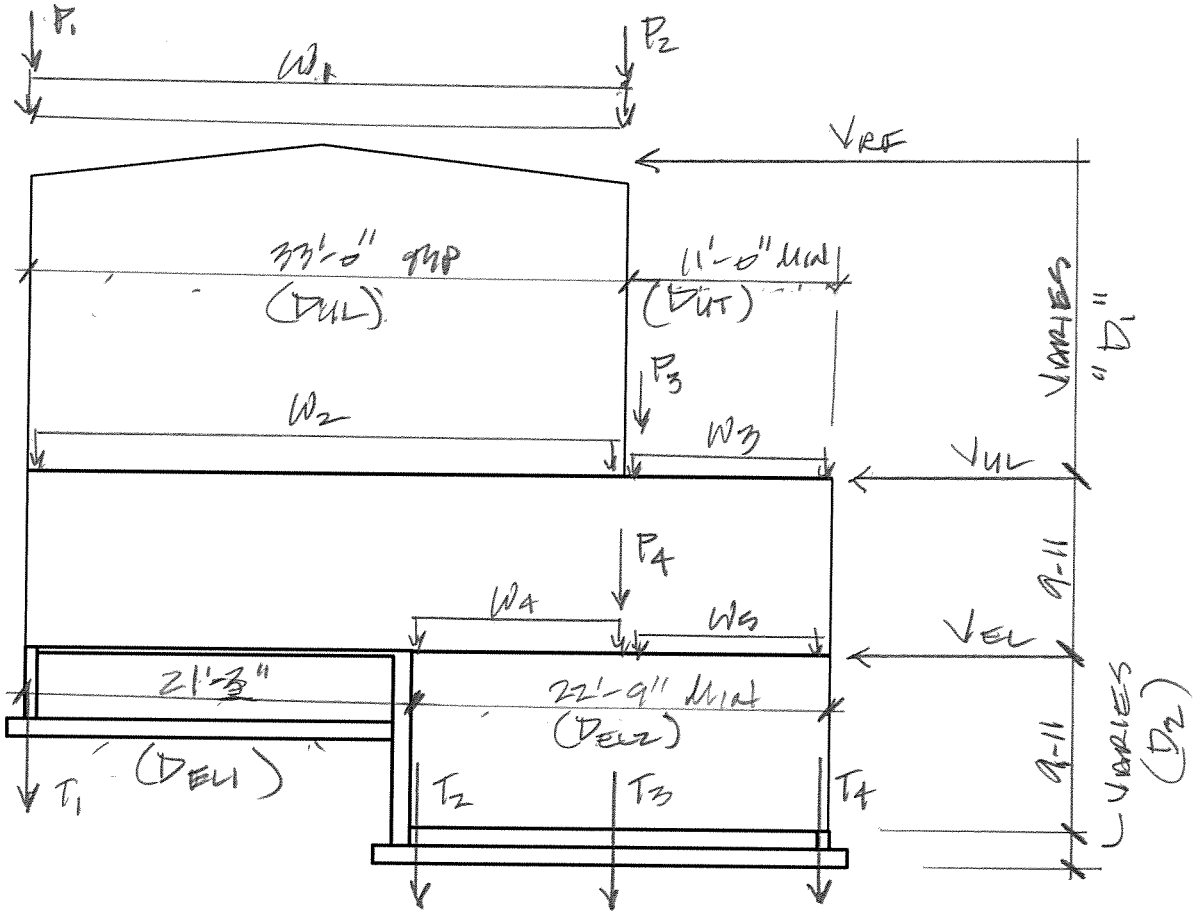
DEMISING WALLS (AND OTHER N-S WALLS)



TYPICAL ELEVATION

Demising Wall Seismic Shears and Moments									
Unit	VRF	D1	OTM RF-UL	VUL (net)	VUL (gross)	OTM UL-EL	VEL (net)	VEL (gross)	OTM EL-BL
	(lbs)	(feet)	(ft-kips)	(kips)	(kips)	(ft-kips)	(kips)	(kips)	(ft-kips)
124W	6552	14.27	93.48	1201	7753	76.91	293	8046	79.82
124E	4826	14.27	68.85	1201	6027	59.78	293	6320	62.70
125	3869	14.80	57.25	926	4794	47.56	224	5018	49.78
126	4534	16.10	73.01	866	5401	53.58	218	5619	55.74
127	4409	15.61	68.84	853	5262	52.20	221	5483	54.39
128	3644	15.91	57.99	850	4494	44.58	220	4714	46.77
129	3644	15.89	57.91	851	4494	44.58	220	4714	46.77
130	4417	15.92	70.33	847	5264	52.22	219	5483	54.39
131	4393	14.96	65.73	866	5259	52.17	224	5483	54.39
132	3621	14.91	53.99	869	4489	44.54	225	4714	46.77
133W	4156	14.08	58.51	1023	5179	51.37	259	5438	53.94
133E	5588	14.08	78.69	1023	6612	65.59	259	6870	68.15

Demising Wall Wind Shears and Moments									
Unit	VRF	D1	OTM RF-UL	VUL (net)	VUL (gross)	OTM UL-EL	VEL (net)	VEL (gross)	OTM EL-BL
	(lbs)	(feet)	(ft-kips)	(kips)	(kips)	(ft-kips)	(kips)	(kips)	(ft-kips)
124W	1306	14.27	18.64	1815	3121	30.96	1706	4828	47.89
124E	1306	14.27	18.64	1815	3121	30.96	1706	4828	47.89
125	1355	14.80	20.05	1863	3218	31.92	1706	4925	48.85
126	1449	16.10	23.33	1958	3407	33.79	1706	5113	50.72
127	1433	15.61	22.37	1941	3375	33.48	1706	5081	50.40
128	1459	15.91	23.22	1967	3426	33.99	1706	5133	50.92
129	1457	15.89	23.16	1966	3423	33.96	1706	5130	50.89
130	1457	15.92	23.20	1965	3422	33.95	1706	5129	50.88
131	1378	14.96	20.61	1886	3264	32.38	1706	4970	49.31
132	1373	14.91	20.47	1881	3254	32.28	1706	4960	49.21
133W	1303	14.08	18.35	1811	3114	30.89	1706	4821	47.82
133E	1303	14.08	18.35	1811	3114	30.89	1706	4821	47.82

Demising Wall Unit 124 West Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	17.16	feet	Wall Ht Trib =		14.27	feet		
w1DL =	526	plf	w1SL =	4444	plf			
P1 =	R(OHB-27R)		P1DL =	3010	lbs	P1SL =	22229	lbs
P2 =	R(OHB-32R)		P2DL =	2506	lbs	P2SL =	19506	lbs
UL Floor Trib =	12.00	feet	Wall Ht Trib =		9.92	feet		
w2DL =	379	plf	w2LL =	480	plf			
w3DL =	88	plf						
P3 =	R(TB-3L)		P3DL =	2358	lbs	P3SL =	21593	lbs
EL Floor Trib 4 =	2.00	feet	Wall Ht Trib =		9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	129	plf	w4LL =	80	plf			
w5DL =	79	plf	w5LL =	0	plf			
P4 =	N/A		P4DL =	0	lbs	P4LL =	0	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	6552	lbs	1306	lbs
OTM RF-UL =	93.48	ft-kips	18.64	ft-kips
VUL(GR) =	7753	lbs	3121	lbs
OTM UL-EL =	76.91	ft-kips	30.96	ft-kips
VEL(GR) =	8046	lbs	4828	lbs
OTM EL-BL =	79.82	ft-kips	47.89	ft-kips

Wall btwn Roof and UL					
vmax =	262	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	4137	lbs	No Uplift		
.6DL+OTM: T3 =	3835	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	176	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	7377	lbs	No Uplift		
.6DL+OTM: T4 =	5149	lbs	No Uplift		

Wall btwn EL and BL						
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)						
Vmax =	4170	lbs				
vmax =	183	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"			
			v_{ALLOW} = 260		plf, min.	
.6DL+OTM: T2 =	-2694	lbs	Bolt to Wall			
.6DL+OTM: T4 =	2126	lbs	No Uplift			

Demising Wall Unit 124 West Pg 2 of 2

Footing Design Values								
(Assume footing overturning at lowest level (BL) to be conservative)								
OTM RF-UL =	93.48	ft-kips	DUL =	40.08	feet	LWALL =	53.25	feet
OTM UL-EL =	76.91	ft-kips	DUT =	13.17	feet			
OTM EL-BL =	79.82	ft-kips	DEL1 =	28.33	feet			
Total OTM =	250.20	ft-kips	DEL2 =	24.92	feet			
PDL =	47881	lbs	wDL =	899	plf	MDL =	198.04	ft-kips
PSL =	241461	lbs	wSL =	4534	plf	MSL =	1211.87	ft-kips
PLL =	20178	lbs	wLL =	379	plf	MSL =	119.56	ft-kips

Demising Wall Unit 124 East Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	12.00	feet		Wall Ht Trib =	14.27	feet		
w1DL =	402	plf	w1SL =	3108	plf			
P1 =	R(EOHB-13R)		P1DL =	1557	lbs	P1SL =	14641	lbs
P2 =	R(EOHB-15R)		P2DL =	650	lbs	P2SL =	5231	lbs
UL Floor Trib =	12.00	feet		Wall Ht Trib =	9.92	feet		
w2DL =	379	plf	w2LL =	480	plf			
w3DL =	88	plf						
P3 =	N/A		P3DL =	0	lbs	P3SL =	0	lbs
EL Floor Trib 4 =	0.00	feet		Wall Ht Trib =	9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	79	plf	w4LL =	0	plf			
w5DL =	79	plf	w5LL =	0	plf			
P4 =	N/A		P4DL =	0	lbs	P4LL =	0	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	4826	lbs	1306	lbs
OTM RF-UL =	68.85	ft-kips	18.64	ft-kips
VUL(GR) =	6027	lbs	3121	lbs
OTM UL-EL =	59.78	ft-kips	30.96	ft-kips
VEL(GR) =	6320	lbs	4828	lbs
OTM EL-BL =	62.70	ft-kips	47.89	ft-kips

Wall btwn Roof and UL					
vmax =	146	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260 plf, min.		
.6DL+OTM: T1 =	2797	lbs	No Uplift		
.6DL+OTM: T3 =	2253	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	137	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260 plf, min.		
.6DL+OTM: T1 =	6430	lbs	No Uplift		
.6DL+OTM: T4 =	3961	lbs	No Uplift		

Wall btwn EL and BL						
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)						
Vmax =	3307	lbs				
vmax =	145	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"			
			v_{ALLOW} = 260 plf, min.			
.6DL+OTM: T2 =	-2263	lbs	Bolt to Wall			
.6DL+OTM: T4 =	1698	lbs	No Uplift			

Demising Wall Unit 124 East Pg 2 of 2

Footing at EL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	68.85	x 0.644 =	44.34	ft-kips				
OTM UL-EL =	59.78	x 0.483 =	28.87	ft-kips				
		Total OTM =	73.21	ft-kips				
PDL =	20837	lbs	wDL =	845	plf	MDL =	19.21	ft-kips
PSL =	91315	lbs	wSL =	3701	plf	MSL =	180.60	ft-kips
PLL =	11842	lbs	wLL =	480	plf	MLL =	64.52	ft-kips

Footing at BL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	68.85	x 0.356 =	24.52	ft-kips				
OTM UL-EL =	59.78	x 0.517 =	30.91	ft-kips				
OTM EL-BL =	62.70	x 1.000 =	62.70	ft-kips				
		Total OTM =	118.12	ft-kips				
PDL =	12603	lbs	wDL =	554	plf	MDL =	44.60	ft-kips
PSL =	41750	lbs	wSL =	1835	plf	MSL =	198.89	ft-kips
PLL =	5640	lbs	wLL =	248	plf	MLL =	31.02	ft-kips

Demising Wall Unit 125 West	Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	10.00	feet	Wall Ht Trib =		14.8	feet		
w1DL =	358	plf	w1SL =	2590	plf			
P1 =	R(EOHB-12R)		P1DL =	963	lbs	P1SL =	8167	lbs
P2 =	R(EOHB-4R)		P2DL =	1048	lbs	P2SL =	9538	lbs
UL Floor Trib =	9.42	feet	Wall Ht Trib =		9.92	feet		
w2DL =	315	plf	w2LL =	376.6664	plf			
w3DL =	88	plf						
P3 =	R(TB-1L)		P3DL =	1545	lbs	P3SL =	15952	lbs
EL Floor Trib 4 =	2.00	feet	Wall Ht Trib =		9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	129	plf	w4LL =	80	plf			
w5DL =	79	plf	w5LL =	0	plf			
P4 =	R(FB4-4L)		P4DL =	3261	lbs	P4LL =	4581	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	3869	lbs	1355	lbs
OTM RF-UL =	57.25	ft-kips	20.05	ft-kips
VUL(GR) =	4794	lbs	3218	lbs
OTM UL-EL =	47.56	ft-kips	31.92	ft-kips
VEL(GR) =	5018	lbs	4925	lbs
OTM EL-BL =	49.78	ft-kips	48.85	ft-kips

Wall btwn Roof and UL					
vmax =	117	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	2364	lbs	No Uplift		
.6DL+OTM: T3 =	2415	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	109	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	5426	lbs	No Uplift		
.6DL+OTM: T4 =	3978	lbs	No Uplift		

Wall btwn EL and BL						
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)						
Vmax =	2621	lbs				
vmax =	115	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"			
			v_{ALLOW} = 260		plf, min.	
.6DL+OTM: T2 =	-1359	lbs	Bolt to Wall			
.6DL+OTM: T4 =	2290	lbs	No Uplift			

Demising Wall Unit 125 West Pg 2 of 2

Footing at EL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	57.25	x 0.644 =	36.86	ft-kips				
OTM UL-EL =	47.56	x 0.483 =	22.97	ft-kips				
		Total OTM =	59.83	ft-kips				
PDL =	17570	lbs	wDL =	712	plf	MDL =	11.88	ft-kips
PSL =	72062	lbs	wSL =	2921	plf	MSL =	100.74	ft-kips
PLL =	9292	lbs	wLL =	377	plf	MLL =	117.65	ft-kips

Footing at BL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	57.25	x 0.356 =	20.38	ft-kips				
OTM UL-EL =	47.56	x 0.517 =	24.59	ft-kips				
OTM EL-BL =	49.78	x 1.000 =	49.78	ft-kips				
		Total OTM =	94.76	ft-kips				
PDL =	17121	lbs	wDL =	753	plf	MDL =	38.87	ft-kips
PSL =	55922.5	lbs	wSL =	2458	plf	MSL =	157.82	ft-kips
PLL =	9946.8302	lbs	wLL =	437	plf	MLL =	27.79	ft-kips

Demising Wall Unit 125 East Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	10.00	feet	Wall Ht Trib =		14.8	feet		
w1DL =	358	plf	w1SL =	2590	plf			
P1 =	R(EOHB-11R)		P1DL =	1567	lbs	P1SL =	14753	lbs
P2 =	R(EOHB-3R)		P2DL =	581	lbs	P2SL =	4488	lbs
UL Floor Trib =	9.42	feet	Wall Ht Trib =		9.92	feet		
w2DL =	315	plf	w2LL =	376.6664	plf			
w3DL =	88	plf						
P3 =	N/A		P3DL =	0	lbs	P3SL =	0	lbs
EL Floor Trib 4 =	7.50	feet	Wall Ht Trib =		9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	267	plf	w4LL =	300	plf			
w5DL =	79	plf	w5LL =	0	plf			
P4 =	R(FB-4R)		P4DL =	2044	lbs	P4LL =	2879	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	3869	lbs	1355	lbs
OTM RF-UL =	57.25	ft-kips	20.05	ft-kips
VUL(GR) =	4794	lbs	3218	lbs
OTM UL-EL =	47.56	ft-kips	31.92	ft-kips
VEL(GR) =	5018	lbs	4925	lbs
OTM EL-BL =	49.78	ft-kips	48.85	ft-kips

Wall btwn Roof and UL					
vmax =	117	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260 plf, min.		
.6DL+OTM: T1 =	2727	lbs	No Uplift		
.6DL+OTM: T3 =	2135	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	109	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260 plf, min.		
.6DL+OTM: T1 =	5789	lbs	No Uplift		
.6DL+OTM: T4 =	3698	lbs	No Uplift		

Wall btwn EL and BL						
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)						
Vmax =	2621	lbs				
vmax =	115	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"			
			v_{ALLOW} = 260 plf, min.			
.6DL+OTM: T2 =	-451	lbs	Bolt to Wall			
.6DL+OTM: T4 =	2009	lbs	No Uplift			

Demising Wall Unit 125 East Pg 2 of 2

Footing at EL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	57.25	x 0.644 =	36.86	ft-kips				
OTM UL-EL =	47.56	x 0.483 =	22.97	ft-kips				
		Total OTM =	59.83	ft-kips				
PDL =	18174	lbs	wDL =	737	plf	MDL =	19.33	ft-kips
PSL =	78648	lbs	wSL =	3188	plf	MSL =	181.98	ft-kips
PLL =	9292	lbs	wLL =	377	plf	MLL =	55.36	ft-kips

Footing at BL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	57.25	x 0.356 =	20.38	ft-kips				
OTM UL-EL =	47.56	x 0.517 =	24.59	ft-kips				
OTM EL-BL =	49.78	x 1.000 =	49.78	ft-kips				
		Total OTM =	94.76	ft-kips				
PDL =	15508	lbs	wDL =	682	plf	MDL =	48.97	ft-kips
PSL =	34920.5	lbs	wSL =	1535	plf	MSL =	165.70	ft-kips
PLL =	10829.8302	lbs	wLL =	476	plf	MLL =	42.65	ft-kips

Demising Wall Unit 126 West Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	10.00	feet	Wall Ht Trib =		16.1	feet		
w1DL =	369	plf	w1SL =	2590	plf			
P1 =	R(EOHB-10R)		P1DL =	1563	lbs	P1SL =	14661	lbs
P2 =	R(EOHB-3R)		P2DL =	580	lbs	P2SL =	4488	lbs
UL Floor Trib =	9.42	feet	Wall Ht Trib =		9.92	feet		
w2DL =	315	plf	w2LL =	376.6664	plf			
w3DL =	88	plf						
P3 =	N/A		P3DL =	0	lbs	P3SL =	0	lbs
EL Floor Trib 4 =	7.50	feet	Wall Ht Trib =		9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	267	plf	w4LL =	300	plf			
w5DL =	79	plf	w5LL =	0	plf			
P4 =	R(FB-4R)		P4DL =	2044	lbs	P4LL =	2879	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	4534	lbs	1449	lbs
OTM RF-UL =	73.01	ft-kips	23.33	ft-kips
VUL(GR) =	5401	lbs	3407	lbs
OTM UL-EL =	53.58	ft-kips	33.79	ft-kips
VEL(GR) =	5619	lbs	5113	lbs
OTM EL-BL =	55.74	ft-kips	50.72	ft-kips

Wall btwn Roof and UL					
vmax =	137	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260 plf, min.		
.6DL+OTM: T1 =	2342	lbs	No Uplift		
.6DL+OTM: T3 =	1753	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	123	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260 plf, min.		
.6DL+OTM: T1 =	5266	lbs	No Uplift		
.6DL+OTM: T4 =	3177	lbs	No Uplift		

Wall btwn EL and BL						
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)						
Vmax =	2918	lbs				
vmax =	128	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"			
			v_{ALLOW} = 260 plf, min.			
.6DL+OTM: T2 =	-716	lbs	Bolt to Wall			
.6DL+OTM: T4 =	1224	lbs	No Uplift			

Demising Wall Unit 126 West Pg 2 of 2

Footing at EL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	73.01	x 0.644 =	47.02	ft-kips				
OTM UL-EL =	53.58	x 0.483 =	25.87	ft-kips				
		Total OTM =	72.89	ft-kips				
PDL =	18427	lbs	wDL =	747	plf	MDL =	19.28	ft-kips
PSL =	78556	lbs	wSL =	3184	plf	MSL =	180.84	ft-kips
PLL =	9292	lbs	wLL =	377	plf	MLL =	55.36	ft-kips

Footing at BL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	73.01	x 0.356 =	26.00	ft-kips				
OTM UL-EL =	53.58	x 0.517 =	27.70	ft-kips				
OTM EL-BL =	55.74	x 1.000 =	55.74	ft-kips				
		Total OTM =	109.44	ft-kips				
PDL =	15629	lbs	wDL =	687	plf	MDL =	49.64	ft-kips
PSL =	34920.5	lbs	wSL =	1535	plf	MSL =	165.70	ft-kips
PLL =	10829.8302	lbs	wLL =	476	plf	MLL =	42.65	ft-kips

Demising Wall Unit 126 East Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	10.00	feet	Wall Ht Trib =		16.1	feet		
w1DL =	369	plf	w1SL =	2590	plf			
P1 =	R(EOHB-9R)		P1DL =	2153	lbs	P1SL =	21079	lbs
P2 =	R(EOHB-6R)		P2DL =	2001	lbs	P2SL =	19821	lbs
UL Floor Trib =	9.42	feet	Wall Ht Trib =		9.92	feet		
w2DL =	315	plf	w2LL =	376.6664	plf			
w3DL =	88	plf						
P3 =	R(TB-1L)		P3DL =	1545	lbs	P3SL =	15952	lbs
EL Floor Trib 4 =	2.00	feet	Wall Ht Trib =		9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	1290	plf	w4LL =	80	plf			
w5DL =	1240	plf	w5LL =	0	plf			
P4 =	R(FB-4L)		P4DL =	3261	lbs	P4LL =	4581	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	4534	lbs	1449	lbs
OTM RF-UL =	73.01	ft-kips	23.33	ft-kips
VUL(GR) =	5401	lbs	3407	lbs
OTM UL-EL =	53.58	ft-kips	33.79	ft-kips
VEL(GR) =	5619	lbs	5113	lbs
OTM EL-BL =	55.74	ft-kips	50.72	ft-kips

Wall btwn Roof and UL					
vmax =	137	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260 plf, min.		
.6DL+OTM: T1 =	2696	lbs	No Uplift		
.6DL+OTM: T3 =	2605	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	123	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260 plf, min.		
.6DL+OTM: T1 =	5620	lbs	No Uplift		
.6DL+OTM: T4 =	4030	lbs	No Uplift		

Wall btwn EL and BL						
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)						
Vmax =	2918	lbs				
vmax =	128	plf	10" Concrete Wall (OK by Inspection)			
.6DL+OTM: T2 =	6037	lbs	No Uplift			
.6DL+OTM: T4 =	9736	lbs	No Uplift			

Demising Wall Unit 126 East Pg 2 of 2

Footing Design Values								
(Assume footing overturning at lowest level (BL) to be conservative)								
OTM RF-UL =	73.01	ft-kips	DUL =	33	feet	LWALL =	44	feet
OTM UL-EL =	53.58	ft-kips	DUT =	11	feet			
OTM EL-BL =	55.74	ft-kips	DEL1 =	21.25	feet			
Total OTM =	182.33	ft-kips	DEL2 =	22.75	feet			
PDL =	61280	lbs	wDL =	1151	plf	MDL =	-222.10	ft-kips
PSL =	142322	lbs	wSL =	2673	plf	MSL =	540.32	ft-kips
PLL =	17951	lbs	wLL =	337	plf	MLL =	13.16	ft-kips

Demising Wall Unit 127 West Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	10.00	feet		Wall Ht Trib =	15.61	feet		
w1DL =	365	plf	w1SL =	2590	plf			
P1 =	R(EOHB-5R)		P1DL =	2123	lbs	P1SL =	20777	lbs
P2 =	R(EOHB-6R)		P2DL =	2001	lbs	P2SL =	19821	lbs
UL Floor Trib =	9.42	feet		Wall Ht Trib =	9.92	feet		
w2DL =	315	plf	w2LL =	376.6664	plf			
w3DL =	88	plf						
P3 =	R(TB-1L)		P3DL =	1545	lbs	P3SL =	15952	lbs
EL Floor Trib 4 =	2.00	feet		Wall Ht Trib =	9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	1290	plf	w4LL =	80	plf			
w5DL =	1240	plf	w5LL =	0	plf			
P4 =	R(FB-4L)		P4DL =	3261	lbs	P4LL =	4581	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	4409	lbs	1433	lbs
OTM RF-UL =	68.84	ft-kips	22.37	ft-kips
VUL(GR) =	5262	lbs	3375	lbs
OTM UL-EL =	52.20	ft-kips	33.48	ft-kips
VEL(GR) =	5483	lbs	5081	lbs
OTM EL-BL =	54.39	ft-kips	50.40	ft-kips

Wall btwn Roof and UL					
vmax =	134	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260 plf, min.		
.6DL+OTM: T1 =	2768	lbs	No Uplift		
.6DL+OTM: T3 =	2695	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	120	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260 plf, min.		
.6DL+OTM: T1 =	5723	lbs	No Uplift		
.6DL+OTM: T4 =	4151	lbs	No Uplift		

Wall btwn EL and BL						
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)						
Vmax =	2852	lbs				
vmax =	125	plf	10" Concrete Wall (OK by Inspection)			
.6DL+OTM: T2 =	6097	lbs	No Uplift			
.6DL+OTM: T4 =	9917	lbs	No Uplift			

Demising Wall Unit 127 West Pg 2 of 2

Footing Design Values								
(Assume footing overturning at lowest level (BL) to be conservative)								
OTM RF-UL =	68.84	ft-kips	DUL =	33	feet	LWALL =	44	feet
OTM UL-EL =	52.20	ft-kips	DUT =	11	feet			
OTM EL-BL =	54.39	ft-kips	DEL1 =	21.25	feet			
Total OTM =	175.44	ft-kips	DEL2 =	22.75	feet			
PDL =	61121	lbs	wDL =	1148	plf	MDL =	-223.47	ft-kips
PSL =	142020	lbs	wSL =	2667	plf	MSL =	533.68	ft-kips
PLL =	17951	lbs	wLL =	337	plf	MLL =	13.16	ft-kips

Demising Wall Unit 127 East	Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	10.00	feet	Wall Ht Trib =		15.61	feet		
w1DL =	365	plf	w1SL =	2590	plf			
P1 =	R(EOHB-1R)		P1DL =	1571	lbs	P1SL =	14826	lbs
P2 =	R(EOHB-3R)		P2DL =	581	lbs	P2SL =	4488	lbs
UL Floor Trib =	9.42	feet	Wall Ht Trib =		9.92	feet		
w2DL =	315	plf	w2LL =	376.6664	plf			
w3DL =	88	plf						
P3 =	N/A		P3DL =	0	lbs	P3SL =	0	lbs
EL Floor Trib 4 =	7.50	feet	Wall Ht Trib =		9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	267	plf	w4LL =	300	plf			
w5DL =	79	plf	w5LL =	0	plf			
P4 =	R(FB4-4R)		P4DL =	2044	lbs	P4LL =	2879	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	4409	lbs	1433	lbs
OTM RF-UL =	68.84	ft-kips	22.37	ft-kips
VUL(GR) =	5262	lbs	3375	lbs
OTM UL-EL =	52.20	ft-kips	33.48	ft-kips
VEL(GR) =	5483	lbs	5081	lbs
OTM EL-BL =	54.39	ft-kips	50.40	ft-kips

Wall btwn Roof and UL					
vmax =	134	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	2437	lbs	No Uplift		
.6DL+OTM: T3 =	1843	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	120	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	5392	lbs	No Uplift		
.6DL+OTM: T4 =	3299	lbs	No Uplift		

Wall btwn EL and BL						
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)						
Vmax =	2852	lbs				
vmax =	125	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"			
			v_{ALLOW} = 260		plf, min.	
.6DL+OTM: T2 =	-656	lbs	Bolt to Wall			
.6DL+OTM: T4 =	1405	lbs	No Uplift			

Demising Wall Unit 127 East Pg 2 of 2

Footing at EL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	68.84	x 0.644 =	44.33	ft-kips				
OTM UL-EL =	52.20	x 0.483 =	25.21	ft-kips				
		Total OTM =	69.54	ft-kips				
PDL =	18338	lbs	wDL =	743	plf	MDL =	19.38	ft-kips
PSL =	78721	lbs	wSL =	3191	plf	MSL =	182.88	ft-kips
PLL =	9292	lbs	wLL =	377	plf	MLL =	55.36	ft-kips

Footing at BL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	68.84	x 0.356 =	24.51	ft-kips				
OTM UL-EL =	52.20	x 0.517 =	26.99	ft-kips				
OTM EL-BL =	54.39	x 1.000 =	54.39	ft-kips				
		Total OTM =	105.90	ft-kips				
PDL =	15584	lbs	wDL =	685	plf	MDL =	49.39	ft-kips
PSL =	34920.5	lbs	wSL =	1535	plf	MSL =	165.70	ft-kips
PLL =	10829.8302	lbs	wLL =	476	plf	MLL =	42.65	ft-kips

Demising Wall Unit 128 West	Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	10.00	feet	Wall Ht Trib =		15.91	feet		
w1DL =	367	plf	w1SL =	2590	plf			
P1 =	R(EOHB-1R)		P1DL =	1571	lbs	P1SL =	14826	lbs
P2 =	R(EOHB-3R)		P2DL =	581	lbs	P2SL =	4488	lbs
UL Floor Trib =	9.42	feet	Wall Ht Trib =		9.92	feet		
w2DL =	315	plf	w2LL =	376.6664	plf			
w3DL =	88	plf						
P3 =	N/A		P3DL =	0	lbs	P3SL =	0	lbs
EL Floor Trib 4 =	7.50	feet	Wall Ht Trib =		9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	267	plf	w4LL =	300	plf			
w5DL =	79	plf	w5LL =	0	plf			
P4 =	R(FB4-4R)		P4DL =	2044	lbs	P4LL =	2879	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	3644	lbs	1459	lbs
OTM RF-UL =	57.99	ft-kips	23.22	ft-kips
VUL(GR) =	4494	lbs	3426	lbs
OTM UL-EL =	44.58	ft-kips	33.99	ft-kips
VEL(GR) =	4714	lbs	5133	lbs
OTM EL-BL =	46.77	ft-kips	50.92	ft-kips

Wall btwn Roof and UL					
vmax =	110	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	2794	lbs	No Uplift		
.6DL+OTM: T3 =	2200	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	102	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	5925	lbs	No Uplift		
.6DL+OTM: T4 =	3832	lbs	No Uplift		

Wall btwn EL and BL						
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)						
Vmax =	2467	lbs				
vmax =	108	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"			
			v_{ALLOW} = 260	plf, min.		
.6DL+OTM: T2 =	-317	lbs	Bolt to Wall			
.6DL+OTM: T4 =	2277	lbs	No Uplift			

Demising Wall Unit 128 West Pg 2 of 2

Footing at EL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	57.99	x 0.644 =	37.34	ft-kips				
OTM UL-EL =	44.58	x 0.483 =	21.53	ft-kips				
		Total OTM =	58.87	ft-kips				
PDL =	18397	lbs	wDL =	746	plf	MDL =	19.38	ft-kips
PSL =	78721	lbs	wSL =	3191	plf	MSL =	182.88	ft-kips
PLL =	9292	lbs	wLL =	377	plf	MLL =	55.36	ft-kips

Footing at BL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	57.99	x 0.356 =	20.65	ft-kips				
OTM UL-EL =	44.58	x 0.517 =	23.05	ft-kips				
OTM EL-BL =	46.77	x 1.000 =	46.77	ft-kips				
		Total OTM =	90.47	ft-kips				
PDL =	15612	lbs	wDL =	686	plf	MDL =	49.54	ft-kips
PSL =	34920.5	lbs	wSL =	1535	plf	MSL =	165.70	ft-kips
PLL =	10829.8302	lbs	wLL =	476	plf	MLL =	42.65	ft-kips

Demising Wall Unit 128 East Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	10.00	feet	Wall Ht Trib =		15.91	feet		
w1DL =	367	plf	w1SL =	2590	plf			
P1 =	R(EOHB-2R)		P1DL =	947	lbs	P1SL =	8084	lbs
P2 =	R(EOHB-4R)		P2DL =	1048	lbs	P2SL =	9538	lbs
UL Floor Trib =	9.42	feet	Wall Ht Trib =		9.92	feet		
w2DL =	315	plf	w2LL =	376.6664	plf			
w3DL =	88	plf						
P3 =	R(TB-1L)		P3DL =	1545	lbs	P3SL =	15952	lbs
EL Floor Trib 4 =	2.00	feet	Wall Ht Trib =		9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	129	plf	w4LL =	80	plf			
w5DL =	79	plf	w5LL =	0	plf			
P4 =	R(FB-4L)		P4DL =	3261	lbs	P4LL =	4581	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	3644	lbs	1459	lbs
OTM RF-UL =	57.99	ft-kips	23.22	ft-kips
VUL(GR) =	4494	lbs	3426	lbs
OTM UL-EL =	44.58	ft-kips	33.99	ft-kips
VEL(GR) =	4714	lbs	5133	lbs
OTM EL-BL =	46.77	ft-kips	50.92	ft-kips

Wall btwn Roof and UL					
vmax =	110	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	2420	lbs	No Uplift		
.6DL+OTM: T3 =	2481	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	102	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	5550	lbs	No Uplift		
.6DL+OTM: T4 =	4112	lbs	No Uplift		

Wall btwn EL and BL						
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)						
Vmax =	2467	lbs				
vmax =	108	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"			
			v_{ALLOW} = 260		plf, min.	
.6DL+OTM: T2 =	-1225	lbs	Bolt to Wall			
.6DL+OTM: T4 =	2557	lbs	No Uplift			

Demising Wall Unit 128 East Pg 2 of 2

Footing at EL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	57.99	x 0.644 =	37.34	ft-kips				
OTM UL-EL =	44.58	x 0.483 =	21.53	ft-kips				
		Total OTM =	58.87	ft-kips				
PDL =	17773	lbs	wDL =	720	plf	MDL =	11.68	ft-kips
PSL =	71979	lbs	wSL =	2918	plf	MSL =	99.72	ft-kips
PLL =	9292	lbs	wLL =	377	plf	MLL =	117.65	ft-kips

Footing at BL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	57.99	x 0.356 =	20.65	ft-kips				
OTM UL-EL =	44.58	x 0.517 =	23.05	ft-kips				
OTM EL-BL =	46.77	x 1.000 =	46.77	ft-kips				
		Total OTM =	90.47	ft-kips				
PDL =	17226	lbs	wDL =	757	plf	MDL =	39.45	ft-kips
PSL =	55922.5	lbs	wSL =	2458	plf	MSL =	157.82	ft-kips
PLL =	9946.8302	lbs	wLL =	437	plf	MLL =	27.79	ft-kips

Demising Wall Unit 129 West	Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	10.00	feet	Wall Ht Trib =		15.89	feet		
w1DL =	367	plf	w1SL =	2590	plf			
P1 =	R(EOHB-2R)		P1DL =	947	lbs	P1SL =	8084	lbs
P2 =	R(EOHB-4R)		P2DL =	1048	lbs	P2SL =	9538	lbs
UL Floor Trib =	9.42	feet	Wall Ht Trib =		9.92	feet		
w2DL =	315	plf	w2LL =	376.6664	plf			
w3DL =	88	plf						
P3 =	R(TB-1L)		P3DL =	1545	lbs	P3SL =	15952	lbs
EL Floor Trib 4 =	2.00	feet	Wall Ht Trib =		9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	129	plf	w4LL =	80	plf			
w5DL =	79	plf	w5LL =	0	plf			
P4 =	R(FB-4L)		P4DL =	3261	lbs	P4LL =	4581	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	3644	lbs	1457	lbs
OTM RF-UL =	57.91	ft-kips	23.16	ft-kips
VUL(GR) =	4494	lbs	3423	lbs
OTM UL-EL =	44.58	ft-kips	33.96	ft-kips
VEL(GR) =	4714	lbs	5130	lbs
OTM EL-BL =	46.77	ft-kips	50.89	ft-kips

Wall btwn Roof and UL					
vmax =	110	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	2421	lbs	No Uplift		
.6DL+OTM: T3 =	2481	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	102	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	5551	lbs	No Uplift		
.6DL+OTM: T4 =	4113	lbs	No Uplift		

Wall btwn EL and BL						
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)						
Vmax =	2467	lbs				
vmax =	108	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"			
			v_{ALLOW} = 260		plf, min.	
.6DL+OTM: T2 =	-1225	lbs	Bolt to Wall			
.6DL+OTM: T4 =	2558	lbs	No Uplift			

Demising Wall Unit 129 West	Pg 2 of 2

Footing at EL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	57.91	x 0.644 =	37.29	ft-kips				
OTM UL-EL =	44.58	x 0.483 =	21.53	ft-kips				
		Total OTM =	58.82	ft-kips				
PDL =	17769	lbs	wDL =	720	plf	MDL =	11.68	ft-kips
PSL =	71979	lbs	wSL =	2918	plf	MSL =	99.72	ft-kips
PLL =	9292	lbs	wLL =	377	plf	MLL =	117.65	ft-kips

Footing at BL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	57.91	x 0.356 =	20.62	ft-kips				
OTM UL-EL =	44.58	x 0.517 =	23.05	ft-kips				
OTM EL-BL =	46.77	x 1.000 =	46.77	ft-kips				
		Total OTM =	90.44	ft-kips				
PDL =	17224	lbs	wDL =	757	plf	MDL =	39.44	ft-kips
PSL =	55922.5	lbs	wSL =	2458	plf	MSL =	157.82	ft-kips
PLL =	9946.8302	lbs	wLL =	437	plf	MLL =	27.79	ft-kips

Demising Wall Unit 129 East Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	10.00	feet	Wall Ht Trib =		15.91	feet		
w1DL =	367	plf	w1SL =	2590	plf			
P1 =	R(EOHB-1R)		P1DL =	1571	lbs	P1SL =	14826	lbs
P2 =	R(EOHB-3R)		P2DL =	581	lbs	P2SL =	4488	lbs
UL Floor Trib =	9.42	feet	Wall Ht Trib =		9.92	feet		
w2DL =	315	plf	w2LL =	376.6664	plf			
w3DL =	88	plf						
P3 =	N/A		P3DL =	0	lbs	P3SL =	0	lbs
EL Floor Trib 4 =	7.50	feet	Wall Ht Trib =		9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	267	plf	w4LL =	300	plf			
w5DL =	79	plf	w5LL =	0	plf			
P4 =	R(FB4-4R)		P4DL =	2044	lbs	P4LL =	2879	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	3644	lbs	1457	lbs
OTM RF-UL =	57.91	ft-kips	23.16	ft-kips
VUL(GR) =	4494	lbs	3423	lbs
OTM UL-EL =	44.58	ft-kips	33.96	ft-kips
VEL(GR) =	4714	lbs	5130	lbs
OTM EL-BL =	46.77	ft-kips	50.89	ft-kips

Wall btwn Roof and UL					
vmax =	110	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	2797	lbs	No Uplift		
.6DL+OTM: T3 =	2203	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	102	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	5927	lbs	No Uplift		
.6DL+OTM: T4 =	3834	lbs	No Uplift		

Wall btwn EL and BL						
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)						
Vmax =	2467	lbs				
vmax =	108	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"			
			v_{ALLOW} = 260		plf, min.	
.6DL+OTM: T2 =	-317	lbs	Bolt to Wall			
.6DL+OTM: T4 =	2279	lbs	No Uplift			

Demising Wall Unit 129 East	Pg 2 of 2

Footing at EL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	57.91	x 0.644 =	37.29	ft-kips				
OTM UL-EL =	44.58	x 0.483 =	21.53	ft-kips				
		Total OTM =	58.82	ft-kips				
PDL =	18397	lbs	wDL =	746	plf	MDL =	19.38	ft-kips
PSL =	78721	lbs	wSL =	3191	plf	MSL =	182.88	ft-kips
PLL =	9292	lbs	wLL =	377	plf	MLL =	55.36	ft-kips

Footing at BL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	57.91	x 0.356 =	20.62	ft-kips				
OTM UL-EL =	44.58	x 0.517 =	23.05	ft-kips				
OTM EL-BL =	46.77	x 1.000 =	46.77	ft-kips				
		Total OTM =	90.44	ft-kips				
PDL =	15612	lbs	wDL =	686	plf	MDL =	49.54	ft-kips
PSL =	34920.5	lbs	wSL =	1535	plf	MSL =	165.70	ft-kips
PLL =	10829.8302	lbs	wLL =	476	plf	MLL =	42.65	ft-kips

Demising Wall Unit 130 West Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	10.00	feet	Wall Ht Trib =		15.92	feet		
w1DL =	367	plf	w1SL =	2590	plf			
P1 =	R(EOHB-1R)		P1DL =	1571	lbs	P1SL =	14826	lbs
P2 =	R(EOHB-3R)		P2DL =	581	lbs	P2SL =	4488	lbs
UL Floor Trib =	9.42	feet	Wall Ht Trib =		9.92	feet		
w2DL =	315	plf	w2LL =	376.6664	plf			
w3DL =	88	plf						
P3 =	N/A		P3DL =	0	lbs	P3SL =	0	lbs
EL Floor Trib 4 =	7.50	feet	Wall Ht Trib =		9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	267	plf	w4LL =	300	plf			
w5DL =	79	plf	w5LL =	0	plf			
P4 =	R(FB4-4R)		P4DL =	2044	lbs	P4LL =	2879	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	4417	lbs	1457	lbs
OTM RF-UL =	70.33	ft-kips	23.20	ft-kips
VUL(GR) =	5264	lbs	3422	lbs
OTM UL-EL =	52.22	ft-kips	33.95	ft-kips
VEL(GR) =	5483	lbs	5129	lbs
OTM EL-BL =	54.39	ft-kips	50.88	ft-kips

Wall btwn Roof and UL					
vmax =	134	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	2415	lbs	No Uplift		
.6DL+OTM: T3 =	1821	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	120	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	5370	lbs	No Uplift		
.6DL+OTM: T4 =	3277	lbs	No Uplift		

Wall btwn EL and BL						
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)						
Vmax =	2851	lbs				
vmax =	125	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"			
			v_{ALLOW} = 260		plf, min.	
.6DL+OTM: T2 =	-656	lbs	Bolt to Wall			
.6DL+OTM: T4 =	1384	lbs	No Uplift			

Demising Wall Unit 130 West Pg 2 of 2

Footing at EL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	70.33	x 0.644 =	45.29	ft-kips				
OTM UL-EL =	52.22	x 0.483 =	25.22	ft-kips				
		Total OTM =	70.51	ft-kips				
PDL =	18399	lbs	wDL =	746	plf	MDL =	19.38	ft-kips
PSL =	78721	lbs	wSL =	3191	plf	MSL =	182.88	ft-kips
PLL =	9292	lbs	wLL =	377	plf	MLL =	55.36	ft-kips

Footing at BL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	70.33	x 0.356 =	25.04	ft-kips				
OTM UL-EL =	52.22	x 0.517 =	27.00	ft-kips				
OTM EL-BL =	54.39	x 1.000 =	54.39	ft-kips				
		Total OTM =	106.43	ft-kips				
PDL =	15613	lbs	wDL =	686	plf	MDL =	49.55	ft-kips
PSL =	34920.5	lbs	wSL =	1535	plf	MSL =	165.70	ft-kips
PLL =	10829.8302	lbs	wLL =	476	plf	MLL =	42.65	ft-kips

Demising Wall Unit 130 East	Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	10.00	feet		Wall Ht Trib =	15.92	feet		
w1DL =	367	plf	w1SL =	2590	plf			
P1 =	R(EOHB-5R)		P1DL =	2123	lbs	P1SL =	20777	lbs
P2 =	R(EOHB-6R)		P2DL =	2001	lbs	P2SL =	19821	lbs
UL Floor Trib =	9.42	feet		Wall Ht Trib =	9.92	feet		
w2DL =	315	plf	w2LL =	376.6664	plf			
w3DL =	88	plf						
P3 =	R(TB-1L)		P3DL =	1545	lbs	P3SL =	15952	lbs
EL Floor Trib 4 =	2.00	feet		Wall Ht Trib =	9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	1290	plf	w4LL =	80	plf			
w5DL =	1240	plf	w5LL =	0	plf			
P4 =	R(FB-4L)		P4DL =	3261	lbs	P4LL =	4581	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	4417	lbs	1457	lbs
OTM RF-UL =	70.33	ft-kips	23.20	ft-kips
VUL(GR) =	5264	lbs	3422	lbs
OTM UL-EL =	52.22	ft-kips	33.95	ft-kips
VEL(GR) =	5483	lbs	5129	lbs
OTM EL-BL =	54.39	ft-kips	50.88	ft-kips

Wall btwn Roof and UL					
vmax =	134	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260 plf, min.		
.6DL+OTM: T1 =	2747	lbs	No Uplift		
.6DL+OTM: T3 =	2673	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	120	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260 plf, min.		
.6DL+OTM: T1 =	5701	lbs	No Uplift		
.6DL+OTM: T4 =	4129	lbs	No Uplift		

Wall btwn EL and BL						
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)						
Vmax =	2851	lbs				
vmax =	125	plf	10" Concrete Wall (OK by Inspection)			
.6DL+OTM: T2 =	6097	lbs	No Uplift			
.6DL+OTM: T4 =	9896	lbs	No Uplift			

Demising Wall Unit 130 East Pg 2 of 2

Footing Design Values								
(Assume footing overturning at lowest level (BL) to be conservative)								
OTM RF-UL =	70.33	ft-kips	DUL =	33	feet	LWALL =	44	feet
OTM UL-EL =	52.22	ft-kips	DUT =	11	feet			
OTM EL-BL =	54.39	ft-kips	DEL1 =	21.25	feet			
Total OTM =	176.94	ft-kips	DEL2 =	22.75	feet			
PDL =	61202	lbs	wDL =	1149	plf	MDL =	-223.02	ft-kips
PSL =	142020	lbs	wSL =	2667	plf	MSL =	533.68	ft-kips
PLL =	17951	lbs	wLL =	337	plf	MLL =	13.16	ft-kips

Demising Wall Unit 131 West Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	10.00	feet	Wall Ht Trib =		14.96	feet		
w1DL =	360	plf	w1SL =	2590	plf			
P1 =	R(EOHB-5R)		P1DL =	2123	lbs	P1SL =	20777	lbs
P2 =	R(EOHB-6R)		P2DL =	2001	lbs	P2SL =	19821	lbs
UL Floor Trib =	9.42	feet	Wall Ht Trib =		9.92	feet		
w2DL =	315	plf	w2LL =	376.6664	plf			
w3DL =	88	plf						
P3 =	R(TB-1L)		P3DL =	1545	lbs	P3SL =	15952	lbs
EL Floor Trib 4 =	2.00	feet	Wall Ht Trib =		9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	1290	plf	w4LL =	80	plf			
w5DL =	1240	plf	w5LL =	0	plf			
P4 =	R(FB-4L)		P4DL =	3261	lbs	P4LL =	4581	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	4393	lbs	1378	lbs
OTM RF-UL =	65.73	ft-kips	20.61	ft-kips
VUL(GR) =	5259	lbs	3264	lbs
OTM UL-EL =	52.17	ft-kips	32.38	ft-kips
VEL(GR) =	5483	lbs	4970	lbs
OTM EL-BL =	54.39	ft-kips	49.31	ft-kips

Wall btwn Roof and UL					
vmax =	133	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	2812	lbs	No Uplift		
.6DL+OTM: T3 =	2739	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	120	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	5768	lbs	No Uplift		
.6DL+OTM: T4 =	4196	lbs	No Uplift		

Wall btwn EL and BL					
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)					
Vmax =	2854	lbs			
vmax =	125	plf	10" Concrete Wall (OK by Inspection)		
.6DL+OTM: T2 =	6097	lbs	No Uplift		
.6DL+OTM: T4 =	9962	lbs	No Uplift		

Demising Wall Unit 131 West Pg 2 of 2

Footing Design Values								
(Assume footing overturning at lowest level (BL) to be conservative)								
OTM RF-UL =	65.73	ft-kips	DUL =	33	feet	LWALL =	44	feet
OTM UL-EL =	52.17	ft-kips	DUT =	11	feet			
OTM EL-BL =	54.39	ft-kips	DEL1 =	21.25	feet			
Total OTM =	172.29	ft-kips	DEL2 =	22.75	feet			
PDL =	60949	lbs	wDL =	1145	plf	MDL =	-224.41	ft-kips
PSL =	142020	lbs	wSL =	2667	plf	MSL =	533.68	ft-kips
PLL =	17951	lbs	wLL =	337	plf	MLL =	13.16	ft-kips

Demising Wall Unit 131 East Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	10.00	feet	Wall Ht Trib =		14.96	feet		
w1DL =	360	plf	w1SL =	2590	plf			
P1 =	R(EOHB-1R)		P1DL =	1571	lbs	P1SL =	14826	lbs
P2 =	R(EOHB-3R)		P2DL =	581	lbs	P2SL =	4488	lbs
UL Floor Trib =	9.42	feet	Wall Ht Trib =		9.92	feet		
w2DL =	315	plf	w2LL =	376.6664	plf			
w3DL =	88	plf						
P3 =	N/A		P3DL =	0	lbs	P3SL =	0	lbs
EL Floor Trib 4 =	7.50	feet	Wall Ht Trib =		9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	267	plf	w4LL =	300	plf			
w5DL =	79	plf	w5LL =	0	plf			
P4 =	R(FB4-4R)		P4DL =	2044	lbs	P4LL =	2879	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	4393	lbs	1378	lbs
OTM RF-UL =	65.73	ft-kips	20.61	ft-kips
VUL(GR) =	5259	lbs	3264	lbs
OTM UL-EL =	52.17	ft-kips	32.38	ft-kips
VEL(GR) =	5483	lbs	4970	lbs
OTM EL-BL =	54.39	ft-kips	49.31	ft-kips

Wall btwn Roof and UL					
vmax =	133	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260 plf, min.		
.6DL+OTM: T1 =	2481	lbs	No Uplift		
.6DL+OTM: T3 =	1887	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	120	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260 plf, min.		
.6DL+OTM: T1 =	5437	lbs	No Uplift		
.6DL+OTM: T4 =	3344	lbs	No Uplift		

Wall btwn EL and BL						
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)						
Vmax =	2854	lbs				
vmax =	125	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"			
			v_{ALLOW} = 260 plf, min.			
.6DL+OTM: T2 =	-656	lbs	Bolt to Wall			
.6DL+OTM: T4 =	1450	lbs	No Uplift			

Demising Wall Unit 131 East	Pg 2 of 2

Footing at EL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	65.73	x 0.644 =	42.32	ft-kips				
OTM UL-EL =	52.17	x 0.483 =	25.20	ft-kips				
		Total OTM =	67.52	ft-kips				
PDL =	15903	lbs	wDL =	748	plf	MDL =	16.69	ft-kips
PSL =	69864	lbs	wDL =	3288	plf	MSL =	157.53	ft-kips
PLL =	8004	lbs	wDL =	377	plf	MSL =	47.69	ft-kips

Footing at BL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	65.73	x 0.356 =	23.40	ft-kips				
OTM UL-EL =	52.17	x 0.517 =	26.97	ft-kips				
OTM EL-BL =	54.39	x 1.000 =	54.39	ft-kips				
		Total OTM =	104.77	ft-kips				
PDL =	15523	lbs	wDL =	682	plf	MDL =	49.05	ft-kips
PSL =	34921	lbs	wDL =	1535	plf	MSL =	165.70	ft-kips
PLL =	10830	lbs	wDL =	476	plf	MSL =	42.65	ft-kips

Demising Wall Unit 132 West Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	10.00	feet	Wall Ht Trib =		14.91	feet		
w1DL =	359	plf	w1SL =	2590	plf			
P1 =	R(EOHB-1R)		P1DL =	1571	lbs	P1SL =	14826	lbs
P2 =	R(EOHB-3R)		P2DL =	581	lbs	P2SL =	4488	lbs
UL Floor Trib =	9.42	feet	Wall Ht Trib =		9.92	feet		
w2DL =	315	plf	w2LL =	376.6664	plf			
w3DL =	88	plf						
P3 =	N/A		P3DL =	0	lbs	P3SL =	0	lbs
EL Floor Trib 4 =	7.50	feet	Wall Ht Trib =		9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	267	plf	w4LL =	300	plf			
w5DL =	79	plf	w5LL =	0	plf			
P4 =	R(FB4-4R)		P4DL =	2044	lbs	P4LL =	2879	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	3621	lbs	1373	lbs
OTM RF-UL =	53.99	ft-kips	20.47	ft-kips
VUL(GR) =	4489	lbs	3254	lbs
OTM UL-EL =	44.54	ft-kips	32.28	ft-kips
VEL(GR) =	4714	lbs	4960	lbs
OTM EL-BL =	46.77	ft-kips	49.21	ft-kips

Wall btwn Roof and UL					
vmax =	110	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	2838	lbs	No Uplift		
.6DL+OTM: T3 =	2244	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	102	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	5969	lbs	No Uplift		
.6DL+OTM: T4 =	3877	lbs	No Uplift		

Wall btwn EL and BL						
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)						
Vmax =	2470	lbs				
vmax =	109	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"			
			v_{ALLOW} = 260		plf, min.	
.6DL+OTM: T2 =	-317	lbs	Bolt to Wall			
.6DL+OTM: T4 =	2322	lbs	No Uplift			

Demising Wall Unit 132 West	Pg 2 of 2

Footing at EL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	53.99	x 0.644 =	34.77	ft-kips				
OTM UL-EL =	44.54	x 0.483 =	21.51	ft-kips				
		Total OTM =	56.28	ft-kips				
PDL =	15895	lbs	wDL =	748	plf	MDL =	16.69	ft-kips
PSL =	69864	lbs	wDL =	3288	plf	MSL =	157.53	ft-kips
PLL =	8004	lbs	wDL =	377	plf	MSL =	47.69	ft-kips

Footing at BL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	53.99	x 0.356 =	19.22	ft-kips				
OTM UL-EL =	44.54	x 0.517 =	23.03	ft-kips				
OTM EL-BL =	46.77	x 1.000 =	46.77	ft-kips				
		Total OTM =	89.02	ft-kips				
PDL =	15518	lbs	wDL =	682	plf	MDL =	49.03	ft-kips
PSL =	34921	lbs	wDL =	1535	plf	MSL =	165.70	ft-kips
PLL =	10830	lbs	wDL =	476	plf	MSL =	42.65	ft-kips

Demising Wall Unit 132 East Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	10.00	feet	Wall Ht Trib =		14.91	feet		
w1DL =	359	plf	w1SL =	2590	plf			
P1 =	R(EOHB-2R)		P1DL =	947	lbs	P1SL =	8084	lbs
P2 =	R(EOHB-4R)		P2DL =	1048	lbs	P2SL =	9538	lbs
UL Floor Trib =	9.42	feet	Wall Ht Trib =		9.92	feet		
w2DL =	315	plf	w2LL =	376.6664	plf			
w3DL =	88	plf						
P3 =	R(TB-1L)		P3DL =	1545	lbs	P3SL =	15952	lbs
EL Floor Trib 4 =	2.00	feet	Wall Ht Trib =		9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	129	plf	w4LL =	80	plf			
w5DL =	79	plf	w5LL =	0	plf			
P4 =	R(FB-4L)		P4DL =	3261	lbs	P4LL =	4581	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	3621	lbs	1373	lbs
OTM RF-UL =	53.99	ft-kips	20.47	ft-kips
VUL(GR) =	4489	lbs	3254	lbs
OTM UL-EL =	44.54	ft-kips	32.28	ft-kips
VEL(GR) =	4714	lbs	4960	lbs
OTM EL-BL =	46.77	ft-kips	49.21	ft-kips

Wall btwn Roof and UL					
vmax =	110	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	2464	lbs	No Uplift		
.6DL+OTM: T3 =	2524	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	102	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	5595	lbs	No Uplift		
.6DL+OTM: T4 =	4157	lbs	No Uplift		

Wall btwn EL and BL						
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)						
Vmax =	2470	lbs				
vmax =	109	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"			
			v_{ALLOW} = 260		plf, min.	
.6DL+OTM: T2 =	-1225	lbs	Bolt to Wall			
.6DL+OTM: T4 =	2602	lbs	No Uplift			

Demising Wall Unit 132 East Pg 2 of 2

Footing at EL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	53.99	x 0.644 =	34.77	ft-kips				
OTM UL-EL =	44.54	x 0.483 =	21.51	ft-kips				
		Total OTM =	56.28	ft-kips				
PDL =	15271	lbs	wDL =	719	plf	MDL =	10.06	ft-kips
PSL =	63122	lbs	wDL =	2970	plf	MSL =	85.89	ft-kips
PLL =	8004	lbs	wDL =	377	plf	MSL =	101.34	ft-kips

Footing at BL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	53.99	x 0.356 =	19.22	ft-kips				
OTM UL-EL =	44.54	x 0.517 =	23.03	ft-kips				
OTM EL-BL =	46.77	x 1.000 =	46.77	ft-kips				
		Total OTM =	89.02	ft-kips				
PDL =	17132	lbs	wDL =	753	plf	MDL =	38.93	ft-kips
PSL =	55923	lbs	wDL =	2458	plf	MSL =	157.82	ft-kips
PLL =	9947	lbs	wDL =	437	plf	MSL =	27.79	ft-kips

Demising Wall Unit 133 West Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	12.00	feet	Wall Ht Trib =		14.08	feet		
w1DL =	401	plf	w1SL =	3108	plf			
P1 =	R(EOHB-1R)		P1DL =	1571	lbs	P1SL =	14826	lbs
P2 =	R(EOHB-3R)		P2DL =	581	lbs	P2SL =	4488	lbs
UL Floor Trib =	11.50	feet	Wall Ht Trib =		9.92	feet		
w2DL =	367	plf	w2LL =	460	plf			
w3DL =	88	plf						
P3 =	N/A		P3DL =	0	lbs	P3SL =	0	lbs
EL Floor Trib 4 =	0.00	feet	Wall Ht Trib =		9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	79	plf	w4LL =	0	plf			
w5DL =	79	plf	w5LL =	0	plf			
P4 =	N/A		P4DL =	0	lbs	P4LL =	0	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	4156	lbs	1303	lbs
OTM RF-UL =	58.51	ft-kips	18.35	ft-kips
VUL(GR) =	5179	lbs	3114	lbs
OTM UL-EL =	51.37	ft-kips	30.89	ft-kips
VEL(GR) =	5438	lbs	4821	lbs
OTM EL-BL =	53.94	ft-kips	47.82	ft-kips

Wall btwn Roof and UL					
vmax =	126	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	3109	lbs	No Uplift		
.6DL+OTM: T3 =	2515	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	118	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	6770	lbs	No Uplift		
.6DL+OTM: T4 =	4333	lbs	No Uplift		

Wall btwn EL and BL						
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)						
Vmax =	2848	lbs				
vmax =	125	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"			
			v_{ALLOW} = 260		plf, min.	
.6DL+OTM: T2 =	-1874	lbs	Bolt to Wall			
.6DL+OTM: T4 =	2460	lbs	No Uplift			

Demising Wall Unit 133 West Pg 2 of 2

Footing at EL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	58.51	x 0.644 =	37.68	ft-kips				
OTM UL-EL =	51.37	x 0.483 =	24.81	ft-kips				
		Total OTM =	62.49	ft-kips				
PDL =	17880	lbs	wDL =	841	plf	MDL =	16.69	ft-kips
PSL =	80871	lbs	wDL =	3806	plf	MSL =	157.53	ft-kips
PLL =	9775	lbs	wDL =	460	plf	MSL =	47.69	ft-kips

Footing at BL								
(Assume footing takes portion of upper OTM's based on trib length of wall)								
OTM RF-UL =	58.51	x 0.356 =	20.83	ft-kips				
OTM UL-EL =	51.37	x 0.517 =	26.56	ft-kips				
OTM EL-BL =	53.94	x 1.000 =	53.94	ft-kips				
		Total OTM =	101.34	ft-kips				
PDL =	12369	lbs	wDL =	544	plf	MDL =	43.72	ft-kips
PSL =	41007	lbs	wDL =	1803	plf	MSL =	199.17	ft-kips
PLL =	5405	lbs	wDL =	238	plf	MSL =	29.73	ft-kips

Demising Wall Unit 133 East Pg 1 of 2

Wall Gravity Loads								
Roof Trib =	16.33	feet	Wall Ht Trib =		14.08	feet		
w1DL =	505	plf	w1SL =	4229.47	plf			
P1 =	R(OHB-15R)		P1DL =	3205	lbs	P1SL =	23846	lbs
P2 =	R(OHB-10R)		P2DL =	2367	lbs	P2SL =	18360	lbs
UL Floor Trib =	11.50	feet	Wall Ht Trib =		9.92	feet		
w2DL =	367	plf	w2LL =	460	plf			
w3DL =	88	plf						
P3 =	R(TB-2R)		P3DL =	1965	lbs	P3SL =	18585	lbs
EL Floor Trib 4 =	0.00	feet	Wall Ht Trib =		9.92	feet		
EL Floor Trib 5 =	0.00	feet						
w4DL =	1240	plf	w4LL =	0	plf			
w5DL =	1240	plf	w5LL =	0	plf			
P4 =	N/A		P4DL =	0	lbs	P4LL =	0	lbs

Wall Lateral Loads				
	Seismic		Wind	
VRF =	5588	lbs	1303	lbs
OTM RF-UL =	78.69	ft-kips	18.35	ft-kips
VUL(GR) =	6612	lbs	3114	lbs
OTM UL-EL =	65.59	ft-kips	30.89	ft-kips
VEL(GR) =	6870	lbs	4821	lbs
OTM EL-BL =	68.15	ft-kips	47.82	ft-kips

Wall btwn Roof and UL					
vmax =	294	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	4497	lbs	No Uplift		
.6DL+OTM: T3 =	3994	lbs	No Uplift		

Wall btwn UL and EL					
vmax =	150	plf	Use 1/2" Sheathing One Side w/ 8d @ 6"		
			v_{ALLOW} = 260	plf, min.	
.6DL+OTM: T1 =	7832	lbs	No Uplift		
.6DL+OTM: T4 =	5486	lbs	No Uplift		

Wall btwn EL and BL					
(Assume lower wall takes 1/2 shear from RF & UL plus full shear from EL)					
Vmax =	3565	lbs			
vmax =	157	plf	10" Concrete Wall (OK by Inspection)		
.6DL+OTM: T2 =	5155	lbs	No Uplift		
.6DL+OTM: T4 =	10641	lbs	No Uplift		

Demising Wall Unit 133 East Pg 2 of 2

Footing Design Values								
(Assume footing overturning at lowest level (BL) to be conservative)								
OTM RF-UL =	78.69	ft-kips	DUL =	33	feet	LWALL =	44	feet
OTM UL-EL =	65.59	ft-kips	DUT =	11	feet			
OTM EL-BL =	68.15	ft-kips	DEL1 =	21.25	feet			
Total OTM =	212.43	ft-kips	DEL2 =	22.75	feet			
PDL =	65468	lbs	wDL =	1229	plf	MDL =	-134.62	ft-kips
PSL =	200364	lbs	wSL =	3763	plf	MSL =	885.87	ft-kips
PLL =	15180	lbs	wLL =	285	plf	MLL =	83.49	ft-kips

Demising Wall Foundation Load Summary

Wall	Upper Wall								Combined									
	VEQ	MEQ	wDL	wLL	wSL	MDL	MLL	MSL	VEQ	MEQ	wDL	wLL	wSL	MDL	MLL	MSL	Stem Ht.	MEQ
124W	See Below								See Below									
124E	3013	73.21	845	480	3701	19.21	64.52	180.60	5410	133.04	1557	857	6623	31.08	182.18	281.34	5.00	160.10
125W	2397	59.83	712	377	2921	11.88	117.65	100.74										
125E	2397	59.83	737	377	3188	19.33	55.36	181.98	5098	132.73	1484	753	6372	38.61	110.72	362.82	4.50	155.66
126W	2700	72.89	747	377	3184	19.28	55.36	180.84										
126E	See Below								See Below									
127W	See Below								See Below									
127E	2631	69.54	743	377	3191	19.38	55.36	182.88	4878	128.41	1489	753	6382	38.76	110.72	365.76	5.00	152.81
128W	2247	58.87	746	377	3191	19.38	55.36	182.88										
128E	2247	58.87	720	377	2918	11.68	117.65	99.72	4494	117.69	1441	753	5835	23.36	235.30	199.43	5.00	140.17
129W	2247	58.82	720	377	2918	11.68	117.65	99.72										
129E	2247	58.82	746	377	3191	0.00	55.36	182.88	4879	129.33	1492	753	6382	19.38	110.72	365.76	5.00	153.73
130W	2632	70.51	746	377	3191	19.38	55.36	182.88										
130E	See Below								See Below									
131W	See Below								See Below									
131E	2629	67.52	748	377	3288	16.69	47.69	157.53	4874	123.80	1496	753	6575	33.38	95.37	315.05	6.00	153.04
132W	2245	56.28	748	377	3288	16.69	47.69	157.53										
132E	2245	56.28	719	377	2970	10.06	101.34	85.89	4834	118.77	1560	837	6776	26.75	149.03	243.42	4.00	138.10
133W	2589	62.49	841	460	3806	16.69	47.69	157.53										
133E	See Below								See Below									

Wall	Lower Wall								Combined									
	VEQ	MEQ	wDL	wLL	wSL	MDL	MLL	MSL	VEQ	MEQ	wDL	wLL	wSL	MDL	MLL	MSL	Stem Ht.	MEQ
124W	See Combined Upper & Lower Walls -->								8046	250.20	899	379	4534	198.04	119.56	1211.87	4.00	282.38
124E	3307	118.12	554	248	1835	44.60	31.02	198.89	5928	212.88	1307	685	4293	83.47	58.81	356.71	2.00	224.74
125W	2621	94.76	753	437	2458	38.87	27.79	157.82										
125E	2621	94.76	682	476	1535	48.97	42.65	165.70	5928	212.88	1369	952	3070	98.61	85.30	331.39	2.50	227.70
126W	3307	118.12	687	476	1535	49.64	42.65	165.70										
126E	See Combined Upper & Lower Walls -->								5619	182.33	1151	337	2673	-222.10	13.16	540.32	2.00	193.57
127W	See Combined Upper & Lower Walls -->								5483	175.44	1148	337	2667	-223.47	13.16	533.68	2.00	186.40
127E	3307	118.12	685	476	1535	49.39	42.65	165.70	6614	236.24	1371	952	3070	98.93	85.30	331.39	2.50	252.78
128W	3307	118.12	686	476	1535	49.54	42.65	165.70										
128E	3307	118.12	757	437	2458	39.45	27.79	157.82	6614	236.24	1514	874	4916	78.88	55.59	315.64	2.75	254.43
129W	3307	118.12	757	437	2458	39.44	27.79	157.82										
129E	3307	118.12	686	476	1535	49.54	42.65	165.70	6614	236.24	1373	952	3070	99.09	85.30	331.39	2.75	254.43
130W	3307	118.12	686	476	1535	49.55	42.65	165.70										
130E	See Combined Upper & Lower Walls -->								5483	176.94	1149	337	2667	-223.02	13.16	533.68	2.00	187.91
131W	See Combined Upper & Lower Walls -->								5483	172.29	1145	337	2667	-224.41	13.16	533.68	2.00	183.26
131E	3307	118.12	682	476	1535	49.05	42.65	165.70	6614	236.24	1364	952	3070	98.08	85.30	331.39	3.00	256.08
132W	3307	118.12	682	476	1535	49.03	42.65	165.70										
132E	3307	118.12	753	437	2458	38.93	27.79	157.82	6614	236.24	1297	675	4261	82.65	57.52	356.99	3.00	256.08
133W	3307	118.12	544	238	1803	43.72	29.73	199.17										
133E	See Combined Upper & Lower Walls -->								6870	212.43	1229	285	3763	-134.62	83.49	885.87	2.00	226.17

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA : Unit 124 West

Allow. Soil Pr. =	2.400	ksf	DL OTM =	198.04	f t - kips
Fy =	60	ksi	FLR LL OTM =	119.56	f t - kips
f 'c =	3000	psi	RF LL OTM =	1211.87	f t - kips
Wall DL =	0.90	klf	SEISMIC OTM =	282.38	f t - kips
Roof LL =	4.53	klf	Footing Length :	57.25	feet
Floor LL =	0.38	klf	Footing Width :	4.00	feet
Wall Length =	53.25	feet	Footing Thkness:	12	inches
Wall Thickness =	10	inches	Footing DL :	1.982	klf

OUTPUT DATA :

EQ'N 16-11 : DL + FL:

P =	402.8 kips	P_{ult} =	579.9 kips		
OTM =	1409.9 ft-kips	OTM_{ult} =	2176.6 ft-kips		
e =	3.50 feet	X bar =	N/A feet		
Soil Pr. =	2.40 ksf, max.,	3.46 ksf, ult.		Required Width =	4.01 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	357.6 kips	P_{ULT} =	507.6 kips		
OTM =	1408.4 ft-kips	OTM_{ULT} =	2174.2 ft-kips		
e =	3.94 feet	X bar =	N/A feet		
Soil Pr. =	2.21 ksf, max.,	3.13 ksf, ult.		Required Width =	3.68 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	96.8 kips	P (ult) =	116.2 kips		
OTM =	401.2 ft-kips	OTM_{ULT} =	458.85 ft-kips		
e =	4.14 feet	X bar =	N/A feet		
Soil Pr. =	0.61 ksf, max.,	0.73 ksf, ult.		Required Width =	1.01 feet

Resisting Moment = 4618.39 ft-kips Factor of Safety = 14.59

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	9.36 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	62 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	6.23 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	115 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.25	sq.in./ft.	v(longit.) =	44 psi
Transverse Steel Required =	0.17	sq.in./ft.	v(transv.)=	29 psi
			V(allow) =	93.1 psi

rudow + berry
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scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA : Unit 124E/125W Lower Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	83.47	f t - kips
Fy =	60	ksi	FLR LL OTM =	58.81	f t - kips
f 'c =	3000	psi	RF LL OTM =	356.71	f t - kips
Wall DL =	1.31	klf	SEISMIC OTM =	224.74	f t - kips
Roof LL =	4.29	klf	Footing Length :	25.00	feet
Floor LL =	0.69	klf	Footing Width :	5.00	feet
Wall Length =	22.75	feet	Footing Thkness:	12	inches
Wall Thickness =	16	inches	Footing DL :	1.339	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	148.1 kips	P_{ult} =	211.7 kips		
OTM =	395.11 ft-kips	OTM_{ult} =	598.79 ft-kips		
e =	2.67 feet	X bar =	N/A feet		
Soil Pr. =	1.94 ksf, max.,	2.78 ksf, ult.		Required Width =	4.05 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	148.1 kips	P_{ULT} =	211.7 kips		
OTM =	563.7 ft-kips	OTM_{ULT} =	868.48 ft-kips		
e =	3.80 feet	X bar =	N/A feet		
Soil Pr. =	2.27 ksf, max.,	3.24 ksf, ult.		Required Width =	4.72 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	37.9 kips	P (ult) =	45.5 kips		
OTM =	274.8 ft-kips	OTM_{ULT} =	311.81 ft-kips		
e =	7.25 feet	X bar =	5.25 feet		
Soil Pr. =	0.96 ksf, max.,	1.16 ksf, ult.		Required Width =	2.01 feet

Resisting Moment = 790.01 ft-kips Factor of Safety = 3.81

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	3.40 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	23 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	7.28 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	135 psi
Shear =	0.56 kips/ft	Fv(allow)=	71 psi	fv(act.)=	4 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.09	sq.in./ft.	v(longit.) =	13 psi
Transverse Steel Required =	0.19	sq.in./ft.	v(transv.)=	35 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA : Unit 124E/125W Upper Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	31.08	f t - kips
Fy =	60	ksi	FLR LL OTM =	182.18	f t - kips
f 'c =	3000	psi	RF LL OTM =	281.34	f t - kips
Wall DL =	1.56	klf	SEISMIC OTM =	160.1	f t - kips
Roof LL =	6.62	klf	Footing Length :	27.00	feet
Floor LL =	0.86	klf	Footing Width :	6.00	feet
Wall Length =	24.67	feet	Footing Thkness:	12	inches
Wall Thickness =	16	inches	Footing DL :	3.679	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	276.1 kips	P_{ult} =	386.7 kips		
OTM =	378.72 ft-kips	OTM_{ult} =	593.52 ft-kips		
e =	1.37 feet	X bar =	N/A feet		
Soil Pr. =	2.22 ksf, max.,	3.11 ksf, ult.		Required Width =	5.56 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	276.1 kips	P_{ULT} =	386.7 kips		
OTM =	498.8 ft-kips	OTM_{ULT} =	785.64 ft-kips		
e =	1.81 feet	X bar =	N/A feet		
Soil Pr. =	2.39 ksf, max.,	3.35 ksf, ult.		Required Width =	5.97 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	82.6 kips	P (ult) =	99.2 kips		
OTM =	178.7 ft-kips	OTM_{ULT} =	201.69 ft-kips		
e =	2.16 feet	X bar =	N/A feet		
Soil Pr. =	0.76 ksf, max.,	0.91 ksf, ult.		Required Width =	1.89 feet

Resisting Moment = 1859.43 ft-kips Factor of Safety = 14.22

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	3.72 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	25 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	22	inches			
Moment =	11.53 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	173 psi
Shear =	1.72 kips/ft	Fv(allow)=	71 psi	fv(act.)=	10 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.10	sq.in./ft.	v(longit.) =	15 psi
Transverse Steel Required =	0.31	sq.in./ft.	v(transv.)=	53 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA : Unit 125E/126W Lower Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	98.61	f t - kips
Fy =	60	ksi	FLR LL OTM =	85.3	f t - kips
f 'c =	3000	psi	RF LL OTM =	331.39	f t - kips
Wall DL =	1.37	klf	SEISMIC OTM =	227.7	f t - kips
Roof LL =	3.07	klf	Footing Length :	25.00	feet
Floor LL =	0.95	klf	Footing Width :	5.00	feet
Wall Length =	22.75	feet	Footing Thkness:	12	inches
Wall Thickness =	16	inches	Footing DL :	1.339	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	133.2 kips	P_{ult} =	187.3 kips		
OTM =	411.13 ft-kips	OTM_{ult} =	618.36 ft-kips		
e =	3.09 feet	X bar =	N/A feet		
Soil Pr. =	1.86 ksf, max.,	2.61 ksf, ult.		Required Width =	3.87 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	133.2 kips	P_{ULT} =	187.3 kips		
OTM =	581.9 ft-kips	OTM_{ULT} =	891.6 ft-kips		
e =	4.37 feet	X bar =	8.13 feet		
Soil Pr. =	2.18 ksf, max.,	3.07 ksf, ult.		Required Width =	4.55 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	38.8 kips	P (ult) =	46.5 kips		
OTM =	286.9 ft-kips	OTM_{ULT} =	326.02 ft-kips		
e =	7.40 feet	X bar =	5.10 feet		
Soil Pr. =	1.01 ksf, max.,	1.22 ksf, ult.		Required Width =	2.11 feet

Resisting Moment = 807.64 ft-kips Factor of Safety = 3.70

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	3.20 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	21 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	6.78 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	126 psi
Shear =	0.54 kips/ft	Fv(allow)=	71 psi	fv(act.)=	3 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.08	sq.in./ft.	v(longit.) =	12 psi
Transverse Steel Required =	0.18	sq.in./ft.	v(transv.)=	33 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 125E/126W Upper Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	35.60	f t - kips
Fy =	60	ksi	FLR LL OTM =	102.1	f t - kips
f 'c =	3000	psi	RF LL OTM =	334.58	f t - kips
Wall DL =	1.49	klf	SEISMIC OTM =	155.66	f t - kips
Roof LL =	6.47	klf	Footing Length :	25.75	feet
Floor LL =	0.75	klf	Footing Width :	6.00	feet
Wall Length =	22.75	feet	Footing Thkness:	12	inches
Wall Thickness =	16	inches	Footing DL :	3.679	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	252.0 kips	P_{ult} =	351.7 kips		
OTM =	363.11 ft-kips	OTM_{ult} =	566.74 ft-kips		
e =	1.44 feet	X bar =	N/A feet		
Soil Pr. =	2.18 ksf, max.,	3.04 ksf, ult.		Required Width =	5.45 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	252.0 kips	P_{ULT} =	351.7 kips		
OTM =	479.9 ft-kips	OTM_{ULT} =	753.53 ft-kips		
e =	1.90 feet	X bar =	N/A feet		
Soil Pr. =	2.35 ksf, max.,	3.29 ksf, ult.		Required Width =	5.89 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	77.2 kips	P (ult) =	92.7 kips		
OTM =	177.0 ft-kips	OTM_{ULT} =	199.97 ft-kips		
e =	2.29 feet	X bar =	N/A feet		
Soil Pr. =	0.77 ksf, max.,	0.92 ksf, ult.		Required Width =	1.92 feet

Resisting Moment = 1657.19 ft-kips Factor of Safety = 12.72

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	5.45 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	36 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	22	inches			
Moment =	11.21 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	168 psi
Shear =	1.69 kips/ft	Fv(allow)=	71 psi	fv(act.)=	10 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.14	sq.in./ft.	v(longit.) =	25 psi
Transverse Steel Required =	0.30	sq.in./ft.	v(transv.)=	51 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 126 East (EQ OTM to North)

Allow. Soil Pr. =	2.400	ksf	DL OTM =	222.10	f t - kips
Fy =	60	ksi	FLR LL OTM =	-13.16	f t - kips
f 'c =	3000	psi	RF LL OTM =	-540.32	f t - kips
Wall DL =	1.15	klf	SEISMIC OTM =	193.57	f t - kips
Roof LL =	2.67	klf	Footing Length :	48.00	feet
Floor LL =	0.34	klf	Footing Width :	2.00	feet
Wall Length =	44.00	feet	Footing Thkness:	12	inches
Wall Thickness =	10	inches	Footing DL :	0.549	klf

OUTPUT DATA :

EQ'N 16-11 : DL + FL:

P =	194.6 kips	P_{ult} =	280.6 kips		
OTM =	-318.2 ft-kips	OTM_{ult} =	-598.0 ft-kips		
e =	-1.64 feet	X bar =	N/A feet		
Soil Pr. =	1.61 ksf, max.,	2.33 ksf, ult.		Required Width =	1.34 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	176.3 kips	P_{ULT} =	251.3 kips		
OTM =	-47.8 ft-kips	OTM_{ULT} =	-165.4 ft-kips		
e =	-0.27 feet	X bar =	N/A feet		
Soil Pr. =	1.77 ksf, max.,	2.53 ksf, ult.		Required Width =	1.48 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	46.2 kips	P (ult) =	55.4 kips		
OTM =	326.8 ft-kips	OTM_{ULT} =	376.71 ft-kips		
e =	7.08 feet	X bar =	N/A feet		
Soil Pr. =	0.91 ksf, max.,	1.09 ksf, ult.		Required Width =	0.76 feet

Resisting Moment = 1847.52 ft-kips Factor of Safety = 7

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	6.83 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	46 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	1.04 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	19 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.18	sq.in./ft.	v(longit.) =	32 psi
Transverse Steel Required =	0.03	sq.in./ft.	v(transv.)=	0 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 126 East (EQ OTM to South)

Allow. Soil Pr. =	2.400	ksf	DL OTM =	-222.10	f t - kips
Fy =	60	ksi	FLR LL OTM =	13.16	f t - kips
f 'c =	3000	psi	RF LL OTM =	540.32	f t - kips
Wall DL =	1.15	klf	SEISMIC OTM =	193.57	f t - kips
Roof LL =	2.67	klf	Footing Length :	48.00	feet
Floor LL =	0.34	klf	Footing Width :	2.00	feet
Wall Length =	44.00	feet	Footing Thkness:	12	inches
Wall Thickness =	10	inches	Footing DL :	0.549	klf

OUTPUT DATA :

EQ'N 16-11 : DL + FL:

P =	194.6 kips	P_{ult} =	280.6 kips		
OTM =	318.2 ft-kips	OTM_{ult} =	598.0 ft-kips		
e =	1.64 feet	X bar =	N/A feet		
Soil Pr. =	2.44 ksf, max.,	3.52 ksf, ult.		Required Width =	2.03 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	176.3 kips	P_{ULT} =	251.3 kips		
OTM =	338.2 ft-kips	OTM_{ULT} =	629.94 ft-kips		
e =	1.92 feet	X bar =	N/A feet		
Soil Pr. =	2.28 ksf, max.,	3.25 ksf, ult.		Required Width =	1.90 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	46.2 kips	P (ult) =	55.4 kips		
OTM =	60.3 ft-kips	OTM_{ULT} =	56.886 ft-kips		
e =	1.31 feet	X bar =	N/A feet		
Soil Pr. =	0.56 ksf, max.,	0.67 ksf, ult.		Required Width =	0.47 feet

Resisting Moment = 1847.52 ft-kips Factor of Safety = 825

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	9.54 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	64 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	1.46 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	27 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.26	sq.in./ft.	v(longit.) =	44 psi
Transverse Steel Required =	0.04	sq.in./ft.	v(transv.)=	0 psi
			V(allow) =	93.1 psi

294

project no. 17100

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 127 West (EQ OTM to North)

Allow. Soil Pr. =	2.400	ksf	DL OTM =	223.47	f t - kips
Fy =	60	ksi	FLR LL OTM =	-13.16	f t - kips
f 'c =	3000	psi	RF LL OTM =	-533.16	f t - kips
Wall DL =	1.15	klf	SEISMIC OTM =	186.4	f t - kips
Roof LL =	2.67	klf	Footing Length :	48.00	feet
Floor LL =	0.34	klf	Footing Width :	2.00	feet
Wall Length =	44.00	feet	Footing Thkness:	12	inches
Wall Thickness =	10	inches	Footing DL :	0.549	klf

OUTPUT DATA :

EQ'N 16-11 : DL + FL:

P =	194.2 kips	P_{ult} =	280.0 kips		
OTM =	-309.7 ft-kips	OTM_{ult} =	-584.9 ft-kips		
e =	-1.59 feet	X bar =	N/A feet		
Soil Pr. =	1.62 ksf, max.,	2.34 ksf, ult.		Required Width =	1.35 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	176.0 kips	P_{ULT} =	250.8 kips		
OTM =	-46.5 ft-kips	OTM_{ULT} =	-163.7 ft-kips		
e =	-0.26 feet	X bar =	N/A feet		
Soil Pr. =	1.77 ksf, max.,	2.53 ksf, ult.		Required Width =	1.48 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	46.1 kips	P (ult) =	55.3 kips		
OTM =	320.5 ft-kips	OTM_{ULT} =	369.67 ft-kips		
e =	6.95 feet	X bar =	N/A feet		
Soil Pr. =	0.90 ksf, max.,	1.08 ksf, ult.		Required Width =	0.75 feet

Resisting Moment = 1844.35 ft-kips Factor of Safety = 7

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	6.82 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	45 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	1.04 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	19 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.18	sq.in./ft.	v(longit.) =	32 psi
Transverse Steel Required =	0.03	sq.in./ft.	v(transv.)=	0 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 127 West (EQ OTM to South)

Allow. Soil Pr. =	2.400	ksf		DL OTM =	-223.47	f t - kips	
Fy =	60	ksi		FLR LL OTM =	13.16	f t - kips	
f 'c =	3000	psi		RF LL OTM =	533.16	f t - kips	
Wall DL =	1.15	klf		SEISMIC OTM =	186.4	f t - kips	
Roof LL =	2.67	klf		Footing Length :	48.00	feet	
Floor LL =	0.34	klf		Footing Width :	2.00	feet	
Wall Length =	44.00	feet		Footing Thkness:	12	inches	
Wall Thickness =	10	inches		Footing DL :	0.549	klf	

OUTPUT DATA :

EQ'N 16-11 : DL + FL:

P =	194.2 kips	P_{ult} =	280.0 kips		
OTM =	309.7 ft-kips	OTM_{ult} =	584.9 ft-kips		
e =	1.59 feet	X bar =	N/A feet		
Soil Pr. =	2.43 ksf, max.,	3.50 ksf, ult.		Required Width =	2.02 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	176.0 kips	P_{ULT} =	250.8 kips		
OTM =	326.1 ft-kips	OTM_{ULT} =	611.1 ft-kips		
e =	1.85 feet	X bar =	N/A feet		
Soil Pr. =	2.26 ksf, max.,	3.22 ksf, ult.		Required Width =	1.88 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	46.1 kips	P (ult) =	55.3 kips		
OTM =	52.3 ft-kips	OTM_{ULT} =	47.87 ft-kips		
e =	1.13 feet	X bar =	N/A feet		
Soil Pr. =	0.55 ksf, max.,	0.66 ksf, ult.		Required Width =	0.46 feet

Resisting Moment = 1844.35 ft-kips Factor of Safety = -512

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	9.48 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	63 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	1.45 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	27 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.26	sq.in./ft.	v(longit.) =	44 psi
Transverse Steel Required =	0.04	sq.in./ft.	v(transv.)=	0 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 127E/128W Lower Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	98.93	f t - kips
Fy =	60	ksi	FLR LL OTM =	85.3	f t - kips
f 'c =	3000	psi	RF LL OTM =	331.39	f t - kips
Wall DL =	1.37	klf	SEISMIC OTM =	252.78	f t - kips
Roof LL =	3.07	klf	Footing Length :	25.00	feet
Floor LL =	0.95	klf	Footing Width :	5.00	feet
Wall Length =	22.75	feet	Footing Thkness:	12	inches
Wall Thickness =	16	inches	Footing DL :	1.339	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	133.3 kips	P_{ult} =	187.4 kips		
OTM =	411.45 ft-kips	OTM_{ult} =	618.74 ft-kips		
e =	3.09 feet	X bar =	N/A feet		
Soil Pr. =	1.86 ksf, max.,	2.61	ksf, ult.	Required Width =	3.87 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	133.3 kips	P_{ULT} =	187.4 kips		
OTM =	601.0 ft-kips	OTM_{ULT} =	922.08 ft-kips		
e =	4.51 feet	X bar =	7.99 feet		
Soil Pr. =	2.22 ksf, max.,	3.13	ksf, ult.	Required Width =	4.63 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	38.8 kips	P (ult) =	46.6 kips		
OTM =	312.1 ft-kips	OTM_{ULT} =	354.34 ft-kips		
e =	8.05 feet	X bar =	4.45 feet		
Soil Pr. =	1.16 ksf, max.,	1.39	ksf, ult.	Required Width =	2.42 feet

Resisting Moment = 808.21 ft-kips Factor of Safety = 3.42

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	3.26 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	22 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	6.89 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	128 psi
Shear =	0.55 kips/ft	Fv(allow)=	71 psi	fv(act.)=	3 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.09	sq.in./ft.	v(longit.) =	13 psi
Transverse Steel Required =	0.18	sq.in./ft.	v(transv.)=	34 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 127E/128W Upper Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	33.38	f t - kips
Fy =	60	ksi	FLR LL OTM =	95.37	f t - kips
f 'c =	3000	psi	RF LL OTM =	315.05	f t - kips
Wall DL =	1.51	klf	SEISMIC OTM =	152.81	f t - kips
Roof LL =	6.58	klf	Footing Length :	25.75	feet
Floor LL =	0.75	klf	Footing Width :	6.00	feet
Wall Length =	22.75	feet	Footing Thkness:	12	inches
Wall Thickness =	16	inches	Footing DL :	3.679	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	254.1 kips	P_{ult} =	354.9 kips		
OTM =	341.20 ft-kips	OTM_{ult} =	532.56 ft-kips		
e =	1.34 feet	X bar =	N/A feet		
Soil Pr. =	2.16 ksf, max.,	3.02 ksf, ult.		Required Width =	5.40 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	254.1 kips	P_{ULT} =	354.9 kips		
OTM =	455.8 ft-kips	OTM_{ULT} =	715.93 ft-kips		
e =	1.79 feet	X bar =	N/A feet		
Soil Pr. =	2.33 ksf, max.,	3.26 ksf, ult.		Required Width =	5.83 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	77.4 kips	P (ult) =	92.9 kips		
OTM =	172.8 ft-kips	OTM_{ULT} =	195.18 ft-kips		
e =	2.23 feet	X bar =	N/A feet		
Soil Pr. =	0.76 ksf, max.,	0.91 ksf, ult.		Required Width =	1.90 feet

Resisting Moment = 1661.88 ft-kips Factor of Safety = 13.09

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	5.40 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	36 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	22	inches			
Moment =	11.11 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	167 psi
Shear =	1.67 kips/ft	Fv(allow)=	71 psi	fv(act.)=	9 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.14	sq.in./ft.	v(longit.) =	25 psi
Transverse Steel Required =	0.30	sq.in./ft.	v(transv.)=	51 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA : Unit 128E/129W Lower Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	78.88	f t - kips
Fy =	60	ksi	FLR LL OTM =	55.59	f t - kips
f 'c =	3000	psi	RF LL OTM =	315.64	f t - kips
Wall DL =	1.51	klf	SEISMIC OTM =	254.43	f t - kips
Roof LL =	4.92	klf	Footing Length :	25.00	feet
Floor LL =	0.87	klf	Footing Width :	5.00	feet
Wall Length =	22.75	feet	Footing Thkness:	12	inches
Wall Thickness =	16	inches	Footing DL :	1.339	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	166.7 kips	P_{ult} =	239.6 kips		
OTM =	357.30 ft-kips	OTM_{ult} =	540.13 ft-kips		
e =	2.14 feet	X bar =	N/A feet		
Soil Pr. =	2.02 ksf, max.,	2.90 ksf, ult.		Required Width =	4.21 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	166.7 kips	P_{ULT} =	239.6 kips		
OTM =	548.1 ft-kips	OTM_{ULT} =	845.45 ft-kips		
e =	3.29 feet	X bar =	N/A feet		
Soil Pr. =	2.39 ksf, max.,	3.43 ksf, ult.		Required Width =	4.97 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	40.7 kips	P (ult) =	48.9 kips		
OTM =	301.8 ft-kips	OTM_{ULT} =	341.76 ft-kips		
e =	7.41 feet	X bar =	5.09 feet		
Soil Pr. =	1.07 ksf, max.,	1.28 ksf, ult.		Required Width =	2.22 feet

Resisting Moment = 848.88 ft-kips Factor of Safety = 3.77

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	3.60 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	24 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	7.71 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	143 psi
Shear =	0.60 kips/ft	Fv(allow)=	71 psi	fv(act.)=	4 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.10	sq.in./ft.	v(longit.) =	14 psi
Transverse Steel Required =	0.21	sq.in./ft.	v(transv.)=	37 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 128E/129W Upper Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	20.12	f t - kips
Fy =	60	ksi	FLR LL OTM =	202.68	f t - kips
f 'c =	3000	psi	RF LL OTM =	171.79	f t - kips
Wall DL =	1.45	klf	SEISMIC OTM =	140.17	f t - kips
Roof LL =	5.94	klf	Footing Length :	25.75	feet
Floor LL =	0.75	klf	Footing Width :	6.00	feet
Wall Length =	22.75	feet	Footing Thkness:	12	inches
Wall Thickness =	16	inches	Footing DL :	3.679	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	242.0 kips	P_{ult} =	336.1 kips		
OTM =	300.97 ft-kips	OTM_{ult} =	473.51 ft-kips		
e =	1.24 feet	X bar =	N/A feet		
Soil Pr. =	2.02 ksf, max.,	2.81 ksf, ult.		Required Width =	5.05 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	242.0 kips	P_{ULT} =	336.1 kips		
OTM =	406.1 ft-kips	OTM_{ULT} =	641.71 ft-kips		
e =	1.68 feet	X bar =	N/A feet		
Soil Pr. =	2.18 ksf, max.,	3.03 ksf, ult.		Required Width =	5.45 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	76.7 kips	P (ult) =	92.0 kips		
OTM =	152.2 ft-kips	OTM_{ULT} =	171.48 ft-kips		
e =	1.99 feet	X bar =	N/A feet		
Soil Pr. =	0.73 ksf, max.,	0.87 ksf, ult.		Required Width =	1.81 feet

Resisting Moment = 1645.19 ft-kips Factor of Safety = 14.93

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	5.02 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	33 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	22	inches			
Moment =	10.34 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	155 psi
Shear =	1.55 kips/ft	Fv(allow)=	71 psi	fv(act.)=	9 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.13	sq.in./ft.	v(longit.) =	23 psi
Transverse Steel Required =	0.28	sq.in./ft.	v(transv.)=	47 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 129E/130W Lower Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	99.09	f t - kips
Fy =	60	ksi	FLR LL OTM =	85.3	f t - kips
f 'c =	3000	psi	RF LL OTM =	331.39	f t - kips
Wall DL =	1.37	klf	SEISMIC OTM =	254.43	f t - kips
Roof LL =	3.07	klf	Footing Length :	25.00	feet
Floor LL =	0.95	klf	Footing Width :	5.00	feet
Wall Length =	22.75	feet	Footing Thkness:	12	inches
Wall Thickness =	16	inches	Footing DL :	1.780	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	144.4 kips	P_{ult} =	200.7 kips		
OTM =	411.61 ft-kips	OTM_{ult} =	618.94 ft-kips		
e =	2.85 feet	X bar =	N/A feet		
Soil Pr. =	1.95 ksf, max.,	2.70 ksf, ult.		Required Width =	4.05 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	144.4 kips	P_{ULT} =	200.7 kips		
OTM =	602.4 ft-kips	OTM_{ULT} =	924.25 ft-kips		
e =	4.17 feet	X bar =	8.33 feet		
Soil Pr. =	2.31 ksf, max.,	3.21 ksf, ult.		Required Width =	4.82 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	45.4 kips	P (ult) =	54.5 kips		
OTM =	313.9 ft-kips	OTM_{ULT} =	356.31 ft-kips		
e =	6.91 feet	X bar =	5.59 feet		
Soil Pr. =	1.08 ksf, max.,	1.30 ksf, ult.		Required Width =	2.26 feet

Resisting Moment = 946.75 ft-kips Factor of Safety = 3.99

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	3.35 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	22 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	7.10 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	132 psi
Shear =	0.57 kips/ft	Fv(allow)=	71 psi	fv(act.)=	4 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.09	sq.in./ft.	v(longit.) =	13 psi
Transverse Steel Required =	0.19	sq.in./ft.	v(transv.)=	35 psi
			V(allow) =	93.1 psi

rudow + berry
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scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 129E/130W Upper Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	16.69	f t - kips
Fy =	60	ksi	FLR LL OTM =	95.37	f t - kips
f 'c =	3000	psi	RF LL OTM =	315.05	f t - kips
Wall DL =	1.51	klf	SEISMIC OTM =	153.73	f t - kips
Roof LL =	6.58	klf	Footing Length :	25.75	feet
Floor LL =	0.75	klf	Footing Width :	6.00	feet
Wall Length =	22.75	feet	Footing Thkness:	12	inches
Wall Thickness =	16	inches	Footing DL :	3.679	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	254.2 kips	P_{ult} =	355.0 kips		
OTM =	324.51 ft-kips	OTM_{ult} =	512.53 ft-kips		
e =	1.28 feet	X bar =	N/A feet		
Soil Pr. =	2.13 ksf, max.,	2.98 ksf, ult.		Required Width =	5.34 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	254.2 kips	P_{ULT} =	355.0 kips		
OTM =	439.8 ft-kips	OTM_{ULT} =	697.01 ft-kips		
e =	1.73 feet	X bar =	N/A feet		
Soil Pr. =	2.31 ksf, max.,	3.22 ksf, ult.		Required Width =	5.77 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	77.5 kips	P (ult) =	93.0 kips		
OTM =	163.7 ft-kips	OTM_{ULT} =	184.19 ft-kips		
e =	2.11 feet	X bar =	N/A feet		
Soil Pr. =	0.75 ksf, max.,	0.90 ksf, ult.		Required Width =	1.87 feet

Resisting Moment = 1662.47 ft-kips Factor of Safety = 14.13

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	5.35 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	36 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	22	inches			
Moment =	11.01 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	165 psi
Shear =	1.65 kips/ft	Fv(allow)=	71 psi	fv(act.)=	9 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.14	sq.in./ft.	v(longit.) =	25 psi
Transverse Steel Required =	0.30	sq.in./ft.	v(transv.)=	50 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 130 East (EQ OTM to North)

Allow. Soil Pr. =	2.400	ksf	DL OTM =	223.02	f t - kips
Fy =	60	ksi	FLR LL OTM =	-13.16	f t - kips
f 'c =	3000	psi	RF LL OTM =	-533.68	f t - kips
Wall DL =	1.15	klf	SEISMIC OTM =	187.91	f t - kips
Roof LL =	2.67	klf	Footing Length :	48.00	feet
Floor LL =	0.34	klf	Footing Width :	2.00	feet
Wall Length =	44.00	feet	Footing Thkness:	12	inches
Wall Thickness =	10	inches	Footing DL :	0.549	klf

OUTPUT DATA :

EQ'N 16-11 : DL + FL:

P =	194.2 kips	P_{ult} =	280.0 kips		
OTM =	-310.7 ft-kips	OTM_{ult} =	-586.3 ft-kips		
e =	-1.60 feet	X bar =	N/A feet		
Soil Pr. =	1.62 ksf, max.,	2.33 ksf, ult.		Required Width =	1.35 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	176.0 kips	P_{ULT} =	250.9 kips		
OTM =	-46.2 ft-kips	OTM_{ULT} =	-163.1 ft-kips		
e =	-0.26 feet	X bar =	N/A feet		
Soil Pr. =	1.77 ksf, max.,	2.53 ksf, ult.		Required Width =	1.48 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	46.1 kips	P (ult) =	55.4 kips		
OTM =	321.7 ft-kips	OTM_{ULT} =	371.03 ft-kips		
e =	6.97 feet	X bar =	N/A feet		
Soil Pr. =	0.90 ksf, max.,	1.08 ksf, ult.		Required Width =	0.75 feet

Resisting Moment = 1845.41 ft-kips Factor of Safety = 7

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	6.82 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	45 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	1.04 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	19 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.18	sq.in./ft.	v(longit.) =	32 psi
Transverse Steel Required =	0.03	sq.in./ft.	v(transv.)=	0 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 130 East (EQ OTM to South)

Allow. Soil Pr. =	2.400	ksf	DL OTM =	-223.02	f t - kips
Fy =	60	ksi	FLR LL OTM =	13.16	f t - kips
f 'c =	3000	psi	RF LL OTM =	533.68	f t - kips
Wall DL =	1.15	klf	SEISMIC OTM =	187.91	f t - kips
Roof LL =	2.67	klf	Footing Length :	48.00	feet
Floor LL =	0.34	klf	Footing Width :	2.00	feet
Wall Length =	44.00	feet	Footing Thkness:	12	inches
Wall Thickness =	10	inches	Footing DL :	0.549	klf

OUTPUT DATA :

EQ'N 16-11 : DL + FL:

P =	194.2 kips	P_{ult} =	280.0 kips		
OTM =	310.7 ft-kips	OTM_{ult} =	586.3 ft-kips		
e =	1.60 feet	X bar =	N/A feet		
Soil Pr. =	2.43 ksf, max.,	3.50 ksf, ult.		Required Width =	2.02 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	176.0 kips	P_{ULT} =	250.9 kips		
OTM =	328.0 ft-kips	OTM_{ULT} =	614.08 ft-kips		
e =	1.86 feet	X bar =	N/A feet		
Soil Pr. =	2.26 ksf, max.,	3.22 ksf, ult.		Required Width =	1.88 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	46.1 kips	P (ult) =	55.4 kips		
OTM =	54.1 ft-kips	OTM_{ULT} =	49.885 ft-kips		
e =	1.17 feet	X bar =	N/A feet		
Soil Pr. =	0.55 ksf, max.,	0.66 ksf, ult.		Required Width =	0.46 feet

Resisting Moment = 1845.41 ft-kips Factor of Safety = -811

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	9.49 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	63 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	1.45 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	27 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.26	sq.in./ft.	v(longit.) =	44 psi
Transverse Steel Required =	0.04	sq.in./ft.	v(transv.)=	0 psi
			V(allow) =	93.1 psi

304

project no. 17100

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 131 West (EQ OTM to North)

Allow. Soil Pr. =	2.400	ksf	DL OTM =	224.41	f t - kips
Fy =	60	ksi	FLR LL OTM =	-13.16	f t - kips
f 'c =	3000	psi	RF LL OTM =	-533.68	f t - kips
Wall DL =	1.15	klf	SEISMIC OTM =	183.26	f t - kips
Roof LL =	2.67	klf	Footing Length :	48.00	feet
Floor LL =	0.34	klf	Footing Width :	2.00	feet
Wall Length =	44.00	feet	Footing Thkness:	12	inches
Wall Thickness =	10	inches	Footing DL :	0.549	klf

OUTPUT DATA :

EQ'N 16-11 : DL + FL:

P =	194.1 kips	P_{ult} =	279.8 kips		
OTM =	-309.3 ft-kips	OTM_{ult} =	-584.6 ft-kips		
e =	-1.59 feet	X bar =	N/A feet		
Soil Pr. =	1.62 ksf, max.,	2.33 ksf, ult.		Required Width =	1.35 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	175.8 kips	P_{ULT} =	250.7 kips		
OTM =	-48.3 ft-kips	OTM_{ULT} =	-167 ft-kips		
e =	-0.27 feet	X bar =	N/A feet		
Soil Pr. =	1.77 ksf, max.,	2.52 ksf, ult.		Required Width =	1.47 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	46.0 kips	P (ult) =	55.2 kips		
OTM =	317.9 ft-kips	OTM_{ULT} =	366.83 ft-kips		
e =	6.91 feet	X bar =	N/A feet		
Soil Pr. =	0.89 ksf, max.,	1.07 ksf, ult.		Required Width =	0.74 feet

Resisting Moment = 1841.18 ft-kips Factor of Safety = 7

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	6.81 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	45 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	1.03 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	19 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.18	sq.in./ft.	v(longit.) =	32 psi
Transverse Steel Required =	0.03	sq.in./ft.	v(transv.)=	0 psi
			V(allow) =	93.1 psi

305

project no. 17100

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 131 West (EQ OTM to South)

Allow. Soil Pr. =	2.400	ksf	DL OTM =	-224.41	f t - kips
Fy =	60	ksi	FLR LL OTM =	13.16	f t - kips
f 'c =	3000	psi	RF LL OTM =	533.68	f t - kips
Wall DL =	1.15	klf	SEISMIC OTM =	183.26	f t - kips
Roof LL =	2.67	klf	Footing Length :	48.00	feet
Floor LL =	0.34	klf	Footing Width :	2.00	feet
Wall Length =	44.00	feet	Footing Thkness:	12	inches
Wall Thickness =	10	inches	Footing DL :	0.549	klf

OUTPUT DATA :

EQ'N 16-11 : DL + FL:

P =	194.1 kips	P_{ult} =	279.8 kips		
OTM =	309.3 ft-kips	OTM_{ult} =	584.6 ft-kips		
e =	1.59 feet	X bar =	N/A feet		
Soil Pr. =	2.42 ksf, max.,	3.50 ksf, ult.		Required Width =	2.02 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	175.8 kips	P_{ULT} =	250.7 kips		
OTM =	323.2 ft-kips	OTM_{ULT} =	606.83 ft-kips		
e =	1.84 feet	X bar =	N/A feet		
Soil Pr. =	2.25 ksf, max.,	3.21 ksf, ult.		Required Width =	1.88 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	46.0 kips	P (ult) =	55.2 kips		
OTM =	48.6 ft-kips	OTM_{ULT} =	43.676 ft-kips		
e =	1.06 feet	X bar =	N/A feet		
Soil Pr. =	0.54 ksf, max.,	0.65 ksf, ult.		Required Width =	0.45 feet

Resisting Moment = 1841.18 ft-kips Factor of Safety = -289

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	9.48 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	63 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	1.45 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	27 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.26	sq.in./ft.	v(longit.) =	44 psi
Transverse Steel Required =	0.04	sq.in./ft.	v(transv.)=	0 psi
			V(allow) =	93.1 psi

306

project no. 17100

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 131E/132W Lower Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	98.08	f t - kips
Fy =	60	ksi	FLR LL OTM =	85.3	f t - kips
f 'c =	3000	psi	RF LL OTM =	331.39	f t - kips
Wall DL =	1.36	klf	SEISMIC OTM =	256.08	f t - kips
Roof LL =	3.07	klf	Footing Length :	25.00	feet
Floor LL =	0.95	klf	Footing Width :	5.00	feet
Wall Length =	22.75	feet	Footing Thkness:	12	inches
Wall Thickness =	16	inches	Footing DL :	1.780	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	144.2	kips	P_{ult} =	200.4	kips		
OTM =	410.60	ft-kips	OTM_{ult} =	617.72	ft-kips		
e =	2.85	feet	X bar =	N/A	feet		
Soil Pr. =	1.94	ksf, max.,	2.70	ksf, ult.		Required Width =	4.05 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	144.2	kips	P_{ULT} =	200.4	kips		
OTM =	602.7	ft-kips	OTM_{ULT} =	925.02	ft-kips		
e =	4.18	feet	X bar =	8.32	feet		
Soil Pr. =	2.31	ksf, max.,	3.21	ksf, ult.		Required Width =	4.81 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	45.3	kips	P (ult) =	54.4	kips		
OTM =	314.9	ft-kips	OTM_{ULT} =	357.43	ft-kips		
e =	6.95	feet	X bar =	5.55	feet		
Soil Pr. =	1.09	ksf, max.,	1.31	ksf, ult.		Required Width =	2.27 feet

Resisting Moment = 944.19 ft-kips Factor of Safety = 3.97

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches					
Moment =	3.35	ft-kips/ft	Fb(allow)=	178	psi	fb(act.)=	22 psi
Shear =	0.00	kips/ft	Fv(allow)=	71	psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches					
Moment =	7.10	ft-kips/ft	Fb(allow)=	178	psi	fb(act.)=	131 psi
Shear =	0.57	kips/ft	Fv(allow)=	71	psi	fv(act.)=	4 psi

Reinf. Thickness (if used) =	12	inches			
Longitudinal Steel Required =	0.09	sq.in./ft.	v(longit.) =	13	psi
Transverse Steel Required =	0.19	sq.in./ft.	v(transv.)=	35	psi
			V(allow) =	93.1	psi

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 131E/132W Upper Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	33.38	f t - kips
Fy =	60	ksi	FLR LL OTM =	95.37	f t - kips
f 'c =	3000	psi	RF LL OTM =	315.05	f t - kips
Wall DL =	1.50	klf	SEISMIC OTM =	153.04	f t - kips
Roof LL =	6.68	klf	Footing Length :	26.25	feet
Floor LL =	0.75	klf	Footing Width :	6.00	feet
Wall Length =	22.75	feet	Footing Thkness:	12	inches
Wall Thickness =	16	inches	Footing DL :	4.373	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	275.6 kips	P_{ult} =	381.4 kips		
OTM =	341.20 ft-kips	OTM_{ult} =	532.56 ft-kips		
e =	1.24 feet	X bar =	N/A feet		
Soil Pr. =	2.24 ksf, max.,	3.11 ksf, ult.		Required Width =	5.61 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	275.6 kips	P_{ULT} =	381.4 kips		
OTM =	456.0 ft-kips	OTM_{ULT} =	716.21 ft-kips		
e =	1.65 feet	X bar =	N/A feet		
Soil Pr. =	2.41 ksf, max.,	3.34 ksf, ult.		Required Width =	6.03 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	89.3 kips	P (ult) =	107.2 kips		
OTM =	173.1 ft-kips	OTM_{ULT} =	195.44 ft-kips		
e =	1.94 feet	X bar =	N/A feet		
Soil Pr. =	0.82 ksf, max.,	0.98 ksf, ult.		Required Width =	2.05 feet

Resisting Moment = 1953.45 ft-kips Factor of Safety = 15.36

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	7.14 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	48 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	22	inches			
Moment =	11.35 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	170 psi
Shear =	1.70 kips/ft	Fv(allow)=	71 psi	fv(act.)=	10 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.19	sq.in./ft.	v(longit.) =	34 psi
Transverse Steel Required =	0.31	sq.in./ft.	v(transv.)=	52 psi
			V(allow) =	93.1 psi

rudow + berry
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scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 132E/133W Lower Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	82.65	f t - kips
Fy =	60	ksi	FLR LL OTM =	57.52	f t - kips
f 'c =	3000	psi	RF LL OTM =	356.99	f t - kips
Wall DL =	1.30	klf	SEISMIC OTM =	256.08	f t - kips
Roof LL =	4.26	klf	Footing Length :	25.00	feet
Floor LL =	0.68	klf	Footing Width :	5.00	feet
Wall Length =	22.75	feet	Footing Thkness:	12	inches
Wall Thickness =	16	inches	Footing DL :	1.927	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	161.9 kips	P_{ult} =	228.0 kips		
OTM =	393.53 ft-kips	OTM_{ult} =	596.59 ft-kips		
e =	2.43 feet	X bar =	N/A feet		
Soil Pr. =	2.05 ksf, max.,	2.89 ksf, ult.		Required Width =	4.27 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	161.9 kips	P_{ULT} =	228.0 kips		
OTM =	585.6 ft-kips	OTM_{ULT} =	903.89 ft-kips		
e =	3.62 feet	X bar =	N/A feet		
Soil Pr. =	2.42 ksf, max.,	3.41 ksf, ult.		Required Width =	5.04 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	46.6 kips	P (ult) =	55.9 kips		
OTM =	305.7 ft-kips	OTM_{ULT} =	346.32 ft-kips		
e =	6.56 feet	X bar =	5.94 feet		
Soil Pr. =	1.05 ksf, max.,	1.26 ksf, ult.		Required Width =	2.18 feet

Resisting Moment = 971.13 ft-kips Factor of Safety = 4.24

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	3.57 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	24 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	7.66 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	142 psi
Shear =	0.59 kips/ft	Fv(allow)=	71 psi	fv(act.)=	4 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.09	sq.in./ft.	v(longit.) =	14 psi
Transverse Steel Required =	0.21	sq.in./ft.	v(transv.)=	37 psi
			V(allow) =	93.1 psi

rudow + berry
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scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 132E/133W Upper Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	26.75	f t - kips
Fy =	60	ksi	FLR LL OTM =	149.03	f t - kips
f 'c =	3000	psi	RF LL OTM =	243.42	f t - kips
Wall DL =	1.56	klf	SEISMIC OTM =	138.1	f t - kips
Roof LL =	6.78	klf	Footing Length :	25.75	feet
Floor LL =	0.84	klf	Footing Width :	6.00	feet
Wall Length =	22.75	feet	Footing Thkness:	12	inches
Wall Thickness =	16	inches	Footing DL :	2.984	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	242.2 kips	P_{ult} =	342.6 kips		
OTM =	321.09 ft-kips	OTM_{ult} =	503.04 ft-kips		
e =	1.33 feet	X bar =	N/A feet		
Soil Pr. =	2.05 ksf, max.,	2.90	ksf, ult.	Required Width =	5.13 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	242.2 kips	P_{ULT} =	342.6 kips		
OTM =	424.7 ft-kips	OTM_{ULT} =	668.76 ft-kips		
e =	1.75 feet	X bar =	N/A feet		
Soil Pr. =	2.21 ksf, max.,	3.12	ksf, ult.	Required Width =	5.52 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	67.4 kips	P (ult) =	80.9 kips		
OTM =	154.2 ft-kips	OTM_{ULT} =	173.93 ft-kips		
e =	2.29 feet	X bar =	N/A feet		
Soil Pr. =	0.67 ksf, max.,	0.80	ksf, ult.	Required Width =	1.67 feet

Resisting Moment = 1446.22 ft-kips Factor of Safety = 12.83

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	5.18 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	35 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	22	inches			
Moment =	10.66 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	160 psi
Shear =	1.60 kips/ft	Fv(allow)=	71 psi	fv(act.)=	9 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.14	sq.in./ft.	v(longit.) =	24 psi
Transverse Steel Required =	0.29	sq.in./ft.	v(transv.)=	49 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 133 East (EQ OTM to North)

Allow. Soil Pr. =	2.400	ksf	DL OTM =	134.62	f t - kips
Fy =	60	ksi	FLR LL OTM =	-83.49	f t - kips
f 'c =	3000	psi	RF LL OTM =	-885.87	f t - kips
Wall DL =	1.23	klf	SEISMIC OTM =	226.17	f t - kips
Roof LL =	3.76	klf	Footing Length :	48.00	feet
Floor LL =	0.29	klf	Footing Width :	3.00	feet
Wall Length =	44.00	feet	Footing Thkness:	12	inches
Wall Thickness =	10	inches	Footing DL :	0.805	klf

OUTPUT DATA :

EQ'N 16-11 : DL + FL:

P =	258.3 kips	P_{ult} =	376.2 kips		
OTM =	-751.3 ft-kips	OTM_{ult} =	-1256 ft-kips		
e =	-2.91 feet	X bar =	N/A feet		
Soil Pr. =	1.14 ksf, max.,	1.66 ksf, ult.		Required Width =	1.43 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	226.3 kips	P_{ULT} =	325.0 kips		
OTM =	-422.8 ft-kips	OTM_{ULT} =	-730.3 ft-kips		
e =	-1.87 feet	X bar =	N/A feet		
Soil Pr. =	1.20 ksf, max.,	1.73 ksf, ult.		Required Width =	1.51 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	55.6 kips	P (ult) =	66.7 kips		
OTM =	306.9 ft-kips	OTM_{ULT} =	350.24 ft-kips		
e =	5.52 feet	X bar =	N/A feet		
Soil Pr. =	0.65 ksf, max.,	0.78 ksf, ult.		Required Width =	0.82 feet

Resisting Moment = 2224.80 ft-kips Factor of Safety = 9

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	4.69 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	31 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	1.71 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	32 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.12	sq.in./ft.	v(longit.) =	22 psi
Transverse Steel Required =	0.04	sq.in./ft.	v(transv.)=	6 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 133 East (EQ OTM to South)

Allow. Soil Pr. =	2.400	ksf	DL OTM =	-134.62	f t - kips
Fy =	60	ksi	FLR LL OTM =	83.49	f t - kips
f 'c =	3000	psi	RF LL OTM =	885.87	f t - kips
Wall DL =	1.23	klf	SEISMIC OTM =	226.17	f t - kips
Roof LL =	3.76	klf	Footing Length :	48.00	feet
Floor LL =	0.29	klf	Footing Width :	3.00	feet
Wall Length =	44.00	feet	Footing Thkness:	12	inches
Wall Thickness =	10	inches	Footing DL :	0.805	klf

OUTPUT DATA :

EQ'N 16-11 : DL + FL:

P =	258.3 kips	P_{ult} =	376.2 kips		
OTM =	751.3 ft-kips	OTM_{ult} =	1255.8 ft-kips		
e =	2.91 feet	X bar =	N/A feet		
Soil Pr. =	2.45 ksf, max.,	3.56 ksf, ult.		Required Width =	3.06 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	226.3 kips	P_{ULT} =	325.0 kips		
OTM =	762.0 ft-kips	OTM_{ULT} =	1273.1 ft-kips		
e =	3.37 feet	X bar =	N/A feet		
Soil Pr. =	2.23 ksf, max.,	3.21 ksf, ult.		Required Width =	2.79 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	55.6 kips	P (ult) =	66.7 kips		
OTM =	145.4 ft-kips	OTM_{ULT} =	156.38 ft-kips		
e =	2.61 feet	X bar =	N/A feet		
Soil Pr. =	0.51 ksf, max.,	0.61 ksf, ult.		Required Width =	0.64 feet

Resisting Moment = 2224.80 ft-kips Factor of Safety = 29

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	9.63 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	64 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	3.50 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	65 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.26	sq.in./ft.	v(longit.) =	45 psi
Transverse Steel Required =	0.09	sq.in./ft.	v(transv.)=	13 psi
			V(allow) =	93.1 psi

Powdercat
Job #17100

Typical Unit, Far South Shear Wall

Wall	RF to UL	UL to EL
Length	4.00	4.00
Post CL	3.54	3.54
Height	9.92	9.92
Weight	397	397

Loads	Upper Level		Entry Level		
	DL	SL	DL	LL	SL
Left Edge	336	3108	300	480	0
Right Edge	559	5175	500	799	0

Sheathing	UL to EL		EL to BL	
	EQ	Wind	EQ	Wind
Net Shear	229	1287	113	742
Gross Shear	229	1287	342	2029
Shear (plf)	57	322	86	507
WSP	0.940		0.940	
Sheathing	5/8" OS		5/8" OS	
Nails	10d at 4		10d at 4	
Table Shear	1020	1430	1020	1430
Allow. Shear	479	672	479	672
F.S.	8.37	2.09	5.61	1.33

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	2272	12767	OTM @ EL	2272	12767
Ft (EQ/Wind)	641	3605	Ft (EQ/Wind)	641	3605
P_{DL}	336	336	P_{DL}	559.44	559.44
P_{SL}	3108	3108	P_{SL}	5174.82	5174.82
P(min)	-321	-3284	P(min)	-187	-3150
Straps @ EL	MST48		Straps @ EL	MST48	
T_{ALLOW}	3463		T_{ALLOW}	3463	
F.S.	10.80	1.05	F.S.	18.55	1.10
P(max)	3148	5371	P(max)	4922	7144
Lu (ft)	12.33		Lu (ft)	11.67	

Wall Chords at Basement Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	5663	32888	OTM @ EL	5663	32888
Ft (EQ/Wind)	1599	9286	Ft (EQ/Wind)	1599	9286
P_{DL}	636	636	P_{DL}	1059	1059
P_{SL}	3108	3108	P_{SL}	5175	5175
P_{LL}	480	480	P_{LL}	799	799
P(min)	-979	-8666	P(min)	-726	-8413
PULT(min)	-1815	-14114	PULT(min)	-1510	-13810
Holdown	Simpson HDU14-SDS2.5		Holdown	Simpson HDU14-SDS2.5	
TALLOW	14445		TALLOW	14445	
P(max)	4526	10292	P(max)	6739	12504
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Typical Unit, Far South Shear Wall

Powdercat

Job #17100

16d Nails btwn UL and EL			
VUL =	1287	lbs	Wind Controls
VALLOW =	226	lbs	Per NDS Table 12A
# 16d Nails	6	16d @ 8" O.C. Max.	

1/2" Dia. Sill Bolts at Wall Base			
VMAX =	2029	lbs	Wind Controls
VALLOW =	1040	lbs	Per NDS Table 12E
No.Bolts	2	1/2" Dia. AB's @ 24" O.C. Max.	

Foundation Loads			
BL to B.O. FTG =		6	feet
OTM @ B.O.FTG.	EQ =	7.72	ft-kips
	Wind =	45.06	ft-kips
Supporting Stem Length =		20.00	feet
w_{DL} =	606	plf	
w_{SL} =	2084	plf	
w_{LL} =	240	plf	

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA : Typical Unit Far South Wall

Allow. Soil Pr. =	2.400	ksf		DL OTM =	0.00	f t - kips
Fy =	60	ksi		FLR LL OTM =	0	f t - kips
f 'c =	3000	psi		RF LL OTM =	0	f t - kips
Wall DL =	0.61	klf		WIND OTM =	45.06	f t - kips
Roof LL =	2.08	klf		Footing Length :	20.00	feet
Floor LL =	0.24	klf		Footing Width :	2.00	feet
Wall Length =	20.00	feet		Footing Thkness:	12	inches
Wall Thickness =	8	inches		Footing DL :	0.933	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	65.6 kips	P_{ult} =	92.7 kips		
OTM =	0.00 ft-kips	OTM_{ult} =	0 ft-kips		
e =	0.00 feet	X bar =	N/A feet		
Soil Pr. =	1.64 ksf, max.,	2.32 ksf, ult.		Required Width =	1.37 feet

EQ'N 16-13: DL + .75(FL + RL + W)

P =	65.6 kips	P_{ULT} =	92.7 kips		
OTM =	33.8 ft-kips	OTM_{ULT} =	54.072 ft-kips		
e =	0.51 feet	X bar =	N/A feet		
Soil Pr. =	1.89 ksf, max.,	2.68 ksf, ult.		Required Width =	1.58 feet

EQ'N 16-15: 0.6DL + W

P =	18.5 kips	P (ult) =	22.2 kips		
OTM =	45.1 ft-kips	OTM_{ULT} =	72.096 ft-kips		
e =	2.44 feet	X bar =	N/A feet		
Soil Pr. =	0.80 ksf, max.,	0.96 ksf, ult.		Required Width =	0.67 feet

Resisting Moment = 307.87 ft-kips Factor of Safety = 9.76

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	12	inches			
Moment =	0.15 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	9 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	12	inches			
Moment =	1.33 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	80 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

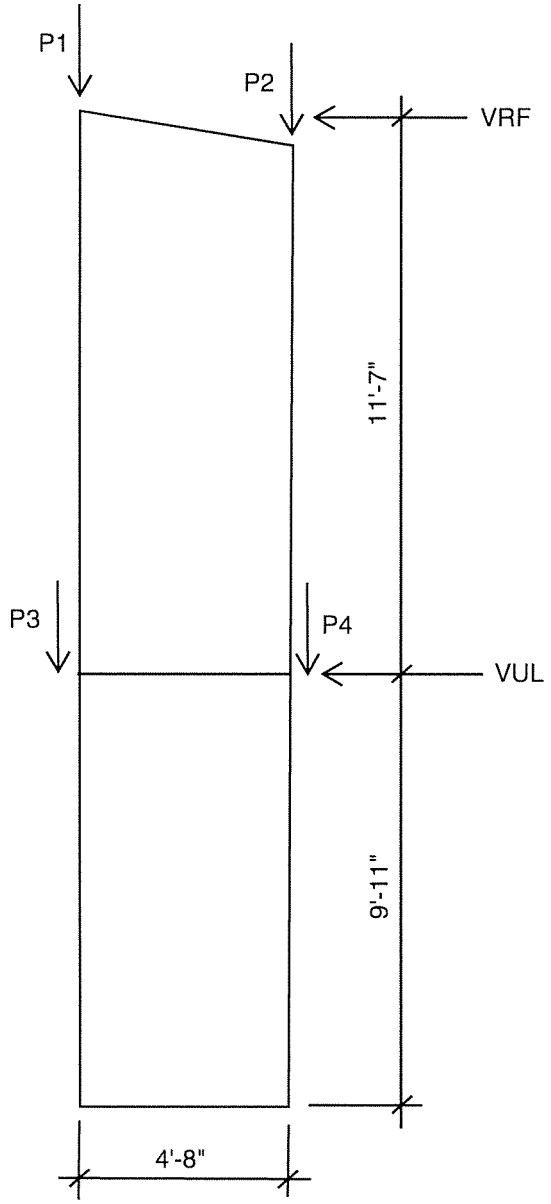
Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.00	sq.in./ft.	v(longit.) =	0 psi
Transverse Steel Required =	0.03	sq.in./ft.	v(transv.)=	0 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat pg
job number: 17100 of

designed by: MAR date: 5/17
checked by: date:

UNIT 124 NORTH SHEAR WALL



VRF = 5689# EQ, 1500# WIND
VUL = 892# EQ, 2126# WIND
6581# EQ, 3626# WIND

P1 = R(OHB25R) + R(OHB27L) =
1457# D + 12991# S

P2 = R(OHB24) = 1968# D + 19076# S

P3 = 2.67(3.83)(25 + 40)
= 256# D + 409# S

P4 = 2.17(4.83)(25 + 40)
= 262# D + 419# S

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 124, North Shear Wall

Powdercat
Job #17100

Wall	RF to UL	UL to EL
Length	4.67	4.67
Post CL	4.00	4.00
Height	11.58	9.92
Weight	540	463

Loads	Roof		Upper Level		
	DL	SL	DL	LL	SL
Left Edge	1457	12991	256	409	0
Right Edge	1968	19076	262	419	0

Sheathing	RF to UL		UL to EL	
	EQ	Wind	EQ	Wind
Net Shear	5689	1500	892	2126
Gross Shear	5689	1500	6581	3626
Shear (plf)	1219	321	1410	777
WSP	0.940		0.984	
Sheathing	5/8" BS		5/8" BS	
Nails	10d at 2		10d at 2	
Table Shear	1740	2435	1740	2435
Allow. Shear	1635	2288	1713	2397
F.S.	1.34	7.12	1.21	3.08

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	65878.62	17370	OTM @ UL	65878.62	17370
Ft (EQ/Wind)	16470	4343	Ft (EQ/Wind)	16470	4343
P_{DL}	1457	1457	P_{DL}	1968	1968
P_{SL}	12991	12991	P_{SL}	19076	19076
P(min)	-15433	-3306	P(min)	-15127	-3000
Straps @ UL	(4) MST37		Straps @ UL	(4) MST37	
T_{ALLOW}	20320		T_{ALLOW}	20320	
F.S.	1.32	6.15	F.S.	1.34	6.77
P(max)	23552	14457	P(max)	28627	19532
Lu (ft)	10.33		Lu (ft)	11.25	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	131140	53328	OTM @ EL	131140	53328
Ft (EQ/Wind)	32785	13332	Ft (EQ/Wind)	32785	13332
P_{DL}	1713	1713	P_{DL}	2230	2230
P_{SL}	12991	12991	P_{SL}	19076	19076
P_{LL}	409	409	P_{LL}	419	419
P(min)	-31456	-12003	P(min)	-31146	-11693
PULT(min)	-50862	-19737	PULT(min)	-50489	-19364
As(req'd) (in2)	0.94	0.37	As(req'd) (in2)	0.93	0.36
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	7	3	No. 3/4" Bolts	7	3
P(max)	36352	21762	P(max)	41440	26850
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Unit 124, North Shear Wall

Powdercat
Job #17100

Lags at Roof Beam - 3/4" Dia. x 8"			
VROOF =	5689	lbs	EQ Controls
VALLOW =	1536	lbs	Per NDS Table 12J
No. Lags	4		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	5689	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	3		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	6581	lbs	EQ Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	3		

Foundation Loads				
EL to B.O. FTG =		4.42	feet	
OTM @ B.O.FTG.	EQ =	160.23	ft-kips	
	Wind =	69.35	ft-kips	
Supporting Stem Length =		18.08	feet	
Left Edge to CL Stem =		6.46	feet	
Right Edge to CL Stem =		1.79	feet	
P_{DL} =	4946	lbs =	274	plf
P_{SL} =	32067	lbs =	1774	plf
P_{LL} =	828	lbs =	46	plf
M_{DL} =	19.20	ft-kips		
M_{SL} =	118.07	ft-kips		
M_{LL} =	3.39	ft-kips		

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA : Unit 124 North Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	19.20	f t - kips
Fy =	60	ksi	FLR LL OTM =	3.39	f t - kips
f 'c =	3000	psi	RF LL OTM =	118.07	f t - kips
Wall DL =	0.27	klf	SEISMIC OTM =	163.52	f t - kips
Roof LL =	1.77	klf	Footing Length :	20.08	feet
Floor LL =	0.05	klf	Footing Width :	4.00	feet
Wall Length =	18.08	feet	Footing Thkness:	12	inches
Wall Thickness =	8	inches	Footing DL :	2.560	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	81.0 kips	P_{ult} =	107.1 kips		
OTM =	110.30 ft-kips	OTM_{ult} =	168.79 ft-kips		
e =	1.36 feet	X bar =	N/A feet		
Soil Pr. =	1.42 ksf, max.,	1.88 ksf, ult.		Required Width =	2.37 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	81.0 kips	P_{ULT} =	107.1 kips		
OTM =	232.9 ft-kips	OTM_{ULT} =	365.02 ft-kips		
e =	2.87 feet	X bar =	N/A feet		
Soil Pr. =	1.88 ksf, max.,	2.48 ksf, ult.		Required Width =	3.13 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	33.8 kips	P (ult) =	40.6 kips		
OTM =	175.0 ft-kips	OTM_{ULT} =	196.97 ft-kips		
e =	5.18 feet	X bar =	4.86 feet		
Soil Pr. =	1.16 ksf, max.,	1.39 ksf, ult.		Required Width =	1.93 feet

Resisting Moment = 565.84 ft-kips Factor of Safety = 4.49

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	2.17 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	14 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	4.74 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	88 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

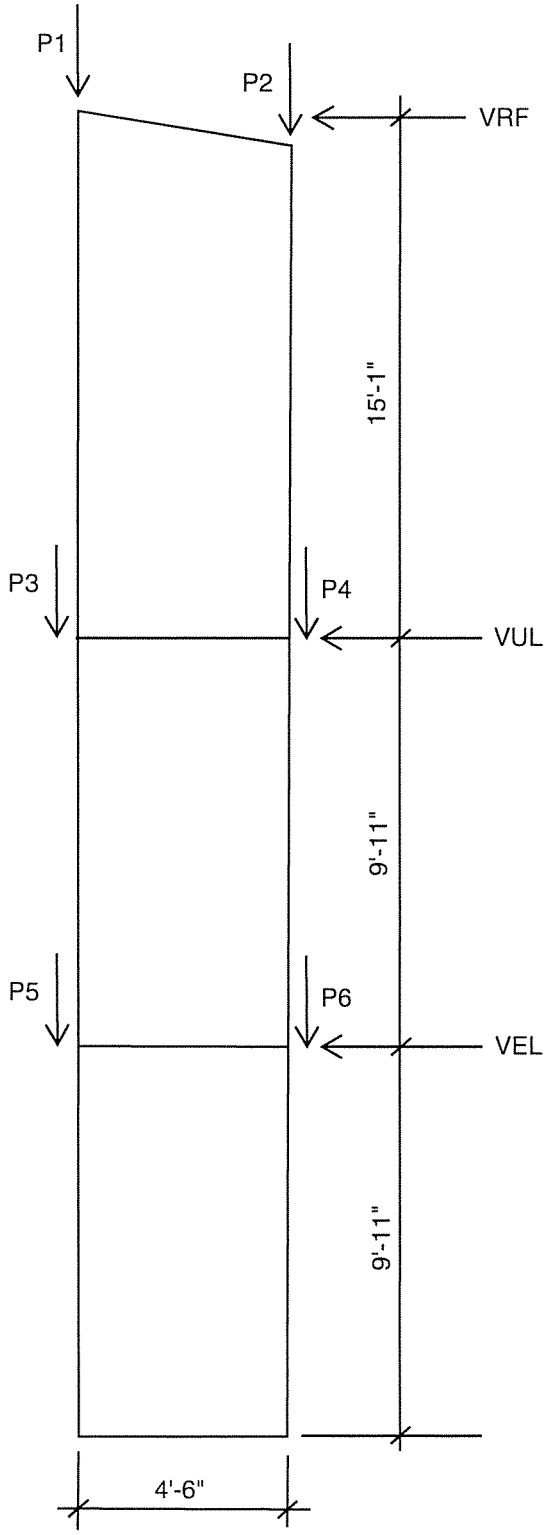
Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.06	sq.in./ft.	v(longit.) =	7 psi
Transverse Steel Required =	0.13	sq.in./ft.	v(transv.)=	23 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

UNIT 124 - SOUTH SHEAR WALL



VRF = 5689# EQ, 1500# WIND
VUL = 1201# EQ, 3210# WIND
VEL = 293# EQ, 1483# WIND

7183# EQ, 6193# WIND

P1 = R(OHB29R) + R(OHB34R)
= 3565# D + 29558# S

P2 = R(EOHB15R) = 650# D + 5231# S

P3 = R(TB3R)
= 2273# D + 282# L + 20656# S

P4 = 0

P5 = R(FB13R) = 2552# D + 3888# L

P6 = 0

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 124, South Shear Wall	Pg 1 of 2

Powdercat
Job #17100

Wall	RF to UL	UL to EL	EL to BL
Length	4.50	4.50	4.50
Post CL	3.75	3.75	3.75
Height	15.08	9.92	9.92
Weight	679	446	446

Gravity Loads	Roof		Upper Level			Entry Level		
	DL	SL	DL	LL	SL	DL	LL	SL
Left Edge	3565	29558	2273	282	20656	2552	3888	0
Right Edge	650	5231	0	0	0	0	0	0

Sheathing	RF to UL		UL to EL		EL to BL	
	EQ	Wind	EQ	Wind	EQ	Wind
Net Shear	5689	1500	1201	3210	293	1483
Gross Shear	5689	1500	6890	4710	7183	6193
Shear (plf)	1264	333	1531	1047	1596	1376
WSP	0.831		0.975		0.975	
Sheathing	5/8" BS		5/8" BS		5/8" BS	
Nails	10d at 2		10d at 2		10d at 2	
Table Shear	1740	2435	1740	2435	1740	2435
Allow. Shear	1446	2024	1696	2373	1696	2373
F.S.	1.14	6.07	1.11	2.27	1.06	1.72

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	85790	22620	OTM @ UL	85790	22620
Ft (EQ/Wind)	22877	6032	Ft (EQ/Wind)	22877	6032
P_{DL}	3565	3565	P_{DL}	650	650
P_{SL}	29558	29558	P_{SL}	5231	5231
P(min)	-20535	-3689	P(min)	-22284	-5438
Straps @ UL	(4) MST48		Straps @ UL	(4) MST48	
T_{ALLOW}	21240		T_{ALLOW}	21240	
F.S.	1.03	5.76	F.S.	0.95	3.91
P(max)	42892	30258	P(max)	23527	9097
Lu (ft)	12.67		Lu (ft)	13.50	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	154116	69327	OTM @ UL	154116	69327
Ft (EQ/Wind)	41098	18487	Ft (EQ/Wind)	41098	18487
P_{DL}	5838	5838	P_{DL}	650	650
P_{SL}	50214	50214	P_{SL}	5231	5231
P_{LL}	282	282	P_{LL}	0	0
P(min)	-37257	-14647	P(min)	-40370	-17760
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	8	3	No. 3/4" Bolts	9	4
P(max)	74533	57575	P(max)	41748	19137
Lu (ft)	9.92		Lu (ft)	9.92	

Unit 124, South Shear Wall	Pg 2 of 2

Powdercat
Job #17100

Wall Chords at Basement Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	225347	130741	OTM @ EL	225347	130741
Ft (EQ/Wind)	60093	34864	Ft (EQ/Wind)	60093	34864
P_{DL}	8390	8390	P_{DL}	650	650
P_{SL}	50214	50214	P_{SL}	5231	5231
P_{LL}	4170	4170	P_{LL}	0	0
P(min)	-54587	-29359	P(min)	-59365	-34137
PULT(min)	-89542	-49177	PULT(min)	-95275	-54910
As(req'd) (in2)	-1.66	-0.91	As(req'd) (in2)	-1.76	-1.02
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	4	3	No. 3/4" Bolts	4	4
P(max)	94247	75326	P(max)	60743	35514
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Strap at Roof Beam Conn. To Wall			
VROOF =	5689	lbs	EQ Controls
Strap	Simpson MST60 w/ (68) 16d Nails		
VALLOW (lbs)	6730		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	5689	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	3		

3/4" Dia. Sill Bolts btwn UL and EL			
VROOF =	6890	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	4		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	7183	lbs	EQ Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	3		

Foundation Loads					
BL to B.O. FTG =		3	feet		
OTM @ B.O.FTG.	EQ =	246.90	ft-kips		
	Wind =	149.32	ft-kips		
Supporting Stem Length =		5.33	feet		
Left Edge to CL Stem =		2.67	feet		
Right Edge to CL Stem =		-1.83	feet		
P_{DL} =	10611	lbs =	1991	plf	
P_{SL} =	55445	lbs =	10402	plf	
P_{LL} =	282	lbs =	53	plf	
M_{DL} =	21.21	ft-kips			
M_{SL} =	124.50	ft-kips			
M_{LL} =	11.13	ft-kips			

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA : Unit 124 South Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	21.21	f t - kips
Fy =	60	ksi	FLR LL OTM =	11.13	f t - kips
f 'c =	3000	psi	RF LL OTM =	124.5	f t - kips
Wall DL =	1.99	klf	SEISMIC OTM =	246.9	f t - kips
Roof LL =	10.40	klf	Footing Length :	16.33	feet
Floor LL =	0.05	klf	Footing Width :	8.00	feet
Wall Length =	5.33	feet	Footing Thkness:	24	inches
Wall Thickness =	8	inches	Footing DL :	3.380	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	107.6 kips	P_{ult} =	145.8 kips		
OTM =	122.93 ft-kips	OTM_{ult} =	188.21 ft-kips		
e =	1.14 feet	X bar =	N/A feet		
Soil Pr. =	1.17 ksf, max.,	1.58 ksf, ult.		Required Width =	3.90 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	107.6 kips	P_{ULT} =	145.8 kips		
OTM =	308.1 ft-kips	OTM_{ULT} =	484.49 ft-kips		
e =	2.86 feet	X bar =	5.30 feet		
Soil Pr. =	1.69 ksf, max.,	2.29 ksf, ult.		Required Width =	5.64 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	39.5 kips	P (ult) =	47.4 kips		
OTM =	259.6 ft-kips	OTM_{ULT} =	291.8 ft-kips		
e =	6.58 feet	X bar =	1.59 feet		
Soil Pr. =	2.07 ksf, max.,	2.48 ksf, ult.		Required Width =	6.90 feet

Resisting Moment = 537.32 ft-kips Factor of Safety = 2.90

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	40	inches			
Moment =	42.26 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	176 psi
Shear =	5.38 kips/ft	Fv(allow)=	71 psi	fv(act.)=	17 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	28	inches			
Moment =	19.87 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	176 psi
Shear =	3.31 kips/ft	Fv(allow)=	71 psi	fv(act.)=	15 psi

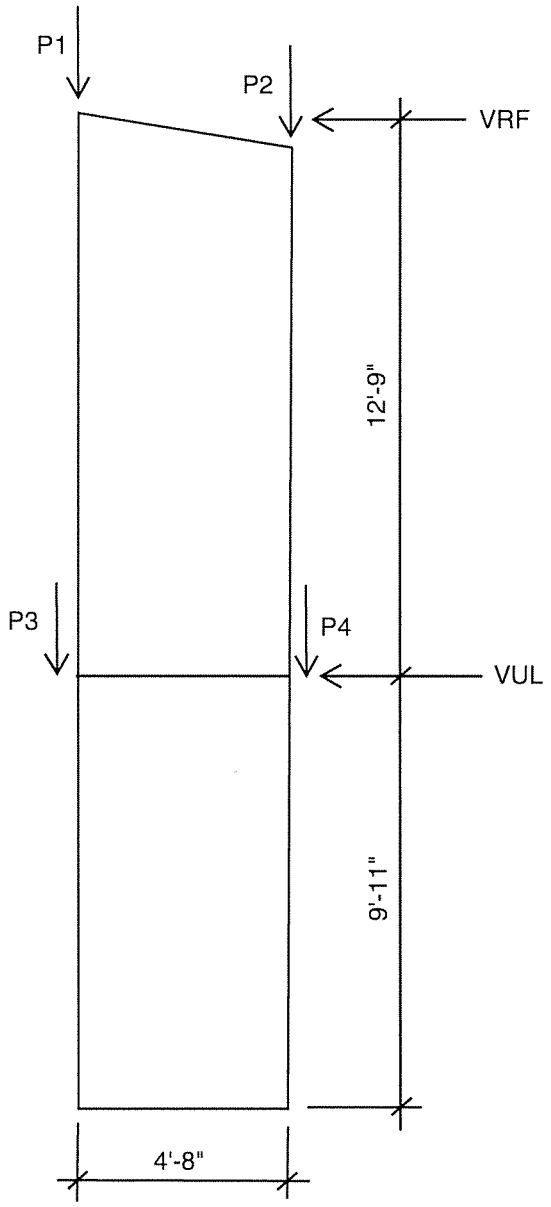
Reinf. Thickness (if used) =	24	inches		
Longitudinal Steel Required =	0.47	sq.in./ft.	v(longit.) =	38 psi
Transverse Steel Required =	0.22	sq.in./ft.	v(transv.)=	20 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

UNIT 125 NORTH SHEAR WALL



VRF = 3869# EQ, 0# WIND
VUL = 697# EQ, 0# WIND
4566# EQ, 0# WIND

P1 = R(OHB22R) = 1372# D + 12605# S

P2 = R(OHB21R) = 2010# D + 19504# S

P3 = 2.33(2.33)(25 + 40)
= 136# D + 218# L

P4 = 2.00(4.83)(25 + 40)
= 242# D + 386# L

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 125, North Shear Wall

Powdercat
Job #17100

Wall	RF to UL	UL to EL
Length	4.67	4.67
Post CL	4.00	4.00
Height	12.75	9.92
Weight	595	463

Loads	Roof		Upper Level		
	DL	SL	DL	LL	SL
Left Edge	1372	12605	136	218	0
Right Edge	2010	19504	242	386	0

Sheathing	RF to UL		UL to EL	
	EQ	Wind	EQ	Wind
Net Shear	3869	0	697	0
Gross Shear	3869	0	4566	0
Shear (plf)	829	0	978	0
WSP	0.908		0.984	
Sheathing	5/8" BS		5/8" BS	
Nails	10d at 4		10d at 4	
Table Shear	1020	1430	1020	1430
Allow. Shear	927	1299	1004	1408
F.S.	1.12	-	1.03	-

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	49329.75	0	OTM @ UL	49329.75	0
Ft (EQ/Wind)	12332	0	Ft (EQ/Wind)	12332	0
P_{DL}	1372	1372	P_{DL}	2010	2010
P_{SL}	12605	12605	P_{SL}	19504	19504
P(min)	-11331	1002	P(min)	-10948	1384
Straps @ UL	(4) MST37		Straps @ UL	(4) MST37	
T_{ALLOW}	20320		T_{ALLOW}	20320	
F.S.	1.79	-	F.S.	1.86	-
P(max)	20075	10826	P(max)	25887	16638
Lu (ft)	12.33		Lu (ft)	11.67	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	94609	0	OTM @ EL	94609	0
Ft (EQ/Wind)	23652	0	Ft (EQ/Wind)	23652	0
P_{DL}	1508	1508	P_{DL}	2252	2252
P_{SL}	12605	12605	P_{SL}	19504	19504
P_{LL}	218	218	P_{LL}	386	386
P(min)	-22430	1222	P(min)	-21984	1669
PULT(min)	-36377	1467	PULT(min)	-35841	2002
As(req'd) (in2)	0.67	-0.03	As(req'd) (in2)	0.66	-0.04
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	5	-	No. 3/4" Bolts	5	-
P(max)	28864	11125	P(max)	34909	17170
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Unit 125, North Shear Wall

Powdercat
Job #17100

Lags at Roof Beam - 3/4" Dia. x 8"			
VROOF =	3869	lbs	EQ Controls
VALLOW =	1536	lbs	Per NDS Table 12J
No. Lags	3		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	3869	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	3		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	4566	lbs	EQ Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	2		

Foundation Loads				
EL to B.O. FTG =		4.42	feet	
OTM @ B.O.FTG.	EQ =	114.79	ft-kips	
	Wind =	0.00	ft-kips	
Supporting Stem Length =		14.92	feet	
Left Edge to CL Stem =		7.46	feet	
Right Edge to CL Stem =		2.79	feet	
P_{DL} =	4818	lbs =	323	plf
P_{SL} =	32109	lbs =	2152	plf
P_{LL} =	604	lbs =	40	plf
M_{DL} =	22.95	ft-kips		
M_{SL} =	148.45	ft-kips		
M_{LL} =	2.70	ft-kips		

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 125 North Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	22.95	f t - kips
Fy =	60	ksi	FLR LL OTM =	2.7	f t - kips
f 'c =	3000	psi	RF LL OTM =	148.45	f t - kips
Wall DL =	0.32	klf	SEISMIC OTM =	114.79	f t - kips
Roof LL =	2.15	klf	Footing Length :	16.92	feet
Floor LL =	0.04	klf	Footing Width :	4.00	feet
Wall Length =	14.92	feet	Footing Thkness:	12	inches
Wall Thickness =	8	inches	Footing DL :	2.310	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	68.4 kips	P_{ult} =	91.9 kips		
OTM =	136.31 ft-kips	OTM_{ult} =	208.92 ft-kips		
e =	1.99 feet	X bar =	N/A feet		
Soil Pr. =	1.73 ksf, max.,	2.32 ksf, ult.		Required Width =	2.88 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	68.4 kips	P_{ULT} =	91.9 kips		
OTM =	222.4 ft-kips	OTM_{ULT} =	346.67 ft-kips		
e =	3.25 feet	X bar =	5.21 feet		
Soil Pr. =	2.19 ksf, max.,	2.94 ksf, ult.		Required Width =	3.65 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	26.3 kips	P (ult) =	31.6 kips		
OTM =	128.6 ft-kips	OTM_{ULT} =	145.09 ft-kips		
e =	4.88 feet	X bar =	3.58 feet		
Soil Pr. =	1.23 ksf, max.,	1.47 ksf, ult.		Required Width =	2.04 feet

Resisting Moment = 371.43 ft-kips Factor of Safety = 3.95

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	2.54 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	17 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	5.38 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	100 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

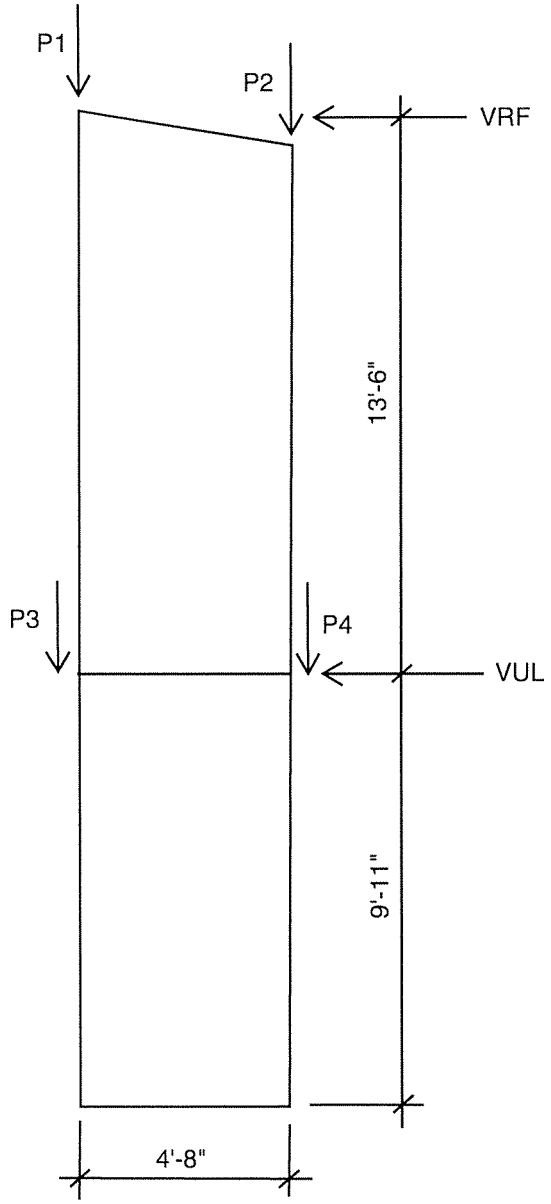
Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.07	sq.in./ft.	v(longit.) =	8 psi
Transverse Steel Required =	0.14	sq.in./ft.	v(transv.)=	27 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

UNIT 126 NORTH SHEAR WALL



VRF = 4534# EQ, 2101# WIND
VUL = 645# EQ, 2728# WIND
5179# EQ, 4829# WIND

P1 = R(OHB19R) = 1972# D + 19121# S

P2 = R(OHB18R) = 1441# D + 13386# S

P3 = 2.00(4.75)(25 + 40)
= 238# D + 380# L

P4 = 1.50(2.67)(25 + 40)
= 100# D + 160# L

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 126, North Shear Wall

Powdercat
Job #17100

Wall	RF to UL	UL to EL
Length	4.67	4.67
Post CL	4.00	4.00
Height	13.50	9.92
Weight	630	463

Loads	Roof		Upper Level		
	DL	SL	DL	LL	SL
Left Edge	1972	19121	238	380	0
Right Edge	1441	13386	100	160	0

Sheathing	RF to UL		UL to EL	
	EQ	Wind	EQ	Wind
Net Shear	4534	2101	645	2728
Gross Shear	4534	2101	5179	4829
Shear (plf)	972	450	1110	1035
WSP	0.888		0.984	
Sheathing	5/8" BS		5/8" BS	
Nails	10d at 3		10d at 3	
Table Shear	1330	1860	1330	1860
Allow. Shear	1182	1652	1309	1831
F.S.	1.22	3.67	1.18	1.77

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	61209	28363.5	OTM @ UL	61209	28363.5
Ft (EQ/Wind)	15302	7091	Ft (EQ/Wind)	15302	7091
P_{DL}	1972	1972	P_{DL}	1441	1441
P_{SL}	19121	19121	P_{SL}	13386	13386
P(min)	-13930	-5719	P(min)	-14249	-6037
Straps @ UL	(4) MST37		Straps @ UL	(4) MST37	
T_{ALLOW}	20320		T_{ALLOW}	20320	
F.S.	1.46	3.55	F.S.	1.43	3.37
P(max)	27789	21631	P(max)	22957	16799
Lu (ft)	12.08		Lu (ft)	13.25	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	112567	76251	OTM @ EL	112567	76251
Ft (EQ/Wind)	28142	19063	Ft (EQ/Wind)	28142	19063
P_{DL}	2210	2210	P_{DL}	1541	1541
P_{SL}	19121	19121	P_{SL}	13386	13386
P_{LL}	380	380	P_{LL}	160	160
P(min)	-26488	-17409	P(min)	-26889	-17810
PULT(min)	-43042	-28516	PULT(min)	-43524	-28998
As(req'd) (in2)	0.80	0.53	As(req'd) (in2)	0.81	0.54
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	6	4	No. 3/4" Bolts	6	4
P(max)	37942	31133	P(max)	32807	25998
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Unit 126, North Shear Wall

Powdercat
Job #17100

Lags at Roof Beam - 3/4" Dia. x 8"			
VROOF =	4534	lbs	EQ Controls
VALLOW =	1536	lbs	Per NDS Table 12J
No. Lags	3		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	4534	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	3		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	5179	lbs	EQ Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	3		

Foundation Loads				
EL to B.O. FTG =		4.42	feet	
OTM @ B.O.FTG.	EQ =	135.46	ft-kips	
	Wind =	97.60	ft-kips	
Supporting Stem Length =		14.83	feet	
Left Edge to CL Stem =		2.75	feet	
Right Edge to CL Stem =		7.42	feet	
P_{DL} =	4844	lbs =	327	plf
P_{SL} =	32507	lbs =	2192	plf
P_{LL} =	540	lbs =	36	plf
M_{DL} =	23.07	ft-kips		
M_{SL} =	151.91	ft-kips		
M_{LL} =	2.23	ft-kips		

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA : Unit 126 North Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	23.07	f t - kips
Fy =	60	ksi	FLR LL OTM =	2.23	f t - kips
f 'c =	3000	psi	RF LL OTM =	151.91	f t - kips
Wall DL =	0.33	klf	SEISMIC OTM =	135.46	f t - kips
Roof LL =	2.19	klf	Footing Length :	16.83	feet
Floor LL =	0.04	klf	Footing Width :	4.00	feet
Wall Length =	14.83	feet	Footing Thkness:	12	inches
Wall Thickness =	8	inches	Footing DL :	2.310	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	68.5 kips	P_{ult} =	92.1 kips		
OTM =	138.68 ft-kips	OTM_{ult} =	212.65 ft-kips		
e =	2.02 feet	X bar =	N/A feet		
Soil Pr. =	1.75 ksf, max.,	2.36 ksf, ult.		Required Width =	2.92 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	68.5 kips	P_{ULT} =	92.1 kips		
OTM =	240.3 ft-kips	OTM_{ULT} =	375.2 ft-kips		
e =	3.51 feet	X bar =	4.91 feet		
Soil Pr. =	2.33 ksf, max.,	3.13 ksf, ult.		Required Width =	3.88 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	26.2 kips	P (ult) =	31.5 kips		
OTM =	149.3 ft-kips	OTM_{ULT} =	168.33 ft-kips		
e =	5.69 feet	X bar =	2.72 feet		
Soil Pr. =	1.61 ksf, max.,	1.93 ksf, ult.		Required Width =	2.68 feet

Resisting Moment = 367.96 ft-kips Factor of Safety = 3.39

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	2.70 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	18 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	5.69 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	105 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

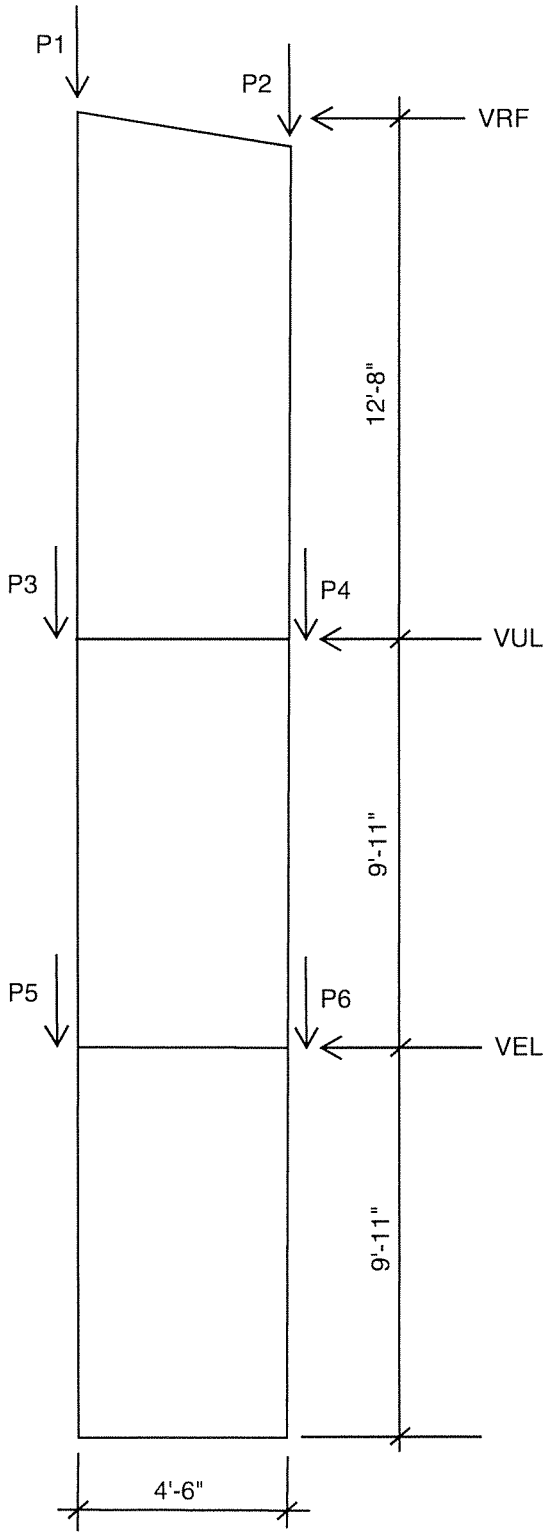
Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.07	sq.in./ft.	v(longit.) =	9 psi
Transverse Steel Required =	0.15	sq.in./ft.	v(transv.)=	29 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

UNIT 125 SOUTH SHEAR WALL



VRF = 3869# EQ, 0# WIND
VUL = 926# EQ, 0# WIND
VEL = 224# EQ, 0# WIND

5019# EQ, 0# WIND

P1 = R(OHB3R) + R(OHB5R)
= 2517# D + 22146# S

P2 = R(EOHB3R) = 1395# D + 13272# S

P3 = R(TB1)
= 1601# D + 206# L + 16607# S

P4 = 0

P5 = R(FB5) = 232# D + 294# L

P6 = 0

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 125, South Shear Wall	Pg 1 of 2

Powdercat
Job #17100

Wall	RF to UL	UL to EL	EL to BL
Length	4.50	4.50	4.50
Post CL	3.75	3.75	3.75
Height	12.67	9.92	9.92
Weight	570	446	446

Loads	Roof		Upper Level			Entry Level		
	DL	SL	DL	LL	SL	DL	LL	SL
Left Edge	2517	22146	1601	206	16607	232	294	0
Right Edge	1395	13272	0	0	0	0	0	0

Sheathing	RF to UL		UL to EL		EL to BL	
	EQ	Wind	EQ	Wind	EQ	Wind
Net Shear	3869	0	926	0	224	0
Gross Shear	3869	0	4795	0	5019	0
Shear (plf)	860	0	1066	0	1115	0
WSP	0.898		0.975		0.975	
Sheathing	5/8" BS		5/8" BS		5/8" BS	
Nails	10d at 3		10d at 3		10d at 3	
Table Shear	1330	1860	1330	1860	1330	1860
Allow. Shear	1194	1670	1296	1813	1296	1813
F.S.	1.39	-	1.22	-	1.16	-

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	49020	0	OTM @ UL	49020	0
Ft (EQ/Wind)	13072	0	Ft (EQ/Wind)	13072	0
P_{DL}	2517	2517	P_{DL}	1395	1395
P_{SL}	22146	22146	P_{SL}	13272	13272
P(min)	-11391	1681	P(min)	-12064	1008
Straps @ UL	(4) MST27		Straps @ UL	(4) MST27	
T_{ALLOW}	14800		T_{ALLOW}	14800	
F.S.	1.30	-	F.S.	1.23	-
P(max)	28931	19127	P(max)	21153	11349
Lu (ft)	11.00		Lu (ft)	10.25	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	96571	0	OTM @ UL	96571	0
Ft (EQ/Wind)	25752	0	Ft (EQ/Wind)	25752	0
P_{DL}	4118	4118	P_{DL}	1395	1395
P_{SL}	38753	38753	P_{SL}	13272	13272
P_{LL}	206	206	P_{LL}	0	0
P(min)	-22976	2776	P(min)	-24610	1142
Straps @ UL	(4) MST60		Straps @ UL	(4) MST60	
T_{ALLOW}	26920		T_{ALLOW}	26920	
F.S.	1.17	-	F.S.	1.09	-
P(max)	52651	33337	P(max)	30663	11349
Lu (ft)	9.92		Lu (ft)	9.92	

Unit 125, South Shear Wall	Pg 2 of 2

Powdercat
Job #17100

Wall Chords at Basement Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	146342	0	OTM @ EL	146342	0
Ft (EQ/Wind)	39025	0	Ft (EQ/Wind)	39025	0
P_{DL}	4350	4350	P_{DL}	1395	1395
P_{SL}	38753	38753	P_{SL}	13272	13272
P_{LL}	500	500	P_{LL}	0	0
P(min)	-35976	3049	P(min)	-37883	1142
PULT(min)	-58781	3659	PULT(min)	-61069	1370
As(req'd) (in2)	1.09	-	As(req'd) (in2)	1.13	-
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	8	-	No. 3/4" Bolts	8	-
P(max)	63058	33790	P(max)	40617	11349
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Strap at Roof Beam Conn. To Wall			
VROOF =	3869	lbs	EQ Controls
Strap	Simpson MST48 w/ (50) 16d Nails		
VALLOW (lbs)	5310		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	3869	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	3		

3/4" Dia. Sill Bolts btwn UL and EL			
VROOF =	4795	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	3		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	5019	lbs	EQ Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	3		

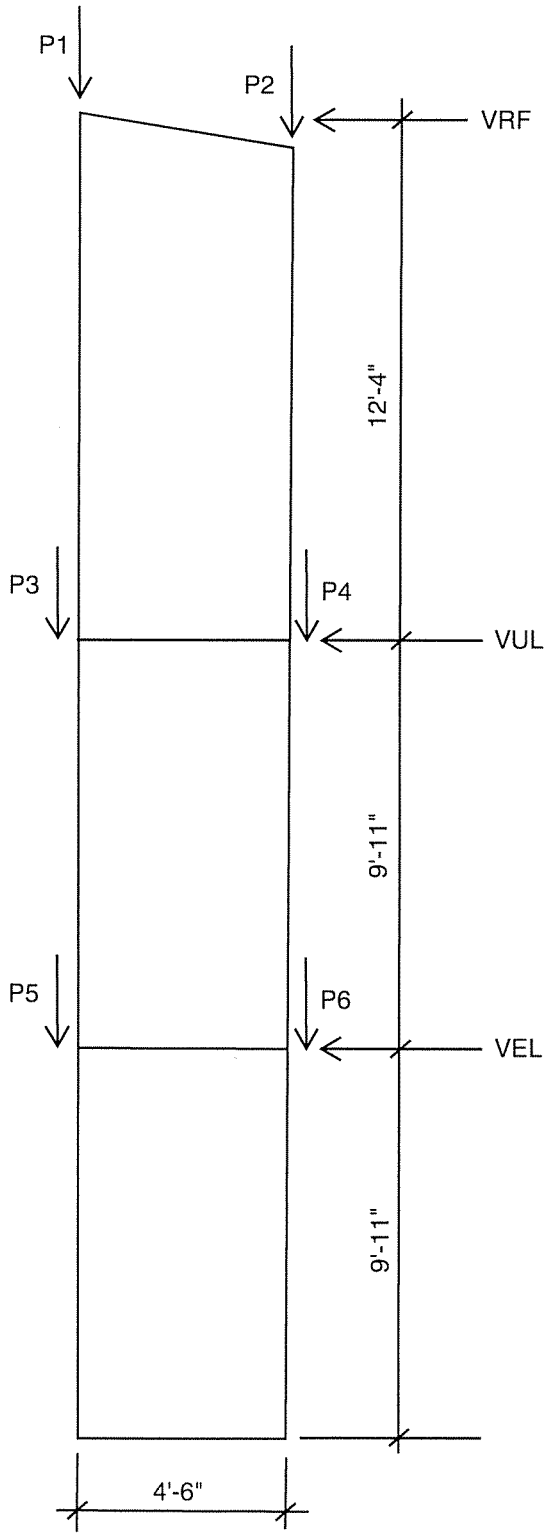
Foundation Loads				
BL to B.O. FTG =		3	feet	
OTM @ B.O.FTG.	EQ =	161.40	ft-kips	
	Wind =	0.00	ft-kips	
Supporting Stem Length =		4.67	feet	
Left Edge to CL Stem =		2.33	feet	
Right Edge to CL Stem =		-2.17	feet	
P_{DL} =	7208	lbs =	1543	plf
P_{SL} =	52025	lbs =	11140	plf
P_{LL} =	500	lbs =	107	plf
M_{DL} =	7.11	ft-kips		
M_{SL} =	61.49	ft-kips		
M_{LL} =	1.17	ft-kips		

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

UNIT 126 SOUTH SHEAR WALL



VRF =	4534# EQ,	2101# WIND
VUL =	866# EQ,	4295# WIND
VEL =	218# EQ,	1483# WIND
	5618# EQ,	7879# WIND

P2 = R(OHB3R) + R(OHB5R)
= 2517# D + 22146# S

P1 = R(EOHB3R) = 1395# D + 13272# S

P4 = R(TB1)
= 1601# D + 206# L + 16607# S

P3 = 0

P6 = R(FB5) = 232# D + 294# L

P5 = 0

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 126, South Shear Wall Pg 1 of 2

Powdercat
Job #17100

Wall	RF to UL	UL to EL	EL to BL
Length	4.50	4.50	4.50
Post CL	3.75	3.75	3.75
Height	12.33	9.92	9.92
Weight	555	446	446

Loads	Roof		Upper Level			Entry Level		
	DL	SL	DL	LL	SL	DL	LL	SL
Left Edge	1395	13272	0	0	0	0	0	0
Right Edge	2517	22146	1601	206	16607	232	294	0

Sheathing	RF to UL		UL to EL		EL to BL	
	EQ	Wind	EQ	Wind	EQ	Wind
Net Shear	4534	2101	866	4295	218	1483
Gross Shear	4534	2101	5400	6396	5618	7879
Shear (plf)	1008	467	1200	1421	1248	1751
WSP	0.908		0.975		0.975	
Sheathing	5/8" BS		5/8" BS		5/8" BS	
Nails	10d at 3		10d at 3		10d at 3	
Table Shear	1330	1860	1330	1860	1330	1860
Allow. Shear	1207	1688	1296	1813	1296	1813
F.S.	1.20	3.62	1.08	1.28	1.04	1.04

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	55904	25905	OTM @ UL	55904	25905
Ft (EQ/Wind)	14908	6908	Ft (EQ/Wind)	14908	6908
P_{DL}	1395	1395	P_{DL}	2517	2517
P_{SL}	13272	13272	P_{SL}	22146	22146
P(min)	-13904	-5905	P(min)	-13231	-5231
Straps @ UL	(4) MST27		Straps @ UL	(4) MST27	
T_{ALLOW}	14800		T_{ALLOW}	14800	
F.S.	1.06	2.51	F.S.	1.12	2.83
P(max)	22530	16530	P(max)	30307	24308
Lu (ft)	9.75		Lu (ft)	10.83	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	109454	89332	OTM @ UL	109454	89332
Ft (EQ/Wind)	29188	23822	Ft (EQ/Wind)	29188	23822
P_{DL}	1395	1395	P_{DL}	4118	4118
P_{SL}	13272	13272	P_{SL}	38753	38753
P_{LL}	0	0	P_{LL}	206	206
P(min)	-28050	-22685	P(min)	-26417	-21051
Straps @ UL	(4) MST60		Straps @ UL	(4) MST60	
T_{ALLOW}	26920		T_{ALLOW}	26920	
F.S.	0.96	1.19	F.S.	1.02	1.28
P(max)	33240	29215	P(max)	55228	51204
Lu (ft)	9.92		Lu (ft)	9.92	

Unit 126, South Shear Wall	Pg 2 of 2

Powdercat
Job #17100

Wall Chords at Basement Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	165166	167466	OTM @ EL	165166	167466
Ft (EQ/Wind)	44044	44658	Ft (EQ/Wind)	44044	44658
P_{DL}	1395	1395	P_{DL}	4350	4118
P_{SL}	13272	13272	P_{SL}	38753	22146
P_{LL}	0	0	P_{LL}	500	206
P(min)	-42773	-43386	P(min)	-41134	-41886
PULT(min)	-68945	-69927	PULT(min)	-66978	-68127
As(req'd) (in2)	1.28	-1.29	As(req'd) (in2)	1.24	-1.26
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	9	9	No. 3/4" Bolts	9	9
P(max)	45439	46053	P(max)	66823	54375
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Strap at Roof Beam Conn. To Wall			
VROOF =	4534	lbs	EQ Controls
Strap	Simpson MST48 w/ (50) 16d Nails		
VALLOW (lbs)	5310		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	4534	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	3		

3/4" Dia. Sill Bolts btwn UL and EL			
VROOF =	6396	lbs	Wind Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	4		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	7879	lbs	Wind Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	4		

Foundation Loads					
BL to B.O. FTG =		3	feet		
OTM @ B.O.FTG.	EQ =	182.02	ft-kips		
	Wind =	191.10	ft-kips		
Supporting Stem Length =		4.67	feet		
Left Edge to CL Stem =		2.17	feet		
Right Edge to CL Stem =		-2.33	feet		
P_{DL} =	7192	lbs =	1540	plf	
P_{SL} =	52025	lbs =	11140	plf	
P_{LL} =	500	lbs =	107	plf	
M_{DL} =	-7.11	ft-kips			
M_{SL} =	-61.49	ft-kips			
M_{LL} =	-1.17	ft-kips			

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 125 & 126 South Walls

Allow. Soil Pr. =	2.400	ksf	DL OTM =	0.00	f t - kips
Fy =	60	ksi	FLR LL OTM =	0	f t - kips
f 'c =	3000	psi	RF LL OTM =	0	f t - kips
Wall DL =	1.54	klf	SEISMIC OTM =	343.42	f t - kips
Roof LL =	11.14	klf	Footing Length :	19.33	feet
Floor LL =	0.11	klf	Footing Width :	7.33	feet
Wall Length =	9.33	feet	Footing Thkness:	24	inches
Wall Thickness =	8	inches	Footing DL :	3.099	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	153.0 kips	P_{ult} =	215.1 kips		
OTM =	0.00 ft-kips	OTM_{ult} =	0.00 ft-kips		
e =	0.00 feet	X bar =	N/A feet		
Soil Pr. =	1.08 ksf, max.,	1.52 ksf, ult.		Required Width =	3.30 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	153.0 kips	P_{ULT} =	215.1 kips		
OTM =	257.6 ft-kips	OTM_{ULT} =	412.1 ft-kips		
e =	1.68 feet	X bar =	N/A feet		
Soil Pr. =	1.64 ksf, max.,	2.31 ksf, ult.		Required Width =	5.02 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	44.6 kips	P (ult) =	53.5 kips		
OTM =	343.4 ft-kips	OTM_{ULT} =	384.63 ft-kips		
e =	7.71 feet	X bar =	1.96 feet		
Soil Pr. =	2.07 ksf, max.,	2.48 ksf, ult.		Required Width =	6.32 feet

Resisting Moment = 717.94 ft-kips Factor of Safety = 2.99

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	38	inches			
Moment =	35.30 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	163 psi
Shear =	4.55 kips/ft	Fv(allow)=	71 psi	fv(act.)=	15 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	26	inches			
Moment =	16.67 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	174 psi
Shear =	2.89 kips/ft	Fv(allow)=	71 psi	fv(act.)=	14 psi

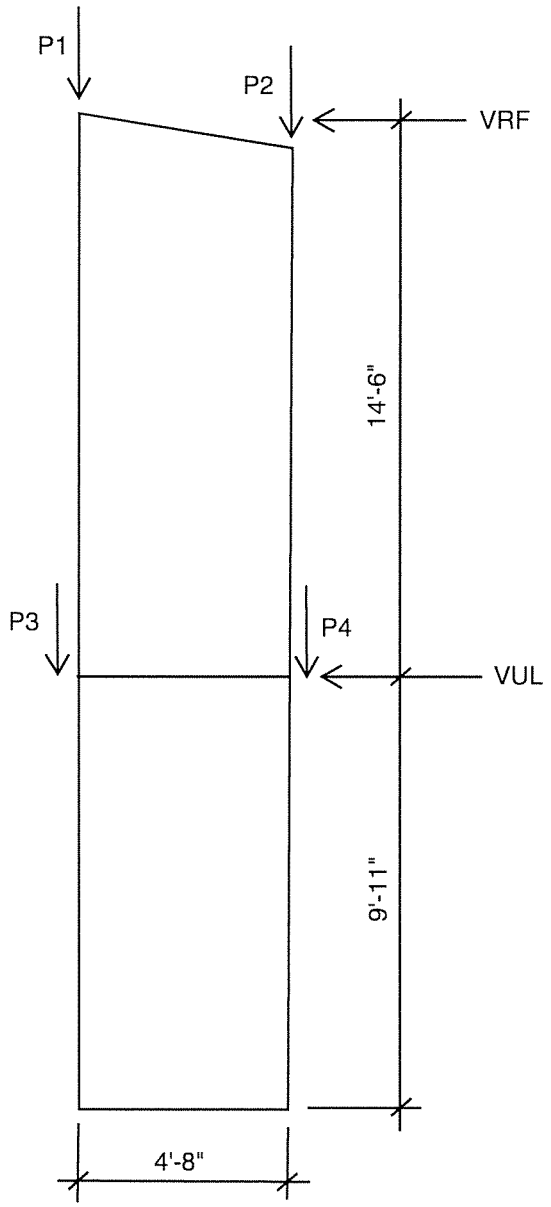
Reinf. Thickness (if used) =	24	inches		
Longitudinal Steel Required =	0.39	sq.in./ft.	v(longit.) =	33 psi
Transverse Steel Required =	0.18	sq.in./ft.	v(transv.)=	16 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

UNIT 127 NORTH SHEAR WALL



VRF = 4409# EQ, 2180# WIND
VUL = 629# EQ, 2806# WIND
5038# EQ, 4986# WIND

P1 = R(OHB2R) = 1405# D + 13026# S

P2 = R(OHB1R) = 1946# D + 18862# S

P3 = 1.33(2.50)(25 + 40)
= 83# D + 133# L

P4 = 1.33(4.83)(25 + 40)
= 161# D + 258# L

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 127, North Shear Wall

Powdercat
Job #17100

Wall	RF to UL	UL to EL
Length	4.67	4.67
Post CL	4.00	4.00
Height	14.50	9.92
Weight	677	463

Loads	Roof		Upper Level		
	DL	SL	DL	LL	SL
Left Edge	1405	13026	83	133	0
Right Edge	1946	18862	161	258	0

Sheathing	RF to UL		UL to EL	
	EQ	Wind	EQ	Wind
Net Shear	4409	2180	629	2806
Gross Shear	4409	2180	5038	4986
Shear (plf)	945	467	1080	1068
WSP	0.862		0.984	
Sheathing	5/8" BS		5/8" BS	
Nails	10d at 3		10d at 3	
Table Shear	1330	1860	1330	1860
Allow. Shear	1146	1603	1309	1831
F.S.	1.21	3.43	1.21	1.71

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	63930.5	31610	OTM @ UL	63930.5	31610
Ft (EQ/Wind)	15983	7903	Ft (EQ/Wind)	15983	7903
P_{DL}	1405	1405	P_{DL}	1946	1946
P_{SL}	13026	13026	P_{SL}	18862	18862
P(min)	-14937	-6857	P(min)	-14612	-6532
Straps @ UL	(4) MST37		Straps @ UL	(4) MST37	
T_{ALLOW}	20320		T_{ALLOW}	20320	
F.S.	1.36	2.96	F.S.	1.39	3.11
P(max)	23161	17101	P(max)	28079	22019
Lu (ft)	14.33		Lu (ft)	13.25	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	113891	81054	OTM @ EL	113891	81054
Ft (EQ/Wind)	28473	20264	Ft (EQ/Wind)	28473	20264
P_{DL}	1488	1488	P_{DL}	2107	2107
P_{SL}	13026	13026	P_{SL}	18862	18862
P_{LL}	133	133	P_{LL}	258	258
P(min)	-27238	-19029	P(min)	-26867	-18658
PULT(min)	-44075	-30940	PULT(min)	-43629	-30495
As(req'd) (in2)	0.82	0.57	As(req'd) (in2)	0.81	0.56
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	6	4	No. 3/4" Bolts	6	4
P(max)	32712	26555	P(max)	37802	31645
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Unit 127, North Shear Wall

Powdercat
Job #17100

Lags at Roof Beam - 3/4" Dia. x 8"			
VROOF =	4409	lbs	EQ Controls
VALLOW =	1536	lbs	Per NDS Table 12J
No. Lags	3		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	4409	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	3		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	5038	lbs	EQ Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	3		

Foundation Loads				
EL to B.O. FTG =		4.42	feet	
OTM @ B.O.FTG.	EQ =	136.16	ft-kips	
	Wind =	103.09	ft-kips	
Supporting Stem Length =		14.92	feet	
Left Edge to CL Stem =		7.46	feet	
Right Edge to CL Stem =		2.79	feet	
P_{DL} =	4734	lbs =	317	plf
P_{SL} =	31888	lbs =	2137	plf
P_{LL} =	391	lbs =	26	plf
M_{DL} =	22.82	ft-kips		
M_{SL} =	149.80	ft-kips		
M_{LL} =	1.71	ft-kips		

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA : Unit 127 North Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	22.82	f t - kips
Fy =	60	ksi	FLR LL OTM =	1.71	f t - kips
f 'c =	3000	psi	RF LL OTM =	149.8	f t - kips
Wall DL =	0.32	klf	SEISMIC OTM =	136.16	f t - kips
Roof LL =	2.14	klf	Footing Length :	16.92	feet
Floor LL =	0.03	klf	Footing Width :	4.00	feet
Wall Length =	14.92	feet	Footing Thkness:	12	inches
Wall Thickness =	8	inches	Footing DL :	2.310	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	68.0 kips	P_{ult} =	91.3 kips		
OTM =	136.45 ft-kips	OTM_{ult} =	209.20 ft-kips		
e =	2.01 feet	X bar =	N/A feet		
Soil Pr. =	1.72 ksf, max.,	2.31 ksf, ult.		Required Width =	2.87 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	68.0 kips	P_{ULT} =	91.3 kips		
OTM =	238.6 ft-kips	OTM_{ULT} =	372.59 ft-kips		
e =	3.51 feet	X bar =	4.95 feet		
Soil Pr. =	2.29 ksf, max.,	3.07 ksf, ult.		Required Width =	3.82 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	26.3 kips	P (ult) =	31.5 kips		
OTM =	149.9 ft-kips	OTM_{ULT} =	168.93 ft-kips		
e =	5.70 feet	X bar =	2.76 feet		
Soil Pr. =	1.59 ksf, max.,	1.91 ksf, ult.		Required Width =	2.65 feet

Resisting Moment = 370.67 ft-kips Factor of Safety = 3.40

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	2.65 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	18 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	5.59 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	104 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

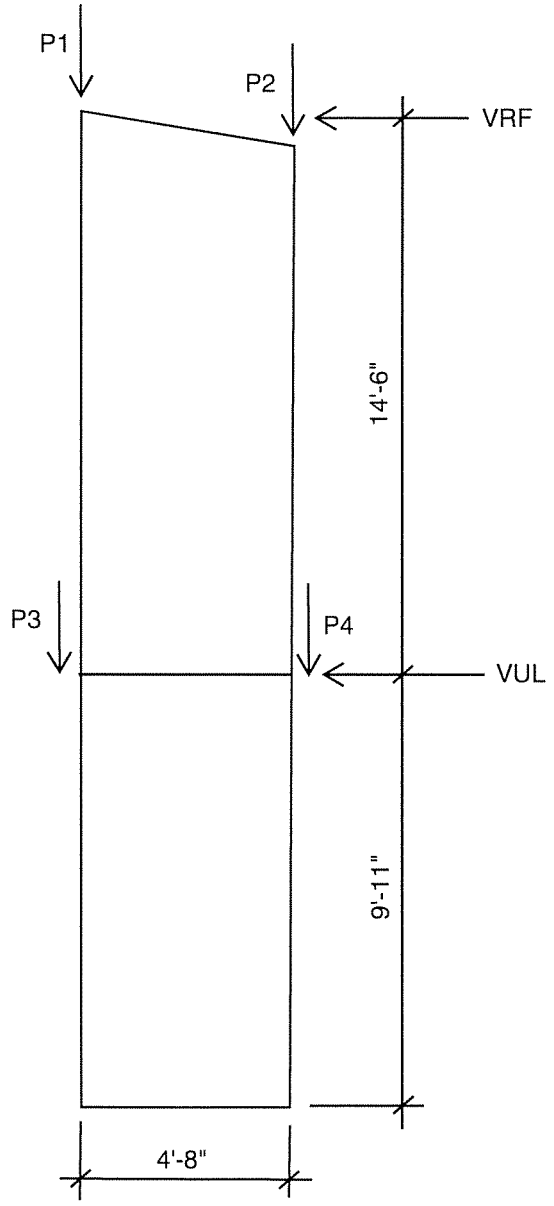
Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.07	sq.in./ft.	v(longit.) =	9 psi
Transverse Steel Required =	0.15	sq.in./ft.	v(transv.)=	28 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

UNIT 128 NORTH SHEAR WALL



VRF = 3644# EQ, 0# WIND
VUL = 626# EQ, 0# WIND
4270# EQ, 0# WIND

P1 = R(OHB1R) = 1946# D + 18862# S

P2 = R(OHB2R) = 1405# D + 13026# S

P3 = 1.33(4.83)(25 + 40)
= 161# D + 258# L

P4 = 1.33(2.33)(25 + 40)
= 78# D + 124# L

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 128, North Shear Wall

Powdercat
Job #17100

Wall	RF to UL	UL to EL
Length	4.67	4.67
Post CL	4.00	4.00
Height	14.50	9.92
Weight	677	463

Loads	Roof		Upper Level		
	DL	SL	DL	LL	SL
Left Edge	1946	18862	161	258	0
Right Edge	1405	13026	78	124	0

Sheathing	RF to UL		UL to EL	
	EQ	Wind	EQ	Wind
Net Shear	3644	0	626	0
Gross Shear	3644	0	4270	0
Shear (plf)	781	0	915	0
WSP	0.862		0.984	
Sheathing	5/8" BS		5/8" BS	
Nails	10d at 3		10d at 3	
Table Shear	1330	1860	1330	1860
Allow. Shear	1146	1603	1309	1831
F.S.	1.47	-	1.43	-

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	52838	0	OTM @ UL	52838	0
Ft (EQ/Wind)	13210	0	Ft (EQ/Wind)	13210	0
P_{DL}	1946	1946	P_{DL}	1405	1405
P_{SL}	18862	18862	P_{SL}	13026	13026
P(min)	-11839	1371	P(min)	-12164	1046
Straps @ UL	(4) MST37		Straps @ UL	(4) MST37	
T_{ALLOW}	20320		T_{ALLOW}	20320	
F.S.	1.72	-	F.S.	1.67	-
P(max)	26000	16093	P(max)	21082	11175
Lu (ft)	14.33		Lu (ft)	13.25	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	95182	0	OTM @ EL	95182	0
Ft (EQ/Wind)	23796	0	Ft (EQ/Wind)	23796	0
P_{DL}	2107	2107	P_{DL}	1483	1483
P_{SL}	18862	18862	P_{SL}	13026	13026
P_{LL}	258	258	P_{LL}	124	124
P(min)	-22190	1606	P(min)	-22564	1232
PULT(min)	-36146	1927	PULT(min)	-36595	1478
As(req'd) (in2)	0.67	-0.04	As(req'd) (in2)	0.68	-0.03
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	5	-	No. 3/4" Bolts	5	-
P(max)	34294	16447	P(max)	29192	11346
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Unit 128, North Shear Wall

Powdercat
Job #17100

Lags at Roof Beam - 3/4" Dia. x 8"			
VROOF =	3644	lbs	EQ Controls
VALLOW =	1536	lbs	Per NDS Table 12J
No. Lags	3		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	3644	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	2		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	4270	lbs	EQ Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	2		

Foundation Loads				
EL to B.O. FTG =		4.92	feet	
OTM @ B.O.FTG.	EQ =	116.19	ft-kips	
	Wind =	0.00	ft-kips	
Supporting Stem Length =		14.83	feet	
Left Edge to CL Stem =		2.75	feet	
Right Edge to CL Stem =		7.42	feet	
P_{DL} =	4729	lbs =	319	plf
P_{SL} =	31888	lbs =	2150	plf
P_{LL} =	382	lbs =	26	plf
M_{DL} =	22.59	ft-kips		
M_{SL} =	148.52	ft-kips		
M_{LL} =	1.63	ft-kips		

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA : Unit 128 North Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	22.59	f t - kips
Fy =	60	ksi	FLR LL OTM =	1.63	f t - kips
f 'c =	3000	psi	RF LL OTM =	148.52	f t - kips
Wall DL =	0.32	klf	SEISMIC OTM =	116.19	f t - kips
Roof LL =	2.15	klf	Footing Length :	16.83	feet
Floor LL =	0.03	klf	Footing Width :	4.00	feet
Wall Length =	14.83	feet	Footing Thkness:	12	inches
Wall Thickness =	8	inches	Footing DL :	2.310	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	67.8 kips	P_{ult} =	91.1 kips		
OTM =	135.20 ft-kips	OTM_{ult} =	207.29 ft-kips		
e =	1.99 feet	X bar =	N/A feet		
Soil Pr. =	1.72 ksf, max.,	2.31 ksf, ult.		Required Width =	2.87 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	67.8 kips	P_{ULT} =	91.1 kips		
OTM =	222.3 ft-kips	OTM_{ULT} =	346.72 ft-kips		
e =	3.28 feet	X bar =	5.14 feet		
Soil Pr. =	2.20 ksf, max.,	2.95 ksf, ult.		Required Width =	3.67 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	26.2 kips	P (ult) =	31.4 kips		
OTM =	129.7 ft-kips	OTM_{ULT} =	146.4 ft-kips		
e =	4.96 feet	X bar =	3.46 feet		
Soil Pr. =	1.26 ksf, max.,	1.51 ksf, ult.		Required Width =	2.10 feet

Resisting Moment = 366.96 ft-kips Factor of Safety = 3.87

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	2.55 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	17 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	5.40 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	100 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

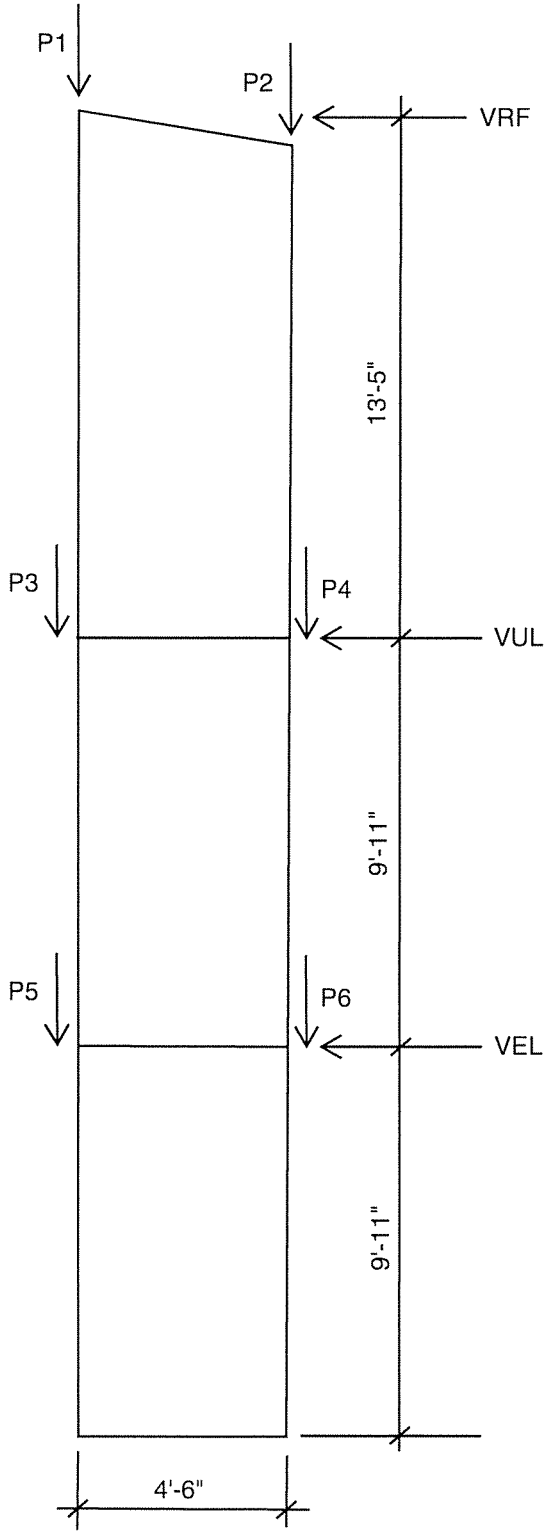
Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.07	sq.in./ft.	v(longit.) =	8 psi
Transverse Steel Required =	0.14	sq.in./ft.	v(transv.)=	27 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

UNIT 127 SOUTH SHEAR WALL



VRF =	4409# EQ,	2180# WIND
VUL =	853# EQ,	3977# WIND
VEL =	221# EQ,	1483# WIND
	5483# EQ,	7640# WIND

P1 = R(OHB3R) + R(OHB5R)
= 2517# D + 22146# S

P2 = R(EOHB3R) = 1395# D + 13272# S

P3 = R(TB1)
= 1601# D + 206# L + 16607# S

P4 = 0

P5 = R(FB5) = 232# D + 294# L

P6 = 0

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 127, South Shear Wall Pg 1 of 2

Powdercat
Job #17100

Wall	RF to UL	UL to EL	EL to BL
Length	4.50	4.50	4.50
Post CL	3.83	3.83	3.83
Height	13.42	9.92	9.92
Weight	604	446	446

Loads	Roof		Upper Level			Entry Level		
	DL	SL	DL	LL	SL	DL	LL	SL
Left Edge	2517	22146	1601	206	16607	232	294	0
Right Edge	1395	13272	0	0	0	0	0	0

Sheathing	RF to UL		UL to EL		EL to BL	
	EQ	Wind	EQ	Wind	EQ	Wind
Net Shear	4409	2180	853	3977	221	1483
Gross Shear	4409	2180	5262	6157	5483	7640
Shear (plf)	980	484	1169	1368	1218	1698
WSP	0.877		0.975		0.975	
Sheathing	5/8" BS		5/8" BS		5/8" BS	
Nails	10d at 3		10d at 3		10d at 3	
Table Shear	1330	1860	1330	1860	1330	1860
Allow. Shear	1167	1632	1296	1813	1296	1813
F.S.	1.19	3.37	1.11	1.32	1.06	1.07

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	59169	29256	OTM @ UL	59169	29256
Ft (EQ/Wind)	15435	7632	Ft (EQ/Wind)	15435	7632
P_{DL}	2517	2517	P_{DL}	1395	1395
P_{SL}	22146	22146	P_{SL}	13272	13272
P(min)	-13744	-5941	P(min)	-14417	-6614
Straps @ UL	(4) MST27		Straps @ UL	(4) MST27	
T_{ALLOW}	14800		T_{ALLOW}	14800	
F.S.	1.08	2.49	F.S.	1.03	2.24
P(max)	30703	24850	P(max)	22926	17073
Lu (ft)	11.83		Lu (ft)	10.83	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	111350	90313	OTM @ UL	111350	90313
Ft (EQ/Wind)	29048	23560	Ft (EQ/Wind)	29048	23560
P_{DL}	4118	4118	P_{DL}	1395	1395
P_{SL}	38753	38753	P_{SL}	13272	13272
P_{LL}	206	206	P_{LL}	0	0
P(min)	-26262	-20774	P(min)	-27896	-22408
Straps @ UL	(4) MST60		Straps @ UL	(4) MST60	
T_{ALLOW}	26920		T_{ALLOW}	26920	
F.S.	1.03	1.30	F.S.	0.97	1.20
P(max)	55123	51007	P(max)	33135	29019
Lu (ft)	9.92		Lu (ft)	9.92	

Unit 127, South Shear Wall	Pg 2 of 2

Powdercat
Job #17100

Wall Chords at Basement Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	165723	166076	OTM @ EL	165723	166076
Ft (EQ/Wind)	43232	43324	Ft (EQ/Wind)	43232	43324
P_{DL}	4350	4350	P_{DL}	1395	1395
P_{SL}	38753	38753	P_{SL}	13272	13272
P_{LL}	500	500	P_{LL}	0	0
P(min)	-40173	-40265	P(min)	-42080	-42172
PULT(min)	-65501	-65648	PULT(min)	-67789	-67936
As(req'd) (in2)	1.21	1.22	As(req'd) (in2)	1.26	1.26
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	8	8	No. 3/4" Bolts	9	9
P(max)	66214	66283	P(max)	44627	44719
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Strap at Roof Beam Conn. To Wall			
VROOF =	4409	lbs	EQ Controls
Strap	Simpson MST48 w/ (50) 16d Nails		
VALLOW (lbs)	5310		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	4409	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	3		

3/4" Dia. Sill Bolts btwn UL and EL			
VROOF =	6157	lbs	Wind Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	4		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	7640	lbs	Wind Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	4		

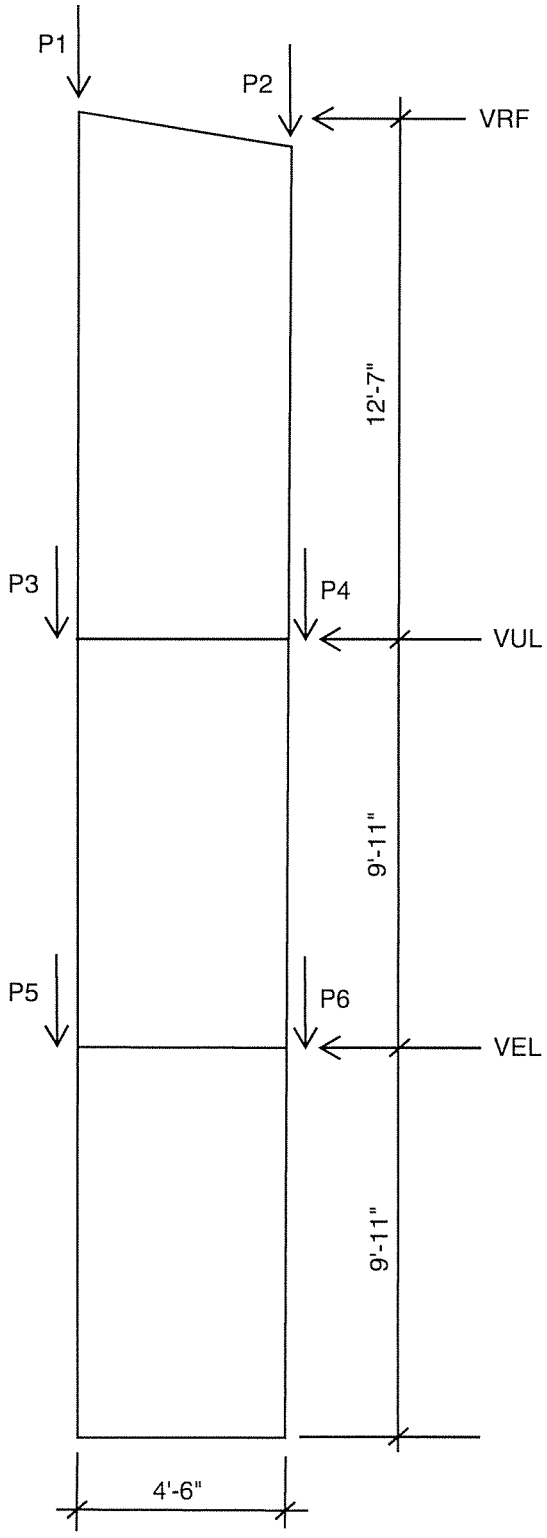
Foundation Loads				
BL to B.O. FTG =		3	feet	
OTM @ B.O.FTG.	EQ =	182.17	ft-kips	
	Wind =	189.00	ft-kips	
Supporting Stem Length =		4.67	feet	
Left Edge to CL Stem =		2.33	feet	
Right Edge to CL Stem =		-2.17	feet	
P_{DL} =	7241	lbs =	1551	plf
P_{SL} =	52025	lbs =	11140	plf
P_{LL} =	500	lbs =	107	plf
M_{DL} =	7.11	ft-kips		
M_{SL} =	61.49	ft-kips		
M_{LL} =	1.17	ft-kips		

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

UNIT 128 SOUTH SHEAR WALL



VRF = 3644# EQ, 0# WIND
VUL = 850# EQ, 0# WIND
VEL = 220# EQ, 0# WIND

4714# EQ, 0# WIND

P2 = R(OHB3R) + R(OHB5R)
= 2517# D + 22146# S

P1 = R(EOHB3R) = 1395# D + 13272# S

P4 = R(TB1)
= 1601# D + 206# L + 16607# S

P3 = 0

P6 = R(FB5) = 232# D + 294# L

P5 = 0

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 128, South Shear Wall Pg 1 of 2

Powdercat
Job #17100

Wall	RF to UL	UL to EL	EL to BL
Length	4.50	4.50	4.50
Post CL	3.75	3.75	3.75
Height	12.58	9.92	9.92
Weight	566	446	446

Loads	Roof		Upper Level			Entry Level		
	DL	SL	DL	LL	SL	DL	LL	SL
Left Edge	1395	13272	0	0	0	0	0	0
Right Edge	2517	22146	1601	206	16607	232	294	0

Sheathing	RF to UL		UL to EL		EL to BL	
	EQ	Wind	EQ	Wind	EQ	Wind
Net Shear	3644	0	850	0	220	0
Gross Shear	3644	0	4494	0	4714	0
Shear (plf)	810	0	999	0	1048	0
WSP	0.901		0.975		0.975	
Sheathing	5/8" BS		5/8" BS		5/8" BS	
Nails	10d at 3		10d at 3		10d at 3	
Table Shear	1330	1860	1330	1860	1330	1860
Allow. Shear	1198	1675	1296	1813	1296	1813
F.S.	1.48	-	1.30	-	1.24	-

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	45842	0	OTM @ UL	45842	0
Ft (EQ/Wind)	12224	0	Ft (EQ/Wind)	12224	0
P_{DL}	1395	1395	P_{DL}	2517	2517
P_{SL}	13272	13272	P_{SL}	22146	22146
P(min)	-11218	1007	P(min)	-10544	1680
Straps @ UL	(4) MST27		Straps @ UL	(4) MST27	
T_{ALLOW}	14800		T_{ALLOW}	14800	
F.S.	1.32	-	F.S.	1.40	-
P(max)	20517	11349	P(max)	28295	19127
Lu (ft)	9.75		Lu (ft)	11.17	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	90407	0	OTM @ UL	90407	0
Ft (EQ/Wind)	24109	0	Ft (EQ/Wind)	24109	0
P_{DL}	1395	1395	P_{DL}	4118	4118
P_{SL}	13272	13272	P_{SL}	38753	38753
P_{LL}	0	0	P_{LL}	206	206
P(min)	-22968	1141	P(min)	-21334	2775
Straps @ UL	(4) MST60		Straps @ UL	(4) MST60	
T_{ALLOW}	26920		T_{ALLOW}	26920	
F.S.	1.17	-	F.S.	1.26	-
P(max)	29430	11349	P(max)	51419	33337
Lu (ft)	9.92		Lu (ft)	9.92	

Unit 128, South Shear Wall	Pg 2 of 2

Powdercat
Job #17100

Wall Chords at Basement Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	137154	0	OTM @ EL	137154	0
Ft (EQ/Wind)	36574	0	Ft (EQ/Wind)	36574	0
P_{DL}	1395	1395	P_{DL}	4350	4118
P_{SL}	13272	13272	P_{SL}	38753	22146
P_{LL}	0	0	P_{LL}	500	206
P(min)	-35300	1275	P(min)	-33661	2775
PULT(min)	-56990	1529	PULT(min)	-55023	3329
As(req'd) (in2)	1.06	-	As(req'd) (in2)	1.02	-
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	8	-	No. 3/4" Bolts	7	-
P(max)	38780	11349	P(max)	61221	20882
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Strap at Roof Beam Conn. To Wall			
VROOF =	3644	lbs	EQ Controls
Strap	Simpson MST48 w/ (50) 16d Nails		
VALLOW (lbs)	5310		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	3644	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	2		

3/4" Dia. Sill Bolts btwn UL and EL			
VROOF =	4494	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	3		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	4714	lbs	EQ Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	2		

Foundation Loads				
BL to B.O. FTG =		3	feet	
OTM @ B.O.FTG.	EQ =	151.30	ft-kips	
	Wind =	0.00	ft-kips	
Supporting Stem Length =		4.67	feet	
Left Edge to CL Stem =		2.17	feet	
Right Edge to CL Stem =		-2.33	feet	
P_{DL} =	7204	lbs =	1543	plf
P_{SL} =	52025	lbs =	11140	plf
P_{LL} =	500	lbs =	107	plf
M_{DL} =	-7.11	ft-kips		
M_{SL} =	-61.49	ft-kips		
M_{LL} =	-1.17	ft-kips		

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 127 & 128 South Walls

Allow. Soil Pr. =	2.400	ksf	DL OTM =	0.00	f t - kips
Fy =	60	ksi	FLR LL OTM =	0	f t - kips
f 'c =	3000	psi	RF LL OTM =	0	f t - kips
Wall DL =	1.55	klf	SEISMIC OTM =	333.47	f t - kips
Roof LL =	11.14	klf	Footing Length :	19.33	feet
Floor LL =	0.11	klf	Footing Width :	7.33	feet
Wall Length =	9.33	feet	Footing Thkness:	24	inches
Wall Thickness =	8	inches	Footing DL :	3.099	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	153.0 kips	P_{ult} =	215.1 kips		
OTM =	0.00 ft-kips	OTM_{ult} =	0.00 ft-kips		
e =	0.00 feet	X bar =	N/A feet		
Soil Pr. =	1.08 ksf, max.,	1.52 ksf, ult.		Required Width =	3.30 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	153.0 kips	P_{ULT} =	215.1 kips		
OTM =	250.1 ft-kips	OTM_{ULT} =	400.16 ft-kips		
e =	1.63 feet	X bar =	N/A feet		
Soil Pr. =	1.63 ksf, max.,	2.29 ksf, ult.		Required Width =	4.97 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	44.6 kips	P (ult) =	53.5 kips		
OTM =	333.5 ft-kips	OTM_{ULT} =	373.49 ft-kips		
e =	7.48 feet	X bar =	2.19 feet		
Soil Pr. =	1.85 ksf, max.,	2.22 ksf, ult.		Required Width =	5.66 feet

Resisting Moment = 718.39 ft-kips Factor of Safety = 3.08

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	36	inches			
Moment =	31.64 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	164 psi
Shear =	4.45 kips/ft	Fv(allow)=	71 psi	fv(act.)=	15 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	26	inches			
Moment =	14.94 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	156 psi
Shear =	2.59 kips/ft	Fv(allow)=	71 psi	fv(act.)=	12 psi

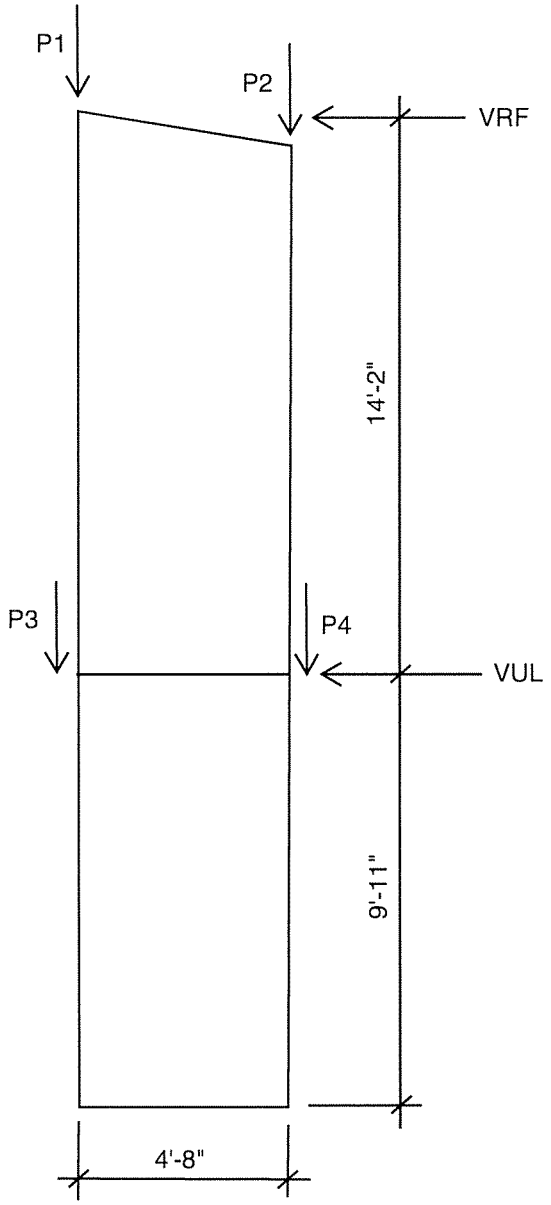
Reinf. Thickness (if used) =	24	inches		
Longitudinal Steel Required =	0.35	sq.in./ft.	v(longit.) =	30 psi
Transverse Steel Required =	0.16	sq.in./ft.	v(transv.)=	15 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

UNIT 129 NORTH SHEAR WALL



VRF = 3644# EQ, 0# WIND
VUL = 626# EQ, 0# WIND
4270# EQ, 0# WIND

P1 = R(OHB2R) = 1405# D + 13026# S

P2 = R(OHB1R) = 1946# D + 18862# S

P3 = 1.33(2.33)(25 + 40)
= 78# D + 124# L

P4 = 1.33(4.83)(25 + 40)
= 161# D + 258# L

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 129, North Shear Wall

Powdercat
Job #17100

Wall	RF to UL	UL to EL
Length	4.67	4.67
Post CL	4.00	4.00
Height	14.17	9.92
Weight	661	463

Loads	Roof		Upper Level		
	DL	SL	DL	LL	SL
Left Edge	1405	13026	78	124	0
Right Edge	1946	18862	161	258	0

Sheathing	RF to UL		UL to EL	
	EQ	Wind	EQ	Wind
Net Shear	3644	0	626	0
Gross Shear	3644	0	4270	0
Shear (plf)	781	0	915	0
WSP	0.870		0.984	
Sheathing	5/8" BS		5/8" BS	
Nails	10d at 3		10d at 3	
Table Shear	1330	1860	1330	1860
Allow. Shear	1158	1619	1309	1831
F.S.	1.48	-	1.43	-

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	51635.48	0	OTM @ UL	51635.48	0
Ft (EQ/Wind)	12909	0	Ft (EQ/Wind)	12909	0
P_{DL}	1405	1405	P_{DL}	1946	1946
P_{SL}	13026	13026	P_{SL}	18862	18862
P(min)	-11867	1041	P(min)	-11543	1366
Straps @ UL	(4) MST37		Straps @ UL	(4) MST37	
T_{ALLOW}	20320		T_{ALLOW}	20320	
F.S.	1.71	-	F.S.	1.76	-
P(max)	20856	11175	P(max)	25774	16093
Lu (ft)	13.75		Lu (ft)	13	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	93980	0	OTM @ EL	93980	0
Ft (EQ/Wind)	23495	0	Ft (EQ/Wind)	23495	0
P_{DL}	1483	1483	P_{DL}	2107	2107
P_{SL}	13026	13026	P_{SL}	18862	18862
P_{LL}	124	124	P_{LL}	258	258
P(min)	-22268	1227	P(min)	-21894	1601
PULT(min)	-36119	1472	PULT(min)	-35670	1922
As(req'd) (in2)	0.67	-0.03	As(req'd) (in2)	0.66	-0.04
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	5	-	No. 3/4" Bolts	5	-
P(max)	28967	11346	P(max)	34068	16447
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Unit 129, North Shear Wall

Powdercat
Job #17100

Lags at Roof Beam - 3/4" Dia. x 8"			
VROOF =	3644	lbs	EQ Controls
VALLOW =	1536	lbs	Per NDS Table 12J
No. Lags	3		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	3644	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	2		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	4270	lbs	EQ Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	2		

Foundation Loads				
EL to B.O. FTG =		4.67	feet	
OTM @ B.O.FTG.	EQ =	113.92	ft-kips	
	Wind =	0.00	ft-kips	
Supporting Stem Length =		14.92	feet	
Left Edge to CL Stem =		7.46	feet	
Right Edge to CL Stem =		2.79	feet	
P_{DL} =	4714	lbs =	316	plf
P_{SL} =	31888	lbs =	2137	plf
P_{LL} =	382	lbs =	26	plf
M_{DL} =	22.70	ft-kips		
M_{SL} =	149.80	ft-kips		
M_{LL} =	1.64	ft-kips		

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA : Unit 129 North Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	22.70	f t - kips
Fy =	60	ksi	FLR LL OTM =	1.64	f t - kips
f 'c =	3000	psi	RF LL OTM =	149.8	f t - kips
Wall DL =	0.32	klf	SEISMIC OTM =	113.92	f t - kips
Roof LL =	2.14	klf	Footing Length :	16.92	feet
Floor LL =	0.03	klf	Footing Width :	4.00	feet
Wall Length =	14.92	feet	Footing Thkness:	12	inches
Wall Thickness =	8	inches	Footing DL :	2.310	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	68.0 kips	P_{ult} =	91.3 kips		
OTM =	136.28 ft-kips	OTM_{ult} =	208.97 ft-kips		
e =	2.00 feet	X bar =	N/A feet		
Soil Pr. =	1.72 ksf, max.,	2.31 ksf, ult.		Required Width =	2.86 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	68.0 kips	P_{ULT} =	91.3 kips		
OTM =	221.7 ft-kips	OTM_{ULT} =	345.67 ft-kips		
e =	3.26 feet	X bar =	5.20 feet		
Soil Pr. =	2.18 ksf, max.,	2.93 ksf, ult.		Required Width =	3.63 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	26.3 kips	P (ult) =	31.5 kips		
OTM =	127.5 ft-kips	OTM_{ULT} =	143.93 ft-kips		
e =	4.85 feet	X bar =	3.61 feet		
Soil Pr. =	1.21 ksf, max.,	1.46 ksf, ult.		Required Width =	2.02 feet

Resisting Moment = 370.55 ft-kips Factor of Safety = 3.97

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	2.53 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	17 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	5.35 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	99 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

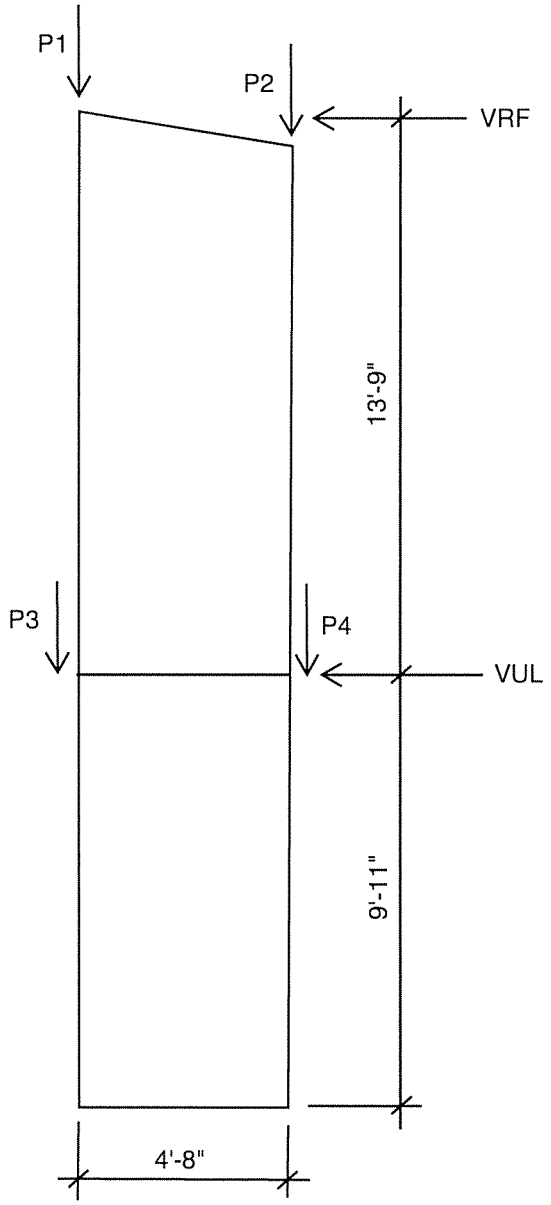
Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.07	sq.in./ft.	v(longit.) =	8 psi
Transverse Steel Required =	0.14	sq.in./ft.	v(transv.)=	27 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

UNIT 130 NORTH SHEAR WALL



VRF = 4417# EQ, 2108# WIND
VUL = 624# EQ, 2735# WIND
5041# EQ, 4843# WIND

P1 = R(OHB1R) = 1946# D + 18862# S

P2 = R(OHB2R) = 1405# D + 13026# S

P3 = 1.33(4.83)(25 + 40)
= 161# D + 258# L

P4 = 1.33(2.50)(25 + 40)
= 83# D + 133# L

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 130, North Shear Wall

Powdercat
Job #17100

Wall	RF to UL	UL to EL
Length	4.67	4.67
Post CL	4.00	4.00
Height	13.75	9.92
Weight	642	463

Loads	Roof		Upper Level		
	DL	SL	DL	LL	SL
Left Edge	1946	18862	161	258	0
Right Edge	1405	13026	83	133	0

Sheathing	RF to UL		UL to EL	
	EQ	Wind	EQ	Wind
Net Shear	4417	2108	624	2735
Gross Shear	4417	2108	5041	4843
Shear (plf)	947	452	1080	1038
WSP	0.882		0.984	
Sheathing	5/8" BS		5/8" BS	
Nails	10d at 3		10d at 3	
Table Shear	1330	1860	1330	1860
Allow. Shear	1173	1640	1309	1831
F.S.	1.24	3.63	1.21	1.76

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	60733.75	28985	OTM @ UL	60733.75	28985
Ft (EQ/Wind)	15183	7246	Ft (EQ/Wind)	15183	7246
P_{DL}	1946	1946	P_{DL}	1405	1405
P_{SL}	18862	18862	P_{SL}	13026	13026
P(min)	-13823	-5886	P(min)	-14148	-6211
Straps @ UL	(4) MST37		Straps @ UL	(4) MST37	
T_{ALLOW}	20320		T_{ALLOW}	20320	
F.S.	1.47	3.45	F.S.	1.44	3.27
P(max)	27480	21527	P(max)	22562	16609
Lu (ft)	12.42		Lu (ft)	13.58	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	110724	77011	OTM @ EL	110724	77011
Ft (EQ/Wind)	27681	19253	Ft (EQ/Wind)	27681	19253
P_{DL}	2107	2107	P_{DL}	1488	1488
P_{SL}	18862	18862	P_{SL}	13026	13026
P_{LL}	258	258	P_{LL}	133	133
P(min)	-26085	-17657	P(min)	-26457	-18029
PULT(min)	-42375	-28890	PULT(min)	-42821	-29336
As(req'd) (in2)	0.78	0.53	As(req'd) (in2)	0.79	0.54
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	6	4	No. 3/4" Bolts	6	4
P(max)	37208	30887	P(max)	32118	25797
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Unit 130, North Shear Wall

Powdercat
Job #17100

Lags at Roof Beam - 3/4" Dia. x 8"			
VROOF =	4417	lbs	EQ Controls
VALLOW =	1536	lbs	Per NDS Table 12J
No. Lags	3		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	4417	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	3		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	5041	lbs	EQ Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	3		

Foundation Loads				
EL to B.O. FTG =		4.92	feet	
OTM @ B.O.FTG.	EQ =	135.53	ft-kips	
	Wind =	100.84	ft-kips	
Supporting Stem Length =		14.83	feet	
Left Edge to CL Stem =		2.75	feet	
Right Edge to CL Stem =		7.42	feet	
P_{DL} =	4699	lbs =	317	plf
P_{SL} =	31888	lbs =	2150	plf
P_{LL} =	391	lbs =	26	plf
M_{DL} =	22.45	ft-kips		
M_{SL} =	148.52	ft-kips		
M_{LL} =	1.70	ft-kips		

360

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA : Unit 130 North Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	22.45	f t - kips
Fy =	60	ksi	FLR LL OTM =	1.7	f t - kips
f 'c =	3000	psi	RF LL OTM =	148.52	f t - kips
Wall DL =	0.32	klf	SEISMIC OTM =	135.53	f t - kips
Roof LL =	2.15	klf	Footing Length :	16.83	feet
Floor LL =	0.03	klf	Footing Width :	4.00	feet
Wall Length =	14.83	feet	Footing Thkness:	12	inches
Wall Thickness =	8	inches	Footing DL :	2.310	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	67.8 kips	P_{ult} =	91.0 kips		
OTM =	135.12 ft-kips	OTM_{ult} =	207.20 ft-kips		
e =	1.99 feet	X bar =	N/A feet		
Soil Pr. =	1.72 ksf, max.,	2.31 ksf, ult.		Required Width =	2.87 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	67.8 kips	P_{ULT} =	91.0 kips		
OTM =	236.8 ft-kips	OTM_{ULT} =	369.84 ft-kips		
e =	3.49 feet	X bar =	4.92 feet		
Soil Pr. =	2.30 ksf, max.,	3.08 ksf, ult.		Required Width =	3.83 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	26.1 kips	P (ult) =	31.4 kips		
OTM =	149.0 ft-kips	OTM_{ULT} =	167.96 ft-kips		
e =	5.70 feet	X bar =	2.72 feet		
Soil Pr. =	1.60 ksf, max.,	1.93 ksf, ult.		Required Width =	2.67 feet

Resisting Moment = 366.71 ft-kips Factor of Safety = 3.38

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	2.66 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	18 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

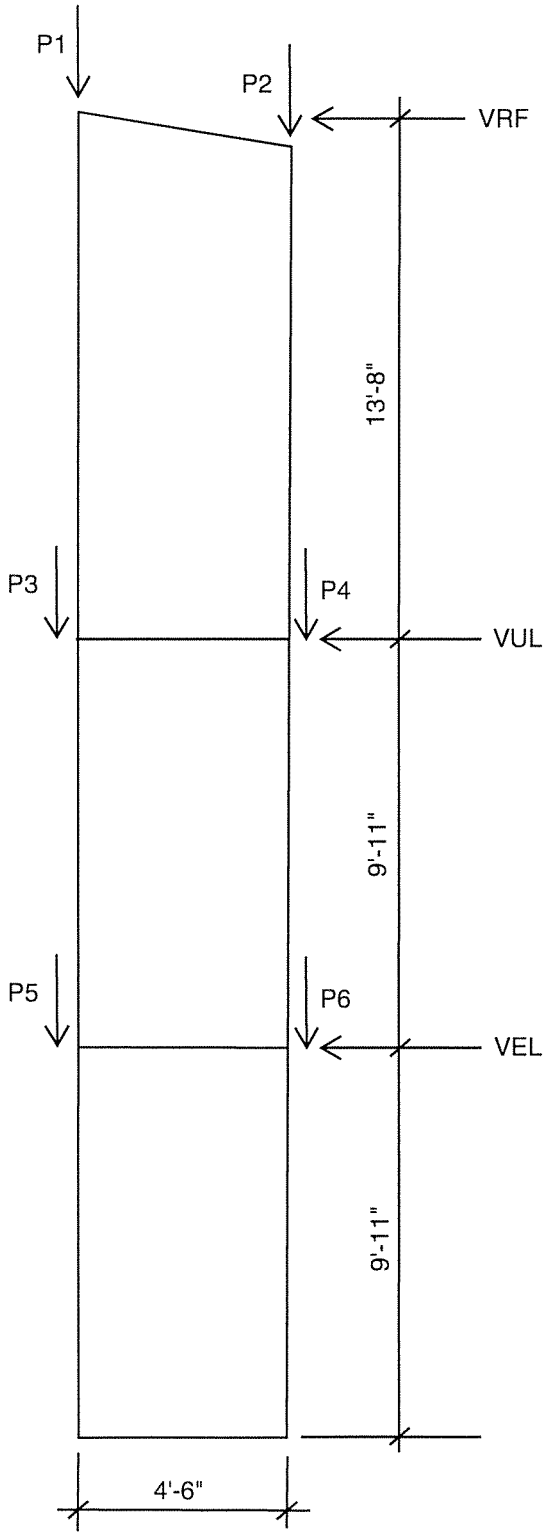
Req'd Unreinf Thickness =	20	inches			
Moment =	5.61 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	104 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.07	sq.in./ft.	v(longit.) =	9 psi
Transverse Steel Required =	0.15	sq.in./ft.	v(transv.)=	28 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
job number: 17100
designed by: MAR date: 5/17
checked by: date:

UNIT 129 SOUTH SHEAR WALL



VRF = 3644# EQ, 0# WIND
VUL = 851# EQ, 0# WIND
VEL = 220# EQ, 0# WIND
4715# EQ, 0# WIND

P1 = R(OHB3R) + R(OHB5R)
= 2517# D + 22146# S

P2 = R(EOHB3R) = 1395# D + 13272# S

P3 = R(TB1)
= 1601# D + 206# L + 16607# S

P4 = 0

P5 = R(FB5) = 232# D + 294# L

P6 = 0

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 129, South Shear Wall	Pg 1 of 2

Powdercat
Job #17100

Wall	RF to UL	UL to EL	EL to BL
Length	4.50	4.50	4.50
Post CL	3.75	3.75	3.75
Height	13.67	9.92	9.92
Weight	615	446	446

Loads	Roof		Upper Level			Entry Level		
	DL	SL	DL	LL	SL	DL	LL	SL
Left Edge	2517	22146	1601	206	16607	232	294	0
Right Edge	1395	13272	0	0	0	0	0	0

Sheathing	RF to UL		UL to EL		EL to BL	
	EQ	Wind	EQ	Wind	EQ	Wind
Net Shear	3644	0	851	0	220	0
Gross Shear	3644	0	4495	0	4715	0
Shear (plf)	810	0	999	0	1048	0
WSP	0.870		0.975		0.975	
Sheathing	5/8" BS		5/8" BS		5/8" BS	
Nails	10d at 3		10d at 3		10d at 3	
Table Shear	1330	1860	1330	1860	1330	1860
Allow. Shear	1157	1619	1296	1813	1296	1813
F.S.	1.43	-	1.30	-	1.24	-

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	49813	0	OTM @ UL	49813	0
Ft (EQ/Wind)	13284	0	Ft (EQ/Wind)	13284	0
P_{DL}	2517	2517	P_{DL}	1395	1395
P_{SL}	22146	22146	P_{SL}	13272	13272
P(min)	-11589	1695	P(min)	-12262	1022
Straps @ UL	(4) MST27		Straps @ UL	(4) MST27	
T_{ALLOW}	14800		T_{ALLOW}	14800	
F.S.	1.28	-	F.S.	1.21	-
P(max)	29089	19127	P(max)	21312	11349
Lu (ft)	12.00		Lu (ft)	11.33	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	94389	0	OTM @ UL	94389	0
Ft (EQ/Wind)	25170	0	Ft (EQ/Wind)	25170	0
P_{DL}	4118	4118	P_{DL}	1395	1395
P_{SL}	38753	38753	P_{SL}	13272	13272
P_{LL}	206	206	P_{LL}	0	0
P(min)	-22381	2789	P(min)	-24015	1155
Straps @ UL	(4) MST60		Straps @ UL	(4) MST60	
T_{ALLOW}	26920		T_{ALLOW}	26920	
F.S.	1.20	-	F.S.	1.12	-
P(max)	52215	33337	P(max)	30227	11349
Lu (ft)	9.92		Lu (ft)	9.92	

Unit 129, South Shear Wall	Pg 2 of 2

Powdercat
Job #17100

Wall Chords at Basement Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	141146	0	OTM @ EL	141146	0
Ft (EQ/Wind)	37639	0	Ft (EQ/Wind)	37639	0
P_{DL}	4350	4350	P_{DL}	1395	1395
P_{SL}	38753	38753	P_{SL}	13272	13272
P_{LL}	500	500	P_{LL}	0	0
P(min)	-34577	3062	P(min)	-36484	1155
PULT(min)	-56548	3675	PULT(min)	-58836	1387
As(req'd) (in2)	1.05	-	As(req'd) (in2)	1.09	-
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	7	-	No. 3/4" Bolts	8	-
P(max)	62019	33790	P(max)	39578	11349
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Strap at Roof Beam Conn. To Wall			
VROOF =	3644	lbs	EQ Controls
Strap	Simpson MST48 w/ (50) 16d Nails		
VALLOW (lbs)	5310		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	3644	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	2		

3/4" Dia. Sill Bolts btwn UL and EL			
VROOF =	4495	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	3		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	4715	lbs	EQ Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	2		

Foundation Loads				
BL to B.O. FTG =		3	feet	
OTM @ B.O.FTG.	EQ =	155.29	ft-kips	
	Wind =	0.00	ft-kips	
Supporting Stem Length =		4.67	feet	
Left Edge to CL Stem =		2.33	feet	
Right Edge to CL Stem =		-2.17	feet	
P_{DL} =	7253	lbs =	1553	plf
P_{SL} =	52025	lbs =	11140	plf
P_{LL} =	500	lbs =	107	plf
M_{DL} =	7.11	ft-kips		
M_{SL} =	61.49	ft-kips		
M_{LL} =	1.17	ft-kips		

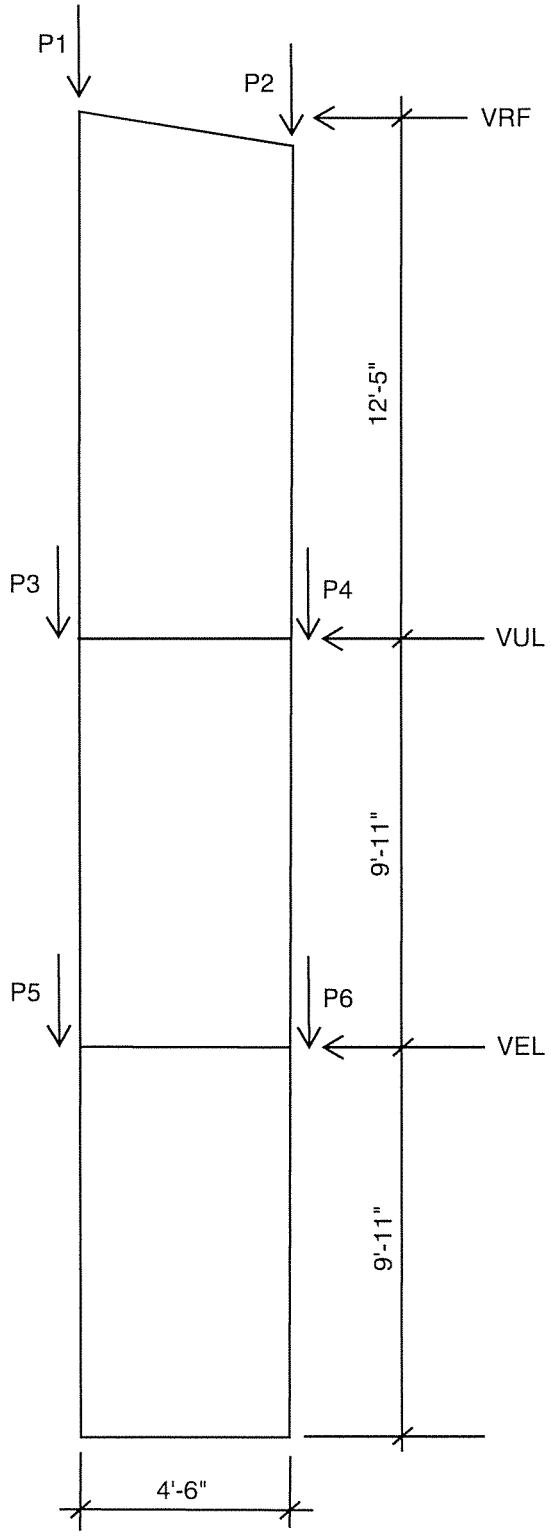
rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

pg 364 of

UNIT 130 SOUTH SHEAR WALL



VRF =	4417# EQ,	2108# WIND
VUL =	847# EQ,	4299# WIND
VEL =	219# EQ,	1483# WIND
	5483# EQ,	7890# WIND

P2 = R(OHB3R) + R(OHB5R)
= 2517# D + 22146# S

P1 = R(EOHB3R) = 1395# D + 13272# S

P4 = R(TB1)
= 1601# D + 206# L + 16607# S

P3 = 0

P6 = R(FB5) = 232# D + 294# L

P5 = 0

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 130, South Shear Wall	Pg 1 of 2

Powdercat
Job #17100

Wall	RF to UL	UL to EL	EL to BL
Length	4.50	4.50	4.50
Post CL	3.75	3.75	3.75
Height	12.42	9.92	9.92
Weight	559	446	446

Loads	Roof		Upper Level			Entry Level		
	DL	SL	DL	LL	SL	DL	LL	SL
Left Edge	1395	13272	0	0	0	0	0	0
Right Edge	2517	22146	1601	206	16607	232	294	0

Sheathing	RF to UL		UL to EL		EL to BL	
	EQ	Wind	EQ	Wind	EQ	Wind
Net Shear	4417	2108	847	4299	219	1483
Gross Shear	4417	2108	5264	6407	5483	7890
Shear (plf)	982	468	1170	1424	1218	1753
WSP	0.905		0.975		0.975	
Sheathing	5/8" BS		5/8" BS		5/8" BS	
Nails	10d at 3		10d at 3		10d at 3	
Table Shear	1330	1860	1330	1860	1330	1860
Allow. Shear	1204	1683	1296	1813	1296	1813
F.S.	1.23	3.59	1.11	1.27	1.06	1.03

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	54859	26181	OTM @ UL	54859	26181
Ft (EQ/Wind)	14629	6982	Ft (EQ/Wind)	14629	6982
P_{DL}	1395	1395	P_{DL}	2517	2517
P_{SL}	13272	13272	P_{SL}	22146	22146
P(min)	-13624	-5977	P(min)	-12951	-5304
Straps @ UL	(4) MST27		Straps @ UL	(4) MST27	
T_{ALLOW}	14800		T_{ALLOW}	14800	
F.S.	1.09	2.48	F.S.	1.14	2.79
P(max)	22321	16585	P(max)	30098	24363
Lu (ft)	9.75		Lu (ft)	10.92	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	107060	89717	OTM @ UL	107060	89717
Ft (EQ/Wind)	28549	23925	Ft (EQ/Wind)	28549	23925
P_{DL}	1395	1395	P_{DL}	4118	4118
P_{SL}	13272	13272	P_{SL}	38753	38753
P_{LL}	0	0	P_{LL}	206	206
P(min)	-27411	-22786	P(min)	-25777	-21152
Straps @ UL	(4) MST60		Straps @ UL	(4) MST60	
T_{ALLOW}	26920		T_{ALLOW}	26920	
F.S.	0.98	1.18	F.S.	1.04	1.27
P(max)	32761	29292	P(max)	54749	51281
Lu (ft)	9.92		Lu (ft)	9.92	

Unit 130, South Shear Wall	Pg 2 of 2

Powdercat
Job #17100

Wall Chords at Basement Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	161434	167960	OTM @ EL	161434	167960
Ft (EQ/Wind)	43049	44789	Ft (EQ/Wind)	43049	44789
P_{DL}	1395	1395	P_{DL}	4350	4118
P_{SL}	13272	13272	P_{SL}	38753	22146
P_{LL}	0	0	P_{LL}	500	206
P(min)	-41777	-43517	P(min)	-40137	-42017
PULT(min)	-67351	-70136	PULT(min)	-65384	-68336
As(req'd) (in2)	1.25	1.30	As(req'd) (in2)	1.21	1.27
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	9	9	No. 3/4" Bolts	8	9
P(max)	44444	46184	P(max)	66076	54474
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Strap at Roof Beam Conn. To Wall			
VROOF =	4417	lbs	EQ Controls
Strap	Simpson MST48 w/ (50) 16d Nails		
VALLOW (lbs)	5310		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	4417	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	3		

3/4" Dia. Sill Bolts btwn UL and EL			
VROOF =	6407	lbs	Wind Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	4		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	7890	lbs	Wind Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	4		

Foundation Loads				
BL to B.O. FTG =		3	feet	
OTM @ B.O.FTG.	EQ =	177.88	ft-kips	
	Wind =	191.63	ft-kips	
Supporting Stem Length =		4.67	feet	
Left Edge to CL Stem =		2.17	feet	
Right Edge to CL Stem =		-2.33	feet	
P_{DL} =	7196	lbs =	1541	plf
P_{SL} =	52025	lbs =	11140	plf
P_{LL} =	500	lbs =	107	plf
M_{DL} =	-7.11	ft-kips		
M_{SL} =	-61.49	ft-kips		
M_{LL} =	-1.17	ft-kips		

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA : Unit 129 & 130 South Walls

Allow. Soil Pr. =	2.400	ksf	DL OTM =	0.00	f t - kips
Fy =	60	ksi	FLR LL OTM =	0	f t - kips
f 'c =	3000	psi	RF LL OTM =	0	f t - kips
Wall DL =	1.55	klf	SEISMIC OTM =	333.17	f t - kips
Roof LL =	11.14	klf	Footing Length :	19.33	feet
Floor LL =	0.11	klf	Footing Width :	7.33	feet
Wall Length =	9.33	feet	Footing Thkness:	24	inches
Wall Thickness =	8	inches	Footing DL :	3.099	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	153.0 kips	P_{ult} =	215.1 kips		
OTM =	0.00 ft-kips	OTM_{ult} =	0.00 ft-kips		
e =	0.00 feet	X bar =	N/A feet		
Soil Pr. =	1.08 ksf, max.,	1.52 ksf, ult.		Required Width =	3.30 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	153.0 kips	P_{ULT} =	215.1 kips		
OTM =	249.9 ft-kips	OTM_{ULT} =	399.8 ft-kips		
e =	1.63 feet	X bar =	N/A feet		
Soil Pr. =	1.63 ksf, max.,	2.29 ksf, ult.		Required Width =	4.97 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	44.6 kips	P (ult) =	53.5 kips		
OTM =	333.2 ft-kips	OTM_{ULT} =	373.15 ft-kips		
e =	7.47 feet	X bar =	2.19 feet		
Soil Pr. =	1.85 ksf, max.,	2.22 ksf, ult.		Required Width =	5.65 feet

Resisting Moment = 718.39 ft-kips Factor of Safety = 3.08

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	36	inches			
Moment =	31.55 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	164 psi
Shear =	4.44 kips/ft	Fv(allow)=	71 psi	fv(act.)=	15 psi

TRANSVERSE DIRECTION:

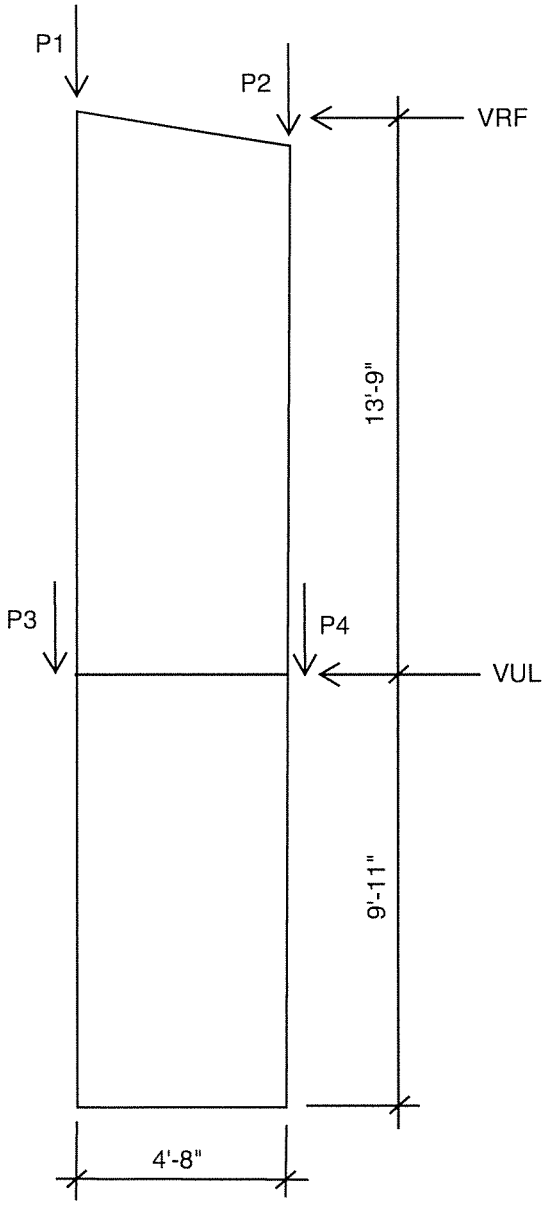
Req'd Unreinf Thickness =	26	inches			
Moment =	14.90 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	155 psi
Shear =	2.58 kips/ft	Fv(allow)=	71 psi	fv(act.)=	12 psi

Reinf. Thickness (if used) =	24	inches		
Longitudinal Steel Required =	0.35	sq.in./ft.	v(longit.) =	30 psi
Transverse Steel Required =	0.16	sq.in./ft.	v(transv.)=	15 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name:	Powdercat			pg
job number:	17100			of
designed by:	MAR	date:	5/17	368
checked by:		date:		

UNIT 131 NORTH SHEAR WALL



VRF = 4393# EQ, 2036# WIND
VUL = 638# EQ, 2662# WIND
5031# EQ, 4698# WIND

P1 = R(OHB2R) = 1405# D + 13026# S

P2 = R(OHB1R) = 1946# D + 18862# S

P3 = 1.33(2.50)(25 + 40)
= 83# D + 133# L

P4 = 1.33(4.83)(25 + 40)
= 161# D + 258# L

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 131, North Shear Wall

Powdercat
Job #17100

Wall	RF to UL	UL to EL
Length	4.67	4.67
Post CL	4.00	4.00
Height	13.75	9.92
Weight	642	463

Loads	Roof		Upper Level		
	DL	SL	DL	LL	SL
Left Edge	1405	13026	83	133	0
Right Edge	1946	18862	161	258	0

Sheathing	RF to UL		UL to EL	
	EQ	Wind	EQ	Wind
Net Shear	4393	2036	638	2662
Gross Shear	4393	2036	5031	4698
Shear (plf)	941	436	1078	1007
WSP	0.882		0.984	
Sheathing	5/8" BS		5/8" BS	
Nails	10d at 3		10d at 3	
Table Shear	1330	1860	1330	1860
Allow. Shear	1173	1640	1309	1831
F.S.	1.25	3.76	1.21	1.82

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	60403.75	27995	OTM @ UL	60403.75	27995
Ft (EQ/Wind)	15101	6999	Ft (EQ/Wind)	15101	6999
P_{DL}	1405	1405	P_{DL}	1946	1946
P_{SL}	13026	13026	P_{SL}	18862	18862
P(min)	-14065	-5963	P(min)	-13741	-5639
Straps @ UL	(4) MST37		Straps @ UL	(4) MST37	
T_{ALLOW}	20320		T_{ALLOW}	20320	
F.S.	1.44	3.41	F.S.	1.48	3.60
P(max)	22500	16424	P(max)	27418	21342
Lu (ft)	13.42		Lu (ft)	12.67	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	110294	74583	OTM @ EL	110294	74583
Ft (EQ/Wind)	27574	18646	Ft (EQ/Wind)	27574	18646
P_{DL}	1488	1488	P_{DL}	2107	2107
P_{SL}	13026	13026	P_{SL}	18862	18862
P_{LL}	133	133	P_{LL}	258	258
P(min)	-26349	-17422	P(min)	-25978	-17050
PULT(min)	-42649	-28364	PULT(min)	-42203	-27919
As(req'd) (in2)	0.79	0.53	As(req'd) (in2)	0.78	0.52
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	6	4	No. 3/4" Bolts	6	4
P(max)	32037	25342	P(max)	37127	30431
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Unit 131, North Shear Wall

Powdercat
Job #17100

Lags at Roof Beam - 3/4" Dia. x 8"			
VROOF =	4393	lbs	EQ Controls
VALLOW =	1536	lbs	Per NDS Table 12J
No. Lags	3		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	4393	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	3		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	5031	lbs	EQ Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	3		

Foundation Loads				
EL to B.O. FTG =		4.67	feet	
OTM @ B.O.FTG.	EQ =	133.79	ft-kips	
	Wind =	96.52	ft-kips	
Supporting Stem Length =		14.92	feet	
Left Edge to CL Stem =		7.46	feet	
Right Edge to CL Stem =		2.79	feet	
P_{DL} =	4699	lbs =	315	plf
P_{SL} =	31888	lbs =	2137	plf
P_{LL} =	391	lbs =	26	plf
M_{DL} =	22.64	ft-kips		
M_{SL} =	149.80	ft-kips		
M_{LL} =	1.71	ft-kips		

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 131 North Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	22.64	f t - kips
Fy =	60	ksi	FLR LL OTM =	1.71	f t - kips
f 'c =	3000	psi	RF LL OTM =	149.8	f t - kips
Wall DL =	0.32	klf	SEISMIC OTM =	133.79	f t - kips
Roof LL =	2.14	klf	Footing Length :	16.92	feet
Floor LL =	0.03	klf	Footing Width :	4.00	feet
Wall Length =	14.92	feet	Footing Thkness:	12	inches
Wall Thickness =	8	inches	Footing DL :	2.310	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	68.0 kips	P_{ult} =	91.3 kips		
OTM =	136.27 ft-kips	OTM_{ult} =	208.98 ft-kips		
e =	2.00 feet	X bar =	N/A feet		
Soil Pr. =	1.72 ksf, max.,	2.31 ksf, ult.		Required Width =	2.86 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	68.0 kips	P_{ULT} =	91.3 kips		
OTM =	236.6 ft-kips	OTM_{ULT} =	369.53 ft-kips		
e =	3.48 feet	X bar =	4.98 feet		
Soil Pr. =	2.28 ksf, max.,	3.05 ksf, ult.		Required Width =	3.79 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	26.3 kips	P (ult) =	31.5 kips		
OTM =	147.4 ft-kips	OTM_{ULT} =	166.15 ft-kips		
e =	5.61 feet	X bar =	2.85 feet		
Soil Pr. =	1.54 ksf, max.,	1.84 ksf, ult.		Required Width =	2.56 feet

Resisting Moment = 370.42 ft-kips Factor of Safety = 3.45

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	2.63 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	18 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	5.56 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	103 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

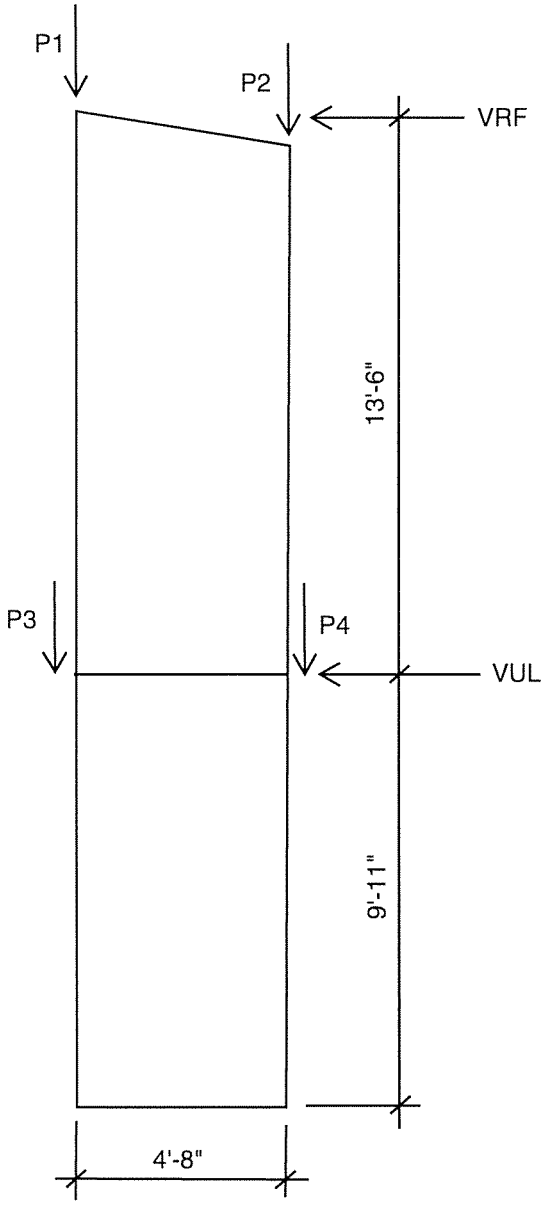
Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.07	sq.in./ft.	v(longit.) =	9 psi
Transverse Steel Required =	0.15	sq.in./ft.	v(transv.)=	28 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

UNIT 132 NORTH SHEAR WALL



VRF = 3621# EQ, 0# WIND
VUL = 640# EQ, 0# WIND
4261# EQ, 0# WIND

P1 = R(OHB1R) = 1946# D + 18862# S

P2 = R(OHB2R) = 1405# D + 13026# S

P3 = 1.33(4.83)(25 + 40)
= 161# D + 258# L

P4 = 1.33(2.50)(25 + 40)
= 83# D + 133# L

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 132, North Shear Wall

Powdercat
Job #17100

Wall	RF to UL	UL to EL
Length	4.67	4.67
Post CL	4.00	4.00
Height	13.50	9.92
Weight	630	463

Loads	Roof		Upper Level		
	DL	SL	DL	LL	SL
Left Edge	1946	18862	161	258	0
Right Edge	1405	13026	83	133	0

Sheathing	RF to UL		UL to EL	
	EQ	Wind	EQ	Wind
Net Shear	3621	0	640	0
Gross Shear	3621	0	4261	0
Shear (plf)	776	0	913	0
WSP	0.888		0.984	
Sheathing	5/8" BS		5/8" BS	
Nails	10d at 3		10d at 3	
Table Shear	1330	1860	1330	1860
Allow. Shear	1182	1652	1309	1831
F.S.	1.52	-	1.43	-

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	48883.5	0	OTM @ UL	48883.5	0
Ft (EQ/Wind)	12221	0	Ft (EQ/Wind)	12221	0
P_{DL}	1946	1946	P_{DL}	1405	1405
P_{SL}	18862	18862	P_{SL}	13026	13026
P(min)	-10864	1357	P(min)	-11189	1032
Straps @ UL	(4) MST37		Straps @ UL	(4) MST37	
T_{ALLOW}	20320		T_{ALLOW}	20320	
F.S.	1.87	-	F.S.	1.82	-
P(max)	25258	16093	P(max)	20340	11175
Lu (ft)	12		Lu (ft)	13.42	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	91138	0	OTM @ EL	91138	0
Ft (EQ/Wind)	22785	0	Ft (EQ/Wind)	22785	0
P_{DL}	2107	2107	P_{DL}	1488	1488
P_{SL}	18862	18862	P_{SL}	13026	13026
P_{LL}	258	258	P_{LL}	133	133
P(min)	-21193	1592	P(min)	-21564	1221
PULT(min)	-34545	1910	PULT(min)	-34991	1465
As(req'd) (in2)	0.64	-0.04	As(req'd) (in2)	0.65	-0.03
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	5	-	No. 3/4" Bolts	5	-
P(max)	33535	16447	P(max)	28446	11357
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Unit 132, North Shear Wall

Powdercat
Job #17100

Lags at Roof Beam - 3/4" Dia. x 8"			
VROOF =	3621	lbs	EQ Controls
VALLOW =	1536	lbs	Per NDS Table 12J
No. Lags	3		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	3621	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	2		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	4261	lbs	EQ Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	2		

Foundation Loads				
EL to B.O. FTG =		4.67	feet	
OTM @ B.O.FTG.	EQ =	111.04	ft-kips	
	Wind =	0.00	ft-kips	
Supporting Stem Length =		14.83	feet	
Left Edge to CL Stem =		2.75	feet	
Right Edge to CL Stem =		7.42	feet	
P_{DL} =	4688	lbs =	316	plf
P_{SL} =	31888	lbs =	2150	plf
P_{LL} =	391	lbs =	26	plf
M_{DL} =	22.39	ft-kips		
M_{SL} =	148.52	ft-kips		
M_{LL} =	1.70	ft-kips		

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA : Unit 132 North Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	22.39	f t - kips
Fy =	60	ksi	FLR LL OTM =	1.7	f t - kips
f 'c =	3000	psi	RF LL OTM =	148.52	f t - kips
Wall DL =	0.32	klf	SEISMIC OTM =	111.04	f t - kips
Roof LL =	2.15	klf	Footing Length :	16.83	feet
Floor LL =	0.03	klf	Footing Width :	4.00	feet
Wall Length =	14.83	feet	Footing Thkness:	12	inches
Wall Thickness =	8	inches	Footing DL :	2.310	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	67.8 kips	P_{ult} =	91.0 kips		
OTM =	135.06 ft-kips	OTM_{ult} =	207.13 ft-kips		
e =	1.99 feet	X bar =	N/A feet		
Soil Pr. =	1.72 ksf, max.,	2.31 ksf, ult.		Required Width =	2.87 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	67.8 kips	P_{ULT} =	91.0 kips		
OTM =	218.3 ft-kips	OTM_{ULT} =	340.38 ft-kips		
e =	3.22 feet	X bar =	5.19 feet		
Soil Pr. =	2.17 ksf, max.,	2.92 ksf, ult.		Required Width =	3.62 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	26.1 kips	P (ult) =	31.4 kips		
OTM =	124.5 ft-kips	OTM_{ULT} =	140.49 ft-kips		
e =	4.76 feet	X bar =	3.65 feet		
Soil Pr. =	1.19 ksf, max.,	1.43 ksf, ult.		Required Width =	1.99 feet

Resisting Moment = 366.59 ft-kips Factor of Safety = 4.02

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	2.52 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	17 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	5.34 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	99 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.07	sq.in./ft.	v(longit.) =	8 psi
Transverse Steel Required =	0.14	sq.in./ft.	v(transv.)=	27 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

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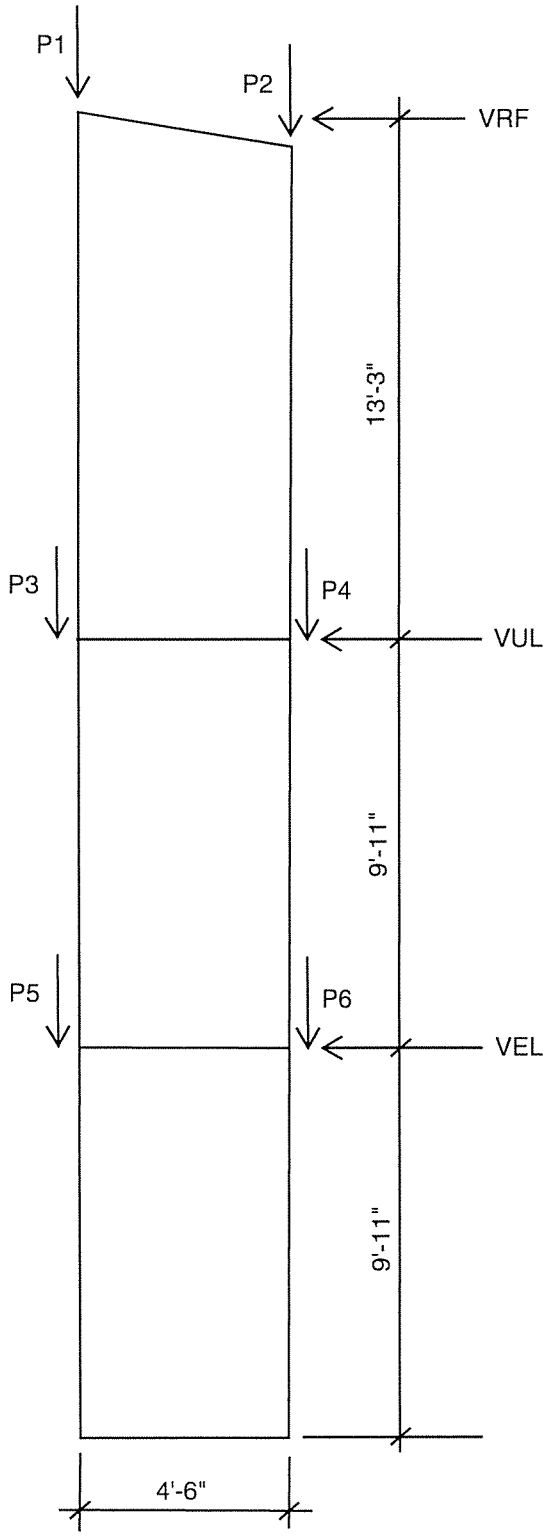
UNIT 131 SOUTH SHEAR WALL



VRF =	4393# EQ,	2035# WIND
VUL =	866# EQ,	3948# WIND
VEL =	224# EQ,	1483# WIND
	5483# EQ,	7466# WIND

P1 = R(OHB3R) + R(OHB5R)
= 2517# D + 22146# S

P2 = R(EOHB3R) = 1395# D + 13272# S

P3 = R(TB1)
= 1601# D + 206# L + 16607# S

P4 = 0

P5 = R(FB5) = 232# D + 294# L

P6 = 0

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 131, South Shear Wall	Pg 1 of 2

Powdercat
Job #17100

Wall	RF to UL	UL to EL	EL to BL
Length	4.50	4.50	4.50
Post CL	3.75	3.75	3.75
Height	13.25	9.92	9.92
Weight	596	446	446

Loads	Roof		Upper Level			Entry Level		
	DL	SL	DL	LL	SL	DL	LL	SL
Left Edge	2517	22146	1601	206	16607	232	294	0
Right Edge	1395	13272	0	0	0	0	0	0

Sheathing	RF to UL		UL to EL		EL to BL	
	EQ	Wind	EQ	Wind	EQ	Wind
Net Shear	4393	2035	866	3948	224	1483
Gross Shear	4393	2035	5259	5983	5483	7466
Shear (plf)	976	452	1169	1330	1218	1659
WSP	0.882		0.975		0.975	
Sheathing	5/8" BS		5/8" BS		5/8" BS	
Nails	10d at 3		10d at 3		10d at 3	
Table Shear	1330	1860	1330	1860	1330	1860
Allow. Shear	1173	1640	1296	1813	1296	1813
F.S.	1.20	3.63	1.11	1.36	1.06	1.09

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	58207	26964	OTM @ UL	58207	26964
Ft (EQ/Wind)	15522	7190	Ft (EQ/Wind)	15522	7190
P_{DL}	2517	2517	P_{DL}	1395	1395
P_{SL}	22146	22146	P_{SL}	13272	13272
P(min)	-13833	-5501	P(min)	-14506	-6174
Straps @ UL	(4) MST27		Straps @ UL	(4) MST27	
T_{ALLOW}	14800		T_{ALLOW}	14800	
F.S.	1.07	2.69	F.S.	1.02	2.40
P(max)	30768	24519	P(max)	22990	16742
Lu (ft)	11.58		Lu (ft)	10.92	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	110359	86295	OTM @ UL	110359	86295
Ft (EQ/Wind)	29429	23012	Ft (EQ/Wind)	29429	23012
P_{DL}	4118	4118	P_{DL}	1395	1395
P_{SL}	38753	38753	P_{SL}	13272	13272
P_{LL}	206	206	P_{LL}	0	0
P(min)	-26646	-20228	P(min)	-28279	-21862
Straps @ UL	(4) MST60		Straps @ UL	(4) MST60	
T_{ALLOW}	26920		T_{ALLOW}	26920	
F.S.	1.01	1.33	F.S.	0.95	1.23
P(max)	55409	50596	P(max)	33421	28608
Lu (ft)	9.92		Lu (ft)	9.92	

Unit 131, South Shear Wall	Pg 2 of 2

Powdercat
Job #17100

Wall Chords at Basement Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	164732	160333	OTM @ EL	164732	160333
Ft (EQ/Wind)	43929	42755	Ft (EQ/Wind)	43929	42755
P_{DL}	4350	4350	P_{DL}	1395	1395
P_{SL}	38753	38753	P_{SL}	13272	13272
P_{LL}	500	500	P_{LL}	0	0
P(min)	-40872	-39699	P(min)	-42779	-41606
PULT(min)	-66618	-64741	PULT(min)	-68906	-67029
As(req'd) (in2)	1.23	1.20	As(req'd) (in2)	1.28	1.24
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	9	8	No. 3/4" Bolts	9	9
P(max)	66736	65856	P(max)	45324	44150
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Strap at Roof Beam Conn. To Wall			
VROOF =	4393	lbs	EQ Controls
Strap	Simpson MST48 w/ (50) 16d Nails		
VALLOW (lbs)	5310		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	4393	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	3		

3/4" Dia. Sill Bolts btwn UL and EL			
VROOF =	5983	lbs	Wind Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	4		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	7466	lbs	Wind Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	4		

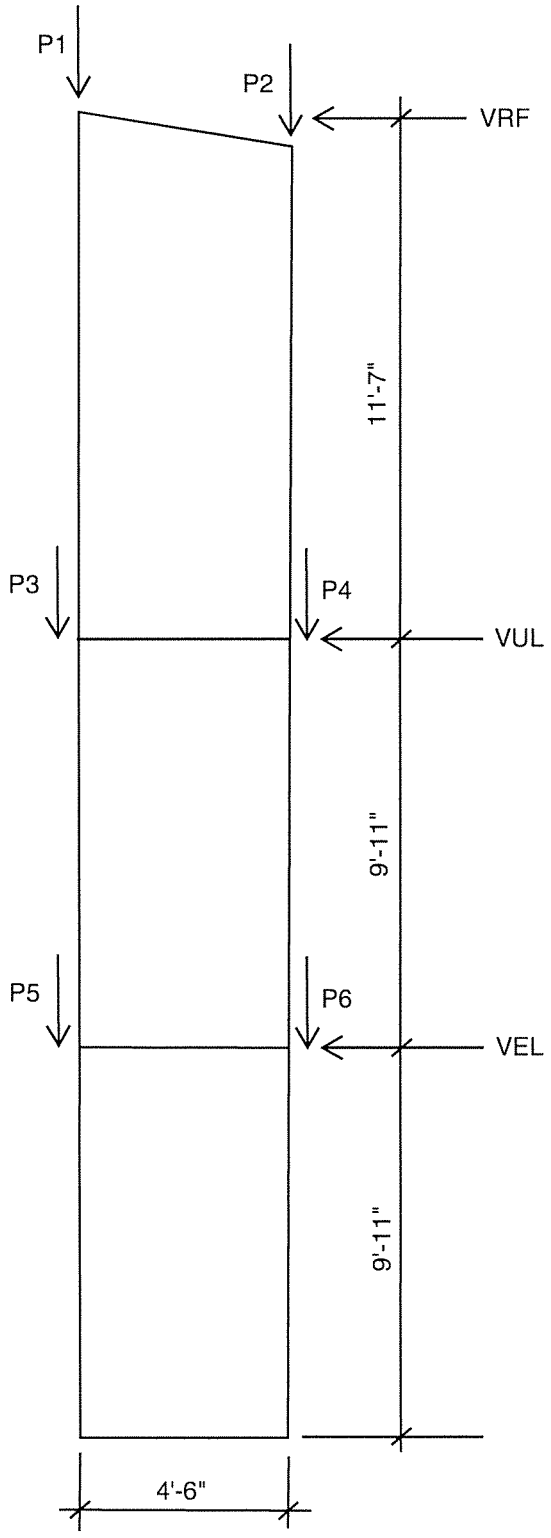
Foundation Loads				
BL to B.O. FTG =		3	feet	
OTM @ B.O.FTG.	EQ =	181.18	ft-kips	
	Wind =	182.73	ft-kips	
Supporting Stem Length =		4.67	feet	
Left Edge to CL Stem =		2.33	feet	
Right Edge to CL Stem =		-2.17	feet	
P_{DL} =	7234	lbs =	1549	plf
P_{SL} =	52025	lbs =	11140	plf
P_{LL} =	500	lbs =	107	plf
M_{DL} =	7.11	ft-kips		
M_{SL} =	61.49	ft-kips		
M_{LL} =	1.17	ft-kips		

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

UNIT 132 SOUTH SHEAR WALL



VRF = 3621# EQ, 0# WIND
VUL = 869# EQ, 0# WIND
VEL = 225# EQ, 0# WIND
4715# EQ, 0# WIND

P2 = R(OHB3R) + R(OHB5R)
= 2517# D + 22146# S

P1 = R(EOHB3R) = 1395# D + 13272# S

P4 = R(TB1)
= 1601# D + 206# L + 16607# S

P3 = 0

P6 = R(FB5) = 232# D + 294# L

P5 = 0

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 132, South Shear Wall	Pg 1 of 2

Powdercat
Job #17100

Wall	RF to UL	UL to EL	EL to BL
Length	4.50	4.50	4.50
Post CL	3.75	3.75	3.75
Height	11.58	9.92	9.92
Weight	521	446	446

Loads	Roof		Upper Level			Entry Level		
	DL	SL	DL	LL	SL	DL	LL	SL
Left Edge	1395	13272	0	0	0	0	0	0
Right Edge	2517	22146	1601	206	16607	232	294	0

Sheathing	RF to UL		UL to EL		EL to BL	
	EQ	Wind	EQ	Wind	EQ	Wind
Net Shear	3261	0	869	0	225	0
Gross Shear	3261	0	4130	0	4355	0
Shear (plf)	725	0	918	0	968	0
WSP	0.928		0.975		0.975	
Sheathing	5/8" BS		5/8" BS		5/8" BS	
Nails	10d at 3		10d at 3		10d at 3	
Table Shear	1330	1860	1330	1860	1330	1860
Allow. Shear	1235	1727	1296	1813	1296	1813
F.S.	1.70	-	1.41	-	1.34	-

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	37762	0	OTM @ UL	37762	0
Ft (EQ/Wind)	10070	0	Ft (EQ/Wind)	10070	0
P_{DL}	1395	1395	P_{DL}	2517	2517
P_{SL}	13272	13272	P_{SL}	22146	22146
P(min)	-9077	993	P(min)	-8403	1667
Straps @ UL	(4) MST27		Straps @ UL	(4) MST27	
T_{ALLOW}	14800		T_{ALLOW}	14800	
F.S.	1.63	-	F.S.	1.76	-
P(max)	18901	11349	P(max)	26679	19127
Lu (ft)	8.75		Lu (ft)	10.17	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	78718	0	OTM @ UL	78718	0
Ft (EQ/Wind)	20992	0	Ft (EQ/Wind)	20992	0
P_{DL}	1395	1395	P_{DL}	4118	4118
P_{SL}	13272	13272	P_{SL}	38753	38753
P_{LL}	0	0	P_{LL}	206	206
P(min)	-19864	1127	P(min)	-18231	2761
Straps @ UL	(4) MST60		Straps @ UL	(4) MST60	
T_{ALLOW}	26920		T_{ALLOW}	26920	
F.S.	1.36	-	F.S.	1.48	-
P(max)	27093	11349	P(max)	49081	33337
Lu (ft)	9.92		Lu (ft)	9.92	

Unit 132, South Shear Wall	Pg 2 of 2

Powdercat
Job #17100

Wall Chords at Basement Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	121905	0	OTM @ EL	121905	0
Ft (EQ/Wind)	32508	0	Ft (EQ/Wind)	32508	0
P_{DL}	1395	1395	P_{DL}	4350	4118
P_{SL}	13272	13272	P_{SL}	38753	22146
P_{LL}	0	0	P_{LL}	500	206
P(min)	-31247	1261	P(min)	-29608	2761
PULT(min)	-50500	1513	PULT(min)	-48533	3313
As(req'd) (in2)	0.94	-	As(req'd) (in2)	0.90	-
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	7	-	No. 3/4" Bolts	6	-
P(max)	35730	11349	P(max)	58171	20882
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Strap at Roof Beam Conn. To Wall			
VROOF =	3261	lbs	EQ Controls
Strap	Simpson MST48 w/ (50) 16d Nails		
VALLOW (lbs)	5310		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	3261	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	2		

3/4" Dia. Sill Bolts btwn UL and EL			
VROOF =	4130	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	3		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	4355	lbs	EQ Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	2		

Foundation Loads				
BL to B.O. FTG =		3	feet	
OTM @ B.O.FTG.	EQ =	134.97	ft-kips	
	Wind =	0.00	ft-kips	
Supporting Stem Length =		4.67	feet	
Left Edge to CL Stem =		2.17	feet	
Right Edge to CL Stem =		-2.33	feet	
P_{DL} =	7159	lbs =	1533	plf
P_{SL} =	52025	lbs =	11140	plf
P_{LL} =	500	lbs =	107	plf
M_{DL} =	-7.11	ft-kips		
M_{SL} =	-61.49	ft-kips		
M_{LL} =	-1.17	ft-kips		

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 131 & 132 South Walls

Allow. Soil Pr. =	2.400	ksf	DL OTM =	0.00	f t - kips
Fy =	60	ksi	FLR LL OTM =	0	f t - kips
f 'c =	3000	psi	RF LL OTM =	0	f t - kips
Wall DL =	1.54	klf	SEISMIC OTM =	316.15	f t - kips
Roof LL =	11.14	klf	Footing Length :	19.33	feet
Floor LL =	0.11	klf	Footing Width :	7.33	feet
Wall Length =	9.33	feet	Footing Thkness:	24	inches
Wall Thickness =	8	inches	Footing DL :	3.099	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	153.0 kips	P_{ult} =	215.0 kips		
OTM =	0.00 ft-kips	OTM_{ult} =	0.00 ft-kips		
e =	0.00 feet	X bar =	N/A feet		
Soil Pr. =	1.08 ksf, max.,	1.52 ksf, ult.		Required Width =	3.30 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	153.0 kips	P_{ULT} =	215.0 kips		
OTM =	237.1 ft-kips	OTM_{ULT} =	379.38 ft-kips		
e =	1.55 feet	X bar =	N/A feet		
Soil Pr. =	1.60 ksf, max.,	2.25 ksf, ult.		Required Width =	4.88 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	44.6 kips	P (ult) =	53.5 kips		
OTM =	316.2 ft-kips	OTM_{ULT} =	354.09 ft-kips		
e =	7.09 feet	X bar =	2.57 feet		
Soil Pr. =	1.58 ksf, max.,	1.89 ksf, ult.		Required Width =	4.82 feet

Resisting Moment = 717.85 ft-kips Factor of Safety = 3.24

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	34	inches			
Moment =	30.30 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	178 psi
Shear =	4.72 kips/ft	Fv(allow)=	71 psi	fv(act.)=	17 psi

TRANSVERSE DIRECTION:

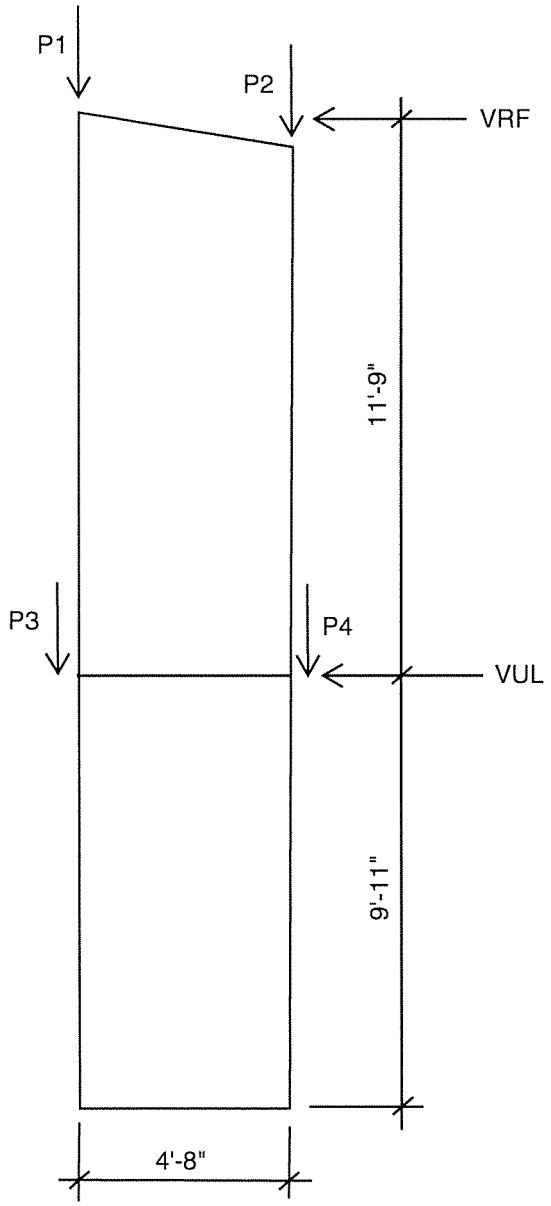
Req'd Unreinf Thickness =	24	inches			
Moment =	12.73 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	158 psi
Shear =	2.80 kips/ft	Fv(allow)=	71 psi	fv(act.)=	15 psi

Reinf. Thickness (if used) =	24	inches		
Longitudinal Steel Required =	0.33	sq.in./ft.	v(longit.) =	29 psi
Transverse Steel Required =	0.14	sq.in./ft.	v(transv.)=	13 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name:	Powdercat			pg
job number:	17100			of
				383
designed by:	MAR	date:	5/17	
checked by:		date:		

UNIT 133 NORTH SHEAR WALL



VRF = 4872# EQ, 1500# WIND
VUL = 758# EQ, 2126# WIND
5630# EQ, 3626# WIND

P1 = R(OHB1R) = 1946# D + 18862# S

P2 = R(OHB14R) + R(OHB15L)
= 1900# D + 16204# S

P3 = 1.33(4.75)(25 + 40)
= 158# D + 253# L

P4 = 1.33(4.67)(25 + 40)
= 156# D + 249# L

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 133, North Shear Wall

Powdercat
Job #17100

Wall	RF to UL	UL to EL
Length	4.67	4.67
Post CL	4.00	4.00
Height	11.75	9.92
Weight	548	463

Loads	Roof		Upper Level		
	DL	SL	DL	LL	SL
Left Edge	1946	18862	158	253	0
Right Edge	1900	16204	156	249	0

Sheathing	RF to UL		UL to EL	
	EQ	Wind	EQ	Wind
Net Shear	4872	1500	758	2126
Gross Shear	4872	1500	5630	3626
Shear (plf)	1044	321	1206	777
WSP	0.935		0.984	
Sheathing	5/8" BS		5/8" BS	
Nails	10d at 3		10d at 3	
Table Shear	1330	1860	1330	1860
Allow. Shear	1244	1740	1309	1831
F.S.	1.19	5.41	1.09	2.36

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	57246	17625	OTM @ UL	57246	17625
Ft (EQ/Wind)	14312	4406	Ft (EQ/Wind)	14312	4406
P_{DL}	1946	1946	P_{DL}	1900	1900
P_{SL}	18862	18862	P_{SL}	16204	16204
P(min)	-12979	-3074	P(min)	-13007	-3102
Straps @ UL	(4) MST37		Straps @ UL	(4) MST37	
T_{ALLOW}	20320		T_{ALLOW}	20320	
F.S.	1.57	6.61	F.S.	1.56	6.55
P(max)	26826	19397	P(max)	24787	17358
Lu (ft)	11.42		Lu (ft)	10.58	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	113077	53583	OTM @ EL	113077	53583
Ft (EQ/Wind)	28269	13396	Ft (EQ/Wind)	28269	13396
P_{DL}	2104	2104	P_{DL}	2056	2056
P_{SL}	18862	18862	P_{SL}	16204	16204
P_{LL}	253	253	P_{LL}	249	249
P(min)	-26703	-11830	P(min)	-26732	-11859
PULT(min)	-43352	-19554	PULT(min)	-43386	-19589
As(req'd) (in2)	0.80	0.36	As(req'd) (in2)	0.80	0.36
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	6	3	No. 3/4" Bolts	6	3
P(max)	37642	26487	P(max)	35598	24443
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Unit 133, North Shear Wall

Powdercat
Job #17100

Lags at Roof Beam - 3/4" Dia. x 8"			
VROOF =	4872	lbs	EQ Controls
VALLOW =	1536	lbs	Per NDS Table 12J
No. Lags	4		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	4872	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	3		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	5630	lbs	EQ Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	3		

Foundation Loads				
EL to B.O. FTG =		5.92	feet	
OTM @ B.O.FTG.	EQ =	146.41	ft-kips	
	Wind =	75.05	ft-kips	
Supporting Stem Length =		17.92	feet	
Left Edge to CL Stem =		1.83	feet	
Right Edge to CL Stem =		6.50	feet	
P_{DL} =	5171	lbs =	289	plf
P_{SL} =	35066	lbs =	1957	plf
P_{LL} =	502	lbs =	28	plf
M_{DL} =	21.43	ft-kips		
M_{SL} =	139.84	ft-kips		
M_{LL} =	2.08	ft-kips		

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA : Unit 133 North Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	21.43	f t - kips
Fy =	60	ksi	FLR LL OTM =	2.08	f t - kips
f 'c =	3000	psi	RF LL OTM =	139.84	f t - kips
Wall DL =	0.29	klf	SEISMIC OTM =	146.41	f t - kips
Roof LL =	1.96	klf	Footing Length :	19.92	feet
Floor LL =	0.03	klf	Footing Width :	4.00	feet
Wall Length =	17.92	feet	Footing Thkness:	12	inches
Wall Thickness =	8	inches	Footing DL :	2.310	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	77.9 kips	P_{ult} =	104.1 kips		
OTM =	127.87 ft-kips	OTM_{ult} =	196.02 ft-kips		
e =	1.64 feet	X bar =	N/A feet		
Soil Pr. =	1.46 ksf, max.,	1.95 ksf, ult.		Required Width =	2.43 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	77.9 kips	P_{ULT} =	104.1 kips		
OTM =	237.7 ft-kips	OTM_{ULT} =	371.71 ft-kips		
e =	3.05 feet	X bar =	N/A feet		
Soil Pr. =	1.88 ksf, max.,	2.51 ksf, ult.		Required Width =	3.13 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	30.7 kips	P (ult) =	36.9 kips		
OTM =	159.3 ft-kips	OTM_{ULT} =	179.41 ft-kips		
e =	5.19 feet	X bar =	4.77 feet		
Soil Pr. =	1.07 ksf, max.,	1.29 ksf, ult.		Required Width =	1.79 feet

Resisting Moment = 509.89 ft-kips Factor of Safety = 4.42

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	32	inches			
Moment =	2.19 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	15 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	20	inches			
Moment =	4.78 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	89 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

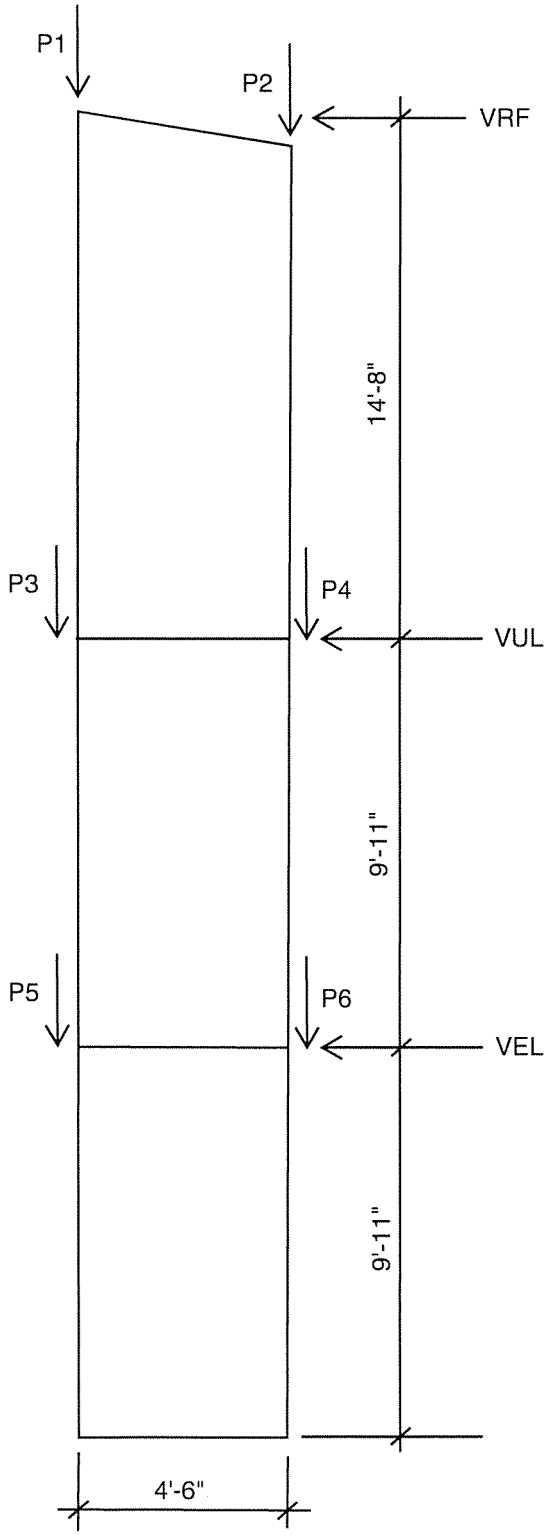
Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.06	sq.in./ft.	v(longit.) =	7 psi
Transverse Steel Required =	0.13	sq.in./ft.	v(transv.)=	23 psi
			V(allow) =	93.1 psi

rudow + berry
structural engineering
scottsdale, arizona 85251
t (480) 946-8171
f (480) 946-9480

job name: Powdercat
job number: 17100

designed by: MAR date: 5/17
checked by: date:

UNIT 133 SOUTH SHEAR WALL



VRF =	4872# EQ,	1500# WIND
VUL =	1023# EQ,	4110# WIND
VEL =	259# EQ,	1483# WIND
	6154# EQ,	7093# WIND

P2 = R(OHB8R) + R(OHB12L)
= 2852# D + 23729# S

P1 = R(EOHB3R) = 1395# D + 13272# S

P4 = R(TB2L)
= 1877# D + 236# L + 17640# S

P3 = 0

P6 = R(FB8L) = 1987# D + 3088# L

P5 = 0

NOTE: WALL IS VIEWED FROM SOUTH. ROOF SLOPE VARIES FROM WHAT IS SHOWN.

Unit 133, South Shear Wall	Pg 1 of 2

Powdercat
Job #17100

Wall	RF to UL	UL to EL	EL to BL
Length	4.50	4.50	4.50
Post CL	3.75	3.75	3.75
Height	14.67	9.92	9.92
Weight	660	446	446

Gravity Loads	Roof		Upper Level			Entry Level		
	DL	SL	DL	LL	SL	DL	LL	SL
Left Edge	1395	13272	0	0	0	0	0	0
Right Edge	2852	23729	1877	236	17640	1987	3088	0

Sheathing	RF to UL		UL to EL		EL to BL	
	EQ	Wind	EQ	Wind	EQ	Wind
Net Shear	4872	1500	1023	4110	259	1483
Gross Shear	4872	1500	5895	5610	6154	7093
Shear (plf)	1083	333	1310	1247	1368	1576
WSP	0.843		0.975		0.975	
Sheathing	5/8" BS		5/8" BS		5/8" BS	
Nails	10d at 2		10d at 2		10d at 2	
Table Shear	1740	2435	1740	2435	1740	2435
Allow. Shear	1466	2051	1696	2373	1696	2373
F.S.	1.35	6.15	1.29	1.90	1.24	1.51

Wall Chords at Upper Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ UL	71472	22005	OTM @ UL	71472	22005
Ft (EQ/Wind)	19059	5868	Ft (EQ/Wind)	19059	5868
P_{DL}	1395	1395	P_{DL}	2852	2852
P_{SL}	13272	13272	P_{SL}	23729	23729
P(min)	-18024	-4833	P(min)	-17150	-3959
Straps @ UL	(4) MST48		Straps @ UL	(4) MST48	
T_{ALLOW}	21240		T_{ALLOW}	21240	
F.S.	1.18	4.39	F.S.	1.24	5.37
P(max)	25643	15750	P(max)	34943	25050
Lu (ft)	13.00		Lu (ft)	12.25	

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	129931	77637	OTM @ UL	129931	77637
Ft (EQ/Wind)	34648	20703	Ft (EQ/Wind)	34648	20703
P_{DL}	1395	1395	P_{DL}	4729	4729
P_{SL}	13272	13272	P_{SL}	41369	41369
P_{LL}	0	0	P_{LL}	236	236
P(min)	-33479	-19534	P(min)	-31479	-17534
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	7	4	No. 3/4" Bolts	7	4
P(max)	37335	26876	P(max)	61919	51460
Lu (ft)	9.92		Lu (ft)	9.92	

Unit 133, South Shear Wall	Pg 2 of 2

Powdercat
Job #17100

Wall Chords at Basement Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	190958	147976	OTM @ EL	190958	147976
Ft (EQ/Wind)	50922	39460	Ft (EQ/Wind)	50922	39460
P_{DL}	1395	1395	P_{DL}	6716	4729
P_{SL}	13272	13272	P_{SL}	41369	23729
P_{LL}	0	0	P_{LL}	3324	236
P(min)	-49619	-38158	P(min)	-46561	-36291
PULT(min)	-79912	-61573	PULT(min)	-76242	-59333
As(req'd) (in2)	-1.48	-1.14	As(req'd) (in2)	-1.41	-1.10
Rebar	(4)#6	(4)#6	Rebar	(4)#6	(4)#6
3/4" Bolt Vallow	5040		3/4" Bolt Vallow	5040	
No. 3/4" Bolts	4	4	No. 3/4" Bolts	3	4
P(max)	52317	40944	P(max)	78427	52298
Lu (ft)	9.92	9.92	Lu (ft)	9.92	9.92

Strap at Roof Beam Conn. To Wall			
VROOF =	4872	lbs	EQ Controls
Strap	Simpson MST60 w/ (68) 16d Nails		
VALLOW (lbs)	6730		

3/4" Dia. Sill Bolts btwn Roof and UL			
VROOF =	4872	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	3		

3/4" Dia. Sill Bolts btwn UL and EL			
VROOF =	5895	lbs	EQ Controls
VALLOW =	1933	lbs	Per NDS Table 12A
No.Bolts	4		

3/4" Dia. Sill Bolts at Wall Base			
VMAX =	7093	lbs	Wind Controls
VALLOW =	2464	lbs	Per NDS Table 12E
No.Bolts	3		

Foundation Loads				
BL to B.O. FTG =		3	feet	
OTM @ B.O.FTG.	EQ =	209.42	ft-kips	
	Wind =	169.26	ft-kips	
Supporting Stem Length =		5.33	feet	
Left Edge to CL Stem =		1.83	feet	
Right Edge to CL Stem =		-2.67	feet	
P_{DL} =	9664	lbs =	1813	plf
P_{SL} =	54641	lbs =	10252	plf
P_{LL} =	236	lbs =	44	plf
M_{DL} =	-15.38	ft-kips		
M_{SL} =	-86.17	ft-kips		
M_{LL} =	-8.88	ft-kips		

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 133 South Wall

Allow. Soil Pr. =	2.400	ksf	DL OTM =	15.38	f t - kips
Fy =	60	ksi	FLR LL OTM =	8.88	f t - kips
f 'c =	3000	psi	RF LL OTM =	86.17	f t - kips
Wall DL =	1.81	klf	SEISMIC OTM =	209.42	f t - kips
Roof LL =	10.25	klf	Footing Length :	15.00	feet
Floor LL =	0.04	klf	Footing Width :	8.00	feet
Wall Length =	5.33	feet	Footing Thkness:	24	inches
Wall Thickness =	8	inches	Footing DL :	3.380	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	101.5 kips	P_{ult} =	138.3 kips		
OTM =	86.67 ft-kips	OTM_{ult} =	132.52 ft-kips		
e =	0.85 feet	X bar =	N/A feet		
Soil Pr. =	1.13 ksf, max.,	1.55 ksf, ult.		Required Width =	3.78 feet

EQ'N 16-14: DL + .75(FL + RL + .7E)

P =	101.5 kips	P_{ULT} =	138.3 kips		
OTM =	243.7 ft-kips	OTM_{ULT} =	383.82 ft-kips		
e =	2.40 feet	X bar =	N/A feet		
Soil Pr. =	1.66 ksf, max.,	2.26 ksf, ult.		Required Width =	5.53 feet

EQ'N 16-16: 0.6DL + 0.7E

P =	36.2 kips	P (ult) =	43.5 kips		
OTM =	218.6 ft-kips	OTM_{ULT} =	245.62 ft-kips		
e =	6.04 feet	X bar =	1.46 feet		
Soil Pr. =	2.06 ksf, max.,	2.48 ksf, ult.		Required Width =	6.88 feet

Resisting Moment = 452.72 ft-kips Factor of Safety = 2.91

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	36	inches			
Moment =	33.06 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	172 psi
Shear =	4.54 kips/ft	Fv(allow)=	71 psi	fv(act.)=	16 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	28	inches			
Moment =	19.80 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	176 psi
Shear =	3.30 kips/ft	Fv(allow)=	71 psi	fv(act.)=	15 psi

Reinf. Thickness (if used) =	24	inches		
Longitudinal Steel Required =	0.36	sq.in./ft.	v(longit.) =	31 psi
Transverse Steel Required =	0.22	sq.in./ft.	v(transv.)=	20 psi
			V(allow) =	93.1 psi

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Job #17100

Unit 133, Far South Shear Wall

Wall	RF to UL	UL to EL
Length	3.42	3.42
Post CL	2.96	2.96
Height	9.92	7.42
Weight	339	254

Loads	Upper Level		Entry Level		
	DL	SL	DL	LL	SL
Left Edge	1023	9467	914	1462	0
Right Edge	853	7892	762	1219	0

Sheathing	UL to EL		EL to BL	
	EQ	Wind	EQ	Wind
Net Shear	309	1084	147	742
Gross Shear	309	1084	456	1826
Shear (plf)	90	317	133	534
WSP	0.887		0.979	
Sheathing	5/8" OS		5/8" OS	
Nails	10d at 4		10d at 4	
Table Shear	1020	1430	1020	1430
Allow. Shear	453	635	499	700
F.S.	5.01	2.00	3.74	1.31

Wall Chords at Entry Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	3065	10753	OTM @ EL	3065	10753
Ft (EQ/Wind)	1035	3631	Ft (EQ/Wind)	1035	3631
P_{DL}	1023.435	1023.435	P_{DL}	853.195	853.195
P_{SL}	9466.77375	9466.77375	P_{SL}	7892.05375	7892.05375
P(min)	-319	-2915	P(min)	-421	-3017
Straps @ EL	MST48		Straps @ EL	MST48	
T_{ALLOW}	3463		T_{ALLOW}	3463	
F.S.	10.85	1.19	F.S.	8.22	1.15
P(max)	8900	10847	P(max)	7548	9495
Lu (ft)	9.92		Lu (ft)	9.92	

Wall Chords at Basement Level					
Left Wall Edge			Right Wall Edge		
	EQ	Wind		EQ	Wind
OTM @ EL	6447	24296	OTM @ EL	6447	24296
Ft (EQ/Wind)	2177	8204	Ft (EQ/Wind)	2177	8204
P_{DL}	1937.21625	1937.21625	P_{DL}	1615	1615
P_{SL}	9466.77375	9466.77375	P_{SL}	7892	7892
P_{LL}	1462.05	1462.05	P_{LL}	1219	1219
P(min)	-837	-6863	P(min)	-1030	-7057
PULT(min)	-1875	-11517	PULT(min)	-2107	-11749
Holdown	Simpson HDU14-SDS2.5		Holdown	Simpson HDU14-SDS2.5	
TALLOW	14445		TALLOW	14445	
P(max)	11767	16286	P(max)	10081	14601
Lu (ft)	9.92	9.92	Lu (ft)	7.42	7.42

Unit 133, Far South Shear Wall

Powdercat

Job #17100

16d Nails btwn UL and EL			
VUL =	1084	lbs	Wind Controls
VALLOW =	226	lbs	Per NDS Table 12A
# 16d Nails	5	16d @ 8" O.C. Max.	

1/2" Dia. Sill Bolts at Wall Base			
VMAX =	1826	lbs	Wind Controls
VALLOW =	1040	lbs	Per NDS Table 12E
No.Bolts	2	1/2" Dia. AB's @ 24" O.C. Max.	

Foundation Loads			
BL to B.O. FTG =		6.5	feet
OTM @ B.O.FTG.	EQ =	9.41	ft-kips
	Wind =	36.17	ft-kips
Supporting Stem Length =		21.75	feet
w_{DL} =	606	plf	
w_{SL} =	2084	plf	
w_{LL} =	240	plf	

rudow + berry
structural engineering
scottsdale, arizona
(602) 946-8171

project name: Powdercat - CCW

project no. 17100

designed by: MAR date: May-17
checked by: date:

SHEAR WALL FOOTING DESIGN

INPUT DATA :

Unit 133 Far South Wall

Allow. Soil Pr. =	2.400	ksf		DL OTM =	0.00	f t - kips
Fy =	60	ksi		FLR LL OTM =	0	f t - kips
f 'c =	3000	psi		RF LL OTM =	0	f t - kips
Wall DL =	0.61	klf		WIND OTM =	36.17	f t - kips
Roof LL =	2.08	klf		Footing Length :	21.75	feet
Floor LL =	0.24	klf		Footing Width :	2.00	feet
Wall Length =	21.75	feet		Footing Thkness:	12	inches
Wall Thickness =	8	inches		Footing DL :	1.033	klf

OUTPUT DATA :

EQ'N 16-11 : DL + .75(FL + RL):

P =	73.6 kips	P_{ult} =	103.4 kips		
OTM =	0.00 ft-kips	OTM_{ult} =	0 ft-kips		
e =	0.00 feet	X bar =	N/A feet		
Soil Pr. =	1.69 ksf, max.,	2.38 ksf, ult.		Required Width =	1.41 feet

EQ'N 16-13: DL + .75(FL + RL + W)

P =	73.6 kips	P_{ULT} =	103.4 kips		
OTM =	27.1 ft-kips	OTM_{ULT} =	43.404 ft-kips		
e =	0.37 feet	X bar =	N/A feet		
Soil Pr. =	1.86 ksf, max.,	2.62 ksf, ult.		Required Width =	1.55 feet

EQ'N 16-15: 0.6DL + W

P =	21.4 kips	P (ult) =	25.7 kips		
OTM =	36.2 ft-kips	OTM_{ULT} =	57.872 ft-kips		
e =	1.69 feet	X bar =	N/A feet		
Soil Pr. =	0.72 ksf, max.,	0.87 ksf, ult.		Required Width =	0.60 feet

Resisting Moment = 387.75 ft-kips Factor of Safety = 15.31

FOOTING REINFORCING:

LONGITUDINAL DIRECTION:

Req'd Unreinf Thickness =	12	inches			
Moment =	0.15 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	9 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

TRANSVERSE DIRECTION:

Req'd Unreinf Thickness =	12	inches			
Moment =	1.30 ft-kips/ft	Fb(allow)=	178 psi	fb(act.)=	78 psi
Shear =	0.00 kips/ft	Fv(allow)=	71 psi	fv(act.)=	0 psi

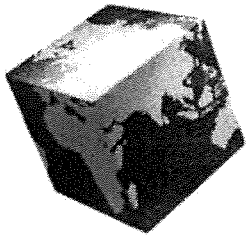
Reinf. Thickness (if used) =	12	inches		
Longitudinal Steel Required =	0.00	sq.in./ft.	v(longit.) =	0 psi
Transverse Steel Required =	0.03	sq.in./ft.	v(transv.)=	0 psi
			V(allow) =	93.1 psi

APPENDIX

Geotechnical and Geologic Hazard Investigation Report

By

IGES, Inc.



IGES®

Intermountain GeoEnvironmental Services, Inc.
12429 South 300 East, Suite 100, Draper, Utah 84120
Phone (801) 748-4044 ~ F: (801) 748-4045
www.igesinc.com

GEOTECHNICAL AND GEOLOGIC HAZARD INVESTIGATION
Copper Crest West
Summit Powder Mountain Resort
Weber County, Utah

IGES Project No. 01628-022

January 16, 2017

Prepared for:

Summit Mountain Holding Group

Intermountain GeoEnvironmental Services, Inc.
12429 South 300 East, Suite 100, Draper, Utah 84120 ~ T: (801) 748-4044 ~ F: (801) 748-4045

Prepared for:

Summit Mountain Holding Group
3632 North Wolf Creek Drive
Eden, Utah 84310
Attn: Mr. Rick Everson

Geotechnical and Geologic Hazard Investigation
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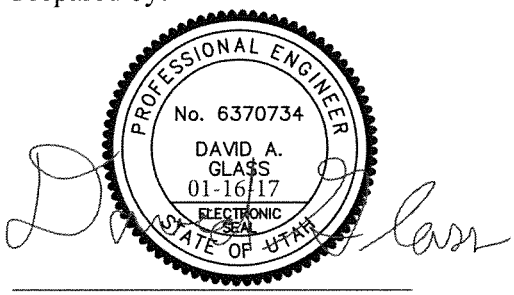
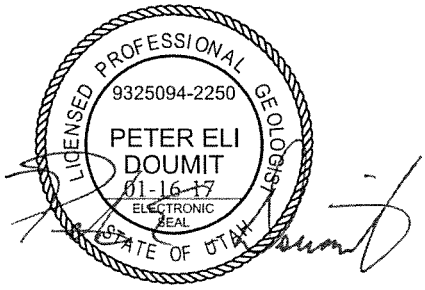


David A. Glass, P.E.
Senior Geotechnical Engineer



Peter E. Doumit, P.G., C.P.G.
Senior Geologist

IGES, Inc.
12429 South 300 East, Suite 100
Draper, Utah 84120
(801) 748-4044

January 16, 2017

TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE OF WORK

This report presents the results of a geotechnical and geologic hazard investigation conducted for the *Copper Crest West* townhome development, part of the currently on-going expansion at the Powder Mountain Ski Resort in Weber County. The purpose of our investigation was to assess the nature and engineering properties of the subsurface soils at the proposed townhome site and to provide recommendations for the design and construction of foundations, grading, and drainage. In addition, geologic hazards have been assessed for the property. The scope of work completed for this study included literature review, subsurface exploration, engineering analyses, and preparation of this report.

Our services were performed in accordance with our proposal to Summit Mountain Holding Group (Client), dated October 20, 2016. The recommendations presented in this report are subject to the limitations presented in the "Limitations" section of this report (Section 6.1).

1.2 PROJECT DESCRIPTION

Our understanding of the project is based primarily on our previous involvement with the Summit Powder Mountain resort project, which included two geotechnical investigations for the greater 200-acre Powder Mountain Resort expansion project (IGES, 2012a and 2012b) and subsequent geotechnical consulting for several other aspects of the project.

The Summit Powder Mountain Resort expansion project is located southeast of SR-158 (Powder Mountain Road), south of previously developed portions of Powder Mountain Resort, in unincorporated Weber County, Utah. The project is accessed by Powder Ridge Road and Copper Crest Road. The *Copper Crest West* townhomes will be located within the Summit Eden Phase 1C area (see *Site Vicinity Map*, Figure A-1 in Appendix A). The approximately 0.42-acre *Copper Crest West* project will consist of 11 residential units, presumably intended to be vacation homes. The entire townhome structure is expected to have a structural footprint on the order of 15,000 square feet. The units are expected to be similar to the *Copper Crest – East* development; the units are expected to have three levels – the southern end of the townhomes will have, in effect, a walk-out basement (the portion of the building adjacent to the street will be subterranean). Individual units will have a single-car garage, with a possible storage space below the garage floor.

2.0 METHODS OF STUDY

2.1 LITERATURE REVIEW

2.1.1 Geotechnical

The earliest geotechnical report for the area is by AMEC (2001), which was a reconnaissance-level geotechnical and geologic hazard study. IGES later completed a geotechnical investigation for the Powder Mountain Resort expansion in 2012 (2012a, 2012b). Our previous work included twenty-two test pits and one soil boring excavated at various locations across the 200-acre development; as a part of this current study, the logs from relevant nearby test pits and other data from our reports were reviewed.

2.1.2 Geological

Several pertinent publications were reviewed as part of this assessment. Sorensen and Crittenden, Jr. (1979) provides 1:24,000 scale geologic mapping of the Huntsville Quadrangle, and Crittenden, Jr. (1972) provides 1:24,000 scale geologic mapping of the Brown's Hole Quadrangle. Coogan and King (2001) provide more recent geologic mapping of the area, but at a 1:100,000 scale. An updated Coogan and King (2016) regional geologic map (1:62,500 scale) provides the most recent published geologic mapping that covers the project area. Western Geologic (2012) conducted a reconnaissance-level geologic hazard study for the greater 200-acre Powder Mountain expansion project, including the Copper Crest West area. The Western Geologic (2012) study modified some of the potential landslide hazard boundaries that had previously been mapped at a regional scale (1:100,000) by Coogan and King (2001) and Elliott and Harty (2010). The corresponding United States Geological Survey (USGS) topographic maps for the Huntsville and Brown's Hole Quadrangles (2014) provide physiographic and hydrologic data for the project area. Regional-scale geologic hazard maps pertaining to landslides (Elliott and Harty, 2010; Colton, 1991), faults (Christenson and Shaw, 2008a; USGS and Utah Geological Survey (UGS), 2006), debris-flows (Christenson and Shaw, 2008b), and liquefaction (Christenson and Shaw, 2008c; Anderson et al., 1994) that cover the project area were also reviewed. The Quaternary Fault and Fold Database (USGS and UGS, 2006), was reviewed to identify the location of proximal faults that have had associated Quaternary-aged displacement.

Stereo-paired aerial imagery for the project site and recent and historic Google Earth imagery was also reviewed to assist in the identification of potential adverse geologic conditions. The aerial photographs reviewed are documented in the *References* section of this report.

2.2 FIELD INVESTIGATION

Subsurface soils were investigated by excavating two test pits at representative locations. The approximate location of the test pits are illustrated on the *Geotechnical Map* (Figure A-2 in Appendix A). The soil types were visually logged at the time of our field work in general accordance with the *Unified Soil Classification System* (USCS). Soil classifications and descriptions are included on the test pit logs, Figures A-3 and A-4 in Appendix A. A key to USCS symbols and terminology is included as Figure A-5.

2.3 LABORATORY TESTING

Samples retrieved during the subsurface investigation were transported to the IGES laboratory for evaluation of engineering properties. Specific laboratory tests included:

- Atterberg Limits (ASTM D4318)
- Grain-Size Distribution (ASTM D6913)
- Fines Content (ASTM D1140)
- In situ Moisture Content
- Soluble Sulfate, Soluble Chloride, pH and Resistivity

Results of the laboratory testing are discussed in this report and presented in Appendix B. Some test results, including moisture content and Atterberg Limits, have been incorporated into the test pit logs (Figures A-3 and A-4).

3.0 GEOLOGIC CONDITIONS

3.1 GENERAL GEOLOGIC SETTING

The Copper Crest West property is situated in the western portion of the northern Wasatch Mountains, approximately 4 miles north of Ogden Valley. The Wasatch Mountains contain a broad depositional history of thick Precambrian and Paleozoic sediments that have been subsequently modified by various tectonic episodes that have included thrusting, folding, intrusion, and volcanics, as well as scouring by glacial and fluvial processes (Stokes, 1987). The uplift of the Wasatch Mountains occurred relatively recently during the Late Tertiary Period (Miocene Epoch) between 12 and 17 million years ago (Milligan, 2000). Since uplift, the Wasatch Front has seen substantial modification due to such occurrences as movement along the Wasatch Fault and associated spurs, the development of the numerous canyons that empty into the current Salt Lake Valley and Utah Valley and their associated alluvial fans, erosion and deposition from Lake Bonneville, and localized mass movement events (Hintze, 1988).

The Wasatch Mountains, as part of the Middle Rocky Mountains Province (Milligan, 2000), were uplifted as a fault block along the Wasatch Fault (Hintze, 1988). Ogden Valley itself is a fault-bounded trough that was occupied by Lake Bonneville (Sorensen and Crittenden, Jr, 1979) before being cut through by the Ogden River and subsequently dammed to form the Pineview Reservoir.

The Wasatch Fault and its associated segments are part of an approximately 230-mile long zone of active normal faulting referred to as the Wasatch Fault Zone (WFZ), which has well-documented evidence of late Pleistocene and Holocene (though not historic) movement (Lund, 1990; Hintze, 1988). The faults associated with the WFZ are all normal faults, exhibiting block movement down to the west of the fault and up to the east. The WFZ is contained within a greater area of active seismic activity known as the Intermountain Seismic Belt (ISB), which runs approximately north-south from northwestern Montana, along the Wasatch Front of Utah, through southern Nevada, and into northern Arizona. In terms of earthquake risk and potential associated damage, the ISB ranks only second in North America to the San Andreas Fault Zone in California (Stokes, 1987).

The WFZ consists of a series of ten segments of the Wasatch Fault that each display different characteristics and past movement, and are believed to have movement independent of one another (UGS, 1996). The Copper Crest West property is located approximately 10.2 miles to the northeast of the Weber Segment of the Wasatch Fault, which is the closest documented Holocene-aged (active) fault to the property and trends north-south along the Wasatch Front (USGS and UGS, 2006).

3.2 SURFICIAL GEOLOGY

According to Crittenden, Jr. (1972), the property is entirely underlain by the undivided Tertiary/Cretaceous Wasatch and Evanston Formations (TKwe), described as "unconsolidated pale-red to greenish-red pebble, cobble, and boulder conglomerate. Forms boulder-covered slopes but does not crop out anywhere. Clasts are mainly Precambrian quartzite and are tan, gray, or purple; matrix is mainly poorly consolidated sand and silt." A generalized bedding attitude shows this unit striking due north and dipping 10 degrees to the east; this map forms the basemap for the *Regional Geology Map 1* (Figure A-6). Coogan and King (2001) produced a regional-scale geologic map that covered the property; this map shows the property to be entirely underlain by the Wasatch Formation. Western Geologic (2012) identified a number of landslide deposits contained within the Powder Mountain Resort expansion area, though none of these were shown underlying the Copper Crest West area (Figure A-7). Deposits mapped as "mixed slope colluvium, shallow landslides, and talus" are found southwest of the property. Finally, Coogan and King (2016) updated their 2001 map, which shows the property to be straddling the contact between the northeasternmost reach of a lobe of landslide deposits (unit Qms) and theWasatch Formation (unit Tw) (Figure A-8). Wasatch Formation bedrock in the area is shown to be striking approximately to the north-northeast, and dipping between 3 and 6 degrees to the east-southeast; additionally, according to this map, the property is just west of a north-south trending syncline[1].

3.3 HYDROLOGY

The USGS topographic maps for the Huntsville and Brown's Hole Quadrangles (2014) show that the Copper Crest West project area is situated on a slope, with the topographic gradient down to the southwest towards Lefty's Canyon (see Figure A-1). No active or ephemeral stream drainages are found on the property, though a dry small gully was observed during the site reconnaissance. No springs are known to occur on the property, though it is possible that springs may occur on various parts of the property during peak runoff.

Baseline groundwater depths for the Copper Crest West property are currently unknown, but are anticipated to fluctuate both seasonally and annually. At the time of our subsurface exploration, seepage was observed at a depth of 14.5 feet in TP-1 and 18 feet in TP-2. This seepage is likely an underground spring and is not expected to represent the local piezometric groundwater surface.

3.4 GEOLOGIC HAZARDS FROM LITERATURE

Based upon the available geologic literature, regional-scale geologic hazard maps that cover the Copper Crest West project area have been produced for landslide, fault, debris-flow, and liquefaction hazards. The following is a summary of the data presented in these regional geologic hazard maps.

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[1] Syncline: A fold of which the core contains the stratigraphically younger rocks; it is generally concave upward. (AGI, 2005)

3.4.1 Landslides

Two regional-scale landslide hazard maps have been produced that cover the project area. Colton (1991) does not show the property to be underlain by or adjacent to landslide deposits. Elliott and Harty (2010) shows deposits mapped as "Landslide undifferentiated from talus and/or colluvial deposits" near the southern margin of the property. Most recently and more site-specific, Western Geologic (2012) used the Elliott and Harty (2010) map as a base map, which shows "mixed slope colluvium, shallow landslides, and talus" deposits southwest of the property (see Figure A-7).

3.4.2 Faults

Neither Christensen and Shaw (2008a) nor the Quaternary Fault and Fold Database of the United States (USGS and UGS, 2006) show any Quaternary-aged (~2.6 million years ago to the present) faults to be present on or projecting towards the subject property. The Weber County Natural Hazards Overlay Districts defines an active fault to be "a fault displaying evidence of greater than four inches of displacement along one or more of its traces during Holocene time (about 11,000 years ago to the present)" (Weber County, 2015). The closest active fault to the property is the Weber Segment of the Wasatch Fault Zone, located approximately 10.2 miles southwest of the western margin of the property (USGS and UGS, 2006).

3.4.3 Debris Flows

Christensen and Shaw (2008b) do not show the project area to be located within a debris-flow hazard special study area.

3.4.4 Liquefaction

Anderson, et al. (1994) and Christensen and Shaw (2008c) both show the project area to be located in an area with very low potential for liquefaction.

3.5 REVIEW OF AERIAL IMAGERY

A series of aerial photographs that cover project area were taken from the UGS Aerial Imagery Collection and analyzed stereoscopically for the presence of adverse geologic conditions across the property. This included a review of photos collected from the years 1947, 1953, and 1963. A table displaying the details of the aerial photographs reviewed can be found in the *References* section at the end of this report.

No geologic lineaments, fault scarps, landslide headscarps, or landslide deposits were observed in the aerial photography on the subject property.

Google Earth imagery of the property from between the years of 1993 and 2016 were also reviewed. No landslide or other geological hazard features were noted in the imagery. The property was observed to contain some surficial gravel, cobbles, and boulders, and devoid of drainages.

Most of the project area was found to be covered in various forms of vegetation, with no bedrock exposures anywhere on the property.

At the time of this report, no LiDAR data for the project area was available to be reviewed.

3.6 SEISMICITY

Following the criteria outlined in the 2015 International Building Code (IBC, 2015), spectral response at the site was evaluated for the *Maximum Considered Earthquake* (MCE) which equates to a probabilistic seismic event having a two percent probability of exceedance in 50 years (2PE50). Spectral accelerations were determined based on the location of the site using the *U.S. Seismic "DesignMaps" Web Application* (USGS, 2012/15); this software incorporates seismic hazard maps depicting probabilistic ground motions and spectral response data developed for the United States by the U. S. Geological Survey as part of NEHRP/NSHMP (Frankel et al., 1996). These maps have been incorporated into both *NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures* (FEMA, 1997) and the *International Building Code* (IBC) (International Code Council, 2015).

Table 3.6
Short- and Long-Period Spectral Accelerations for MCE

Parameter	Short Period (0.2 sec)	Long Period (1.0 sec)
MCE Spectral Response Acceleration (g)	$S_S = 0.810$	$S_1 = 0.269$
MCE Spectral Response Acceleration Site Class C (g)	$S_{MS} = S_S F_a = 0.872$	$S_{M1} = S_1 F_v = 0.411$
Design Spectral Response Acceleration (g)	$S_{DS} = S_{MS}{}^{*2}/_3 = 0.581$	$S_{D1} = S_{M1}{}^{*2}/_3 = 0.274$

To account for site effects, site coefficients that vary with the magnitude of spectral acceleration and *Site Class* are used. Site Class is a parameter that accounts for site amplification effects of soft soils and is based on the average shear wave velocity of the upper 100 feet; based on our field exploration and our understanding of the geology in this area, the subject site is appropriately classified as Site Class C (*very dense soil/soft rock*). Based on IBC criteria, the short-period (F_a) coefficient is 1.076 and the long-period (F_v) site coefficient is 1.531. Based on the design spectral response accelerations for a *Building Risk Category* of I, II or III, the site's *Seismic Design Category* is D. The short- and long-period *Design Spectral Response Accelerations* are presented in Table 3.6; a summary of the *Design Maps* analysis is presented in Appendix B. The *peak ground acceleration* (PGA) may be taken as $0.4*S_{MS}$.

3.7 GEOLOGIC HAZARD ASSESSMENT

Geologic hazard assessments are necessary to determine the potential risk associated with particular geologic hazards that are capable of adversely affecting a proposed development area. As such, they are essential in evaluating the suitability of an area for development and provide critical data in both the planning and design stages of a proposed development. The geologic hazard assessment discussion below is based upon a qualitative assessment of the risk associated with a particular geologic hazard, based upon the data reviewed and collected as part of this investigation.

A "low" hazard rating is an indication that the hazard is either absent, is present in such a remote possibility so as to pose limited or little risk, or is not anticipated to impact the project in an adverse way. Areas with a low-risk determination for a particular geologic hazard do not require additional site-specific studies or associated mitigation practices with regard to the geologic hazard in question. A "moderate" hazard rating is an indication that the hazard has the capability of adversely affecting the project at least in part, and that the conditions necessary for the geologic hazard are present in a significant, though not abundant, manner. Areas with a moderate-risk determination for a particular geologic hazard may require additional site-specific studies, depending on location and construction specifics, as well as associated mitigation practices in the areas that have been identified as the most prone to susceptibility to the particular geologic hazard. A "high" hazard rating is an indication that the hazard is very capable of or currently does adversely affecting the project, that the geologic conditions pertaining to the particular hazard are present in abundance, and/or that there is geologic evidence of the hazard having occurred at the area in the historic or geologic past. Areas with a high-risk determination always require additional site-specific hazard investigations and associated mitigation practices where the location and construction specifics are directly impacted by the hazard. For areas with a high-risk geologic hazard, simple avoidance is often considered.

The following is a summary of the geologic hazard assessment for the Copper Crest West property.

3.7.1 Landslides/Mass Movement/Slope Stability

The property is situated on mapped landslides near the contact with Wasatch Formation bedrock, according to the most recent geologic map covering the property (Coogan and King, 2016). However, other literature sources, including the Western Geologic (2012) reconnaissance-level geologic hazard assessment for the greater Powder Mountain area and Elliott and Harty (2010), show the property to not be underlain by landslide deposits, but near deposits mapped as landslide or colluvial deposits southwest of the property. Additionally, landslide deposits or headscarps were not observed in the aerial imagery evaluation, and no geomorphic expression of landslide deposits or headscarps were observed on or upslope of the property during the site reconnaissance. Though a deep clay seam displaying slickensides was observed in TP-2 during the subsurface investigation,

the seam also exhibited a blocky texture, indicating a lack of internal movement; additionally, no distinct slide plane was observed.

The average slope across the property is found to be approximately 6:1 (horizontal:vertical), which does not require site-specific slope stability analyses. Though slow soil-creep may currently be occurring, the subsurface data indicate that this is restricted to the topsoil. Given this data, the risk associated with landslide and slope stability hazards on the property is considered to be low.

3.7.2 Rockfall

Though the property is on a slope, no bedrock outcrops are exposed upslope of the property. As such, the rockfall hazard associated with the property is considered to be low.

3.7.3 Surface-Fault Rupture and Earthquake-Related Hazards

No faults are known to be present on or project across the property, and the closest active fault to the property is the Weber Segment of the Wasatch Fault Zone, located approximately 10.2 miles to the west of the property (USGS and UGS, 2006). Given this information, the risk associated with surface-fault-rupture on the property is considered low.

The entire property is subject to earthquake-related ground shaking from a large earthquake generated along the active Wasatch Fault. Given the distance from the Wasatch Fault, the hazard associated with ground shaking is considered to be moderate. Proper building design according to appropriate building code and design parameters can assist in mitigating the hazard associated with earthquake ground shaking.

3.7.4 Liquefaction

The site is underlain by Wasatch Formation, a poorly consolidated sedimentary rock unit (conglomerate). Rock units such as these are not considered susceptible to liquefaction; as such, the potential for liquefaction occurring at the site is considered low.

3.7.5 Debris-Flows and Flooding Hazards

Though a small, dry gully was observed on the property, the property does not contain and is not located adjacent to any active or ephemeral drainages. Additionally, there are no debris-flow source areas upslope of the property, and the property is on a consistent slope downhill to the southwest. Given these conditions, the debris-flow and flooding hazard associated with the property is considered to be low.

3.7.6 Shallow Groundwater

Groundwater was encountered in both of the test pits excavated as part of this investigation, at depths of 14.5 feet and 18 feet, respectively. These test pits were excavated in early November, and the groundwater level was likely to be on its way down towards its seasonal low. No springs

were observed on the property, and no plants indicative of shallow groundwater conditions were observed on the property.

Given the existing data, it is expected that groundwater levels will fluctuate both seasonally and annually, and the risk associated with shallow groundwater hazards is considered high. Spring thaw and runoff are likely to significantly contribute to elevated groundwater conditions, especially if groundwater levels are still within 20 feet of existing grade in November. However, shallow groundwater issues can be mitigated through appropriate grading measures and/or the avoidance of the construction of residences with basements, or constructing basements with foundation drains.

4.0 GENERALIZED SITE CONDITIONS

4.1 SITE RECONNAISSANCE

Mr. Peter E. Doumit, P.G., C.P.G., of IGES conducted reconnaissance of the site and the immediate adjacent properties on November 2, 2016. The site reconnaissance was conducted with the intent to assess the general geologic conditions present across the property, with specific interest in those areas identified in the geologic literature and aerial imagery reviews as potential geologic hazard areas. Additionally, the site reconnaissance provided the opportunity to geologically map the surficial geology of the area. Figure A-2 is a site-specific geologic map of the Copper Crest West property and adjacent areas.

At the time of the site reconnaissance, the property was observed to have a gentle topographic gradient to the southwest, and much of the property had already been grubbed. However, some occasional shrubs and other low-lying vegetation were encountered on the property.

Variously-sized boulders and cobbles were found scattered across the property, as part of a surficial geologic unit considered to be either weathered Wasatch Formation or colluvial deposits derived from weathered Wasatch Formation. These were typically subrounded, and were found to be as large as 3 feet in diameter. The rock clasts[2] were found to be comprised predominantly of banded to massive purple quartzite, though some dark gray sandy limestone and yellowish-orange sandstone clasts were also observed.

A single, small, northeast-southwest trending gully was observed in the eastern portion of the property and contained small rounded alluvial gravel and cobbles. The gully was dry and was up to one foot deep. No springs, seeps, or running water were observed on the property at the time of the site visit. Additionally, no evidence of landsliding or other geologic hazards was observed on the property, though potential localized landslide features were observed to the south and west of the property (see Figure A-2).

4.2 SUBSURFACE CONDITIONS

On November 4, 2016, two exploration test pits were excavated at representative locations across the property (Figure A-2). The test pits were excavated with to depths ranging between 15 and 18 feet below existing grade with the aid of a Caterpillar 313F tracked excavator. Detailed logs for the test pits are displayed in Figure A-3 and Figure A-4. Five distinct geologic units were encountered in the subsurface, with three of these units being found in both of the test pits. The soil and moisture conditions encountered during our investigation are discussed in the following paragraphs.

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[2] Clast: An individual constituent, grain, or fragment of a sediment or rock, produced by the mechanical or chemical disintegration or a larger rock mass. (AGI, 2005)

4.2.1 Earth Materials

A/B Soil Horizon: This topsoil unit was found to be approximately 1.5 feet thick in both test pits. The unit was a dark brown, loose, moist, sandy lean CLAY with gravel (CL), with gravel and larger-sized quartzite clasts comprising between 10% and 15% of the unit. The topsoil was found to be forming upon the underlying colluvium or alluvial unit.

Cemented Colluvium: This unit was only observed in TP-1, and was found to be approximately 1.5 feet thick. The unit consisted of a light brown, medium-stiff, slightly moist, sandy lean CLAY with gravel (CL). Gravel and larger-sized subrounded quartzite clasts comprised approximately 20% of the unit, with individual clasts up to two inches in diameter.

Alluvial: This unit was encountered in both test pits, being approximately 5 feet thick in TP-1 and 4.5 feet thick in TP-2. The unit consisted of a moderate to dark brown, medium dense, moist, clayey GRAVEL with sand (GC). Gravel and larger-sized subrounded quartzite clasts comprised between approximately 50% and 65% of the unit, with individual clasts up to three feet in diameter.

Wasatch Formation: This unit was found to underlie the alluvial unit in both test pits, being more than 6 feet thick and extending to the maximum depth of exploration in TP-1, and being approximately 5 feet thick in TP-2. The unit consisted of weakly consolidated conglomerate bedrock that had been largely disaggregated into a heterogeneous dark reddish brown to moderate reddish brown, medium-dense to dense, moist to wet mixture of clay, sand, and gravel that classifies as a clayey GRAVEL with sand (GC). Gravel and larger-sized subrounded quartzite clasts comprised approximately 36% of the unit, with individual clasts up to 1 foot in diameter and a mode clast size of 2 to 3 inches.

Clay Seam: This unit was only observed in TP-2, underlying the Wasatch Formation and extending to the maximum depth of exploration (at least 6 feet thick). The unit consisted of a light gray, medium-stiff to stiff, moist to wet, fat CLAY with gravel (CH). Gravel and larger-sized subrounded quartzite clasts comprised approximately <5% of the unit, with individual clasts up to three inches in diameter. Though the color was indicative of some of the dolomite bedrock found elsewhere on Powder Mountain, no bedrock clasts were observed in the unit. Though the unit exhibited a blocky texture, natural slickensides were observed internally within some of the blocks.

4.2.2 Groundwater

Groundwater was encountered in both of the test pits. In TP-1, the groundwater was observed to be seeping out of the lower exposed portion of the Wasatch Formation at a depth of approximately 14.5 feet below existing grade. In TP-2, the groundwater was observed to be seeping out of the bottom of the test pit at a depth of approximately 18 feet below existing grade. This water is expected to derive from a localized underground spring and likely represents underground seepage, as opposed to a localized piezometric surface.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 GENERAL CONCLUSIONS

Based on the results of the field observations, literature review, and previously completed geotechnical investigation (IGES, 2012a), the subsurface conditions are considered suitable for the proposed development provided that the recommendations presented in this report are incorporated into the design and construction of the project.

Supporting data upon which the following recommendations are based have been presented in the previous sections of this report. The recommendations presented herein are governed by the physical properties of the earth materials encountered in the subsurface explorations. If subsurface conditions other than those described herein are encountered in conjunction with construction, and/or if design and layout changes are initiated, IGES must be informed so that our recommendations can be reviewed and revised as deemed necessary.

5.2 GEOLOGIC CONCLUSIONS AND RECOMMENDATIONS

Based upon the data collected and reviewed as part of the geologic hazard assessment, IGES makes the following conclusions regarding the geological hazards present at the Copper Crest West project area:

- **The Copper Crest West project area does not appear to have major geological hazards that would adversely affect the development as currently proposed.**

- Shallow groundwater conditions were observed on the property in both test pits, despite the excavations occurring in November; therefore, shallow groundwater hazards are considered to be high for the property.

- Earthquake ground shaking is the only other identified hazard that may potentially affect all parts of the project area and is considered to pose a moderate risk.

- Landslide, rockfall, surface-fault-rupture, liquefaction, debris-flow, and flooding hazards are considered to be low for the property.

Given the conclusions listed above, IGES makes the following recommendations:

- Because landslide deposits are noted near the property, an IGES geologist or geotechnical engineer should observe the foundation excavations to confirm the absence of landside deposits.

5.3 EARTHWORK

5.3.1 General Site Preparation and Grading

Below proposed structures, fills, and man-made improvements, all vegetation, topsoil, debris and undocumented fill (if any) should be removed. Any existing utilities should be re-routed or protected in place. The exposed native soils should then be proof-rolled with heavy rubber-tired equipment such as a scraper or loader*. Any soft/loose areas identified during proof-rolling should be removed and replaced with structural fill. All excavation bottoms should be observed by an IGES representative during proof-rolling or otherwise prior to placement of engineered fill to evaluate whether soft, loose, or otherwise deleterious earth materials have been removed, and to assess compliance with the recommendations presented in this report.

*not required where bedrock is exposed in the foundation subgrade

5.3.2 Excavations

Soft, loose, or otherwise unsuitable soils beneath structural elements, hardscape or pavements may need to be over-excavated and replaced with structural fill. If over-excavation is required, the excavations should extend one foot laterally for every foot of depth of over-excavation. Excavations should extend laterally at least two feet beyond flatwork, pavements, and slabs-on-grade. Structural fill should consist of granular materials and should be placed and compacted in accordance with the recommendations presented in this report.

Prior to placing engineered fill, all excavation bottoms should be scarified to at least 6 inches, moisture conditioned as necessary at or slightly above optimum moisture content (OMC), and compacted to at least 90 percent of the maximum dry density (MDD) as determined by ASTM D-1557 (Modified Proctor). Scarification is not required where bedrock is exposed.

5.3.3 Excavation Stability

The contractor is responsible for site safety, including all temporary trenches excavated at the site and the design of any required temporary shoring. The contractor is responsible for providing the "competent person" required by Occupational Safety and Health (OSHA) standards to evaluate soil conditions. For planning purposes, Soil Type C is expected to predominate at the site (sands and gravels). Close coordination between the competent person and IGES should be maintained to facilitate construction while providing safe excavations.

Based on OSHA guidelines for excavation safety, trenches with vertical walls up to 5 feet in depth may be occupied. Where very moist soil conditions or groundwater is encountered, or when the trench is deeper than 5 feet, we recommend a trench-shield or shoring be used as a protective system to workers in the trench. As an alternative to shoring or shielding, trench walls may be laid back at one and one half horizontal to one vertical (1½H:1V) (34 degrees) in accordance with OSHA Type C soils. Trench walls may need to be laid back at a steeper grade pending evaluation

of soil conditions by the geotechnical engineer. Soil conditions should be evaluated in the field on a case-by-case basis. Large rocks exposed on excavation walls should be removed (scaled) to minimize rock fall hazards.

5.3.4 Structural Fill and Compaction

All fill placed for the support of structures, flatwork or pavements should consist of structural fill. Structural fill should consist of granular native soils, which may be defined as soils with less than 25% fines, 10-60% sand, and contain no rock larger than 4 inches in nominal size (6 inches in greatest dimension). Structural fill should also be free of vegetation and debris. All structural fill should be 1 inch minus material when within 1 foot of any base coarse material. Soils not meeting these criteria may be suitable for use as structural fill; however, such soils should be evaluated on a case by case basis and should be approved by IGES prior to use.

All structural fill should be placed in maximum 4-inch loose lifts if compacted by small hand-operated compaction equipment, maximum 6-inch loose lifts if compacted by light-duty rollers, and maximum 8-inch loose lifts if compacted by heavy duty compaction equipment that is capable of efficiently compacting the entire thickness of the lift. Additional lift thickness may be allowed by IGES provided the Contractor can demonstrate sufficient compaction can be achieved with a given lift thickness with the equipment in use. We recommend that all structural fill be compacted on a horizontal plane, unless otherwise approved by IGES. Structural fill underlying all shallow footings and pavements should be compacted to at least 95 percent of the MDD as determined by ASTM D-1557. **The moisture content should be at, or slightly above, the OMC for all structural fill**. Any imported fill materials should be approved prior to importing. Also, prior to placing any fill, the excavations should be observed by IGES to confirm that unsuitable materials have been removed. In addition, proper grading should precede placement of fill, as described in the General Site Preparation and Grading subsection of this report.

Specifications from governing authorities such as Weber County and/or special service districts having their own precedence for backfill and compaction should be followed where more stringent.

5.3.5 Oversize Material

Based on our observations, there is a significant potential for the presence of oversize materials (larger than 6 inches in greatest dimension). Large rocks, particularly boulders (>12 inches), may require special handling, such as segregation from structural fill, and disposal.

5.3.6 Utility Trench Backfill

Utility trenches should be backfilled with structural fill in accordance with Section 5.3.4 of this report. Utility trenches can be backfilled with the onsite soils free of debris, organic and oversized material. Prior to backfilling the trench, pipes should be bedded in and shaded with a uniform granular material that has a Sand Equivalent (SE) of 30 or greater. Pipe bedding may be water-

densified in-place (jetting). Alternatively, pipe bedding and shading may consist of clean ¾-inch gravel, which generally does not require densification. Native earth materials can be used as backfill over the pipe bedding zone. All utility trenches backfilled below pavement sections, curb and gutter, and hardscape, should be backfilled with structural fill compacted to at least 95 percent of the MDD as determined by ASTM D-1557. All other trenches should be backfilled and compacted to approximately 90 percent of the MDD (ASTM D-1557). However, in all cases the pipe bedding and shading should meet the design criteria of the pipe manufacturer. Specifications from governing authorities having their own precedence for backfill and compaction should be followed where they are more stringent.

5.4 FOUNDATION RECOMMENDATIONS

Based on our field observations and considering the presence of relatively competent native earth materials, we recommend that the footings for proposed townhome structure be founded either *entirely* on competent native soils or *entirely* on structural fill. Native/fill transition zones are not allowed. If soft, loose, or otherwise deleterious earth materials are exposed in the footing excavations, then all footings must be deepened such that all footings bear on relatively uniform, competent native earth materials. Alternatively, the foundation excavation may be over-excavated a minimum of 2 feet below the bottom of proposed footings and replaced with structural fill, such that the footings bear entirely on a uniform fill blanket. We recommend that IGES assess the bottom of the foundation excavation prior to the placement of steel or concrete to identify the competent native earth materials as well as any unsuitable soils or transition zones. Additional over-excavation may be required based on the actual subsurface conditions observed.

Shallow spread or continuous wall footings constructed entirely on competent, uniform native earth materials or on a minimum of 2 feet of *structural fill* may be proportioned utilizing a maximum net allowable bearing pressure of **2,400 pounds per square foot (psf)** for dead load plus live load conditions. The net allowable bearing value presented above is for dead load plus live load conditions. The minimum recommended footing width is 20 inches for continuous wall footings and 30 inches for isolated spread footings.

All conventional foundations exposed to the full effects of frost should be established at a minimum depth of 42 inches below the lowest adjacent final grade. Interior footings, not subjected to the full effects of frost (i.e., *a continuously heated structure*), may be established at higher elevations, however, a minimum depth of embedment of 12 inches is recommended for confinement purposes.

Foundation drains should be installed around below-ground foundations (e.g., basement walls) to minimize the potential for flooding from shallow groundwater, which may be present at various times during the year, particularly spring run-off.

5.5 SETTLEMENT

5.5.1 Static Settlement

Static settlements of properly designed and constructed conventional foundations, founded as described in Section 5.4, are anticipated to be on the order of 1 inch or less. Differential settlement is expected to be half of total settlement over a distance of 30 feet.

5.5.2 Dynamic Settlement

Dynamic settlement (or seismically-induced settlement) consists of dry dynamic settlement of unsaturated soils (above groundwater) and liquefaction-induced settlement (below groundwater). During a strong seismic event, seismically-induced settlement can occur within loose to moderately dense sandy soil due to reduction in volume during, and shortly after, an earthquake event. Settlement caused by ground shaking is often non-uniformly distributed, which can result in differential settlement.

Based on the subsurface conditions encountered, dynamic settlement arising from a MCE seismic event is expected to be on the low; for design purposes, settlement on the order of ½ inch over 40 feet may be assumed.

5.6 EARTH PRESSURES AND LATERAL RESISTANCE

Lateral forces imposed upon conventional foundations due to wind or seismic forces may be resisted by the development of passive earth pressures and friction between the base of the footing and the supporting soils. In determining the frictional resistance against concrete, a coefficient of friction of 0.45 for sandy native soils or structural fill should be used.

Table 5.6
Lateral Earth Pressure Coefficients

Condition	Level Backfill		2H:1V Backfill	
	Lateral Pressure Coefficient	Equivalent Fluid Density (pcf)	Lateral Pressure Coefficient	Equivalent Fluid Density (pcf)
Active (Ka)	0.33	35	0.53	56
At-rest (Ko)	0.50	55	0.80	85
Passive (Kp)	3.0	320	—	—

Ultimate lateral earth pressures from *granular* backfill acting against retaining walls, temporary shoring, or buried structures may be computed from the lateral pressure coefficients or equivalent fluid densities presented in Table 5.6. These lateral pressures should be assumed even if the backfill is placed in a relatively narrow gap between a vertical bedrock cut and the foundation wall. These coefficients and densities assume no buildup of hydrostatic pressures. The force of water should be added to the presented values if hydrostatic pressures are anticipated.

Clayey soils drain poorly and may swell upon wetting, thereby greatly increasing lateral pressures acting on earth retaining structures; therefore, clayey soils should not be used as retaining wall backfill. Backfill should consist of native granular soil with an Expansion Index (EI) less than 20.

Walls and structures allowed to rotate slightly should use the active condition. If the element is to be constrained against rotation (i.e., a basement wall), the at-rest condition should be used. These values should be used with an appropriate factor of safety against overturning and sliding. A value of 1.5 is typically used. Additionally, if passive resistance is calculated in conjunction with frictional resistance, the passive resistance should be reduced by ½.

5.7 CONCRETE SLAB-ON-GRADE CONSTRUCTION

To minimize settlement and cracking of slabs, and to aid in drainage beneath the concrete floor slabs, all concrete slabs should be founded on a minimum 4-inch layer of compacted gravel overlying properly prepared subgrade. The gravel should consist of free-draining gravel or road base with a 3/4-inch maximum particle size and no more than 5 percent passing the No. 200 mesh sieve. The layer should be compacted to at least 95 percent of the MDD as determined by ASTM D-1557.

All concrete slabs should be designed to minimize cracking as a result of shrinkage. Consideration should be given to reinforcing the slab with a welded wire fabric, re-bar, or fibermesh. Slab reinforcement should be designed by the structural engineer; however, as a minimum, slab reinforcement should consist of 4''×4'' W4.0×W4.0 welded wire mesh within the middle third of the slab. We recommend that concrete be tested to assess that the slump and/or air content is in compliance with the plans and specifications. We recommend that concrete be placed in general accordance with the requirements of the American Concrete Institute (ACI). A Modulus of Subgrade Reaction of **250 psi/inch** may be used for design.

A moisture barrier (vapor retarder) consisting of 10-mil thick Visqueen (or equivalent) plastic sheeting should be placed below slabs-on-grade where moisture-sensitive floor coverings or equipment is planned. Prior to placing this moisture barrier, any objects that could puncture it, such as protruding gravel or rocks, should be removed from the building pad. Alternatively, the subgrade may be covered with 2 inches of clean sand.

5.8 MOISTURE PROTECTION AND SURFACE DRAINAGE

Surface moisture should not be allowed to infiltrate into the soils in the vicinity of the foundations. As such, design strategies to minimize ponding and infiltration near the townhome structure should be implemented.

We recommend roof runoff devices be installed to direct all runoff a minimum of 10 feet away from the townhome foundations. The builder should be responsible for compacting the exterior backfill soils around the foundation, particularly around basement walls. Additionally, the ground surface within 10 feet of the structure should be constructed so as to slope a minimum of **five** percent away. Pavement sections should be constructed to divert surface water off the pavement into storm drains, curb/gutter, or another suitable location.

For the subterranean portion of the townhome, IGES recommends a perimeter foundation drain be constructed in accordance with the International Residential Code (IRC).

5.9 SOIL CORROSION POTENTIAL

Based on laboratory testing of soil samples taken in this vicinity during several previous geotechnical investigations (e.g., IGES 2016, Copper Crest East), the soils in this area generally have a sulfate content less than 100 ppm. Accordingly, the soils are classified as having a 'low' potential for deterioration of concrete due to the presence of soluble sulfate. As such, conventional Type I/II Portland cement may be used for all concrete in contact with site soils.

Soil samples from this area have previously been tested for resistivity, soluble chloride and pH (e.g., IGES, 2016). Based on local testing, the onsite native soil is considered to be *moderately corrosive* to ferrous metal. Consideration should be given to retaining the services of a qualified corrosion engineer to provide an assessment of any metal that may be in contact with site soils.

5.10 CONSTRUCTION CONSIDERATIONS

5.10.1 Temporary Shoring

Temporary shoring may be required during excavation of the lower floors, particularly below the planned garage level, if the earth material below the garage will be left in-place. If a temporary storage area is constructed below the garages, temporary shoring may also be required to protect the street (Copper Crest), particularly if utilities have been installed that preclude the possibility of laying-back the slope.

If the area below the garage is laid-back during construction of the foundation wall, the entire garage slab should be underlain by a minimum of 3 feet of structural fill (to minimize excessive differential fill thicknesses below the structure).

5.10.2 Over-Size Material

Large boulders (up to 36 inches) were observed within the test pits; as such, excavation of the basement may generate an abundance of over-size material that may require special handling, processing, or disposal.

5.10.3 Groundwater

Water was encountered at a depth of 14.5 feet (TP-1) and at a depth of 18 feet (TP-2). This water most likely represents a localized underground spring and constitutes local seepage, rather than a piezometric groundwater surface. Nevertheless, water seepage could conceivably impact the proposed construction; seepage could cause equipment mobility problems, and could cause localized excavation instability. The Contractor should be aware that shoring and/or localized dewatering may be necessary during construction of the foundations, particularly during spring and early summer.

6.0 CLOSURE

6.1 LIMITATIONS

The recommendations presented in this report are based on limited field exploration, review of existing hazard studies and other geotechnical data, and our understanding of the proposed construction. The subsurface data used in the preparation of this report were obtained from the explorations made for this investigation. It is possible that variations in the soil and groundwater conditions could exist between and beyond the points explored. The nature and extent of variations may not be evident until construction occurs. If any conditions are encountered at this site that are different from those described in this report, we should be immediately notified so that we may make any necessary revisions to recommendations contained in this report. In addition, if the scope of the proposed construction changes from that described in this report, IGES should also be notified.

This report was prepared in accordance with the generally accepted standard of practice at the time the report was written. No warranty, expressed or implied, is made.

It is the Client's responsibility to see that all parties to the project including the Designer, Contractor, Subcontractors, etc. are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the Contractor's option and risk.

6.2 ADDITIONAL SERVICES

The recommendations made in this report are based on the assumption that an adequate program of tests and observations will be made during the construction. IGES staff or other qualified personnel should be on site to verify compliance with these recommendations. These tests and observations should include at a minimum the following:

- Observations and testing during site preparation, earthwork and structural fill placement.
- Consultation as may be required during construction.
- Quality control on concrete placement to verify slump, air content, and strength.
- Quality control and testing during placement and compaction of asphalt.

We also recommend that project plans and specifications be reviewed by us to verify compatibility with our conclusions and recommendations. Additional information concerning the scope and cost of these services can be obtained from our office.

We appreciate the opportunity to be of service on this project. Should you have any questions regarding the report or wish to discuss additional services, please do not hesitate to contact us at your convenience at (801) 748-4044.

7.0 REFERENCES

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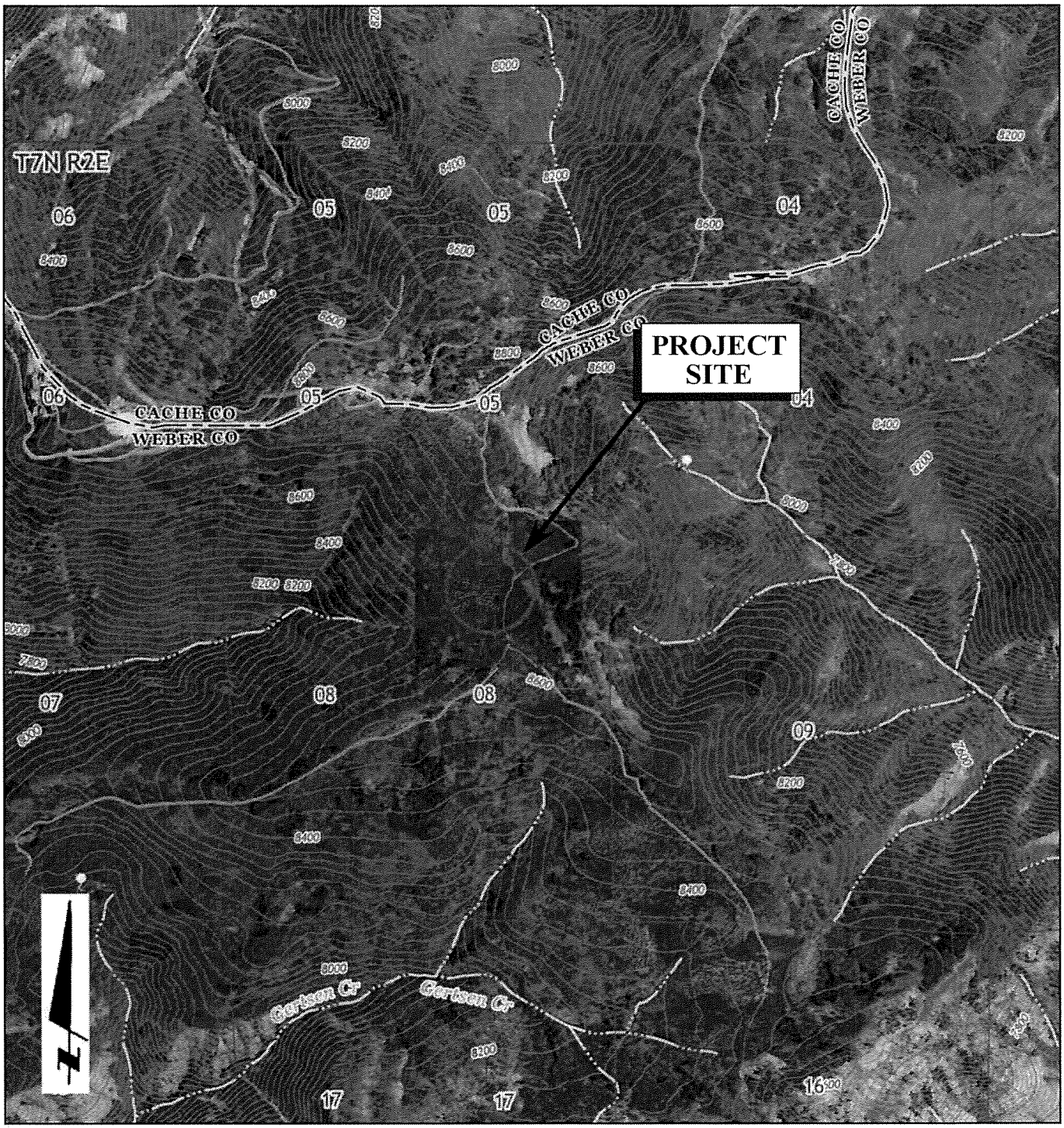
AERIAL PHOTOGRAPHS

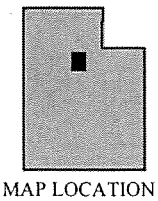
Data Set	Date	Flight	Photographs	Scale
1947 AAJ	August 10, 1946	AAJ_1B	88, 89, 90	1:20,000
1953 AAI	September 14, 1952	AAI_4K	34, 35, 36	1:20,000
1963 ELK	June 25, 1963	ELK_3	57, 58, 59	1:15,840

*https://geodata.geology.utah.gov/imagery/

APPENDIX A



BASE MAP:
USGS Huntsville, Browns Hole, James Peak and Sharp Mountain
7.5-Minute Quadrangle Topographic Maps (2014)



MAP LOCATION

0 1000' 2000'

SCALE 1:24,000

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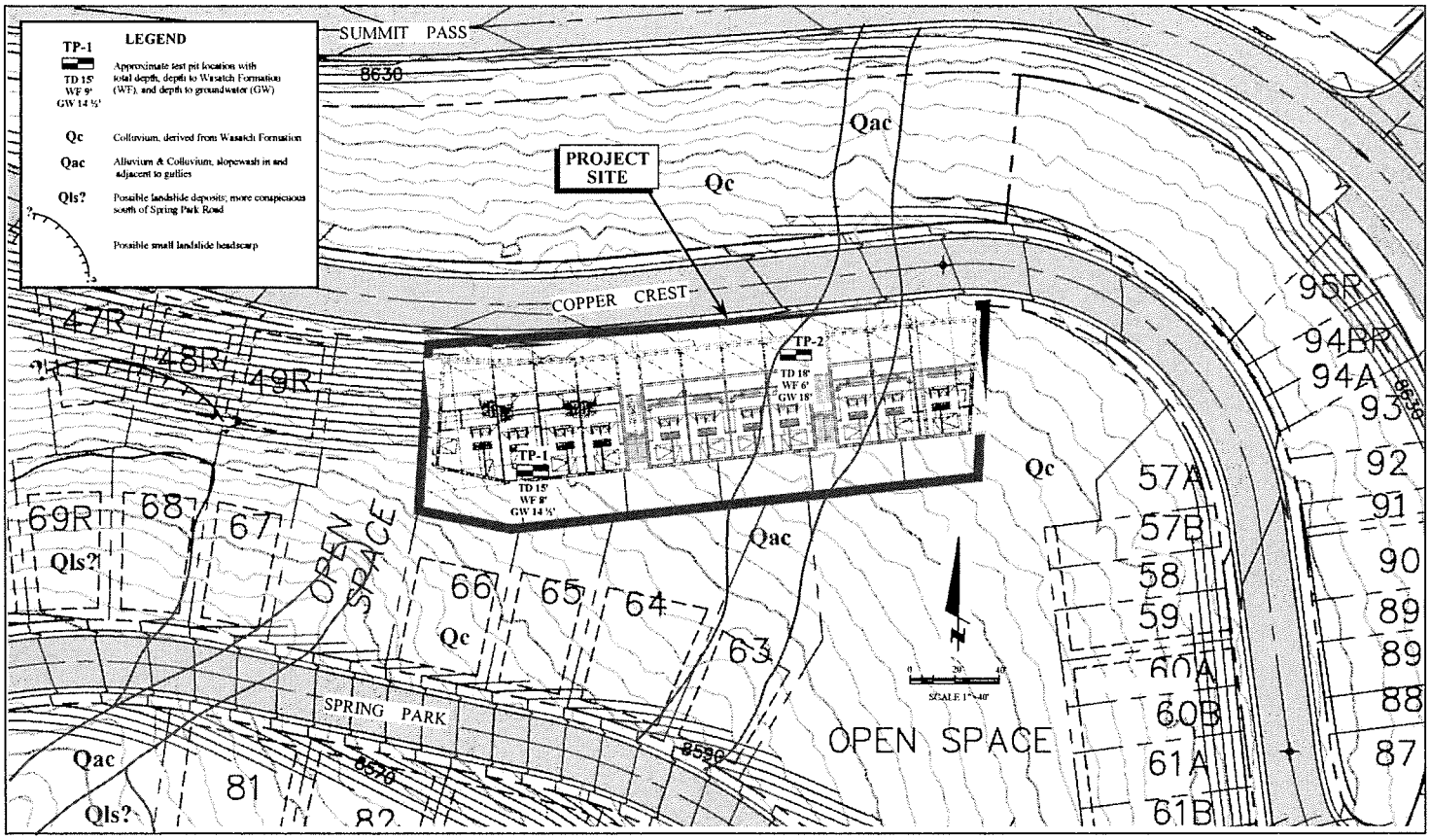
Project No. 01628-022

Geotechnical & Geologic Hazard Investigation
Copper Crest West
Summit Powder Mountain Resort
Weber County, Utah

SITE VICINITY MAP

Figure

A-1



Basemap Undated plan titled "Copper Crest West. Neighborhood Overview", EB5 Project Phase 1, page 13

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Project No. 01628-022

Geotechnical & Geologic Hazard Investigation
Copper Crest West
Summit Powder Mountain Resort
Weber County, Utah GEOTECH & GEOLOGY MAP

Figure
A-2

Intermountain GeoEnvironmental Services, Inc.

Date 11/4/16 by ET
Ckd by PD on 11/7/16

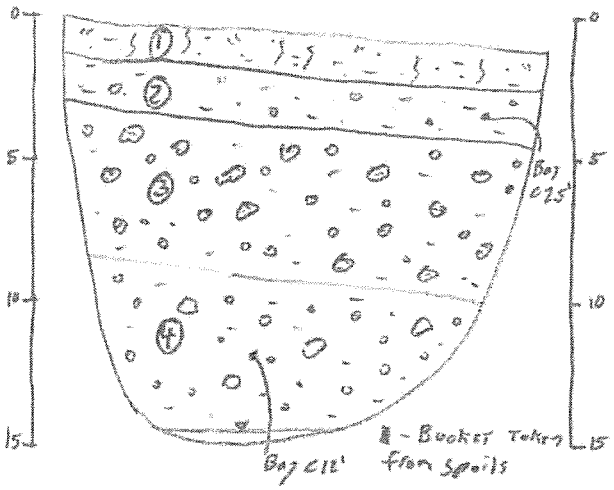
E-Wall
20° +

Copper Crest West
TP-1

WPT 647 1552
N41. 36298
W111. 74554

Total depth:
15'

Gw @ 14.5'



0-15' in Aggregate:
G:35.6%
S:25.6%
F:38.8%

LITHOLOGIC UNIT DESCRIPTIONS:

1. A/B Soil Horizon: ~1.5' thick topsoil; dark yellowish brown (10YR 4/2) sandy lean CLAY with gravel (CL), loose, slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~10-15% of unit; clasts entirely subrounded quartzite up to 3" in diameter, though mode size <1"; abundant plant and tree roots; gradational, planar basal contact.

2. Cemented Colluvium: ~1.5' thick; light brown (5YR 6/4) sandy lean CLAYwith gravel (CL), medium-stiff, slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~20% of unit; clasts entirely quartzite up to 2" in diameter, though mode size is <1"; occasional plant and tree roots; sharp, irregular basal contact.

3. Alluvial: ~5' thick; dark yellowish brown (10YR 4/2) to moderate yellowish brown (10YR 5/4) clayey GRAVEL with sand (GC), medium-dense, moist, massive; gravel and larger sized clasts comprise ~55-65% of unit; clasts entirely subangular quartzite up to 3' in diameter, though mode size is ~6"; low plasticity fines; sharp, planar basal contact.

4. Wasatch Fm: ~At least 6' thick; dark reddish brown (10R 3/4) to moderate reddish brown (10R 4/6); weakly consolidated conglomerate bedrock, disaggregated to clayey GRAVEL with sand (GC) gradational to clayey SAND with gravel (SC), medium-dense to dense, moist to wet, massive; gravel and larger sized clasts comprise ~30-40% of unit; clasts entirely subangular quartzite up to 1' in diameter, though mode size 2-3"; low plasticity fines; base of unit is source of groundwater in test pit.

FIGURE A-3
TP-1 LOG

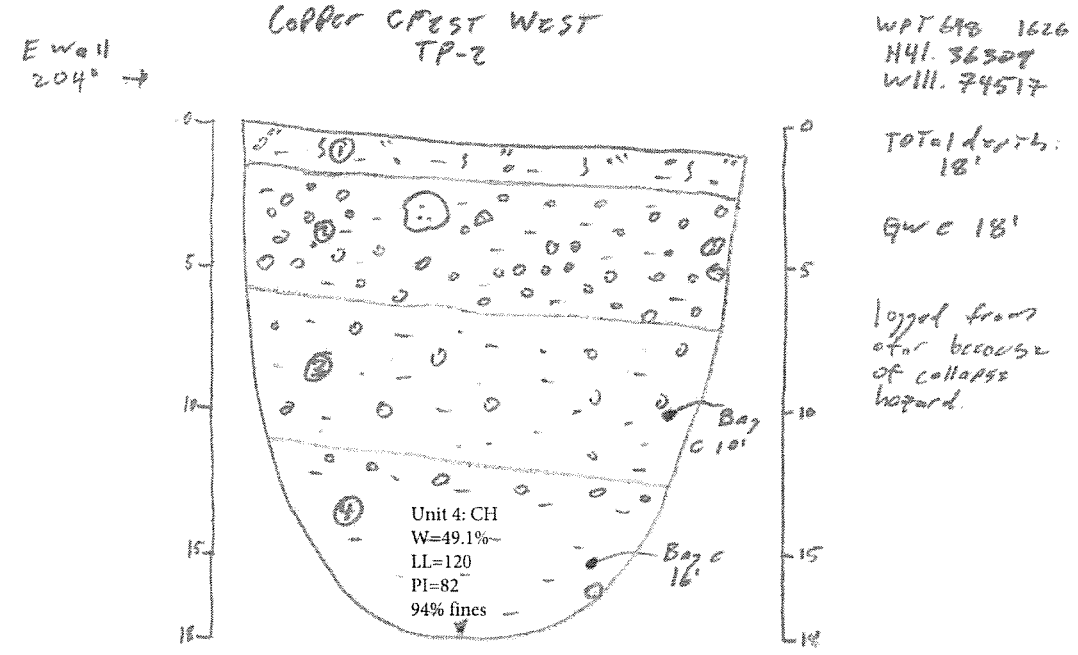
COPPER CREST WEST

GEOTECHNICAL AND GEOLOGIC HAZARD ASSESSMENT

SUMMIT POWDER MOUNTAIN

WEBER COUNTY, UTAH

DATE: 01/13/2017	SCALE:	IGES
PROJECT: 01626-022	1"=5'	



LITHOLOGIC UNIT DESCRIPTIONS:

1. A/B Soil Horizon: ~1.5' thick topsoil; dark yellowish brown (10YR 4/2) sandy lean CLAY with gravel (CL), loose, slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~10-15% of unit; clasts entirely subrounded quartzite up to 3" in diameter, though mode size <1"; abundant plant and tree roots; gradational, planar basal contact.

2. Alluvial: ~4.5' thick; dark yellowish brown (10YR 4/2) to moderate yellowish brown (10YR 5/4) clayey GRAVEL with sand (GC), medium-dense, moist, massive; gravel and larger sized clasts comprise ~50-60% of unit; clasts entirely subangular quartzite up to 2' in diameter, though mode size is ~5"; low plasticity fines; sharp, planar basal contact.

3. Wasatch Fm: ~5' thick; dark reddish brown (10R 3/4) to moderate reddish brown (10R 4/6); weakly consolidated conglomerate bedrock, disaggregated to clayey GRAVEL with sand (GC) gradational to clayey SAND with gravel (SC), medium-dense to dense, moist, massive; gravel and larger sized clasts comprise ~30-40% of unit; clasts entirely subangular quartzite up to 1' in diameter, though mode size 2-3", low plasticity fines; sharp, wavy basal contact.

4. Clay Seam: ~At least 6' thick; light gray (N7) fat CLAY with gravel (CH), medium-stiff to stiff, moist to wet, high to moderate plasticity, massive; gravel and larger sized clasts comprise ~6% of unit, clasts entirely subrounded to subangular quartzite up to 3" in diameter; color suggests weathered dolomite, though no dolomite clasts observed; blocky texture, though some discontinuous internal slickensides.

FIGURE A-4
TP-2 LOG

COPPER CREST WEST

GEOTECHNICAL AND GEOLOGIC HAZARD ASSESSMENT

SUMMIT POWDER MOUNTAIN

WEBER COUNTY, UTAH

DATE: 01/13/2017	SCALE: 1"=5'	IGES
PROJECT: 01628-022		

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			USCS SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS (More than half of material is larger than the #200 sieve)	GRAVELS (More than half of coarse fraction is larger than the #4 sieve)	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, GRAVEL-SILT-SAND MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS (More than half of coarse fraction is smaller than the #4 sieve)	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, SAND-GRAVEL-SILT MIXTURES
			SC	CLAYEY SANDS SAND-GRAVEL-CLAY MIXTURES
FINE GRAINED SOILS (More than half of material is smaller than the #200 sieve)	SILTS AND CLAYS (Liquid limit less than 50)		ML	INORGANIC SILTS & VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS. CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS (Liquid limit greater than 50)		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILT
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS & ORGANIC SILTS OF MEDIUM-TO-HIGH PLASTICITY
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

LOG KEY SYMBOLS

BORING SAMPLE LOCATION

TEST-PIT SAMPLE LOCATION

WATER LEVEL (level after completion)

WATER LEVEL (level where first encountered)

CEMENTATION

DESCRIPTION	DESCRIPTION
WEAKELY	CRUMBLES OR BREAKS WITH HANDLING OR SLIGHT FINGER PRESSURE
MODERATELY	CRUMBLES OR BREAKS WITH CONSIDERABLE FINGER PRESSURE
STRONGLY	WILL NOT CRUMBLE OR BREAK WITH FINGER PRESSURE

OTHER TESTS KEY

C	CONSOLIDATION	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	DS	DIRECT SHEAR
UC	UNCONFINED COMPRESSION	T	TRIAXIAL
S	SOLUBILITY	R	RESISTIVITY
O	ORGANIC CONTENT	RV	R-VALUE
CBR	CALIFORNIA BEARING RATIO	SU	SOLUBLE SULFATES
COMP	MOISTURE/DENSITY RELATIONSHIP	PM	PERMEABILITY
CI	CALIFORNIA IMPACT	-200	% FINER THAN #200
COL	COLLAPSE POTENTIAL	Gs	SPECIFIC GRAVITY
SS	SHRINK SWELL	SL	SWELL LOAD

MODIFIERS

DESCRIPTION	%
TRACE	<5
SOME	5 - 12
WITH	>12

MOISTURE CONTENT

DESCRIPTION	FIELD TEST
DRY	ABSENCE OF MOISTURE, DUSTY, DRY TO THE TOUCH
MOIST	DAMP BUT NO VISIBLE WATER
WET	VISIBLE FREE WATER, USUALLY SOIL BELOW WATER TABLE

STRATIFICATION

DESCRIPTION	THICKNESS	DESCRIPTION	THICKNESS
SEAM	1/16 - 1/2"	OCCASIONAL	ONE OR LESS PER FOOT OF THICKNESS
LAYER	1/2 - 12"	FREQUENT	MORE THAN ONE PER FOOT OF THICKNESS

GENERAL NOTES

1. Lines separating strata on the logs represent approximate boundaries only. Actual transitions may be gradual.
2. No warranty is provided as to the continuity of soil conditions between individual sample locations.
3. Logs represent general soil conditions observed at the point of exploration on the date indicated.
4. In general, Unified Soil Classification designations presented on the logs were evaluated by visual methods only. Therefore, actual designations (based on laboratory tests) may vary.

APPARENT / RELATIVE DENSITY - COARSE-GRAINED SOIL

APPARENT DENSITY	SPT (blows/ft)	MODIFIED CA. SAMPLER (blows/ft)	CALIFORNIA SAMPLER (blows/ft)	RELATIVE DENSITY (%)	FIELD TEST
VERY LOOSE	<4	<4	<5	0 - 15	EASILY PENETRATED WITH 1/2-INCH REINFORCING ROD PUSHED BY HAND
LOOSE	4 - 10	5 - 12	5 - 15	15 - 35	DIFFICULT TO PENETRATE WITH 1/2-INCH REINFORCING ROD PUSHED BY HAND
MEDIUM DENSE	10 - 30	12 - 35	15 - 40	35 - 65	EASILY PENETRATED A FOOT WITH 1/2-INCH REINFORCING ROD DRIVEN WITH 5-LB HAMMER
DENSE	30 - 50	35 - 60	40 - 70	65 - 85	DIFFICULT TO PENETRATED A FOOT WITH 1/2-INCH REINFORCING ROD DRIVEN WITH 5-LB HAMMER
VERY DENSE	>50	>60	>70	85 - 100	PENETRATED ONLY A FEW INCHES WITH 1/2-INCH REINFORCING ROD DRIVEN WITH 5-LB HAMMER

CONSISTENCY - FINE-GRAINED SOIL

CONSISTENCY	SPT (blows/ft)	TORVANE UNTRAINED SHEAR STRENGTH (tsf)	POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH (tsf)	FIELD TEST
VERY SOFT	<2	<0.125	<0.25	EASILY PENETRATED SEVERAL INCHES BY THUMB. EXUDES BETWEEN THUMB AND FINGERS WHEN SQUEEZED BY HAND.
SOFT	2 - 4	0.125 - 0.25	0.25 - 0.5	EASILY PENETRATED ONE INCH BY THUMB. MOLDED BY LIGHT FINGER PRESSURE.
MEDIUM STIFF	4 - 8	0.25 - 0.5	0.5 - 1.0	PENETRATED OVER 1/2 INCH BY THUMB WITH MODERATE EFFORT. MOLDED BY STRONG FINGER PRESSURE.
STIFF	8 - 15	0.5 - 1.0	1.0 - 2.0	INDENTED ABOUT 1/2 INCH BY THUMB BUT PENETRATED ONLY WITH GREAT EFFORT.
VERY STIFF	15 - 30	1.0 - 2.0	2.0 - 4.0	READILY INDENTED BY THUMBNAIL.
HARD	>30	>2.0	>4.0	INDENTED WITH DIFFICULTY BY THUMBNAIL.

IGES

Key to Soil Symbols and Terminology

Figure A-5

IGES, Inc. Project No.: 01628-022

BASE MAPS

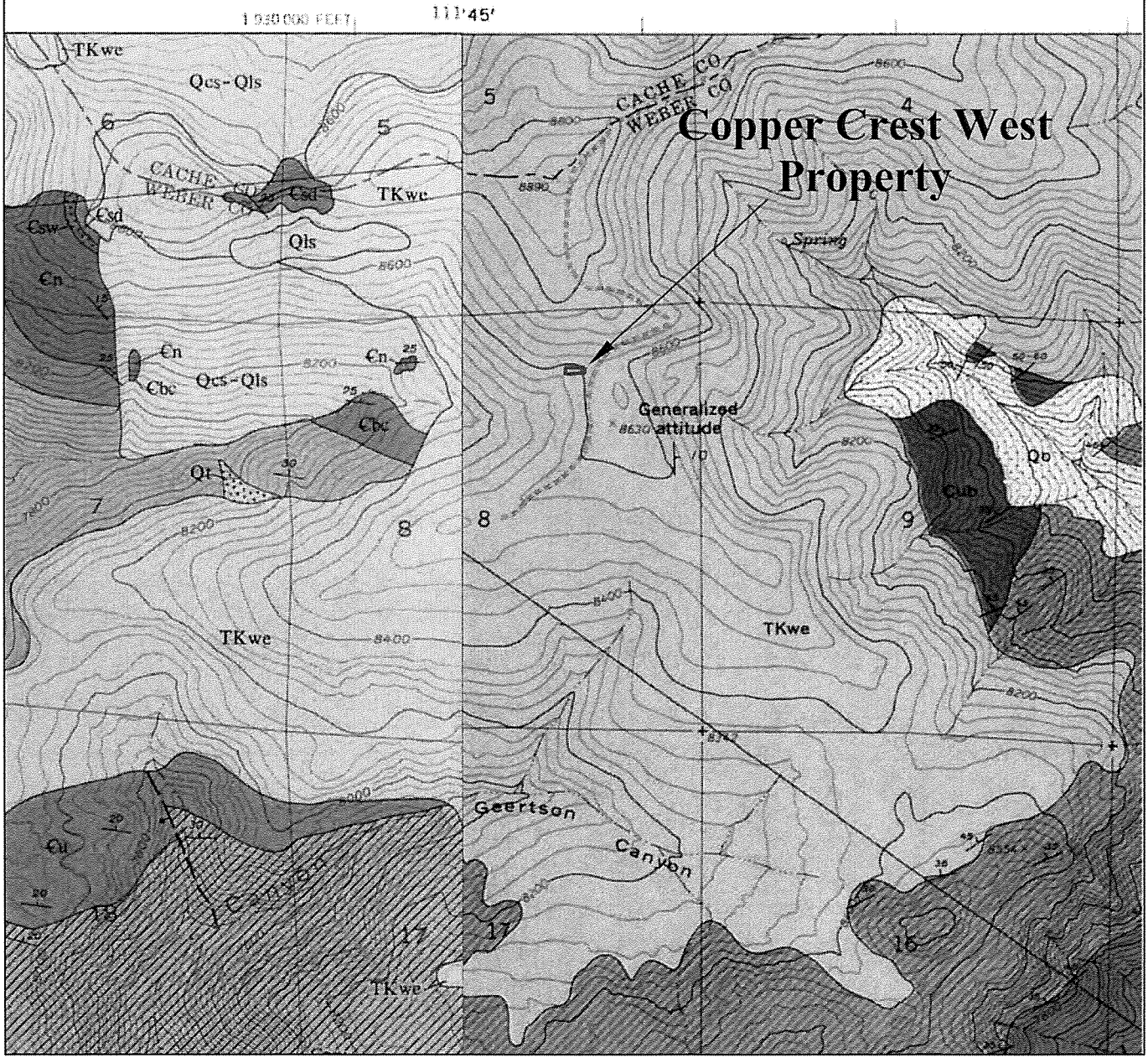
-USGS Huntsville 7.5-Minute Geologic Quadrangle Map (GQ-1503), Sorensen and Crittenden, Jr. (1979)

-USGS Brown's Hole 7.5-Minute Geologic Quadrangle Map (GQ-968), Crittenden, Jr. (1972)

N

0' 1,000' 2,000' 4,000'

SCALE: 1"=2,000'



IGES®

Project No. 01628-022

Geotechnical & Geologic Hazard Investigation
Copper Crest West
Summit Powder Mountain Resort
Weber County, Utah REGIONAL GEOLOGY MAP 1

Figure

A-6a

MAP LEGEND

Qal — ALLUVIAL DEPOSITS, UNDIFFERENTIATED (Holocene) – Unconsolidated gravel, sand, and silt deposits in presently active stream channels and floodplains; thickness 0-6 m

Qcs — COLLUVIUM AND SLOPEWASH (Holocene) – Bouldery colluvium and slopewash chiefly along eastern margin of Ogden Valley; in part, lag from Tertiary units; thickness 0-30 m

Qf — ALLUVIAL FAN DEPOSITS (Holocene) – Alluvial fan deposits; postdate, at least in part, time of highest stand of former Lake Bonneville; thickness 0-30 m

Qls — LANDSLIDE DEPOSITS (Holocene) – thickness 0-6 m

Qt — TALUS DEPOSITS (Holocene) – thickness 0-6 m

TKwe — WASATCH AND EVANSTON(?) FORMATIONS, UNDIVIDED (Eocene, Paleocene, and Upper Cretaceous?) – Unconsolidated pale-reddish-brown pebble, cobble, and boulder conglomerate; forms boulder-covered slopes. Clasts are mainly Precambrian quartzite and are tan, gray, or purple; matrix is mainly poorly consolidated sand and silt; thickness 0-150 m

Ɛsd — ST. CHARLES LIMESTONE (Upper Cambrian) – Includes:
Dolomite member – Thin- to thick-bedded, finely to medium crystalline, light- to medium-gray, white- to light-gray-weathering, cliff-forming dolomite; linguloid brachiopods common in basal 15 m; thickness 150-245 m

Ɛsw — Worm Creek Quartzite Member – Thin-bedded, fine- to medium-grained, medium- to dark-gray, tan- to brown-weathering calcareous quartzitic sandstone; detrital grains well-sorted and well-rounded; thickness 6 m

Ɛn — NOUNAN DOLOMITE (Upper and Middle Cambrian) – Thin- to thick-bedded, finely crystalline, medium-gray, light- to medium-gray-weathering, cliff-forming dolomite; white twiggy structures common throughout unit; thickness 150-230 m

Ɛbc — CALLS FORT SHALE MEMBER OF BLOOMINGTON FORMATION (Middle Cambrian) – Olive-drab to light-brown shale and light- to dark-blue-gray limestone with intercalated orange to rusty-brown silty limestone; intraformational conglomerate common throughout unit; thickness 23-90 m

Ɛlu — CAMBRIAN LIMESTONES, UNDIVIDED (Middle Cambrian) – Includes limestone and Hodges Shale Members of Bloomington Formation, and Blacksmith and Ute Limestones

Ɛb — BLACKSMITH LIMESTONE (Middle Cambrian)) – Medium- to thin-bedded, light-gray to dark-blue-gray limestone; thin-bedded, flaggy-weathering, gray to tan silty limestone and interbedded siltstone; light- to dark-gray dolomite, with some reddish siliceous partings; thickness 400? m

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Copper Crest West
Summit Powder Mountain Resort
Weber County, Utah REGIONAL GEOLOGY MAP 1

Figure

A-6b

MAP LEGEND

ϵu — UTE LIMESTONE (Middle Cambrian) — Medium- to thin-bedded, finely crystalline, light- to dark-gray silty limestone with irregular wavy partings, mottled and streaked surfaces, worm tracks, and twiggy structures common throughout unit; oolites and *Girvanella* in many beds; olive-drab fissile shale interbedded throughout unit. Includes thin-bedded, gray-weathering, pale-tan to brown dolomite exposed at base of unit, 18-24 m at head of Geertsen Canyon and 0-3 m elsewhere; thickness 245? m

ϵgcu — GEERTSEN CANYON QUARTZITE (Lower Cambrian) — Includes: Upper member — Pale-buff to white or flesh-pink quartzite, locally streaked with pale red or purple. Coarse-grained; small pebbles occur throughout unit and increase in abundance downward. Base marked by zone 30-60 m thick of cobble conglomerate in beds 30 cm to 2 m thick; clasts, 5-10 cm in diameter, are mainly reddish vein quartz or quartzite, sparse gray quartzite, or red jasper; thickness 730-820 m

ϵgcl — Lower member — Pale-buff to white and tan quartzite with irregular streaks and lenses of cobble conglomerate decreasing in abundance downward. Lower 90-120 m strongly arkosic, streaked greenish or pinkish. Feldspar clasts increase in size to 0.6-1.3 cm in lower part of unit; thickness 490-520 m

Recently active normal fault — Dashed where inferred. Ticks on downthrown side

Pre-Tertiary normal fault — Dotted where concealed. Bar and ball on downthrown side

Thrust fault — Dashed where inferred. Sawteeth on upper plate

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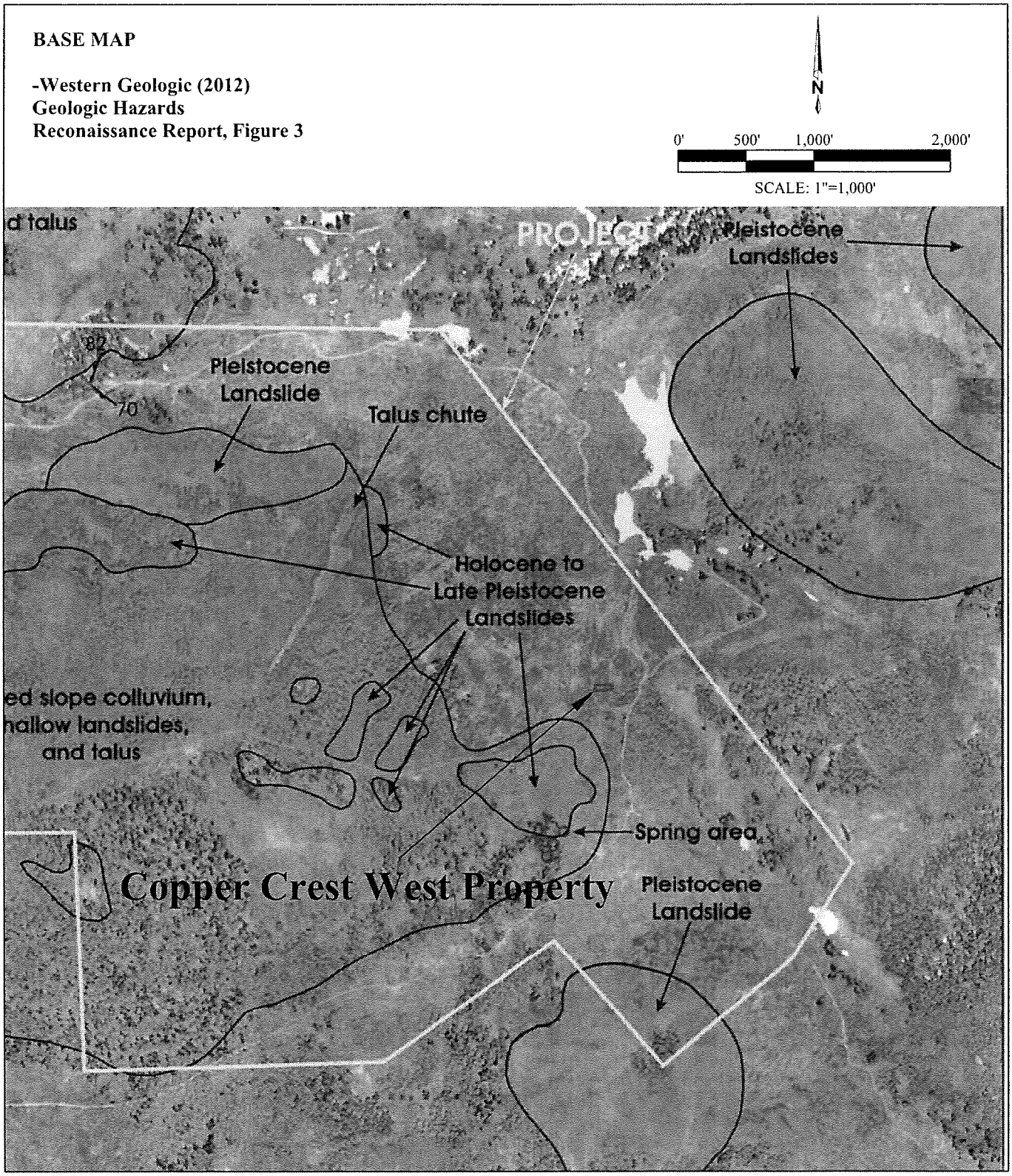
Weber County, Utah REGIONAL GEOLOGY MAP 1

Figure

A-6c

BASE MAP

-Western Geologic (2012)
Geologic Hazards
Reconaissance Report, Figure 3



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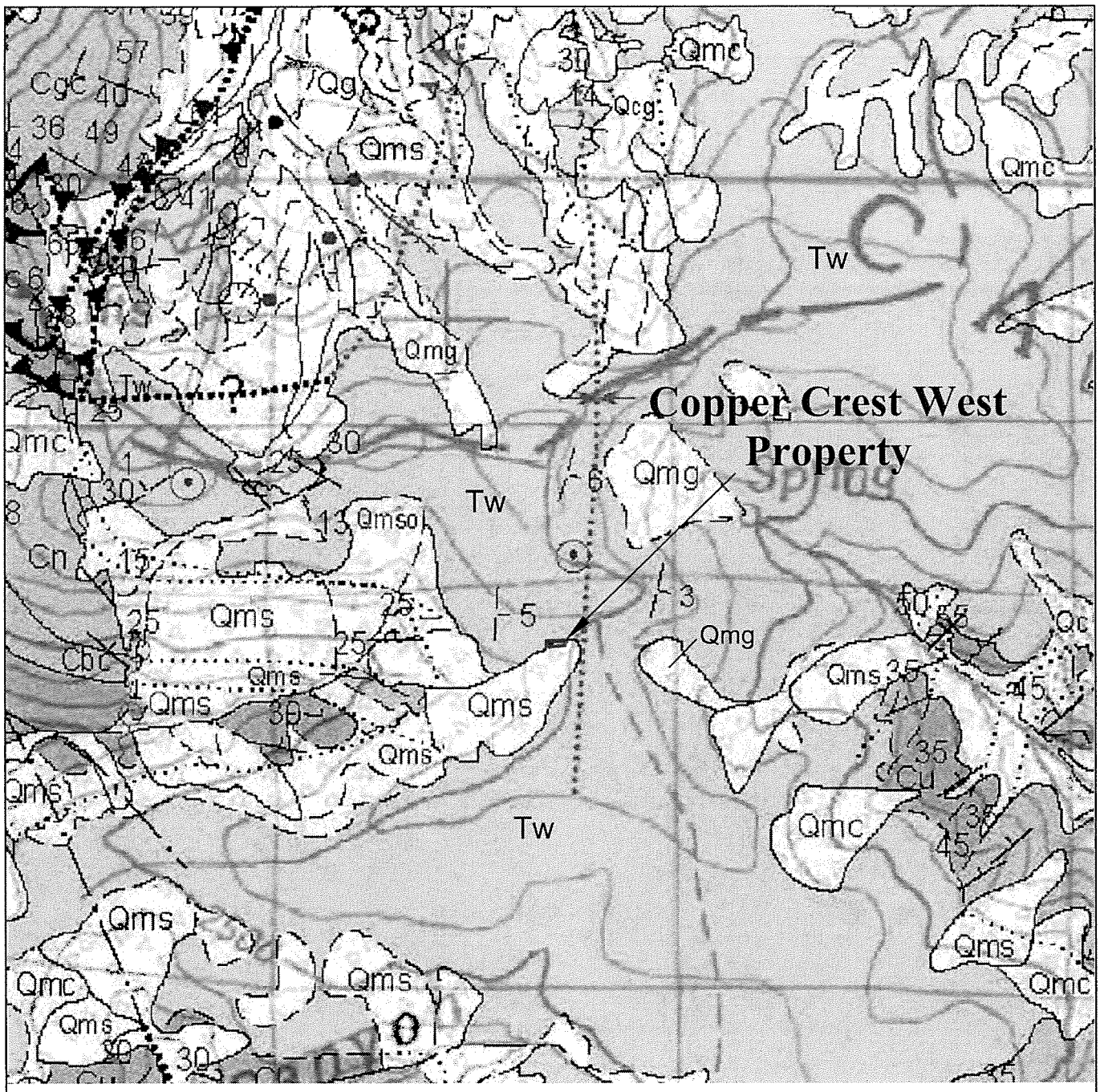
Geotechnical & Geologic Hazard Investigation
Copper Crest West
Summit Powder Mountain Resort
Weber County, Utah REGIONAL GEOLOGY MAP 2

Figure

A-7



BASE MAP

-Coogan and King (2016)
UGS Ogden 30'x60' Geologic Quadrangle Map, OFR-635DM
Plate 1

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Geotechnical & Geologic Hazard Investigation
Copper Crest West
Summit Powder Mountain Resort
Weber County, Utah REGIONAL GEOLOGY MAP 3

Figure

A-8a

MAP LEGEND

Qmc **Landslide and colluvial deposits, undivided (Holocene and Pleistocene)** – Poorly sorted to unsorted clay- to boulder-sized material; mapped where landslide deposits are difficult to distinguish from colluvium (slopewash and soil creep) and where mapping separate, small, intermingled areas of landslide and colluvial deposits is not possible at map scale; locally includes talus and debris flow and flood deposits; typically mapped where landslides are thin ("shallow"); also mapped where the blocky or rumpled morphology that is characteristic of landslides has been diminished ("smoothed") by slopewash and soil creep; composition depends on local sources; 6 to 40 feet (2-12 m) thick. These deposits are as unstable as other landslide units (Qms, Qmsy, Qmso).

Human disturbances

Qh, Qh? **Human disturbances (Historical)** - Mapped disturbances obscure original deposits or rocks by cover or removal; only larger disturbances that pre-date the 1984 aerial photographs used to map the Ogden 30 x 60-minute quadrangle are shown; includes engineered fill, particularly along Interstate Highways 80 and 84, the Union Pacific Railroad, and larger dams, as well as aggregate operations, gravel pits, sewage-treatment facilities, cement plant quarries and operations, brick plant and clay pit, Defense Depot Ogden (Browning U.S. Army Reserve Center), gas and oil field operations (for example drill pads) including gas plants, and low dams along several creeks, including a breached dam on Yellow Creek.

Qms, Qms?, Qmsy, Qmsy?, Qmso, Qmso?

Landslide deposits (Holocene and upper and middle? Pleistocene) – Poorly sorted clay- to boulder-sized material; includes slides, slumps, and locally flows and floods; generally characterized by hummocky topography, main and internal scarps, and chaotic bedding in displaced blocks; composition depends on local sources; morphology becomes more subdued with time and amount of water in material during emplacement; Qms may be in contact with Qms when landslides are different/distinct; thickness highly variable, up to about 20 to 30 feet (6-9 m) for small slides, and 80 to 100 feet (25-30 m) thick for larger landslides. Qmsy and Qmso queried where relative age uncertain; Qms queried where classification uncertain. Numerous landslides are too small to show at map scale and more detailed maps shown in the index to geologic mapping should be examined.

Qmg, Qmg?

Mass-movement and glacial deposits, undivided (Holocene and Pleistocene) – Unsorted and unstratified clay, silt, sand, and gravel; mapped where glacial deposits lack typical moraine morphology, and appear to have failed or moved down slope; also mapped in upper Strawberry Bowl (Snow Basin quadrangle) where glacial deposits have lost their distinct morphology and the contacts between them and colluvium and talus in the cirques cannot be mapped; likely less than 30 feet (9 m) thick, but may be thicker in Mantua, James Peak, North Ogden, Huntsville, and Peterson quadrangles.

Tw, Tw?

Wasatch Formation (Eocene and upper Paleocene) – Typically red to brownish-red sandstone, siltstone, mudstone, and conglomerate with minor gray limestone and marlstone locally (see Twl); lighter shades of red, yellow, tan, and light gray present locally and more common in uppermost part, complicating mapping of contacts with overlying similarly colored Norwood and Fowkes Formations; clasts typically rounded Neoproterozoic and Paleozoic sedimentary rocks, mainly Neoproterozoic and Cambrian quartzite; basal conglomerate more gray and less likely to be red, and containing more locally derived angular clasts of limestone, dolomite and sandstone, typically from Paleozoic strata, for example in northern Causey Dam

APPENDIX B

Water Content and Unit Weight of Soil

(In General Accordance with ASTM D7263 Method B and D2216)

Project: Summit - Copper Crest West
No: 01628-022
Location: Powder Mountain, UT
Date: 12/23/2016
By: ET

Sample Info.	Boring No.	TP-2							
	Sample:								
	Depth:	16.0'							
Unit Weight Info.	Sample height, H (in)								
	Sample diameter, D (in)								
	Sample volume, V (ft^3)								
	Mass rings + wet soil (g)								
	Mass rings/tare (g)								
	Moist soil, Ws (g)								
	Moist unit wt., γ_m (pcf)								
Water Content	Wet soil + tare (g)	977.46							
	Dry soil + tare (g)	752.53							
	Tare (g)	294.23							
Water Content, w (%)		**49.1**							
Dry Unit Wt., γ_d (pcf)									

Entered by:_____

Reviewed:_____

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

Project: Summit - Copper Crest West
No: 01628-022
Location: Powder Mountain, UT
Date: 12/27/2016
By: DKS

Boring No.: TP-2
Sample:
Depth: 16.0'
Description: Light brown fat clay

Preparation method: Wet
Liquid limit test method: Multipoint

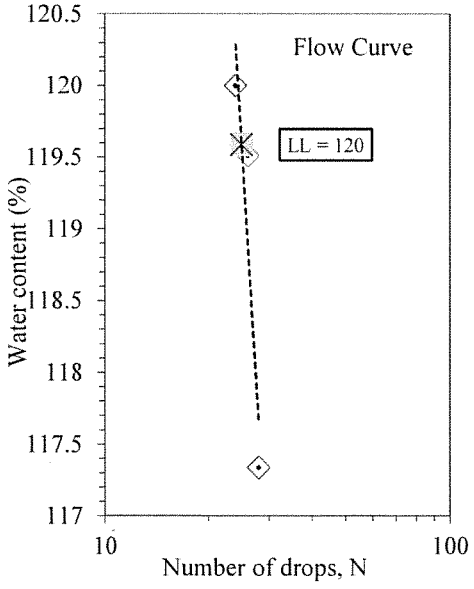
Plastic Limit

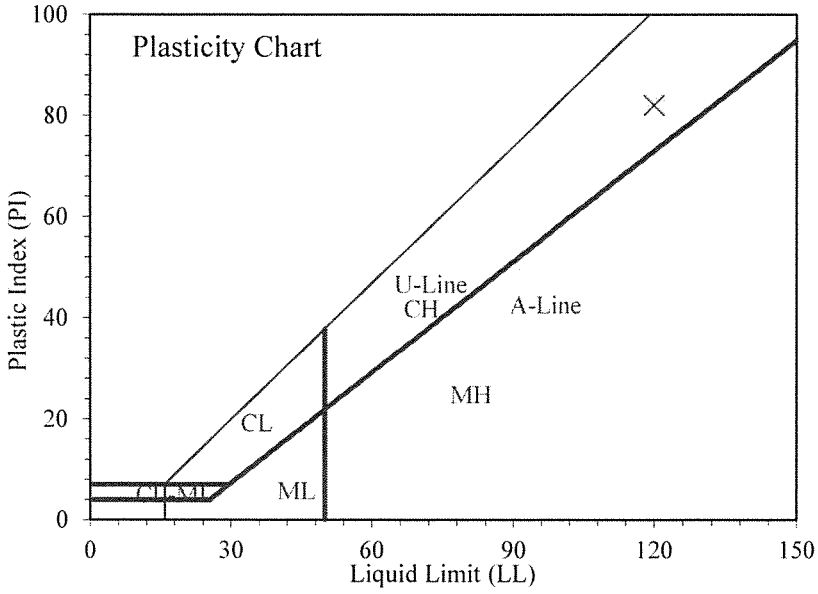
Determination No	1	2				
Wet Soil + Tare (g)	28.81	30.18				
Dry Soil + Tare (g)	26.91	28.00				
Water Loss (g)	1.90	2.18				
Tare (g)	21.94	22.22				
Dry Soil (g)	4.97	5.78				
Water Content, w (%)	38.23	37.72				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	28	26	24			
Wet Soil + Tare (g)	30.45	30.17	30.51			
Dry Soil + Tare (g)	25.78	25.76	25.83			
Water Loss (g)	4.67	4.41	4.68			
Tare (g)	21.80	22.07	21.93			
Dry Soil (g)	3.98	3.69	3.90			
Water Content, w (%)	117.34	119.51	120.00			
One-Point LL (%)	119	120	119			

Liquid Limit, LL (%)	**120**
Plastic Limit, PL (%)	**38**
Plasticity Index, PI (%)	**82**





Entered by:_____
Reviewed:_____

Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

(ASTM D6913)

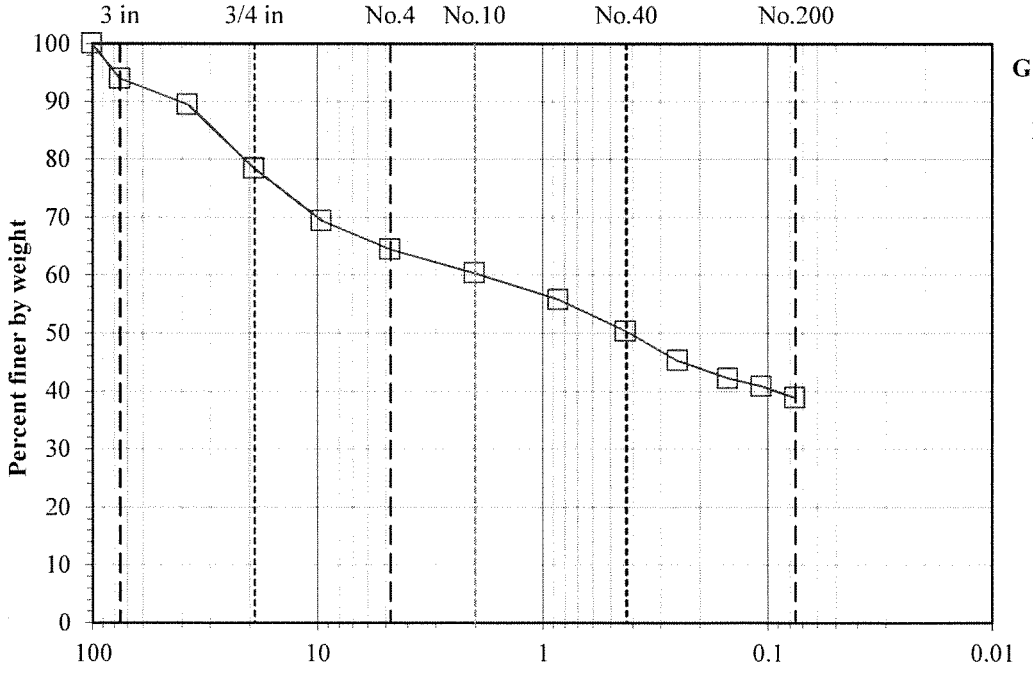
Project: Summit - Copper Crest West
No: 01628-022
Location: Powder Mountain, UT
Date: 12/27/2016
By: ET

Boring No.: TP-1
Sample:
Depth: 0 to 15'
Description: Brown clayey gravel with sand

Split:	Yes	
Split sieve:	3/4"	
	Moist	Dry
Total sample wt. (g):	25735.00	23814.32
+3/4" Coarse fraction (g):	5174.80	5139.91
-3/4" Split fraction (g):	2645.33	2402.70
Split fraction:	0.784	

Water content data	C.F.(+3/4")	S.F.(-3/4")
Moist soil + tare (g):	3010.92	2958.15
Dry soil + tare (g):	2992.83	2715.52
Tare (g):	328.07	312.82
Water content (%):	0.7	10.1

Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer	
8"	-	200	-	
6"	-	150	-	
4"	-	100	100.0	
3"	1460.09	75	93.9	
1.5"	2527.74	37.5	89.4	
3/4"	5139.91	19	78.4	←Split
3/8"	279.22	9.5	69.3	
No.4	430.10	4.75	64.4	
No.10	556.38	2	60.3	
No.20	694.28	0.85	55.8	
No.40	862.43	0.425	50.3	
No.60	1016.42	0.25	45.2	
No.100	1110.56	0.15	42.2	
No.140	1153.79	0.106	40.8	
No.200	1214.10	0.075	38.8	



Gravel (%): 35.6
Sand (%): 25.6
Fines (%): 38.8

Entered by:_____
Reviewed:_____

Amount of Material in Soil Finer than the No. 200 (75μm) Sieve

(ASTM D1140)

Project: Summit - Copper Crest West
No: 01628-022
Location: Powder Mountain, UT
Date: 12/27/2016
By: ET

Sample Info.	Boring No.	TP-2								
	Sample									
	Depth	16.0'								
	Split	No								
	Split Sieve*									
	Method	B								
Specimen soak time (min)		250								
Moist total sample wt. (g)		683.23								
Moist coarse fraction (g)										
Moist split fraction + tare (g)										
Split fraction tare (g)										
Dry split fraction (g)										
Dry retained No. 200 + tare (g)		321.57								
Wash tare (g)		294.23								
No. 200 Dry wt. retained (g)		27.34								
Split sieve* Dry wt. retained (g)										
Dry total sample wt. (g)		458.30								
Coarse Fraction	Moist soil + tare (g)									
	Dry soil + tare (g)									
	Tare (g)									
	Water content (%)									
Split Fraction	Moist soil + tare (g)	977.46								
	Dry soil + tare (g)	752.53								
	Tare (g)	294.23								
	Water content (%)	49.08								
Percent passing split sieve* (%)										
Percent passing No. 200 sieve (%)		**94.0**								

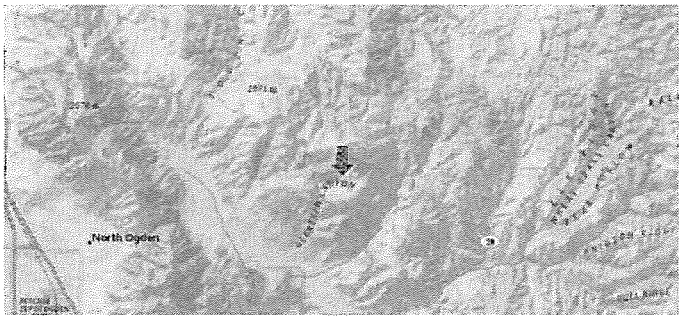
Entered by:_____
Reviewed:_____

APPENDIX C

USGS Design Maps Summary Report

User-Specified Input

Report Title	Copper Crest West Wed January 11, 2017 22:55:18 UTC
Building Code Reference Document	2012/2015 International Building Code (which utilizes USGS hazard data available in 2008)
Site Coordinates	41.3627°N, 111.7445°W
Site Soil Classification	Site Class C – "Very Dense Soil and Soft Rock"
Risk Category	I/II/III

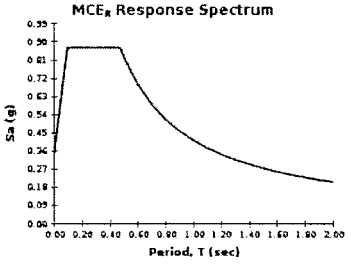


USGS-Provided Output

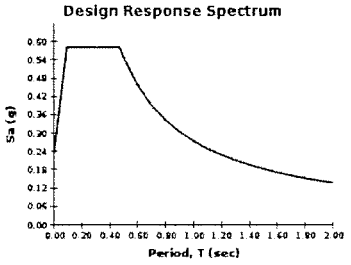
S_S =	0.810 g	S_{MS} =	0.872 g	S_{DS} =	0.581 g
S_1 =	0.269 g	S_{M1} =	0.411 g	S_{D1} =	0.274 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

MCE_R Response Spectrum



Design Response Spectrum



USGS Design Maps Detailed Report

2012/2015 International Building Code (41.3627°N, 111.7445°W)

Site Class C – "Very Dense Soil and Soft Rock", Risk Category I/II/III

Section 1613.3.1 — Mapped acceleration parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_s) and 1.3 (to obtain S_1). Maps in the 2012/2015 International Building Code are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 1613.3.3.

From Figure 1613.3.1(1) [1]	S_s = 0.810 g
From Figure 1613.3.1(2) [2]	S_1 = 0.269 g

Section 1613.3.2 — Site class definitions

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class C, based on the site soil properties in accordance with Section 1613.

2010 ASCE-7 Standard – Table 20.3-1
SITE CLASS DEFINITIONS

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index PI > 20, • Moisture content w ≥ 40%, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 1613.3.3 — Site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters

TABLE 1613.3.3(1)
VALUES OF SITE COEFFICIENT F_a

Site Class	Mapped Spectral Response Acceleration at Short Period				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_S

For Site Class = C and S_S = 0.810 g, F_a = 1.076

TABLE 1613.3.3(2)
VALUES OF SITE COEFFICIENT F_v

Site Class	Mapped Spectral Response Acceleration at 1-s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_1

For Site Class = C and S_1 = 0.269 g, F_v = 1.531

Equation (16-37):	$S_{MS} = F_a S_S = 1.076 \times 0.810 = 0.872$ g
Equation (16-38):	$S_{M1} = F_v S_1 = 1.531 \times 0.269 = 0.411$ g

Section 1613.3.4 — Design spectral response acceleration parameters

Equation (16-39):	$S_{DS} = ⅔ S_{MS} = ⅔ \times 0.872 = 0.581$ g
Equation (16-40):	$S_{D1} = ⅔ S_{M1} = ⅔ \times 0.411 = 0.274$ g

Section 1613.3.5 — Determination of seismic design category

TABLE 1613.3.5(1)
SEISMIC DESIGN CATEGORY BASED ON SHORT-PERIOD (0.2 second) RESPONSE ACCELERATION

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 0.581 g, Seismic Design Category = D

TABLE 1613.3.5(2)
SEISMIC DESIGN CATEGORY BASED ON 1-SECOND PERIOD RESPONSE ACCELERATION

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.274 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 1613.3.5(1) or 1613.3.5(2)" = D

Note: See Section 1613.3.5.1 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 1613.3.1(1)*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/IBC-2012-Fig1613p3p1(1).pdf
2. *Figure 1613.3.1(2)*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/IBC-2012-Fig1613p3p1(2).pdf