Star Valley Ranch

Building Assessment
Office Building
Barn Building
Silo Building

October 15, 2009

Submitted By
Sargent Engineers, Inc
1290 Arrowhead Plaza Way
P.O. Box 441
Driggs, ID 83422
208-354-4400-p
208-354-4420- f
sargentengineers.com

Firm Representative and Contact:
Kari Moulton, P.E.
e-mail: karim@sargentengineers.com

SARGENT

Table of Contents

Introduction 2

A-Frame Office/ Pro Shop 3

- Summary 3
- Structural Repair Requirements 5
  - Photos 7
- Architectural Comments 11
  - Photos 13

Barn Building 19

- Summary 19
- Structural Repair Requirements 21
  - Photos 23
- Architectural Comments 26
  - Photos 28

Silo Building 30

- Summary 30
- Structural Repair Requirements 32
  - Photos 34
- Architectural Comments 36
  - Photos 38

Appendix A: As-Built Drawings .....

Appendix B: A-Frame/Clubhouse Structural Calculations .....

Appendix C: Barn Building Structural Calculations .....

Appendix D: Silo Building Structural Calculations .....

Introduction

In September of 2009, Sargent Engineers and Plan One/Architects, at the request of Wendy Straight and Randy King, General Managers under the direction of the Star Valley Ranch Association Board of Directors, visited the three association owned buildings to perform a Structural and Architectural visual observation of the three buildings. The inspection team consisted of:

Kari Moulton – Sargent Engineers
Matt Hebdon – Sargent Engineers
Bob Heneage – Plan One/Architects

The purpose of this review was to identify items from a Structural and Architectural standpoint that are in need of repair, replacement, or are code violations. Observations dealing with code issues were based on the 2006 Edition of the International Building Code (2006 IBC). Please note that while there are elements of these buildings that are not in code compliance under the 2006 IBC there is a possibility to utilize some of the buildings under provisions of the International Existing Building Code.

Conditions of the three individual buildings; the A-Frame Office and Pro-Shop, the Barn, and the Silo buildings are discussed in greater detail in the following portions of this report. Generally, the conditions observed ranged from adequate to very poor. Several code violations and safety issues were discovered during the evaluation, many of which will need immediate attention. Some items which are not code related are noted for the Association's information. Such items are, in general, outside the scope of this report and are not to be considered an exhaustive list.

This report contains structural drawings showing the elements of the buildings as could be observed. Some elements were unknown and would require extensive demolition to determine the particular details of size and condition. In these situations, reasonable assumptions were made based on other information. The occupancy or use of the buildings and rooms of the buildings were taken to be the same as current use. The facts and findings related to these specific buildings are intended to be a working document. It should be referred to often and quite possibly be updated as needs and conditions change. This report should also serve as the basis for scheduling structural repairs and replacement to the buildings as well as making enhancements to the accessibility of the building under the provisions of the Americans with Disabilities Act (ADA).

The costs associated with the items requiring correction discussed in the remainder of the report are intended to be an approximation for general budget purposes. The estimated costs are in no way to be considered a bid and may vary substantially from the actual cost of the work when it is performed. Material costs and labor costs have the potential to vary significantly based on product and contractor availability.

We would like to thank the General Manager, the Board of Directors and staff of Star Valley Ranch Association for their help and support during this Project. We have found this to be a very enjoyable working relationship.

A-Frame Office/ Pro Shop

Summary

The A-Frame building was built in the late 60's or early 70's as near as could be ascertained. It is our understanding that the building was constructed to be a family cabin and was converted to office and retail space at a later time. The building is currently occupied by the offices of the SVRA manager and staff on the main level. The lower level functions as a multi-purpose room, library, and general meeting room for various clubs and organizations. The Aspen Hills Pro-Shop is also located on the lower level under the main deck. It is our understanding that the Pro-Shop is proposed to be moved onto the main level in the future.

The building has many areas that are deficient in structure for the current occupancy loads. The International Building Code (IBC) specifies a 100 pound per square foot live load requirement for spaces used as retail on the main level and a 50 pound per square foot requirement for upper floor areas. File storage areas within an office are to receive special consideration as to the loading. In general, the floors of this building were not designed to be used as office or retail space. While the floors of this building fail to meet the provisions of the IBC, there is a real possibility that under the Existing Building Code and some modifications that this building can serve adequately as office space with some light retail space. Analysis of the compliance to the Existing Building Code is outside the scope of this report.

One item that is of immediate concern is the replacement of the roof and installation of insulation. There are several shakes torn loose from the roof and in many places the felt paper is visible. It is our understanding that it is the desire of the board to replace the roofing as soon as possible. The existing roof is un-insulated allowing the building to feel the extremes of the weather.

The second floor level is not adequately supported to withstand the design weight of the file storage boxes. We recommend that the room should not be used as a storage area and that file boxes should be placed in other areas where the structure is designed to accommodate storage loads such as on a concrete floor at the lower level.

There are several points of ADA non-compliance. In particular, there is no ADA access to the building or the restrooms. Compliance will require an ADA accessible ramp to be built to access at least one of the entrances. Door hardware and direction of door swings with panic hardware will also be required. The ramps, restrooms, and hardware can be brought into compliance fairly quickly and with moderate cost.

The covered entries are also in need of repair and/or replacement. The northwest entry is leaning and the stairs are sloping. The west entry is pulling away from the building and should be repaired or replaced before another winter cycle. The replacement of these entries could be done as an integral system with the construction of the ADA ramps.

The deck to the south is inadequate to support the design snow loads or the loads required as an exit corridor. The current deck does not appear to drain adequately and should be replaced if the space below is to be occupied. If the space below is to be unoccupied, there are ways to add additional support to the deck structure with a minimal amount of cost. The specific design is outside the scope of this report. The handrails are not to code and should be replaced

regardless of whether the deck is replaced. The existing footings for the deck were placed at surface level and should be removed and replaced with footings placed below frost depth.

The main floor level and foundation system have a few deficiencies as denoted in the following report. The repairs to the floor joists, beams and footings are not difficult provided appropriate access is provided. It will be difficult and more costly to make repairs in the crawlspace given the limited access and working room. In the library area, the tile ceiling could be removed and replaced after the joists are strengthened. The steel support beam and column in this area appear to be adequate for the loads from either office or retail use.

There are some seismic concerns with the chimney due to the nature of the construction. While it is typical of chimney construction during the late 60's and into the early 80's, there is the possibility that the chimney and or rock veneer could come loose during a seismic event. The nature of masonry construction is very stiff and ridged. As a seismic event moves the building, the stones may dislodge and cause damage to the building and potential injury to people in the vicinity. This is a situation where the chimney was likely built to the standard practice of the day but with more information from seismic events, design professionals are becoming more mindful of the risks associated with this type of construction.

Below you will find description of the work items to be completed along with some estimates on the cost to repair each item or group of items.

A-Frame Office/Pro-Shop

Structural Repair Requirements

Foundation

Crawlspace and New Porch Footings *(see images SP1, SP2, and SP7)*

- Insufficient footing in the crawlspace
    - Add additional footings in crawlspace and replace wood footings with proper concrete footings
    - Install additional anchorage between the support rafter-column and footings
    - Insufficient footing in the crawlspace

- No footings supporting northwest entry
    - Install footings and piers at the north west covered entry

Estimate = $18,000

Existing retaining walls *(see images SP4, SP5)*

- Retaining wall at the southeast corner of the building under the deck is deteriorating
    - Replace existing cmu retaining walls with similar walls of concrete or masonry with proper drainage behind the wall.

Estimate = $8,000

Footings at the walkout basement/under deck area *(see image SP6)*

- Existing footings for the deck and covered patio are not below the frost level
    - Replace existing pad footings at surface with footings below frost level with piers.

Estimate = $10,000

Floor Framing

Main level floor framing *(see images SP3, SP8-SP11)*

- Main level floor framing is overstressed for office loads and not adequate for retail loading
    - Add additional joists or add additional bearing points to strengthen the existing floor structure.
    - Add additional anchorage at the top of columns and at floor beams in crawlspace areas
    - Strengthen existing connections at joist splice and at the connection to rafters
    - Add joist hangers at hung joists
    - Install blocking at all bearing points

Estimate = $36,000

Second level floor framing *(see images SP12, SP13)*

- Second floor beams and joists are overstressed for office, retail or storage loads.
    - Add additional support to joists using additional beams or bearing walls. Follow loads through main floor framing and into footings.
    - Install connection hardware at beam and joist connection points
    - Strengthen connection at joist and rafter connection point.
    - Strengthen connections between joists and beams.
    - Notched balcony support beam connection over stressed

Estimate = $25,000

Roof Framing

Roof Framing *(see images SP14, SP15)*

- Covered entries are failing and falling away from the main structure.
    - Remove and replace entries to tie into main roof structure.
    - Replace with ADA compliant ramp and entrance.

Estimate = $16,000

Chimney

Chimney Connections *(see image SP16)*

- No connection from chimney to main framing at floor and roof levels was observed
    - Add additional new anchorage between chimney and wood elements.
- Attachment between masonry chimney and rock veneer stone likely does not meet current code.
    - Remove stone, install anchorage, and replace stone.

Estimate = $45,000

Deck Framing

Deck Framing *(see image SP17)*

- Deck framing is overstressed and leaks on the storage pro shop area below
- Railings do not meet code
    - See architectural comments on type and cost.
    - Replace to meet ADA requirements.

Estimate = Included in architectural costs

Total A-frame Office/Pro-Shop Structural Estimate = $158,000

A-Frame Office/Pro-Shop

Photos

A-Frame SP1- Wood block used as a footing no column connection

A-Frame SP3- Floor at the first floor level

A-Frame SP4- Masonry Retaining Wall

A-Frame SP2- Wood block used as a footing

A-Frame SP5- Masonry Retaining Wall

A-Frame SP7- Northwest entry leaning and tilted stairs

A-Frame SP6- Deck footing at ground surface

A-Frame SP8- Main floor framing lack of connection

A-Frame SP9- Main floor framing lack of connection

A-Frame SP12- Joist to main frame connection 2nd story

A-Frame SP10- Joist splice detail

A-Frame SP13- Notched floor joist connection

A-Frame SP11- Joist to main frame connection

A-Frame SP14- West covered entry separating from building

A-Frame SP15- Lack of connection between elements at covered entry

A-Frame SP16- Chimney to main rafter connection

A-Frame SP17- Deck railing

A-Frame Office/Pro-Shop

Architectural Comments

Exterior

Re-roof Building *(see images a1 through a6)*

- Re-roof entire A-Frame structure (about 18:12 pitch)
    - Class A cedar shakes, over 1 ½" poly-iso rigid insulation base layer (about R-11)
    - Repair damage to vent stacks and chimneys

Estimate = $95,000

Re-side Building *(see images a7 and a8)*

- Repair, caulk, spot prime, prep and paint all exterior wood siding

Estimate = $8,000

Repair deck above Aspen Hills Pro Shop *(see images a13 through a20)*

- The deck currently leaks into shop and storage area below
- There is mold present in the occupied spaces below (rain currently leaks through floor/roof joists)
- There is a squirrel family living in floor/roof joist cavity (can hear them)

- Remove Astroturf covering and supporting framing and decking
- Reframe at lower level and re-deck/re-surface
- Install roof membrane with internal drain system or scuppers and mono-pitch
- Install sleepers and finish decking (Trex or similar)

Estimate = $45,000

Interior

ADA Issues; building access *(see images a9 and a10)*

- There is currently no ADA access to the entire building
- The best current access is at either end of the main floor (at the deck over the Pro Shop, or the hallway near the rest rooms)

- Demo existing stairs at either location and replace with stair-ramp combination (and cover if at north entrance)

Estimate = $12,000

ADA Issues; toilets *(see images a21 through a24)*

- There are currently no ADA-compliant toilets or toilet rooms

- Renovate and make compliant by removing the shower stall, then gut the entire room and reinstall toilets , urinals and sinks with handicapped clearances
- Replace/reconfigure door openings/doors (into toilets)

Estimate = $22,000

ADA Issues; hardware

- Install lever-type ADA hardware throughout building

Estimate = $1,500

Additional Code Items (not an exhaustive list)

- The building should receive blown-in cellulose or foam insulation in walls and roof, or fiberglass batts at a minimum
- There are an inadequate number of electrical receptacles

Estimate = $30,000

Additional Non-Code Items (not an exhaustive list)

- There is fairly widespread water damage that needs to be repaired and repainted
- There are extensive non-uniform finishes throughout

  - Doors, windows, hardware, carpet, etc. were installed with no effort made to coordinate appearance (e.g. paint-grade trim with stain-grade finish on it)
  - There is quite a bit of door and window trim that doesn't match, or is missing
  - There are a lot of homemade light fixtures

Estimate = $25,000

Total A-frame Office/Clubhouse Architectural Estimate = $238,500

Photos

a1. A-Frame Office/Pro Shop roof SW Valley

a2. A-Frame Office/ Pro Shop roof broken shingles

A3. A-Frame Office/ Pro Shop roof sheared vent stack

a4. A-Frame Office/ Pro Shop roof repaired shingles

A5. A-Frame Office/ Pro Shop roof north dormer

a6. A-Frame Office/ Pro Shop roof broken shingles

a7. A-Frame Office/ Pro Shop siding dry rot at grade

a8. A-Frame Office/ Pro Shop siding dry rot at grade

a9. A-Frame Office/ Pro Shop NE entry leaning to left

a10. A-Frame Office/ Pro Shop north entry into stair landing

a11. A-Frame Office/ Pro Shop roof bent vent stack

a12. A-Frame Office/ Pro Shop roof bent vent stack

a13. A-Frame Office/ Pro Shop west deck; north stairs

a14. A-Frame Office/ Pro Shop west deck

a15. A-Frame Office/ Pro Shop west deck from north

a16. A-Frame Office/ Pro Shop west entry

a17. A-Frame Office/ Pro Shop west deck framing and overhang

a18. A-Frame Office/ Pro Shop west deck; south stairs dry rot

a19. A-Frame Office/ Pro Shop west deck from south

a20. A-Frame Office/ Pro Shop basement corridor ceiling

a21. A-Frame Office/ Pro Shop toilet room; stall plywood doors

a22. A-Frame Office/ Pro Shop toilet room; urinal next to sink

a23. A-Frame Office/ Pro Shop toilet room; non-ADA shower stall

a24. A-Frame Office/Clubhouse toilet

Barn Building

Summary

The gambrel Barn building was constructed in the early 70's as near as could be ascertained. It is our understanding that the building was constructed to serve as a community center and quasi-clubhouse for the Cedar Creek Golf Course. The building is currently occupied by the Cedar Hills maintenance department with golf cart parking on the lower level and a large public gathering area and bar on the main level. A small portable stage with stage curtains and lights are located at the north end of the building.

While construction of this barn is typical of many barns in the area that were built in the 1970's, the building has many components that are structurally deficient when evaluated to the currently defined occupancy loads and code requirements. The IBC specifies a 100 pound per square foot requirement for spaces used as assembly area with movable seating. In general, the floors of this building were not designed to support assembly area loading. The roof structure does not have the capacity to support current design snow loads and was not built to serve as part of the lateral force resisting system; which is required to meet current code provisions. In addition, the walls were not constructed as shear walls to transfer wind and seismic forces to the foundation.

The foundation generally appears to be of good construction with a couple of noted exceptions. The footings at the north end wall and the north end of the west side wall are resting on top of the ground instead of below the frost line. It is my opinion that the movement due to frost heave action is what has caused the crack on the west foundation wall near the north end. The interior pad footings in the golf cart storage portion of the building are smaller than required for the current design loads. Although the footings do not conform to code requirements, this condition has not yet resulted in foundation failure. This is probably because the building is not used during the winter season. Due to this the snow load on the roof and the assembly loads on the floor have not happened simultaneously. The IBC however does not allow designers the option of separating the loads and the combined total loading is required for design purposes. It appears that the shed roof on the south end of the building does not rest on piers or an adequate foundation system.

The floor of this building is structurally inadequate for use as a large gathering area. However, the barn building has adequate basement space to allow additional floor joists and new floor beams to be installed.

The walls of the barn are problematic from a structural point of view. The gable end walls are broken with horizontal wall plates in several locations up the wall. The result is that the wall has hinge locations that more readily allows it to buckle under certain load conditions. The wall should be retrofitted with continuous full height members. The walls are sheathed with an architectural plywood panel on the outside. Structural wall sheathing with proper nailing will be required to create shear walls to resist the seismic and wind forces. Applying the structural sheathing to the inside of the wall would avoid removing and replacing the existing wall panels. If any electrical or mechanical work or the addition of wall insulation is to be completed we would recommend doing so prior to installing the structural sheathing.

The roof structure is significantly under-designed for the 100 pounds per square foot ground snow load required for this location. The building was evaluated for a reduced snow load as allowed by code for a slippery un-obstructed surface. Deficiencies were noted, even with the reduced snow load considerations. To correct the deficiencies, the lower steep section of roof will need to be removed and replaced with larger framing members. Roof sheathing would then be applied to the entire roof and the existing roofing replaced or new roofing installed. The shed roof on the south end of the building should be removed and replaced with properly designed members for applicable snow load conditions.. Columns should be appropriately anchored to the concrete and also the beam above. The south gable prow that extends out should be re-constructed with appropriate sized members.

There are several points of ADA non-compliance. In particular, there is no ADA access to the building or the restrooms. The ramp from the silo building is steeper than allowed under the ADA provisions and the door from the pro-shop area of the silo into the lobby area that accesses the ramp has a door that is too narrow to meet ADA requirements. Compliance would require an ADA accessible ramp to be built at a minimum of one of the entrances. Separation between exit conditions will require that at least the east entrance be made ADA accessible. Door hardware and direction of door swings with panic hardware will also be required.

Following you will find description of the work items to be completed along with estimates on the cost to repair each item or group of items.

Barn Building

Structural Repair Requirements

Foundation

Foundation (see images SPB1-SPB5)

- Existing footings are smaller than required
    - Enlarge interior footings to support the design loads
- North basement wall footings are at grade having inadequate coverage for frost protection
    - Add frost wall to north end wall footing and north end of west wall
- Crack around window at the north end of the west basement wall
    - Repair crack in the west basement wall
- South shed entry does not have piers and footing
    - Replace south piers to achieve adequate frost depth and footing size

Estimate = $35,000

Floor Framing

Floor Framing (see imagesSPB6-SPB8)

- Floor framing is inadequate for the current design loads and building use
    - Add additional 2x12 joist between existing joists
    - Replace floor beams or strengthen existing floor beams
    - Add connection where floor beams bear on concrete foundation wall
    - Add connecting hardware on top and bottom of existing columns

Estimate = $60,000

Wall Framing

Side Wall Framing (see images SPB9-SPB10)

- Walls not designed as shear walls for seismic and wind forces
    - Add additional structural paneling on the interior of the walls and nail as shear walls (Before this is done we would recommend installing new electrical and insulation- not included in the estimate below)
    - Add additional wall studs to create a column at log beam bearing points
    - Add additional continuous laminated structural lumber (LSL) studs at end wall framing to eliminate the existing hinge point.
    - Install holdowns at ends of walls and sides of doors

Estimate = $70,000

Roof Framing

Roof framing (see images SPB11-SPB15)

- Roof Framing is over-stressed
    - Replace rafters with larger members
- No roof sheathing to provide lateral diaphragm
    - Add roof sheathing with proper diaphragm nailing
- Roof connections are inadequate or non-existing
    - Add connections between beams, columns, rafters, and trusses
    - Replace the south prow beams and rafters
- South entry shed roof is overstressed for the snow loads
    - Remove shed roof and reframe with rafters of adequate size and spacing
    - Replace beam at lower elevation of south entry shed
    - Replace ledger to main structure

- Note: it is assumed that existing red metal roofing can be removed and replaced. A competent roofing contractor should make that determination.

Estimate=$150,000

ADA Ramps Access Framing

ADA Ramp between barn and silo

- Ramp is steeper than ADA allows
    - See architectural comments on type and cost.
    - Replace to meet ADA requirements.

Estimate = Included in architectural costs

Total Barn Structural Estimate = $315,000

Barn Building

Photos

Barn SPB1- Footing with no frost coverage

Barn SPB2- Footing undersized

Barn SPB3- West wall foundation crack

Barn SPB4- West wall foundation crack

Barn SPB5- South shed column with no pier

Barn SPB6- Lack of connection from beam to concrete wall

Barn SPB7- Lack of connection from beam to concrete wall

Barn SPB8- Example of floor framing

Barn SPB9- End wall framing

Barn SPB10- End Wall Framing

Barn SPB11- South shed ledger to building

Barn SPB14- Roof Framing

Barn SPB12- South shed bearing beam

Barn SPB15- Roof Framing

Barn SPB13- South shed column to beam connection

Barn Building

Architectural Comments

Exterior
Roofing

- Beef up framing and replace roof *(see images b1 through b4)*

    - It rains outside and in this building you can see daylight in multiple locations. The roof is totally un-insulated. The structure is so light, it is doubtful it can handle the additional load of insulation (structure depth is inadequate for either batts or blown-in).

Estimate = $60,000

Re-side Building

- Repair, caulk, spot prime, prep and paint exterior siding

Estimate = $28,000

Interior
ADA Issues; building access

- There is currently no ADA access to the entire building

- Install ramped entry with integrated stairs

Estimate = $12,000

    - Need two exits separated by ½ the overall diagonal (1/3 the overall diagonal if fully sprinkled). Neither of the two secondary exits will qualify—one is a 4:12 ramp, and the other is a rickety set of stairs.

- Install second ramped entry with integrated stairs *(see image b8)*

Estimate = $8,000

    - Current toilet situation (shared between “Barn” and “Silo”):

      - Both have ADA compliant toilet stalls (1 each) and for the most part, have compliant toilet rooms overall (notable exception is Ladies sinks/vanity – not wheelchair compliant). Men’s is in “Barn” while women’s is in “Silo”. The breezeway separating the two is a non-compliant (about 4:12) ramp.

ADA Issues; toilets

- Correct (primarily Ladies) toilet situation between the two buildings

Estimate = $19,000

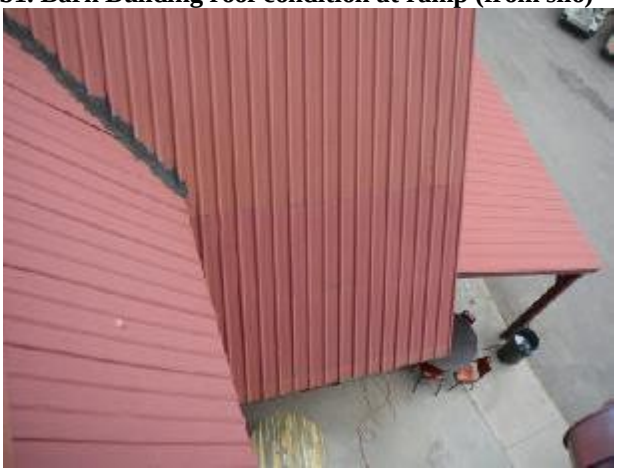
- Correct non-compliant ramp situation between the two buildings *(see image b5)*

Estimate = $15,000

Total Barn Building Architectural Estimate = $142,000

Photos

b1. Barn Building roof condition at ramp (from silo)



b2. Barn Building roof condition at patio (from silo)

b3. Barn Building roof patchwork repair

b4. Barn Building roof patchwork reparir

b5. Barn Building ramp to "Silo" Building

b6. Barn Building (Men's) toilet stall

b7. Barn Building (Men's) sink area

b8. Barn Building east exit stairs

Silo Building

Summary

The four story silo building was constructed in the early to mid 70's from what information we were able to obtain. It is our understanding that the building was constructed by the developer to serve as an amenity to the Star Valley Ranch Association and aid in the sale of future building sites and existing homes. The building has had many uses through the years and is currently home to the Cedar Creek Golf Course Pro-shop and restrooms on the main level and the Goofy Bear Restaurant on the third floor. The fourth floor is an abandoned bar and the second floor contains some office space and a meeting room.

The building was evaluated using gathering and assembly loading on the 4th floor, restaurant loading on the 3rd floor, office loading on the 2nd floor and retail loading on the main floor.

The silo building is a 16 sided polygon structure utilizing a center pipe column that extends from the main floor to the top, or the roof. The pipe is 12 inches in diameter and we assume it to be a schedule 40 wall thickness. Based on the calculations the center pipe column has adequate structural capacity to support design loads. The foundation appears much more problematic. We believe that it is highly unlikely that the existing footing matches the 13 foot square by 2 foot thick reinforced concrete footing that is required by the design code to support the building loads. The footing has likely never been loaded in this manner because the snow load on the roof and all 3 above ground floors have not been in use simultaneously. However, the IBC requires design for a worst case load condition on the foundation. The perimeter footings are more lightly loaded and require a 4 foot square footing. Without sacrificing the integrity of the existing footing we were unable to fully determine the size and depth of the perimeter footings. After observing the footings of other structures on the site it is anticipated that the silo footings are much smaller than what is required. An option of retrofitting the footing with helical piers was pursued enough to provide approximate costs to salvage the foundation.

As constructed, the floors of this building are structurally inadequate for use as a large gathering area. While some of the beams and intermediate framing members are adequate for the loads, other structural elements and connections are not adequate. This is evident looking in the hall lobby between the pro-shop and the women's restroom. Where one of the beams has failed and is currently banded together with a post supporting the beam at the break point. The connections of the beams to each other are substandard and will require the use of steel angles, lag screws, and bolts to properly connect the elements. Many of the beams are extremely cracked and checked and would be hard to obtain an accurate lumber grading for the member. Work to retrofit the floor and roof framing on each of the floors is easily accessible from the level below.

The walls of the silo consist of poles at each of the sixteen corners with a bolted connection to an additional column at each floor. The poles are significantly oversized for the loads and therefore even though some rot is present there is little concern for the strength of the poles. Of greater concern is the stability of the structure in a seismic event. The required uplift force at each column is significant and will require a helical pier installed and connected to resist the uplift forces. The wall panels will require structural sheathing on either the interior or exterior face of the walls. In this situation, with the amount of weathering at the exterior of the building, it might be preferable to reside the building after installing sheathing on the outside of the walls. Again in this situation adding insulation and electrical components would make sense before closing the walls off. Holdown straps will be required at the edges of each shear panel.

The roof structure is grossly over stressed for the snow loads used in design even with the load reductions in accordance with the code for a slippery un-obstructed roof surface. To correct the deficiencies, the roof will require removal, replacement of nearly all the components used in the current roof structure with larger logs or timbers, and replacement of the roof sheathing and roofing material. We have assumed that the metal roofing is adequate and can be reinstalled. This may or may not be the case and a competent roofing contractor should be consulted.

ADA non-compliance is the most extensive of all the deficiencies to the silo building. The stairs are not compliant as they vary in height and tread width. Many of the steps are over the allowed height used by the code and many are narrower than allowed. There is no ADA access to the restrooms because of the narrow door separating the pro-shop lobby from the restrooms. The ramp between the silo and the barn building is steeper than allowed by ADA guidelines. The fire escape is no longer accepted as a form of egress to a building under the 2006 IBC. An elevator would be required and could be installed on the outside of the building. Door hardware and direction of door swings with panic hardware will also be required.

Following you will find description of the work items to be completed along with some estimates on the costs to repair each item or group of items.

Silo Building

Structural Repair Requirements

Foundation

Foundation *(see imagesSPS1)*

- The exact dimensions of the existing footing are unknown. Given the required size of 13 foot square and 24 inches thick, we believe that the existing footing is much smaller than required
    - Enlarge interior footing, or reinforce bearing with helical piers to support the load of the center column

- Pole footing are of unknown size although it is unlikely that the fooling is adequate for the uplift loads for seismic .
    - Install a frost wall to avoid frost heave potential
    - Replace footings with helical piers for uplift
    - Install a frost wall to avoid frost heave potential
    - Add uplift connection at base of columns to resist seismic overturning forces

Estimate = $95,000

Floor Framing

Floor Framing *(see images SPS4- SPS8)*

- Rough sawn floor beams vary greatly in quality. Many beams are severely cracked and checked and have compromised structural integrity. Floor framing is overstressed for loads other than light office loads.
    - Replace floor beams or strengthen existing floor beams.
    - Replace beams that show signs of excess cracking and checking.
    - Add connecting hardware between the beams, joists and columns
    - Add connecting hardware on top and bottom of existing columns

Estimate = $70,000

Wall Framing

Side Wall Framing *(see images SPS1, SPS7 and SPS8)*

- Walls not designed as shear walls for seismic and wind forces
    - Add additional structural sheathing on the interior or exterior of the walls and nail as shear walls (Before this is done we would recommend installing new electrical and insulation not included in the estimate below)
    - Replace exterior siding or interior paneling depending on where the structural panels are installed.
    - Install holdowns straps between the floor levels
    - Install connecting hardware between floor beams and wall columns

Estimate = $55,000

Roof Framing

Roof framing *(see images SPS2 and SPS3)*

- Roof Framing logs are overstressed for the design snow loads
- Connections between log rafters lacks capacity for the design loads
    - Replace rafters with larger log or timber rafters
    - Add connections between beams, columns, and, rafters

- Note: it is assumed that existing red metal roofing can be removed and replaced. A competent roofing contractor should make that determination. Reroofing costs are not included in the estimate below.

Estimate = $60,000

ADA Ramps Access Framing

ADA Ramp between Silo and Barn

- Ramp is steeper than ADA allows
    - See architectural comments on type and cost.
    - Replace to meet ADA requirements.

Estimate = Included in architectural costs

Total Silo Structural Estimate = $280,000

Silo Building

Photos

Silo SPS1- Pole columns and showing no footing at grade

Silo SPS2- Center column at roof level

Silo SPS3- Log roof framing

Silo SPS4-Exterior wall beam column connection, through bolts to pole

Silo SPS5- Sheared beam at lobby area

Silo SPS6- Sheared beam at lobby area

Silo SPS7- Connection to pole at stair

Silo SPS8- Connection to pole at stair

Silo Building

Architectural Comments

Exterior
Re-side Building

- Repair, caulk, spot prime, prep and paint exterior siding

Estimate = $18,000

Interior
ADA Issues; building access *(see images s1, s4 and s5)*

- Inadequate accessible route

  - Doorway to Ladies lobby/access to "Barn" is 31" clear, has a diagonal wall adjoining one side of doorway, such that the route to both toilets is inaccessible from the main "Silo" entry.

- Remodel to resolve accessibility to both toilet rooms as outlined above

Estimate = $3,000

- No access above 1st floor

- Add four-stop elevator (and lobbies) to exterior of building (an interior renovation would be more costly)

Estimate = $175,000

- No access to men's toilet room

- Second exit from 1st floor is marginal for exit separation, but also the door swings in the wrong direction (into the flow of exiting), then immediately joins a ramp with no landing. Then a person is in another building (the Barn), not the outdoors.

- (see comments and price estimate for these two issues under "Barn" Building)

ADA Issues; hardware

- Install lever-type ADA hardware throughout building

Estimate = $1,500

ADA Issues; toilets *(see images s2, s3, s11 and s12)*

- Resolve non-compliant toilets in restaurant space by installing under-floor plumbing, and updated/ADA compliant fixtures and layout

- (see additional comments and price estimate for this issue under "Barn" Building)

Estimate = $22,500

Additional Code Items (not an exhaustive list)

- Replace older single-pane aluminum windows, throughout building, with thermally broken double- or triple-paned units (wired glass where facing fairway)

Estimate = $20,000

- The building should receive blown-in cellulose or foam insulation in walls and roof, or fiberglass batts at a minimum

Estimate = $20,000

  - The rise on the building's stairs ranges between 7 ½" and 8" per riser (maximum per code is 7"). The run on the building's stairs ranges between 10" and 11" per tread, as taken along the stairs' centerline (the minimum per code is 11")

  - The handrails on the stairs need 12" extensions to meet handicap requirements

- Rebuild stairs and handrails as required to minimally meet rise/run and handrail requirements

Estimate = $20,000

Additional Non-Code Items (not an exhaustive list)

  - Above the 1st floor, secondary exiting is done via fire escape. Separation is adequate and panic hardware has been installed. However, the current (2006) IBC does not allow fire escapes, except in a "grandfathered" existing building application (like in the case of the "Silo"). The fire escape faces the prevailing weather, and is likely to be significantly built-up with ice and snow in the winter.

- (price estimate for correcting the above item can vary widely, depending on approach chosen by Owner)

- Replace/upgrade sporadic and undersized electric unit heaters

Estimate = $6,000

- Install insulation to prevent sound transmission between floors

Estimate = $15,000

General additional comments: Silo Building

- The second and fourth floors are currently unoccupied and out of service

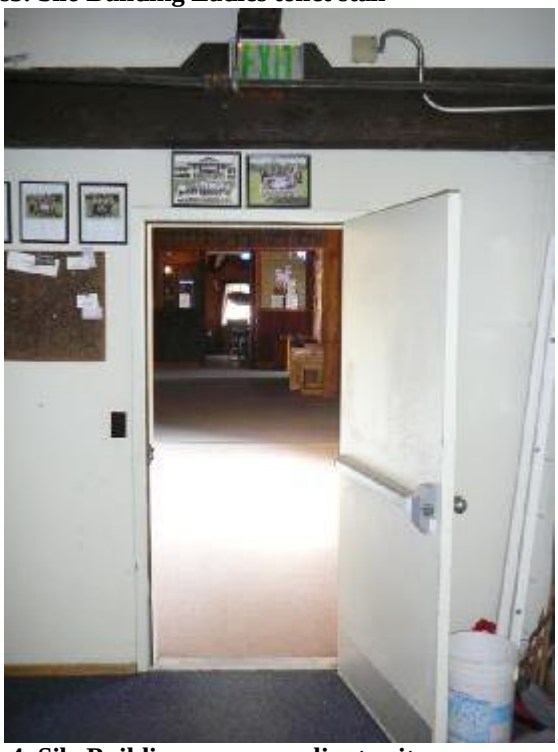
Total Silo Building Architectural Estimate = $301,000

Photos

s1. Silo Building;view up ramp into Barn Building

s2. Silo Building; Ladies toilet wash basins

s3. Silo Building Ladies toilet stall



s4. Silo Building: non-compliant exit

s5. Silo Building; inaccessible passage door to toilets and 2nd exit

s6. Silo Building; roof framing and sprinkler system

s7. Silo Building floor condition in 4th floor bar area

s8. Silo Building; evidence of roof leak on 4th floor walls

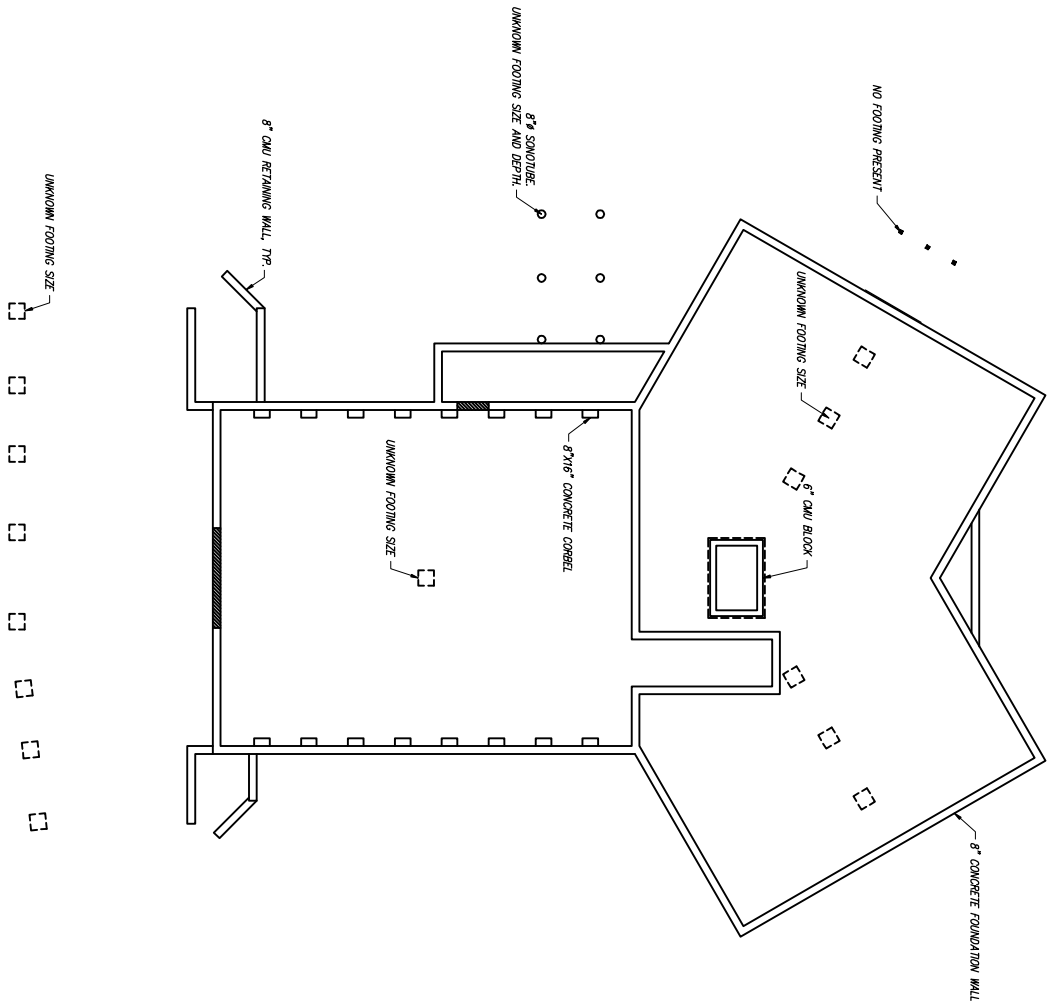
s9. Silo Building; stair exit enclosure on 4th floor

s10. Silo Building; view of 4th floor windows

s11. Silo Building; non-compliant restaurant Men's room

s12. Silo Building; non-compliant restaurant Ladies Room

Appendix A: As-Built Drawings



ADMINISTRATION BUILDING FOUNDATION PLAN

Scale: 3/16" = 1'-0"

NOT TO SCALE

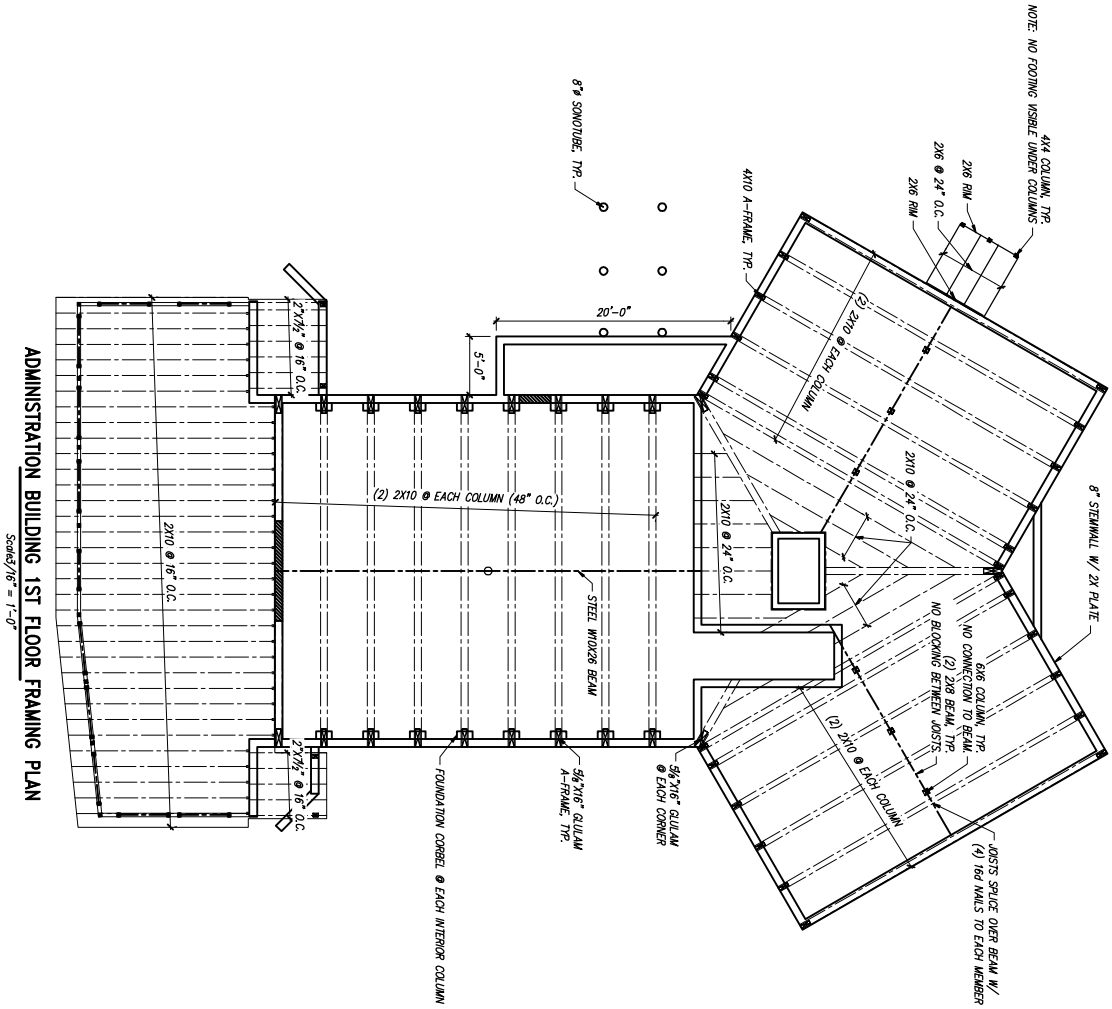
SHEET NO.	S2.1
SHEETS	15 OF
Designed by:	.
Checked by:	.
Dr. Drafter:	MHH
Drafter:	MHH
Date:	10/16/2009
Project Ref.:	D09135.00
Client Ref.:	

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH

ADMIN. BLDG. FOUNDATION PLAN

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

Rev.	Date	By	Description
.	.	.	.



ADMINISTRATION BUILDING 1ST FLOOR FRAMING PLAN

Scale: 3/16" = 1'-0"

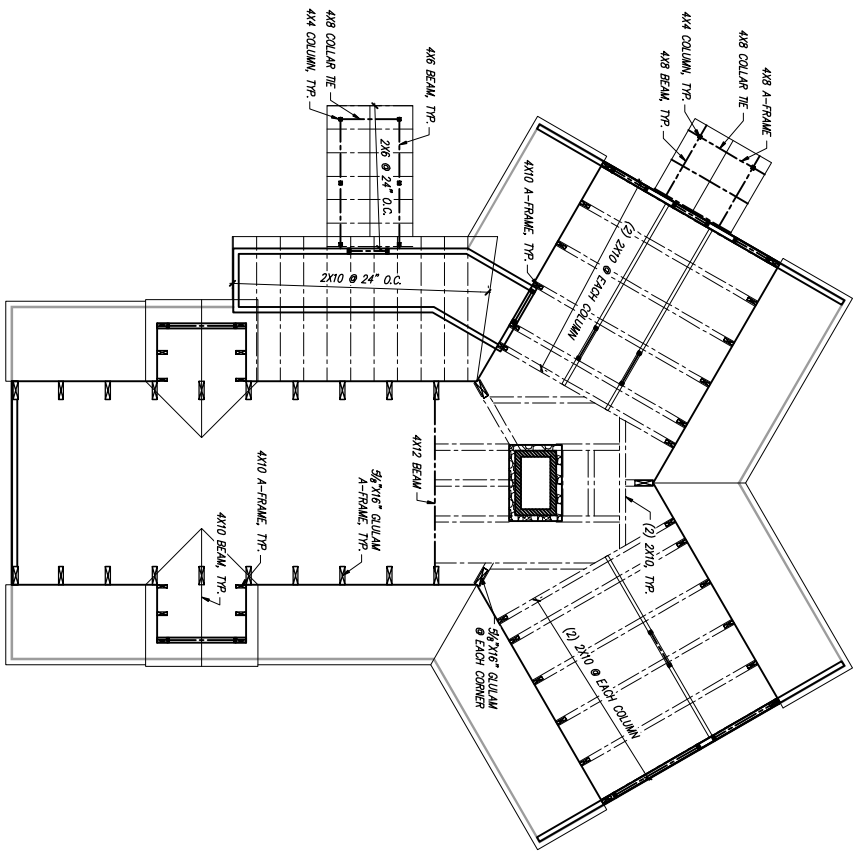
NOT TO SCALE

SHEET NO.	S2.2
OF SHEETS	15
Designed by:	.
Checked by:	.
Drafter:	MHH
Dwg Drafter:	MHH
Issue Date:	10/16/2009
Project Ref.:	D09135.00
Client Ref.:	

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH
ADMIN. BLDG. 1ST FLOOR FRAMING

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

Rev.	Date	By	Description
.	.	.	.



ADMINISTRATION BUILDING 2ND FLOOR FRAMING PLAN

Scale: 3/16" = 1'-0"

NOT TO SCALE

SHEET NO.	S2.3
OF SHEETS	15
Designed by:	.
Checked by:	.
Dr/ Drafter:	MHH
Drafter:	MHH
Issue Date:	10/16/2009
Project Ref.:	D09135.00
Client Ref.:	

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH
ADMIN. BLDG. 2ND FLOOR FRAMING

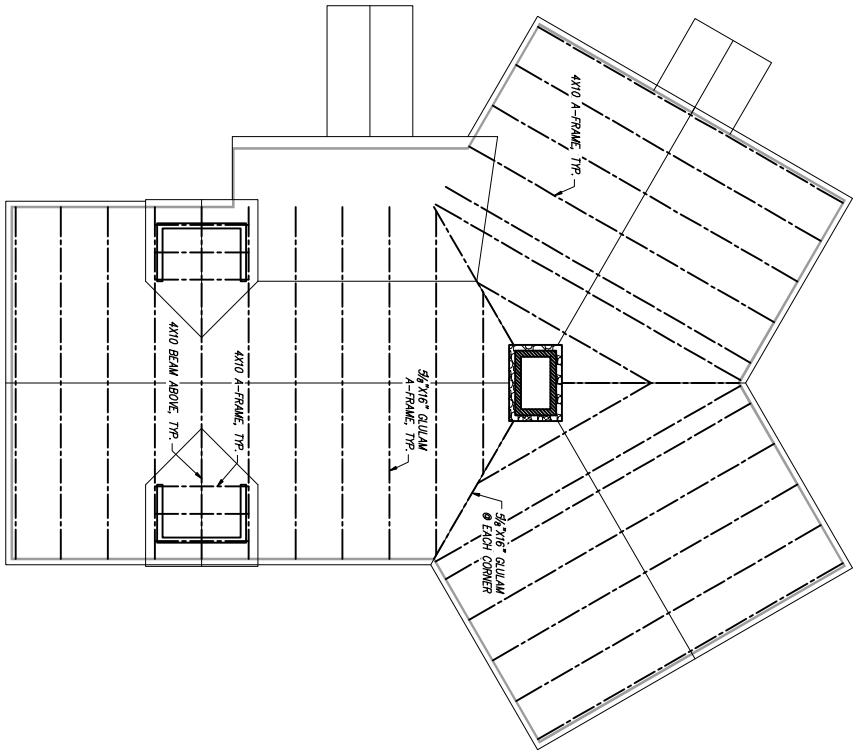
SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

Rev.	Date	By	Description
.	.	.	.

NOT TO SCALE

ADMINISTRATION BUILDING ROOF FRAMING PLAN

Scale: 3/16" = 1'-0"

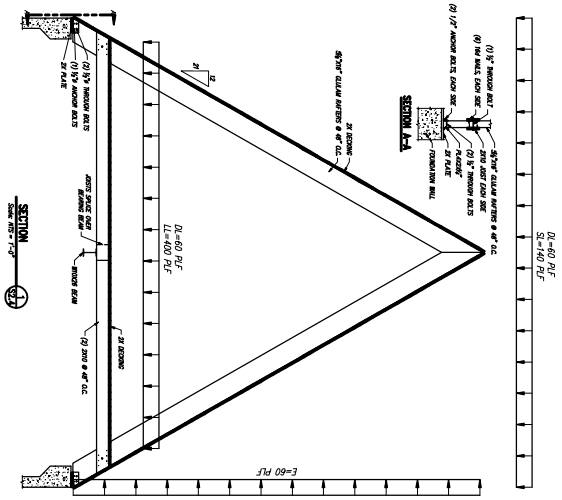


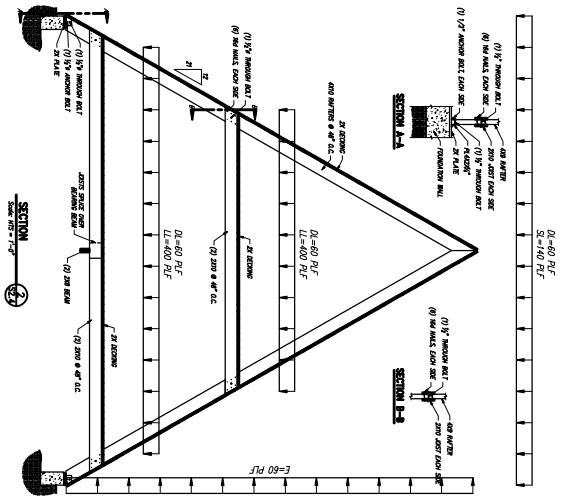
SHEET NO.	S2.4
OF SHEETS	15
Designed by:	.
Checked by:	.
Dr/ Drafter:	MHH
Drafter:	MHH
Issue Date:	10/16/2009
Project Ref.:	D09135.00
Client Ref.:	

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH
ADMIN. BLDG. ROOF FRAMING PLAN

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

Rev.	Date	By	Description
.	.	.	.





NOT TO SCALE

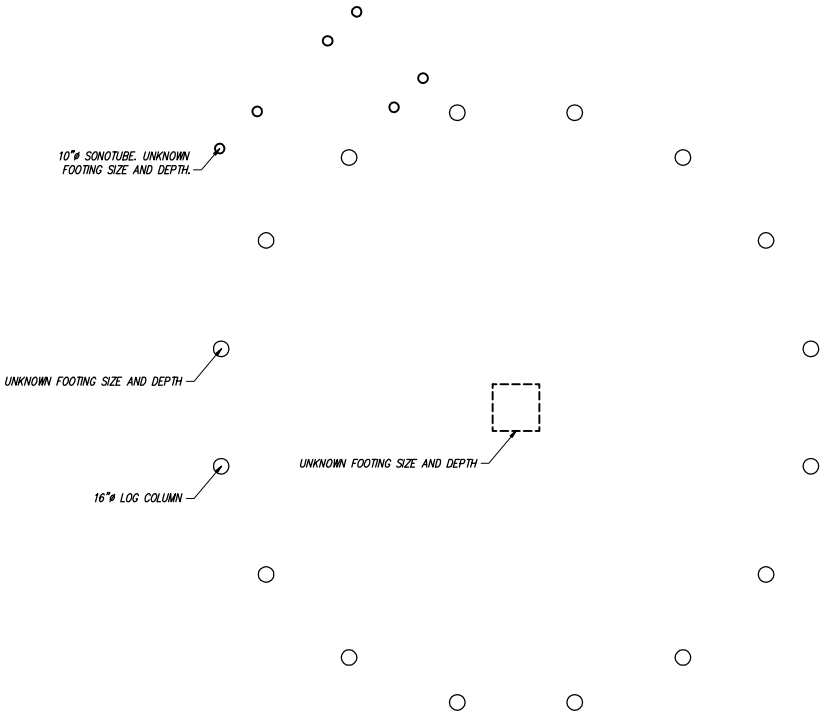
SHEET NO.	S2.5
SHEETS	15 OF
Designed by:	.
Checked by:	.
Drafter:	MHH
Proj. Drafter:	MHH
Issue Date:	10/16/2009
Project Ref.:	D09135.00
Client Ref.:	

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH

ADMIN. BLDG. SECTIONS

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

Rev.	Date	By	Description
.	.	.	.



SILO FOUNDATION & 1ST FLOOR FRAMING PLAN

Scale3/16" = 1'-0"

Rev.	Date	By	Description
.	.	.	.

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH

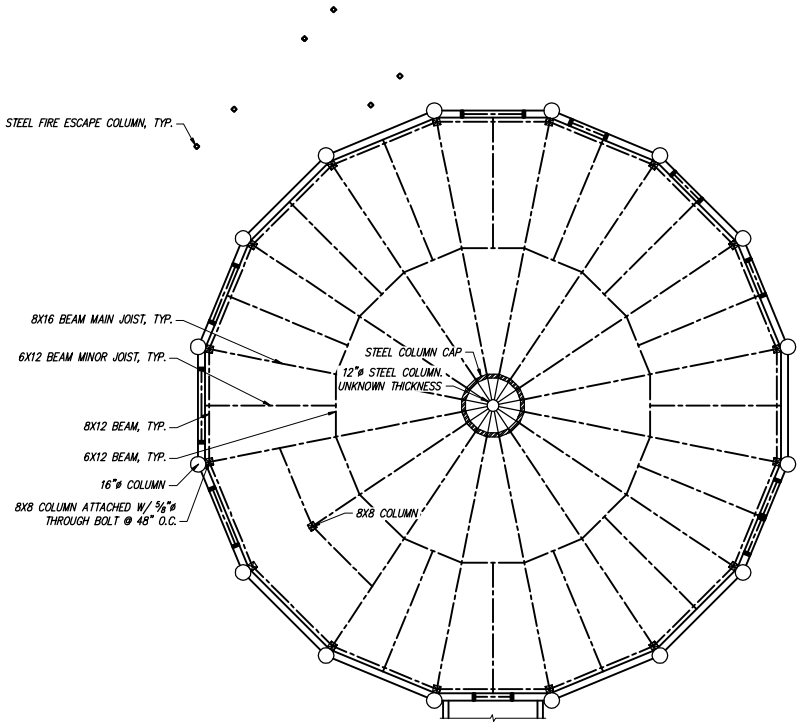
SILO FOUND. & 1ST FL. PLAN

Designed by:	.
Checked by:	.
Prj. Drafter:	MHH
Drafter:	MHH
Issue Date:	10/15/2009
Project Ref.:	D09135.00
Client Ref.:	.
	.

SHEET NO. S3.1 OF 15 SHEETS

Plot: . Time: . Last Detailer: . Layout: S3.1 Drawing: S:\Projects\2009\D09135.00 Star Valley Ranch Association\Construction Drawings\As Built Drawings\ As Built Drawings.dwg

NOT TO SCALE



SILO 2ND FLOOR FRAMING PLAN

Scale3/16" = 1'-0"

NOT TO SCALE

Rev.	Date	By	Description
.	.	.	.

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

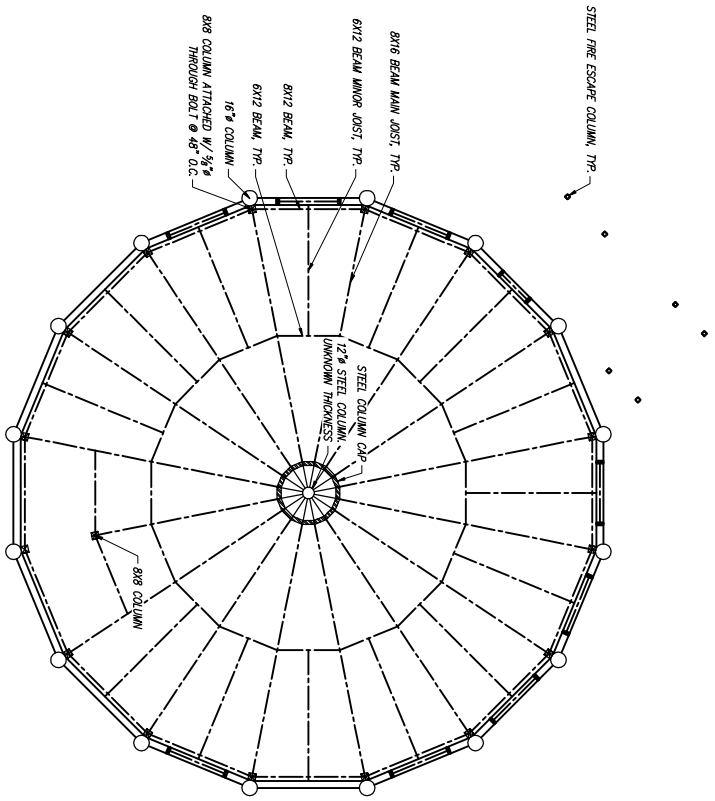
STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH

SILO 2ND FLOOR FRAMING PLAN

Designed by:	.
Checked by:	.
Prj. Drafter:	MHH
Drafter:	MHH
Issue Date:	10/15/2009
Project Ref.:	D09135.00
Client Ref.:	.
	.

SHEET NO. S3.2 | OF 15 SHEETS

Plot: . Time: . Last Detailer: .
Layout: S3.2 Drawing: S:\Projects\2009\D09135.00 Star Valley Ranch Association\Structural\Drawings\As Built Drawings\ As Built Drawings.dwg



SILO 3RD FLOOR FRAMING PLAN

Scale: 3/16" = 1'-0"

NOT TO SCALE

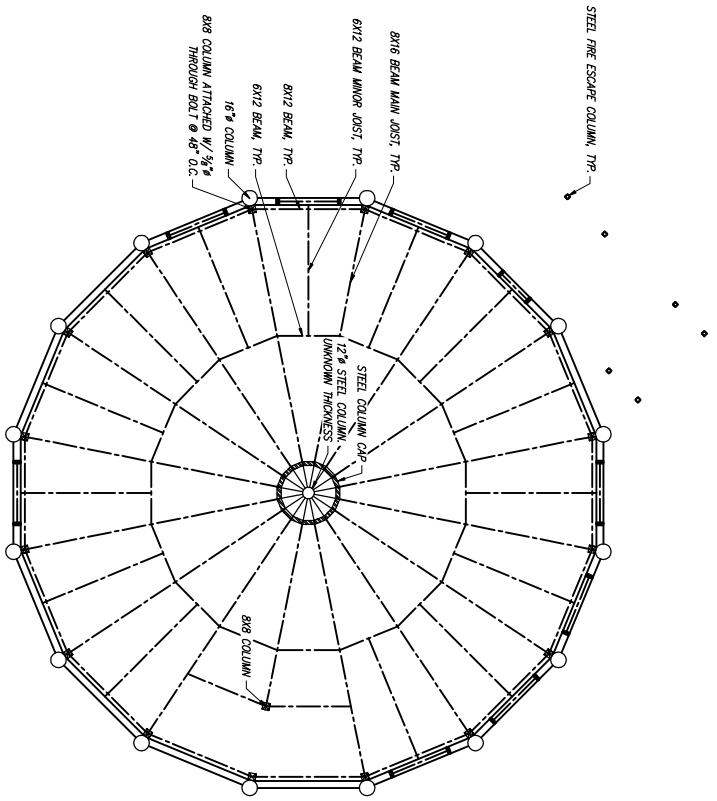
SHEET NO.	S3.3
OF SHEETS	15
Designed by:	.
Checked by:	.
Dr/ Drafter:	MHH
Drafter:	MHH
Issue Date:	10/14/2009
Project Ref.:	D09135.00
Client Ref.:	

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH

SILO 3RD FLOOR FRAMING PLAN

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

Rev.	Date	By	Description
.	.	.	.



SILO 4TH FLOOR FRAMING PLAN

Scale: 3/16" = 1'-0"

NOT TO SCALE

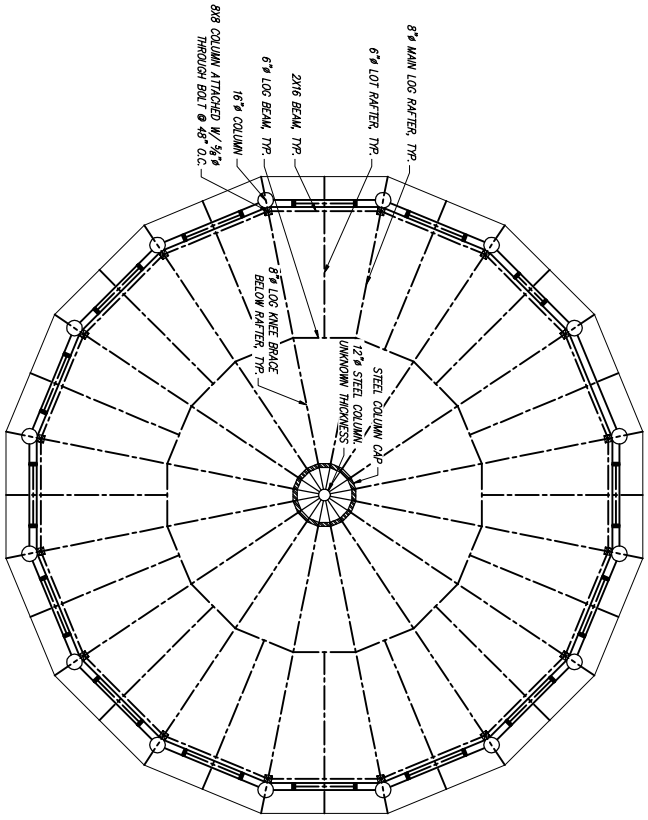
SHEET NO.	S3.4
OF SHEETS	15
Designed by:	.
Checked by:	.
Dr/ Drafter:	MHH
Drafter:	MHH
Issue Date:	10/16/2009
Project Ref.:	D09135.00
Client Ref.:	

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH

SILO 4TH FLOOR FRAMING PLAN

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

Rev.	Date	By	Description
.	.	.	.



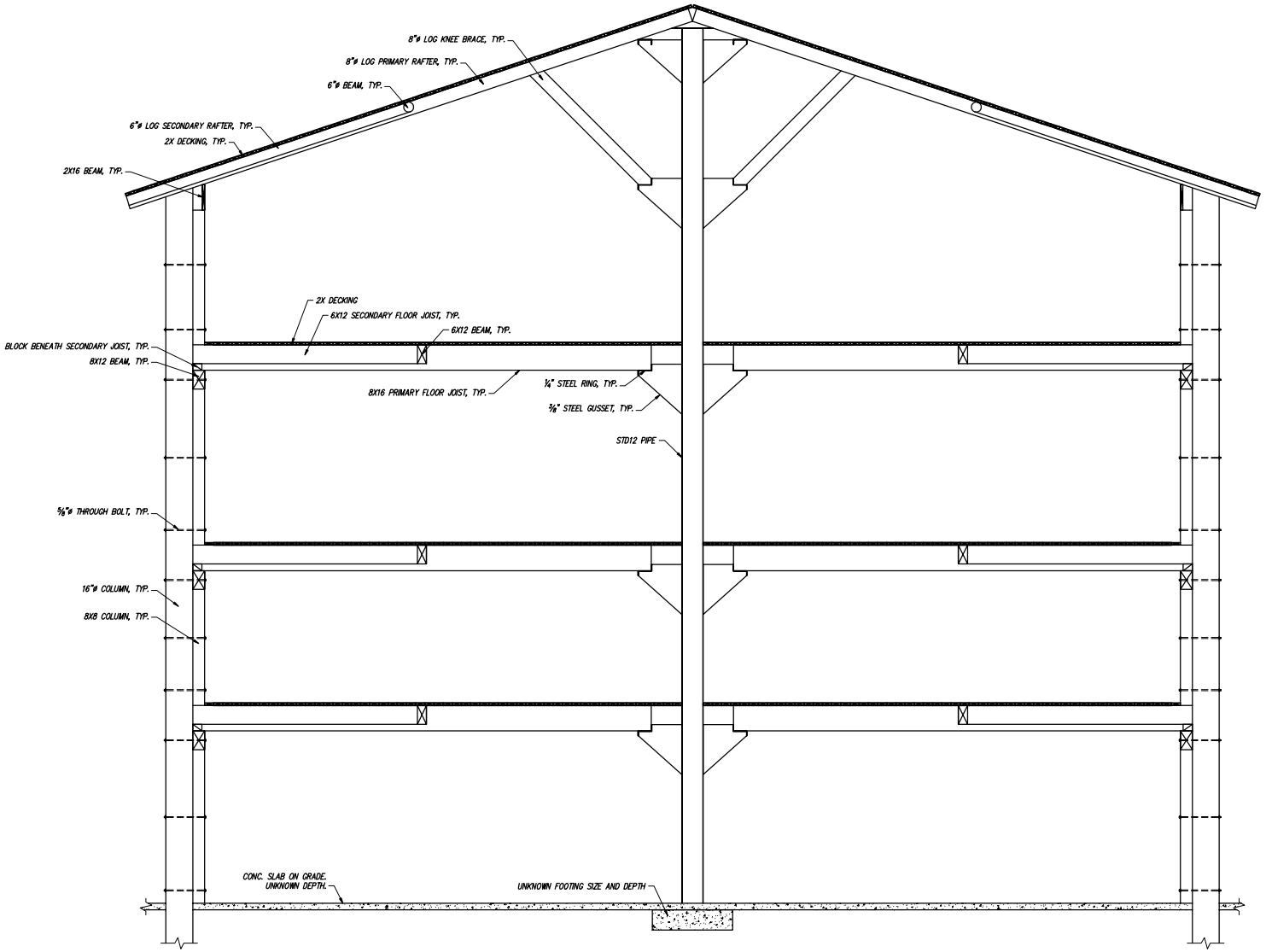
SILO ROOF FRAMING PLAN

Scale: 3/16" = 1'-0"

NOT TO SCALE

SHEET NO. S3.5	Designed by: .	STAR VALLEY RANCH ASSOCIATION	SARGENT Sargent Engineers, Inc. 1290 Arrowhead Plaza Way Driggs, Idaho 83422 Tel. 208 354-4400 • Fax 208 354-4420
OF 15 SHEETS	Checked by: .	AS-BUILT DRAWINGS	
	Dr. Drafter: MHH	STAR VALLEY RANCH	
	Ck. Drafter: MHH	SILO ROOF FRAMING PLAN	
	Issue Date: 10/16/2009		
	Project Ref.: D09135.00		
	Client Ref.:		

Rev.	Date	By	Description
.	.	.	.



SILO SECTION

Scale3/16" = 1'-0"

NOT TO SCALE

Rev.	Date	By	Description
.	.	.	.

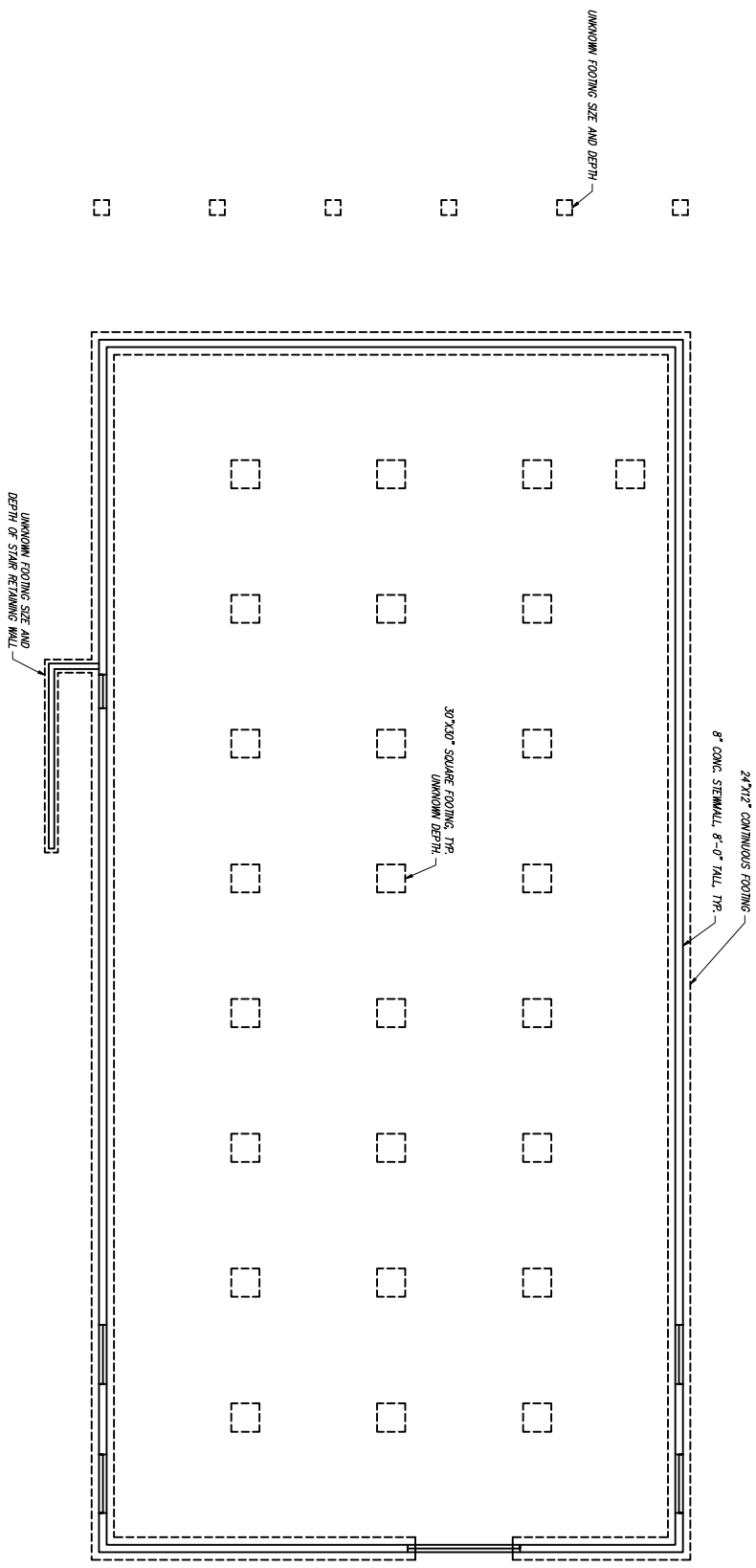
SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH
SILO SECTION

Designed by:	.
Checked by:	.
Prj. Drafter:	MHH
Drafter:	MHH
Issue Date:	10/15/2009
Project Ref.:	D09135.00
Client Ref.:	.

SHEET NO. S3.5 OF 15 SHEETS

Plot: . Time: . Last Detailer: . Layout: S3.6 Drawing: S:\Projects\2009\D09135.00 Star Valley Ranch Association\Construction Drawings\As Built Drawings\As Built Drawings.dwg



BARN FOUNDATION PLAN

Scale:3/16" = 1'-0"

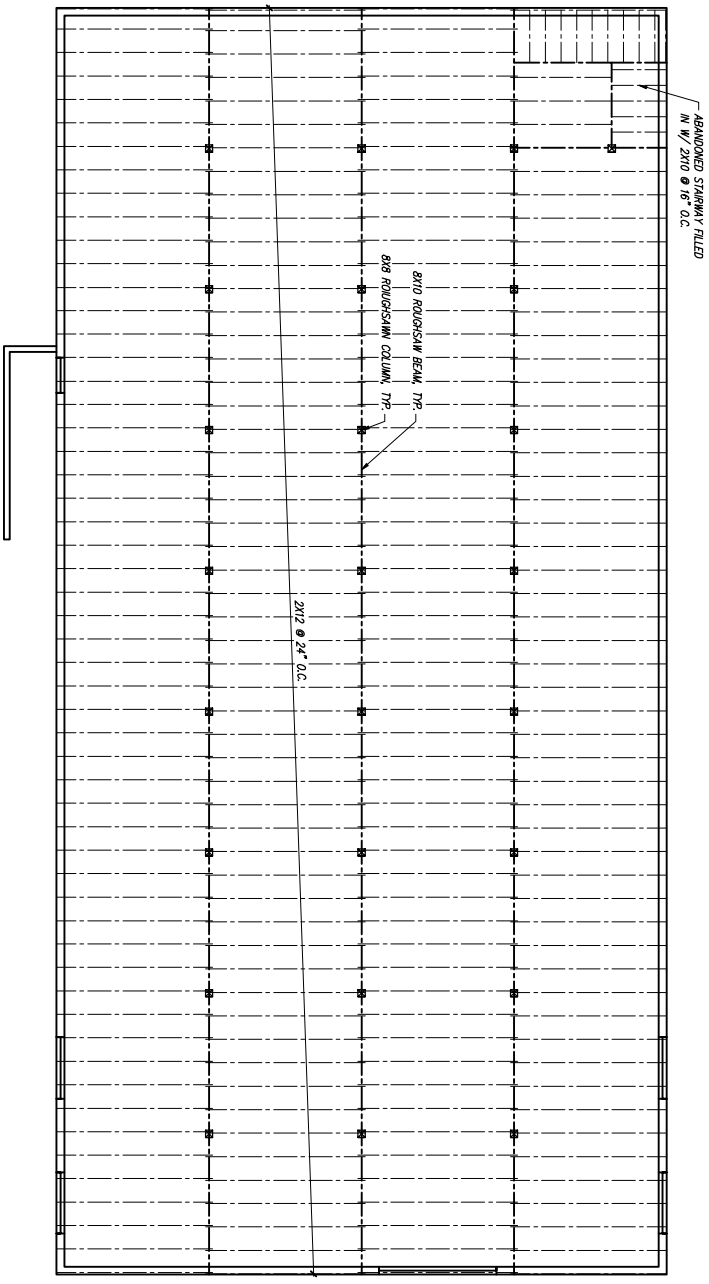
NOT TO SCALE

SHEET NO.	S4.1
OF SHEETS	15
Designed by:	.
Checked by:	.
Dft Drafter:	MHH
Drafter:	MHH
Issue Date:	10/14/2009
Project Ref.:	D09135.00
Client Ref.:	

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH
BARN FOUNDATION PLAN

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

Rev.	Date	By	Description
.	.	.	.



BARN 1ST FLOOR FRAMING PLAN

Scale: 3/16" = 1'-0"

NOT TO SCALE

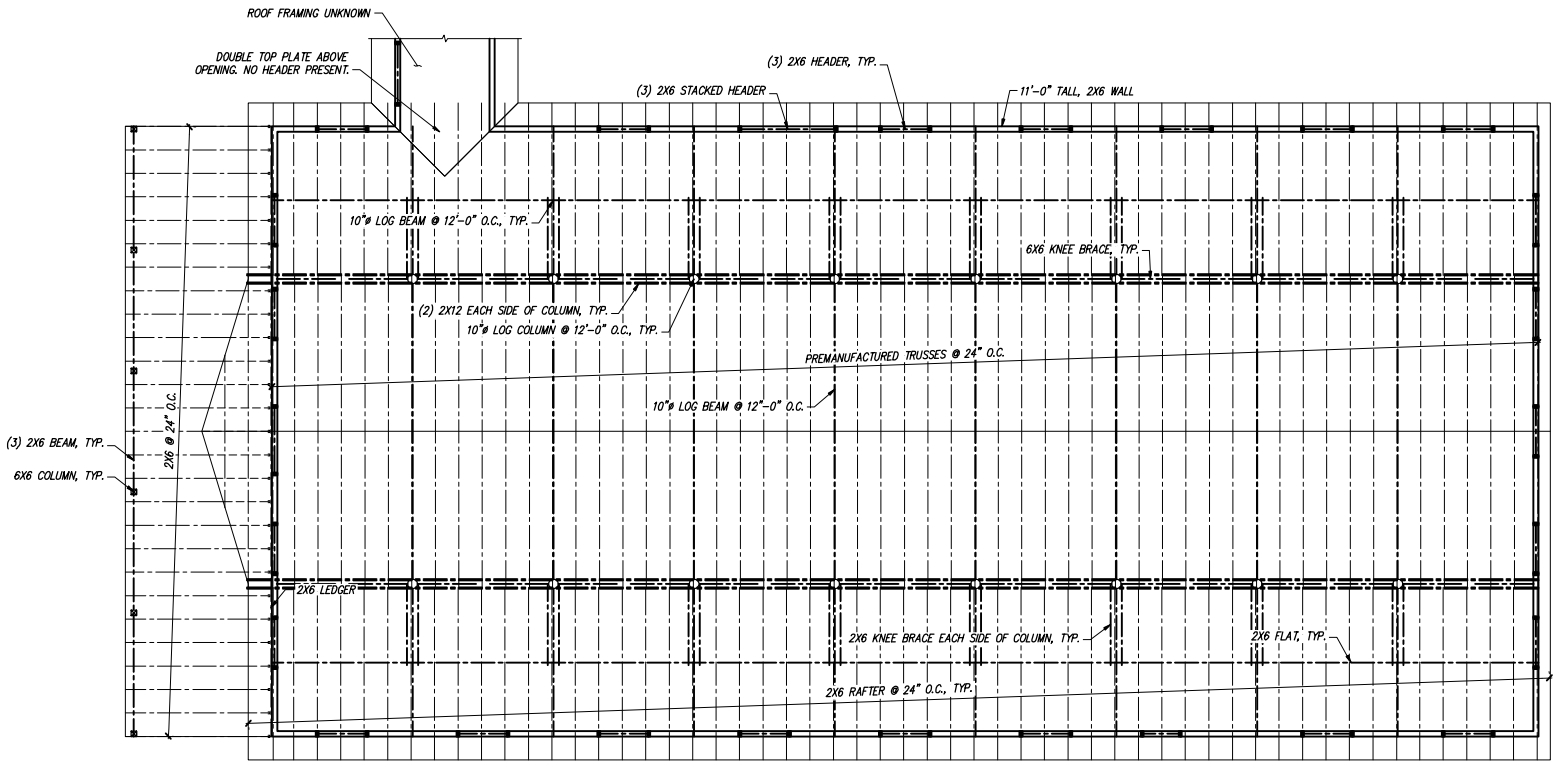
SHEET NO.	S4.2
OF SHEETS	15
Designed by:	.
Checked by:	.
Drafter:	MHH
Proj. Drafter:	MHH
Issue Date:	10/16/2009
Project Ref.:	D09135.00
Client Ref.:	

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH

BARN 1ST FLOOR FRAMING PLAN

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

Rev.	Date	By	Description
.	.	.	.



BARN ROOF FRAMING PLAN

Scale3/16" = 1'-0"

NOT TO SCALE

Rev.	Date	By	Description
.	.	.	.

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

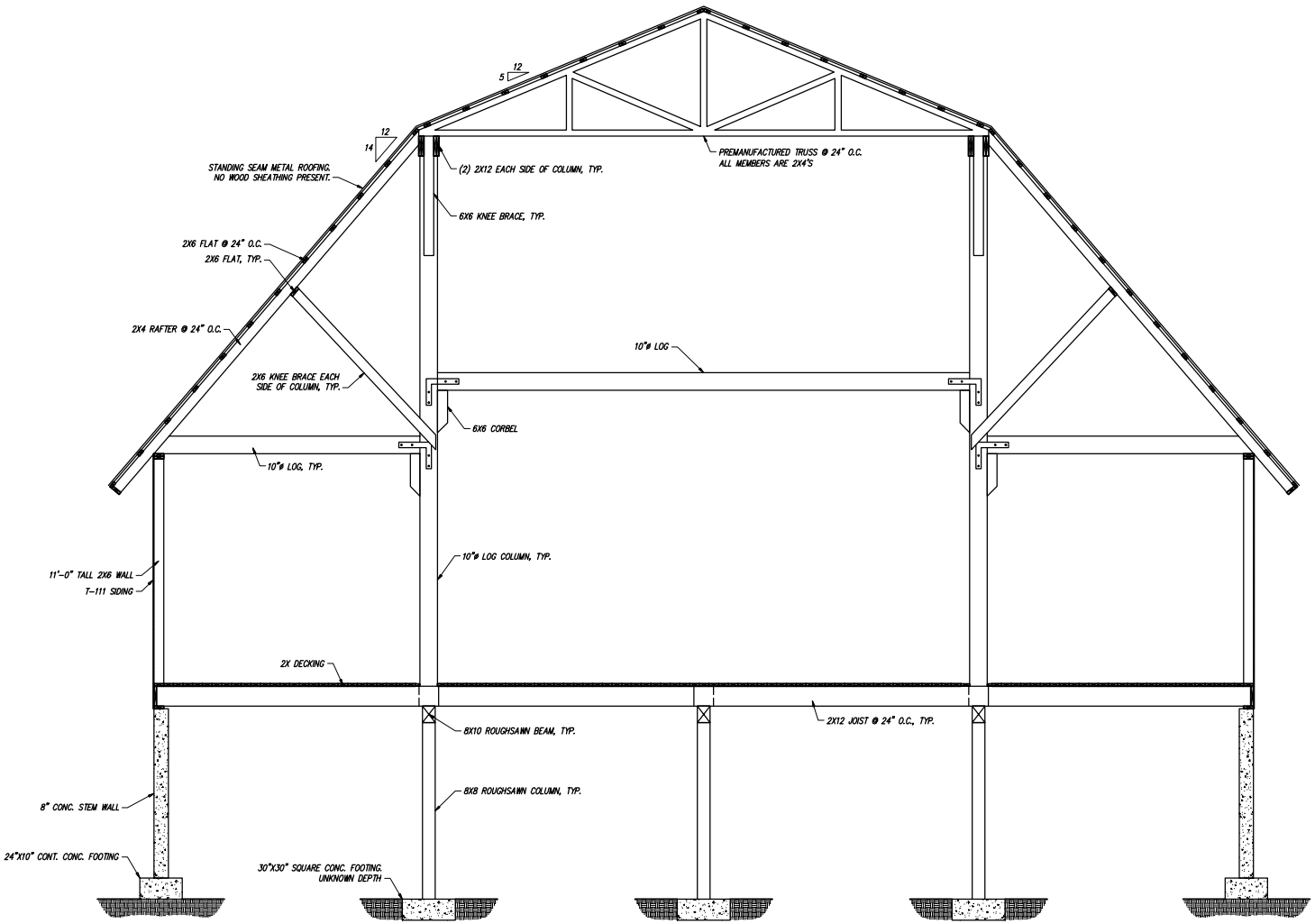
STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH

BARN ROOF FRAMING PLAN

Designed by:	.
Checked by:	.
Prj. Drafter:	MHH
Drafter:	MHH
Issue Date:	10/15/2009
Project Ref.:	D09135.00
Client Ref.:	.

SHEET NO. S4.3 | OF 15 SHEETS

Plot: . Time: . Last Detailer: . Layout: S4.3 Drawing: S:\Projects\2009\D09135.00 Star Valley Ranch Association\Construction Drawings\As Built Drawings\ As Built Drawings.dwg



BARN SECTION

Scale: 3/8" = 1'-0"

NOT TO SCALE

Rev.	Date	By	Description
.	.	.	.

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH
BARN SECTION

Designed by:	.
Checked by:	.
Prj. Drafter:	MHH
Drafter:	MHH
Issue Date:	10/15/2009
Project Ref.:	D09135.00
Client Ref.:	.

SHEET NO. S4.4 OF 15 SHEETS

Plot: . Time: . Last Detailer: . Layout: S4.4 Drawing: S:\Projects\2009\D09135.00 Star Valley Ranch Association\Construction\Drawings\As Built Drawings\ As Built Drawings.dwg

Appendix B: A-Frame/Clubhouse Structural Calculations

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

Project Location and Design Criteria

Project #:	D09135.00
Project Title:	Star Valley Ranch Association - Administration Building
Client:	Star Valley Ranch Association P.O. Box 7008 781 Vista East Dr. Star Valley Ranch, WY 83127 307-883-2669 fax: 307-883-2016
Location:	781 Vista East Dr. Star Valley Ranch, WY 83127
Date Started:	08/24/09
Codes:	IBC 2006 Edition ASCE 7-05 NDS 2005 Edition ACI 318-05 AISC Steel Construction Manual, 13 Ed.
Occupancy Category:	II (ASCE 7-05 Table 1-1)

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

Vertical Loads

Roof:

$pitch := 21$ Roof Pitch (__/12)

$\theta := \operatorname{atan}\left(\frac{21}{12}\right)$ $\theta = 60.26 \cdot deg$

$surface := N$ Roof Surface (S=Slippery, N=Non-Slippery)

$C_e := 1.0$ Exposure Factor (ASCE 7-05 Table 7-2)

$C_t := 1.1$ Thermal Factor (ASCE 7-05 Table 7-3)

$I := 1.0$ Snow Importance Factor (ASCE 7-05 Table 7-4)

$p_g := 130psf$ Ground Snow Load (Local Building Department)

$p_f := 0.7 \cdot C_e \cdot C_t \cdot I \cdot p_g$

$p_f = 100.1 \cdot psf$ Flat Roof Snow Load

$dl_r := 15psf$ Roof Dead Load

$sl_{rs} := 35psf$ Sloped Roof Snow Load

$sl_{rub} := 100psf$ Roof Unbalanced Snow Load

Floor:

$dl_f := 15psf$ Floor Dead Load

$ll_f := 100psf$ Floor Live Load

Walls:

$dl_w := 10psf$ Wall Dead Load

$dl_{cw.8} := 150pcf \cdot 8in$ 8" Concrete Wall Dead Load

$dl_{st.6} := 44psf \cdot \frac{6in}{4in}$ 6" Stone Wall Dead Load

$dl_{m.6} := 43psf$ 6" Masonry Wall Dead Load

Variables Defined

w	Uniform Load
P	Point Load
a	Distance to Point Load (assumed from left edge of beam u.n.o.)
L	Length
L_a	Cantilever Length
h	Height
h_{ret}	Retained Soil Height
h_{toe}	Soil Height above Toe
h_{xunb}	Column Unbraced Height in X-X Axis
h_{yunb}	Column Unbraced Height in Y-Y Axis
q_{brg}	Bearing Capacity of Soil

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

Seismic Load Summary

Procedure:	ASCE 7-05 12.8 Equivalent Lateral Force
S_S:	1.3303
S_1:	0.5098
Site Class:	D
S_{DS}:	0.887
S_{D1}:	0.510
R:	6.5
Seismic Design Cat.:	D
h_n:	26.5ft

$C_s := 0.0955$ Seismic Response Coefficient

$W_s := \left(dl_r + 0.2 \cdot sl_{rs}\right) \cdot 2902ft^2 + dl_f \cdot 945ft^2 + dl_{m.6} \cdot 16ft \cdot 28ft + dl_{st.6} \cdot 17ft \cdot 28ft$

$W_s = 128699\,lbf$ Seismic Weight

$V_s := C_s \cdot W_s$

$V_s = 12290.75\,lbf$ Seismic Shear

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:

Job # D09135.00

Project Notes :

Printed: 15 OCT 2009, 7:35PM

ASCE 7-05 Seismic Factor Determination

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — **License Owner : SARGENT ENGINEERS INC**

Description : Admin. Bldg. Seismic

Occupancy Category

Calculations per IBC 2006 & ASCE 7-05

Occupancy Category of Building or Other Structure : "II" : All Buildings and other structures except those listed as Category I, III, and IV — *ACSE 7-05, Page 3, Table 1-1*

Occupancy Importance Factor = 1 — *ACSE 7-05, Page 116, Table 11.5-1*

Ground Motion, Using USGS Database values

ASCE 7-05 9.4.1.1

Max. Ground Motions, 5% Damping :

S_S = 1.330 g, 0.2 sec response
S_1 = 0.5098 g, 1.0 sec response

Longitude = 111.006 deg West
Latitude = 42.932 deg North
Location : THAYNE, WY 83127

Site Class, Site Coeff. and Design Category

Site Classification "D" : Shear Wave Velocity 600 to 1,200 ft/sec = D — *ASCE 7-05 Table 20.3-1*

Site Coefficients Fa & Fv (*using straight-line interpolation from table values*) — *ASCE 7-05 Table 11.4-1 & 11.4-2*

Fa = 1.00
Fv = 1.50

Maximum Considered Eartquake Acceleration — *ASCE 7-05 Table 11.4-3*

$S_{MS} = Fa * Ss$ = 1.330
$S_{M1} = Fv * S1$ = 0.765

Design Spectral Acceleration — *ASCE 7-05 Table 11.4-4*

$S_{DS} = S_{MS} * 2/3$ = 0.887
$S_{D1} = S_{M1} * 2/3$ = 0.510

Seismic Design Category = D *(SD1 is most severe)* — *ASCE 7-05 Table 11.6-1*

Resisting System

ASCE 7-05 Table 12.2-1

Basic Seismic Force Resisting System . . . Bearing Wall Systems
Light-framed walls sheathed w/wood structural panels rated for shear resistance or steel sheets.

Response Modification Coefficient " R " = 6.50
System Overstrength Factor " Wo " = 3.00
Deflection Amplification Factor " Cd " = 4.00

NOTE! See ASCE 7-05 for all applicable footnotes.

Building height Limits :

Category "A & B" Limit:	No Limit
Category "C" Limit:	No Limit
Category "D" Limit:	Limit = 65
Category "E" Limit:	Limit = 65
Category "F" Limit:	Limit = 65

Redundancy Factor

ASCE 7-05 Section 12.3.4

Seismic Design Category of D, E, or F therefore Redundancy Factor " p " = 1.3

Lateral Force Procedure

ASCE 7-05 Section 12.8

Equivalent Lateral Force Procedure

The "Equivalent Lateral Force Procedure" is being used according to the provisions of ASCE 7-05 12.8

Determine Building Period

Use ASCE 12.8-7

Structure Type for Building Period Calculation : All Other Structural Systems

" Ct " value = 0.020
" x " value = 0.75
" hn " : Height from base to highest level = 26.50 ft

" Ta " Approximate fundemental period using Eq. 12.8-7 : Ta = Ct * (hn ^ x) = 0.234 sec
"TL" : Long-period transition period per ASCE 7-05 Maps 22-15 -> 22-20 = 8.000 sec

Building Period " Ta " Calculated from Approximate Method selected = 0.234 sec

" Cs " Response Coefficient

ASCE 7-05 Section 12.8.1.1

S_{DS}: Short Period Design Spectral Response	=	0.887	From Eq. 12.8-2, Preliminary Cs	=	0.136
" R " : Response Modification Factor	=	6.50	From Eq. 12.8-3 & 12.8-4 , Cs need not exceed	=	0.336
" I " : Occupancy Importance Factor	=	1	From Eq. 12.8-5 & 12.8-6, Cs not be less than	=	0.010

Cs : Seismic Response Coefficient = S_{DS} / (R/I) * 0.70 = 0.0955

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:35PM

ASCE 7-05 Seismic Factor Determination

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : Admin. Bldg. Seismic

Seismic Base Shear

Calculated for Allowable Stress Design Load Combinations *ASCE 7-05 Section 12.8.3*

Cs = 0.0955 from 12.8.1.1

Vertical Distribution of Seismic Forces

" k " : hx exponent based on Ta = 1.00

W (see Sum Wi below) = 128.70 k

Seismic Base Shear V = Cs * W = 12.29 k

Table of building Weights by Floor Level...

Level #	Wi : Weight	Hi : Height	(Wi * Hi) ^k	Cvx	Fx=Cvx * V	Sum Story Shear	Sum Story Moment
1	128.70	1.00	128.70	1.00	12.29	12.29	0.00

Sum Wi = 128.70 k Sum Wi * Hi = 128.70 k-ft Total Base Shear = 12.29 k Base Moment = 12.3 k-ft

Diaphragm Forces : Seismic Design Category "D", "E" & "F"

ASCE 7-05 9.5.2.6.4.4

Level #	Wi	Fi	Sum Fi	Sum Wi	Fpx
1	128.70	12.29	12.29	128.70	22.82

Wpx . . . . . Weight at level of diaphragm and other structure elements attached to it.
Fi . . . . . Design Lateral Force applied at the level.
Sum Fi . . . . . Sum of "Lat. Force" of current level plus all levels above
MIN Req'd Force @ Level . . . . . $0.20 * S_{DS} * I * Wpx$
MAX Req'd Force @ Level . . . . . $0.40 * S_{DS} * I * Wpx$
Fpx : Design Force @ Level . . . . . Wpx * SUM(x->n) Fi / SUM(x->n) wi, x = Current level, n = Top Level

Wall Anchorage

Concrete & Masonry Wall Normal Force : Minimum Force per ACSE 7-05 12.11.1

Minimum Factor : 0.40 * SDS * Importance * Weight = 0.3547 * Weight

Concrete & Masonry Wall Anchorage : Seismic Design Category "C" & "D" per ACSE 7-05 12.11.2.1

Actual Wall Weight Tributary to Anchor = lbs/ lin. ft

Fp : Anchorage Design Force . . .

Rigid Diaphragm Design Force = 0.40 * SDS * I * Trib. Weight = 0.00 lbs / foot

Flexible Diaphragm Design Force = 0.80 * SDS * I * Trib. Weight = 0.00 lbs / foot

Combination of Load Effects

ASCE 7-05 12.4.2.3

Load Description	D Dead Load	Qe Seismic Load		E H & V Load Effect
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

Wind Load Summary

Procedure: ASCE 7-05 6.5 Method 2 - Analytical Procedure

$V := 90$ Basic Wind Speed (mph) (ASCE 7-05 Fig. 6-1)

$K_d := 0.85$ Directionality Factor (ASCE 7-05 Table 6-4)

$I_w := 1.0$ Wind Importance Factor (ASCE 7-05 Table 6-1)

$R_S := C$ Surface Roughness Category (ASCE 7-05 6.5.6.2)

$E := C$ Exposure Category (ASCE 7-05 6.5.6.3)

$\alpha := 9.5$ Terrain Exposure Constant (ASCE 7-05 Table 6-2)

$z_g := 900$ Terrain Exposure Constant (ASCE 7-05 Table 6-2)

$K_{z.15} := .85$ Velocity Pressure Exposure Coefficient at h=15ft (ASCE 7-05 Table 6-3)

$K_{z.20} := .90$ Velocity Pressure Exposure Coefficient at h=20ft (ASCE 7-05 Table 6-3)

$K_{z.25} := .94$ Velocity Pressure Exposure Coefficient at h=25ft (ASCE 7-05 Table 6-3)

$$K_{z.26.5} := 2.01 \cdot \left(\frac{26.5}{900}\right)^{\frac{2}{\alpha}}$$

$K_{z.26.5} = 0.96$ Velocity Pressure Exposure Coefficient at h=26.5ft (ASCE 7-05 Table 6-3)

$K_{zt} := 1.0$ Topographic Factor (ASCE 7-05 6.5.7)

$G := 0.85$ Gust Effect Factor (ASCE 7-05 6.5.8)

$q_{z.15} := 0.00256 \cdot K_{z.15} \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I$

$q_{z.15} = 14.98$ Velocity Pressure at h=15ft (ASCE 7-05 6.5.10)

$q_{z.20} := 0.00256 \cdot K_{z.20} \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I$

$q_{z.20} = 15.86$ Velocity Pressure at h=20ft (ASCE 7-05 6.5.10)

$q_{z.25} := 0.00256 \cdot K_{z.25} \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I$

$q_{z.25} = 16.57$ Velocity Pressure at h=25ft (ASCE 7-05 6.5.10)

$q_{z.26.5} := 0.00256 \cdot K_{z.26.5} \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I$

$q_{z.26.5} = 16.87$ Velocity Pressure at h=26.5ft (ASCE 7-05 6.5.10)

$GC_{pi} := 0.18$ Gust Effect Factor (ASCE 7-05 Fig. 6-5)

$h := 26.5ft$ Building Height

$$C_p := \frac{(0.01 \cdot \theta)}{deg}$$

$C_p = 0.6$ Force Coefficient (ASCE 7-05 Fig. 6-6)

$$V_{w.t} := \left[q_{z.26.5} \cdot G \cdot C_p \cdot \left(1084ft^2 + 603ft^2\right) + q_{z.26.5} \cdot GC_{pi} \cdot \left(1084ft^2 + 603ft^2\right)\right] \cdot \frac{lbf}{ft^2}$$

$V_{w.t} = 19694.81\,lbf$ Roof Diaphragm Transverse Wind Shear

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

$$V_{w.l} := \left[q_{z.26.5} \cdot G \cdot C_p \cdot \left(400ft^2 + 603ft^2\right) + q_{z.26.5} \cdot GC_{pi} \cdot \left(400ft^2 + 603ft^2\right)\right] \cdot \frac{lbf}{ft^2}$$

$V_{w.l} = 11709.48\,lbf$ Roof Diaphragm Longitudinal Wind Shear

Roof Diaphragm Design

Longitudinal Direction

$V_s = 12290.75\,lbf$ Roof Diaphragm Seismic Shear

$V_{w.l} = 11709.48\,lbf$ Roof Diaphragm Wind Shear

$V := \max\left(V_{w.l}, V_s\right)$

$V = 12290.75\,lbf$ Roof Diaphragm Shear

$$V_d := \frac{V}{(2 \cdot 54ft)}$$

$V_d = 113.8 \cdot plf$ Diaphragm Unit Shear

Unblocked Diaphragm, Case 6, Assumed 8d Nails G.F. 200plf

Unknown if Diaphragm Exists

Transverse Direction

$V_s = 12290.75\,lbf$ Roof Diaphragm Seismic Shear

$V_{w.t} = 19694.81\,lbf$ Roof Diaphragm Wind Shear

$V := \max\left(V_{w.t}, V_s\right)$

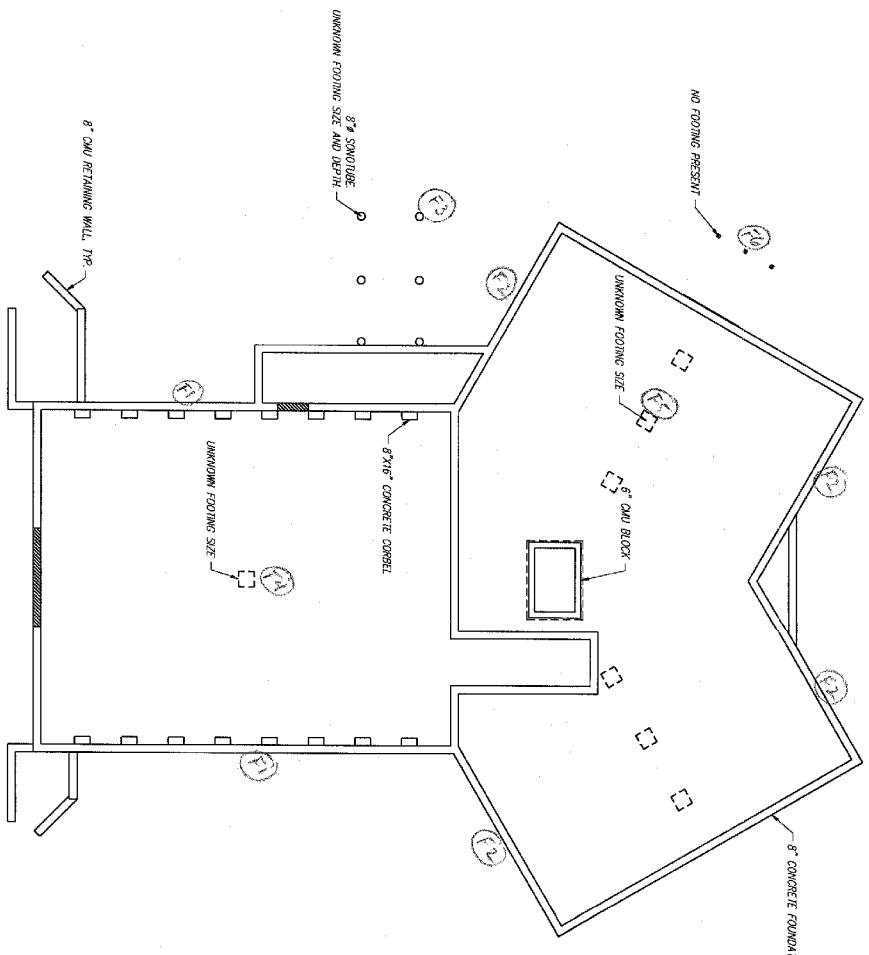
$V = 19694.81\,lbf$ Roof Diaphragm Shear

$$V_d := \frac{V}{(2 \cdot 30ft)}$$

$V_d = 328.25 \cdot plf$ Diaphragm Unit Shear

Unblocked Diaphragm, Case 4, Assumed 8d Nails G.F. 200plf

Unknown if Diaphragm Exists



ADMINISTRATION BUILDING FOUNDATION PLAN

Scale: 1/8" = 1'-0"

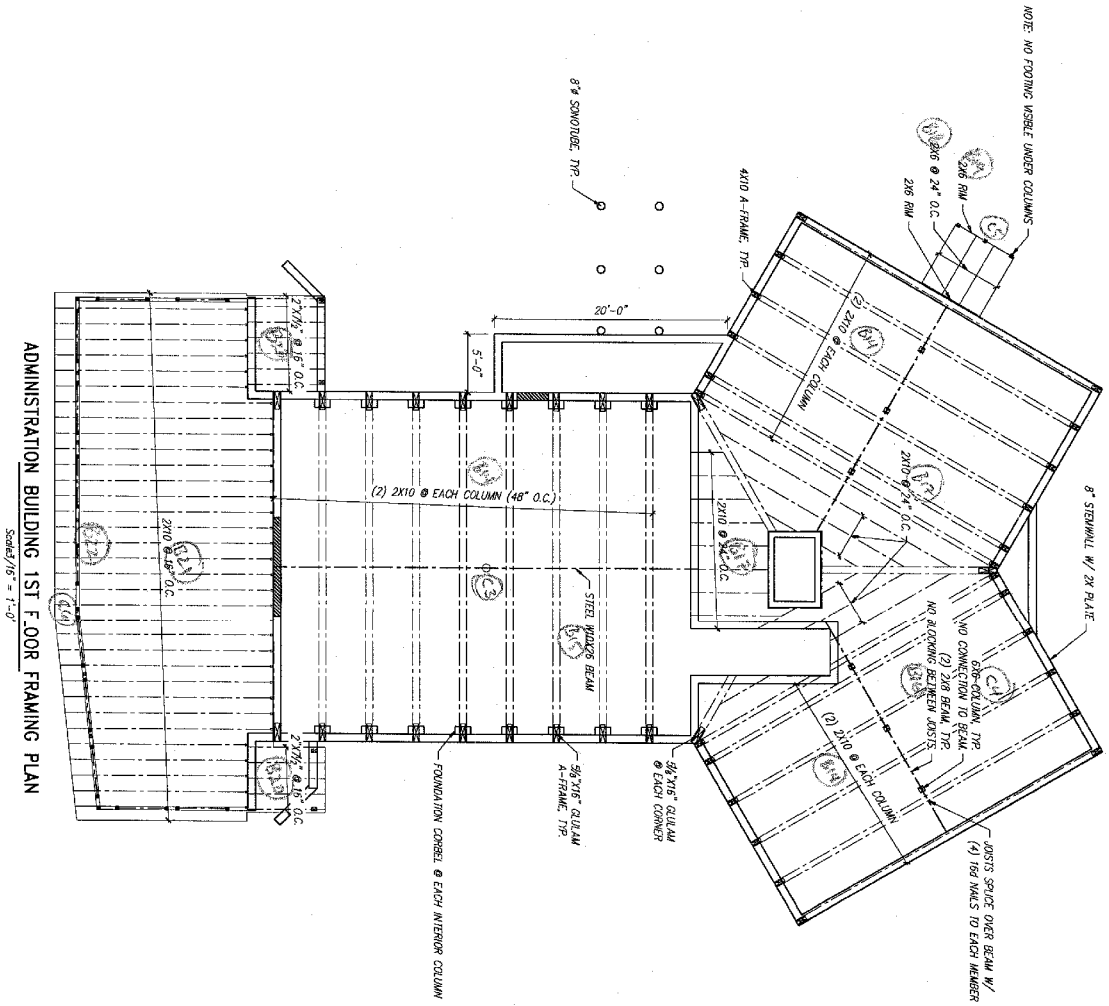
Designed by:	
Checked by:	
Proj. Engineer:	
Drafter:	MPH
Issue Date:	03/16/2009
Project No.:	009135.00
Client Ref.:	

SHEET NO. S2.1 OF 15 SHEETS

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH
ADMIN. BLDG. FOUNDATION PLAN

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

Rev.	Date	By	Description
.		.	.



ADMINISTRATION BUILDING 1ST FLOOR FRAMING PLAN

Scale: 1/16" = 1'-0"

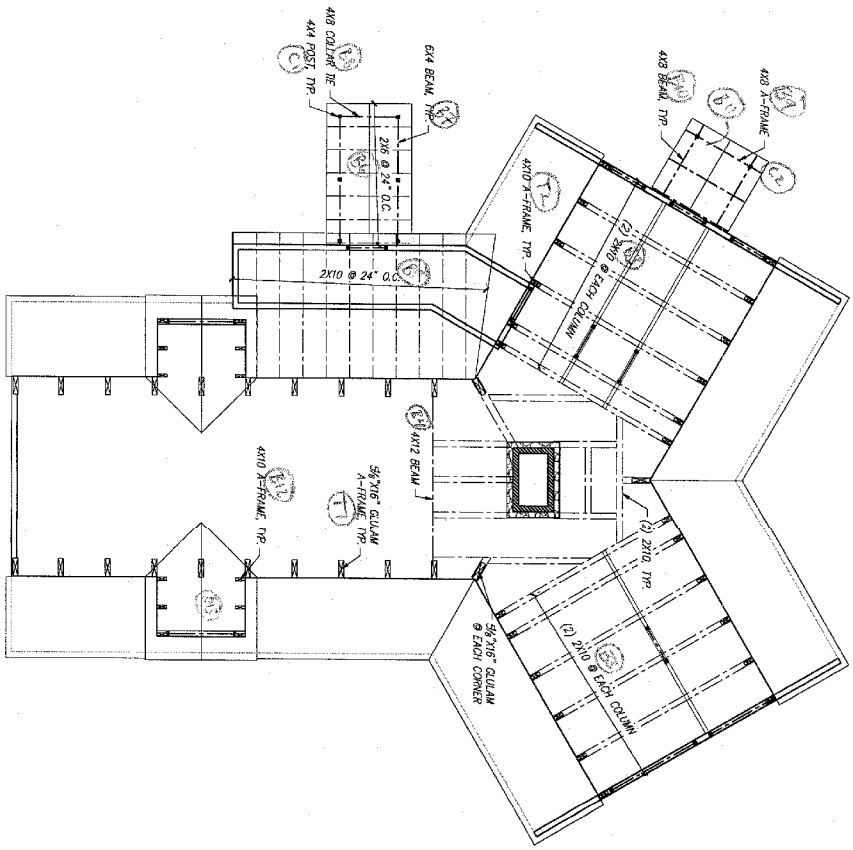
Designed by:	
Checked by:	
Proj. Drafter:	MRH
Drafter:	MRH
Issue Date:	09/16/2009
Project Nbr.:	D09135.00
Drwg. Nbr.:	

SHEET NO. S2.2 OF 15 SHEETS

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH
ADMIN. BLDG. 1ST FLOOR FRAMING

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

Rev.	Date	By	Description
.	.	.	.



ADMINISTRATION BUILDING 2ND FLOOR FRAMING PLAN

Scale: 1/8" = 1'-0"

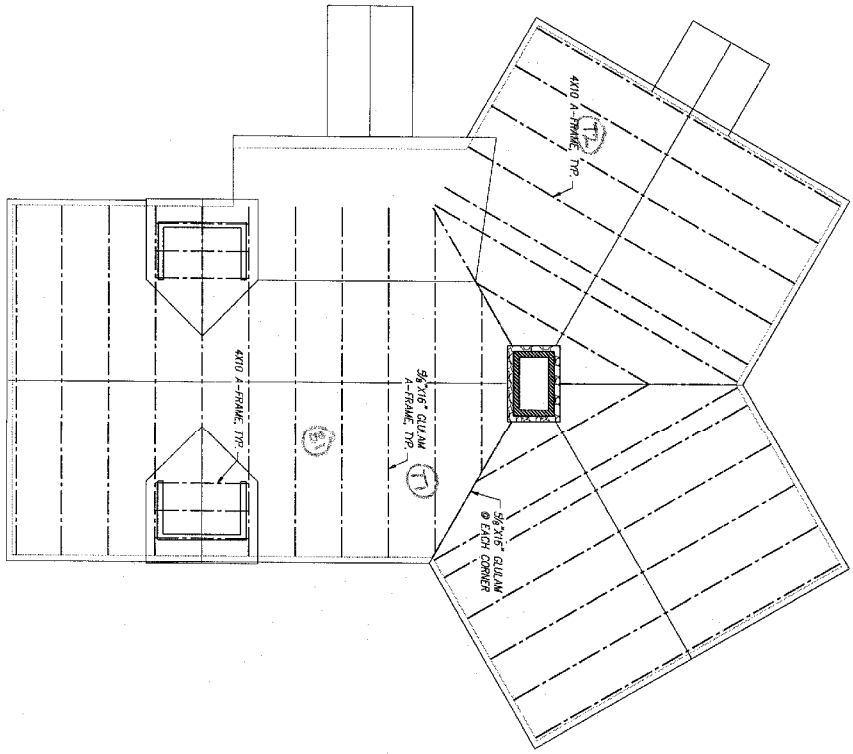
Designed by	
Checked by	
Dr. Detailer	MHH
Drafter	
Issue Date	09/15/2009
Project No.	009135.00
Chem. Rel.	

SHEET NO. S2.3 OF 15 SHEETS

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH
ADMIN. BLDG. 2ND FLOOR FRAMING

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

Rev.	Date	By	Description



ADMINISTRATION BUILDING ROOF FRAMING PLAN

Scale: 3/16" = 1'-0"

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH

ADMIN. BLDG. ROOF FRAMING PLAN

Designed by: MHH
Drawn by: MHH
Checked by:
Date: 09/16/2009
Project Mgr.: D09135.00
Chief, Rpt.:

SHEET NO. S2.4 OF 15 SHEETS

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

Rev.	Date	By	Description
-	-	-	-

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

(T1) Existing Main Wing Truss

Top Chord Loads (Full Length of Truss):

$w_{dl} := dl_r \cdot (4ft)$ $w_{dl} = 60 \cdot plf$

$w_{sl} := sl_{rs} \cdot (4ft)$ $w_{sl} = 140 \cdot plf$

Bottom Chord Loads (Full Length of Truss):

$w_{dl} := dl_f \cdot (4ft)$ $w_{dl} = 60 \cdot plf$

$w_{ll} := ll_f \cdot (4ft)$ $w_{ll} = 400 \cdot plf$

Lateral Loads (Full Height of Truss)

$w_{vl} := \frac{V}{13 \cdot 25ft}$ $w_{vl} = 60.6 \cdot plf$

$L := 30ft$

Reactions at 0ft, 30ft

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 1 \cdot in$

Existing: 5-1/8"x16" Glulam Top Chord w/ (2) 2x10 Collar Tie (@ 1st Floor)
Condition: Top Chord = 33% of Capacity, Collar Tie = 267% of Capacity

(T2) Existing Side Wings Truss

Top Chord Loads (Full Length of Truss):

$w_{dl} := dl_r \cdot (4ft)$ $w_{dl} = 60 \cdot plf$

$w_{sl} := sl_{rs} \cdot (4ft)$ $w_{sl} = 140 \cdot plf$

Bottom Chord Loads (Full Length of Truss):

$w_{dl} := dl_f \cdot (4ft)$ $w_{dl} = 60 \cdot plf$

$w_{ll} := ll_f \cdot (4ft)$ $w_{ll} = 400 \cdot plf$

Lateral Loads (Full Height of Truss)

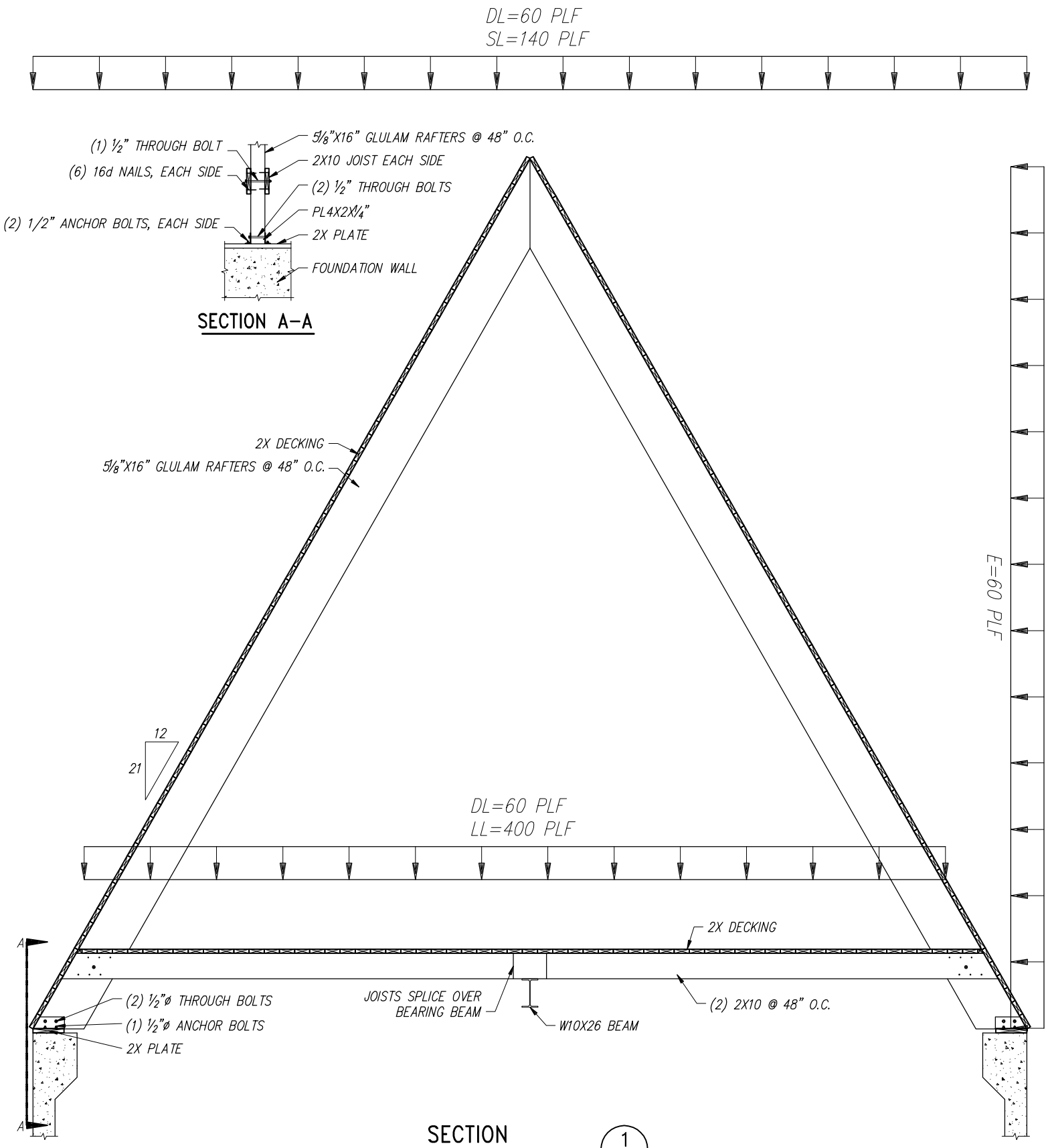
$w_{vl} := \frac{V}{13 \cdot 25ft}$ $w_{vl} = 60.6 \cdot plf$

$L := 30ft$

Reactions at 0ft, 30ft

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 1 \cdot in$

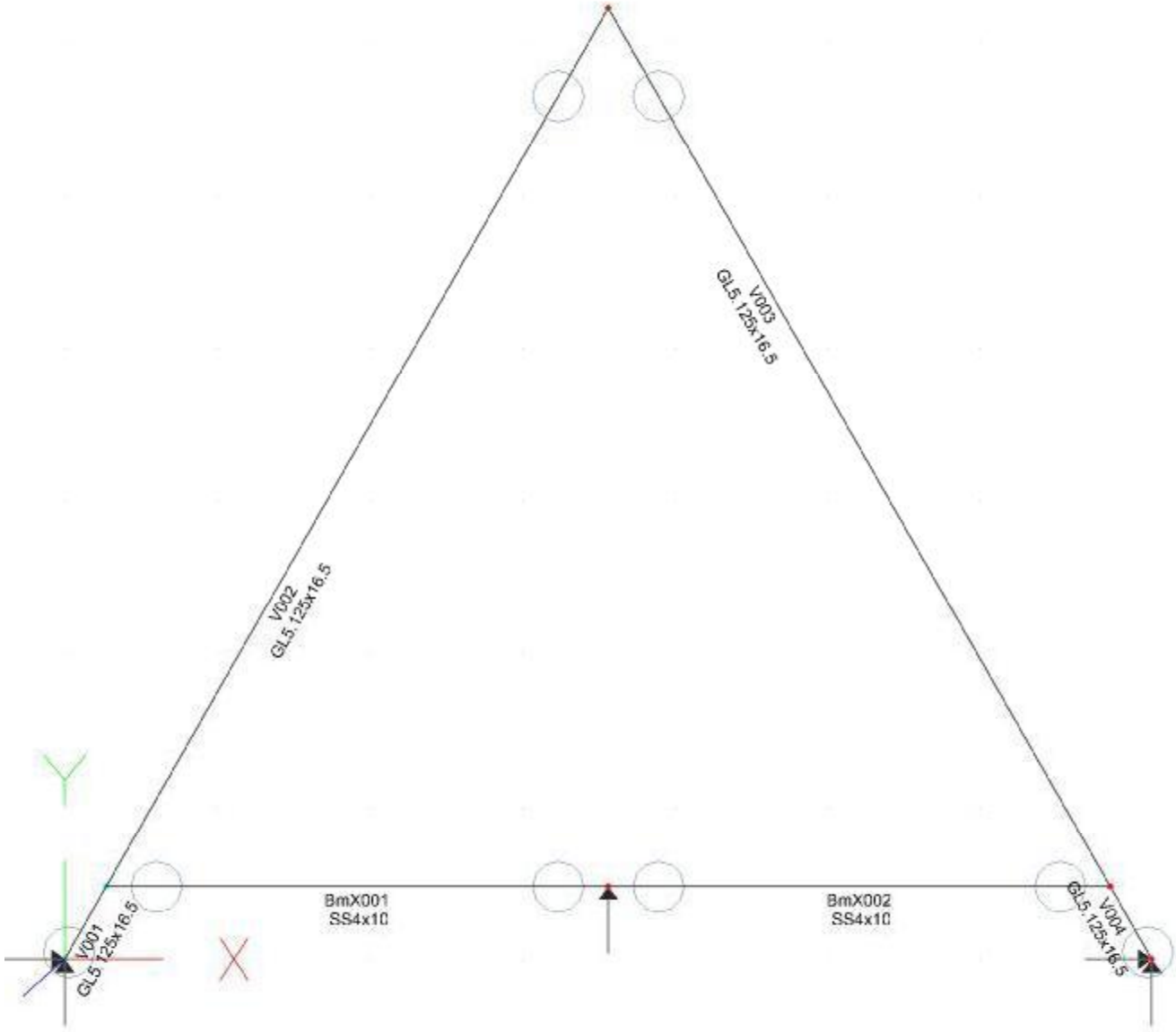
Existing: 4x10 Top Chord w/ (2) 2x10 Floor Joist (@ 1st & 2nd Floors)
Condition: Top Chord = 86% of Capacity, 2nd Floor Collar Tie = 477% of Capacity, 1st Floor Collar Tie = 258% of Cap.



SECTION

Scale: NTS = 1'-0"

1
S2.4


V003
GL5.125x16.5
V002
GL5.125x16.5
BmX001
SS4x10
BmX002
SS4x10
V001
GL5.125x16.5
V004
GL5.125x16.5
Y
X

Untitled Project

VisualAnalysis 6.00 Report
Company: Sargent Engineers, Inc. Engineer: Kari Moulton, PE
Project File: 2Story frame
Folder: S:\Projects\2009\D09135.00 Star Valley Ranch Association\Structural Calculations\

Table of Contents

Project Header
Table of Contents
Material Properties
Design Groups
Section Properties
Member Elements
Member Uniform Loads
Nodal Reactions
Load Case Summary
Load Combination Summary
Member Extreme Results
Member Unity Checks

Material Properties

Material	Strength psf	Elasticity psf	Poisson	Density lb/ft^3	Therm. Coeff. in/in/deg-F
4	-NA-	273600000.	0.3620	27.6480	2.0000e-006
Douglas	-NA-	230400000.	0.3620	31.1040	2.0000e-006

Design Groups

Group	Elements	LL Factor	Unity	Design Shape	Overstrength
Wood_Bea	2	1.0000	2.6695	-NA-	No
Wood_V B	1	1.0000	0.3223	GL5.125x16.5	No
Wood_V B	3	1.0000	0.3223	GL5.125x16.5	No

Section Properties

Section	Theta deg	Ax ft^2	Iz ft^4	Sz(+y) ft^3	Sz(-y) ft^3
GL5.125	0.000	0.587	0.093	0.135	0.135
SS4x10	0.000	0.225	0.011	0.029	0.029

Member Elements

Member	Section	Material	(1)Node	(2)Node	Length in	Weight lb	Rz1	Rz2	One Way
BmX001	SS4x10	Douglas F	N002	N006	157.786	91.950	Free	Free	Normal
BmX002	SS4x10	Douglas F	N006	N004	157.786	91.950	Free	Free	Normal
V001	GL5.125	4	N001	N002	26.202	35.452	Free	Fix	Normal
V002	GL5.125	4	N002	N003	318.028	430.294	Fix	Free	Normal
V003	GL5.125	4	N003	N004	318.028	430.294	Free	Fix	Normal
V004	GL5.125	4	N004	N005	26.202	35.452	Fix	Free	Normal

Member Uniform Loads

Load Case	Member	Direction	Offset End Offset in	Force lb/ft	Moment ft-lb/ft
D	BmX001	DY	0.0000 157.7860	-60.00	-NA-
D	BmX002	DY	0.0000 157.7860	-60.00	-NA-
D	V001	DY	0.0000 26.2023	-60.00	-NA-
D	V002	DY	0.0000 318.0278	-60.00	-NA-
D	V003	DY	0.0000 318.0278	-60.00	-NA-
D	V004	DY	0.0000 26.2023	-60.00	-NA-
L	BmX001	DY	0.0000 157.7860	-400.0	-NA-
L	BmX002	DY	0.0000 157.7860	-400.0	-NA-
S	V001	DY	0.0000 26.2023	-140.0	-NA-
S	V002	DY	0.0000 318.0278	-140.0	-NA-
S	V003	DY	0.0000 318.0278	-140.0	-NA-
S	V004	DY	0.0000 26.2023	-140.0	-NA-
W+X	V003	DX	0.0000 318.0278	-60.00	-NA-

Nodal Reactions

Node	Result Case Name	FX lb	FY lb	MZ lb-ft
N001	16-10Lr	2626.7560	2627.3369	-NA-
N001	16-10S	7068.6927	6643.3556	-NA-
N001	16-11Lr	3557.8742	4599.6618	-NA-
N001	16-11S	6889.3268	7611.6758	-NA-
N001	16-12W »+X	4268.1701	3375.9775	-NA-
N001	16-13W+Lr »+X	4788.9348	5161.1422	-NA-
N001	16-13W+S »+X	**8120.3873**	**8173.1562**	-NA-
N001	16-14 »+X	3217.4677	2325.0427	-NA-
N001	16-14 »+X+Y	1576.0536	1576.4021	-NA-
N001	16-9	3868.2470	5257.1034	-NA-
N001	D	2626.7560	2627.3369	**-NA-**
N001	L	1241.4910	2629.7665	-NA-
N005	16-10Lr	-2626.7560	2627.3369	-NA-
N005	16-10S	**-7068.6927**	6643.3556	-NA-
N005	16-11Lr	-3557.8742	4599.6618	-NA-
N005	16-11S	-6889.3268	7611.6758	-NA-
N005	16-12W »+X	-2678.0309	1878.6964	-NA-
N005	16-13W+Lr »+X	-3596.3304	4038.1814	-NA-
N005	16-13W+S »+X	-6927.7830	7050.1954	-NA-
N005	16-14 »+X	-1627.3285	827.7616	-NA-
N005	16-14 »+X+Y	-1576.0536	1576.4021	-NA-
N005	16-9	-3868.2470	5257.1034	-NA-
N005	D	-2626.7560	2627.3369	-NA-
N005	L	-1241.4910	2629.7665	-NA-
N006	16-10Lr	-NA-	880.8797	-NA-
N006	16-10S	-NA-	880.8797	-NA-
N006	16-11Lr	-NA-	4825.5295	-NA-
N006	16-11S	-NA-	4825.5295	-NA-
N006	16-12W »+X	-NA-	880.8797	-NA-
N006	16-13W+Lr »+X	-NA-	4825.5295	-NA-
N006	16-13W+S »+X	-NA-	4825.5295	-NA-
N006	16-14 »+X	-NA-	**528.5278**	-NA-
N006	16-14 »+X+Y	-NA-	528.5278	-NA-
N006	16-9	-NA-	6140.4128	-NA-
N006	D	-NA-	880.8797	-NA-
N006	L	-NA-	5259.5330	-NA-

Load Case Summary

4 Service Load Cases
10 Equation Combinations

Load Combination Summary

Equation Combination: 16-10Lr
   Combination: D + Lr*0 + H*0 + F*0
   Contributing Cases & Source
   D (D)
Equation Combination: 16-10S
   Combination: D + S + H*0 + F*0
   Contributing Cases & Source
   D (D)
   S (S)
Equation Combination: 16-11Lr
   Combination: D + 0.75L + 0.75Lpa*0 + 0.75Lr*0 + H*0 + F*0 + 0.75T*0
   Contributing Cases & Source
   D (D)
   L (L)
Equation Combination: 16-11S
   Combination: D + 0.75L + 0.75Lpa*0 + 0.75S + H*0 + F*0 + 0.75T*0
   Contributing Cases & Source
   D (D)
   L (L)
   S (S)
Equation Combination: 16-12W »+X
   Combination: D + H*0 + F*0 + 1.50Fa*0 + W+X
   Contributing Cases & Source
   D (D)
   W+X (W+X)
Equation Combination: 16-13W+Lr »+X
   Combination: D + 0.75L + 0.75Lpa*0 + 0.75Lr*0 + H*0 + F*0 + 1.50Fa*0 + 0.75W+X
   Contributing Cases & Source
   D (D)
   L (L)
   W+X (W+X)
Equation Combination: 16-13W+S »+X
   Combination: D + 0.75L + 0.75Lpa*0 + 0.75S + H*0 + F*0 + 1.50Fa*0 + 0.75W+X
   Contributing Cases & Source
   D (D)
   L (L)
   S (S)
   W+X (W+X)
Equation Combination: 16-14 »+X
   Combination: 0.60D + H*0 + 1.50Fa*0 + W+X
   Contributing Cases & Source
   D (D)
   W+X (W+X)
Equation Combination: 16-14 »+X+Y
   Combination: 0.60D + H*0 + 1.50Fa*0 + W+X+Y*0
   Contributing Cases & Source
   D (D)
Equation Combination: 16-9
   Combination: D + L + Lpa*0 + H*0 + F*0 + T*0
   Contributing Cases & Source
   D (D)
   L (L)

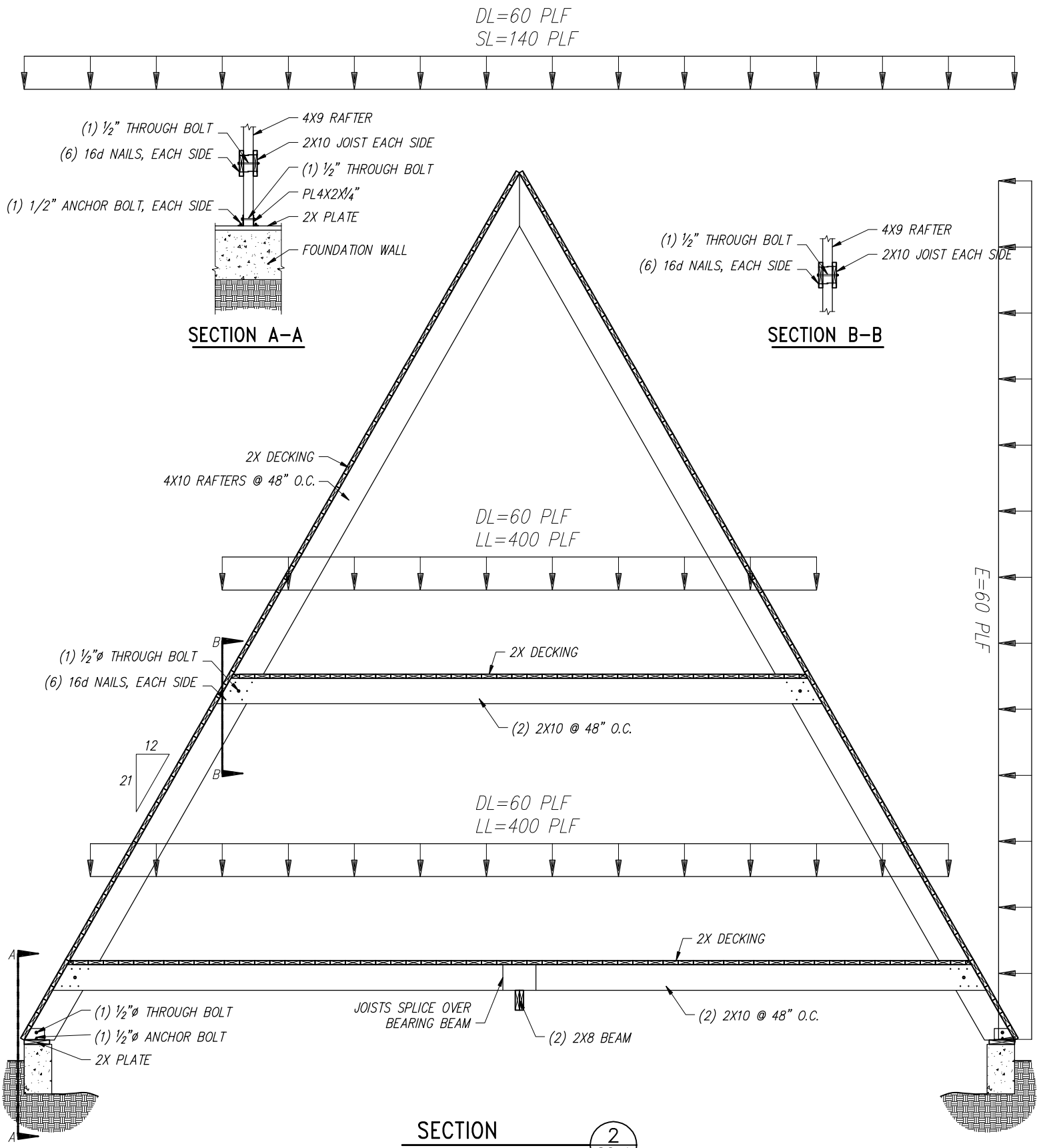
Member Extreme Results

Member	Fx (lc) lb	Vy (lc) lb	Mz (lc) lb-ft
BmX001	-6720.7675 (24)	-3070.2064 (27)	-0.00 (27)
BmX001	-1219.9680 (9)	3070.2064 (27)	**10092.4075 (27)**
BmX002	-6720.7675 (24)	-3070.2064 (27)	-0.00 (27)
BmX002	-1219.9680 (9)	3070.2064 (27)	10092.4075 (27)
V001	**-11125.1272 (24)**	**-3191.7887 (24)**	-6755.0044 (24)
V001	-2063.9234 (26)	226.8135 (9)	495.2537 (9)
V002	-5648.7655 (19)	-1177.8797 (19)	**-6755.0044 (24)**

Member	Fx (lc) lb	Vy (lc) lb	Mz (lc) lb-ft
V002	-10.6784 (9)	1665.3726 (19)	6464.8328 (19)
V003	-5648.7655 (19)	-1924.7310 (24)	-6459.8467 (19)
V003	**344.2915 (25)**	1493.7826 (24)	8649.0911 (24)
V004	-10026.8486 (21)	-226.8135 (9)	-6459.8467 (19)
V004	-1439.3608 (25)	**3075.5723 (19)**	495.2537 (9)

Member Unity Checks

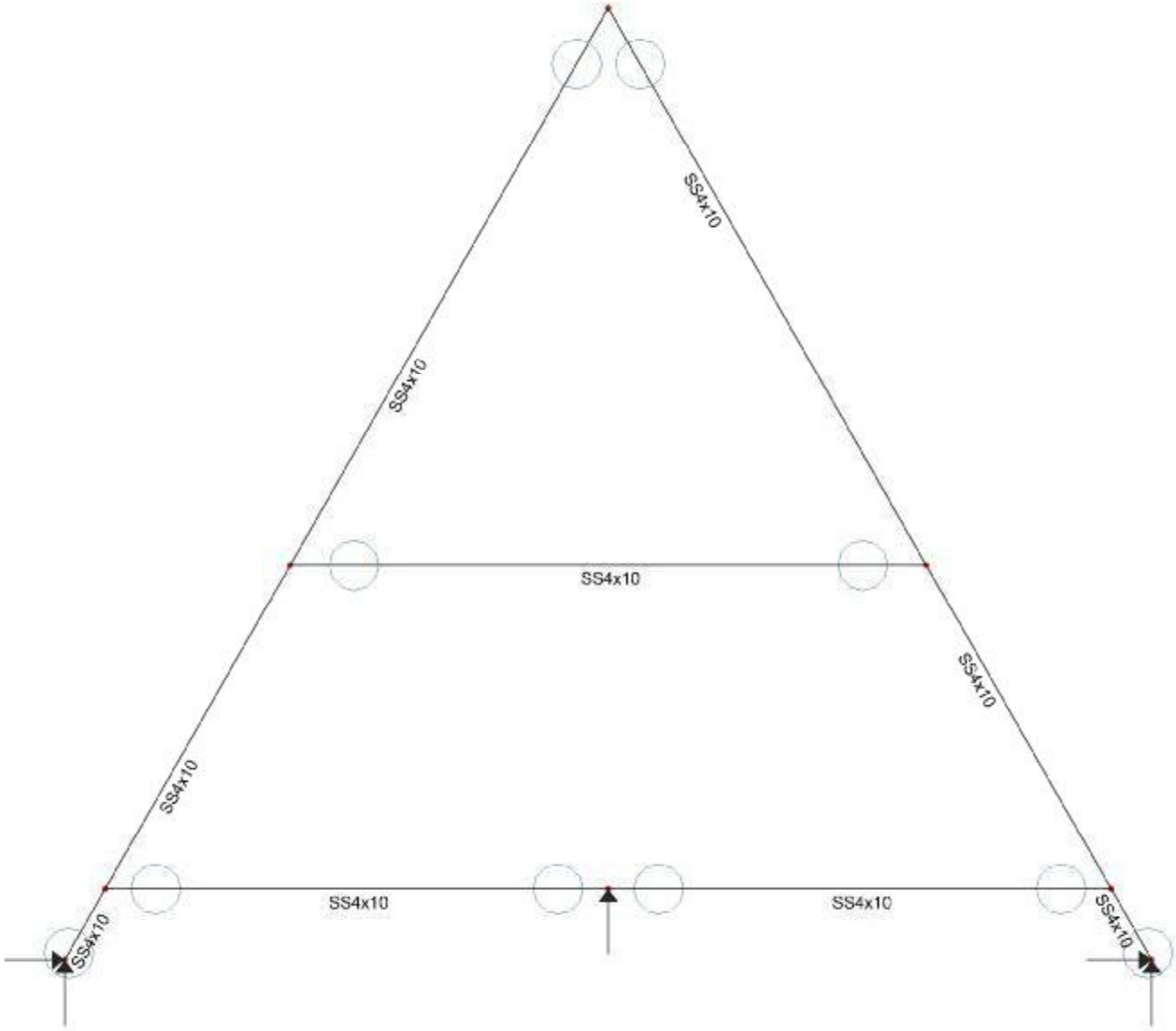
Unity	Member	Status	Group	Model Shape	Design Shape	Messages?
2.6695	BmX001	FAILED	Wood_Bea	SS4x10	-NA-	None
2.6695	BmX002	FAILED	Wood_Bea	SS4x10	-NA-	None
0.3223	V002	Designed	Wood_V B	GL5.125x16.5	GL5.125x16.5	None
0.3223	V003	Designed	Wood_V B	GL5.125x16.5	GL5.125x16.5	None
0.1790	V001	Designed	Wood_V B	GL5.125x16.5	GL5.125x16.5	None
0.1790	V004	Designed	Wood_V B	GL5.125x16.5	GL5.125x16.5	None



SECTION

Scale: NTS = 1'–0"

2
S2.4


SS4x10
SS4x10
SS4x10
SS4x10
SS4x10
SS4x10
SS4x10
SS4x10
SS4x10

Untitled Project

VisualAnalysis 6.00 Report
Company: Sargent Engineers, Inc. Engineer: Kari Moulton, PE
Project File: Wing Frames
Folder: S:\Projects\2009\D09135.00 Star Valley Ranch Association\Structural Calculations\

Table of Contents

Project Header
Table of Contents
Material Properties
Design Groups
Section Properties
Member Elements
Member Uniform Loads
Nodal Reactions
Load Case Summary
Load Combination Summary
Member Extreme Results
Member Unity Checks

Material Properties

Material	Strength psf	Elasticity psf	Poisson	Density lb/ft^3	Therm. Coeff. in/in/deg-F
Douglas	-NA-	230400000.	0.3620	31.1040	2.0000e-006

Design Groups

Group	Elements	LL Factor	Unity	Design Shape	Overstrength
Wood_Bea	3	1.0000	4.7609	SS4x10	No
Wood_V B	6	1.0000	0.8558	SS4x10	No

Section Properties

Section	Theta deg	Ax ft^2	Iz ft^4	Sz(+y) ft^3	Sz(-y) ft^3
SS4x10	0.000	0.225	0.011	0.029	0.029

Member Elements

Member	Section	Material	(1)Node	(2)Node	Length in	Weight lb	Rz1	Rz2	One Way
BmX001	SS4x10	Douglas F	N002	N008	161.673	94.215	Free	Free	Normal
BmX002	SS4x10	Douglas F	N008	N006	161.673	94.215	Free	Free	Normal
BmX003	SS4x10	Douglas F	N003	N005	204.346	119.083	Free	Free	Normal
V001	SS4x10	Douglas F	N001	N002	26.202	15.269	Free	Fix	Normal
V002	SS4x10	Douglas F	N002	N003	119.926	69.887	Fix	Fix	Normal
V003	SS4x10	Douglas F	N003	N004	205.937	120.01	Fix	Free	Normal
V004	SS4x10	Douglas F	N004	N005	205.937	120.01	Free	Fix	Normal
V005	SS4x10	Douglas F	N005	N006	119.926	69.887	Fix	Fix	Normal
V006	SS4x10	Douglas F	N006	N007	26.202	15.269	Fix	Free	Normal

Member Uniform Loads

Load Case	Member	Direction	Offset in	End Offset in	Force lb/ft	Moment ft-lb/ft
D	BmX001	DY	0.0000	161.6732	-60.00	-NA-
D	BmX002	DY	0.0000	161.6732	-60.00	-NA-
D	BmX003	DY	0.0000	204.3463	-60.00	-NA-
D	V001	DY	0.0000	26.2023	-60.00	-NA-
D	V002	DY	0.0000	119.9261	-60.00	-NA-
D	V003	DY	0.0000	205.9366	-60.00	-NA-
D	V004	DY	0.0000	205.9366	-60.00	-NA-
D	V005	DY	0.0000	119.9261	-60.00	-NA-
D	V006	DY	0.0000	26.2023	-60.00	-NA-
L	BmX001	DY	0.0000	161.6732	-400.0	-NA-
L	BmX002	DY	0.0000	161.6732	-400.0	-NA-
L	BmX003	DY	0.0000	204.3463	-400.0	-NA-
S	V001	DY	0.0000	26.2023	-140.0	-NA-
S	V002	DY	0.0000	119.9261	-140.0	-NA-
S	V003	DY	0.0000	205.9366	-140.0	-NA-
S	V004	DY	0.0000	205.9366	-140.0	-NA-
S	V005	DY	0.0000	119.9261	-140.0	-NA-
S	V006	DY	0.0000	26.2023	-140.0	-NA-
W+X	V004	DX	0.0000	205.9366	-60.00	-NA-
W+X	V005	DX	0.0000	119.9261	-60.00	-NA-

Nodal Reactions

Node	Result Case Name	FX lb	FY lb	MZ lb-ft
N001	16-10Lr	1630.1288	2987.1884	-NA-
N001	16-10S	3845.1909	7094.6133	-NA-
N001	16-11Lr	4183.4138	7562.4316	-NA-
N001	16-11S	5844.7104	10643.0002	-NA-
N001	16-12W »+X	2429.2565	3753.0647	-NA-
N001	16-13W+Lr »+X	4782.7596	8136.8388	-NA-
N001	16-13W+S »+X	**6444.0562**	**11217.4075**	-NA-
N001	16-14 »+X	1777.2050	2558.1894	-NA-
N001	16-14 »+X+Y	978.0773	1792.3130	-NA-
N001	16-9	5034.5089	9087.5126	-NA-
N001	D	1630.1288	2987.1884	**-NA-**
N001	L	3404.3801	6100.3242	-NA-
N007	16-10Lr	-1630.1288	2987.1884	-NA-
N007	16-10S	-3845.1909	7094.6133	-NA-
N007	16-11Lr	-4183.4138	7562.4316	-NA-
N007	16-11S	**-5844.7104**	10643.0002	-NA-
N007	16-12W »+X	-799.9432	2221.3121	-NA-
N007	16-13W+Lr »+X	-3560.7747	6988.0243	-NA-
N007	16-13W+S »+X	-5222.0713	10068.5930	-NA-
N007	16-14 »+X	-147.8917	1026.4367	-NA-
N007	16-14 »+X+Y	-978.0773	1792.3130	-NA-
N007	16-9	-5034.5089	9087.5126	-NA-
N007	D	-1630.1288	2987.1884	-NA-
N007	L	-3404.3801	6100.3242	-NA-
N008	16-10Lr	-NA-	902.5808	-NA-
N008	16-10S	-NA-	902.5808	-NA-
N008	16-11Lr	-NA-	4944.4096	-NA-
N008	16-11S	-NA-	4944.4096	-NA-
N008	16-12W »+X	-NA-	902.5808	-NA-
N008	16-13W+Lr »+X	-NA-	4944.4096	-NA-
N008	16-13W+S »+X	-NA-	4944.4096	-NA-
N008	16-14 »+X	-NA-	**541.5485**	-NA-
N008	16-14 »+X+Y	-NA-	541.5485	-NA-
N008	16-9	-NA-	6291.6858	-NA-
N008	D	-NA-	902.5808	-NA-
N008	L	-NA-	5389.1050	-NA-

Load Case Summary

4 Service Load Cases
10 Equation Combinations

Load Combination Summary

Equation Combination: 16-10Lr
   Combination: D + Lr*0 + H*0 + F*0
   Contributing Cases & Source
   D (D)
Equation Combination: 16-10S
   Combination: D + S + H*0 + F*0
   Contributing Cases & Source
   D (D)
   S (S)
Equation Combination: 16-11Lr
   Combination: D + 0.75L + 0.75Lpa*0 + 0.75Lr*0 + H*0 + F*0 + 0.75T*0
   Contributing Cases & Source
   D (D)
   L (L)
Equation Combination: 16-11S
   Combination: D + 0.75L + 0.75Lpa*0 + 0.75S + H*0 + F*0 + 0.75T*0
   Contributing Cases & Source
   D (D)
   L (L)
   S (S)
Equation Combination: 16-12W »+X
   Combination: D + H*0 + F*0 + 1.50Fa*0 + W+X
   Contributing Cases & Source
   D (D)
   W+X (W+X)
Equation Combination: 16-13W+Lr »+X
   Combination: D + 0.75L + 0.75Lpa*0 + 0.75Lr*0 + H*0 + F*0 + 1.50Fa*0 + 0.75W+X
   Contributing Cases & Source
   D (D)
   L (L)
   W+X (W+X)
Equation Combination: 16-13W+S »+X
   Combination: D + 0.75L + 0.75Lpa*0 + 0.75S + H*0 + F*0 + 1.50Fa*0 + 0.75W+X
   Contributing Cases & Source
   D (D)
   L (L)
   S (S)
   W+X (W+X)
Equation Combination: 16-14 »+X
   Combination: 0.60D + H*0 + 1.50Fa*0 + W+X
   Contributing Cases & Source
   D (D)
   W+X (W+X)
Equation Combination: 16-14 »+X+Y
   Combination: 0.60D + H*0 + 1.50Fa*0 + W+X+Y*0
   Contributing Cases & Source
   D (D)
Equation Combination: 16-9
   Combination: D + L + Lpa*0 + H*0 + F*0 + T*0
   Contributing Cases & Source
   D (D)
   L (L)

Member Extreme Results

Member	Fx (lc) lb	Vy (lc) lb	Mz (lc) lb-ft
BmX001	-1780.5208 (35)	-3145.8429 (35)	-0.00 (11)

Member	Fx (lc) lb	Vy (lc) lb	Mz (lc) lb-ft
BmX001	-204.8712 (34)	3145.8429 (35)	10595.7987 (35)
BmX002	-1780.5208 (35)	-3145.8429 (35)	-0.00 (11)
BmX002	-204.8712 (34)	3145.8429 (35)	10595.7987 (35)
BmX003	-3990.7276 (32)	**-3976.1789 (35)**	-0.00 (11)
BmX003	-613.4383 (34)	**3976.1789 (35)**	**16927.4468 (35)**
V001	**-12936.5843 (32)**	-319.7195 (30)	-645.4540 (33)
V001	-1965.2212 (34)	205.7771 (29)	245.8963 (29)
V002	-9663.4724 (32)	-894.3041 (32)	**-4944.2544 (32)**
V002	-1279.6964 (34)	211.9001 (27)	401.4914 (29)
V003	-3492.5787 (27)	-714.5793 (27)	-4944.2544 (32)
V003	0.3886 (11)	1047.8479 (27)	2485.6123 (27)
V004	-3492.5787 (27)	-1120.8544 (32)	-2859.6750 (27)
V004	**482.1798 (33)**	1014.0792 (32)	4132.6950 (32)
V005	-8884.9663 (29)	-449.5030 (32)	-2859.6750 (27)
V005	-476.9050 (33)	814.4402 (27)	2019.1316 (33)
V006	-12140.5004 (29)	-461.3935 (32)	-0.00 (27)
V006	-888.3669 (33)	42.8891 (27)	810.6268 (30)

Member Unity Checks

Unity	Member	Status	Group	Model Shape	Design Shape	Messages?
4.7609	BmX003	FAILED	Wood_Bea	SS4x10	SS4x10	None
2.5713	BmX001	FAILED	Wood_Bea	SS4x10	SS4x10	None
2.5713	BmX002	FAILED	Wood_Bea	SS4x10	SS4x10	None
0.8558	V003	Designed	Wood_V B	SS4x10	SS4x10	None
0.8035	V002	Designed	Wood_V B	SS4x10	SS4x10	None
0.6695	V004	Designed	Wood_V B	SS4x10	SS4x10	None
0.6140	V005	Designed	Wood_V B	SS4x10	SS4x10	None
0.2428	V001	Designed	Wood_V B	SS4x10	SS4x10	None
0.2428	V006	Designed	Wood_V B	SS4x10	SS4x10	None

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

(B1) Roof Decking

$w_{dl} := dl_r$ $w_{dl} = 15 \cdot psf$

$w_{sl} := sl_{rub}$ $w_{sl} = 100 \cdot psf$

$L := 4ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.13 \cdot in$

Existing: Flat 2x6 DF-L No. 2 @ 6" o.c.
Condition: 59% of Capacity - Okay

(B2) Floor Decking

$w_{dl} := dl_r$ $w_{dl} = 15 \cdot psf$

$w_{ll} := ll_f$ $w_{ll} = 100 \cdot psf$

$L := 5.33ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.18 \cdot in$

Existing: Flat 2x6 DF-L No. 2 @ 6" o.c.
Condition: 102% of Capacity, L/150

(B3) 2nd Floor Joists

$w_{dl} := dl_f \cdot 4ft$ $w_{dl} = 60 \cdot plf$

$w_{ll} := ll_f \cdot 4ft$ $w_{ll} = 400 \cdot plf$

$L := 17ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.57 \cdot in$

Existing: (2) 2x10 DF-L No. 2 @ 48" o.c.
Condition: 471% of Capacity
Current Conditions Require 10psf DL + 10psf LL

(B4) 2nd Floor Balcony Bearing Beam

$w_{dl} := dl_f \cdot \frac{(6.5ft)}{2}$ $w_{dl} = 48.75 \cdot plf$

$w_{ll} := ll_f \cdot \frac{(6.5ft)}{2}$ $w_{ll} = 325 \cdot plf$

$L := 17ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.57 \cdot in$

Existing: 4x12 DF-L No. 2
Condition: 222% of Capacity

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:33PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — License Owner : SARGENT ENGINEERS INC

Description : (B1) Roof Decking

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

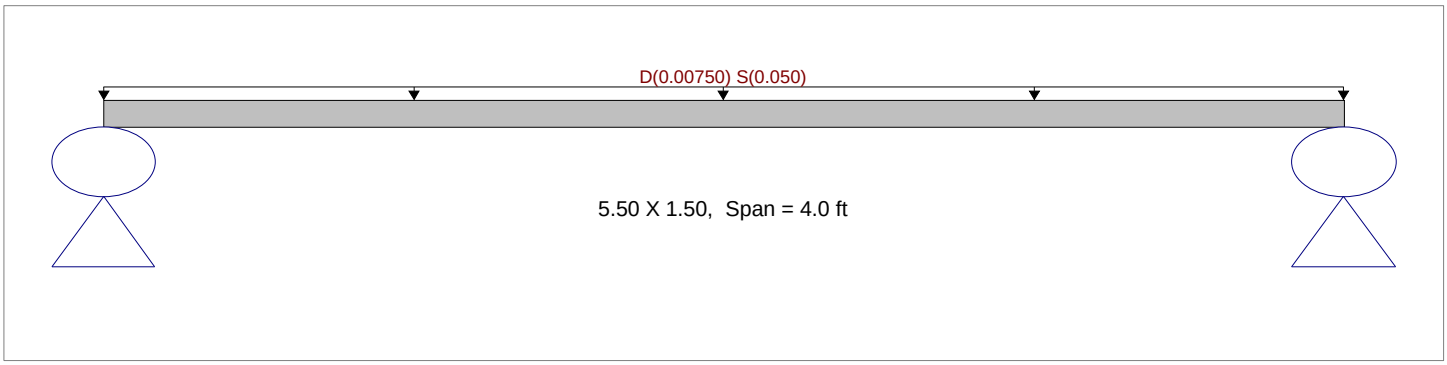
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Loads on all spans...
Uniform Load on ALL spans : D = 0.0150, S = 0.10 k/ft, Tributary Width = 0.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.590 : 1	Maximum Shear Stress Ratio	=	0.113 : 1
Section used for this span		5.50 X 1.50	Section used for this span		5.50 X 1.50
fb : Actual	=	690.56 psi	fv : Actual	=	20.29 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	2.000 ft	Location of maximum on span	=	3.880 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.117 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	409
Max Downward Total Deflection	=	0.139 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	344

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.1392	2.020		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	0.119 k
Support 2, (D+L+S)	0.119 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	0.119	0.119
D Only	0.019	0.019
S Only	0.100	0.100
D+L+S	0.119	0.119

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:33PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — License Owner : SARGENT ENGINEERS INC

Description : (B2) Floor Decking

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

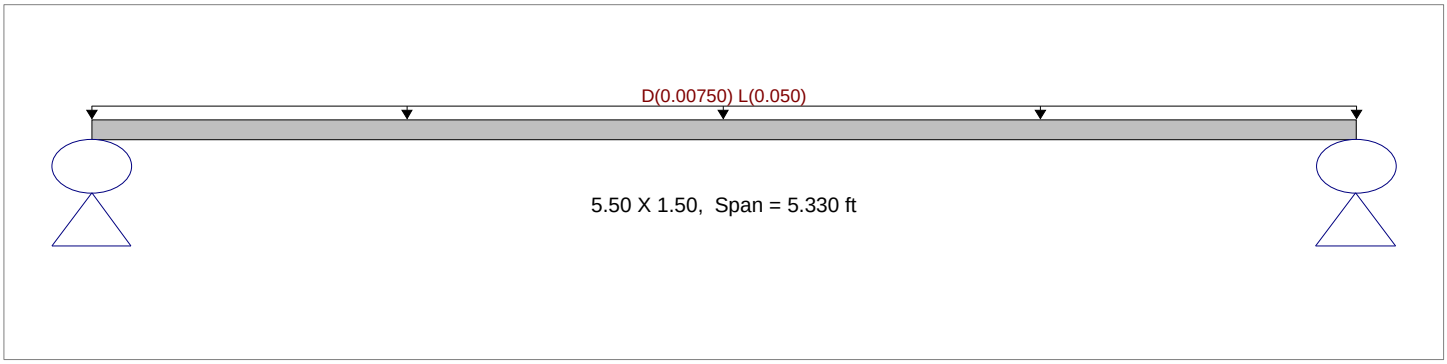
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.0150, L = 0.10 k/ft, Tributary Width = 0.50 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	1.015 : 1	Maximum Shear Stress Ratio	=	0.149 : 1
Section used for this span		5.50 X 1.50	Section used for this span		5.50 X 1.50
fb : Actual	=	1,188.01 psi	fv : Actual	=	26.75 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	2.665 ft	Location of maximum on span	=	5.223 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.370 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	172 <360
Max Downward Total Deflection	=	0.425 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	150 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.4252	2.692		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	0.153 k
Support 2, (D+L+Lr)	0.153 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	0.153	0.153
D Only	0.020	0.020
L Only	0.133	0.133
D+L+S	0.153	0.153
D+L+Lr	0.153	0.153

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:33PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — License Owner : SARGENT ENGINEERS INC

Description : (B3) 2nd Floor Joists

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

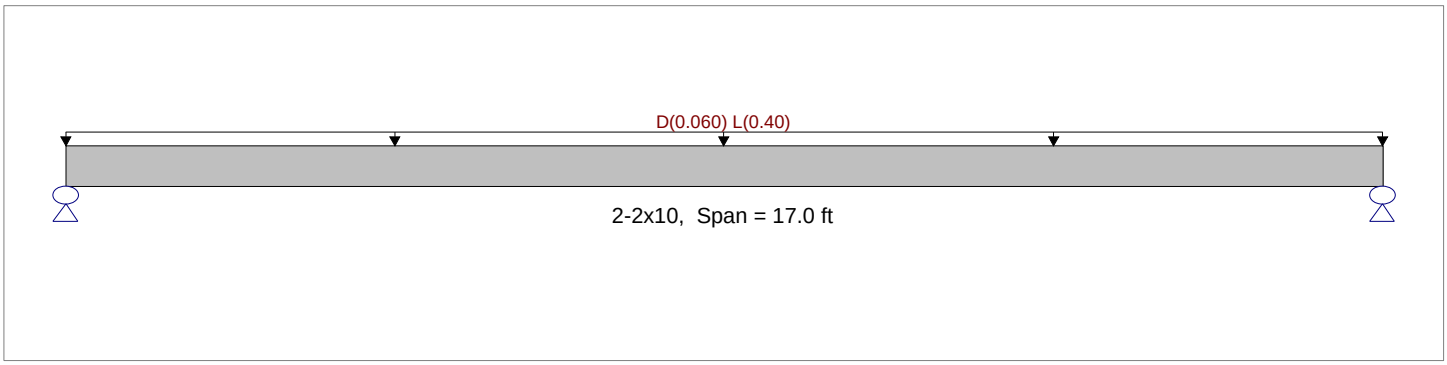
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.060, L = 0.40 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	4.708 : 1	Maximum Shear Stress Ratio	=	1.068 : 1
Section used for this span		2-2x10	Section used for this span		2-2x10
fb : Actual	=	4,661.15 psi	fv : Actual	=	192.33 psi
FB : Allowable	=	990.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	8.500 ft	Location of maximum on span	=	16.235 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	2.393 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	85 <360
Max Downward Total Deflection	=	2.752 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	74 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	2.7524	8.585		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	3.910 k
Support 2, (D+L+Lr)	3.910 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	3.910	3.910
D Only	0.510	0.510
L Only	3.400	3.400
D+L+S	3.910	3.910
D+L+Lr	3.910	3.910

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:33PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : Upper floor collar tie floor beams 50 psf live load

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

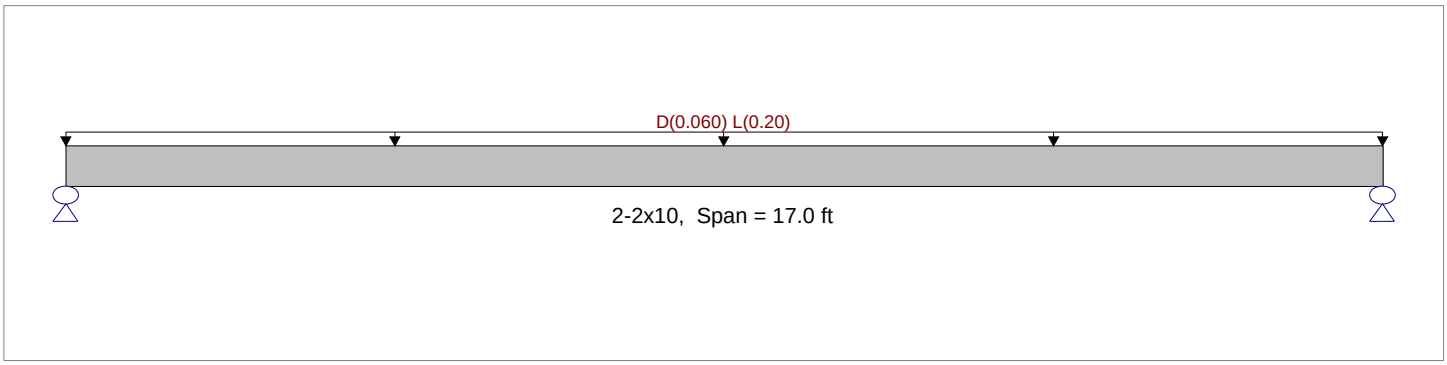
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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

Fb - Tension	750.0 psi
Fb - Compr	750.0 psi
Fc - Prll	700.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	475.0 psi

E : Modulus of Elasticity

Ebend- xx	1,300.0 ksi
Eminbend - xx	470.0 ksi
Density	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.0150, L = 0.050 k/ft, Tributary Width = 4.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	3.193 : 1	Maximum Shear Stress Ratio	=	0.639 : 1
Section used for this span		2-2x10	Section used for this span		2-2x10
fb : Actual	=	2,634.57 psi	fv : Actual	=	108.71 psi
FB : Allowable	=	825.00 psi	Fv : Allowable	=	170.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	8.500 ft	Location of maximum on span	=	16.235 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	1.473 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	138 <360
Max Downward Total Deflection	=	1.915 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	106 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	1.9147	8.585		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	2.210 k
Support 2, (D+L+Lr)	2.210 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	2.210	2.210
D Only	0.510	0.510
L Only	1.700	1.700
D+L+S	2.210	2.210
D+L+Lr	2.210	2.210

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:33PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — License Owner : SARGENT ENGINEERS INC

Description : Upper floor collar tie floor beams 10 psf dl & 10 psf ll

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

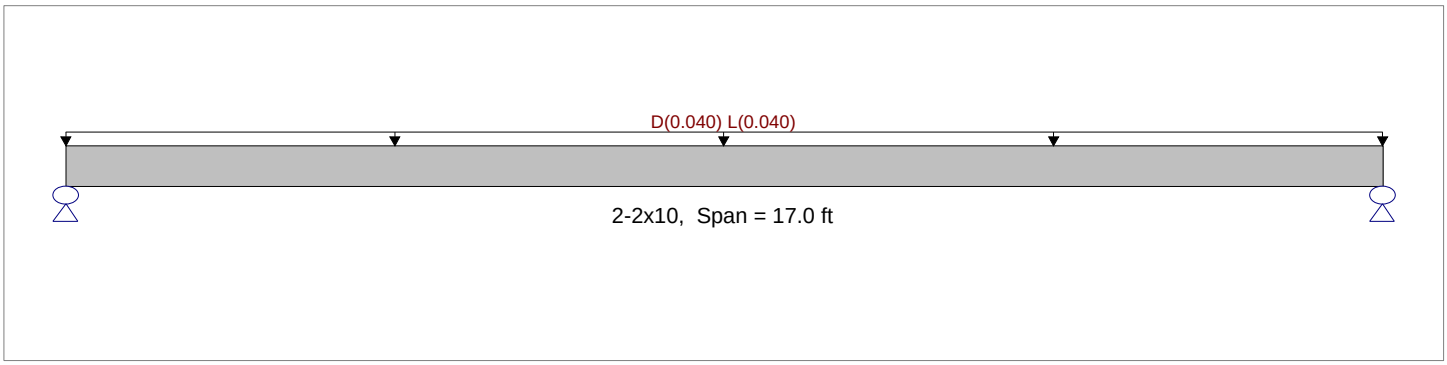
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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

Fb - Tension	750.0 psi
Fb - Compr	750.0 psi
Fc - Prll	700.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	475.0 psi

E : Modulus of Elasticity

Ebend- xx	1,300.0 ksi
Eminbend - xx	470.0 ksi
Density	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.010, L = 0.010 k/ft, Tributary Width = 4.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.983 : 1	Maximum Shear Stress Ratio	=	0.197 : 1
Section used for this span		2-2x10	Section used for this span		2-2x10
fb : Actual	=	810.64 psi	fv : Actual	=	33.45 psi
FB : Allowable	=	825.00 psi	Fv : Allowable	=	170.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	8.500 ft	Location of maximum on span	=	16.235 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.295 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	692
Max Downward Total Deflection	=	0.589 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	346

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.5892	8.585		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	0.680 k
Support 2, (D+L+Lr)	0.680 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	0.680	0.680
D Only	0.340	0.340
L Only	0.340	0.340
D+L+S	0.680	0.680
D+L+Lr	0.680	0.680

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:33PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B4) 2nd Floor Balcony Bearing Beam

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

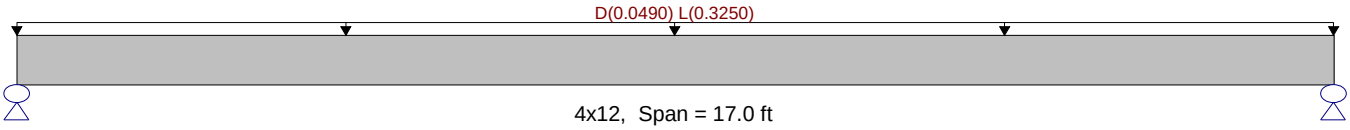
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.0490, L = 0.3250 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	2.218 : 1	Maximum Shear Stress Ratio	=	0.599 : 1
Section used for this span		4x12	Section used for this span		4x12
fb : Actual	=	2,196.03 psi	fv : Actual	=	107.78 psi
FB : Allowable	=	990.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	8.500 ft	Location of maximum on span	=	16.065 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.927 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	220 <360
Max Downward Total Deflection	=	1.066 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	191

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	1.0662	8.585		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	3.179 k
Support 2, (D+L+Lr)	3.179 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	3.179	3.179
D Only	0.417	0.417
L Only	2.763	2.763
D+L+S	3.179	3.179
D+L+Lr	3.179	3.179

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

(B5) Stairway Rafters

$w_{dl} := dl_r$ $w_{dl} = 15 \cdot psf$

$w_{sl} := sl_{rub}$ $w_{sl} = 100 \cdot psf$

$L := 5.5ft, 5.5ft$ $L_a := 1ft$

$\Delta_{max} := \frac{L}{360}$

Existing: 2x10 DF-L No. 2 @ 24" o.c.
Condition: 48% of Capacity - Okay

(B6) W Entrance Rafters

$w_{dl} := dl_r$ $w_{dl} = 15 \cdot psf$

$w_{sl} := sl_{rub}$ $w_{sl} = 100 \cdot psf$

$L := 2.5ft$ $L_a := 1ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.08 \cdot in$

Existing: 2x6 DF-L No. 2 @ 24" o.c.
Condition: 18% of Capacity - Okay

(B7) W Entrance Bearing Beam

$w_{dl} := dl_r \cdot \left[\frac{(5ft)}{2} + 1ft\right]$ $w_{dl} = 52.5 \cdot plf$

$w_{sl} := sl_{rub} \cdot \left[\frac{(5ft)}{2} + 1ft\right]$ $w_{sl} = 350 \cdot plf$

$L := 5.5ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.18 \cdot in$

Existing: 4x6 DF-L No. 2
Condition: 89% of Capacity - Okay

(B7a) W Entrance Bearing Beam Lateral Force from Rafters

$P_{dl} := \left[\frac{dl_r \cdot \left[\frac{(5ft)}{2} + 1ft\right]}{\tan(18.5deg)}\right]$ $P_{dl} = 156.91 \cdot plf$

$P_{sl} := \left[\frac{sl_{rub} \cdot \left[\frac{(5ft)}{2} + 1ft\right]}{\tan(18.5deg)}\right]$ $P_{sl} = 1046.04 \cdot plf$

$L := 11ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.37 \cdot in$

Existing: 4x6 DF-L No. 2
Condition: 1664% of Capacity

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B5) Stairway Rafters

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

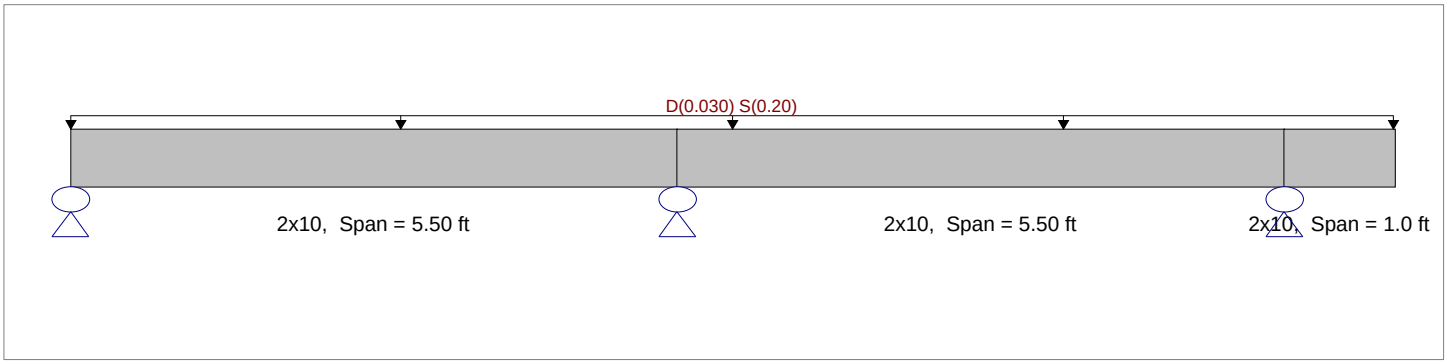
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.0150, S = 0.10 k/ft, Tributary Width = 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.477 : 1	Maximum Shear Stress Ratio	=	0.366 : 1
Section used for this span		2x10	Section used for this span		2x10
fb : Actual	=	471.76 psi	fv : Actual	=	65.87 psi
FB : Allowable	=	990.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	5.500 ft	Location of maximum on span	=	4.734 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.012 in
Max Upward L+Lr+S Deflection	=	-0.006 in
Live Load Deflection Ratio	=	4326
Max Downward Total Deflection	=	0.013 in
Max Upward Total Deflection	=	-0.006 in
Total Deflection Ratio	=	3762

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.0133	2.367		0.0000	0.000
D+L+S	2	0.0105	3.203		0.0000	0.000
	3	0.0000	3.203	D+L+S	-0.0064	1.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	0.480 k
Support 2, (D+L+S)	1.550 k
Support 3, (D+L+S)	0.731 k
Support 4, (D+L+Lr)	k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum	0.480	1.550	0.731	
D Only	0.063	0.202	0.095	
S Only	0.417	1.348	0.635	

SARGENT
Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:

Job # D09135.00

Project Notes :

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540
License Owner : SARGENT ENGINEERS INC

Description : (B5) Stairway Rafters

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4
D+L+S	0.480	1.550	0.731	

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — License Owner : SARGENT ENGINEERS INC

Description : (B6) W Entrance Rafters

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

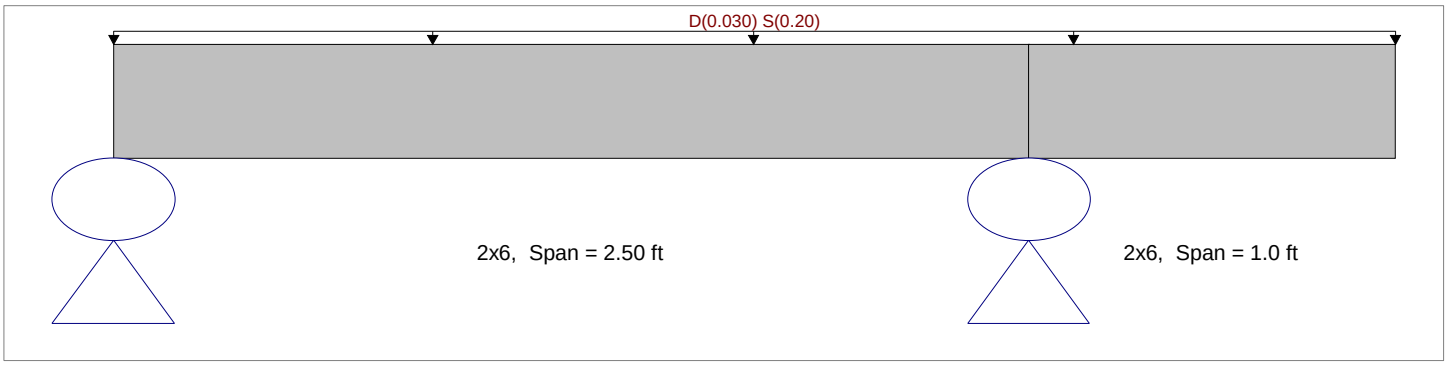
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.0150, S = 0.10 k/ft, Tributary Width = 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.172 : 1	Maximum Shear Stress Ratio	=	0.234 : 1
Section used for this span		2x6	Section used for this span		2x6
fb : Actual	=	201.17 psi	fv : Actual	=	42.14 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	1.058 ft	Location of maximum on span	=	2.058 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.003 in
Max Upward L+Lr+S Deflection	=	-0.001 in
Live Load Deflection Ratio	=	9023
Max Downward Total Deflection	=	0.004 in
Max Upward Total Deflection	=	-0.001 in
Total Deflection Ratio	=	7846

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.0038	1.154		0.0000	0.000
	2	0.0000	1.154	D+L+S	-0.0013	1.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	0.242 k
Support 2, (D+L+S)	0.564 k
Support 3, (D+L+Lr)	k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.242	0.564	
D Only	0.032	0.074	
S Only	0.210	0.490	
D+L+S	0.242	0.564	

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — License Owner : SARGENT ENGINEERS INC

Description : (B7) W Entrance Bearing Beam

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

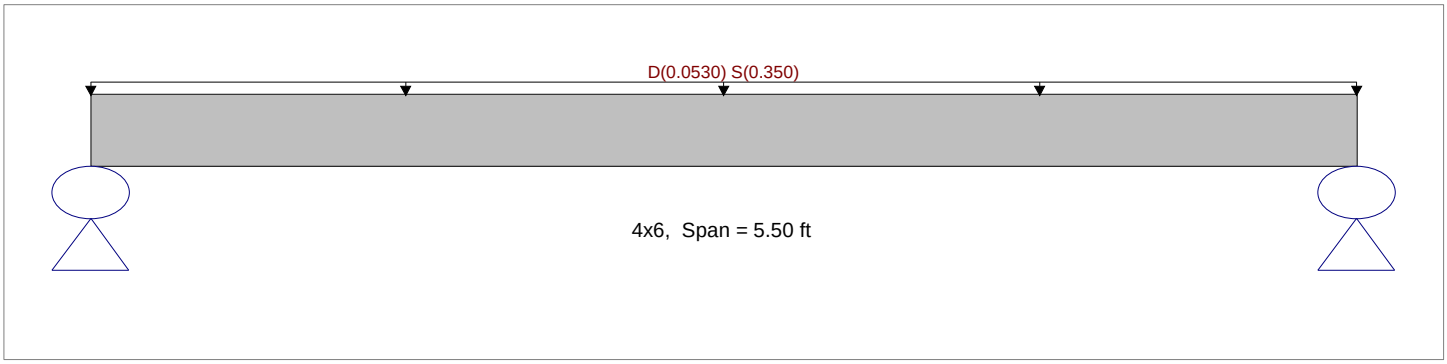
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.0530, S = 0.350 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.886 : 1	Maximum Shear Stress Ratio	=	0.403 : 1
Section used for this span		4x6	Section used for this span		4x6
fb : Actual	=	1,036.29 psi	fv : Actual	=	72.54 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	2.750 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 L+Lr+S Deflection	=	0.094 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	705
Max Downward Total Deflection	=	0.108 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	612

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.1077	2.778		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	1.108 k
Support 2, (D+L+S)	1.108 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	1.108	1.108
D Only	0.146	0.146
S Only	0.963	0.963
D+L+S	1.108	1.108

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B7a) W Entrance Bearing Beam Lateral Force From Rafters

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

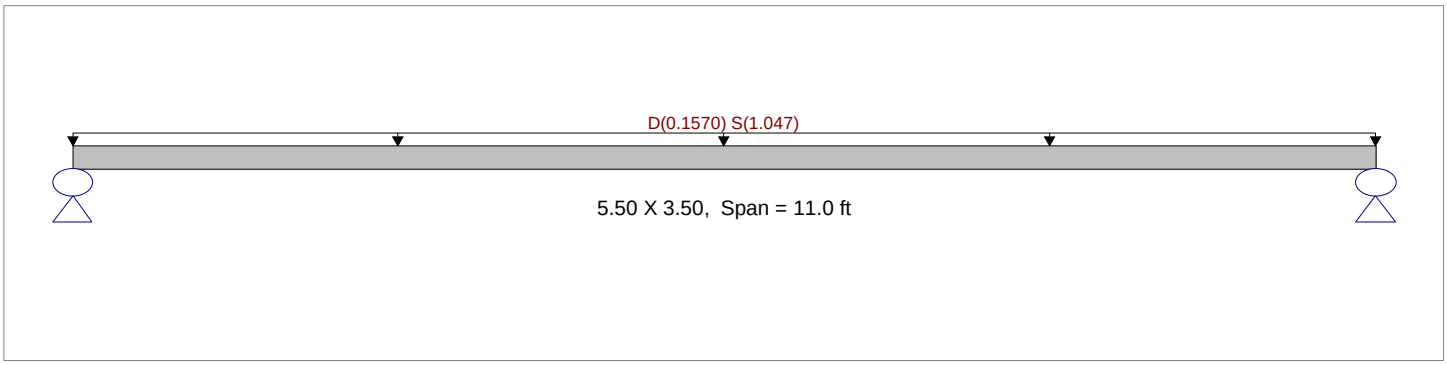
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.1570, S = 1.047 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	16.633 : 1	Maximum Shear Stress Ratio	=	2.723 : 1
Section used for this span		5.50 X 3.50	Section used for this span		5.50 X 3.50
fb : Actual	=	19,460.57 psi	fv : Actual	=	490.20 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	5.500 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 L+Lr+S Deflection	=	11.057 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	11 <360
Max Downward Total Deflection	=	12.716 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	10 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	12.7156	5.555		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	6.622 k
Support 2, (D+L+S)	6.622 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	6.622	6.622
D Only	0.864	0.864
S Only	5.759	5.759
D+L+S	6.622	6.622

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

(B8) W Entrance Collar Tie

$$P_{dl} := \left[\frac{dl_r \cdot \left[\frac{(5ft)}{2} + 1ft\right] \cdot 5.5ft}{\tan(18.5deg)}\right] \qquad P_{dl} = 862.98 \cdot lbf$$

$$P_{sl} := \left[\frac{sl_{rub} \cdot \left[\frac{(5ft)}{2} + 1ft\right] \cdot (5.5ft)}{\tan(18.5deg)}\right] \qquad P_{sl} = 5753.22 \cdot lbf$$

$$P_{tl} := P_{dl} + P_{sl} \qquad P_{tl} = 6616.2\,lbf$$

$$L := 5ft$$

$$f_t := 575psi$$

$$Cap := \frac{P_{tl}}{\left[(3.5in \cdot 7.25in) \cdot f_t\right]} \qquad Cap = 0.45$$

$$\Delta_{max} := \frac{L}{360} \qquad \Delta_{max} = 0.17 \cdot in$$

Existing: 4x8 DF-L No. 2 Collar Tie
Condition: 45% of Capacity - Connection No Good

(B9) NW Entrance Rafters

$$w_{dl} := dl_r \qquad w_{dl} = 15 \cdot psf$$

$$w_{sl} := sl_{rub} \qquad w_{sl} = 100 \cdot psf$$

$$L := 2.5ft \qquad L_a := 1ft$$

$$\Delta_{max} := \frac{L}{360} \qquad \Delta_{max} = 0.08 \cdot in$$

Existing: 4x8 DF-L No. 2 @ 36" o.c.
Condition: 7% of Capacity - Okay

(B10) NW Entrance Bearing Beam

$$w_{dl} := dl_r \cdot \left[\frac{(5ft)}{2} + 1ft\right] \qquad w_{dl} = 52.5 \cdot plf$$

$$w_{sl} := sl_{rub} \cdot \left[\frac{(5ft)}{2} + 1ft\right] \qquad w_{sl} = 350 \cdot plf$$

$$L := 6ft$$

$$\Delta_{max} := \frac{L}{360} \qquad \Delta_{max} = 0.2 \cdot in$$

Existing: 4x8 DF-L No. 2
Condition: 61% of Capacity - Okay

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B9) NW Entrance Rafters

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf

Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.0150, S = 0.10 k/ft, Tributary Width = 3.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.064 : 1	Maximum Shear Stress Ratio	=	0.097 : 1
Section used for this span		4x8	Section used for this span		4x8
fb : Actual	=	74.43 psi	fv : Actual	=	17.41 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	1.058 ft	Location of maximum on span	=	1.904 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.000 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	9999999
Max Downward Total Deflection	=	0.001 in
Max Upward Total Deflection	=	-0.000 in
Total Deflection Ratio	=	27957

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.0011	1.154		0.0000	0.000
	2	0.0000	1.154	D+L+S	-0.0004	1.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	0.362 k
Support 2, (D+L+S)	0.845 k
Support 3, (D+L+S)	k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.362	0.845	
D Only	0.047	0.110	
S Only	0.315	0.735	
D+L+S	0.362	0.845	

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — License Owner : SARGENT ENGINEERS INC

Description : (B10) NW Entrance Bearing Beam

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

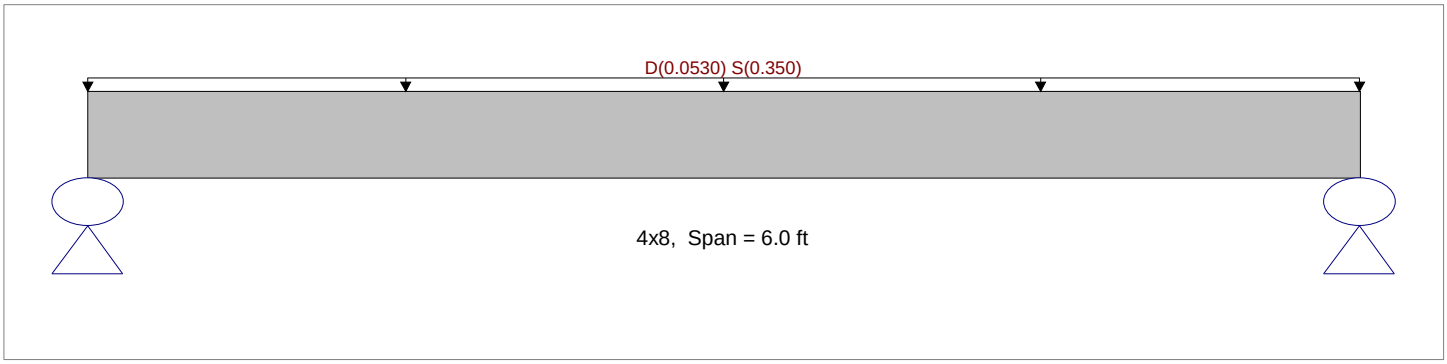
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.0530, S = 0.350 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.607 : 1	Maximum Shear Stress Ratio	=	0.318 : 1
Section used for this span		4x8	Section used for this span		4x8
fb : Actual	=	709.75 psi	fv : Actual	=	57.17 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	3.000 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 L+Lr+S Deflection	=	0.058 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	1244
Max Downward Total Deflection	=	0.067 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	1080

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.0666	3.030		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	1.209 k
Support 2, (D+L+S)	1.209 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	1.209	1.209
D Only	0.159	0.159
S Only	1.050	1.050
D+L+S	1.209	1.209

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

(B10a) NW Entrance Bearing Beam Lateral Force from Rafters

$$P_{dl} := \left\lceil \frac{dl_r \cdot \left\lceil \frac{(5ft)}{2} + 1ft \right\rceil}{\tan(45deg)} \right\rceil \qquad P_{dl} = 52.5 \cdot plf$$

$$P_{sl} := \left\lceil \frac{sl_{rub} \cdot \left\lceil \frac{(5ft)}{2} + 1ft \right\rceil}{\tan(45deg)} \right\rceil \qquad P_{sl} = 350 \cdot plf$$

$L := 6ft$

$$\Delta_{max} := \frac{L}{360} \qquad \Delta_{max} = 0.2 \cdot in$$

Existing: 4x8 DF-L No. 2
Condition: 126% of Capacity

(B11) NW Entrance Collar Tie

$$P_{dl} := \left\lceil \frac{dl_r \cdot \left\lceil \frac{(5ft)}{2} + 1ft \right\rceil \cdot 3ft}{\tan(45deg)} \right\rceil \qquad P_{dl} = 157.5 \cdot lbf$$

$$P_{sl} := \left\lceil \frac{sl_{rub} \cdot \left\lceil \frac{(5ft)}{2} + 1ft \right\rceil \cdot (3ft)}{\tan(45deg)} \right\rceil \qquad P_{sl} = 1050 \cdot lbf$$

$$P_{tl} := P_{dl} + P_{sl} \qquad P_{tl} = 1207.5\,lbf$$

$L := 5ft$

$f_t := 575psi$

$$Cap := \frac{P_{tl}}{\left\lceil (3.5in \cdot 7.25in) \cdot f_t \right\rceil} \qquad Cap = 0.08$$

$$\Delta_{max} := \frac{L}{360} \qquad \Delta_{max} = 0.17 \cdot in$$

Existing: 4x8 DF-L No. 2 Collar Tie
Condition: 17% of Capacity - Connection No Good

(B12) Dormer Rafters

$w_{dl} := dl_r \qquad w_{dl} = 15 \cdot psf$

$w_{sl} := sl_{rub} \qquad w_{sl} = 100 \cdot psf$

$L := 4ft \qquad L_a := 1ft$

$$\Delta_{max} := \frac{L}{360} \qquad \Delta_{max} = 0.13 \cdot in$$

Existing: 4x10 DF-L No. 2 @ 48" o.c.
Condition: 19% of Capacity - Okay

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — License Owner : SARGENT ENGINEERS INC

Description : (B10a) NW Entrance Bearing Beam Lateral Force from Rafters

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

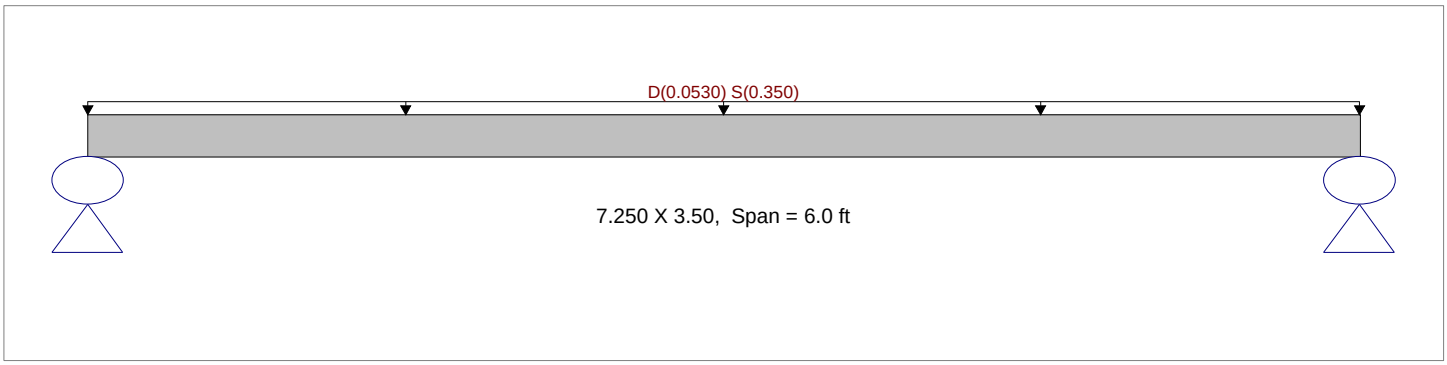
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.0530, S = 0.350 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	1.257 : 1	Maximum Shear Stress Ratio	=	0.361 : 1
Section used for this span		7.250 X 3.50	Section used for this span		7.250 X 3.50
fb : Actual	=	1,470.20 psi	fv : Actual	=	65.04 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	3.000 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 L+Lr+S Deflection	=	0.248 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	290 <360
Max Downward Total Deflection	=	0.286 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	251

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.2858	3.030		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	1.209 k
Support 2, (D+L+S)	1.209 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	1.209	1.209
D Only	0.159	0.159
S Only	1.050	1.050
D+L+S	1.209	1.209

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B12) Dormer Rafters

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

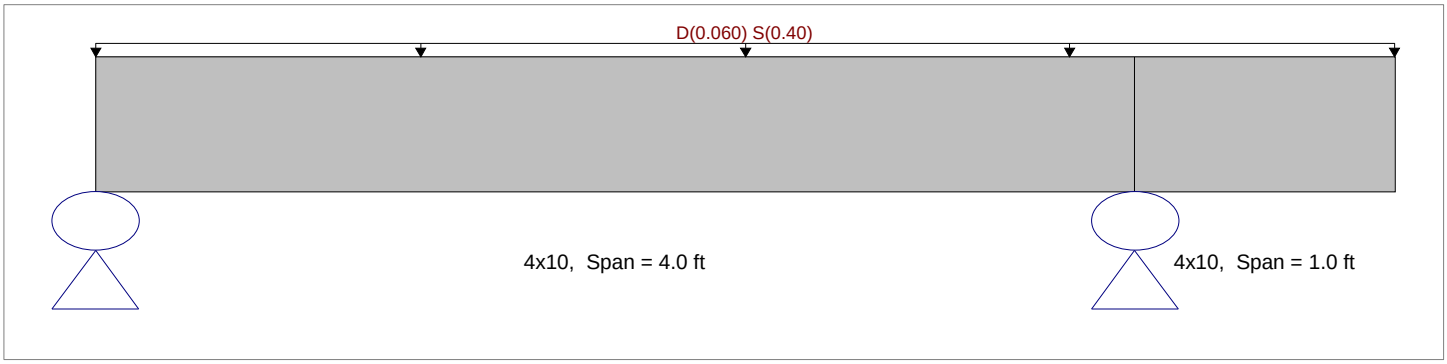
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Loads on all spans...
Uniform Load on ALL spans : D = 0.0150, S = 0.10 k/ft, Tributary Width = 4.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.183 : 1	Maximum Shear Stress Ratio	=	0.163 : 1
Section used for this span		4x10	Section used for this span		4x10
fb : Actual	=	197.47 psi	fv : Actual	=	29.35 psi
FB : Allowable	=	1,080.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	1.877 ft	Location of maximum on span	=	3.231 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.005 in
Max Upward L+Lr+S Deflection	=	-0.004 in
Live Load Deflection Ratio	=	6836
Max Downward Total Deflection	=	0.006 in
Max Upward Total Deflection	=	-0.004 in
Total Deflection Ratio	=	5852

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.0063	1.969		0.0000	0.000
	2	0.0000	1.969	D+L+S	-0.0041	1.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	0.876 k
Support 2, (D+L+S)	1.460 k
Support 3, (D+L+S)	k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.876	1.460	
D Only	0.126	0.210	
S Only	0.750	1.250	
D+L+S	0.876	1.460	

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

(B13) Dormer Ridge Beam

$w_{dl} := dl_r \cdot \frac{(8ft)}{2}$ $w_{dl} = 60 \cdot plf$

$w_{sl} := sl_{rub} \cdot \frac{(8ft)}{2}$ $w_{sl} = 400 \cdot plf$

$L := 10ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.33 \cdot in$

Existing: 4x10 DF-L No. 2
Condition: 128% of Capacity

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B13) Dormer Ridge Beam

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

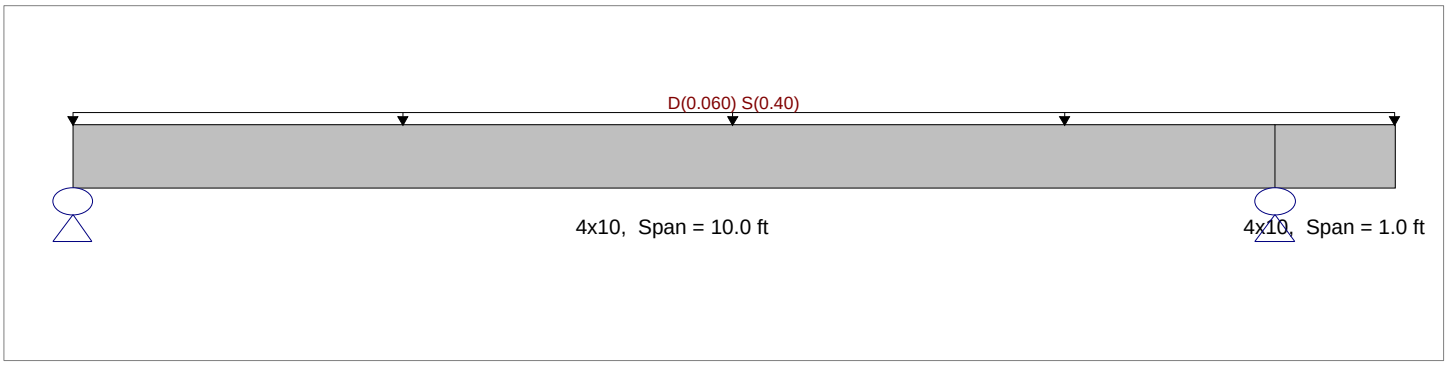
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Loads on all spans...
Uniform Load on ALL spans : D = 0.060, S = 0.40 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	1.274 : 1	Maximum Shear Stress Ratio	=	0.607 : 1
Section used for this span		4x10	Section used for this span		4x10
fb : Actual	=	1,376.23 psi	fv : Actual	=	109.32 psi
FB : Allowable	=	1,080.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	4.923 ft	Location of maximum on span	=	10.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.241 in
Max Upward L+Lr+S Deflection	=	-0.075 in
Live Load Deflection Ratio	=	320 <360
Max Downward Total Deflection	=	0.281 in
Max Upward Total Deflection	=	-0.087 in
Total Deflection Ratio	=	274

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.2813	5.000		0.0000	0.000
	2	0.0000	5.000	D+L+S	-0.0872	1.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	2.313 k
Support 2, (D+L+S)	2.827 k
Support 3, (D+L+S)	k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	2.313	2.827	
D Only	0.333	0.407	
S Only	1.980	2.420	
D+L+S	2.313	2.827	

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

(C1) Columns for B7 (W Entrance Bearing Beam)

$P_{dl} := 2 \cdot 150 lbf$ $P_{dl} = 300 \cdot lbf$

$P_{sl} := 2 \cdot 960 lbf$ $P_{sl} = 1920 \cdot lbf$

$h := 8ft$

$h_{xunb} := 8ft$

$h_{yunb} := 8ft$

$L_{brg} := \frac{(P_{dl} + P_{sl})}{625psi \cdot 8.75in}$ $L_{brg} = 0.41 \cdot in$

Existing: 4x4 DF-L No. 2
Condition: 32% of Capacity - Okay

(C2) Columns for B10 (NW Entrance Bearing Beam)

$P_{dl} := 160 lbf$ $P_{dl} = 160 \cdot lbf$

$P_{sl} := 1050 lbf$ $P_{sl} = 1050 \cdot lbf$

$h := 8ft$

$h_{xunb} := 8ft$

$h_{yunb} := 8ft$

$L_{brg} := \frac{(P_{dl} + P_{sl})}{625psi \cdot 8.75in}$ $L_{brg} = 0.22 \cdot in$

Existing: 4x4 DF-L No. 2
Condition: 18% of Capacity - Okay

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:34PM

Wood Column

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (C1) Columns for B7 (W Entrance Bearing Beam)

General Information

Code Ref : 2006 IBC, ANSI / AF&PA NDS-2005

Analysis Method :	Allowable Stress Design
End Fixities	Top & Bottom Pinned
Overall Column Height	8.0 ft
(Used for non-slender calculations)	
Wood Species	Douglas Fir - Larch
Wood Grade	No.2

Fb - Tension	900.0 psi	Fv	180.0 psi
Fb - Compr	900.0 psi	Ft	575.0 psi
Fc - Prll	1,350.0 psi	Density	32.210 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Load Combination 2006 IBC & ASCE 7-05

Wood Section Name	**4x4**
Wood Grading/Manuf.	Graded Lumber
Wood Member Type	Sawn

Exact Width	**3.50**	in
Exact Depth	**3.50**	in
Area	12.250	in^2
Ix	12.505	in^4
Iy	12.505	in^4

Allowable Stress Modification Factors

Cf or Cv for Bending	1.50
Cf or Cv for Compression	1.150
Cf or Cv for Tension	1.50
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No *(non-glb only)*

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 8ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 8 ft, K = 1.0

Applied Loads

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

Column self weight included : 21.921 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 8.0 ft, D = 0.30, S = 1.920 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.320** : 1

Load Combination	+D+S+H
Governing NDS Formla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	2.242 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	571.91 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1

Load Combination	+D+0.750L+0.750S+0.5250E+H
Location of max.above base	8.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	180.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination :	n/a			
Along X-X	0.0 in	at	0.0 ft	above base
for load combination :	n/a			

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension
Cf or Cv : Size based factors	1.500	1.150	

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:34PM

Wood Column

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (C2) Columns for B10 (NW Entrance Bearing Beam)

General Information

Code Ref : 2006 IBC, ANSI / AF&PA NDS-2005

Analysis Method :	Allowable Stress Design	Wood Section Name	4x4
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Graded Lumber
Overall Column Height	8.0 ft	Wood Member Type	Sawn
(Used for non-slender calculations)			
Wood Species	Douglas Fir - Larch	Exact Width	3.50 in
Wood Grade	No.2	Exact Depth	3.50 in
Fb - Tension	900.0 psi	Fv	180.0 psi	Area	12.25 in^2
Fb - Compr	900.0 psi	Ft	575.0 psi	Ix	12.505 in^4
Fc - Prll	1,350.0 psi	Density	32.210 pcf	Iy	12.505 in^4
Fc - Perp	625.0 psi				

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial	
Basic	1,600.0	1,600.0	1,600.0	ksi
Minimum	580.0	580.0		

Load Combination 2006 IBC & ASCE 7-05

Allowable Stress Modification Factors

Cf or Cv for Bending	1.50
Cf or Cv for Compression	1.150
Cf or Cv for Tension	1.50
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 NDS 15.3.2
Use Cr : Repetitive ?	No (non-glb only)

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 8ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 8 ft, K = 1.0

Applied Loads

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

Column self weight included : 21.921 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 8.0 ft, D = 0.160, S = 1.050 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.1758** : 1

Load Combination	+D+S+H
Governing NDS Formla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	1.232 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	571.91 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1

Load Combination	+D+0.750L+0.750S+0.5250E+H
Location of max.above base	8.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	180.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination :	n/a			
Along X-X	0.0 in	at	0.0 ft	above base
for load combination :	n/a			

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension
Cf or Cv : Size based factors	1.500	1.150	

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

(B14) 1st Floor Joists

$w_{dl} := dl_f \cdot 4ft$ $w_{dl} = 60 \cdot plf$

$w_{ll} := ll_f \cdot 4ft$ $w_{ll} = 400 \cdot plf$

$L := 13.5ft$

$\Delta_{max} := \frac{L}{360}$

Existing: (2) 2x10 DF-L No. 2 @ 48" o.c.
Condition: 301% of Capacity
Current Conditions Require 10psf DL + 23psf LL

(B15) Steel Floor Bearing Beam

$w_{dl} := dl_f \cdot \frac{(27ft)}{2}$ $w_{dl} = 202.5 \cdot plf$

$w_{ll} := ll_f \cdot \frac{(27ft)}{2}$ $w_{ll} = 1350 \cdot plf$

$L := 18.25ft, 18.25ft$

$\Delta_{max} := \frac{L}{360}$

Existing: Steel W10x26
Condition: 85% of Capacity - Okay

(B16) Wood Floor Bearing Beam

$w_{dl} := dl_f \cdot \frac{(27ft)}{2}$ $w_{dl} = 202.5 \cdot plf$

$w_{ll} := ll_f \cdot \frac{(27ft)}{2}$ $w_{ll} = 1350 \cdot plf$

$L := 6ft$

$\Delta_{max} := \frac{L}{360}$

Existing: (2) 2x8 DF-L No. 2
Condition: 297% of Capacity

(B17) 1st Floor In-Fill Joists

$w_{dl} := dl_f \cdot 2ft$ $w_{dl} = 30 \cdot plf$

$w_{ll} := ll_f \cdot 2ft$ $w_{ll} = 200 \cdot plf$

$L := 11.33ft$

$\Delta_{max} := \frac{L}{360}$

Existing: 2x10 DF-L No. 2 @ 24" o.c.
Condition: 212% of Capacity

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : Crawl space beams

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

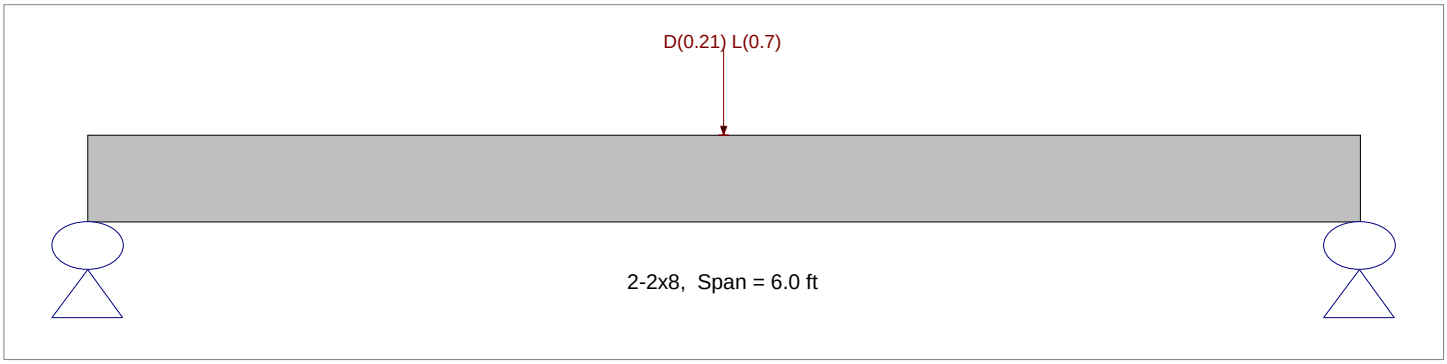
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Load for Span Number 1
Point Load : D = 0.210, L = 0.70 k @ 3.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.577 : 1	Maximum Shear Stress Ratio	=	0.174 : 1
Section used for this span		2-2x8	Section used for this span		2-2x8
fb : Actual	=	623.26 psi	fv : Actual	=	31.38 psi
FB : Allowable	=	1,080.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	3.000 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 L+Lr+S Deflection	=	0.036 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	2001
Max Downward Total Deflection	=	0.047 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	1539

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.0468	3.000		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	0.455 k
Support 2, (D+L+Lr)	0.455 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	0.455	0.455
D Only	0.105	0.105
L Only	0.350	0.350
D+L+S	0.455	0.455
D+L+Lr	0.455	0.455

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — License Owner : SARGENT ENGINEERS INC

Description : (B14) 1st Floor Joists

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

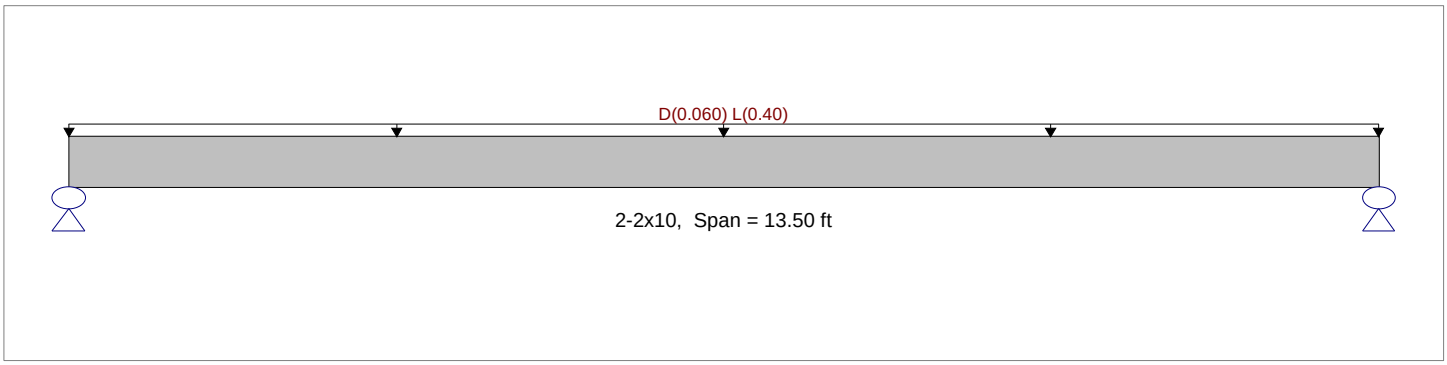
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Loads on all spans...
Uniform Load on ALL spans : D = 0.060, L = 0.40 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	3.009 : 1	Maximum Shear Stress Ratio	=	0.841 : 1
Section used for this span		2-2x10	Section used for this span		2-2x10
fb : Actual	=	2,979.09 psi	fv : Actual	=	151.39 psi
FB : Allowable	=	990.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	6.750 ft	Location of maximum on span	=	12.758 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.952 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	170 <360
Max Downward Total Deflection	=	1.109 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	146 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	1.1094	6.818		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	3.147 k
Support 2, (D+L+Lr)	3.147 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	3.147	3.147
D Only	0.447	0.447
L Only	2.700	2.700
D+L+S	3.147	3.147
D+L+Lr	3.147	3.147

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — License Owner : SARGENT ENGINEERS INC

Description : Admin Floor Joist with 50 psf

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

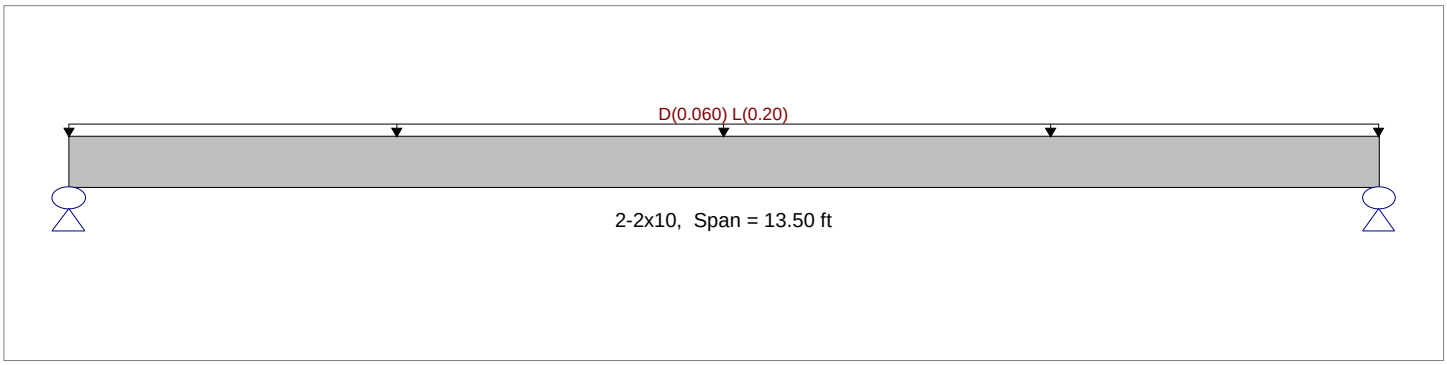
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.0150, L = 0.050 k/ft, Tributary Width = 4.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	1.678 : 1	Maximum Shear Stress Ratio	=	0.469 : 1
Section used for this span		2-2x10	Section used for this span		2-2x10
fb : Actual	=	1,661.42 psi	fv : Actual	=	84.43 psi
FB : Allowable	=	990.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	6.750 ft	Location of maximum on span	=	12.758 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.476 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	340 <360
Max Downward Total Deflection	=	0.619 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	261

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.6187	6.818		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	1.755 k
Support 2, (D+L+Lr)	1.755 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	1.755	1.755
D Only	0.405	0.405
L Only	1.350	1.350
D+L+S	1.755	1.755
D+L+Lr	1.755	1.755

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : Admin Floor Joist 15psf DL 27

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006 IBC & ASCE 7-05

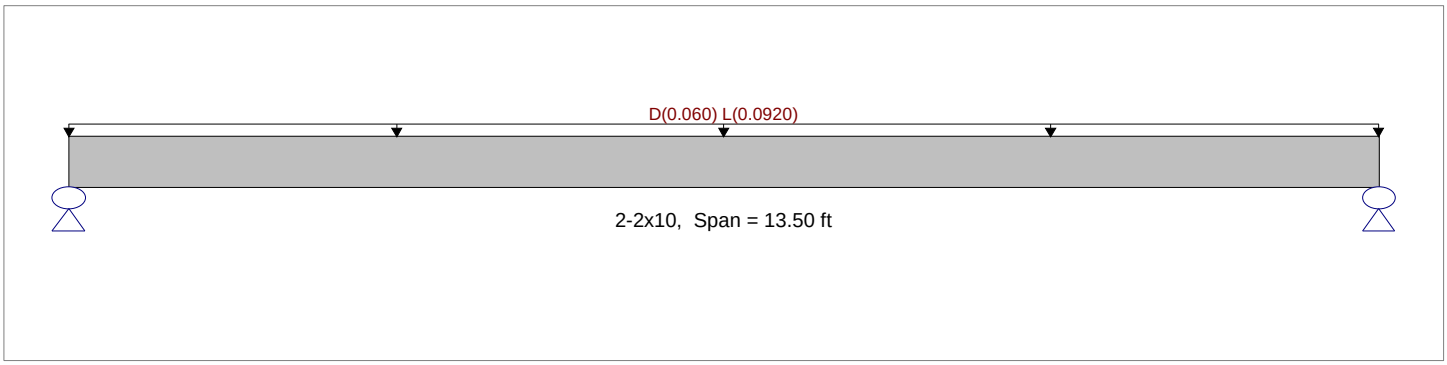
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.0150, L = 0.0230 k/ft, Tributary Width = 4.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.981 : 1	Maximum Shear Stress Ratio	=	0.274 : 1
Section used for this span		2-2x10	Section used for this span		2-2x10
fb : Actual	=	971.29 psi	fv : Actual	=	49.36 psi
FB : Allowable	=	990.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	6.750 ft	Location of maximum on span	=	12.758 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.219 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	739
Max Downward Total Deflection	=	0.362 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	447

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.3617	6.818		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	1.026 k
Support 2, (D+L+Lr)	1.026 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	1.026	1.026
D Only	0.405	0.405
L Only	0.621	0.621
D+L+S	1.026	1.026
D+L+Lr	1.026	1.026

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:34PM

Steel Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540
License Owner : SARGENT ENGINEERS INC

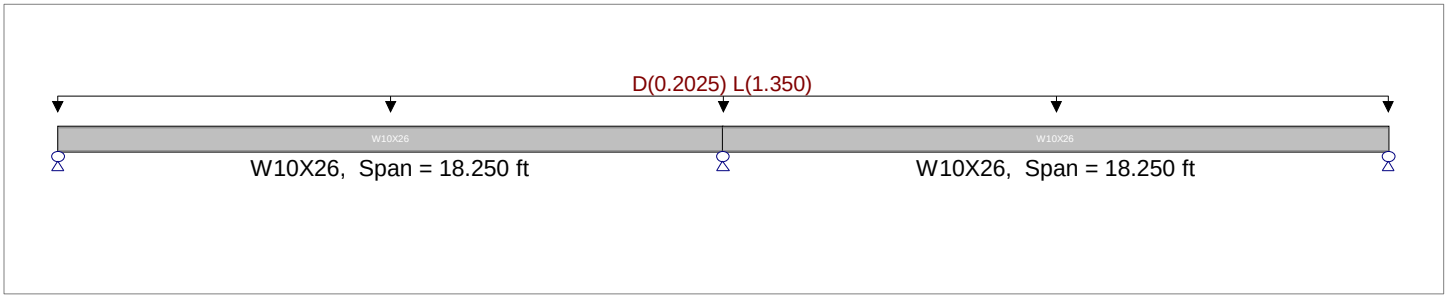
Description : (B15) Steel Floor Bearing Beam

Material Properties

Calculations per IBC 2006, CBC 2007, 13th AISC

Analysis Method : Allowable Stress Design
Beam Bracing : Beam is Fully Braced against lateral-torsion buckling
Bending Axis : Major Axis Bending
Load Combination 2006 IBC & ASCE 7-05

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 loads
Loads on all spans...
Uniform Load on ALL spans : D = 0.0150, L = 0.10 k/ft, Tributary Width = 13.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.841 : 1	Maximum Shear Stress Ratio =	0.336 : 1
Section used for this span	W10X26	Section used for this span	W10X26
Mu : Applied	65.713 k-ft	Vu : Applied	18.004 k
Mn / Omega : Allowable	78.094 k-ft	Vn/Omega : Allowable	53.560 k
Load Combination	+D+L+H	Load Combination	+D+L+H
Location of maximum on span	18.250 ft	Location of maximum on span	18.250 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	0.341 in
Max Upward L+Lr+S Deflection	0.000 in
Live Load Deflection Ratio	642
Max Downward Total Deflection	0.398 in
Max Upward Total Deflection	0.000 in
Total Deflection Ratio	549

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.3982	7.721		0.0000	0.000
D+L+Lr	2	0.3924	10.669		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support & Load Combinati	Support Reaction
Support 1, (D+L+Lr)	10.802 k
Support 2, (D+L+Lr)	36.007 k
Support 3, (D+L+Lr)	10.802 k

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — License Owner : SARGENT ENGINEERS INC

Description : (B16) Wood Floor Bearing Beam

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

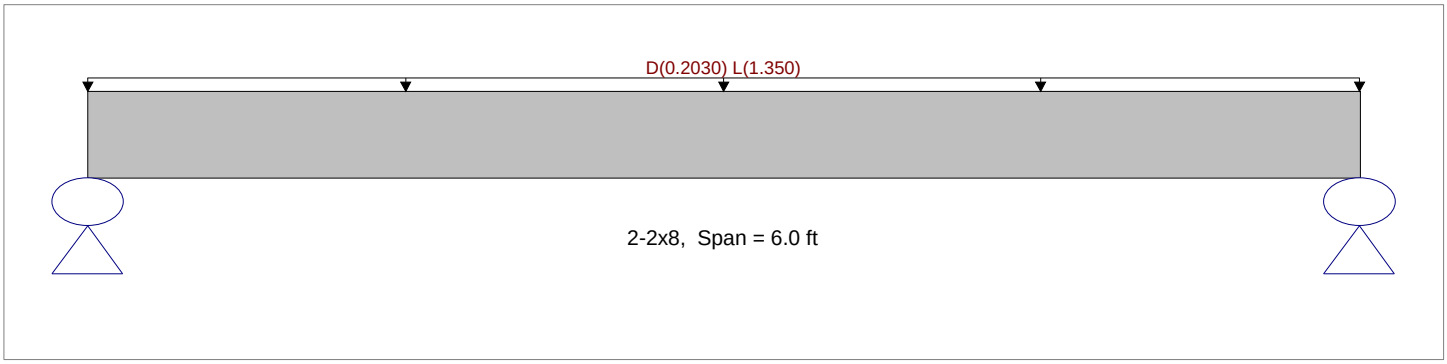
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Loads on all spans...
Uniform Load on ALL spans : D = 0.2030, L = 1.350 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	2.964 : 1	Maximum Shear Stress Ratio	=	1.433 : 1
Section used for this span		2-2x8	Section used for this span		2-2x8
fb : Actual	=	3,200.94 psi	fv : Actual	=	257.85 psi
FB : Allowable	=	1,080.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	3.000 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 L+Lr+S Deflection	=	0.260 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	276 <360
Max Downward Total Deflection	=	0.300 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	239

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.3004	3.030		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	4.674 k
Support 2, (D+L+Lr)	4.674 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	4.674	4.674
D Only	0.624	0.624
L Only	4.050	4.050
D+L+S	4.674	4.674
D+L+Lr	4.674	4.674

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — License Owner : SARGENT ENGINEERS INC

Description : (B17) 1st Floor In-Fill Joists

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

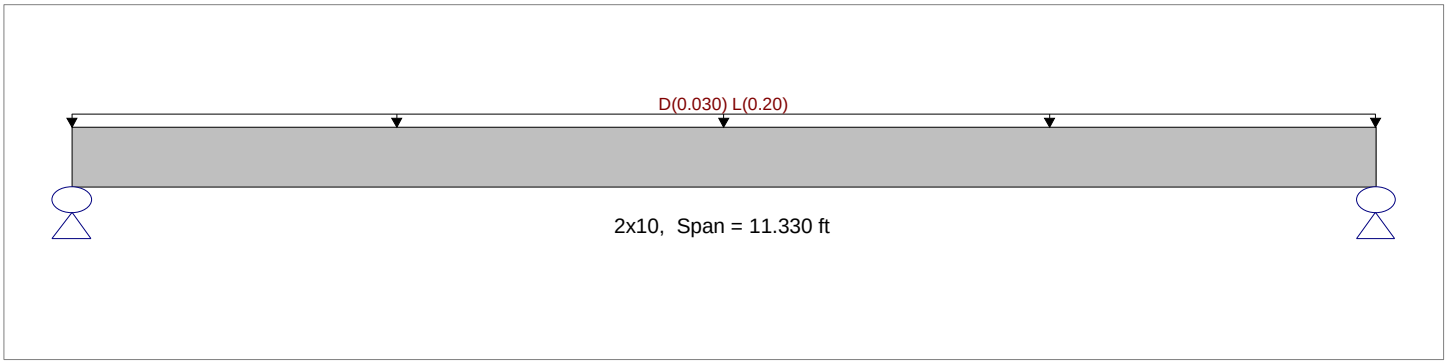
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Loads on all spans...
Uniform Load on ALL spans : D = 0.030, L = 0.20 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	2.120 : 1	Maximum Shear Stress Ratio	=	0.690 : 1
Section used for this span		2x10	Section used for this span		2x10
fb : Actual	=	2,098.34 psi	fv : Actual	=	124.20 psi
FB : Allowable	=	990.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	5.665 ft	Location of maximum on span	=	10.594 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.472 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	287 <360
Max Downward Total Deflection	=	0.550 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	247

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.5504	5.722		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	1.321 k
Support 2, (D+L+Lr)	1.321 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	1.321	1.321
D Only	0.188	0.188
L Only	1.133	1.133
D+L+S	1.321	1.321
D+L+Lr	1.321	1.321

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

(B18) NW Entry Floor Joists

$w_{dl} := dl_f \cdot 2ft$ $w_{dl} = 30 \cdot plf$

$w_{ll} := ll_f \cdot 2ft$ $w_{ll} = 200 \cdot plf$

$L := 6ft$

$\Delta_{max} := \frac{L}{360}$

Existing: 2x6 DF-L No. 2 @ 24" o.c.
Condition: 142% of Capacity

(B19) NW Entry Floor Bearing Beam

$w_{dl} := dl_f \cdot 3ft$ $w_{dl} = 45 \cdot plf$

$w_{ll} := ll_f \cdot 3ft$ $w_{ll} = 300 \cdot plf$

$L := 2.75ft, 2.75ft$

$\Delta_{max} := \frac{L}{360}$

Existing: 2x6 DF-L No. 2
Condition: 45% of Capacity - Okay

(B20) Deck Short Joists

$w_{dl} := dl_f$ $w_{dl} = 15 \cdot psf$

$w_{sl} := ll_f$ $w_{sl} = 100 \cdot psf$

$L := 6.5ft$

$\Delta_{max} := \frac{L}{360}$

Existing: 2x8 DF-L No. 2 @ 16" o.c.
Condition: 70% of Capacity - Okay

(B21) Deck Long Joists

$w_{dl} := dl_f$ $w_{dl} = 15 \cdot psf$

$w_{sl} := ll_f$ $w_{sl} = 100 \cdot psf$

$L := 16.75ft$ $L_a := 2ft$

$\Delta_{max} := \frac{L}{360}$

Existing: 2x10 DF-L No. 2 @ 16" o.c.
Condition: 302% of Capacity

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — License Owner : SARGENT ENGINEERS INC

Description : (B18) NW Entry Floor Joists

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

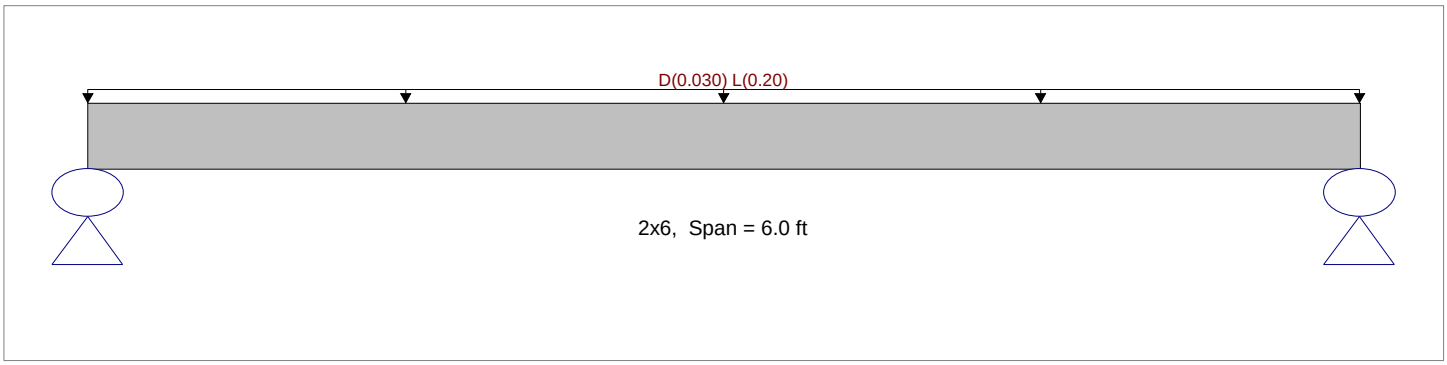
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Loads on all spans...
Uniform Load on ALL spans : D = 0.030, L = 0.20 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	1.415 : 1	Maximum Shear Stress Ratio	=	0.597 : 1
Section used for this span		2x6	Section used for this span		2x6
fb : Actual	=	1,655.49 psi	fv : Actual	=	107.49 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	3.000 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 L+Lr+S Deflection	=	0.177 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	407
Max Downward Total Deflection	=	0.205 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	351

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.2048	3.030		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	0.696 k
Support 2, (D+L+Lr)	0.696 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	0.696	0.696
D Only	0.096	0.096
L Only	0.600	0.600
D+L+S	0.696	0.696
D+L+Lr	0.696	0.696

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B19) NW Entry Floor Bearing Beam

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

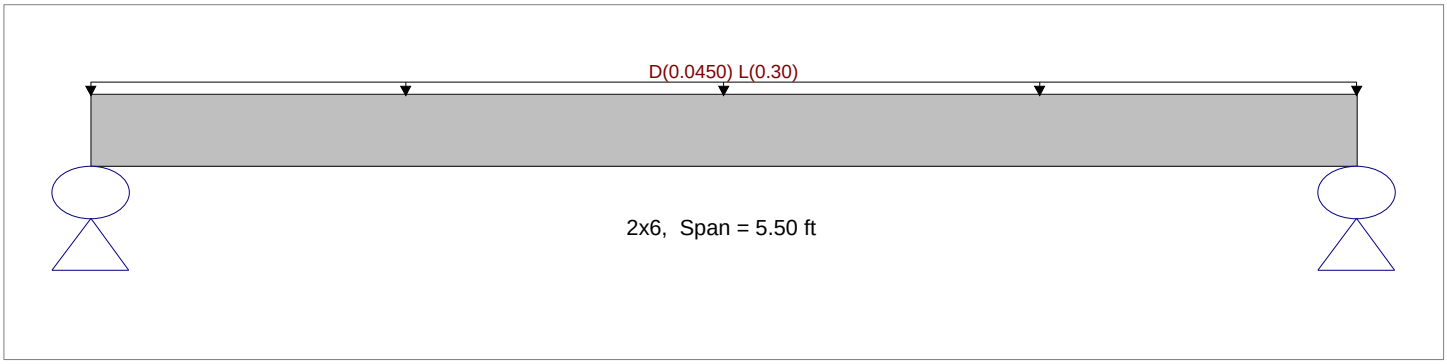
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Loads on all spans...
Uniform Load on ALL spans : D = 0.0450, L = 0.30 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	1.779 : 1	Maximum Shear Stress Ratio	=	0.809 : 1
Section used for this span		2x6	Section used for this span		2x6
fb : Actual	=	2,081.07 psi	fv : Actual	=	145.68 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	2.750 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 L+Lr+S Deflection	=	0.187 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	352 <360
Max Downward Total Deflection	=	0.216 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	305

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.2163	2.778		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	0.954 k
Support 2, (D+L+Lr)	0.954 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	0.954	0.954
D Only	0.129	0.129
L Only	0.825	0.825
D+L+S	0.954	0.954
D+L+Lr	0.954	0.954

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — License Owner : SARGENT ENGINEERS INC

Description : (B20) Deck Short Joists

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

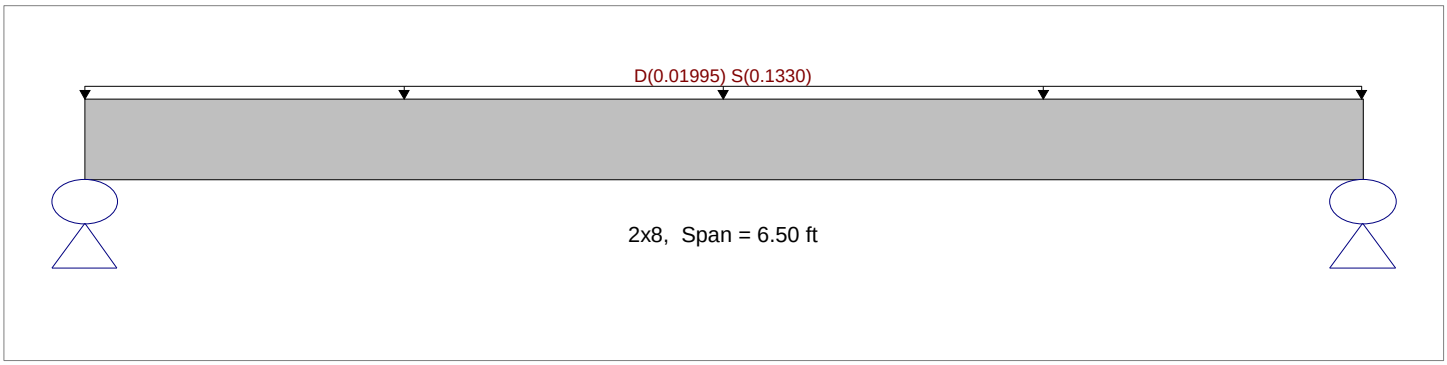
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Loads on all spans...
Uniform Load on ALL spans : D = 0.0150, S = 0.10 k/ft, Tributary Width = 1.330 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.694 : 1	Maximum Shear Stress Ratio	=	0.317 : 1
Section used for this span		2x8	Section used for this span		2x8
fb : Actual	=	749.38 psi	fv : Actual	=	57.12 psi
FB : Allowable	=	1,080.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	3.250 ft	Location of maximum on span	=	5.915 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.071 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	1104
Max Downward Total Deflection	=	0.083 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	945

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.0825	3.283		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	0.505 k
Support 2, (D+L+S)	0.505 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	0.505	0.505
D Only	0.073	0.073
S Only	0.432	0.432
D+L+S	0.505	0.505

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:34PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B21) Deck Long Joists

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

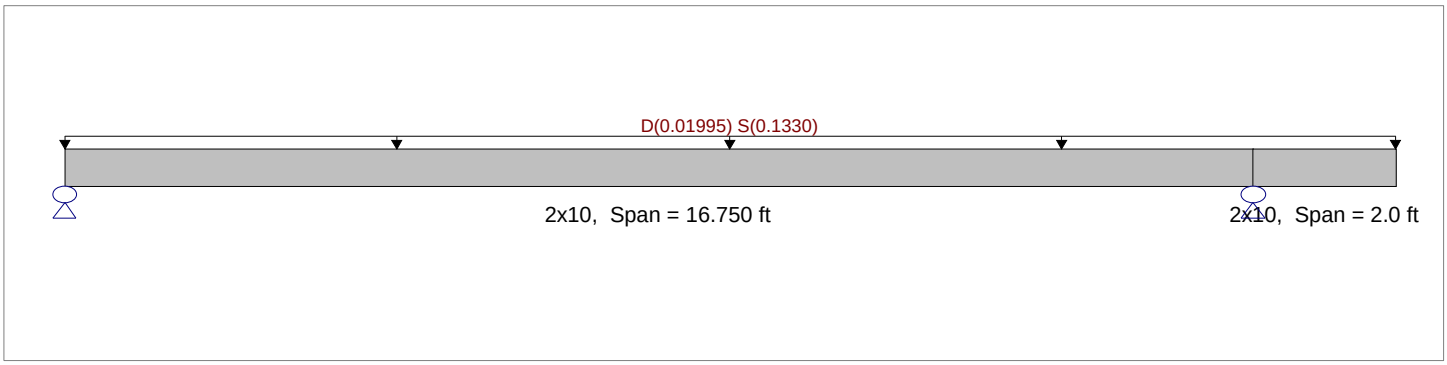
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Loads on all spans...
Uniform Load on ALL spans : D = 0.0150, S = 0.10 k/ft, Tributary Width = 1.330 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	3.013 : 1	Maximum Shear Stress Ratio	=	0.736 : 1
Section used for this span		2x10	Section used for this span		2x10
fb : Actual	=	2,983.31 psi	fv : Actual	=	132.44 psi
FB : Allowable	=	990.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	8.246 ft	Location of maximum on span	=	16.106 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	1.455 in
Max Upward L+Lr+S Deflection	=	-0.533 in
Live Load Deflection Ratio	=	90 <360
Max Downward Total Deflection	=	1.707 in
Max Upward Total Deflection	=	-0.626 in
Total Deflection Ratio	=	76 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	1.7073	8.375		0.0000	0.000
	2	0.0000	8.375	D+L+S	-0.6257	2.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	1.288 k
Support 2, (D+L+S)	1.638 k
Support 3, (D+L+S)	k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	1.288	1.638	
D Only	0.190	0.242	
S Only	1.098	1.396	
D+L+S	1.288	1.638	

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

(B22) Deck Joist Bearing Beam

$w_{dl} := dl_f \cdot \frac{(16.75ft)}{2}$ $w_{dl} = 125.63 \cdot plf$

$w_{sl} := sl_{rub} \cdot \frac{(16.75ft)}{2}$ $w_{sl} = 837.5 \cdot plf$

$L := 7.66ft$

$\Delta_{max} := \frac{L}{360}$

Existing: Unknown
Required: (3) 2x14 DF-L No. 2

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:35PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — License Owner : SARGENT ENGINEERS INC

Description : (B22) Deck Joist Bearing Beam

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

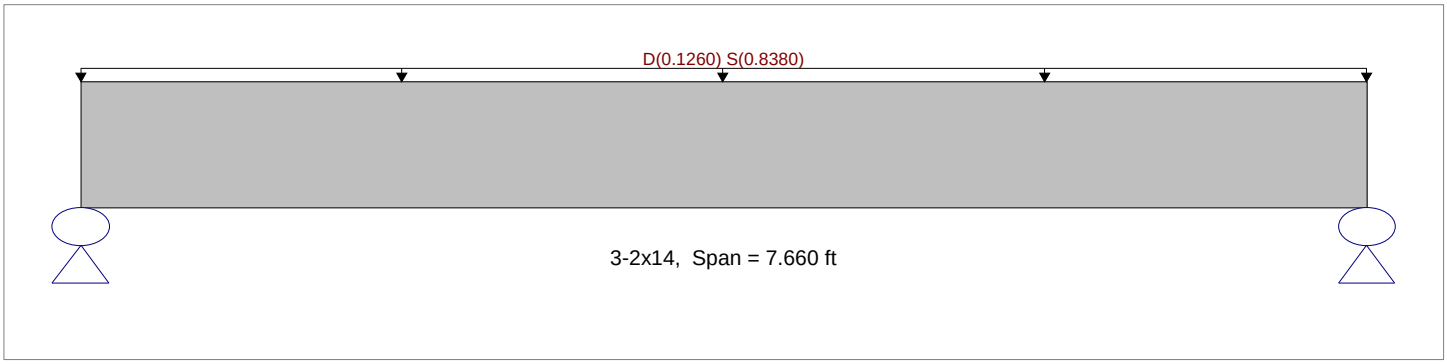
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Loads on all spans...
Uniform Load on ALL spans : D = 0.1260, S = 0.8380 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.807 : 1	Maximum Shear Stress Ratio	=	0.377 : 1
Section used for this span		3-2x14	Section used for this span		3-2x14
fb : Actual	=	653.28 psi	fv : Actual	=	67.80 psi
FB : Allowable	=	810.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	3.830 ft	Location of maximum on span	=	6.588 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.047 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	1960
Max Downward Total Deflection	=	0.055 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	1681

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.0547	3.868		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	3.743 k
Support 2, (D+L+S)	3.743 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	3.743	3.743
D Only	0.534	0.534
S Only	3.210	3.210
D+L+S	3.743	3.743

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

(C3) Steel Column for B15 (Steel Floor Bearing Beam)

$P_{dl} := 5210lbf$ $P_{dl} = 5210 \cdot lbf$

$P_{ll} := 30800lbf$ $P_{ll} = 30800 \cdot lbf$

$h := 9ft$

$h_{xunb} := 9ft$

$h_{yunb} := 9ft$

$L_{brg} := \frac{(P_{dl} + P_{ll})}{625psi \cdot 5.5in}$ $L_{brg} = 10.48 \cdot in$

Existing: 4STD Pipe
Condition: 74% of Capacity - Okay

(C4) Column for B16 (Wood Floor Bearing Beam)

$P_{dl} := 2 \cdot 620lbf$ $P_{dl} = 1240 \cdot lbf$

$P_{ll} := 2 \cdot 4050lbf$ $P_{ll} = 8100 \cdot lbf$

$h := 3ft$

$h_{xunb} := 3ft$

$h_{yunb} := 3ft$

$L_{brg} := \frac{(P_{dl} + P_{ll})}{625psi \cdot 5.5in}$ $L_{brg} = 2.72 \cdot in$

Existing: 6x6 DF-L No. 2
Condition: 74% of Capacity - Okay
No Connection to Beam

(C5) Column for C2 Above, B19 (NW Entry)

$P_{dl} := 160lbf + 2 \cdot 130lbf$ $P_{dl} = 420 \cdot lbf$

$P_{ll} := 2 \cdot 830lbf$ $P_{ll} = 1660 \cdot lbf$

$P_{sl} := 1050lbf$ $P_{sl} = 1050 \cdot lbf$

$h := 3ft$

$h_{xunb} := 3ft$

$h_{yunb} := 3ft$

$L_{brg} := \frac{(P_{dl} + P_{ll} + P_{sl})}{625psi \cdot 5.5in}$ $L_{brg} = 0.91 \cdot in$

Existing: 4x4 DF-L No. 2
Condition: 15% of Capacity - Okay

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:35PM

Steel Column

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (C3) Steel Column for B15 (Steel Floor Bearing Beam)

General Information

Code Ref : 2006 IBC, AISC Manual 13th Edition

Steel Section Name :	**Pipe4STD**
Analysis Method :	2006 IBC & ASCE 7-05
Steel Stress Grade	
Fy : Steel Yield	36.0 ksi
E : Elastic Bending Modulus	29,000.0 ksi
Load Combination :	Allowable Stress

Overall Column Height 9.0 ft
Top & Bottom Fixity Top & Bottom Pinned

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 9ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 9 ft, K = 1.0

Applied Loads

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

AXIAL LOADS . . .
Axial Load at 9.0 ft, D = 5.210, L = 30.80 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.7349** : 1
Load Combination +D+L+H
Location of max.above base 0.0 ft
At maximum location values are . . .
Pu : Axial 36.010 k
Pn / Omega : Allowable 49.001 k
Mu-x : Applied 0.0 k-ft
Mn-x / Omega : Allowable 7.275 k-ft
Mu-y : Applied 0.0 k-ft
Mn-y / Omega : Allowable 7.275 k-ft

PASS Maximum Shear Stress Ratio = **0.0** : 1
Load Combination
Location of max.above base 0.0 ft
At maximum location values are . . .
Vu : Applied 0.0 k
Vn / Omega : Allowable 0.0 k

Maximum SERVICE Load Reactions . .
Top along X-X 0.0 k
Bottom along X-X 0.0 k
Top along Y-Y 0.0 k
Bottom along Y-Y 0.0 k

Maximum SERVICE Load Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination :
Along X-X 0.0 in at 0.0 ft above base
for load combination :

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+D	0.106	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+L+H	0.735	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+Lr+H	0.106	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750Lr+0.750L+H	0.578	PASS	0.00 ft	0.000	PASS	0.00 ft

Maximum Reactions - Unfactored

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top
D Only				
L Only				

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Steel Section Properties : Pipe4STD

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:

Job # D09135.00

Project Notes :

Printed: 15 OCT 2009, 7:35PM

Steel Column

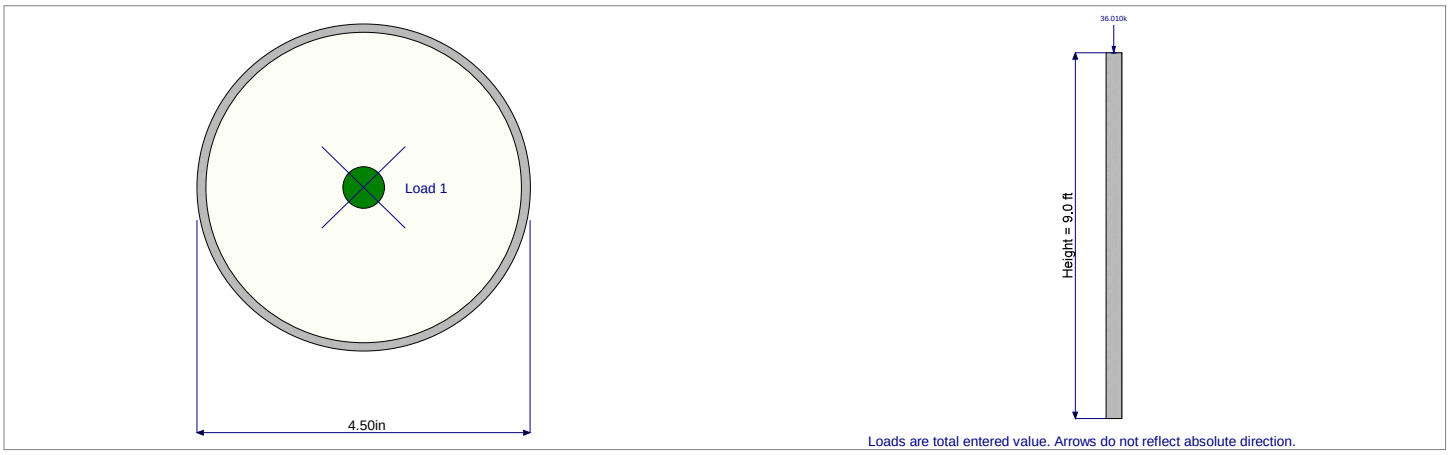
File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (C3) Steel Column for B15 (Steel Floor Bearing Beam)

Steel Section Properties : Pipe4STD

Depth	=	4.500	in	I xx	=	6.82	in^4	J	=	13.600 in^4
Web Thick	=	0.000	in	S xx	=	3.03	in^3			
Flange Width	=	4.500	in	R xx	=	1.510	in			
Flange Thick	=	0.237	in							
Area	=	2.970	in^2	I yy	=	6.820	in^4			
Weight	=	10.800	plf	S yy	=	3.030	in^3			
				R yy	=	1.510	in			
Ycg	=	0.000	in							



SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:35PM

Wood Column

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (C4) Column for B16 (Wood Floor Bearing Beam)

General Information

Code Ref : 2006 IBC, ANSI / AF&PA NDS-2005

Analysis Method :	Allowable Stress Design
End Fixities	Top & Bottom Pinned
Overall Column Height	3.0 ft
(Used for non-slender calculations)	
Wood Species	Douglas Fir - Larch
Wood Grade	No.2

Fb - Tension	900.0 psi	Fv	180.0 psi
Fb - Compr	900.0 psi	Ft	575.0 psi
Fc - Prll	1,350.0 psi	Density	32.210 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Load Combination 2006 IBC & ASCE 7-05

Wood Section Name	6x6
Wood Grading/Manuf.	Graded Lumber
Wood Member Type	Sawn

Exact Width	5.50 in	Allowable Stress Modification Factors	
Exact Depth	5.50 in	Cf or Cv for Bending	1.0
Area	30.250 in^2	Cf or Cv for Compression	1.0
Ix	76.255 in^4	Cf or Cv for Tension	1.0
Iy	76.255 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Factor	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No *(non-glb only)*

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 3ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 3 ft, K = 1.0

Applied Loads

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

Column self weight included : 20.299 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 3.0 ft, D = 1.240, L = 8.10 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2353** : 1

Load Combination	+D+L+H
Governing NDS Formla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	9.360 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,315.06 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1

Load Combination	+D+0.750Lr+0.750L+H
Location of max.above base	3.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	180.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination :	n/a			
Along X-X	0.0 in	at	0.0 ft	above base
for load combination :	n/a			

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension
Cf or Cv : Size based factors	1.000	1.000	

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:35PM

Wood Column

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (C5) Column for C2 Above, B19 (NW Entry)

General Information

Code Ref : 2006 IBC, ANSI / AF&PA NDS-2005

Analysis Method :	Allowable Stress Design	Wood Section Name	4x4
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Graded Lumber
Overall Column Height	3.0 ft	Wood Member Type	Sawn
(Used for non-slender calculations)			
Wood Species	Douglas Fir - Larch	Exact Width	3.50 in
Wood Grade	No.2	Exact Depth	3.50 in
Fb - Tension	900.0 psi	Fv	180.0 psi	Area	12.250 in^2
Fb - Compr	900.0 psi	Ft	575.0 psi	Ix	12.505 in^4
Fc - Prll	1,350.0 psi	Density	32.210 pcf	Iy	12.505 in^4
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial	
Basic	1,600.0	1,600.0	1,600.0	ksi
Minimum	580.0	580.0		

Load Combination 2006 IBC & ASCE 7-05

Allowable Stress Modification Factors

Cf or Cv for Bending	1.50
Cf or Cv for Compression	1.150
Cf or Cv for Tension	1.50
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 NDS 15.3.2
Use Cr : Repetitive ?	No (non-glb only)

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 3ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 3 ft, K = 1.0

Applied Loads

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

Column self weight included : 8.220 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 3.0 ft, D = 0.420, L = 1.660, S = 1.050 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.1412** : 1

Load Combination	+D+0.750L+0.750S+H
Governing NDS Formla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	2.461 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,422.70 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1

Load Combination	+D+0.750L+0.750S+0.5250E+H
Location of max.above base	3.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	180.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination :	n/a			
Along X-X	0.0 in	at	0.0 ft	above base
for load combination :	n/a			

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension
Cf or Cv : Size based factors	1.500	1.150	

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
D+L+S	0.0000 in	0.000 ft	0.000 in	0.000 ft

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

(C6) Columns for B22 (Deck Joist Bearing Beam)

$P_{dl} := 2 \cdot 530 lbf$ $P_{dl} = 1060 \cdot lbf$

$P_{sl} := 2 \cdot 3210 lbf$ $P_{sl} = 6420 \cdot lbf$

$h := 9ft$

$h_{xunb} := 0ft$

$h_{yunb} := 9ft$

$L_{brg} := \frac{(P_{dl} + P_{sl})}{625psi \cdot 5.5in}$ $L_{brg} = 2.18 \cdot in$

Existing: 4x4 DF-L No. 2
Condition: 132% of Capacity

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:35PM

Wood Column

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (C6) Columns for B22 (Deck Joist Bearing Beam)

General Information

Code Ref : 2006 IBC, ANSI / AF&PA NDS-2005

Analysis Method :	Allowable Stress Design
End Fixities	Top & Bottom Pinned
Overall Column Height	9.0 ft
(Used for non-slender calculations)	
Wood Species	Douglas Fir - Larch
Wood Grade	No.2

Fb - Tension	900.0 psi	Fv	180.0 psi
Fb - Compr	900.0 psi	Ft	575.0 psi
Fc - Prll	1,350.0 psi	Density	32.210 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Load Combination 2006 IBC & ASCE 7-05

Wood Section Name	**4x4**
Wood Grading/Manuf.	Graded Lumber
Wood Member Type	Sawn

Exact Width	**3.50**	in
Exact Depth	**3.50**	in
Area	12.250	in^2
Ix	12.505	in^4
Iy	12.505	in^4

Allowable Stress Modification Factors

Cf or Cv for Bending	1.50
Cf or Cv for Compression	1.150
Cf or Cv for Tension	1.50
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No *(non-glb only)*

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling along X-X Axis
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 9 ft, K = 1.0

Applied Loads

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

Column self weight included : 24.661 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 9.0 ft, D = 1.060, S = 6.420 k

DESIGN SUMMARY

Bending & Shear Check Results

FAIL Max. Axial+Bending Stress Ratio = **1.318** : 1

Load Combination	+D+S+H
Governing NDS Formla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	7.505 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	464.86 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1

Load Combination	+D+0.750L+0.750S+0.5250E+H
Location of max.above base	9.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	180.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination :	n/a			
Along X-X	0.0 in	at	0.0 ft	above base
for load combination :	n/a			

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension
Cf or Cv : Size based factors	1.500	1.150	

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

(F1) Main Wing Bearing Wall Footings

$w_{tl} := \frac{8174lbf}{4ft} + dl_{cw.8} \cdot 8ft$ $\quad w_{tl} = 2843.5 \cdot plf$

$q_{brg} := 1500psf$

Existing: Unknown
Required: 30"x10" Continuous Footing w/ (3) #4 Bars Continuous

(F2) Side Wings Bearing Wall Footings

$w_{tl} := \frac{11218lbf}{4ft} + dl_{cw.8} \cdot 8ft$ $\quad w_{tl} = 3604.5 \cdot plf$

$q_{brg} := 1500psf$

Existing: Unknown
Required: 36"x10" Continuous Footing w/ (4) #4 Bars Continuous

(F3) Footing for C1 (W Entrance)

$w_{dl} := 300lbf$ $\quad w_{dl} = 300 \cdot lbf$

$w_{ll} := 0lbf$ $\quad w_{ll} = 0 \cdot lbf$

$w_{sl} := 1920lbf$ $\quad w_{sl} = 1920 \cdot lbf$

$q_{brg} := 1500psf$

Existing: Unknown
Required: 16"x16"x10" Square Footing w/ (3) #4 Bars Each Way

(F4) Footing for C3 (Steel Column in Library)

$w_{dl} := 5210lbf$ $\quad w_{dl} = 5210 \cdot lbf$

$w_{ll} := 30800lbf$ $\quad w_{ll} = 30800 \cdot lbf$

$w_{sl} := 0lbf$ $\quad w_{sl} = 0 \cdot lbf$

$q_{brg} := 1500psf$

Existing: Unknown
Required: 78"x78"x13" Square Footing w/ (10) #4 Bars Each Way

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:35PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (F1) Main Wing Bearing Wall Footings

General Information

Calculations per IBC 2006, CBC 2007, ACI 318-05

Material Properties

f'c : Concrete 28 day strength	=	3.0	ksi
Fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
Φ Values Flexure	=	0.90	
Shear	=	0.850	

Analysis Settings

Min Steel % Bending Reinf.	=	0.00140	
Min Allow % Temp Reinf.	=	0.00180	
Min. Overturning Safety Factor	=	1.50	: 1
Min. Overturning Safety Factor	=	1.50	: 1
AutoCalc Footing Weight as DL	:	Yes	
AutoCalc Pedestal Weight as DL	:	No	

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

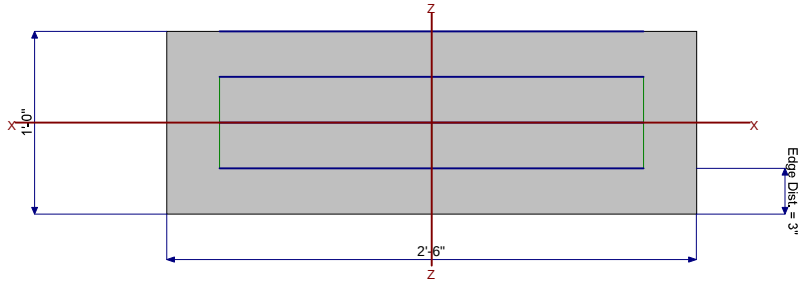
Reference Depth below Surface	=	8.0	ft
Allow. Pressure Increase per foot of depth	=		ksf
when base footing is below	=		ft

Increases based on footing Width

Allow. Pressure Increase per foot of width	=		ksf
when footing is wider than	=		ft

Dimensions

Width along X-X Axis	=	2.50	ft
Length along Z-Z Axi	=	1.0	ft
Footing Thicknes	=	10.0	in
Load location offset from footing center...			
ex : Along X-X Axis	=	0	in
ez : Along Z-Z Axis	=	0	in
Pedestal dimensions...			
px : Along X-X Axis	=		in
pz : Along Z-Z Axis	=		in
Height	=		in
Rebar Centerline to Edge of Concrete..			
at Bottom of footing	=	3.0	in

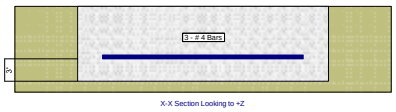


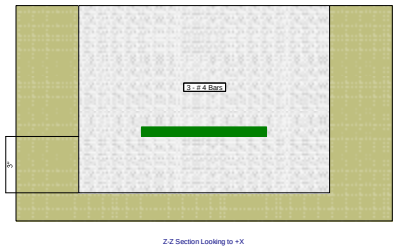
Reinforcing

Bars along X-X Axis		
Number of Bars	=	3.0
Reinforcing Bar Size	=	# 4
Bars along Z-Z Axis		
Number of Bars	=	3.0
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	g Z-Z Axis
# Bars required within zone	57.1 %
# Bars required on each side of zone	42.9 %





Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	2.844							k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:35PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (F1) Main Wing Bearing Wall Footings

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8387	Soil Bearing	1.258 ksf	1.50 ksf	+D+Lr+H
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.07281	Z Flexure (+X)	1.376 k-ft	18.90 k-ft	+1.40D
PASS	0.07281	Z Flexure (-X)	1.376 k-ft	18.90 k-ft	+1.40D
PASS	0.02913	X Flexure (+Z)	0.2202 k-ft	7.560 k-ft	+1.40D
PASS	0.02913	X Flexure (-Z)	0.2202 k-ft	7.560 k-ft	+1.40D
PASS	0.1502	1-way Shear (+X)	13.983 psi	93.113 psi	+1.40D
PASS	0.1502	1-way Shear (-X)	13.983 psi	93.113 psi	+1.40D
PASS	n/a	1-way Shear (+Z)	0.0 psi	93.113 psi	n/a
PASS	n/a	1-way Shear (-Z)	0.0 psi	93.113 psi	n/a
PASS	0.1050	2-way Punching	19.552 psi	186.23 psi	+1.40D

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:35PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — **License Owner : SARGENT ENGINEERS INC**

Description : (F2) Side Wings Bearing Wall Footings

General Information

Calculations per IBC 2006, CBC 2007, ACI 318-05

Material Properties

f'c : Concrete 28 day strength	=	3.0	ksi
Fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
Φ Values Flexure	=	0.90	
Shear	=	0.850	

Analysis Settings

Min Steel % Bending Reinf.	=	0.00140	
Min Allow % Temp Reinf.	=	0.00180	
Min. Overturning Safety Factor	=	1.50	: 1
Min. Overturning Safety Factor	=	1.50	: 1
AutoCalc Footing Weight as DL	:	Yes	
AutoCalc Pedestal Weight as DL	:	No	

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

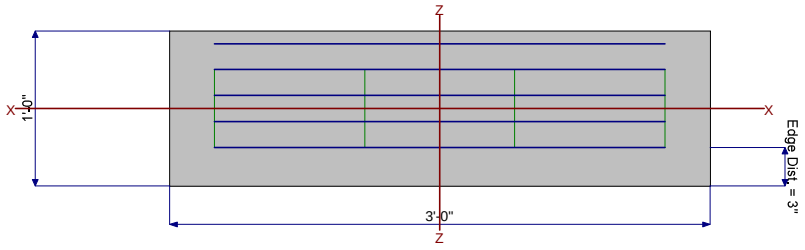
Reference Depth below Surface	=	8.0	ft
Allow. Pressure Increase per foot of depth	=		ksf
when base footing is below	=		ft

Increases based on footing Width

Allow. Pressure Increase per foot of width	=		ksf
when footing is wider than	=		ft

Dimensions

Width along X-X Axis	=	3.0	ft
Length along Z-Z Axi	=	1.0	ft
Footing Thicknes	=	10.0	in
Load location offset from footing center...			
ex : Along X-X Axis	=	0	in
ez : Along Z-Z Axis	=	0	in
Pedestal dimensions...			
px : Along X-X Axis	=		in
pz : Along Z-Z Axis	=		in
Height	=		in
Rebar Centerline to Edge of Concrete..			
at Bottom of footing	=	3.0	in

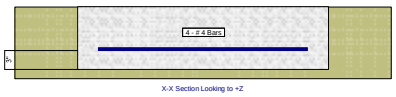


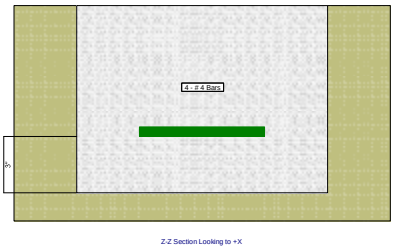
Reinforcing

Bars along X-X Axis		
Number of Bars	=	4.0
Reinforcing Bar Size	=	# 4
Bars along Z-Z Axis		
Number of Bars	=	4.0
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	g Z-Z Axis
# Bars required within zone	50.0 %
# Bars required on each side of zone	50.0 %





Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	3.605							k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:35PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (F2) Side Wings Bearing Wall Footings

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8820	Soil Bearing	1.323 ksf	1.50 ksf	+D+Lr+H
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.08264	Z Flexure (+X)	2.083 k-ft	25.20 k-ft	+1.40D
PASS	0.08264	Z Flexure (-X)	2.083 k-ft	25.20 k-ft	+1.40D
PASS	0.02755	X Flexure (+Z)	0.2314 k-ft	8.40 k-ft	+1.40D
PASS	0.02755	X Flexure (-Z)	0.2314 k-ft	8.40 k-ft	+1.40D
PASS	0.2178	1-way Shear (+X)	20.278 psi	93.113 psi	+1.40D
PASS	0.2178	1-way Shear (-X)	20.278 psi	93.113 psi	+1.40D
PASS	n/a	1-way Shear (+Z)	0.0 psi	93.113 psi	n/a
PASS	n/a	1-way Shear (-Z)	0.0 psi	93.113 psi	n/a
PASS	0.1347	2-way Punching	25.090 psi	186.23 psi	+1.40D

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:35PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — **License Owner : SARGENT ENGINEERS INC**

Description : (F3) Footing for C1 (W Entrance)

General Information

Calculations per IBC 2006, CBC 2007, ACI 318-05

Material Properties

f'c : Concrete 28 day strength	=	3.0	ksi
Fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
Φ Values Flexure	=	0.90	
Shear	=	0.850	

Analysis Settings

Min Steel % Bending Reinf.	=	0.00140	
Min Allow % Temp Reinf.	=	0.00180	
Min. Overturning Safety Factor	=	1.50	: 1
Min. Overturning Safety Factor	=	1.50	: 1
AutoCalc Footing Weight as DL	:	Yes	
AutoCalc Pedestal Weight as DL	:	No	

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

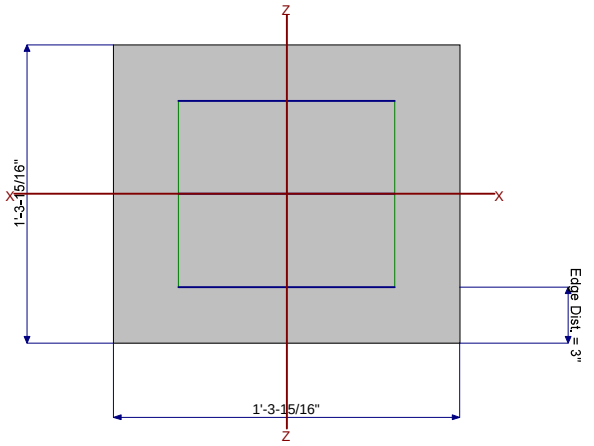
Reference Depth below Surface	=	3.0	ft
Allow. Pressure Increase per foot of depth	=		ksf
when base footing is below	=		ft

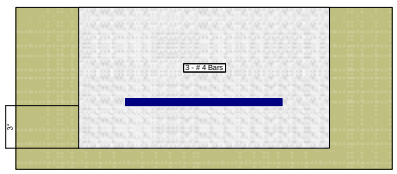
Increases based on footing Width

Allow. Pressure Increase per foot of width	=		ksf
when footing is wider than	=		ft

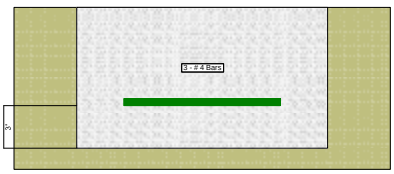
Dimensions

Width along X-X Axis	=	1.330	ft
Length along Z-Z Axi	=	1.330	ft
Footing Thicknes	=	10.0	in
Load location offset from footing center...			
ex : Along X-X Axis	=	0	in
ez : Along Z-Z Axis	=	0	in
Pedestal dimensions...			
px : Along X-X Axis	=		in
pz : Along Z-Z Axis	=		in
Height	=		in
Rebar Centerline to Edge of Concrete..			
at Bottom of footing	=	3.0	in





X-X Section Looking to +Z



Z-Z Section Looking to +X

Reinforcing

Bars along X-X Axis			
Number of Bars	=	3.0	
Reinforcing Bar Size	=	# 4	
Bars along Z-Z Axis			
Number of Bars	=	3.0	
Reinforcing Bar Size	=	# 4	

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	0.30			1.920				k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:35PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (F3) Footing for C1 (W Entrance)

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9173	Soil Bearing	1.376 ksf	1.50 ksf	+D+S+H
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.03244	Z Flexure (+X)	0.4610 k-ft	14.211 k-ft	+1.20D+0.50L+1.60S
PASS	0.03244	Z Flexure (-X)	0.4610 k-ft	14.211 k-ft	+1.20D+0.50L+1.60S
PASS	0.03244	X Flexure (+Z)	0.4610 k-ft	14.211 k-ft	+1.20D+0.50L+1.60S
PASS	0.03244	X Flexure (-Z)	0.4610 k-ft	14.211 k-ft	+1.20D+0.50L+1.60S
PASS	0.02364	1-way Shear (+X)	2.201 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.02364	1-way Shear (-X)	2.201 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.02364	1-way Shear (+Z)	2.201 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.02364	1-way Shear (-Z)	2.201 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.08149	2-way Punching	15.176 psi	186.23 psi	+1.20D+0.50L+1.60S

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:35PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (F4) Footing for C3 (Steel Column in Library)

General Information

Calculations per IBC 2006, CBC 2007, ACI 318-05

Material Properties

f'c : Concrete 28 day strength	=	3.0	ksi
Fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
Φ Values Flexure	=	0.90	
Shear	=	0.850	

Analysis Settings

Min Steel % Bending Reinf.	=	0.00140	
Min Allow % Temp Reinf.	=	0.00180	
Min. Overturning Safety Factor	=	1.50	: 1
Min. Overturning Safety Factor	=	1.50	: 1
AutoCalc Footing Weight as DL	:	Yes	
AutoCalc Pedestal Weight as DL	:	No	

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

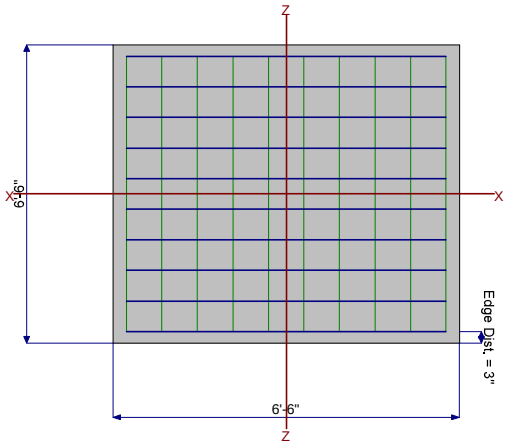
Reference Depth below Surface	=	3.0	ft
Allow. Pressure Increase per foot of depth	=		ksf
when base footing is below	=		ft

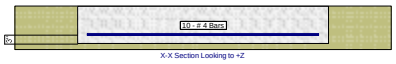
Increases based on footing Width

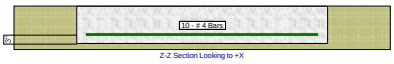
Allow. Pressure Increase per foot of width	=		ksf
when footing is wider than	=		ft

Dimensions

Width along X-X Axis	=	6.50	ft
Length along Z-Z Axi	=	6.50	ft
Footing Thicknes	=	13.0	in
Load location offset from footing center...			
ex : Along X-X Axis	=	0	in
ez : Along Z-Z Axis	=	0	in
Pedestal dimensions...			
px : Along X-X Axis	=		in
pz : Along Z-Z Axis	=		in
Height	=		in
Rebar Centerline to Edge of Concrete..			
at Bottom of footing	=	3.0	in







Reinforcing

Bars along X-X Axis		
Number of Bars	=	10.0
Reinforcing Bar Size	=	# 4
Bars along Z-Z Axis		
Number of Bars	=	10.0
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	5.210		30.80					k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

SARGENT
Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:35PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (F4) Footing for C3 (Steel Column in Library)

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.6727	Soil Bearing	1.009 ksf	1.50 ksf	+D+L+H
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.5731	Z Flexure (+X)	7.936 k-ft	13.846 k-ft	+1.20D+0.50Lr+1.60L+
PASS	0.5731	Z Flexure (-X)	7.936 k-ft	13.846 k-ft	+1.20D+0.50Lr+1.60L+
PASS	0.5731	X Flexure (+Z)	7.936 k-ft	13.846 k-ft	+1.20D+0.50Lr+1.60L+
PASS	0.5731	X Flexure (-Z)	7.936 k-ft	13.846 k-ft	+1.20D+0.50Lr+1.60L+
PASS	0.3264	1-way Shear (+X)	30.391 psi	93.113 psi	+1.20D+0.50Lr+1.60L+
PASS	0.3264	1-way Shear (-X)	30.391 psi	93.113 psi	+1.20D+0.50Lr+1.60L+
PASS	0.3264	1-way Shear (+Z)	30.391 psi	93.113 psi	+1.20D+0.50Lr+1.60L+
PASS	0.3264	1-way Shear (-Z)	30.391 psi	93.113 psi	+1.20D+0.50Lr+1.60L+
PASS	0.8401	2-way Punching	156.45 psi	186.23 psi	+1.20D+0.50Lr+1.60L+

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Admin. Building
By:MH Date:10/15/2009

Subject:
Structural Calcs

(F5) Footing for C4 (Floor Bearing Beam Columns)

$w_{dl} := 1240lbf$ $w_{dl} = 1240 \cdot lbf$

$w_{ll} := 8100lbf$ $w_{ll} = 8100 \cdot lbf$

$w_{sl} := 0lbf$ $w_{sl} = 0 \cdot lbf$

$q_{brg} := 1500psf$

Existing: Unknown
Required: 36"x36"x10" Square Footing w/ (4) #4 Bars Each Way

(F6) Footing for C5 (NW Entrance)

$w_{dl} := 420lbf$ $w_{dl} = 420 \cdot lbf$

$w_{ll} := 1660lbf$ $w_{ll} = 1660 \cdot lbf$

$w_{sl} := 1050lbf$ $w_{sl} = 1050 \cdot lbf$

$q_{brg} := 1500psf$

Existing: None Observed
Required: 24"x24"x10" Square Footing w/ (3) #4 Bars Each Way

(F7) Footing for C6 (Deck Bearing Beam Columns)

$w_{dl} := 1060lbf$ $w_{dl} = 1060 \cdot lbf$

$w_{ll} := 0lbf$ $w_{ll} = 0 \cdot lbf$

$w_{sl} := 6420lbf$ $w_{sl} = 6420 \cdot lbf$

$q_{brg} := 1500psf$

Existing: Existing
Required: 30"x30"x10" Square Footing w/ (3) #4 Bars Each Way

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:35PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — **License Owner : SARGENT ENGINEERS INC**

Description : (F5) Footing for C4 (Floor Bearing Beam Columns)

General Information

Calculations per IBC 2006, CBC 2007, ACI 318-05

Material Properties

f'c : Concrete 28 day strength	=	3.0 ksi
Fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
Φ Values Flexure	=	0.90
Shear	=	0.850

Analysis Settings

Min Steel % Bending Reinf.	=	0.00140
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.50 : 1
Min. Overturning Safety Factor	=	1.50 : 1
AutoCalc Footing Weight as DL	:	Yes
AutoCalc Pedestal Weight as DL	:	No

Soil Design Values

Allowable Soil Bearing	=	1.50 ksf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Increases based on footing Depth

Reference Depth below Surface	=	3.0 ft
Allow. Pressure Increase per foot of depth	=	ksf
when base footing is below	=	ft

Increases based on footing Width

Allow. Pressure Increase per foot of width	=	ksf
when footing is wider than	=	ft

Dimensions

Width along X-X Axis	=	3.0 ft
Length along Z-Z Axi	=	3.0 ft
Footing Thicknes	=	10.0 in

Load location offset from footing center...

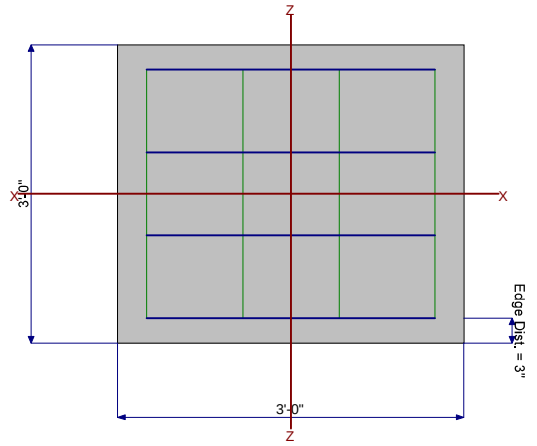
ex : Along X-X Axis	=	0 in
ez : Along Z-Z Axis	=	0 in

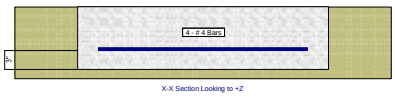
Pedestal dimensions...

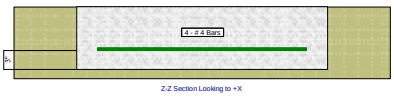
px : Along X-X Axis	=	in
pz : Along Z-Z Axis	=	in
Height	=	in

Rebar Centerline to Edge of Concrete..

at Bottom of footing	=	3.0 in







Reinforcing

Bars along X-X Axis		
Number of Bars	=	4.0
Reinforcing Bar Size	=	# 4
Bars along Z-Z Axis		
Number of Bars	=	4.0
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	1.240		8.10					k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:35PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (F5) Footing for C4 (Floor Bearing Beam Columns)

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.7727	Soil Bearing	1.159 ksf	1.50 ksf	+D+L+H
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.2344	Z Flexure (+X)	1.969 k-ft	8.40 k-ft	+1.20D+0.50Lr+1.60L+
PASS	0.2344	Z Flexure (-X)	1.969 k-ft	8.40 k-ft	+1.20D+0.50Lr+1.60L+
PASS	0.2344	X Flexure (+Z)	1.969 k-ft	8.40 k-ft	+1.20D+0.50Lr+1.60L+
PASS	0.2344	X Flexure (-Z)	1.969 k-ft	8.40 k-ft	+1.20D+0.50Lr+1.60L+
PASS	0.2059	1-way Shear (+X)	19.170 psi	93.113 psi	+1.20D+0.50Lr+1.60L+
PASS	0.2059	1-way Shear (-X)	19.170 psi	93.113 psi	+1.20D+0.50Lr+1.60L+
PASS	0.2059	1-way Shear (+Z)	19.170 psi	93.113 psi	+1.20D+0.50Lr+1.60L+
PASS	0.2059	1-way Shear (-Z)	19.170 psi	93.113 psi	+1.20D+0.50Lr+1.60L+
PASS	0.4143	2-way Punching	77.158 psi	186.23 psi	+1.20D+0.50Lr+1.60L+

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building
Dsgnr: Matt Hebdon
Project Desc.:
Project Notes :

Job # D09135.00

Printed: 15 OCT 2009, 7:35PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — **License Owner : SARGENT ENGINEERS INC**

Description : (F6) Footing for C5 (NW Entrance)

General Information

Calculations per IBC 2006, CBC 2007, ACI 318-05

Material Properties

f'c : Concrete 28 day strength	=	3.0	ksi
Fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
Φ Values Flexure	=	0.90	
Shear	=	0.850	

Analysis Settings

Min Steel % Bending Reinf.	=	0.00140	
Min Allow % Temp Reinf.	=	0.00180	
Min. Overturning Safety Factor	=	1.50	: 1
Min. Overturning Safety Factor	=	1.50	: 1
AutoCalc Footing Weight as DL	:	Yes	
AutoCalc Pedestal Weight as DL	:	No	

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

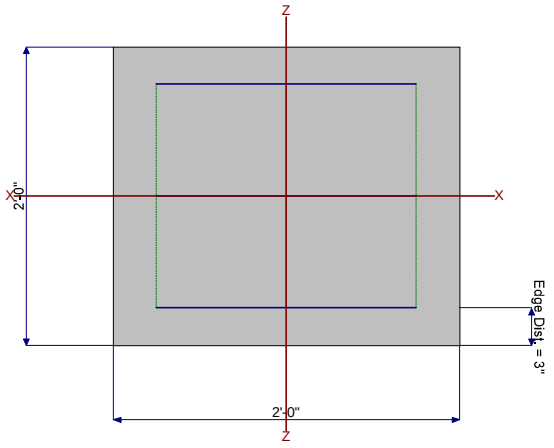
Reference Depth below Surface	=	3.0	ft
Allow. Pressure Increase per foot of depth	=		ksf
when base footing is below	=		ft

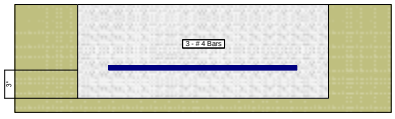
Increases based on footing Width

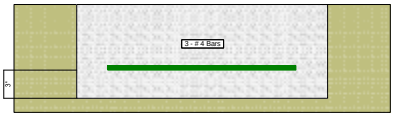
Allow. Pressure Increase per foot of width	=		ksf
when footing is wider than	=		ft

Dimensions

Width along X-X Axis	=	2.0	ft
Length along Z-Z Axi	=	2.0	ft
Footing Thicknes	=	10.0	in
Load location offset from footing center...			
ex : Along X-X Axis	=	0	in
ez : Along Z-Z Axis	=	0	in
Pedestal dimensions...			
px : Along X-X Axis	=		in
pz : Along Z-Z Axis	=		in
Height	=		in
Rebar Centerline to Edge of Concrete..			
at Bottom of footing	=	3.0	in







Reinforcing

Bars along X-X Axis			
Number of Bars	=	3.0	
Reinforcing Bar Size	=	# 4	
Bars along Z-Z Axis			
Number of Bars	=	3.0	
Reinforcing Bar Size	=	# 4	

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	0.420		1.660	1.050				k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:35PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (F6) Footing for C5 (NW Entrance)

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.4893	Soil Bearing	0.7340 ksf	1.50 ksf	+D+0.750L+0.750S+0.5
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.04946	Z Flexure (+X)	0.4674 k-ft	9.450 k-ft	+1.20D+0.50Lr+1.60L+
PASS	0.04946	Z Flexure (-X)	0.4674 k-ft	9.450 k-ft	+1.20D+0.50Lr+1.60L+
PASS	0.04946	X Flexure (+Z)	0.4674 k-ft	9.450 k-ft	+1.20D+0.50Lr+1.60L+
PASS	0.04946	X Flexure (-Z)	0.4674 k-ft	9.450 k-ft	+1.20D+0.50Lr+1.60L+
PASS	0.05101	1-way Shear (+X)	4.749 psi	93.113 psi	+1.20D+0.50Lr+1.60L+
PASS	0.05101	1-way Shear (-X)	4.749 psi	93.113 psi	+1.20D+0.50Lr+1.60L+
PASS	0.05101	1-way Shear (+Z)	4.749 psi	93.113 psi	+1.20D+0.50Lr+1.60L+
PASS	0.05101	1-way Shear (-Z)	4.749 psi	93.113 psi	+1.20D+0.50Lr+1.60L+
PASS	0.09443	2-way Punching	17.586 psi	186.23 psi	+1.20D+0.50Lr+1.60L+

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:35PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — **License Owner : SARGENT ENGINEERS INC**

Description : (F7) Footing for C6 (Deck Bearing Beam Columns)

General Information

Calculations per IBC 2006, CBC 2007, ACI 318-05

Material Properties

f'c : Concrete 28 day strength	=	3.0	ksi
Fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
Φ Values Flexure	=	0.90	
Shear	=	0.850	

Analysis Settings

Min Steel % Bending Reinf.	=	0.00140	
Min Allow % Temp Reinf.	=	0.00180	
Min. Overturning Safety Factor	=	1.50	: 1
Min. Overturning Safety Factor	=	1.50	: 1
AutoCalc Footing Weight as DL	:	Yes	
AutoCalc Pedestal Weight as DL	:	No	

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

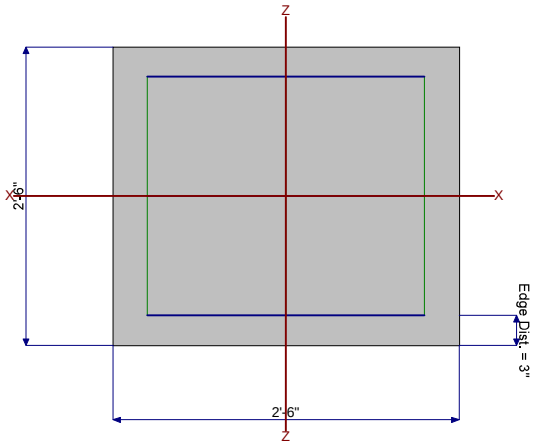
Reference Depth below Surface	=	3.0	ft
Allow. Pressure Increase per foot of depth	=		ksf
when base footing is below	=		ft

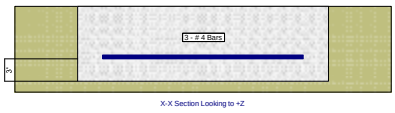
Increases based on footing Width

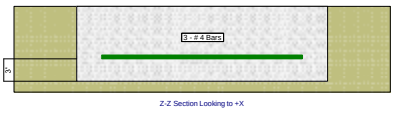
Allow. Pressure Increase per foot of width	=		ksf
when footing is wider than	=		ft

Dimensions

Width along X-X Axis	=	2.50	ft
Length along Z-Z Axi	=	2.50	ft
Footing Thicknes	=	10.0	in
Load location offset from footing center...			
ex : Along X-X Axis	=	0	in
ez : Along Z-Z Axis	=	0	in
Pedestal dimensions...			
px : Along X-X Axis	=		in
pz : Along Z-Z Axis	=		in
Height	=		in
Rebar Centerline to Edge of Concrete..			
at Bottom of footing	=	3.0	in







Reinforcing

Bars along X-X Axis		
Number of Bars	=	3.0
Reinforcing Bar Size	=	# 4
Bars along Z-Z Axis		
Number of Bars	=	3.0
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	1.060			6.420				k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

SARGENT

Sargent Engineers, Inc.

Title : SVRA Administration Building Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:35PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\admin bldg calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (F7) Footing for C6 (Deck Bearing Beam Columns)

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8787	Soil Bearing	1.318 ksf	1.50 ksf	+D+S+H
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.2058	Z Flexure (+X)	1.556 k-ft	7.560 k-ft	+1.20D+0.50L+1.60S
PASS	0.2058	Z Flexure (-X)	1.556 k-ft	7.560 k-ft	+1.20D+0.50L+1.60S
PASS	0.2058	X Flexure (+Z)	1.556 k-ft	7.560 k-ft	+1.20D+0.50L+1.60S
PASS	0.2058	X Flexure (-Z)	1.556 k-ft	7.560 k-ft	+1.20D+0.50L+1.60S
PASS	0.1698	1-way Shear (+X)	15.810 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.1698	1-way Shear (-X)	15.810 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.1698	1-way Shear (+Z)	15.810 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.1698	1-way Shear (-Z)	15.810 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.3236	2-way Punching	60.258 psi	186.23 psi	+1.20D+0.50L+1.60S

Appendix C: Barn Building Structural Calculations

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Barn
By:MH Date:10/15/2009

Subject:
Structural Calcs

Project Location and Design Criteria

Project #:	D09135.00
Project Title:	Star Valley Ranch Association - Barn
Client:	Star Valley Ranch Association P.O. Box 7008 781 Vista East Dr. Star Valley Ranch, WY 83127 307-883-2669 fax: 307-883-2016
Location:	Cedar Creek Drive Star Valley Ranch, WY 83127
Date Started:	08/24/09
Codes:	IBC 2006 Edition ASCE 7-05 NDS 2005 Edition ACI 318-05 AISC Steel Construction Manual, 13 Ed.
Occupancy Category:	II (ASCE 7-05 Table 1-1)

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Barn
By:MH Date:10/15/2009

Subject:
Structural Calcs

Vertical Loads

Roof:

$pitch := 5$	Roof Pitch (__/12)
$surface := S$	Roof Surface (S=Slippery, N=Non-Slippery)
$C_e := 1.0$	Exposure Factor (ASCE 7-05 Table 7-2)
$C_t := 1.1$	Thermal Factor (ASCE 7-05 Table 7-3)
$I := 1.0$	Snow Importance Factor (ASCE 7-05 Table 7-4)
$p_g := 130psf$	Ground Snow Load (Local Building Department)
$p_f := 0.7 \cdot C_e \cdot C_t \cdot I \cdot p_g$	
$p_f = 100.1 \cdot psf$	Flat Roof Snow Load
$dl_r := 15psf$	Roof Dead Load
$sl_{rs.14} := 35psf$	14/12 Sloped Roof Snow Load
$sl_{rs.5} := 80psf$	5/12 Sloped Roof Snow Load
$sl_{rd} := 169psf$	Drift Snow Load

Floor:

$dl_f := 15psf$	Floor Dead Load
$ll_f := 100psf$	Floor Live Load

Walls:

$dl_w := 10psf$	Wall Dead Load
$dl_{cw.8} := 150pcf \cdot 8in$	8" Concrete Wall Dead Load

Variables Defined

w	Uniform Load
P	Point Load
a	Distance to Point Load (assumed from left edge of beam u.n.o.)
L	Length
L_a	Cantilever Length
h	Height
h_{ret}	Retained Soil Height
h_{toe}	Soil Height above Toe
h_{xunb}	Column Unbraced Height in X-X Axis
h_{yunb}	Column Unbraced Height in Y-Y Axis
q_{brg}	Bearing Capacity of Soil

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Barn
By:MH Date:10/15/2009

Subject:
Structural Calcs

Seismic Load Summary

Procedure:	ASCE 7-05 12.8 Equivalent Lateral Force
S_S:	1.3303
S_1:	0.5098
Site Class:	D
S_{DS}:	0.887
S_{D1}:	0.510
R:	6.5
Seismic Design Cat.:	D
h_n:	33ft
$C_S := 0.0955$	Seismic Response Coefficient

Wind Load Summary

Procedure:	ASCE 7-05 6.4 Simplified Procedure
Exposure:	C
Wind Speed:	90 mph
Importance Factor:	1.0
Transverse Direction:	
$p_{T.A} := 24.6psf$	Zone A Transverse Wind Pressure
$p_{T.B} := 16.9psf$	Zone B Transverse Wind Pressure
$p_{T.C} := 19.6psf$	Zone C Transverse Wind Pressure
$p_{T.D} := 13.5psf$	Zone D Transverse Wind Pressure
Longitudinal Direction:	
$p_{L.A} := 21.9psf$	Zone A Longitudinal Wind Pressure
$p_{L.B} := 14.5psf$	Zone B Longitudinal Wind Pressure

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:57PM

ASCE 7-05 Seismic Factor Determination

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : --None--

Occupancy Category

Calculations per IBC 2006 & ASCE 7-05

Occupancy Category of Building or Other Structure : "II" : All Buildings and other structures except those listed as Category I, III, and IV — *ACSE 7-05, Page 3, Table 1-1*

Occupancy Importance Factor = 1 — *ACSE 7-05, Page 116, Table 11.5-1*

Ground Motion, Using USGS Database values

ASCE 7-05 9.4.1.1

Max. Ground Motions, 5% Damping :

S_S = 1.330 g, 0.2 sec response
S_1 = 0.5098 g, 1.0 sec response

Longitude = 111.006 deg West
Latitude = 42.932 deg North
Location : THAYNE, WY 83127

Site Class, Site Coeff. and Design Category

Site Classification "D" : Shear Wave Velocity 600 to 1,200 ft/sec = D — *ASCE 7-05 Table 20.3-1*

Site Coefficients Fa & Fv — *ASCE 7-05 Table 11.4-1 & 11.4-2*
(using straight-line interpolation from table values)
Fa = 1.00
Fv = 1.50

Maximum Considered Eartquake Acceleration — *ASCE 7-05 Table 11.4-3*
S_{MS} = Fa * Ss = 1.330
S_{M1} = Fv * S1 = 0.765

Design Spectral Acceleration — *ASCE 7-05 Table 11.4-4*
$S_{DS} = S_{MS} * 2/3$ = 0.887
$S_{D1} = S_{M1} * 2/3$ = 0.510

Seismic Design Category = D *(SD1 is most severe)* — *ASCE 7-05 Table 11.6-1*

Resisting System

ASCE 7-05 Table 12.2-1

Basic Seismic Force Resisting System . . . Bearing Wall Systems
Light-framed walls sheathed w/wood structural panels rated for shear resistance or steel sheets.

Response Modification Coefficient " R " = 6.50
System Overstrength Factor " Wo " = 3.00
Deflection Amplification Factor " Cd " = 4.00

NOTE! See ASCE 7-05 for all applicable footnotes.

Building height Limits :
Category "A & B" Limit: No Limit
Category "C" Limit: No Limit
Category "D" Limit: Limit = 65
Category "E" Limit: Limit = 65
Category "F" Limit: Limit = 65

Redundancy Factor

ASCE 7-05 Section 12.3.4

Seismic Design Category of D, E, or F therefore Redundancy Factor " p " = 1.3

Lateral Force Procedure

ASCE 7-05 Section 12.8

Equivalent Lateral Force Procedure

The "Equivalent Lateral Force Procedure" is being used according to the provisions of ASCE 7-05 12.8

Determine Building Period

Use ASCE 12.8-7

Structure Type for Building Period Calculation : All Other Structural Systems

" Ct " value = 0.020
" x " value = 0.75
" hn " : Height from base to highest level = 33.0 ft

" Ta " Approximate fundemental period using Eq. 12.8-7 : Ta = Ct * (hn ^ x) = 0.275 sec
"TL" : Long-period transition period per ASCE 7-05 Maps 22-15 -> 22-20 = 8.000 sec

Building Period " Ta " Calculated from Approximate Method selected = 0.275 sec

" Cs " Response Coefficient

ASCE 7-05 Section 12.8.1.1

S_{DS}: Short Period Design Spectral Response = 0.887
" R " : Response Modification Factor = 6.50
" I " : Occupancy Importance Factor = 1

From Eq. 12.8-2, Preliminary Cs = 0.136
From Eq. 12.8-3 & 12.8-4 , Cs need not exceed = 0.285
From Eq. 12.8-5 & 12.8-6, Cs not be less than = 0.010

Cs : Seismic Response Coefficient = S_{DS} / (R/I) * 0.70 = 0.0955

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:57PM

ASCE 7-05 Seismic Factor Determination

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : --None--

Seismic Base Shear

Calculated for Allowable Stress Design Load Combinations *ASCE 7-05 Section 12.8.3*

Cs = 0.0955 from 12.8.1.1

Vertical Distribution of Seismic Forces

" k " : hx exponent based on Ta = 1.00

W (see Sum Wi below) = 0.00 k

Seismic Base Shear V = Cs * W = 0.00 k

Table of building Weights by Floor Level...

Level #	Wi : Weight	Hi : Height	(Wi * Hi) ^k	Cvx	Fx=Cvx * V	Sum Story Shear	Sum Story Moment

Sum Wi = 0.00 k Sum Wi * Hi = 0.00 k-ft Total Base Shear = 0.00 k Base Moment = 0.0 k-ft

Diaphragm Forces : Seismic Design Category "D", "E" & "F"

ASCE 7-05 9.5.2.6.4.4

Level #	Wi	Fi	Sum Fi	Sum Wi	Fpx

Wpx . . . . . Weight at level of diaphragm and other structure elements attached to it.
Fi . . . . . Design Lateral Force applied at the level.
Sum Fi . . . . . Sum of "Lat. Force" of current level plus all levels above
MIN Req'd Force @ Level . . . . . $0.20 * S_{DS} * I * Wpx$
MAX Req'd Force @ Level . . . . . $0.40 * S_{DS} * I * Wpx$
Fpx : Design Force @ Level . . . . . Wpx * SUM(x->n) Fi / SUM(x->n) wi, x = Current level, n = Top Level

Wall Anchorage

Concrete & Masonry Wall Normal Force : Minimum Force per ACSE 7-05 12.11.1

Minimum Factor : 0.40 * SDS * Importance * Weight = 0.3547 * Weight

Concrete & Masonry Wall Anchorage : Seismic Design Category "C" & "D" per ACSE 7-05 12.11.2.1

Actual Wall Weight Tributary to Anchor = lbs/ lin. ft

Fp : Anchorage Design Force . . .

Rigid Diaphragm Design Force = 0.40 * SDS * I * Trib. Weight = 0.00 lbs / foot

Flexible Diaphragm Design Force = 0.80 * SDS * I * Trib. Weight = 0.00 lbs / foot

Combination of Load Effects

ASCE 7-05 12.4.2.3

Load Description	D Dead Load	Qe Seismic Load		E H & V Load Effect
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000

55 South Main, PO Box 441
Driggs, ID 83422
ph. (208)354-4400 fax (208) 354-4420

Calculation by: Matt Hebdon
Date: 9/16/2009

Calculation of Wind Pressures for Low-Rise Buildings
2006 IBC 1609, ACSE 7-05
Simplified provisions for Low-Rise buildings per Section 6.4

Building Data:

Location	SVRA Barn - Star Valley Ranch, WY
Terrain	Open Terrain

Dimensions

Width	52	ft	
Length	108	ft	
Eave ht.	10.5	ft	
Roof slope (vertical)	14.00	V:12	49.40 degrees
Mean roof ht.	22.00	ft.	

Basic Wind Speed	90 mph	Figure 6-1
Exposure	C	Section 6.5.6
Building Category	2	Table 1-1
Wind Importance Factor (Iw)	1.00	Table 6-1
Height and Exposure Coeff.	1.31	Figure 6-2 (Interpolate from table)
Topographic Factor (Kzt)	1.00	Section 6.5.7
Alt Basic Load Comb w	1.3	Wind force adjustment factor for load combinations

Check:
Mean roof ht must be equal to or less than the least horizontal dimension or 60 ft. Whichever is less
If the above condition is met continue, else this method cannot be used to calculate wind pressures.

Edge Strip and End Zone Calculation

10% of least horizontal dimension	5.2 ft
40% of the mean roof height	8.8 ft
not less than 4% of least hor. dim.	2.1 ft
not less than 3 ft.	3.0 ft
Edge Strip Width	5.2 ft
End Zone Width	**10.4 ft**

Apply End Zone pressures to one corner of building for wind base shear

Basic Wind Pressure [3]

Load Case	Roof Pitch Flat	Horizontal Pressures A	B	C	D	Vertical Pressures E	F	G	H	Overhang Eoh	Goh
Transverse 1	49.40	14.4	9.9	11.5	7.9	1.1	-8.8	0.4	-7.5	-5.1	-5.8
Transverse 2	49.40	14.4	9.9	11.5	7.9	5.6	-4.3	4.8	-3.1	-5.1	-5.8
Longitudinal	0	12.8	N/A	8.5	N/A	-15.4	-8.8	-10.7	-6.8	-21.6	-16.9

Use with Alternate Basic Load Combinations of 1605.3.2 (w=1.3)

Revised for Height and Exposure, and Importance Factors, and w

Loading in Transvers Direction (Fig. 2)										
Load Case 1	24.6	16.9	19.6	13.5	1.9	-15.0	0.7	-12.8	-8.7	-9.9
Loac Case 2					9.6	-7.3	8.2	-5.3	-8.7	-9.9
Building Surf. Location	A	B	C	D	E	F	G	H		

Loading in Longitudinal Direction (Fig 3)										
Wind Pressure	21.9	N/A	14.5	N/A	-26.3	-15.0	-18.3	-11.6	-36.9	-28.9
Building Surf. Zone	A	B	C	D	E	F	G	H	NA	NA

Notes:
1. Pressures are applied in accordance with the loading diagrams shown in Fig.1.
2. Plus and minus signs signify pressures acting toward and away from the projected surfaces.
3. Transverse and longitudinal loads for a building with mean roof ht 30 ft. Figure 6-2 Basic wind speed of 90 mph.
4. Longitudinal & Transverse Zones listed for gable wall or hip conditions, respectively.

Base Shear Summation of Wind Forces

Transverse Wind Zone Area (square feet)

Transverse area for each building zone (for Vertical zones use tributary area per holdown devise)

Building Surf. Zone	A	B	C	D
Transverse	0	0	0	0
Longitudinal (See note 4)	0	N/A	0	N/A

Transverse Base Wind Shear by Zone (Pounds)

Transverse Load Case 1	0	0	0	0
Longitudinal (See note 4)	0	N/A	0	N/A

Total Horizontal Transverse Base Wind Shear			***Min. Wind Shear (10 psf)***
Transverse	0	lbs.	0 lbs.

Longitudinal Wind Zone Area (square feet)

Longitudinal area for each building zone (for Vertical zones use tributary area per holdown devise)

Building Surf. Zone	A	B	C	D
Longitudinal	0	N/A	0	N/A
Transverse (See note 4)	0	0	0	0

Longitudinal Base Wind Shear by Zone (Pounds)

Longitudinal	0	N/A	0	N/A
Transverse (See note 4)	0	0	0	0

Total Horizontal Longitudinal Base Wind Shear			***Min. Wind Shear (10 psf)***
Longitudinal	0	lbs.	0 lbs.

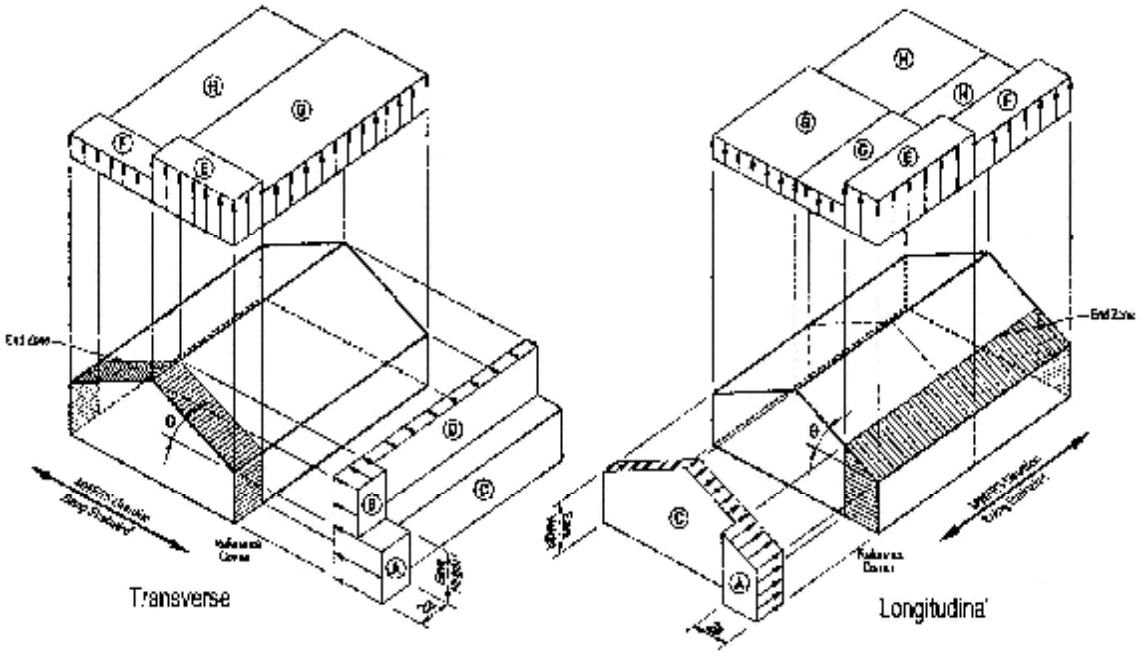


FIGURE 1609.6.2.1
MAIN WINDFORCE LOADING DIAGRAM

Figure 1. Main Wind Force Loading Diagram

Positive Value = pressure
Negative Value = suction

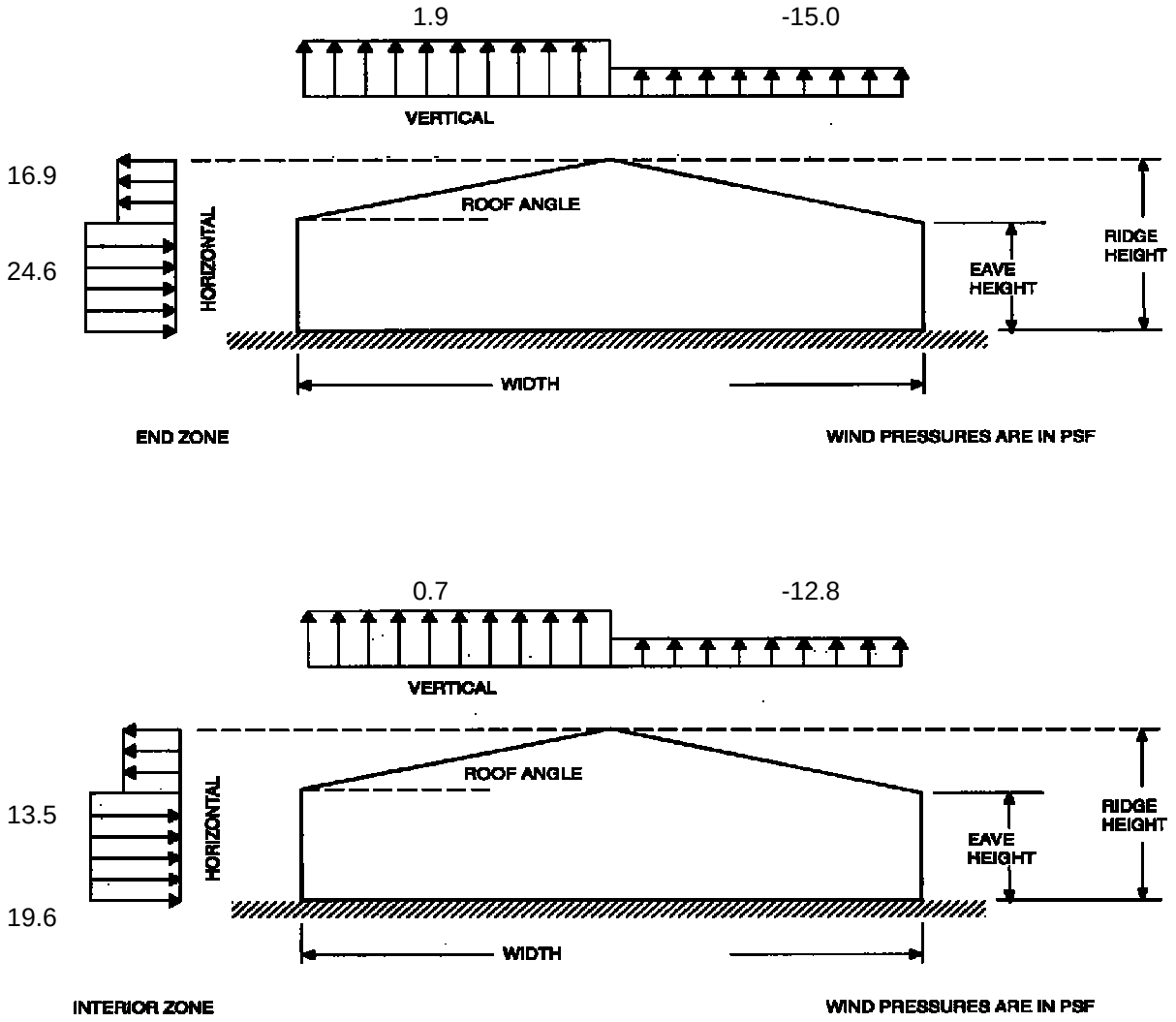


Figure 2. Application of MWFRS Loads in the Transverse Direction

Positive Value = pressure
Negative Value = suction

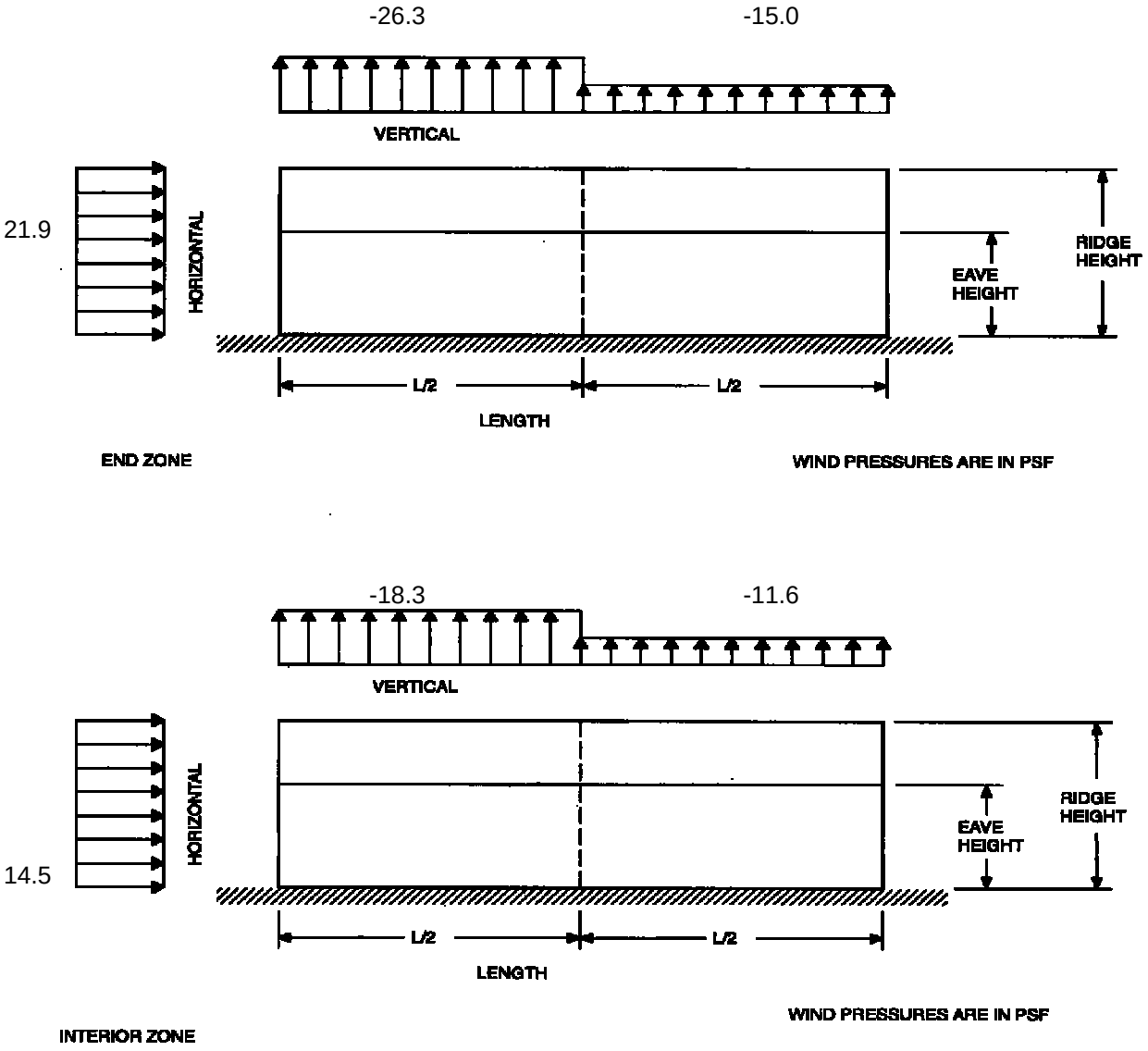


Figure 3. Application of MWFRS Loads in the Longitudinal Direction

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Barn
By:MH Date:10/15/2009

Subject:
Structural Calcs

(1) Shear Wall

$V_w := p_{T.A}\cdot\left(43ft^2\right) + p_{T.B}\cdot\left(293ft^2\right) + p_{T.C}\cdot\left(175ft^2\right) + p_{T.D}\cdot\left(988ft^2\right) + p_{L.A}\cdot\left(0ft^2\right) + p_{L.B}\cdot\left(0ft^2\right)$

$V_w = 22777.5\,lbf$ Wind Shear Force

$V_s := C_s\cdot\left[\left(dl_r + 0.2\cdot sl_{rs.5}\right)\cdot\left(1508ft^2 + 650ft^2\right) + \left(dl_r + 0.2\cdot sl_{rs.14}\right)\cdot\left(2\cdot 840ft^2\right) + dl_w\cdot(5.5ft)\cdot(160ft)\right]$

$V_s = 10758.84\,lbf$ Seismic Shear Force

$V := \max\left(V_w, V_s\right)$ $V = 22777.5\,lbf$ Shear Force

$L_1 := 52ft - 4\cdot 4ft - 5.5ft$ $C_{o1} := 0.75$ Perforated Shear Wall

$L_\Sigma := \left(C_{o1}\cdot L_1\right)$ $L_\Sigma = 22.87\,ft$ Equivalent Shear Wall Length

$h := 11ft$ Shear Wall Height

$\nu := \frac{V}{L_\Sigma}$ $\nu = 995.74\cdot plf$ Wall Shear Type 9 Wall $\nu_{allow} := 1060plf$

$L_t := 52ft$ Total Length of Wall Line

$L_x := 52ft$ Location of Critical Drag

$D := \left(\frac{V}{L_t}\right)$ $D = 438.03\cdot plf$ Shear Drag Force Use Simpson A35 @ 12" o.c. G.F. 450plf

$D := \left(\frac{V}{L_t}\right)\cdot L_x - \left(C_{o1}\cdot L_1\right)\cdot\nu_{allow}$ $D = -1470\cdot lbf$ Critical Drag Force No critical Drag

$L_{min} := \min\left(C_{o1}\cdot L_1\right)$ $L_{min} = 22.87\,ft$ Minimum Equivalent Wall Segment

$P := \nu\cdot h - \frac{\left[L_t\cdot\left[dl_r\cdot(2ft) + dl_w\cdot\left(\frac{h}{2}\right)\right]\right]}{2}$

$P = 8743.11\,lbf$ Uplift Load

Use Simpson HDU11-SDS2.5 to Foundation
w/ (4) 2x6 DF-L No. 2 Studs G.F. 9535lbf

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Barn
By:MH Date:10/15/2009

Subject:
Structural Calcs

(2) Shear Wall

$V_w := p_{T.A}\cdot(43ft^2) + p_{T.B}\cdot(259ft^2) + p_{T.C}\cdot(175ft^2) + p_{T.D}\cdot(988ft^2) + p_{L.A}\cdot(0ft^2) + p_{L.B}\cdot(0ft^2)$

$V_w = 22202.9\,lbf$ Wind Shear Force

$V_s := C_s\cdot\left[(dl_r + 0.2\cdot sl_{rs.5})\cdot(1430ft^2) + (dl_r + 0.2\cdot sl_{rs.14})\cdot(2\cdot 840ft^2) + dl_w\cdot(5.5ft)\cdot(160ft)\right]$

$V_s = 8603.59\,lbf$ Seismic Shear Force

$V := \max(V_w, V_s)$ $V = 22202.9\,lbf$ Shear Force

$L_1 := 52ft - 5\cdot 4ft$ $C_{o1} := 0.97$ Perforated Shear Wall

$L_\Sigma := (C_{o1}\cdot L_1)$ $L_\Sigma = 31.04\,ft$ Equivalent Shear Wall Length

$h := 11ft$ Shear Wall Height

$\nu := \frac{V}{L_\Sigma}$ $\nu = 715.3\cdot plf$ Wall Shear Type 6 Wall $\nu_{allow} := 770plf$

$L_t := 52ft$ Total Length of Wall Line

$L_x := 52ft$ Location of Critical Drag

$D := \left(\frac{V}{L_t}\right)$ $D = 426.98\cdot plf$ Shear Drag Force Use Simpson A35 @ 12" o.c. G.F. 450plf

$D := \left(\frac{V}{L_t}\right)\cdot L_x - (C_{o1}\cdot L_1)\cdot\nu_{allow}$ $D = -1697.9\cdot lbf$ Critical Drag Force No critical Drag

$L_{min} := \min(C_{o1}\cdot L_1)$ $L_{min} = 31.04\,ft$ Minimum Equivalent Wall Segment

$P := \nu\cdot h - \frac{\left[L_t\cdot\left[dl_r\cdot(2ft) + dl_w\cdot\left(\frac{h}{2}\right)\right]\right]}{2}$

$P = 5658.3\,lbf$ Uplift Load

Use Simpson HDU8-SDS2.5 to Foundation G.F. 5980lbf

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Barn
By:MH Date:10/15/2009

Subject:
Structural Calcs

(A) Shear Wall

$V_w := p_{T.A}\cdot(0ft^2) + p_{T.B}\cdot(0ft^2) + p_{T.C}\cdot(0ft^2) + p_{T.D}\cdot(0ft^2) + p_{L.A}\cdot(133ft^2) + p_{L.B}\cdot(365ft^2)$

$V_w = 8205.2\,lbf$ Wind Shear Force

$V_s := C_s\cdot\left[\left(dl_r + 0.2\cdot sl_{rs.5}\right)\cdot\left(1469ft^2 + 325ft^2\right) + \left(dl_r + 0.2\cdot sl_{rs.14}\right)\cdot\left(1665ft^2\right) + dl_w\cdot(5.5ft)\cdot(160ft)\right]$

$V_s = 9649.7\,lbf$ Seismic Shear Force

$V := \max(V_w, V_s)$ $V = 9649.7\,lbf$ Shear Force

$L_1 := 81ft - 5\cdot 4ft - 8ft$ $C_{o1} := 0.78$ Perforated Shear Wall

$L_\Sigma := (C_{o1}\cdot L_1)$ $L_\Sigma = 41.34\,ft$ Equivalent Shear Wall Length

$h := 11ft$ Shear Wall Height

$\nu := \frac{V}{L_\Sigma}$ $\nu = 233.42\cdot plf$ Wall Shear Type 1 Wall $\nu_{allow} := 240plf$

$L_t := 108ft$ Total Length of Wall Line

$L_x := 19ft$ Location of Critical Drag

$D := \left(\frac{V}{L_t}\right)$ $D = 89.35\cdot plf$ Shear Drag Force

Use Simpson H1 Each Rafter
G.F. 242 plf

$D := \left(\frac{V}{L_t}\right)\cdot L_x$ $D = 1697.63\cdot lbf$ Critical Drag Force

Use Simpson CMSTC16 from SW corner to min. 24" of Wall Segment North of Breezeway Connector
G.F. 4585lbf

$L_{min} := \min(C_{o1}\cdot L_1)$ $L_{min} = 41.34\,ft$ Minimum Equivalent Wall Segment

$P := \nu\cdot h - \frac{\left[L_t\cdot\left[dl_r\cdot(6.5ft) + dl_w\cdot\left(\frac{h}{2}\right)\right]\right]}{2}$

$P = -5667.35\,lbf$ Uplift Load

No Holdown Required

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Barn
By:MH Date:10/15/2009

Subject:
Structural Calcs

(B) Shear Wall

$V_w := p_{T.A}\cdot(0ft^2) + p_{T.B}\cdot(0ft^2) + p_{T.C}\cdot(0ft^2) + p_{T.D}\cdot(0ft^2) + p_{L.A}\cdot(133ft^2) + p_{L.B}\cdot(365ft^2)$

$V_w = 8205.2\,lbf$ Wind Shear Force

$V_s := C_s\cdot\left[\left(dl_r + 0.2\cdot sl_{rs.5}\right)\cdot\left(1469ft^2 + 325ft^2\right) + \left(dl_r + 0.2\cdot sl_{rs.14}\right)\cdot\left(1665ft^2\right) + dl_w\cdot(5.5ft)\cdot(160ft)\right]$

$V_s = 9649.7\,lbf$ Seismic Shear Force

$V := \max(V_w, V_s)$ $V = 9649.7\,lbf$ Shear Force

$L_1 := 92ft - 6\cdot 4ft - 3ft$ $C_{o1} := 0.81$ Perforated Shear Wall

$L_\Sigma := (C_{o1}\cdot L_1)$ $L_\Sigma = 52.65\,ft$ Equivalent Shear Wall Length

$h := 11ft$ Shear Wall Height

$\nu := \frac{V}{L_\Sigma}$ $\nu = 183.28\cdot plf$ Wall Shear Type 1 Wall $\nu_{allow} := 240plf$

$L_t := 108ft$ Total Length of Wall Line

$L_x := 8ft$ Location of Critical Drag

$D := \left(\frac{V}{L_t}\right)$ $D = 89.35\cdot plf$ Shear Drag Force Use Simpson H1 Each Rafter G.F. 242 plf

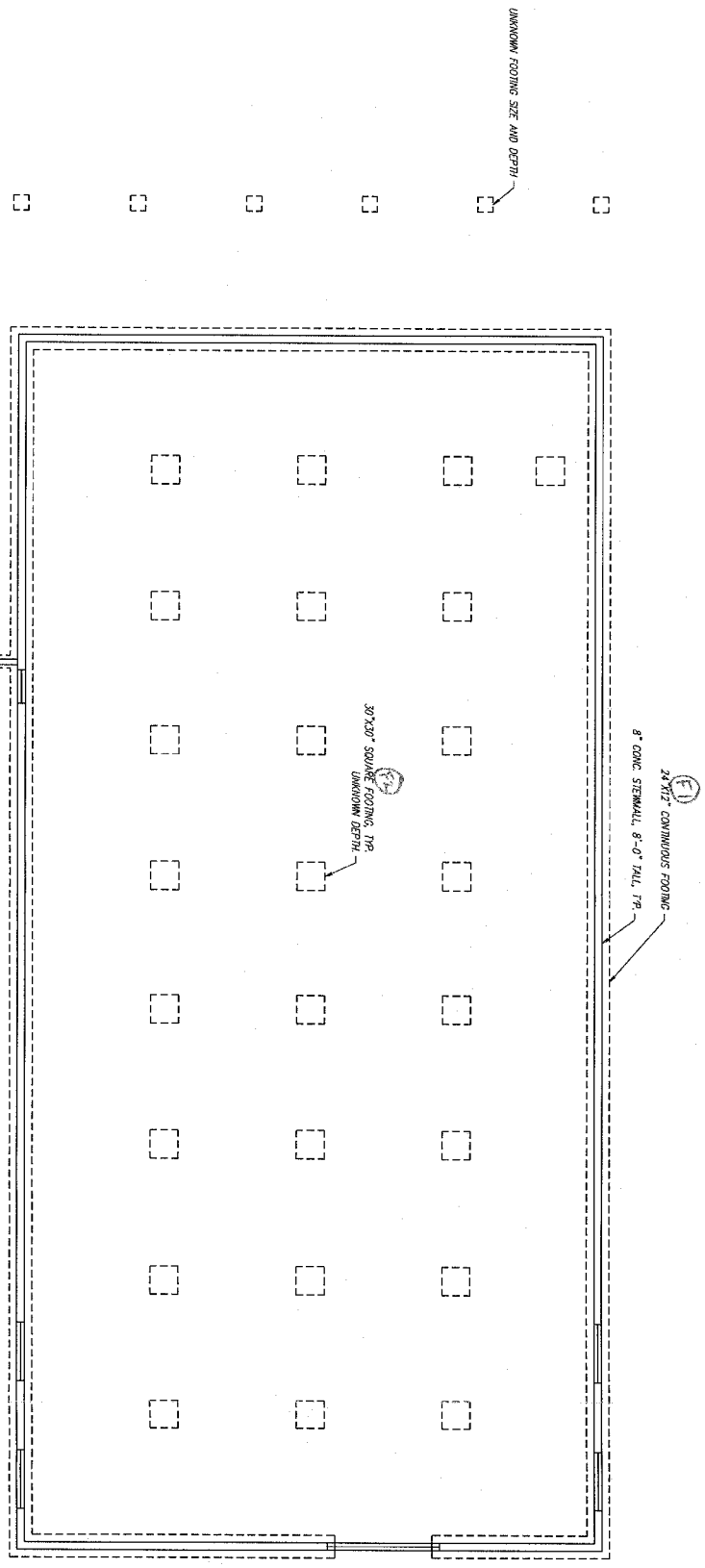
$D := \left(\frac{V}{L_t}\right)\cdot L_x$ $D = 714.79\cdot lbf$ Critical Drag Force Top Plate Okay

$L_{min} := \min(C_{o1}\cdot L_1)$ $L_{min} = 52.65\,ft$ Minimum Equivalent Wall Segment

$P := \nu\cdot h - \frac{\left[L_t\cdot\left[dl_r\cdot(6.5ft) + dl_w\cdot\left(\frac{h}{2}\right)\right]\right]}{2}$

$P = -6218.92\,lbf$ Uplift Load

No Holdown Required



BARN FOUNDATION PLAN

Scale: 1/8" = 1'-0"

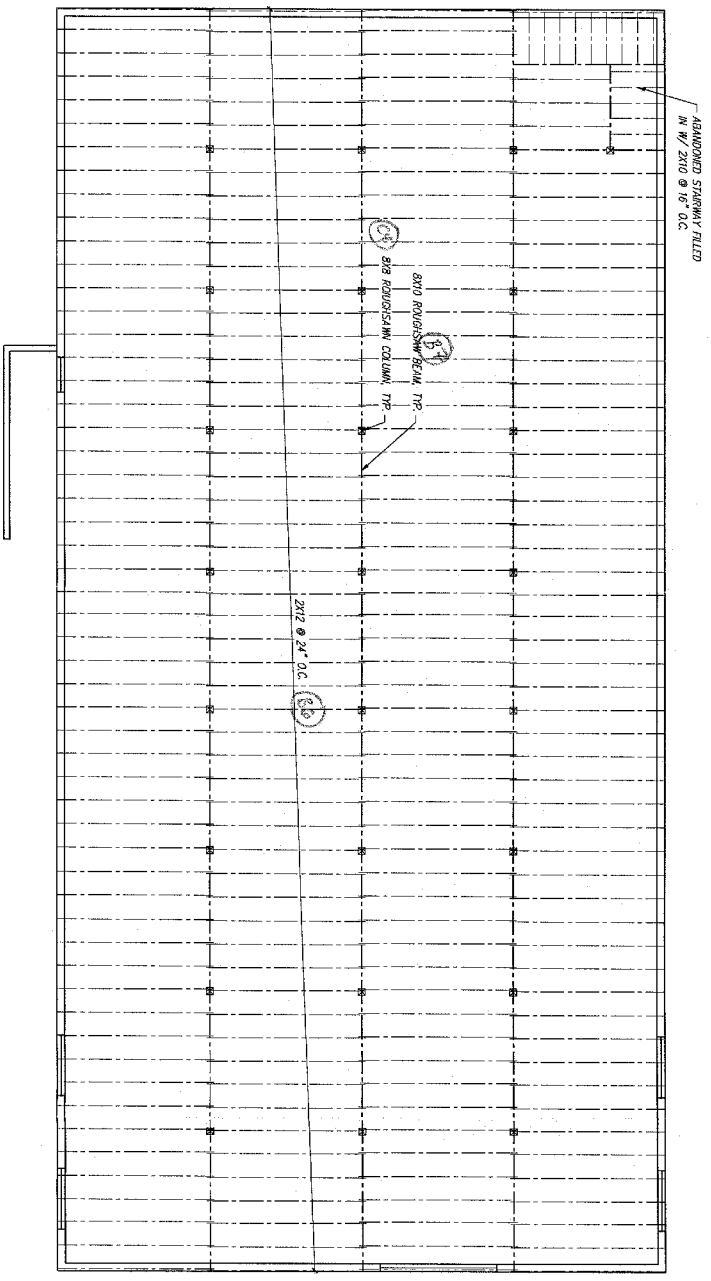
Designed by:	
Checked by:	
Fld. Dwelnr:	MHH
Detailer:	MHH
Issue Date:	08/14/2009
Project No.:	009135.00
Drwg. No.:	
SHEET NO.	S4.1
OF SHEETS	14

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH

BARN FOUNDATION PLAN

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

Rev.	Date	By	Description



BARN 1ST FLOOR FRAMING PLAN

Scale: 1/8" = 1'-0"

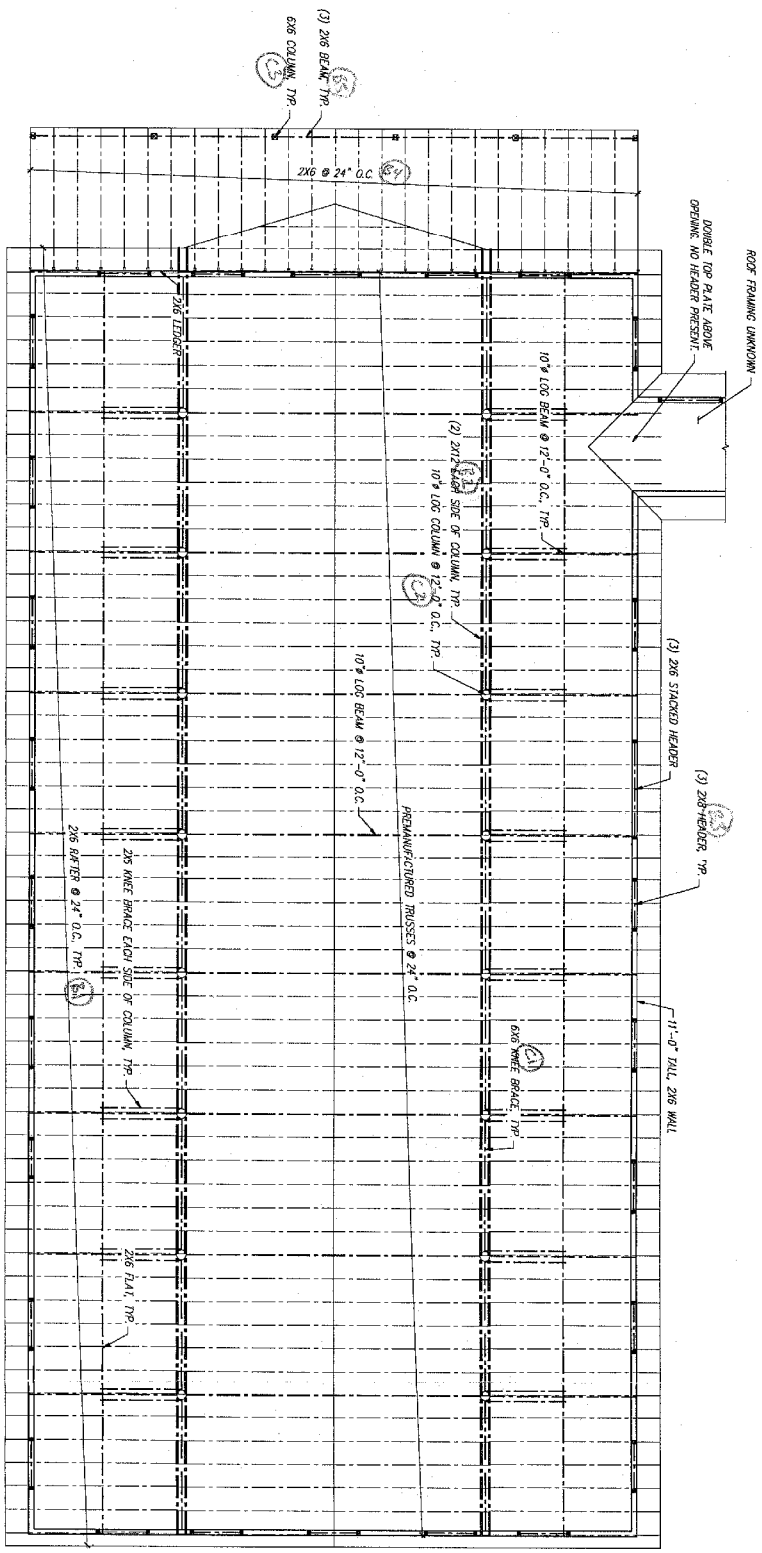
SHEET NO.	S4.2
OF SHEETS	14
Designed by:	-
Checked by:	-
Pr. Detailer:	MHH
Drawn by:	MHH
Issue Date:	08/04/2009
Project Rev.:	009135.00
Client Ref.:	

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH

BARN 1ST FLOOR FRAMING PLAN

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

Rev.	Date	By	Description



BARN ROOF FRAMING PLAN

Scale: 1/8" = 1'-0"

SHEET NO. S4.3	Designed by:	STAR VALLEY RANCH ASSOCIATION	SARGENT Sargent Engineers, Inc. 1290 Arrowhead Plaza Way Driggs, Idaho 83422 Tel. 208 354-4400 • Fax 208 354-4420
OF 14 SHEETS	Checked by:	AS-BUILT DRAWINGS	
	Pr. Detailer:	STAR VALLEY RANCH	
	Detailer: MHH	BARN ROOF FRAMING PLAN	
	Issue Date: 09/14/2009		
	Project No.: 009135.00		
	Drawn Ref.:		

Rev.	Date	By	Description

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Barn
By:MH Date:10/15/2009

Subject:
Structural Calcs

(B1) 14/12 Rafters

$w_{dl} := dl_r \cdot (2ft)$ $w_{dl} = 30 \cdot plf$

$w_{sl} := sl_{rs.14} \cdot (2ft)$ $w_{sl} = 70 \cdot plf$

$L := 13ft$ $L_a := 2ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.43 \cdot in$

Existing: 2x6 DF-L No. 2 @ 24" o.c.
Condition: 274% of Capacity
Required: 2x12 DF-L No. 2 @ 24" o.c.

(B1b) Trusses

$w_{dl} := dl_r \cdot (1ft)$ $w_{dl} = 15 \cdot plf$

Trapezoidal Load 1 Start @ 0ft, End @ 13ft

$w_{sl} := 24psf \cdot 1ft$ $w_{sl} = 24 \cdot plf$

Trapezoidal Load 2 Start @ 13ft, End @ 26ft

$w_{sl} := 137psf \cdot 1ft$ $w_{sl} = 137 \cdot plf$

$L := 26ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.87 \cdot in$

$w_{dl.1} := 200plf$ $w_{dl.2} := 200plf$

$w_{sl.1} := 680plf$ $w_{sl.2} := 1410plf$

(B2) Truss/Rafter Bearing Beam

$w_{dl} := w_{dl.2} + \frac{(190lbf)}{2ft}$ $w_{dl} = 295 \cdot plf$

$w_{sl} := w_{sl.2} + \frac{(440lbf)}{2ft}$ $w_{sl} = 1630 \cdot plf$

$L := 5ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.17 \cdot in$

Existing: (4) 2x12 DF-L No. 2
Condition: 64% of Capacity - Okay

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:56PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (B1) 14/12 Rafters

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

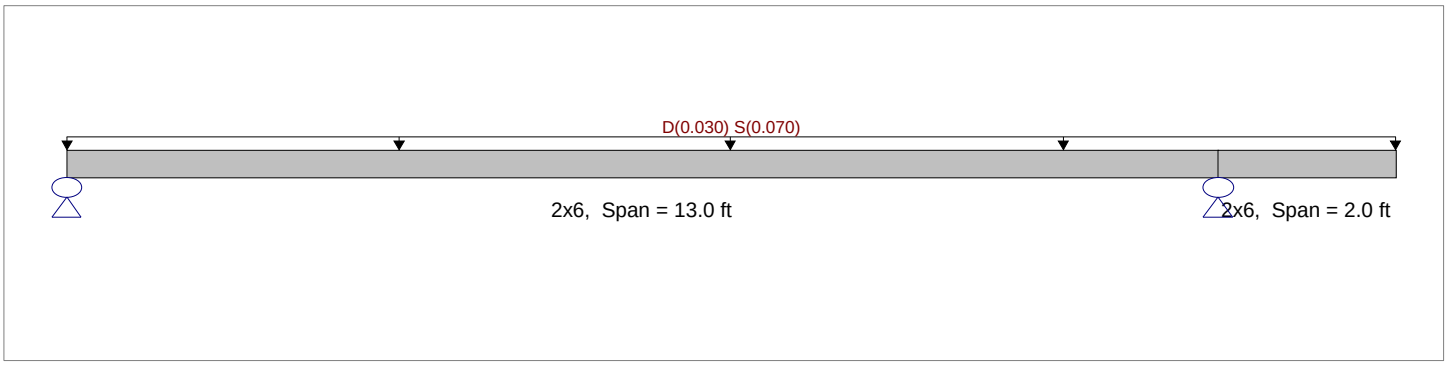
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.030, S = 0.070 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	2.731 : 1	Maximum Shear Stress Ratio	=	0.632 : 1
Section used for this span		2x6	Section used for this span		2x6
fb : Actual	=	3,195.10 psi	fv : Actual	=	113.71 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	6.300 ft	Location of maximum on span	=	12.600 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	1.291 in
Max Upward L+Lr+S Deflection	=	-0.595 in
Live Load Deflection Ratio	=	80 <360
Max Downward Total Deflection	=	1.844 in
Max Upward Total Deflection	=	-0.850 in
Total Deflection Ratio	=	56 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	1.8445	6.500		0.0000	0.000
	2	0.0000	6.500	D+L+S	-0.8504	2.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	0.635 k
Support 2, (D+L+S)	0.865 k
Support 3, ()	k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.635	0.865	
D Only	0.190	0.260	
S Only	0.444	0.606	
D+L+S	0.635	0.865	

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:56PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (B1) Req - 14/12 Rafters

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

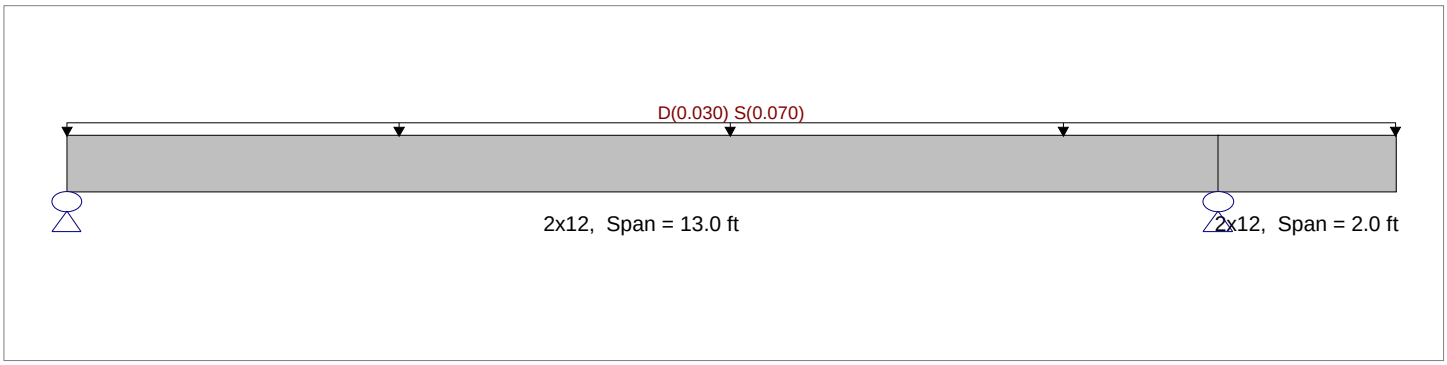
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.030, S = 0.070 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.849 : 1	Maximum Shear Stress Ratio	=	0.329 : 1
Section used for this span		2x12	Section used for this span		2x12
fb : Actual	=	763.67 psi	fv : Actual	=	59.15 psi
FB : Allowable	=	900.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	6.300 ft	Location of maximum on span	=	13.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.151 in
Max Upward L+Lr+S Deflection	=	-0.070 in
Live Load Deflection Ratio	=	690
Max Downward Total Deflection	=	0.216 in
Max Upward Total Deflection	=	-0.099 in
Total Deflection Ratio	=	482

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.2155	6.500		0.0000	0.000
	2	0.0000	6.500	D+L+S	-0.0994	2.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	0.635 k
Support 2, (D+L+S)	0.865 k
Support 3, ()	k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.635	0.865	
D Only	0.190	0.260	
S Only	0.444	0.606	
D+L+S	0.635	0.865	

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:56PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — **License Owner : SARGENT ENGINEERS INC**

Description : (B1b) Trusses

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

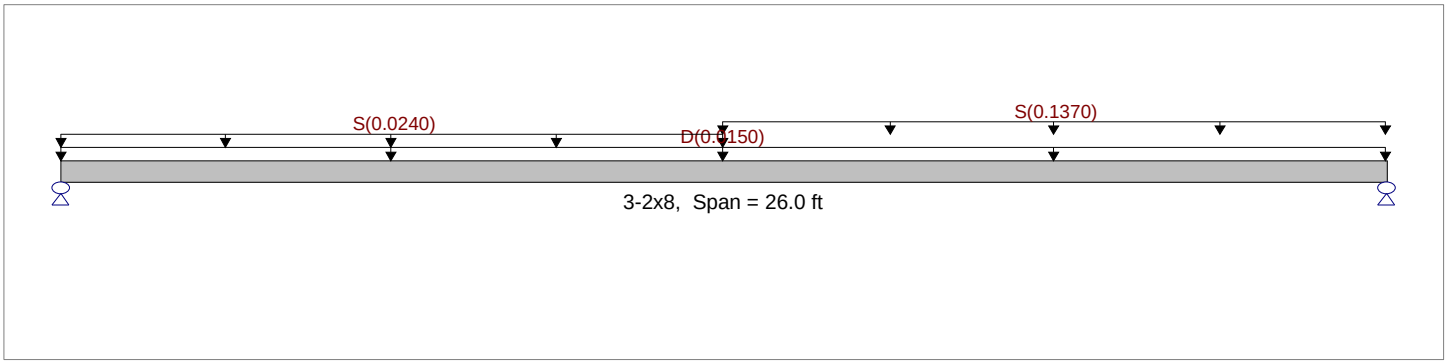
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.0150 k/ft, Tributary Width = 1.0 ft
Partial Length Uniform Load : S = 0.0240 k/ft, Extent = 0.0 -->> 13.0 ft
Partial Length Uniform Load : S = 0.1370 k/ft, Extent = 13.0 -->> 26.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	2.399 : 1	Maximum Shear Stress Ratio	=	0.391 : 1
Section used for this span		3-2x8	Section used for this span		3-2x8
fb : Actual	=	2,591.41 psi	fv : Actual	=	70.33 psi
FB : Allowable	=	1,080.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	15.470 ft	Location of maximum on span	=	25.480 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	3.661 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	85 <360
Max Downward Total Deflection	=	4.339 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	71 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	4.3389	13.650		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	0.874 k
Support 2, (D+L+S)	1.609 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	0.874	1.609
D Only	0.195	0.195
S Only	0.679	1.414
D+L+S	0.874	1.609

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:56PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — **License Owner : SARGENT ENGINEERS INC**

Description : (B2) Truss/Rafter Bearing Beam

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

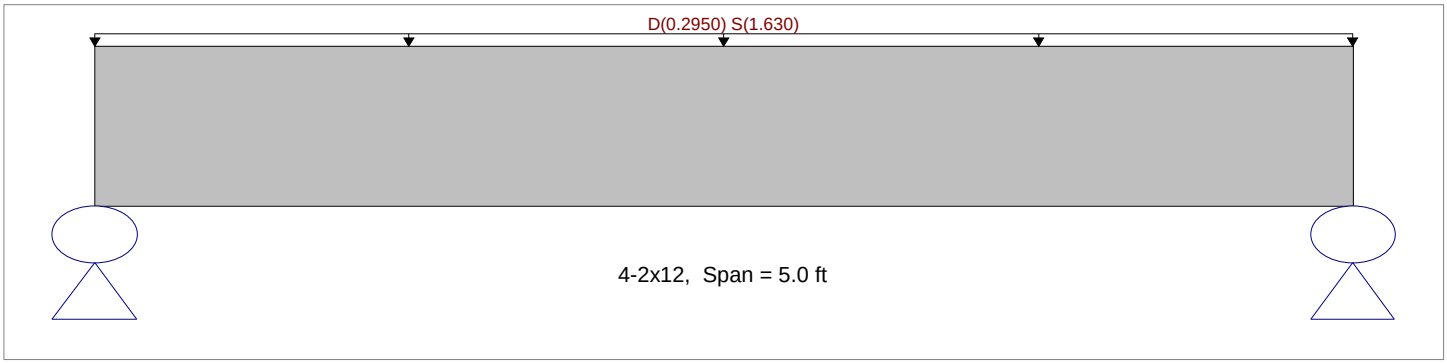
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Loads on all spans...
Uniform Load on ALL spans : D = 0.2950, S = 1.630 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.639 : 1	Maximum Shear Stress Ratio	=	0.377 : 1
Section used for this span		4-2x12	Section used for this span		4-2x12
fb : Actual	=	574.84 psi	fv : Actual	=	67.90 psi
FB : Allowable	=	900.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	2.500 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 L+Lr+S Deflection	=	0.020 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	2957
Max Downward Total Deflection	=	0.024 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	2485

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.0241	2.525		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	4.850 k
Support 2, (D+L+S)	4.850 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	4.850	4.850
D Only	0.775	0.775
S Only	4.075	4.075
D+L+S	4.850	4.850

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Barn
By:MH Date:10/15/2009

Subject:
Structural Calcs

(B3) Rafter Bearing Header

$w_{dl} := \frac{(260\,lbf)}{2\,ft}$ $w_{dl} = 130 \cdot plf$

$w_{sl} := \frac{(610\,lbf)}{2\,ft}$ $w_{sl} = 305 \cdot plf$

$L := 4\,ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.13 \cdot in$

Existing: (3) 2x6 DF-L No. 2
Condition: 40% of Capacity - Okay

$L := 8\,ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.27 \cdot in$

Existing: (3) 2x6 DF-L No. 2
Condition: 79% of Capacity - Okay

Note: Header above breezeway not visible. If no header present, header must be added.

(B4) Lower Roof Rafters

$w_{dl} := dl_r \cdot (2\,ft)$ $w_{dl} = 30 \cdot plf$

$w_{sl} := \left(sl_{rs.5} + sl_{rd}\right) \cdot 2\,ft$ $w_{sl} = 498 \cdot plf$

$L := 12\,ft$ $L_a := 1\,ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.4 \cdot in$

Existing: 2x6 DF-L No. 2 @ 24" o.c.
Condition: 1271% of Capacity
Required: (2) 2x12 DF-L SS @ 16" o.c.

(B5) Lower Roof Rafter Bearing Beam

$w_{dl} := \frac{(210\,lbf)}{2\,ft}$ $w_{dl} = 105 \cdot plf$

$w_{sl} := \frac{(3510\,lbf)}{2\,ft}$ $w_{sl} = 1755 \cdot plf$

$L := 10.33\,ft$ $L_a := 1\,ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.34 \cdot in$

Existing: (3) 2x6 DF-L No. 2
Condition: 1122% of Capacity
Required: 5-1/8"x13-1/2" Glulam 24F-V8

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:56PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B3) Rafter Bearing Header

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

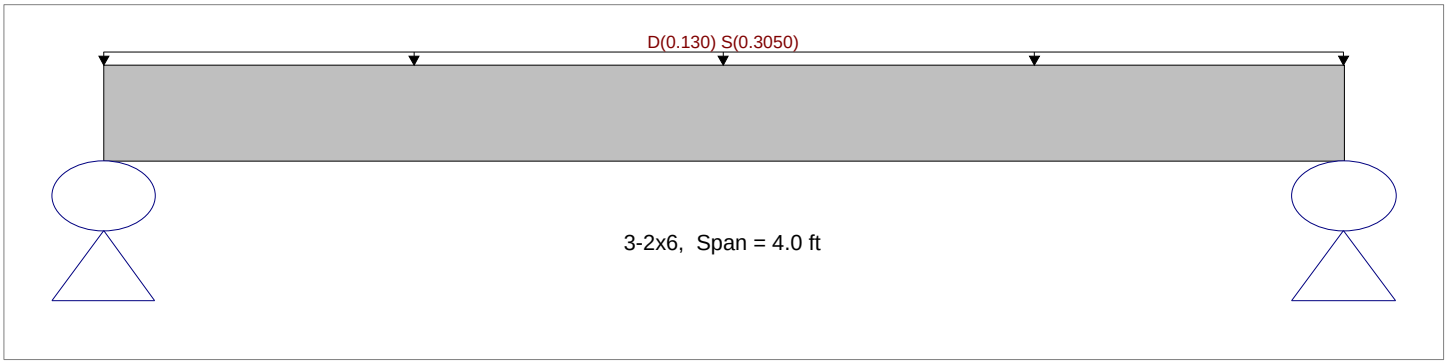
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.130, S = 0.3050 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.393 : 1	Maximum Shear Stress Ratio	=	0.228 : 1
Section used for this span		3-2x6	Section used for this span		3-2x6
fb : Actual	=	460.17 psi	fv : Actual	=	41.13 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	2.000 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 L+Lr+S Deflection	=	0.018 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	2705
Max Downward Total Deflection	=	0.025 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	1897

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.0253	2.020		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	0.870 k
Support 2, (D+L+S)	0.870 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	0.870	0.870
D Only	0.260	0.260
S Only	0.610	0.610
D+L+S	0.870	0.870

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:56PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (B3b) Rafter Bearing Header

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

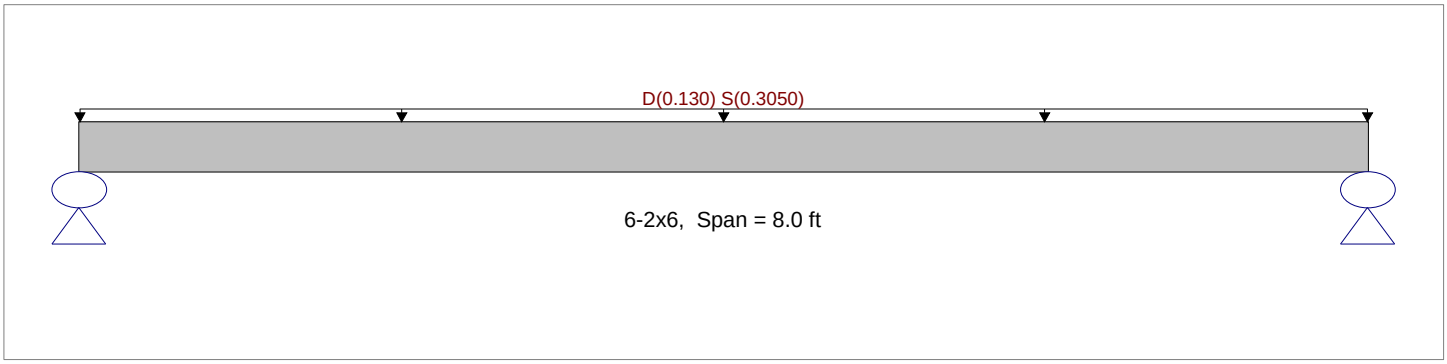
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.130, S = 0.3050 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.787 : 1	Maximum Shear Stress Ratio	=	0.261 : 1
Section used for this span		6-2x6	Section used for this span		6-2x6
fb : Actual	=	920.33 psi	fv : Actual	=	46.93 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	4.000 ft	Location of maximum on span	=	7.560 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.142 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	676
Max Downward Total Deflection	=	0.202 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	474

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.2024	4.040		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	1.740 k
Support 2, (D+L+S)	1.740 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	1.740	1.740
D Only	0.520	0.520
S Only	1.220	1.220
D+L+S	1.740	1.740

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:56PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (B4) Lower Roof Rafters

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

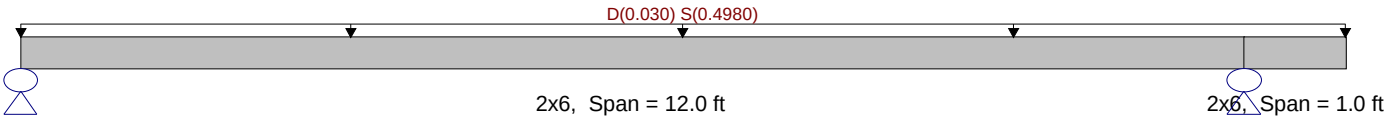
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.030, S = 0.4980 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	12.710 : 1	Maximum Shear Stress Ratio	=	3.025 : 1
Section used for this span		2x6	Section used for this span		2x6
fb : Actual	=	14,871.27 psi	fv : Actual	=	544.55 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	6.000 ft	Location of maximum on span	=	11.631 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	6.951 in
Max Upward L+Lr+S Deflection	=	-1.807 in
Live Load Deflection Ratio	=	12 <360
Max Downward Total Deflection	=	7.370 in
Max Upward Total Deflection	=	-1.916 in
Total Deflection Ratio	=	12 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	7.3700	6.000		0.0000	0.000
	2	0.0000	6.000	D+L+S	-1.9159	1.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	3.146 k
Support 2, (D+L+S)	3.718 k
Support 3, (D+L+S)	k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	3.146	3.718	
D Only	0.179	0.211	
S Only	2.967	3.507	
D+L+S	3.146	3.718	

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:56PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — **License Owner : SARGENT ENGINEERS INC**

Description : (B4) Req - Lower Roof Rafters

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

Wood Species : Douglas Fir - Larch
Wood Grade : Select structural

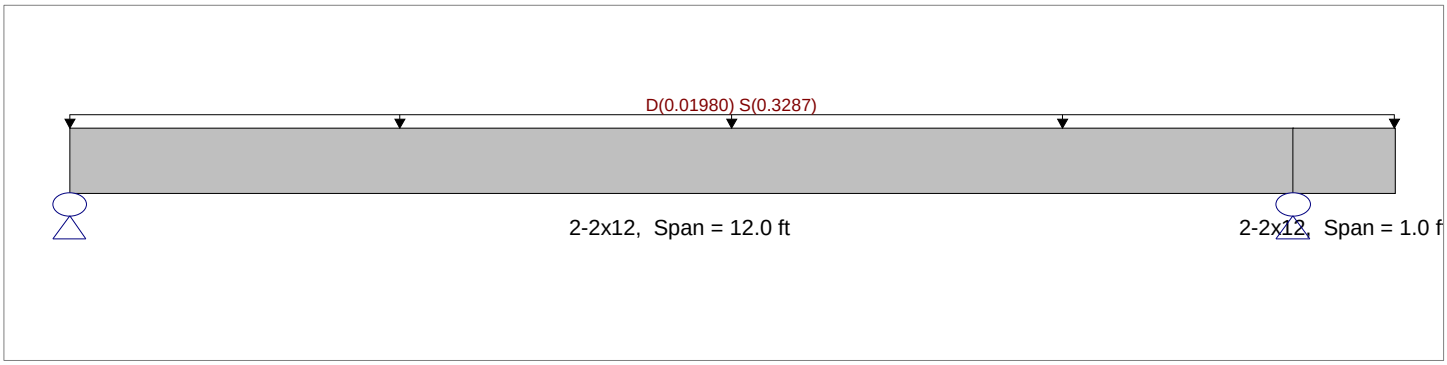
Beam Bracing : Beam is Fully Braced against lateral-torsion buckling

Fb - Tension	1,500.0 psi
Fb - Compr	1,500.0 psi
Fc - Prll	1,700.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	1,000.0 psi

E : Modulus of Elasticity

Ebend- xx	1,900.0 ksi
Eminbend - xx	690.0 ksi
Density	32.210 pcf

Repetitive Member Stress Increase



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.030, S = 0.4980 k/ft, Tributary Width = 0.660 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.680 : 1	Maximum Shear Stress Ratio	=	0.520 : 1
Section used for this span		2-2x12	Section used for this span		2-2x12
fb : Actual	=	1,172.96 psi	fv : Actual	=	93.57 psi
FB : Allowable	=	1,725.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	6.000 ft	Location of maximum on span	=	12.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.226 in
Max Upward L+Lr+S Deflection	=	-0.059 in
Live Load Deflection Ratio	=	408
Max Downward Total Deflection	=	0.239 in
Max Upward Total Deflection	=	-0.062 in
Total Deflection Ratio	=	384

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.2393	6.000		0.0000	0.000
	2	0.0000	6.000	D+L+S	-0.0622	1.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	2.076 k
Support 2, (D+L+S)	2.454 k
Support 3, (D+L+S)	k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	2.076	2.454	
D Only	0.118	0.139	
S Only	1.958	2.314	
D+L+S	2.076	2.454	

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:56PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — **License Owner : SARGENT ENGINEERS INC**

Description : (B5) Lower Roof Rafter Bearing Beam

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

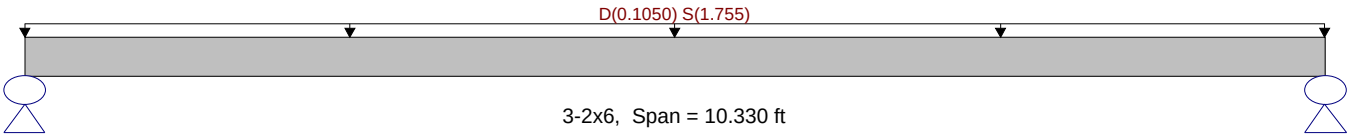
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.1050, S = 1.755 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	11.216 : 1	Maximum Shear Stress Ratio	=	2.976 : 1
Section used for this span		3-2x6	Section used for this span		3-2x6
fb : Actual	=	13,122.55 psi	fv : Actual	=	535.66 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	5.165 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 L+Lr+S Deflection	=	4.540 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	27 <360
Max Downward Total Deflection	=	4.812 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	25 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	4.8119	5.217		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	9.607 k
Support 2, (D+L+S)	9.607 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	9.607	9.607
D Only	0.542	0.542
S Only	9.065	9.065
D+L+S	9.607	9.607

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:56PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B5) Req - Lower Roof Rafter Bearing Beam

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

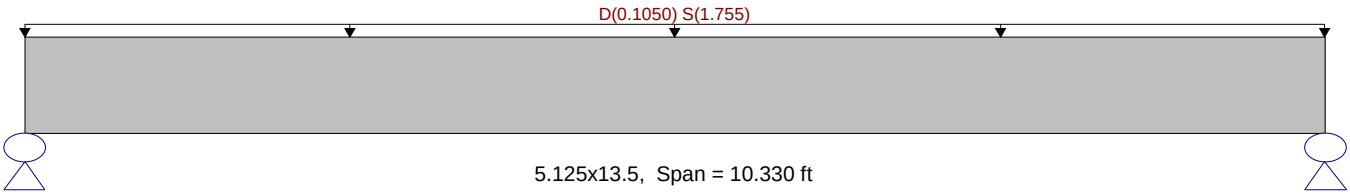
Wood Species : DF/DF
Wood Grade : 24F - V8

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

Fb - Tension	2,400.0 psi
Fb - Compr	2,400.0 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	930.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	830.0 ksi
Density	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.1050, S = 1.755 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.797 : 1	Maximum Shear Stress Ratio	=	0.621 : 1
Section used for this span		5.125x13.5	Section used for this span		5.125x13.5
fb : Actual	=	1,912.47 psi	fv : Actual	=	164.54 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	5.165 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 L+Lr+S Deflection	=	0.240 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	517
Max Downward Total Deflection	=	0.254 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	488

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.2540	5.217		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	9.607 k
Support 2, (D+L+S)	9.607 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	9.607	9.607
D Only	0.542	0.542
S Only	9.065	9.065
D+L+S	9.607	9.607

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Barn
By:MH Date:10/15/2009

Subject:
Structural Calcs

(C1) Knee Brace for B2

$$P_{dl} := \frac{\left[\left[w_{dl.2} + \frac{(190\,lbf)}{2\,ft}\right]\cdot 3.5\,ft\right]}{\cos(45\,deg)} \qquad P_{dl} = 1460.18\cdot lbf$$

$$P_{sl} := \frac{\left[\left[w_{sl.2} + \frac{(440\,lbf)}{2\,ft}\right]\cdot 3.5\,ft\right]}{\cos(45\,deg)} \qquad P_{sl} = 8068.09\cdot lbf$$

$h := 9\,ft$

$h_{xunb} := 7.25\,ft$

$h_{yunb} := 7.25\,ft$

$$L_{brg} := \frac{\left(P_{dl} + P_{sl}\right)}{625\,psi\cdot 5.5\,in} \qquad L_{brg} = 2.77\cdot in$$

Existing: 6x6 DF-L No. 2
Condition: 30% of Capacity - Okay

(C2) Log Column

$$P_{dl} := \left[\left[w_{dl.2} + \frac{(190\,lbf)}{2\,ft}\right]\cdot 12\,ft\right] \qquad P_{dl} = 3540\cdot lbf$$

$$P_{sl} := \left[\left[w_{sl.2} + \frac{(440\,lbf)}{2\,ft}\right]\cdot 12\,ft\right] \qquad P_{sl} = 19560\cdot lbf$$

$h := 26\,ft$

$h_{xunb} := 11\,ft$

$h_{yunb} := 11\,ft$

$$L_{brg} := \frac{\left(P_{dl} + P_{sl}\right)}{625\,psi\cdot 5.5\,in} \qquad L_{brg} = 6.72\cdot in$$

Existing:10" Log Column
Condition: 42% of Capacity - Okay

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:56PM

Wood Column

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (C1) Knee Brace for B2

General Information

Code Ref : 2006 IBC, ANSI / AF&PA NDS-2005

Analysis Method :	Allowable Stress Design	Wood Section Name	6x6
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Graded Lumber
Overall Column Height	7.250 ft	Wood Member Type	Sawn
(Used for non-slender calculations)			
Wood Species	DouglasFir-Larch	Exact Width	5.50 in
Wood Grade	No.2	Exact Depth	5.50 in
Fb - Tension	900.0 psi	Fv	180.0 psi	Area	30.250 in^2
Fb - Compr	900.0 psi	Ft	575.0 psi	Ix	76.255 in^4
Fc - Prll	1,350.0 psi	Density	32.210 pcf	Iy	76.255 in^4
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial	
Basic	1,600.0	1,600.0	1,600.0	ksi
Minimum	580.0	580.0		

Load Combination 2006IBC&ASCE7-05

Allowable Stress Modification Factors

Cf or Cv for Bending	1.0
Cf or Cv for Compression	1.0
Cf or Cv for Tension	1.0
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No *(non-glb only)*

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 7.25ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 7.25 ft, K = 1.0

Applied Loads

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

Column self weight included : 49.056 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 7.250 ft, D = 1.461, S = 8.069 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2943** : 1

Load Combination	+D+S+H
Governing NDS Formla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	9.579 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,075.84 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1

Load Combination	+D+0.750L+0.750S+0.5250E+H
Location of max.above base	7.250 ft
Applied Design Shear	0.0 psi
Allowable Shear	180.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination :	n/a			
Along X-X	0.0 in	at	0.0 ft	above base
for load combination :	n/a			

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension
Cf or Cv : Size based factors	1.000	1.000	

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:56PM

Wood Column

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (C2) Log Column

General Information

Code Ref : 2006 IBC, ANSI / AF&PA NDS-2005

Analysis Method :	Allowable Stress Design
End Fixities	Top & Bottom Pinned
Overall Column Height	26.0 ft
(Used for non-slender calculations)	
Wood Species	DouglasFir-Larch
Wood Grade	No.2

Fb - Tension	900.0 psi	Fv	180.0 psi
Fb - Compr	900.0 psi	Ft	575.0 psi
Fc - Prll	1,350.0 psi	Density	32.210 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Load Combination 2006IBC&ASCE7-05

Wood Section Name	**8x8**
Wood Grading/Manuf.	Graded Lumber
Wood Member Type	Sawn

Exact Width	**7.50**	in
Exact Depth	**7.50**	in
Area	56.250	in^2
Ix	263.67	in^4
Iy	263.67	in^4

Allowable Stress Modification Factors

Cf or Cv for Bending	1.0
Cf or Cv for Compression	1.0
Cf or Cv for Tension	1.0
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No *(non-glb only)*

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 11ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 11 ft, K = 1.0

Applied Loads

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

Column self weight included : 327.13 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 26.0 ft, D = 3.540, S = 19.560 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.4188** : 1

Load Combination	+D+S+H
Governing NDS Formla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	23.427 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	994.54 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1

Load Combination	+D+0.750L+0.750S+0.5250E+H
Location of max.above base	26.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	180.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination :	n/a			
Along X-X	0.0 in	at	0.0 ft	above base
for load combination :	n/a			

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension
Cf or Cv : Size based factors	1.000	1.000	

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Barn
By:MH Date:10/15/2009

Subject:
Structural Calcs

(C3) Lower Roof Columns

$P_{dl} := 105plf \cdot 10.33ft$ $P_{dl} = 1084.65 \cdot lbf$

$P_{sl} := 1755plf \cdot 10.33ft$ $P_{sl} = 18129.15 \cdot lbf$

$h := 9ft$

$h_{xunb} := 9ft$

$h_{yunb} := 9ft$

$L_{brg} := \frac{(P_{dl} + P_{sl})}{625psi \cdot 5.5in}$ $L_{brg} = 5.59 \cdot in$

Existing: 6x6 DF-L No. 2
Condition: 72% of Capacity - Okay

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:56PM

Wood Column

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (C3) Lower Roof Columns

General Information

Code Ref : 2006 IBC, ANSI / AF&PA NDS-2005

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 9.0 ft
(Used for non-slender calculations)

Wood Species : DouglasFir-Larch
Wood Grade : No.2

Fb - Tension	900.0 psi	Fv	180.0 psi
Fb - Compr	900.0 psi	Ft	575.0 psi
Fc - Prll	1,350.0 psi	Density	32.210 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Load Combination 2006IBC&ASCE7-05

Wood Section Name : **6x6**
Wood Grading/Manuf. : Graded Lumber
Wood Member Type : Sawn

Exact Width	**5.50**	in
Exact Depth	**5.50**	in
Area	30.250	in^2
Ix	76.255	in^4
Iy	76.255	in^4

Allowable Stress Modification Factors

Cf or Cv for Bending	1.0
Cf or Cv for Compression	1.0
Cf or Cv for Tension	1.0
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No *(non-glb only)*

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 9ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 9 ft, K = 1.0

Applied Loads

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

Column self weight included : 60.897 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 9.0 ft, D = 1.085, S = 18.130 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.7123** : 1
Load Combination +D+S+H
Governing NDS Formla Comp Only, fc/Fc'
Location of max.above base 0.0 ft
At maximum location values are . . .
Applied Axial 19.276 k
Applied Mx 0.0 k-ft
Applied My 0.0 k-ft
Fc : Allowable 894.58 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1
Load Combination +D+0.750L+0.750S+0.5250E+H
Location of max.above base 9.0 ft
Applied Design Shear 0.0 psi
Allowable Shear 180.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension
Cf or Cv : Size based factors	1.000	1.000	

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Barn
By:MH Date:10/15/2009

Subject:
Structural Calcs

(B6) Floor Joists

$w_{dl} := dl_f \cdot 2ft$ $w_{dl} = 30 \cdot plf$

$w_{sl} := ll_f \cdot 2ft$ $w_{sl} = 200 \cdot plf$

$L := 13ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.43 \cdot in$

Existing: 2x12 DF-L No. 2 @ 24" o.c.
Condition: 178% of Capacity
Required: 2x12 DF-L No. 2 @ 12" o.c.

(B7) Floor Joist Bearing Beam

$w_{dl} := dl_f \cdot 13ft$ $w_{dl} = 195 \cdot plf$

$w_{sl} := ll_f \cdot 13ft$ $w_{sl} = 1300 \cdot plf$

$L := 12ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.4 \cdot in$

Existing: 8x10 DF-L No. 2
Condition: 318% of Capacity
Required: 6-3/4"x12" Glulam 24F-V8

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:56PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (B6) Floor Joists

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

Wood Species : DouglasFir-Larch
Wood Grade : No.2

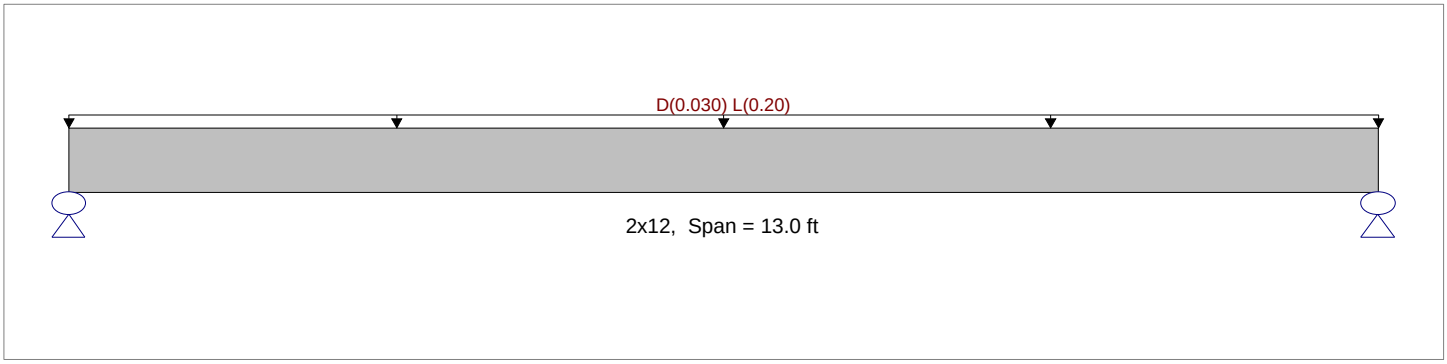
Beam Bracing : Beam is Fully Braced against lateral-torsion buckling

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	32.210 pcf

Repetitive Member Stress Increase



Applied Loads

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

Loads on all spans...

Uniform Load on ALL spans : D = 0.030, L = 0.20 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	1.780 : 1	Maximum Shear Stress Ratio	=	0.635 : 1
Section used for this span		2x12	Section used for this span		2x12
fb : Actual	=	1,842.73 psi	fv : Actual	=	114.28 psi
FB : Allowable	=	1,035.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	6.500 ft	Location of maximum on span	=	12.090 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.455 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	342 <360
Max Downward Total Deflection	=	0.523 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	298

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.5232	6.565		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	1.495 k
Support 2, (D+L+Lr)	1.495 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	1.495	1.495
D Only	0.195	0.195
L Only	1.300	1.300
D+L+S	1.495	1.495
D+L+Lr	1.495	1.495

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:56PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (B6) Req - Floor Joists

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

Wood Species : DouglasFir-Larch
Wood Grade : No.2

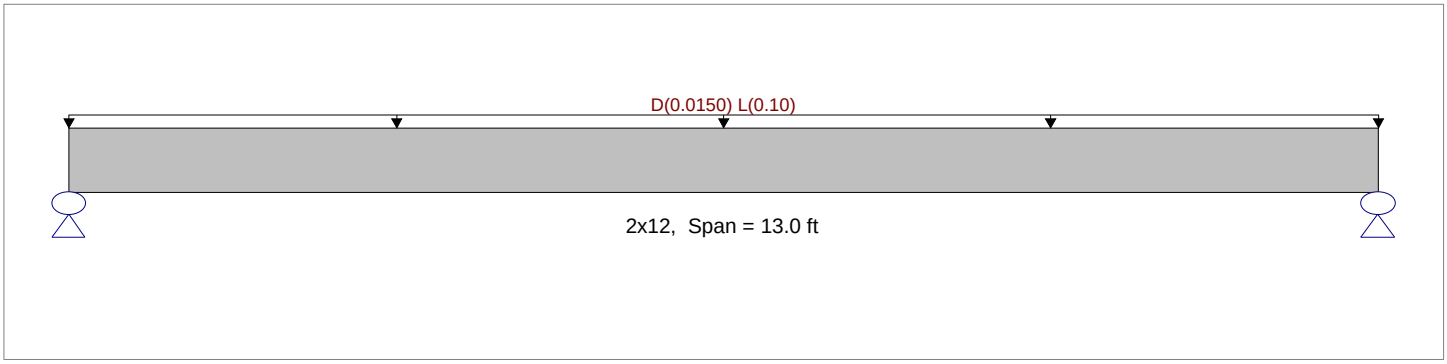
Beam Bracing : Beam is Fully Braced against lateral-torsion buckling

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	32.210 pcf

Repetitive Member Stress Increase



Applied Loads

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

Loads on all spans...

Uniform Load on ALL spans : D = 0.030, L = 0.20 k/ft, Tributary Width = 0.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.890 : 1	Maximum Shear Stress Ratio	=	0.317 : 1
Section used for this span		2x12	Section used for this span		2x12
fb : Actual	=	921.36 psi	fv : Actual	=	57.14 psi
FB : Allowable	=	1,035.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	6.500 ft	Location of maximum on span	=	12.090 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.227 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	685
Max Downward Total Deflection	=	0.262 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	596

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.2616	6.565		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	0.748 k
Support 2, (D+L+Lr)	0.748 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	0.748	0.748
D Only	0.098	0.098
L Only	0.650	0.650
D+L+S	0.748	0.748
D+L+Lr	0.748	0.748

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:56PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — **License Owner : SARGENT ENGINEERS INC**

Description : (B7) Floor Joist Bearing Beam

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

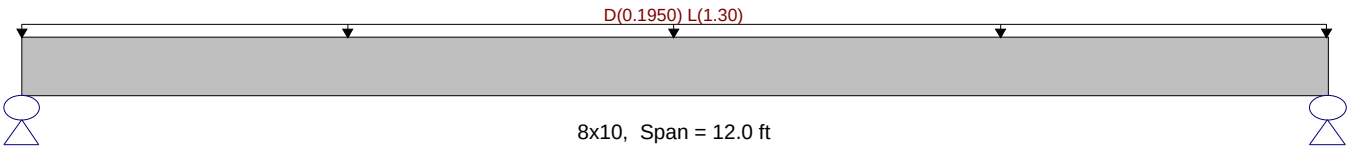
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.1950, L = 1.30 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	3.180 : 1	Maximum Shear Stress Ratio	=	0.913 : 1
Section used for this span		8x10	Section used for this span		8x10
fb : Actual	=	2,862.45 psi	fv : Actual	=	164.29 psi
FB : Allowable	=	900.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+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 L+Lr+S Deflection	=	0.713 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	201 <360
Max Downward Total Deflection	=	0.820 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	175 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.8200	6.060		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	8.970 k
Support 2, (D+L+Lr)	8.970 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	8.970	8.970
D Only	1.170	1.170
L Only	7.800	7.800
D+L+S	8.970	8.970
D+L+Lr	8.970	8.970

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:57PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (B7) Floor Joist Bearing Beam

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

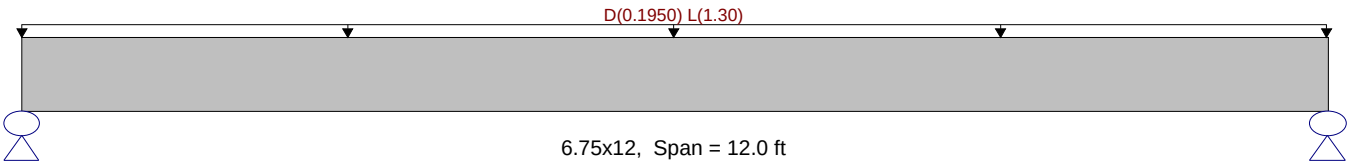
Wood Species : DF/DF
Wood Grade : 24F - V8

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

Fb - Tension	2,400.0 psi
Fb - Compr	2,400.0 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	930.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	830.0 ksi
Density	32.210 pcf



Applied Loads

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

Loads on all spans...
Uniform Load on ALL spans : D = 0.1950, L = 1.30 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.831 : 1	Maximum Shear Stress Ratio	=	0.527 : 1
Section used for this span		6.75x12	Section used for this span		6.75x12
fb : Actual	=	1,993.33 psi	fv : Actual	=	139.53 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	=	6.000 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 L+Lr+S Deflection	=	0.349 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	412
Max Downward Total Deflection	=	0.402 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	358

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.4019	6.060		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	8.970 k
Support 2, (D+L+Lr)	8.970 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	8.970	8.970
D Only	1.170	1.170
L Only	7.800	7.800
D+L+S	8.970	8.970
D+L+Lr	8.970	8.970

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Barn
By:MH Date:10/15/2009

Subject:
Structural Calcs

(C4) Column for Floor Bearing Beams, C2 Above

$P_{dl} := dl_f \cdot 13ft \cdot 12ft + 3540lbf$ $P_{dl} = 5880 \cdot lbf$

$P_{ll} := ll_f \cdot 13ft \cdot 12ft$ $P_{sl} = 18129.15 \cdot lbf$

$P_{sl} := 19560lbf$ $P_{sl} = 19560 \cdot lbf$

$h := 9ft$

$h_{xunb} := 9ft$

$h_{yunb} := 9ft$

$L_{brg} := \frac{(P_{dl} + P_{sl})}{625psi \cdot 5.5in}$ $L_{brg} = 7.4 \cdot in$

Existing:8x8 DF-L No. 2
Condition: 54% of Capacity - Okay

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:57PM

Wood Column

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (C4) Column for Floor Bearing Beams, C2 Above

General Information

Code Ref : 2006 IBC, ANSI / AF&PA NDS-2005

Analysis Method :	Allowable Stress Design
End Fixities	Top & Bottom Pinned
Overall Column Height	9.0 ft
(Used for non-slender calculations)	
Wood Species	DouglasFir-Larch
Wood Grade	No.2

Fb - Tension	900.0 psi	Fv	180.0 psi
Fb - Compr	900.0 psi	Ft	575.0 psi
Fc - Prll	1,350.0 psi	Density	32.210 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Load Combination 2006IBC&ASCE7-05

Wood Section Name	**8x8**
Wood Grading/Manuf.	Graded Lumber
Wood Member Type	Sawn

Exact Width	**7.50** in	Allowable Stress Modification Factors
Exact Depth	**7.50** in	
Area	56.250 in^2	Cf or Cv for Bending 1.0
Ix	263.67 in^4	Cf or Cv for Compression 1.0
Iy	263.67 in^4	Cf or Cv for Tension 1.0
		Cm : Wet Use Factor 1.0
		Ct : Temperature Factor 1.0
		Cfu : Flat Use Factor 1.0
		Kf : Built-up columns 1.0 *NDS 15.3.2*
		Use Cr : Repetitive ? No *(non-glb only)*

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 9ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 9 ft, K = 1.0

Applied Loads

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

Column self weight included : 113.24 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 9.0 ft, D = 5.880, L = 18.130, S = 19.560 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.5375** : 1

Load Combination	+D+0.750L+0.750S+H
Governing NDS Formla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	34.261 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,133.10 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1

Load Combination	+D+0.750L+0.750S+0.5250E+H
Location of max.above base	9.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	180.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination :	n/a			
Along X-X	0.0 in	at	0.0 ft	above base
for load combination :	n/a			

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension
Cf or Cv : Size based factors	1.000	1.000	

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
D+L+S	0.0000 in	0.000 ft	0.000 in	0.000 ft

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Barn
By:MH Date:10/15/2009

Subject:
Structural Calcs

(F1) Bearing Wall Footings

$w_{dl} := \frac{(260lbf)}{2ft} + dl_f \cdot \frac{(13ft)}{2} + dl_w \cdot 11ft + dl_{cw.8} \cdot 8ft$ $w_{dl} = 1137.5 \cdot plf$

$w_{ll} := ll_f \cdot \frac{(13ft)}{2}$ $w_{ll} = 650 \cdot plf$

$w_{sl} := \frac{(610lbf)}{2ft}$ $w_{sl} = 305 \cdot plf$

$q_{brg} := 1500psf$

Existing: 24"x12" Continuous Ftg.
Condition: 72% of Capacity - Okay

(F2) Footing for C4

$P_{dl} := 5880lbf$ $P_{dl} = 5880 \cdot lbf$

$P_{ll} := 18130lbf$ $P_{ll} = 18130 \cdot lbf$

$P_{sl} := 19560lbf$ $P_{sl} = 19560 \cdot lbf$

$q_{brg} := 1500psf$

Existing: 30"x30"x12" Square Ftg.
Condition: 374% of Capacity
Required: 66"x66"x12" Square Ftg. w/ (8) #4 Bars Each Way

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:57PM

Wall Footing Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (F1) Bearing Wall Footings

General Information

Calculations per IBC 2006, CBC 2007, ACI 318-05

Material Properties

f'c : Concrete 28 day strength	=	3.0	ksi
Fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
Φ Values Flexure	=	0.90	
Shear	=	0.850	

Analysis Settings

Min Steel % Bending Reinf.	=	0.00140	
Min Allow % Temp Reinf.	=	0.00180	
Min. Overturning Safety Factor	=	1.50	: 1
Min. Overturning Safety Factor	=	1.50	: 1
AutoCalc Footing Weight as DL	:	Yes	

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

Reference Depth below Surface	=	4.0	ft
Allow. Pressure Increase per foot of depth	=		ksf
when base footing is below	=		ft

Increases based on footing Width

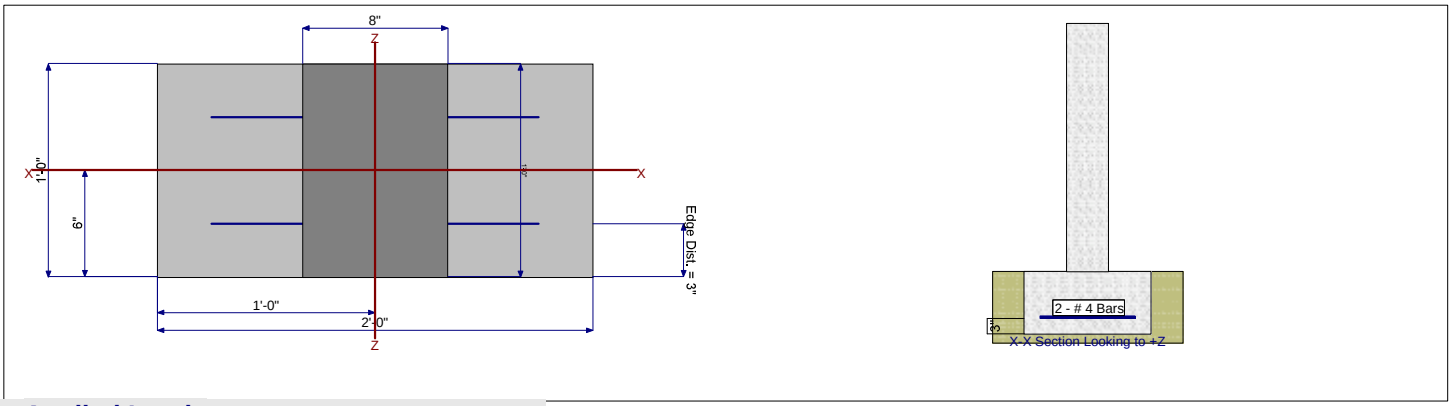
Allow. Pressure Increase per foot of width	=		ksf
when footing is wider than	=		ft

Dimensions

Footing Width	=	2.0	ft	Footing Thickness	=	12.0	in
Wall Thickness	=	8.0	in	Rebar Centerline to Edge of Concrete..			
Wall center offset from center of footing	=	0	in	at Bottom of footing	=	3.0	in

Reinforcing

Bars along X-X Axis		
Number of Bars	=	2.0
Reinforcing Bar Size	=	# 4



Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	1.138		0.650	0.3050				k
OB : Overburden	=								ksf
V-x	=								k
M-zz	=								k-ft

Vx applied = in above top of footing

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.7148	Soil Bearing	1.072 ksf	1.50 ksf	+D+0.750L+0.750S+0.5
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.01889	Z Flexure (+X)	0.3060 k-ft	16.20 k-ft	+1.20D+0.50Lr+1.60L+
PASS	0.01889	Z Flexure (-X)	0.3060 k-ft	16.20 k-ft	+1.20D+0.50Lr+1.60L+
PASS	n/a	1-way Shear (+X)	0.0 psi	93.113 psi	n/a
PASS	0.0	1-way Shear (-X)	0.0 psi	0.0 psi	n/a

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:57PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — **License Owner : SARGENT ENGINEERS INC**

Description : (F2) Footing for C4

General Information

Calculations per IBC 2006, CBC 2007, ACI 318-05

Material Properties

f'c : Concrete 28 day strength	=	3.0	ksi
Fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
Φ Values Flexure	=	0.90	
Shear	=	0.850	

Analysis Settings

Min Steel % Bending Reinf.	=	0.00140	
Min Allow % Temp Reinf.	=	0.00180	
Min. Overturning Safety Factor	=	1.50	: 1
Min. Overturning Safety Factor	=	1.50	: 1
AutoCalc Footing Weight as DL	:	Yes	
AutoCalc Pedestal Weight as DL	:	No	

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

Reference Depth below Surface	=	4.0	ft
Allow. Pressure Increase per foot of depth	=		ksf
when base footing is below	=		ft

Increases based on footing Width

Allow. Pressure Increase per foot of width	=		ksf
when footing is wider than	=		ft

Dimensions

Width along X-X Axis	=	2.50	ft
Length along Z-Z Axi	=	2.50	ft
Footing Thicknes	=	12.0	in

Load location offset from footing center...

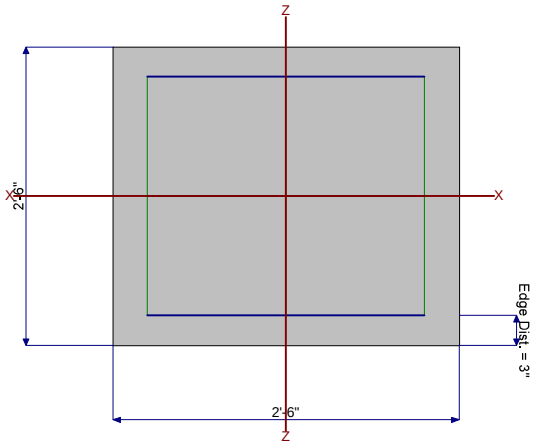
ex : Along X-X Axis	=	0	in
ez : Along Z-Z Axis	=	0	in

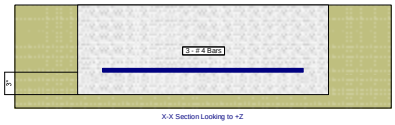
Pedestal dimensions...

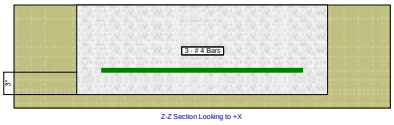
px : Along X-X Axis	=		in
pz : Along Z-Z Axis	=		in
Height	=		in

Rebar Centerline to Edge of Concrete..

at Bottom of footing	=	3.0	in







Reinforcing

Bars along X-X Axis			
Number of Bars	=	3.0	
Reinforcing Bar Size	=	#	4
Bars along Z-Z Axis			
Number of Bars	=	3.0	
Reinforcing Bar Size	=	#	4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	5.880		18.130	19.560				k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:57PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (F2) Footing for C4

DESIGN SUMMARY

As Provided < Min. Spec'd

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
FAIL	3.739	Soil Bearing	5.609 ksf	1.50 ksf	+D+0.750L+0.750S+0.5
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.6237	Z Flexure (+X)	6.062 k-ft	9.720 k-ft	+1.20D+0.50L+1.60S+0
PASS	0.6237	Z Flexure (-X)	6.062 k-ft	9.720 k-ft	+1.20D+0.50L+1.60S+0
PASS	0.6237	X Flexure (+Z)	6.062 k-ft	9.720 k-ft	+1.20D+0.50L+1.60S+0
PASS	0.6237	X Flexure (-Z)	6.062 k-ft	9.720 k-ft	+1.20D+0.50L+1.60S+0
PASS	0.3859	1-way Shear (+X)	35.929 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.3859	1-way Shear (-X)	35.929 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.3859	1-way Shear (+Z)	35.929 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.3859	1-way Shear (-Z)	35.929 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.7283	2-way Punching	135.63 psi	186.23 psi	+1.20D+0.50L+1.60S

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:57PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — **License Owner : SARGENT ENGINEERS INC**

Description : (F2) Req - Footing for C4

General Information

Calculations per IBC 2006, CBC 2007, ACI 318-05

Material Properties

f'c : Concrete 28 day strength	=	3.0	ksi
Fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
Φ Values Flexure	=	0.90	
Shear	=	0.850	

Analysis Settings

Min Steel % Bending Reinf.	=	0.00140	
Min Allow % Temp Reinf.	=	0.00180	
Min. Overturning Safety Factor	=	1.50	: 1
Min. Overturning Safety Factor	=	1.50	: 1
AutoCalc Footing Weight as DL	:	Yes	
AutoCalc Pedestal Weight as DL	:	No	

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

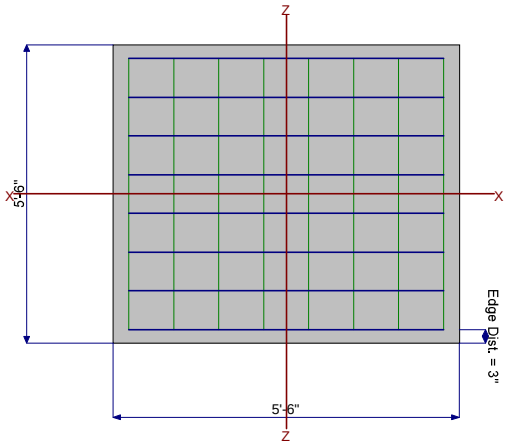
Reference Depth below Surface	=	4.0	ft
Allow. Pressure Increase per foot of depth	=		ksf
when base footing is below	=		ft

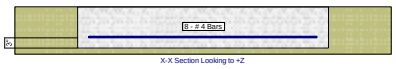
Increases based on footing Width

Allow. Pressure Increase per foot of width	=		ksf
when footing is wider than	=		ft

Dimensions

Width along X-X Axis	=	5.50	ft
Length along Z-Z Axi	=	5.50	ft
Footing Thicknes	=	12.0	in
Load location offset from footing center...			
ex : Along X-X Axis	=	0	in
ez : Along Z-Z Axis	=	0	in
Pedestal dimensions...			
px : Along X-X Axis	=		in
pz : Along Z-Z Axis	=		in
Height	=		in
Rebar Centerline to Edge of Concrete..			
at Bottom of footing	=	3.0	in





Reinforcing

Bars along X-X Axis		
Number of Bars	=	8.0
Reinforcing Bar Size	=	# 4
Bars along Z-Z Axis		
Number of Bars	=	8.0
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	5.880		18.130	19.560				k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Barn Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 7:57PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\barn calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (F2) Req - Footing for C4

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8493	Soil Bearing	1.274 ksf	1.50 ksf	+D+0.750L+0.750S+0.5
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.5588	Z Flexure (+X)	6.584 k-ft	11.782 k-ft	+1.20D+0.50L+1.60S
PASS	0.5588	Z Flexure (-X)	6.584 k-ft	11.782 k-ft	+1.20D+0.50L+1.60S
PASS	0.5588	X Flexure (+Z)	6.584 k-ft	11.782 k-ft	+1.20D+0.50L+1.60S
PASS	0.5588	X Flexure (-Z)	6.584 k-ft	11.782 k-ft	+1.20D+0.50L+1.60S
PASS	0.3429	1-way Shear (+X)	31.928 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.3429	1-way Shear (-X)	31.928 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.3429	1-way Shear (+Z)	31.928 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.3429	1-way Shear (-Z)	31.928 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.8543	2-way Punching	159.10 psi	186.23 psi	+1.20D+0.50L+1.60S

Appendix D: Silo Building Structural Calculations

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

Project Location and Design Criteria

Project #:	D09135.00
Project Title:	Star Valley Ranch Association - Silo
Client:	Star Valley Ranch Association P.O. Box 7008 781 Vista East Dr. Star Valley Ranch, WY 83127 307-883-2669 fax: 307-883-2016
Location:	Cedar Creek Drive Star Valley Ranch, WY 83127
Date Started:	08/24/09
Codes:	IBC 2006 Edition ASCE 7-05 NDS 2005 Edition ACI 318-05 AISC Steel Construction Manual, 13 Ed.
Occupancy Category:	II (ASCE 7-05 Table 1-1)

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

Vertical Loads

Roof:	$pitch := 4$	Roof Pitch (__/12)
	$surface := S$	Roof Surface (S=Slippery, N=Non-Slippery)
	$C_e := 1.0$	Exposure Factor (ASCE 7-05 Table 7-2)
	$C_t := 1.1$	Thermal Factor (ASCE 7-05 Table 7-3)
	$I := 1.0$	Snow Importance Factor (ASCE 7-05 Table 7-4)
	$p_g := 130psf$	Ground Snow Load (Local Building Department)
	$p_f := 0.7 \cdot C_e \cdot C_t \cdot I \cdot p_g$	
	$p_f = 100.1 \cdot psf$	Flat Roof Snow Load
	$dl_r := 15psf$	Roof Dead Load
	$sl_{rs} := 90psf$	Sloped Roof Snow Load
Floor:	$dl_f := 15psf$	Floor Dead Load
	$ll_f := 100psf$	Floor Live Load
Walls:	$dl_w := 10psf$	Wall Dead Load
	$dl_{cw.8} := 150pcf \cdot 8in$	8" Concrete Wall Dead Load

Variables Defined

w	Uniform Load
P	Point Load
a	Distance to Point Load (assumed from left edge of beam u.n.o.)
L	Length
L_a	Cantilever Length
h	Height
h_{ret}	Retained Soil Height
h_{toe}	Soil Height above Toe
h_{xunb}	Column Unbraced Height in X-X Axis
h_{yunb}	Column Unbraced Height in Y-Y Axis
q_{brg}	Bearing Capacity of Soil

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

Seismic Load Summary

Procedure:	ASCE 7-05 12.8 Equivalent Lateral Force
S_S:	1.3303
S_1:	0.5098
Site Class:	D
S_{DS}:	0.887
S_{D1}:	0.510
R:	6.5
Seismic Design Cat.:	D
h_n:	45ft

$C_s := 0.0955$ Seismic Response Coefficient

$W_r := \left(dl_r + 0.2 \cdot sl_{rs}\right) 2346ft^2 + dl_w \cdot (4ft \cdot 160ft)$

$W_r = 83818\,lbf$ Seismic Weight @ Roof Diaphragm $h := 36ft$

$W_4 := \left(dl_f\right) 2011ft^2 + dl_w \cdot (9ft \cdot 160ft)$

$W_4 = 44565\,lbf$ Seismic Weight @ 4th Floor Diaphragm $h := 28ft$

$W_3 := \left(dl_f\right) 2011ft^2 + dl_w \cdot (9ft \cdot 160ft)$

$W_3 = 44565\,lbf$ Seismic Weight @ 3rd Floor Diaphragm $h := 18ft$

$W_2 := \left(dl_f\right) 2011ft^2 + dl_w \cdot (9ft \cdot 160ft)$

$W_2 = 44565\,lbf$ Seismic Weight @ 2nd Floor Diaphragm $h := 10ft$

$V_{s.r} := 11370lbf$ Roof Diaphragm Seismic Shear

$V_{s.4} := 16070lbf$ 4th Floor Diaphragm Seismic Shear

$V_{s.3} := 19090lbf$ 3rd Floor Diaphragm Seismic Shear

$V_{s.2} := 20770lbf$ 2nd Floor Diaphragm Seismic Shear

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:07PM

ASCE 7-05 Seismic Factor Determination

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : Silo Seismic Calcs

Occupancy Category

Calculations per IBC 2006 & ASCE 7-05

Occupancy Category of Building or Other Structure : "II" : All Buildings and other structures except those listed as Category I, III, and IV — *ACSE 7-05, Page 3, Table 1-1*

Occupancy Importance Factor = 1 — *ACSE 7-05, Page 116, Table 11.5-1*

Ground Motion, Using USGS Database values

ASCE 7-05 9.4.1.1

Max. Ground Motions, 5% Damping :

S_S = 1.330 g, 0.2 sec response
S_1 = 0.5098 g, 1.0 sec response

Longitude = 111.006 deg West
Latitude = 42.932 deg North
Location : THAYNE, WY 83127

Site Class, Site Coeff. and Design Category

Site Classification "D" : Shear Wave Velocity 600 to 1,200 ft/sec = D — *ASCE 7-05 Table 20.3-1*

Site Coefficients Fa & Fv — *ASCE 7-05 Table 11.4-1 & 11.4-2*
(using straight-line interpolation from table values)
Fa = 1.00
Fv = 1.50

Maximum Considered Earthquake Acceleration — *ASCE 7-05 Table 11.4-3*
S_{MS} = Fa * Ss = 1.330
S_{M1} = Fv * S1 = 0.765

Design Spectral Acceleration — *ASCE 7-05 Table 11.4-4*
$S_{DS} = S_{MS} * 2/3$ = 0.887
$S_{D1} = S_{M1} * 2/3$ = 0.510

Seismic Design Category = D *(SD1 is most severe)* — *ASCE 7-05 Table 11.6-1*

Resisting System

ASCE 7-05 Table 12.2-1

Basic Seismic Force Resisting System . . . Bearing Wall Systems
Light-framed walls sheathed w/wood structural panels rated for shear resistance or steel sheets.

Response Modification Coefficient " R " = 6.50
System Overstrength Factor " Wo " = 3.00
Deflection Amplification Factor " Cd " = 4.00

NOTE! See ASCE 7-05 for all applicable footnotes.

Building height Limits :
Category "A & B" Limit: No Limit
Category "C" Limit: No Limit
Category "D" Limit: Limit = 65
Category "E" Limit: Limit = 65
Category "F" Limit: Limit = 65

Redundancy Factor

ASCE 7-05 Section 12.3.4

Seismic Design Category of D, E, or F therefore Redundancy Factor " p " = 1.3

Lateral Force Procedure

ASCE 7-05 Section 12.8

Equivalent Lateral Force Procedure

The "Equivalent Lateral Force Procedure" is being used according to the provisions of ASCE 7-05 12.8

Determine Building Period

Use ASCE 12.8-7

Structure Type for Building Period Calculation : All Other Structural Systems

" Ct " value = 0.020
" x " value = 0.75
" hn " : Height from base to highest level = 45.0 ft
" Ta " Approximate fundemental period using Eq. 12.8-7 : Ta = Ct * (hn ^ x) = 0.347 sec
"TL" : Long-period transition period per ASCE 7-05 Maps 22-15 -> 22-20 = 8.000 sec

Building Period " Ta " Calculated from Approximate Method selected = 0.347 sec

" Cs " Response Coefficient

ASCE 7-05 Section 12.8.1.1

S_{DS}: Short Period Design Spectral Response = 0.887
" R " : Response Modification Factor = 6.50
" I " : Occupancy Importance Factor = 1

From Eq. 12.8-2, Preliminary Cs = 0.136
From Eq. 12.8-3 & 12.8-4 , Cs need not exceed = 0.226
From Eq. 12.8-5 & 12.8-6, Cs not be less than = 0.010

Cs : Seismic Response Coefficient = S_{DS} / (R/I) * 0.70 = 0.0955

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:07PM

ASCE 7-05 Seismic Factor Determination

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : Silo Seismic Calcs

Seismic Base Shear

Calculated for Allowable Stress Design Load Combinations *ASCE 7-05 Section 12.8.3*

Cs = 0.0955 from 12.8.1.1

Vertical Distribution of Seismic Forces

" k " : hx exponent based on Ta = 1.00

W (see Sum Wi below) = 217.51 k

Seismic Base Shear V = Cs * W = 20.77 k

Table of building Weights by Floor Level...

Level #	Wi : Weight	Hi : Height	(Wi * Hi) ^k	Cvx	Fx=Cvx * V	Sum Story Shear	Sum Story Moment
4	83.82	36.00	3,017.45	0.55	11.37	11.37	0.00
3	44.57	28.00	1,247.82	0.23	4.70	16.07	90.94
2	44.57	18.00	802.17	0.15	3.02	19.09	251.63
1	44.57	10.00	445.65	0.08	1.68	20.77	404.36

Sum Wi = 217.51 k Sum Wi * Hi = 5,513.09 k-ft Total Base Shear = 20.77 k Base Moment = 612.1 k-ft

Diaphragm Forces : Seismic Design Category "D", "E" & "F"

ASCE 7-05 9.5.2.6.4.4

Level #	Wi	Fi	Sum Fi	Sum Wi	Fpx
4	83.82	11.37	11.37	83.82	14.86
3	44.57	4.70	16.07	128.38	7.90
2	44.57	3.02	19.09	172.95	7.90
1	44.57	1.68	20.77	217.51	7.90

Wpx . . . . . Weight at level of diaphragm and other structure elements attached to it.
Fi . . . . . Design Lateral Force applied at the level.
Sum Fi . . . . . Sum of "Lat. Force" of current level plus all levels above
MIN Req'd Force @ Level . . . . . $0.20 * S_{DS} * I * Wpx$
MAX Req'd Force @ Level . . . . . $0.40 * S_{DS} * I * Wpx$
Fpx : Design Force @ Level . . . . . Wpx * SUM(x->n) Fi / SUM(x->n) wi, x = Current level, n = Top Level

Wall Anchorage

Concrete & Masonry Wall Normal Force : Minimum Force per ACSE 7-05 12.11.1

Minimum Factor : 0.40 * SDS * Importance * Weight = 0.3547 * Weight

Concrete & Masonry Wall Anchorage : Seismic Design Category "C" & "D" per ACSE 7-05 12.11.2.1

Actual Wall Weight Tributary to Anchor = lbs/ lin. ft

Fp : Anchorage Design Force . . .

Rigid Diaphragm Design Force = 0.40 * SDS * I * Trib. Weight = 0.00 lbs / foot

Flexible Diaphragm Design Force = 0.80 * SDS * I * Trib. Weight = 0.00 lbs / foot

Combination of Load Effects

ASCE 7-05 12.4.2.3

Load Description	D Dead Load	Qe Seismic Load		E H & V Load Effect
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000
	0.000	0.000	E = p * Qe + 0.20 * SDS * D =	0.000

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

Wind Load Summary

Procedure: ASCE 7-05 6.5 Method 2 - Analytical Procedure

$V := 90$ Basic Wind Speed (mph) (ASCE 7-05 Fig. 6-1)

$K_d := 0.95$ Directionality Factor (ASCE 7-05 Table 6-4)

$I_w := 1.0$ Wind Importance Factor (ASCE 7-05 Table 6-1)

$R_S := C$ Surface Roughness Category (ASCE 7-05 6.5.6.2)

$E := C$ Exposure Category (ASCE 7-05 6.5.6.3)

$\alpha := 9.5$ Terrain Exposure Constant (ASCE 7-05 Table 6-2)

$z_g := 900$ Terrain Exposure Constant (ASCE 7-05 Table 6-2)

$K_{z.15} := .85$ Velocity Pressure Exposure Coefficient at h=15ft (ASCE 7-05 Table 6-3)

$K_{z.20} := .90$ Velocity Pressure Exposure Coefficient at h=20ft (ASCE 7-05 Table 6-3)

$K_{z.25} := .94$ Velocity Pressure Exposure Coefficient at h=25ft (ASCE 7-05 Table 6-3)

$K_{z.30} := 0.98$ Velocity Pressure Exposure Coefficient at h=30ft (ASCE 7-05 Table 6-3)

$K_{z.40} := 1.04$ Velocity Pressure Exposure Coefficient at h=30ft (ASCE 7-05 Table 6-3)

$$K_{z.45} := 2.01 \cdot \left(\frac{45}{900}\right)^{\frac{2}{\alpha}}$$

$K_{z.45} = 1.07$ Velocity Pressure Exposure Coefficient at h=45ft (ASCE 7-05 Table 6-3)

$K_{zt} := 1.0$ Topographic Factor (ASCE 7-05 6.5.7)

$G := 0.85$ Gust Effect Factor (ASCE 7-05 6.5.8)

$q_{z.15} := 0.00256 \cdot K_{z.15} \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I$

$q_{z.15} = 16.74$ Velocity Pressure at h=15ft (ASCE 7-05 6.5.10)

$q_{z.20} := 0.00256 \cdot K_{z.20} \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I$

$q_{z.20} = 17.73$ Velocity Pressure at h=20ft (ASCE 7-05 6.5.10)

$q_{z.25} := 0.00256 \cdot K_{z.25} \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I$

$q_{z.25} = 18.52$ Velocity Pressure at h=25ft (ASCE 7-05 6.5.10)

$q_{z.30} := 0.00256 \cdot K_{z.30} \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I$

$q_{z.30} = 19.31$ Velocity Pressure at h=30ft (ASCE 7-05 6.5.10)

$q_{z.40} := 0.00256 \cdot K_{z.40} \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I$

$q_{z.40} = 20.49$ Velocity Pressure at h=40ft (ASCE 7-05 6.5.10)

$q_{z.45} := 0.00256 \cdot K_{z.45} \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I$

$q_{z.45} = 21.07$ Velocity Pressure at h=45ft (ASCE 7-05 6.5.10)

$GC_{pi} := 0.18$ Gust Effect Factor (ASCE 7-05 Fig. 6-5)

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

$h := 45ft$ Building Height

$D := 52.5ft$ Building Diameter

$Round := \frac{D}{\sqrt{q_{z.45}}}$

$Round = 11.44\,ft$ Diameter to Pressure Coefficient

$htoD := \frac{h}{D}$

$htoD = 0.86$ Ratio of Height to Diameter

$C_f := 0.5$ Force Coefficient (ASCE 7-05 Fig. 6-21)

$$V_{w.r} := \left[q_{z.45} \cdot G \cdot C_f \cdot \left(70ft^2\right) + q_{z.40} \cdot G \cdot C_f \cdot \left(379ft^2\right)\right] \cdot \frac{lbf}{ft^2}$$

$V_{w.r} = 3926.92\,lbf$ Roof Diaphragm Wind Shear

$$V_{w.4} := \left[q_{z.45} \cdot G \cdot C_f \cdot \left(70ft^2\right) + q_{z.40} \cdot G \cdot C_f \cdot \left(379ft^2 + 106ft^2\right) + q_{z.30} \cdot G \cdot C_f \cdot \left(263ft^2\right) + q_{z.25} \cdot G \cdot C_f \cdot \left(106ft^2\right)\right] \cdot \frac{lbf}{ft^2}$$

$V_{w.4} = 7841.91\,lbf$ 4th Floor Diaphragm Wind Shear

$$V_{w.3} := \left[\begin{array}{l} q_{z.45} \cdot G \cdot C_f \cdot \left(70ft^2\right) + q_{z.40} \cdot G \cdot C_f \cdot \left(379ft^2 + 106ft^2\right) + q_{z.30} \cdot G \cdot C_f \cdot \left(263ft^2\right) \ldots \\ + q_{z.25} \cdot G \cdot C_f \cdot \left(106ft^2 + 158ft^2\right) + q_{z.20} \cdot G \cdot C_f \cdot \left(263ft^2\right) + q_{z.15} \cdot G \cdot C_f \cdot \left(53ft^2\right) \end{array}\right] \cdot \frac{lbf}{ft^2}$$

$V_{w.3} = 11444.2\,lbf$ 3rd Floor Diaphragm Wind Shear

$$V_{w.2} := \left[\begin{array}{l} q_{z.45} \cdot G \cdot C_f \cdot \left(70ft^2\right) + q_{z.40} \cdot G \cdot C_f \cdot \left(379ft^2 + 106ft^2\right) + q_{z.30} \cdot G \cdot C_f \cdot \left(263ft^2\right) \ldots \\ + q_{z.25} \cdot G \cdot C_f \cdot \left(106ft^2 + 158ft^2\right) + q_{z.20} \cdot G \cdot C_f \cdot \left(263ft^2\right) + q_{z.15} \cdot G \cdot C_f \cdot \left(53ft^2 + 474ft^2\right) \end{array}\right] \cdot \frac{lbf}{ft^2}$$

$V_{w.2} = 14817.34\,lbf$ 3rd Floor Diaphragm Wind Shear

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

(1) Shear Walls @ 4th Floor Level

$V_w := V_{w.r}$ $V_w = 3926.92\,lbf$ Wind Shear Force

$V_s := V_{s.r}$ $V_s = 11370\,lbf$ Seismic Shear Force

$V := \max(V_w, V_s)$ $V = 11370\,lbf$ Shear Force

All walls shall use Simpson CMSTC16 above and below windows/doors to allow for reduced height/width ratio

$L_1 := 4\left[1.833ft\cdot\left[\frac{(2\cdot 1.833ft)}{4ft}\right]\right]$ $L_1 = 6.72\,ft$ $C_{o1} := 1.0$ Full Panel

$L_2 := 8\left[1.833ft\cdot\left[\frac{(2\cdot 1.833ft)}{4ft}\right]\cdot\cos(23deg)\right]$ $L_2 = 12.37\,ft$ $C_{o2} := 1.0$ Full Panel

$L_3 := 8\left[1.833ft\cdot\left[\frac{(2\cdot 1.833ft)}{4ft}\right]\cdot\cos(45deg)\right]$ $L_3 = 9.5\,ft$ $C_{o3} := 1.0$ Full Panel

$L_4 := 8\left[1.833ft\cdot\left[\frac{(2\cdot 1.833ft)}{4ft}\right]\cdot\sin(23deg)\right]$ $L_4 = 5.25\,ft$ $C_{o4} := 1.0$ Full Panel

$L_\Sigma := (C_{o1}\cdot L_1) + (C_{o2}\cdot L_2) + (C_{o3}\cdot L_3) + (C_{o4}\cdot L_4)$ $L_\Sigma = 33.85\,ft$ Equivalent Shear Wall Effective Length

$h := 8ft$ Shear Wall Height

$\nu := \frac{V}{L_\Sigma}$ $\nu = 335.94\cdot plf$ Wall Shear Type 2 Wall $\nu_{allow} := 350plf$

$L_t := 2\cdot 8.66ft + 4\cdot 8.66ft\cdot\cos(23deg) + 4\cdot 8.66ft\cdot\cos(45deg) + 4\cdot 8.66ft\cdot\sin(23deg)$

$L_t = 87.24\,ft$ Total Effective Length of Wall Line

$D := \left(\frac{V}{L_t}\right)$ $D = 130.34\cdot plf$ Shear Drag Force

Use Simpson A35 @ 36" o.c.
from Roof Decking to Ext. Wall
G.F. 150plf

$P := \nu\cdot h$

$P = 2687.51\,lbf$ Uplift Load

Use Simpson MSTC66 to Beam Below G.F. 5860lbf
Use (3) 7/8" Lags to Columns G.F. 3060lbf

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

(2) Shear Walls @ 3rd Floor Level

$V_w := V_{w.4}$ $V_w = 7841.91\,lbf$ Wind Shear Force

$V_s := V_{s.4}$ $V_s = 16070\,lbf$ Seismic Shear Force

$V := \max(V_w, V_s)$ $V = 16070\,lbf$ Shear Force

All walls shall use Simpson CMSTC16 above and below windows/doors to allow for reduced height/width ratio

$L_1 := 4\left[1.833ft\cdot\left[\frac{(2\cdot 1.833ft)}{4ft}\right]\right]$ $L_1 = 6.72\,ft$ $C_{o1} := 1.0$ Full Panel

$L_2 := 8\left[1.833ft\cdot\left[\frac{(2\cdot 1.833ft)}{4ft}\right]\cdot\cos(23deg)\right]$ $L_2 = 12.37\,ft$ $C_{o2} := 1.0$ Full Panel

$L_3 := 8\left[1.833ft\cdot\left[\frac{(2\cdot 1.833ft)}{4ft}\right]\cdot\cos(45deg)\right]$ $L_3 = 9.5\,ft$ $C_{o3} := 1.0$ Full Panel

$L_4 := 8\left[1.833ft\cdot\left[\frac{(2\cdot 1.833ft)}{4ft}\right]\cdot\sin(23deg)\right]$ $L_4 = 5.25\,ft$ $C_{o4} := 1.0$ Full Panel

$L_\Sigma := (C_{o1}\cdot L_1) + (C_{o2}\cdot L_2) + (C_{o3}\cdot L_3) + (C_{o4}\cdot L_4)$ $L_\Sigma = 33.85\,ft$ Equivalent Shear Wall Effective Length

$h := 10ft$ Shear Wall Height

$\nu := \frac{V}{L_\Sigma}$ $\nu = 474.81\cdot plf$ Wall Shear Type 3 Wall $\nu_{allow} := 490plf$

$L_t := 2\cdot 8.66ft + 4\cdot 8.66ft\cdot\cos(23deg) + 4\cdot 8.66ft\cdot\cos(45deg) + 4\cdot 8.66ft\cdot\sin(23deg)$

$L_t = 87.24\,ft$ Total Effective Length of Wall Line

$D := \left(\frac{V}{L_t}\right)$ $D = 184.21\cdot plf$ Shear Drag Force

Use Simpson A35 @ 24" o.c.
from Floor Decking to Ext. Wall
G.F. 225plf

$P := \nu\cdot h$

$P = 4748.06\,lbf$ Uplift Load

Use Simpson MSTC66 to Wall Below G.F. 5860lbf
Use (4) 1" Lags to Columns G.F. 5160lbf

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

(3) Shear Walls @ 2nd Floor Level

$V_w := V_{w.3}$ $V_w = 11444.2\,lbf$ Wind Shear Force

$V_s := V_{s.3}$ $V_s = 19090\,lbf$ Seismic Shear Force

$V := \max(V_w, V_s)$ $V = 19090\,lbf$ Shear Force

All walls shall use Simpson CMSTC16 above and below windows/doors to allow for reduced height/width ratio

$L_1 := 4\left[1.833ft\cdot\left[\frac{(2\cdot 1.833ft)}{4ft}\right]\right]$ $L_1 = 6.72\,ft$ $C_{o1} := 1.0$ Full Panel

$L_2 := 8\left[1.833ft\cdot\left[\frac{(2\cdot 1.833ft)}{4ft}\right]\cdot\cos(23deg)\right]$ $L_2 = 12.37\,ft$ $C_{o2} := 1.0$ Full Panel

$L_3 := 8\left[1.833ft\cdot\left[\frac{(2\cdot 1.833ft)}{4ft}\right]\cdot\cos(45deg)\right]$ $L_3 = 9.5\,ft$ $C_{o3} := 1.0$ Full Panel

$L_4 := 8\left[1.833ft\cdot\left[\frac{(2\cdot 1.833ft)}{4ft}\right]\cdot\sin(23deg)\right]$ $L_4 = 5.25\,ft$ $C_{o4} := 1.0$ Full Panel

$L_\Sigma := (C_{o1}\cdot L_1) + (C_{o2}\cdot L_2) + (C_{o3}\cdot L_3) + (C_{o4}\cdot L_4)$ $L_\Sigma = 33.85\,ft$ Equivalent Shear Wall Effective Length

$h := 8ft$ Shear Wall Height

$\nu := \frac{V}{L_\Sigma}$ $\nu = 564.04\cdot plf$ Wall Shear Type 4 Wall $\nu_{allow} := 600plf$

$L_t := 2\cdot 8.66ft + 4\cdot 8.66ft\cdot\cos(23deg) + 4\cdot 8.66ft\cdot\cos(45deg) + 4\cdot 8.66ft\cdot\sin(23deg)$

$L_t = 87.24\,ft$ Total Effective Length of Wall Line

$D := \left(\frac{V}{L_t}\right)$ $D = 218.83\cdot plf$ Shear Drag Force

Use Simpson A35 @ 24" o.c.
from Floor Decking to Ext. Wall
G.F. 225plf

$P := \nu\cdot h$

$P = 4512.28\,lbf$ Uplift Load

Use Simpson MSTC66 to Wall Below G.F. 5860lbf
Use (4) 1" Lags to Columns G.F. 5160lbf

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

(4) Shear Walls @ 1st Floor Level

$V_w := V_{w.2}$ $V_w = 14817.34\,lbf$ Wind Shear Force

$V_s := V_{s.2}$ $V_s = 20770\,lbf$ Seismic Shear Force

$V := \max(V_w, V_s)$ $V = 20770\,lbf$ Shear Force

All walls shall use Simpson CMSTC16 above and below windows/doors to allow for reduced height/width ratio

$L_1 := 4\left[1.833ft\cdot\left[\frac{(2\cdot 1.833ft)}{4ft}\right]\right]$ $L_1 = 6.72\,ft$ $C_{o1} := 1.0$ Full Panel

$L_2 := 8\left[1.833ft\cdot\left[\frac{(2\cdot 1.833ft)}{4ft}\right]\cdot\cos(23deg)\right]$ $L_2 = 12.37\,ft$ $C_{o2} := 1.0$ Full Panel

$L_3 := 8\left[1.833ft\cdot\left[\frac{(2\cdot 1.833ft)}{4ft}\right]\cdot\cos(45deg)\right]$ $L_3 = 9.5\,ft$ $C_{o3} := 1.0$ Full Panel

$L_4 := 8\left[1.833ft\cdot\left[\frac{(2\cdot 1.833ft)}{4ft}\right]\cdot\sin(23deg)\right]$ $L_4 = 5.25\,ft$ $C_{o4} := 1.0$ Full Panel

$L_\Sigma := (C_{o1}\cdot L_1) + (C_{o2}\cdot L_2) + (C_{o3}\cdot L_3) + (C_{o4}\cdot L_4)$ $L_\Sigma = 33.85\,ft$ Equivalent Shear Wall Effective Length

$h := 10ft$ Shear Wall Height

$\nu := \frac{V}{L_\Sigma}$ $\nu = 613.67\cdot plf$ Wall Shear Type 5 Wall $\nu_{allow} := 640plf$

$L_t := 2\cdot 8.66ft + 4\cdot 8.66ft\cdot\cos(23deg) + 4\cdot 8.66ft\cdot\cos(45deg) + 4\cdot 8.66ft\cdot\sin(23deg)$

$L_t = 87.24\,ft$ Total Effective Length of Wall Line

$D := \left(\frac{V}{L_t}\right)$ $D = 238.09\cdot plf$ Shear Drag Force

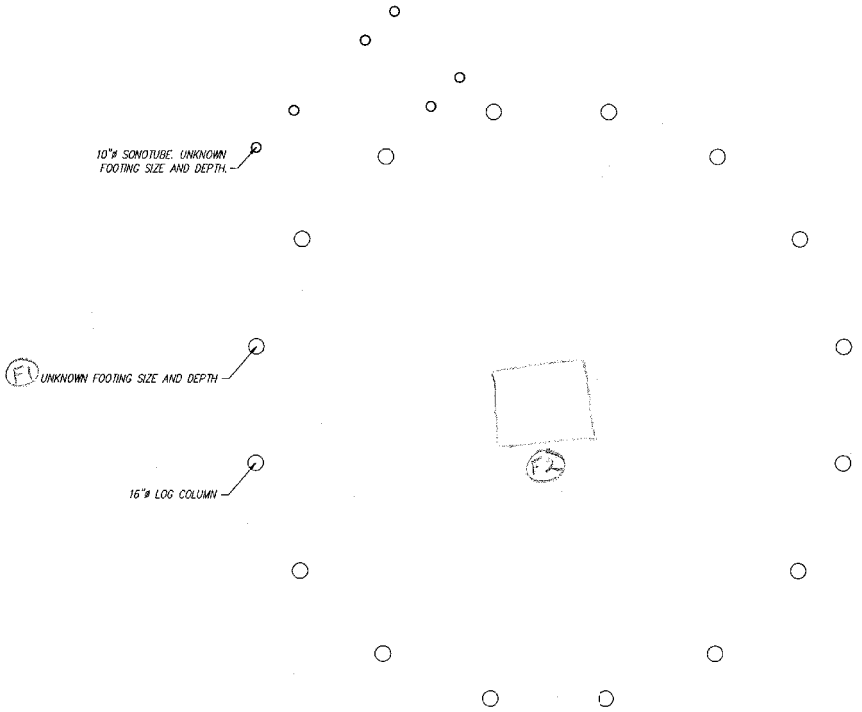
Use Simpson A35 @ 16" o.c.
from Floor Decking to Ext. Wall
G.F. 337plf

$P := \nu\cdot h$

$P = 6136.73\,lbf$ Uplift Load

Use Simpson HDU8-SDS2.5 (w/ (3) 2x6) to Foundation G.F. 6970lbf
Use (5) 1" Lags to Columns G.F. 6450lbf
Use Helical Pier @ Each Column. Attach Column to Helical Pier

Plot: _____ Time: _____ Last Detailer: _____ Layout: S3.1 Drawing: S:\Projects\2009\009135.00 Star Valley Ranch Association\Construction Drawings\As Built Drawings\ As Built Drawings.dwg



SILO FOUNDATION & 1ST FLOOR FRAMING PLAN

Scale: 1/8" = 1'-0"

Rev.	Date	By	Description

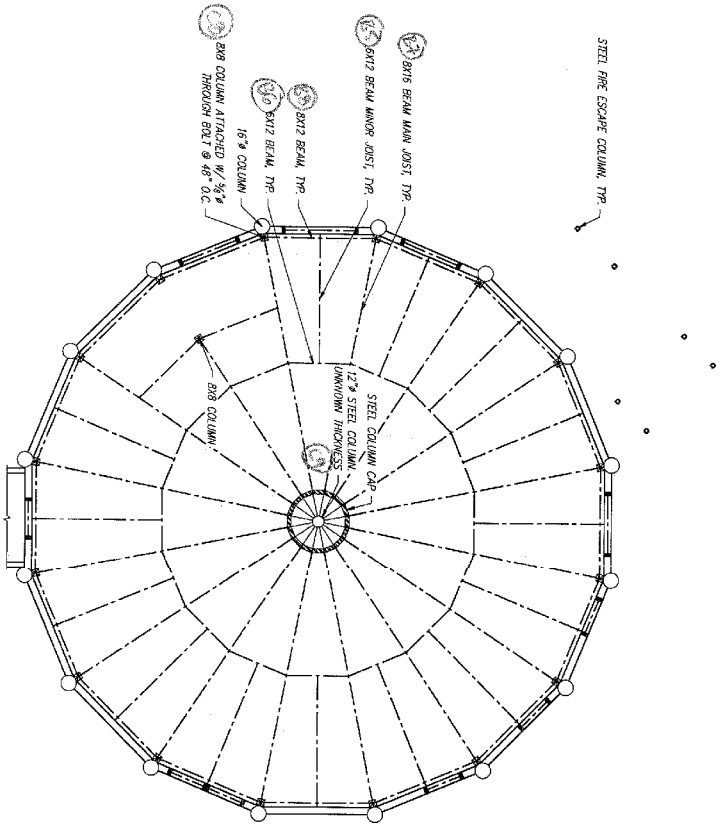
SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH

SILO FOUND. & 1ST FL. PLAN

Designed by:	-
Checked by:	-
Prj Drafter:	MHH
Drafter:	MHH
Issue Date:	05/14/2009
Project Ref.:	009135.00
Client Ref.:	-

SHEET NO. S3.1 OF 14 SHEETS



SILO 2ND FLOOR FRAMING PLAN

Scale: 1/8" = 1'-0"

Designed by:	
Checked by:	
Drawn by:	MHH
Date:	09/14/2009
Project Ref.:	D09135.00
Client Ref.:	

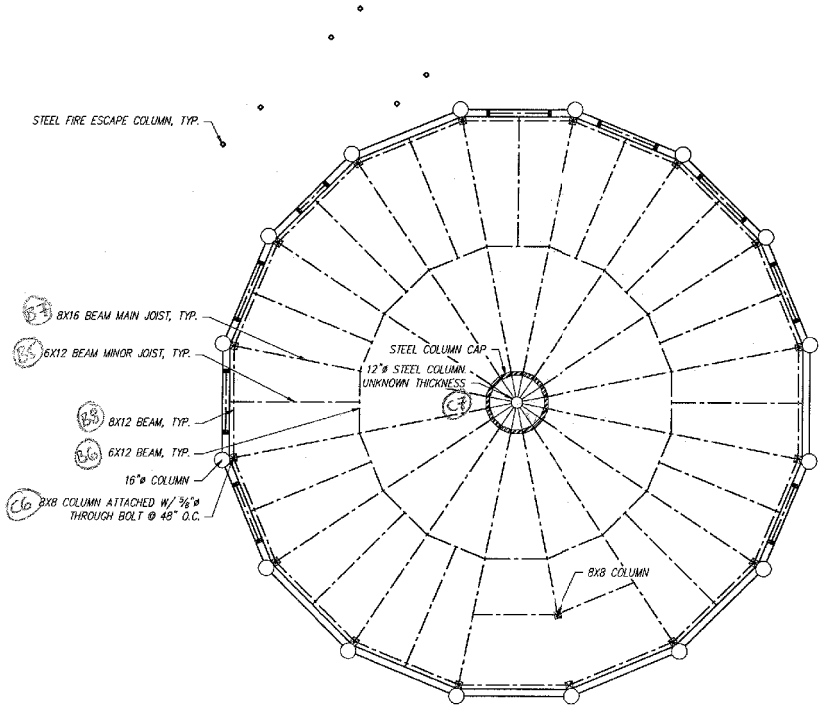
SHEET NO. S3.2 OF 14 SHEETS

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH

SILO 2ND FLOOR FRAMING PLAN

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

Rev.	Date	By	Description



SILO 3RD FLOOR FRAMING PLAN

Scale: 1/8" = 1'-0"

Plot: _____ Time: _____ Last Detailer: _____ Layout: S3.3 Drawing: S:\Projects\2009\D09135.00 Star Valley Ranch Association\Construction Drawings\As Built Drawings\ As Built Drawings.dwg

Rev.	Date:	By	Description

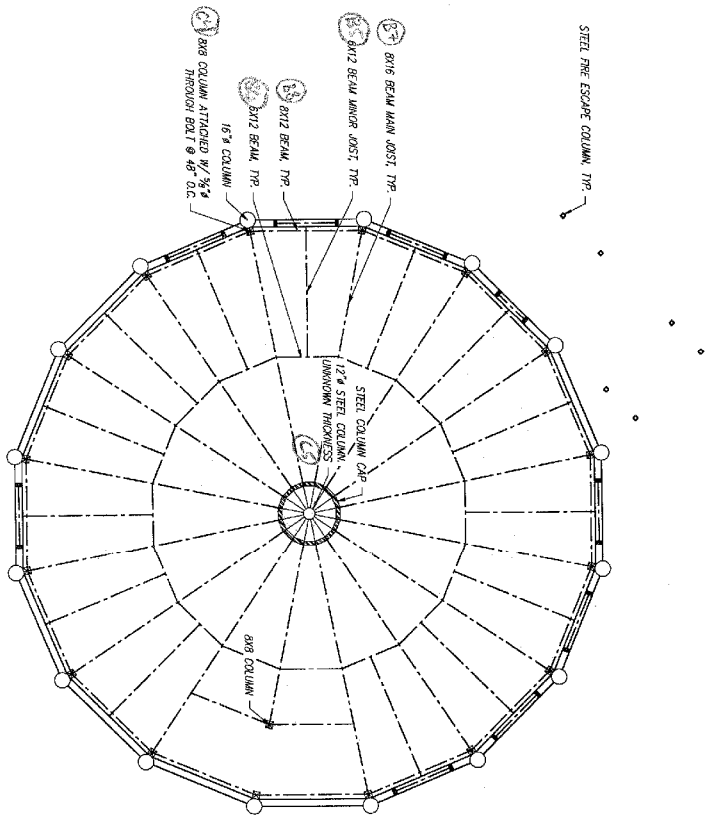
SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH

SILO 3RD FLOOR FRAMING PLAN

Designed by:	.
Checked by:	.
Prj. Drafter:	MHH
Drafter:	MHH
Issue Date:	09/14/2009
Project Ref.:	D09135.00
Client Ref.:	

SHEET NO. S3.3 OF 14 SHEETS



SILO 4TH FLOOR FRAMING PLAN

Scale: 1/8" = 1'-0"

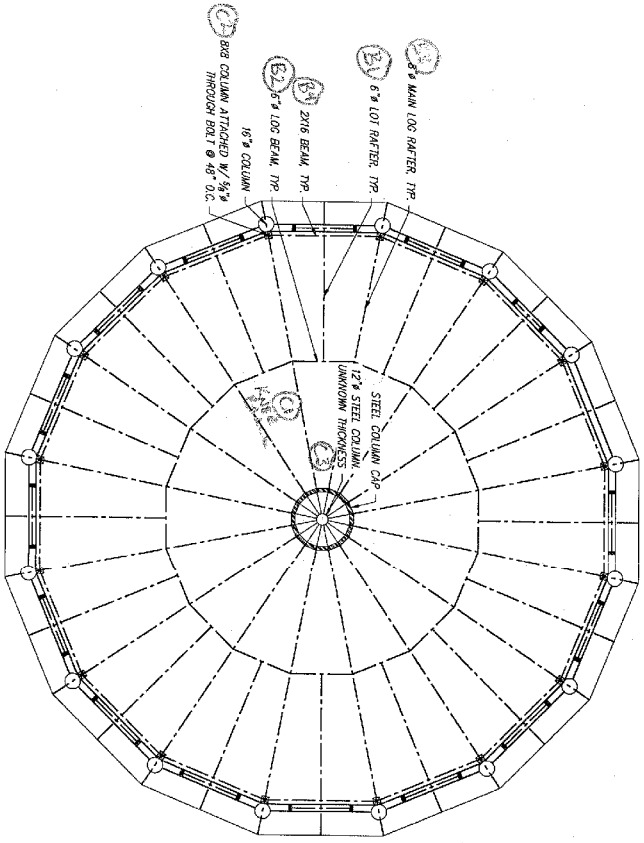
SHEET NO.	S3.4
OF SHEETS	14
Designed by:	
Checked by:	
Drawn by:	MH
Plt. Detailer:	MH
Date:	10/14/2009
Project Ref.:	D09135.00
Obsn. Ref.:	

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH

SILO 4TH FLOOR FRAMING PLAN

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

Rev.	Date	By	Description



SILO ROOF FRAMING PLAN

Scale: 1/8" = 1'-0"

SHEET NO. S3.5	OF 14 SHEETS	Designed by:	
		Checked by:	
		Drawn by:	MEH
		Date:	08/14/2009
		Project Ref.:	D09135.00
		Client Ref.:	

STAR VALLEY RANCH ASSOCIATION
AS-BUILT DRAWINGS
STAR VALLEY RANCH

SILO ROOF FRAMING PLAN

SARGENT
Sargent Engineers, Inc.
1290 Arrowhead Plaza Way
Driggs, Idaho 83422
Tel. 208 354-4400 • Fax 208 354-4420

Rev.	Date	By	Description

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

(B1) Secondary Log Rafters (Unbalanced - Controls)

Trapezoidal Load Start @ 0ft

$w_{dl} := dl_r \cdot (2.66ft)$ $w_{dl} = 39.9 \cdot plf$

$w_{sl} := 115psf \cdot (2.66ft)$ $w_{sl} = 305.9 \cdot plf$

Trapezoidal Load End @ 14ft

$w_{dl} := dl_r \cdot (5.33ft)$ $w_{dl} = 79.95 \cdot plf$

$w_{sl} := 180psf \cdot (5.33ft)$ $w_{sl} = 959.4 \cdot plf$

$L := 11ft$ $L_a := 3ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.37 \cdot in$

Existing: 6" DF-L No. 2 Log Rafter
Condition: 323% of Capacity

(B1a) Secondary Log Rafters (Balanced Snow)

Trapezoidal Load Start @ 0ft

$w_{dl} := dl_r \cdot (2.66ft)$ $w_{dl} = 39.9 \cdot plf$

$w_{sl} := sl_{rs} \cdot (2.66ft)$ $w_{sl} = 239.4 \cdot plf$

Trapezoidal Load End @ 14ft

$w_{dl} := dl_r \cdot (5.33ft)$ $w_{dl} = 79.95 \cdot plf$

$w_{sl} := sl_{rs} \cdot (5.33ft)$ $w_{sl} = 479.7 \cdot plf$

$L := 11ft$ $L_a := 3ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.37 \cdot in$

Existing: 6" DF-L No. 2 Log Rafter
Condition: 270% of Capacity

(B2) Intermediate Rafter Bearing Beam (Unbalanced - Controls)

Point Load @ 2.66ft

$P_{dl} := 250lbf$ $P_{dl} = 250 \cdot lbf$

$P_{sl} := 2250lbf$ $P_{sl} = 2250 \cdot lbf$

$L := 5.33ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.18 \cdot in$

Existing: 6" DF-L No. 2 Log
Condition: 151% of Capacity

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

General Section Properties

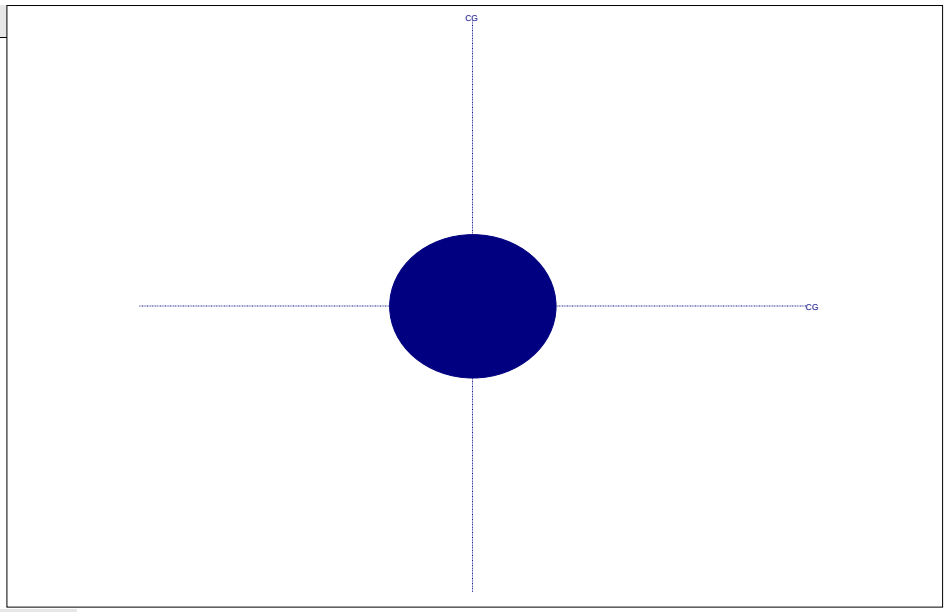
File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : 6" Log

Final Section Properties

Total Area	:	28.274 in^2
Calculated final C.G. distance from Datum :		
X cg Dist.	:	0.0 in
Y cg Dist.	:	0.0 in
Edge Distances from CG. :		
+X	:	3.0 in
-X	:	-3.0 in
+Y	:	3.0 in
-Y	:	-3.0 in
Ixx =	:	63.617 in^4
Iyy =	:	63.617 in^4
Sxx : -X	:	21.206 in^3
Sxx : +X	:	21.206 in^3
Syy : -Y	:	21.206 in^3
Syy : +Y	:	21.206 in^3
r xx	:	1.50 in
r yy	:	1.50 in



General Shapes

Circ : 1 Radius = 3.000 in Thickness 3.000 in Rotation = 0 dec CCW

Area =	28.274 in^2	Xcg =	0.000 in	Ixx =	63.617 in^4	Sxx =	-21.206 in^3	Rxx =	1.500 in
		Ycg =	0.000 in	Iyy =	63.617 in^4	Syy =	-21.206 in^3	Ryy =	1.500 in

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B1) Secondary Log Rafters (Unbalanced - Controls)

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

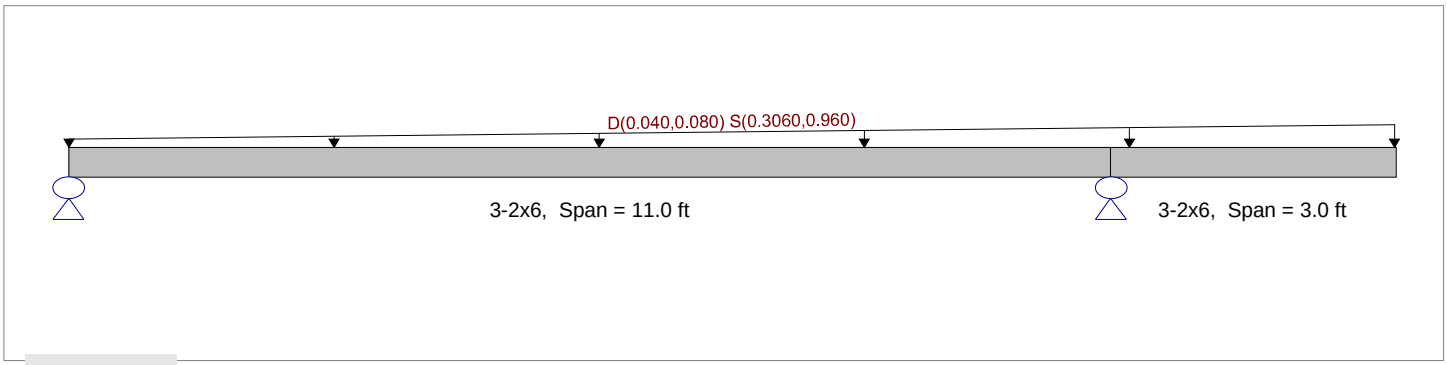
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Varying Uniform Load : D(S,E) = 0.0->0.080, S(S,E) = 0.0->0.960 k/ft, Extent = 0.0 -->> 14.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	3.231 : 1	Maximum Shear Stress Ratio	=	1.325 : 1
Section used for this span		3-2x6	Section used for this span		3-2x6
fb : Actual	=	3,780.83 psi	fv : Actual	=	238.48 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	5.246 ft	Location of maximum on span	=	10.577 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	1.338 in
Max Upward L+Lr+S Deflection	=	-0.727 in
Live Load Deflection Ratio	=	98 <360
Max Downward Total Deflection	=	1.478 in
Max Upward Total Deflection	=	-0.811 in
Total Deflection Ratio	=	88 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	1.4781	5.415		0.0000	0.000
	2	0.0000	5.415	D+L+S	-0.8110	3.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	2.498 k
Support 2, (D+L+S)	7.204 k
	k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	2.498	7.204	
D Only	0.246	0.594	
S Only	2.251	6.611	
D+L+S	2.498	7.204	

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B1a) Secondary Log Rafters (Balanced Snow)

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

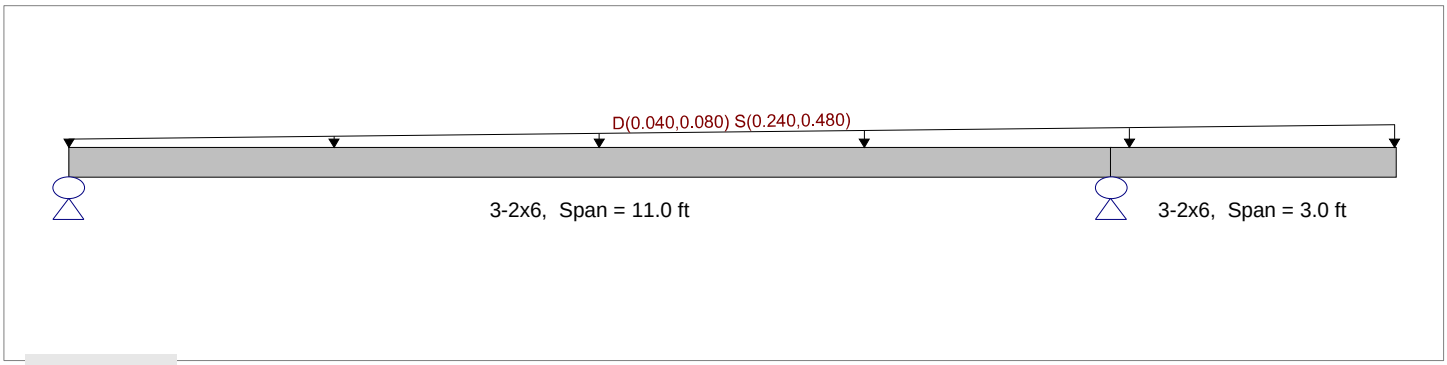
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Varying Uniform Load : D(S,E) = 0.0->0.080, S(S,E) = 0.0->0.480 k/ft, Extent = 0.0 -->> 14.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	2.126 : 1	Maximum Shear Stress Ratio	=	0.865 : 1
Section used for this span		3-2x6	Section used for this span		3-2x6
fb : Actual	=	2,487.10 psi	fv : Actual	=	155.61 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	5.162 ft	Location of maximum on span	=	11.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.842 in
Max Upward L+Lr+S Deflection	=	-0.503 in
Live Load Deflection Ratio	=	142 <360
Max Downward Total Deflection	=	0.982 in
Max Upward Total Deflection	=	-0.587 in
Total Deflection Ratio	=	122 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.9822	5.415		0.0000	0.000
	2	0.0000	5.415	D+L+S	-0.5868	3.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	1.722 k
Support 2, (D+L+S)	4.158 k
	k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	1.722	4.158	
D Only	0.246	0.594	
S Only	1.476	3.564	
D+L+S	1.722	4.158	

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B2) Intermediate Rafter Bearing Beam (Unbalanced - Controls)

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

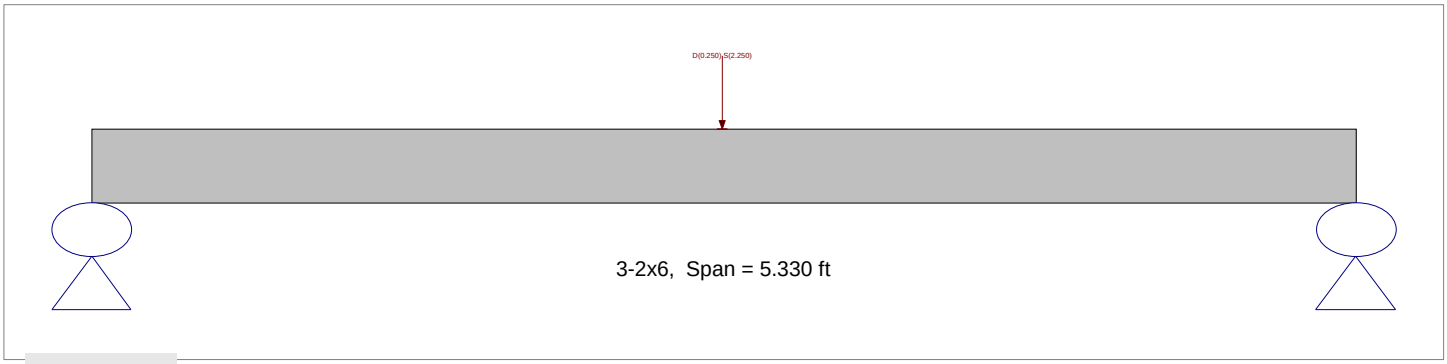
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Point Load : D = 0.250, S = 2.250 k, Starting at : 2.660 ft and placed every 0.0 ft thereafter

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	1.503 : 1	Maximum Shear Stress Ratio	=	0.422 : 1
Section used for this span		3-2x6	Section used for this span		3-2x6
fb : Actual	=	1,758.68 psi	fv : Actual	=	75.90 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	2.665 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 L+Lr+S Deflection	=	0.124 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	516
Max Downward Total Deflection	=	0.138 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	465

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.1375	2.665		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	1.252 k
	1.248 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	1.252	1.248
D Only	0.125	0.125
S Only	1.127	1.123
D+L+S	1.252	1.248

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

(B2a) Intermediate Rafter Bearing Beam (Balanced Snow)

Point Load @ 2.66ft

$P_{dl} := 250lbf$ $P_{dl} = 250 \cdot lbf$

$P_{sl} := 1480lbf$ $P_{sl} = 1480 \cdot lbf$

$L := 5.33ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.18 \cdot in$

Existing: 6" DF-L No. 2 Log
Condition: 104% of Capacity

(B3) Primary Log Rafters (Unbalanced - Controls)

Trapezoidal Load 1 Start @ 0ft

$w_{dl} := dl_r \cdot (1ft)$ $w_{dl} = 15 \cdot plf$

$w_{sl} := 50psf \cdot (1ft)$ $w_{sl} = 50 \cdot plf$

Trapezoidal Load 1 End @ 11ft

$w_{dl} := dl_r \cdot (5.33ft)$ $w_{dl} = 79.95 \cdot plf$

$w_{sl} := 115psf \cdot (5.33ft)$ $w_{sl} = 612.95 \cdot plf$

Trapezoidal Load 2 Start @ 11ft

$w_{dl} := dl_r \cdot (2.66ft)$ $w_{dl} = 39.9 \cdot plf$

$w_{sl} := 115psf \cdot (2.66ft)$ $w_{sl} = 305.9 \cdot plf$

Trapezoidal Load 2 End @ 25ft

$w_{dl} := dl_r \cdot (5.33ft)$ $w_{dl} = 79.95 \cdot plf$

$w_{sl} := 180psf \cdot (5.33ft)$ $w_{sl} = 959.4 \cdot plf$

Point Load @ 11ft

$P_{dl} := 130lbf$ $P_{dl} = 130 \cdot lbf$

$P_{sl} := 1130lbf$ $P_{sl} = 1130 \cdot lbf$

$L := 11ft, 11ft$ $L_a := 3ft$

$\Delta_{max} := \frac{L}{360}$

Existing: 8" DF-L No. 2 Log Rafter
Condition: 167% of Capacity

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B2a) Intermediate Rafter Bearing Beam (Balanced Snow)

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

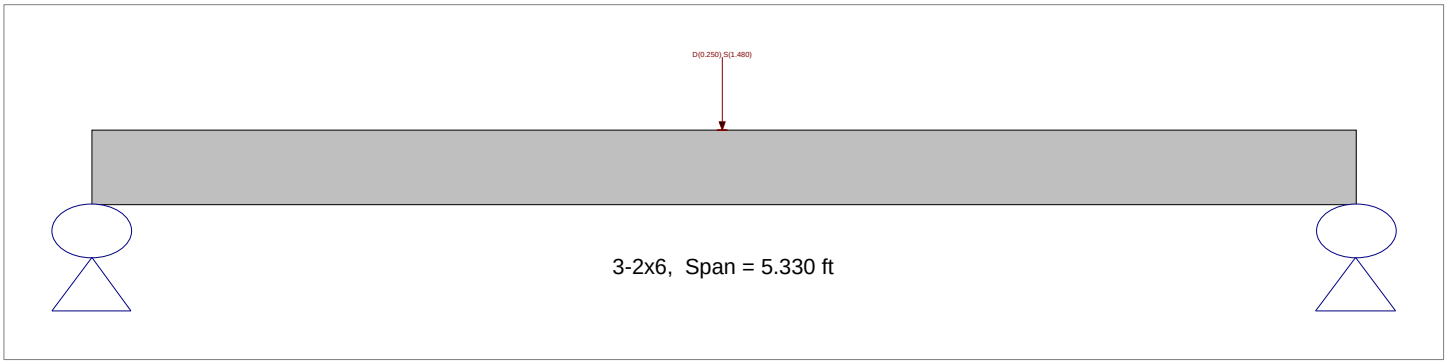
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...

Point Load : D = 0.250, S = 1.480 k, Starting at : 2.660 ft and placed every 0.0 ft thereafter

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	1.040 : 1	Maximum Shear Stress Ratio	=	0.292 : 1
Section used for this span		3-2x6	Section used for this span		3-2x6
fb : Actual	=	1,217.00 psi	fv : Actual	=	52.52 psi
FB : Allowable	=	1,170.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	2.665 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 L+Lr+S Deflection	=	0.081 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	785
Max Downward Total Deflection	=	0.095 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	672

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.0952	2.665		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	0.867 k
Support 2, (D+L+S)	0.863 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	0.867	0.863
D Only	0.125	0.125
S Only	0.741	0.739
D+L+S	0.867	0.863

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

General Section Properties

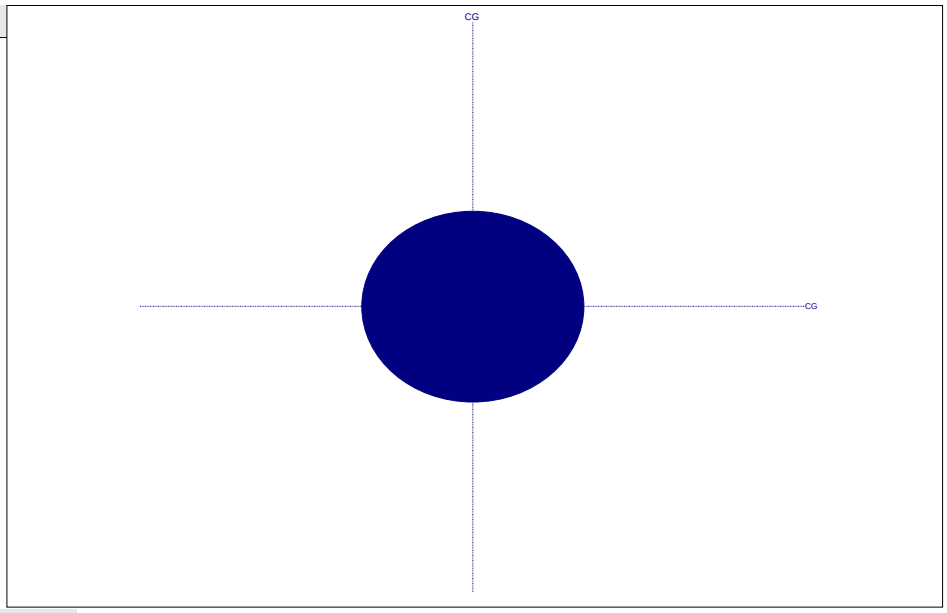
File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : 8" Log

Final Section Properties

Total Area	:	50.265 in^2
Calculated final C.G. distance from Datum :		
X cg Dist.	:	0.0 in
Y cg Dist.	:	0.0 in
Edge Distances from CG. :		
+X	:	4.0 in
-X	:	-4.0 in
+Y	:	4.0 in
-Y	:	-4.0 in
Ixx =	:	201.06 in^4
Iyy =	:	201.06 in^4
Sxx : -X	:	50.265 in^3
Sxx : +X	:	50.265 in^3
Syy : -Y	:	50.265 in^3
Syy : +Y	:	50.265 in^3
r xx	:	2.0 in
r yy	:	2.0 in



General Shapes

Circ : 1 Radius = 4.000 in Thickness 4.000 in Rotation = 0 dec CCW

Area =	50.265 in^2	Xcg =	0.000 in	Ixx =	201.062 in^4	Sxx =	-50.265 in^3	Rxx =	2.000 in
		Ycg =	0.000 in	Iyy =	201.062 in^4	Syy =	-50.265 in^3	Ryy =	2.000 in

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — **License Owner : SARGENT ENGINEERS INC**

Description : (B3) Primary Log Rafters (Unbalanced - Controls)

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

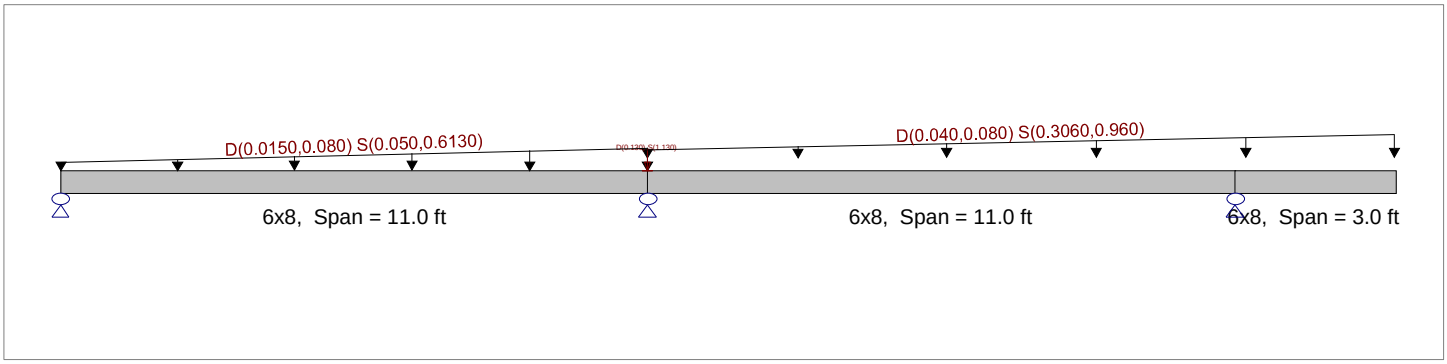
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Varying Uniform Load : D(S,E) = 0.0->0.080, S(S,E) = 0.0->0.6130 k/ft, Extent = 0.0 -->> 11.0 ft
Varying Uniform Load : D(S,E) = 0.040->0.080, S(S,E) = 0.3060->0.960 k/ft, Extent = 11.0 -->> 25.0 ft
Point Load : D = 0.130, S = 1.130 k, Starting at : 11.0 ft and placed every 0.0 ft thereafter

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	1.668 : 1	Maximum Shear Stress Ratio	=	0.653 : 1
Section used for this span		6x8	Section used for this span		6x8
fb : Actual	=	1,501.39 psi	fv : Actual	=	117.54 psi
FB : Allowable	=	900.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	11.000 ft	Location of maximum on span	=	10.443 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 2

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.186 in
Max Upward L+Lr+S Deflection	=	-0.058 in
Live Load Deflection Ratio	=	711
Max Downward Total Deflection	=	0.201 in
Max Upward Total Deflection	=	-0.064 in
Total Deflection Ratio	=	657

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.1383	4.873		0.0000	0.000
D+L+S	2	0.2008	5.987		0.0000	0.000
	3	0.0000	5.987	D+L+S	-0.0637	3.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	0.922 k
Support 2, (D+L+S)	7.591 k
Support 3, (D+L+S)	6.618 k
Support 4, (D+L+S)	k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum	0.922	7.591	6.618	

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (B3) Primary Log Rafters (Unbalanced - Controls)

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4
D Only	0.138	0.825	0.530	
S Only	0.785	6.766	6.088	
D+L+S	0.922	7.591	6.618	

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

(B3a) Primary Log Rafters (Balanced Snow)

Trapezoidal Load 1 Start @ 0ft

$w_{dl} := dl_r \cdot (1ft)$ $w_{dl} = 15 \cdot plf$

$w_{sl} := sl_{rs} \cdot (1ft)$ $w_{sl} = 90 \cdot plf$

Trapezoidal Load 1 End @ 11ft

$w_{dl} := dl_r \cdot (5.33ft)$ $w_{dl} = 79.95 \cdot plf$

$w_{sl} := sl_{rs} \cdot (5.33ft)$ $w_{sl} = 479.7 \cdot plf$

Trapezoidal Load 2 Start @ 11ft

$w_{dl} := dl_r \cdot (2.66ft)$ $w_{dl} = 39.9 \cdot plf$

$w_{sl} := sl_{rs} \cdot (2.66ft)$ $w_{sl} = 239.4 \cdot plf$

Trapezoidal Load 2 End @ 25ft

$w_{dl} := dl_r \cdot (5.33ft)$ $w_{dl} = 79.95 \cdot plf$

$w_{sl} := sl_{rs} \cdot (5.33ft)$ $w_{sl} = 479.7 \cdot plf$

Point Load @ 11ft

$P_{dl} := 130lbf$ $P_{dl} = 130 \cdot lbf$

$P_{sl} := 740lbf$ $P_{sl} = 740 \cdot lbf$

$L := 11ft, 11ft$ $L_a := 3ft$

$\Delta_{max} := \frac{L}{360}$

Existing: 8" DF-L No. 2 Log Rafter
Condition: 127% of Capacity

(B4) Secondary Rafter Bearing Beam @ Wall

Point Load @ 4.75ft

$P_{dl} := 590lbf$ $P_{dl} = 590 \cdot lbf$

$P_{sl} := 6610lbf$ $P_{sl} = 6610 \cdot lbf$

$L := 9.5ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.32 \cdot in$

Existing: 2x16 DF-L No. 2
Condition: 262% of Capacity

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — **License Owner : SARGENT ENGINEERS INC**

Description : (B3a) Primary Log Rafters (Balanced Snow)

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

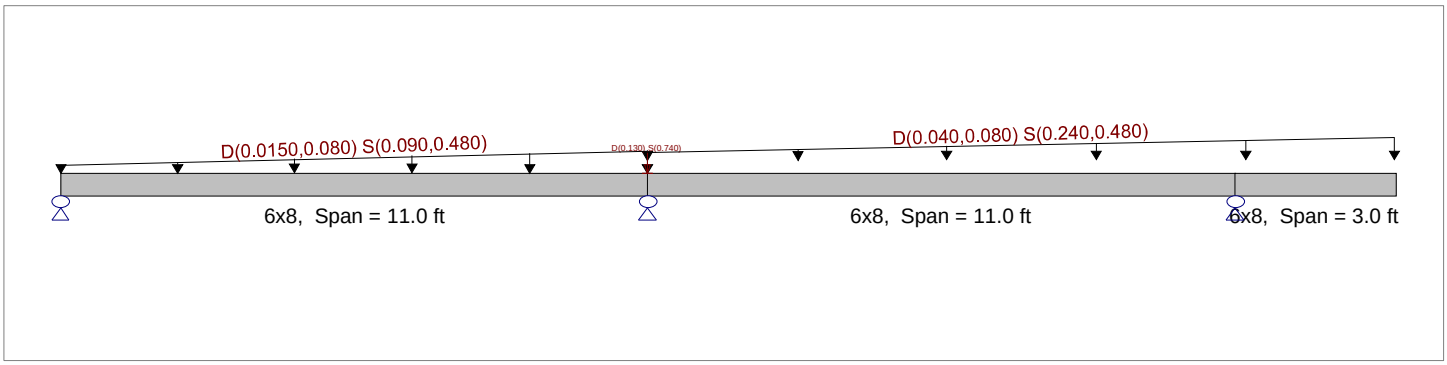
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Varying Uniform Load : D(S,E) = 0.0->0.080, S(S,E) = 0.0->0.480 k/ft, Extent = 0.0 -->> 11.0 ft
Varying Uniform Load : D(S,E) = 0.040->0.080, S(S,E) = 0.240->0.480 k/ft, Extent = 11.0 -->> 25.0 ft
Point Load : D = 0.130, S = 0.740 k, Starting at : 11.0 ft and placed every 0.0 ft thereafter

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	1.271 : 1	Maximum Shear Stress Ratio	=	0.544 : 1
Section used for this span		6x8	Section used for this span		6x8
fb : Actual	=	1,144.00 psi	fv : Actual	=	97.92 psi
FB : Allowable	=	900.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	11.000 ft	Location of maximum on span	=	11.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.130 in
Max Upward L+Lr+S Deflection	=	-0.033 in
Live Load Deflection Ratio	=	1011
Max Downward Total Deflection	=	0.152 in
Max Upward Total Deflection	=	-0.038 in
Total Deflection Ratio	=	867

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.1522	5.013		0.0000	0.000
D+L+S	2	0.1072	6.266	D+L+S	-0.0014	0.278
	3	0.0000	6.266	D+L+S	-0.0384	3.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	0.965 k
Support 2, (D+L+S)	5.732 k
Support 3, (D+L+S)	3.711 k
Support 4, (D+L+S)	k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum	0.965	5.732	3.711	

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B3a) Primary Log Rafters (Balanced Snow)

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3	Support 4
D Only	0.138	0.825	0.530	
S Only	0.827	4.907	3.181	
D+L+S	0.965	5.732	3.711	

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B4) Secondary Rafter Bearing Beam @ Wall

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

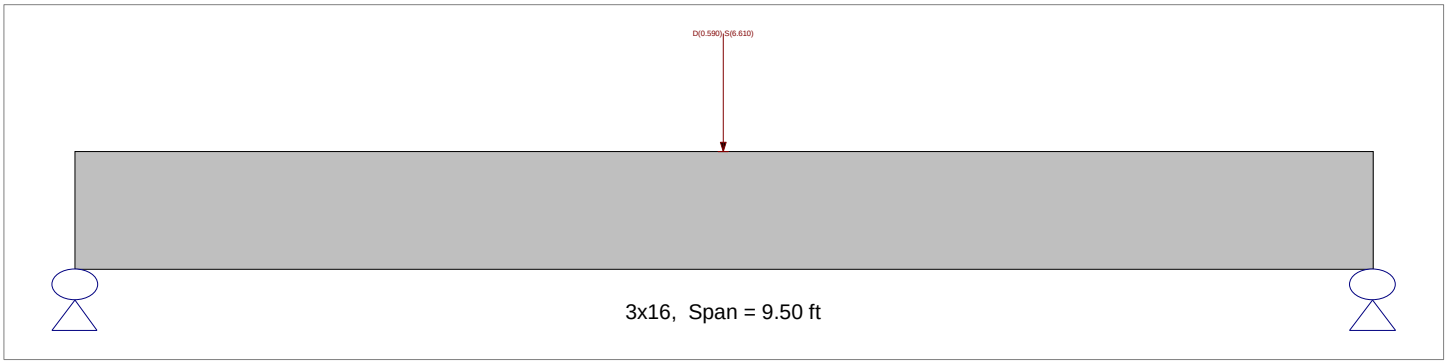
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Point Load : D = 0.590, S = 6.610 k, Starting at : 4.750 ft and placed every 0.0 ft thereafter

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	2.614 : 1	Maximum Shear Stress Ratio	=	0.787 : 1
Section used for this span		3x16	Section used for this span		3x16
fb : Actual	=	2,117.62 psi	fv : Actual	=	141.64 psi
FB : Allowable	=	810.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	4.750 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 L+Lr+S Deflection	=	0.174 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	655
Max Downward Total Deflection	=	0.189 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	601

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.1894	4.750		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+S)	3.600 k
Support 2, (D+L+S)	3.600 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	3.600	3.600
D Only	0.295	0.295
S Only	3.305	3.305
D+L+S	3.600	3.600

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

(C1) Knee Brace Supporting B3

$P_{dl} := \frac{820lbf}{\cos(45deg)}$ $P_{dl} = 1159.66 \cdot lbf$

$P_{sl} := \frac{6770lbf}{\cos(45deg)}$ $P_{sl} = 9574.23 \cdot lbf$

$h := 15.5ft$

$h_{xunb} := 15.5ft$

$h_{yunb} := 15.5ft$

$L_{brg} := \frac{(P_{dl} + P_{sl})}{625psi \cdot 5.5in}$ $L_{brg} = 3.12 \cdot in$

Existing: 8" Log Knee Brace
Condition: 68% of Capacity - Okay

(C2) Exterior Columns Supporting B3, B4

$P_{dl} := 530lbf + 300lbf$ $P_{dl} = 830 \cdot lbf$

$P_{sl} := 6090lbf + 3310lbf$ $P_{sl} = 9400 \cdot lbf$

$h := 8ft$

$h_{xunb} := 0ft$

$h_{yunb} := 8ft$

$L_{brg} := \frac{(P_{dl} + P_{sl})}{625psi \cdot 5.5in}$ $L_{brg} = 2.98 \cdot in$

Existing: 8x8 DF-L No. 2
Condition: 14% of Capacity - Okay

(C3) Interior Column Supporting B3, C1

$P_{dl} := (16 \cdot 140lbf) + (16 \cdot 820lbf)$ $P_{dl} = 15360 \cdot lbf$

$P_{sl} := (16 \cdot 830lbf) + (16 \cdot 4910lbf)$ $P_{sl} = 91840 \cdot lbf$

$h := 16.5ft$

$h_{xunb} := 8.5ft$

$h_{yunb} := 8.5ft$

$L_{brg} := \frac{(P_{dl} + P_{sl})}{625psi \cdot 5.5in}$ $L_{brg} = 31.19 \cdot in$

Existing: 12STD Steel Pipe
Condition: 37% of Capacity - Okay

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Column

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (C1) Knee Brace Supporting B3

General Information

Code Ref : 2006 IBC, ANSI / AF&PA NDS-2005

Analysis Method :	Allowable Stress Design
End Fixities	Top & Bottom Pinned
Overall Column Height	15.50 ft
(Used for non-slender calculations)	
Wood Species	DouglasFir-Larch
Wood Grade	No.2

Fb - Tension	900.0 psi	Fv	180.0 psi
Fb - Compr	900.0 psi	Ft	575.0 psi
Fc - Prll	1,350.0 psi	Density	32.210 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Load Combination 2006IBC&ASCE7-05

Wood Section Name	**6x8**
Wood Grading/Manuf.	Graded Lumber
Wood Member Type	Sawn

Exact Width	**5.50**	in
Exact Depth	**7.50**	in
Area	41.250	in^2
Ix	193.36	in^4
Iy	103.98	in^4

Allowable Stress Modification Factors

Cf or Cv for Bending	1.0
Cf or Cv for Compression	1.0
Cf or Cv for Tension	1.0
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No *(non-glb only)*

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 15.5ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 15.5 ft, K = 1.0

Applied Loads

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

Column self weight included : 143.02 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 15.50 ft, D = 1.160, S = 9.575 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.6785** : 1

Load Combination	+D+S+H
Governing NDS Formla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	10.878 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	388.67 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1

Load Combination	+D+0.750L+0.750S+0.5250E+H
Location of max.above base	15.50 ft
Applied Design Shear	0.0 psi
Allowable Shear	180.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination :	n/a			
Along X-X	0.0 in	at	0.0 ft	above base
for load combination :	n/a			

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension
Cf or Cv : Size based factors	1.000	1.000	

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Column

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (C2) Exterior Columns Supporting B3, B4

General Information

Code Ref : 2006 IBC, ANSI / AF&PA NDS-2005

Analysis Method :	Allowable Stress Design
End Fixities	Top & Bottom Pinned
Overall Column Height	8.0 ft
(Used for non-slender calculations)	
Wood Species	DouglasFir-Larch
Wood Grade	No.2

Fb - Tension	900.0 psi	Fv	180.0 psi
Fb - Compr	900.0 psi	Ft	575.0 psi
Fc - Prll	1,350.0 psi	Density	32.210 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Load Combination 2006IBC&ASCE7-05

Wood Section Name	**8x8**
Wood Grading/Manuf.	Graded Lumber
Wood Member Type	Sawn

Exact Width	**7.50**	in
Exact Depth	**7.50**	in
Area	56.250	in^2
Ix	263.67	in^4
Iy	263.67	in^4

Allowable Stress Modification Factors

Cf or Cv for Bending	1.0
Cf or Cv for Compression	1.0
Cf or Cv for Tension	1.0
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No *(non-glb only)*

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling along X-X Axis
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = (ft, K = 1.0

Applied Loads

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

Column self weight included : 100.66 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 8.0 ft, D = 0.830, S = 9.40 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.1360** : 1

Load Combination	+D+S+H
Governing NDS Formla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	10.331 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,350.0 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1

Load Combination	+D+0.750L+0.750S+0.5250E+H
Location of max.above base	8.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	180.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination : n/a				
Along X-X	0.0 in	at	0.0 ft	above base
for load combination : n/a				

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension
Cf or Cv : Size based factors	1.000	1.000	

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Steel Column

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (C3) Interior Column Supporting B3, C1

General Information

Code Ref : 2006 IBC, AISC Manual 13th Edition

Steel Section Name : **Pipe12STD**
Analysis Method : 2006 IBC & ASCE 7-05
Steel Stress Grade
Fy : Steel Yield 36.0 ksi
E : Elastic Bending Modulus 29,000.0 ksi
Load Combination : Allowable Stress

Overall Column Height 16.50 ft
Top & Bottom Fixity Top & Bottom Pinned

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling along X-X Axis
Y-Y (depth) axis : Fully braced against buckling along Y-Y Axis

Applied Loads

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

Column self weight included : 818.40 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 16.50 ft, D = 15.360, S = 91.840 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.3684** : 1
Load Combination +D+S+H
Location of max.above base 0.0 ft
At maximum location values are . . .
Pu : Axial 108.02 k
Pn / Omega : Allowable 293.17 k
Mu-x : Applied 0.0 k-ft
Mn-x / Omega : Allowable 96.467 k-ft
Mu-y : Applied 0.0 k-ft
Mn-y / Omega : Allowable 96.467 k-ft

PASS Maximum Shear Stress Ratio = **0.0** : 1
Load Combination
Location of max.above base 0.0 ft
At maximum location values are . . .
Vu : Applied 0.0 k
Vn / Omega : Allowable 0.0 k

Maximum SERVICE Load Reactions . .
Top along X-X 0.0 k
Bottom along X-X 0.0 k
Top along Y-Y 0.0 k
Bottom along Y-Y 0.0 k

Maximum SERVICE Load Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination :
Along X-X 0.0 in at 0.0 ft above base
for load combination :

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
	Stress Ratio	Status	Location	Stress Ratio	Status	Location
+D	0.055	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+L+H	0.055	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+Lr+H	0.055	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+S+H	0.368	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750L+0.750S+H	0.290	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750L+0.750S+0.750W+H	0.290	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750L+0.750S+0.5250E+H	0.290	PASS	0.00 ft	0.000	PASS	0.00 ft

Maximum Reactions - Unfactored

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		Y-Y Axis Reaction	
	@ Base	@ Top	@ Base	@ Top
D Only				
S Only				

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Steel Section Properties : Pipe12STD

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Steel Column

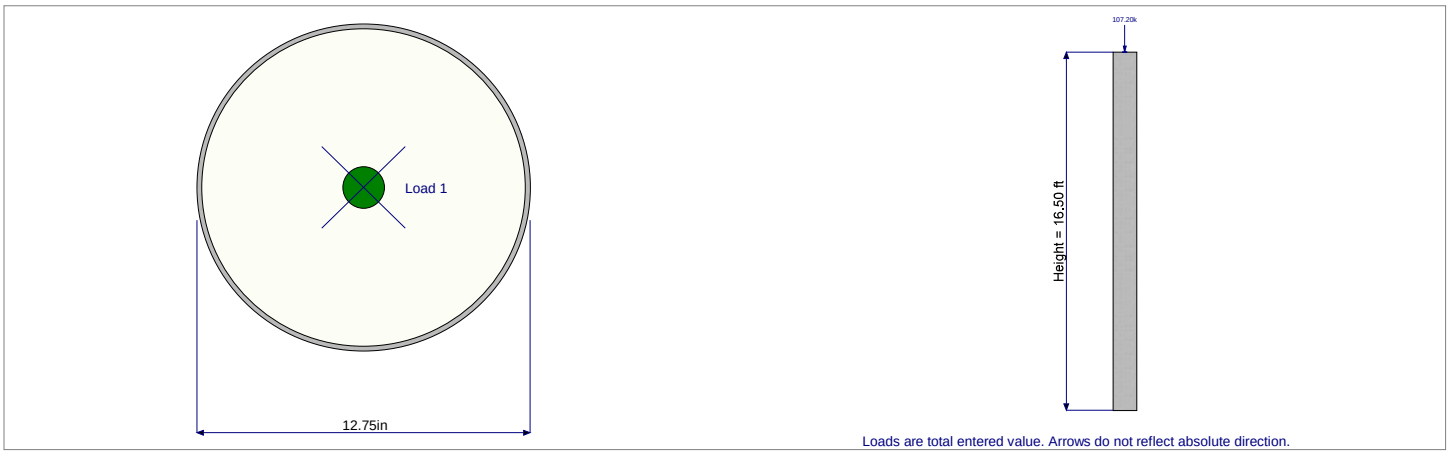
File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (C3) Interior Column Supporting B3, C1

Steel Section Properties : Pipe12STD

Depth	=	12.750	in	I xx	=	262.00	in^4	J	=	523.000 in^4
Web Thick	=	0.000	in	S xx	=	41.00	in^3			
Flange Width	=	12.750	in	R xx	=	4.390	in			
Flange Thick	=	0.375	in							
Area	=	13.600	in^2	I yy	=	262.000	in^4			
Weight	=	49.600	plf	S yy	=	41.000	in^3			
				R yy	=	4.390	in			
Ycg	=	0.000	in							



Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

(B5) Secondary Floor Joist

Trapezoidal Load Start @ 0ft

$w_{dl} := dl_f \cdot (2.66ft)$ $w_{dl} = 39.9 \cdot plf$

$w_{ll} := ll_f \cdot (2.66ft)$ $w_{ll} = 266 \cdot plf$

Trapezoidal Load End @ 11ft

$w_{dl} := dl_f \cdot (4.75ft)$ $w_{dl} = 71.25 \cdot plf$

$w_{ll} := ll_f \cdot (4.75ft)$ $w_{ll} = 475 \cdot plf$

$L := 11ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.37 \cdot in$

Existing: 6x12 DF-L No. 2
Condition: 71% of Capacity - Okay

(B5a) Secondary Floor Joist (w/ Office Load)

Trapezoidal Load Start @ 0ft

$w_{dl} := dl_f \cdot (2.66ft)$ $w_{dl} = 39.9 \cdot plf$

$w_{ll} := 50psf \cdot (2.66ft)$ $w_{ll} = 133 \cdot plf$

Trapezoidal Load End @ 11ft

$w_{dl} := dl_f \cdot (4.75ft)$ $w_{dl} = 71.25 \cdot plf$

$w_{ll} := 50psf \cdot (4.75ft)$ $w_{ll} = 237.5 \cdot plf$

$L := 11ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.37 \cdot in$

Existing: 6x12 DF-L No. 2
Condition: 41% of Capacity - Okay

(B6) Intermediate Joist Bearing Beam

Point Load @ 2.66ft

$P_{dl} := 280lbf$ $P_{dl} = 280 \cdot lbf$

$P_{sl} := 1850lbf$ $P_{sl} = 1850 \cdot lbf$

$L := 5.33ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.18 \cdot in$

Existing: 6x12 DF-L No. 2
Condition: 31% of Capacity - Okay

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B5) Secondary Floor Joist

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

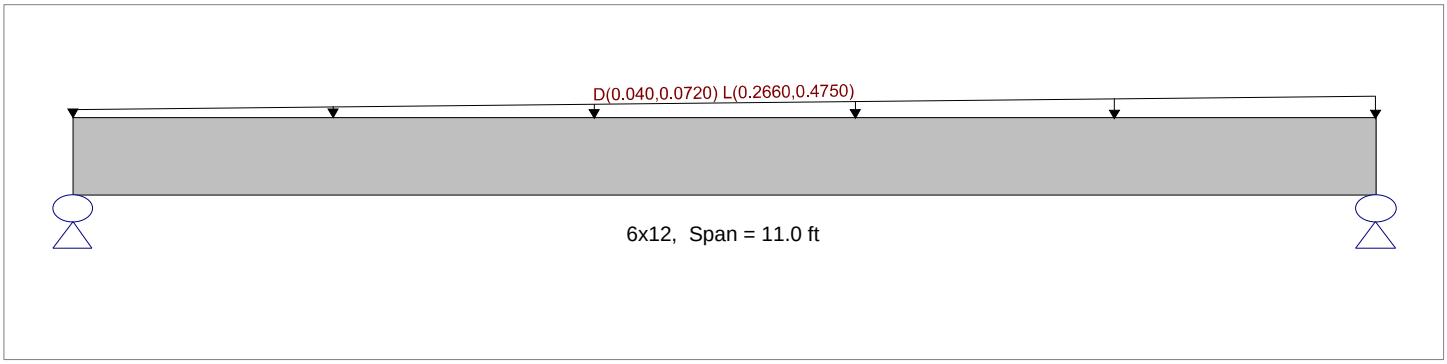
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...

Varying Uniform Load : D(S,E) = 0.0->0.0720, L(S,E) = 0.0->0.4750 k/ft, Extent = 0.0 -->> 11.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.711 : 1	Maximum Shear Stress Ratio	=	0.272 : 1
Section used for this span		6x12	Section used for this span		6x12
fb : Actual	=	639.94 psi	fv : Actual	=	48.97 psi
FB : Allowable	=	900.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	5.775 ft	Location of maximum on span	=	10.065 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.110 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	1196
Max Downward Total Deflection	=	0.127 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	1039

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.1270	5.610		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	2.125 k
Support 2, (D+L+Lr)	2.567 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	2.125	2.567
D Only	0.279	0.337
L Only	1.846	2.229
D+L+S	2.125	2.567
D+L+Lr	2.125	2.567

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B5a) Secondary Floor Joist (w/ Office Load)

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

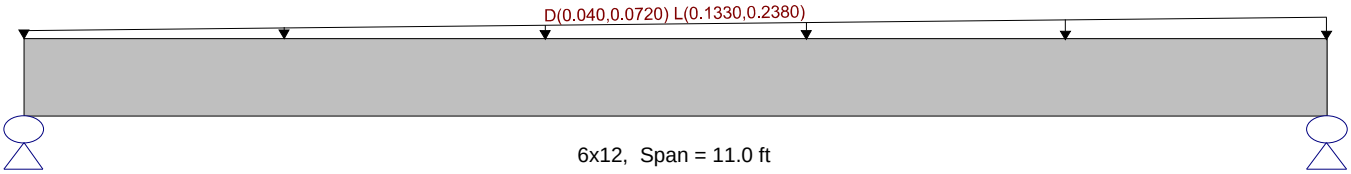
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Varying Uniform Load : D(S,E) = 0.0->0.0720, L(S,E) = 0.0->0.2380 k/ft, Extent = 0.0 -->> 11.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.403 : 1	Maximum Shear Stress Ratio	=	0.154 : 1
Section used for this span		6x12	Section used for this span		6x12
fb : Actual	=	362.37 psi	fv : Actual	=	27.73 psi
FB : Allowable	=	900.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	5.775 ft	Location of maximum on span	=	10.065 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.055 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	2390
Max Downward Total Deflection	=	0.072 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	1835

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.0719	5.610		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	1.203 k
Support 2, (D+L+Lr)	1.454 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	1.203	1.454
D Only	0.279	0.337
L Only	0.924	1.117
D+L+S	1.203	1.454
D+L+Lr	1.203	1.454

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B6) Intermediate Joist Bearing Beam

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

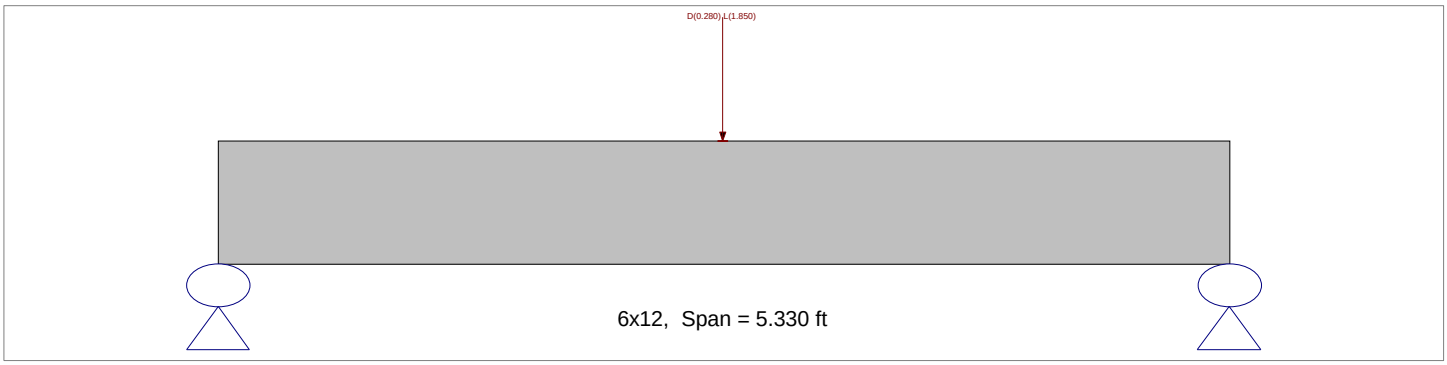
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Point Load : D = 0.280, L = 1.850 k, Starting at : 2.660 ft and placed every 0.0 ft thereafter

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.312 : 1	Maximum Shear Stress Ratio	=	0.141 : 1
Section used for this span		6x12	Section used for this span		6x12
fb : Actual	=	280.42 psi	fv : Actual	=	25.30 psi
FB : Allowable	=	900.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	2.665 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 L+Lr+S Deflection	=	0.009 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	7021
Max Downward Total Deflection	=	0.010 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	6098

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.0105	2.665		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	1.067 k
Support 2, (D+L+Lr)	1.063 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	1.067	1.063
D Only	0.140	0.140
L Only	0.927	0.923
D+L+S	1.067	1.063
D+L+Lr	1.067	1.063

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

(B6a) Intermediate Joist Bearing Beam (w/ Office Load)

Point Load @ 2.66ft

$P_{dl} := 280lbf$ $P_{dl} = 280 \cdot lbf$

$P_{sl} := 920lbf$ $P_{sl} = 920 \cdot lbf$

$L := 5.33ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.18 \cdot in$

Existing: 6x12 DF-L No. 2
Condition: 18% of Capacity - Okay

(B7) Primary Floor Joist

Trapezoidal Load 1 Start @ 0ft

$w_{dl} := dl_f \cdot (1ft)$ $w_{dl} = 15 \cdot plf$

$w_{ll} := ll_f \cdot (1ft)$ $w_{ll} = 100 \cdot plf$

Trapezoidal Load 1 End @ 11ft

$w_{dl} := dl_f \cdot (5.33ft)$ $w_{dl} = 79.95 \cdot plf$

$w_{ll} := ll_f \cdot (5.33ft)$ $w_{ll} = 533 \cdot plf$

Trapezoidal Load 2 Start @ 11ft

$w_{dl} := dl_f \cdot (2.66ft)$ $w_{dl} = 39.9 \cdot plf$

$w_{ll} := ll_f \cdot (2.66ft)$ $w_{ll} = 266 \cdot plf$

Trapezoidal Load 2 End @ 22ft

$w_{dl} := dl_f \cdot (5.33ft)$ $w_{dl} = 79.95 \cdot plf$

$w_{ll} := ll_f \cdot (5.33ft)$ $w_{ll} = 533 \cdot plf$

Point Load @ 11ft

$P_{dl} := 140lbf$ $P_{dl} = 140 \cdot lbf$

$P_{ll} := 930lbf$ $P_{ll} = 930 \cdot lbf$

$L := 11ft, 11ft$

$\Delta_{max} := \frac{L}{360}$

Existing: 8x16 DF-L No. 2
Condition: 153% of Capacity

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B6a) Intermediate Joist Bearing Beam (w/ Office Load)

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

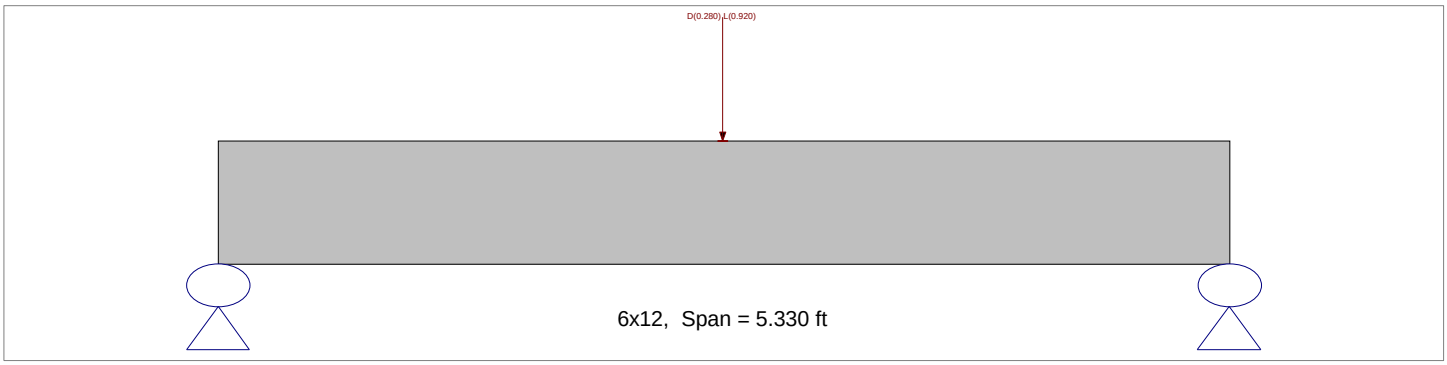
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Point Load : D = 0.280, L = 0.920 k, Starting at : 2.660 ft and placed every 0.0 ft thereafter

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.176 : 1	Maximum Shear Stress Ratio	=	0.079 : 1
Section used for this span		6x12	Section used for this span		6x12
fb : Actual	=	157.98 psi	fv : Actual	=	14.26 psi
FB : Allowable	=	900.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	2.665 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 L+Lr+S Deflection	=	0.005 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	14118
Max Downward Total Deflection	=	0.006 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	10824

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.0059	2.665		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	0.601 k
Support 2, (D+L+Lr)	0.599 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	0.601	0.599
D Only	0.140	0.140
L Only	0.461	0.459
D+L+S	0.601	0.599
D+L+Lr	0.601	0.599

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B7) Primary Floor Joist

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

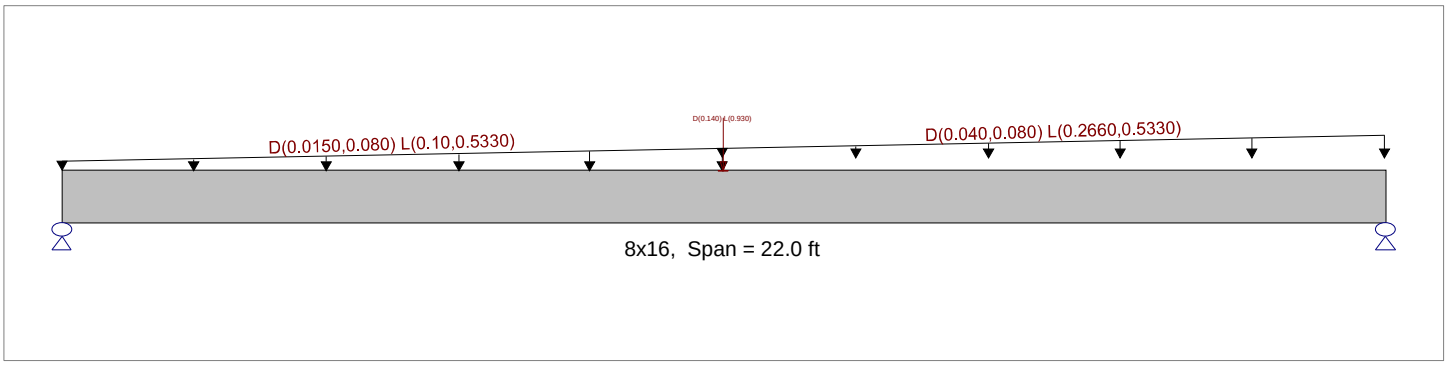
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Loads on all spans...
Varying Uniform Load : D(S,E) = 0.0->0.080, L(S,E) = 0.0->0.5330 k/ft, Extent = 0.0 -->> 11.0 ft
Varying Uniform Load : D(S,E) = 0.040->0.080, L(S,E) = 0.2660->0.5330 k/ft, Extent = 11.0 -->> 22.0 ft
Point Load : D = 0.140, L = 0.930 k, Starting at : 11.0 ft and placed every 0.0 ft thereafter

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	1.523 : 1	Maximum Shear Stress Ratio	=	0.375 : 1
Section used for this span		8x16	Section used for this span		8x16
fb : Actual	=	1,331.89 psi	fv : Actual	=	67.47 psi
FB : Allowable	=	874.77 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	11.000 ft	Location of maximum on span	=	20.790 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.624 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	423
Max Downward Total Deflection	=	0.755 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	349

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.7545	11.110		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	4.719 k
Support 2, (D+L+Lr)	5.982 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	4.719	5.982
D Only	0.865	1.030
L Only	3.854	4.952
D+L+S	4.719	5.982

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (B7) Primary Floor Joist

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
D+L+Lr	4.719	5.982

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

(B7a) Primary Floor Joist (w/ Office Loading)

Trapezoidal Load 1 Start @ 0ft

$w_{dl} := dl_f \cdot (1ft)$ $w_{dl} = 15 \cdot plf$

$w_{ll} := 50psf \cdot (1ft)$ $w_{ll} = 50 \cdot plf$

Trapezoidal Load 1 End @ 11ft

$w_{dl} := dl_f \cdot (5.33ft)$ $w_{dl} = 79.95 \cdot plf$

$w_{ll} := 50psf \cdot (5.33ft)$ $w_{ll} = 266.5 \cdot plf$

Trapezoidal Load 2 Start @ 11ft

$w_{dl} := dl_f \cdot (2.66ft)$ $w_{dl} = 39.9 \cdot plf$

$w_{ll} := 50psf \cdot (2.66ft)$ $w_{ll} = 133 \cdot plf$

Trapezoidal Load 2 End @ 22ft

$w_{dl} := dl_f \cdot (5.33ft)$ $w_{dl} = 79.95 \cdot plf$

$w_{ll} := 50psf \cdot (5.33ft)$ $w_{ll} = 266.5 \cdot plf$

Point Load @ 11ft

$P_{dl} := 140lbf$ $P_{dl} = 140 \cdot lbf$

$P_{ll} := 460lbf$ $P_{ll} = 460 \cdot lbf$

$L := 11ft, 11ft$

$\Delta_{max} := \frac{L}{360}$

Existing: 8x16 DF-L No. 2
Condition: 90% of Capacity

(B8) Secondary Joist Bearing Beam @ Wall

Point Load @ 4.75ft

$P_{dl} := 340lbf$ $P_{dl} = 340 \cdot lbf$

$P_{ll} := 2230lbf$ $P_{ll} = 2230 \cdot lbf$

$L := 9.5ft$

$\Delta_{max} := \frac{L}{360}$ $\Delta_{max} = 0.32 \cdot in$

Existing: 8x12 DF-L No. 2
Condition: 50% of Capacity - Okay

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B7a) Primary Floor Joist (w/ Office Loading)

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

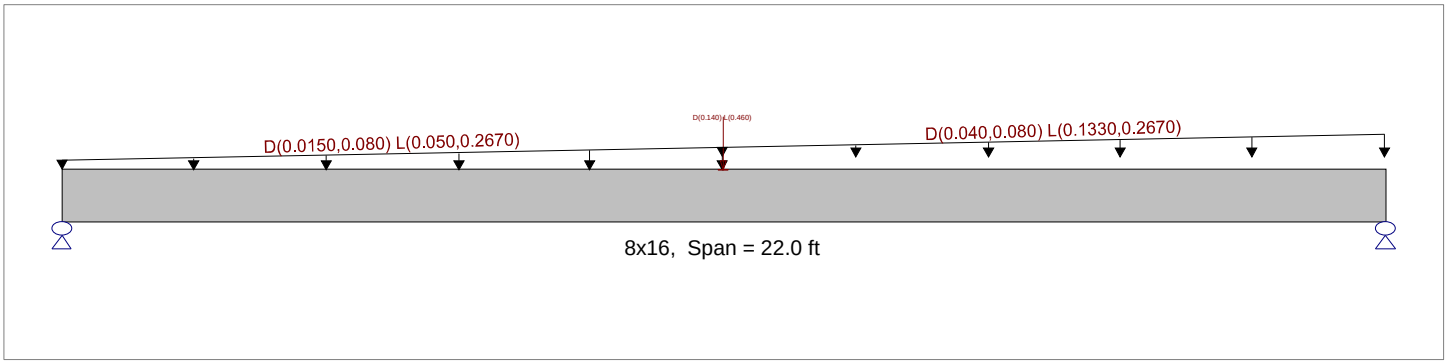
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Loads on all spans...
Varying Uniform Load : D(S,E) = 0.0->0.080, L(S,E) = 0.0->0.2670 k/ft, Extent = 0.0 -->> 11.0 ft
Varying Uniform Load : D(S,E) = 0.040->0.080, L(S,E) = 0.1330->0.2670 k/ft, Extent = 11.0 -->> 22.0 ft
Point Load : D = 0.140, L = 0.460 k, Starting at : 11.0 ft and placed every 0.0 ft thereafter

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.891 : 1	Maximum Shear Stress Ratio	=	0.220 : 1
Section used for this span		8x16	Section used for this span		8x16
fb : Actual	=	779.75 psi	fv : Actual	=	39.57 psi
FB : Allowable	=	874.77 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	11.000 ft	Location of maximum on span	=	20.790 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	=	0.312 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	846
Max Downward Total Deflection	=	0.443 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	596

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.4425	11.110		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	2.792 k
Support 2, (D+L+Lr)	3.507 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	2.792	3.507
D Only	0.865	1.030
L Only	1.927	2.477
D+L+S	2.792	3.507

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B7a) Primary Floor Joist (w/ Office Loading)

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
D+L+Lr	2.792	3.507

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Beam Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 License Owner : SARGENT ENGINEERS INC

Description : (B8) Secondary Joist Bearing Beam @ Wall

Material Properties

Calculations per IBC 2006, CBC 2007, 2005 NDS

Analysis Method : Allowable Stress Design
Load Combination 2006IBC&ASCE7-05

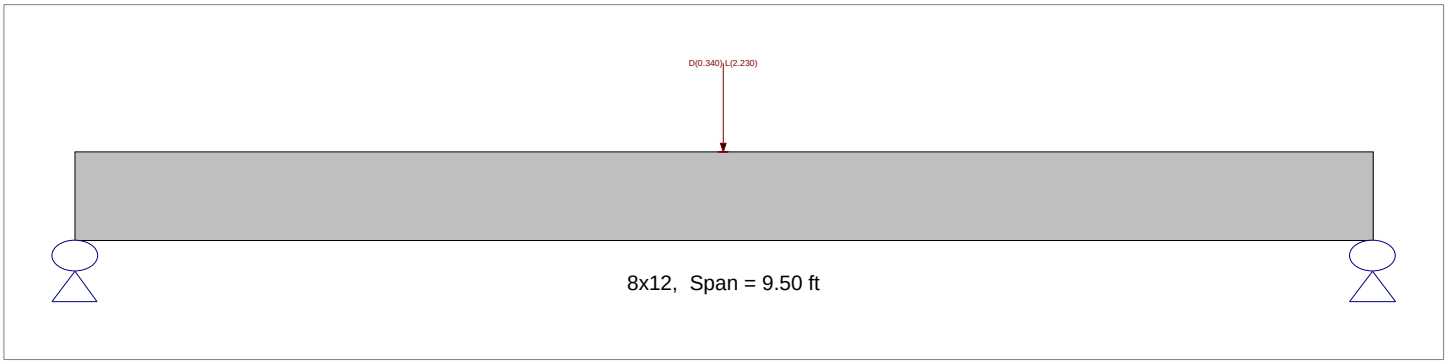
Wood Species : DouglasFir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsion 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	32.210 pcf



Applied Loads

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

Loads on all spans...
Point Load : D = 0.340, L = 2.230 k, Starting at : 4.750 ft and placed every 0.0 ft thereafter

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.492 : 1	Maximum Shear Stress Ratio	=	0.124 : 1
Section used for this span		8x12	Section used for this span		8x12
fb : Actual	=	443.07 psi	fv : Actual	=	22.35 psi
FB : Allowable	=	900.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	4.750 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 L+Lr+S Deflection	=	0.046 in
Max Upward L+Lr+S Deflection	=	0.000 in
Live Load Deflection Ratio	=	2500
Max Downward Total Deflection	=	0.053 in
Max Upward Total Deflection	=	0.000 in
Total Deflection Ratio	=	2169

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+Lr	1	0.0525	4.750		0.0000	0.000

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Support & Load Combination	Support Reaction
Support 1, (D+L+Lr)	1.285 k
Support 2, (D+L+Lr)	1.285 k

Maximum Vertical Reactions - Unfactored

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	1.285	1.285
D Only	0.170	0.170
L Only	1.115	1.115
D+L+S	1.285	1.285
D+L+Lr	1.285	1.285

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

(C4) Exterior Columns Supporting C2 Above, B7, B8

$P_{dl} := 830lbf + 1030lbf + 170lbf$ $P_{dl} = 2030 \cdot lbf$

$P_{ll} := 4950lbf + 1120lbf$ $P_{ll} = 6070 \cdot lbf$

$P_{sl} := 9400lbf$ $P_{sl} = 9400 \cdot lbf$

$h := 10ft$

$h_{xunb} := 0ft$

$h_{yunb} := 10ft$

$L_{brg} := \frac{(P_{dl} + P_{sl})}{625psi \cdot 5.5in}$ $L_{brg} = 3.33 \cdot in$

Existing: 8x8 DF-L No. 2
Condition: 23% of Capacity - Okay

(C5) Interior Column Supporting C3 Above, B7

$P_{dl} := 15360lbf + (16 \cdot 860lbf)$ $P_{dl} = 29120 \cdot lbf$

$P_{sl} := (16 \cdot 3850lbf)$ $P_{sl} = 61600 \cdot lbf$

$P_{sl} := 91840lbf$ $P_{sl} = 91840 \cdot lbf$

$h := 10ft$

$h_{xunb} := 10ft$

$h_{yunb} := 10ft$

$L_{brg} := \frac{(P_{dl} + P_{sl})}{625psi \cdot 5.5in}$ $L_{brg} = 35.19 \cdot in$

Existing: 12STD Steel Pipe
Condition: 52% of Capacity - Okay

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:06PM

Wood Column

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (C4) Exterior Columns Supporting C2 Above, B7, B8

General Information

Code Ref : 2006 IBC, ANSI / AF&PA NDS-2005

Analysis Method :	Allowable Stress Design
End Fixities	Top & Bottom Pinned
Overall Column Height	10.0 ft
(Used for non-slender calculations)	
Wood Species	DouglasFir-Larch
Wood Grade	No.2

Fb - Tension	900.0 psi	Fv	180.0 psi
Fb - Compr	900.0 psi	Ft	575.0 psi
Fc - Prll	1,350.0 psi	Density	32.210 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Load Combination 2006IBC&ASCE7-05

Wood Section Name	**8x8**
Wood Grading/Manuf.	Graded Lumber
Wood Member Type	Sawn

Exact Width	**7.50**	in
Exact Depth	**7.50**	in
Area	56.250	in^2
Ix	263.67	in^4
Iy	263.67	in^4

Allowable Stress Modification Factors

Cf or Cv for Bending	1.0
Cf or Cv for Compression	1.0
Cf or Cv for Tension	1.0
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No *(non-glb only)*

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling along X-X Axis
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 10 ft, K = 1.0

Applied Loads

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

Column self weight included : 125.82 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 10.0 ft, D = 2.030, L = 6.070, S = 9.40 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2290** : 1

Load Combination	+D+0.750L+0.750S+H
Governing NDS Formla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	13.758 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,067.97 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1

Load Combination	+D+0.750L+0.750S+0.5250E+H
Location of max.above base	10.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	180.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination :	n/a			
Along X-X	0.0 in	at	0.0 ft	above base
for load combination :	n/a			

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension
Cf or Cv : Size based factors	1.000	1.000	

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
D+L+S	0.0000 in	0.000 ft	0.000 in	0.000 ft

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:07PM

Steel Column

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (C5) Interior Column Supporting C3 Above, B7

General Information

Code Ref : 2006 IBC, AISC Manual 13th Edition

Steel Section Name : **Pipe12STD**
Analysis Method : 2006 IBC & ASCE 7-05
Steel Stress Grade
Fy : Steel Yield 36.0 ksi
E : Elastic Bending Modulus 29,000.0 ksi
Load Combination : Allowable Stress

Overall Column Height 10.0 ft
Top & Bottom Fixity Top & Bottom Pinned

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 10ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 10 ft, K = 1.0

Applied Loads

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

Column self weight included : 496.0 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 10.0 ft, D = 29.120, L = 61.60, S = 91.840 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.5134** : 1
Load Combination +D+0.750L+0.750S+H
Location of max.above base 0.0 ft
At maximum location values are . . .
Pu : Axial 144.70 k
Pn / Omega : Allowable 281.86 k
Mu-x : Applied 0.0 k-ft
Mn-x / Omega : Allowable 96.467 k-ft
Mu-y : Applied 0.0 k-ft
Mn-y / Omega : Allowable 96.467 k-ft

PASS Maximum Shear Stress Ratio = **0.0** : 1
Load Combination
Location of max.above base 0.0 ft
At maximum location values are . . .
Vu : Applied 0.0 k
Vn / Omega : Allowable 0.0 k

Maximum SERVICE Load Reactions . .
Top along X-X 0.0 k
Bottom along X-X 0.0 k
Top along Y-Y 0.0 k
Bottom along Y-Y 0.0 k

Maximum SERVICE Load Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination :
Along X-X 0.0 in at 0.0 ft above base
for load combination :

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
	Stress Ratio	Status	Location	Stress Ratio	Status	Location
+D	0.105	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+L+H	0.324	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+Lr+H	0.105	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+S+H	0.431	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750Lr+0.750L+H	0.269	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750L+0.750S+H	0.513	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750L+0.750S+0.750W+H	0.513	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750L+0.750S+0.5250E+H	0.513	PASS	0.00 ft	0.000	PASS	0.00 ft

Maximum Reactions - Unfactored

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		Y-Y Axis Reaction	
	@ Base	@ Top	@ Base	@ Top
D Only				
L Only				
S Only				
D+L+S				

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
D+L+S	0.0000 in	0.000 ft	0.000 in	0.000 ft

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:07PM

Steel Column

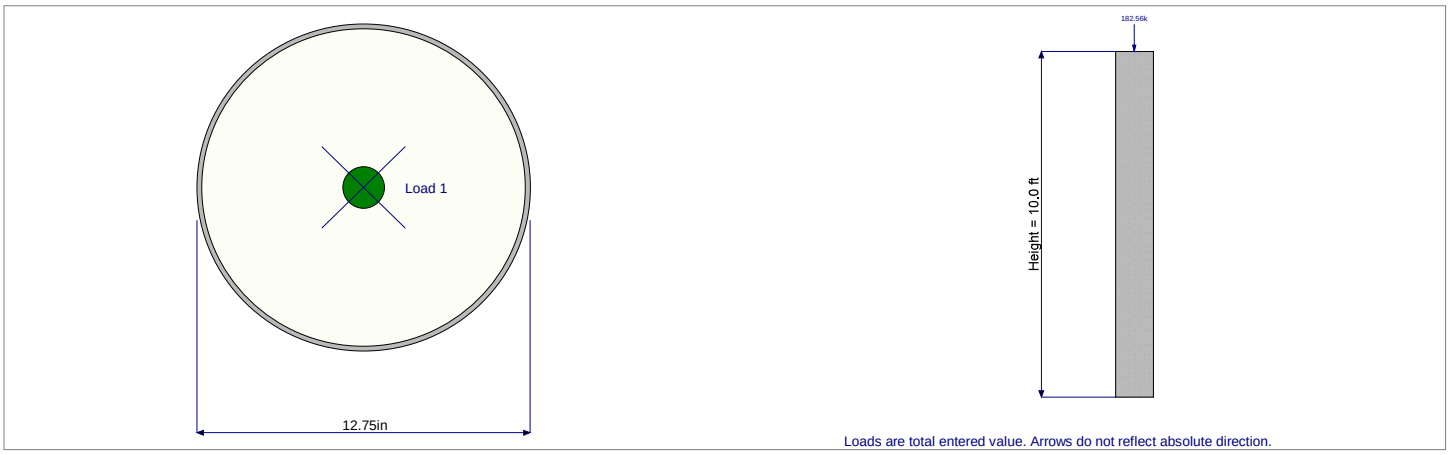
File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (C5) Interior Column Supporting C3 Above, B7

Steel Section Properties : Pipe12STD

Depth	=	12.750	in	I xx	=	262.00	in^4	J	=	523.000 in^4
Web Thick	=	0.000	in	S xx	=	41.00	in^3			
Flange Width	=	12.750	in	R xx	=	4.390	in			
Flange Thick	=	0.375	in							
Area	=	13.600	in^2	I yy	=	262.000	in^4			
Weight	=	49.600	plf	S yy	=	41.000	in^3			
				R yy	=	4.390	in			
Ycg	=	0.000	in							



Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

(C6) Exterior Columns Supporting C4 Above, B7, B8

$P_{dl} := 2030lbf + 1030lbf + 170lbf$ $P_{dl} = 3230 \cdot lbf$

$P_{ll} := 6070lbf + 1120lbf$ $P_{ll} = 7190 \cdot lbf$

$P_{sl} := 9400lbf$ $P_{sl} = 9400 \cdot lbf$

$h := 10ft$

$h_{xunb} := 0ft$

$h_{yunb} := 10ft$

$L_{brg} := \frac{(P_{dl} + P_{sl})}{625psi \cdot 5.5in}$ $L_{brg} = 3.67 \cdot in$

Existing: 8x8 DF-L No. 2
Condition: 27% of Capacity - Okay

(C7) Interior Column Supporting C5 Above, B7

$P_{dl} := 29120lbf + (16 \cdot 860lbf)$ $P_{dl} = 42880 \cdot lbf$

$P_{dl} := 61600lbf + (16 \cdot 860lbf)$ $P_{dl} = 75360 \cdot lbf$

$P_{sl} := 91840lbf$ $P_{sl} = 91840 \cdot lbf$

$h := 10ft$

$h_{xunb} := 10ft$

$h_{yunb} := 10ft$

$L_{brg} := \frac{(P_{dl} + P_{sl})}{625psi \cdot 5.5in}$ $L_{brg} = 48.64 \cdot in$

Existing: 12STD Steel Pipe
Condition: 60% of Capacity - Okay

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:07PM

Wood Column

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (C6) Exterior Columns Supporting C4 Above, B7, B8

General Information

Code Ref : 2006 IBC, ANSI / AF&PA NDS-2005

Analysis Method :	Allowable Stress Design
End Fixities	Top & Bottom Pinned
Overall Column Height	10.0 ft
(Used for non-slender calculations)	
Wood Species	DouglasFir-Larch
Wood Grade	No.2

Fb - Tension	900.0 psi	Fv	180.0 psi
Fb - Compr	900.0 psi	Ft	575.0 psi
Fc - Prll	1,350.0 psi	Density	32.210 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Load Combination 2006IBC&ASCE7-05

Wood Section Name	**8x8**
Wood Grading/Manuf.	Graded Lumber
Wood Member Type	Sawn

Exact Width	**7.50**	in
Exact Depth	**7.50**	in
Area	56.25	in^2
Ix	263.67	in^4
Iy	263.67	in^4

Allowable Stress Modification Factors

Cf or Cv for Bending	1.0
Cf or Cv for Compression	1.0
Cf or Cv for Tension	1.0
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No *(non-glb only)*

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling along X-X Axis
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 10 ft, K = 1.0

Applied Loads

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

Column self weight included : 125.82 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 10.0 ft, D = 3.230, L = 7.190, S = 9.40 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2630** : 1

Load Combination	+D+0.750L+0.750S+H
Governing NDS Formla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	15.798 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,067.97 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1

Load Combination	+D+0.750L+0.750S+0.5250E+H
Location of max.above base	10.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	180.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination :	n/a			
Along X-X	0.0 in	at	0.0 ft	above base
for load combination :	n/a			

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension
Cf or Cv : Size based factors	1.000	1.000	

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
D+L+S	0.0000 in	0.000 ft	0.000 in	0.000 ft

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:07PM

Steel Column

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (C7) Interior Column Supporting C5 Above, B7

General Information

Code Ref : 2006 IBC, AISC Manual 13th Edition

Steel Section Name : **Pipe12STD**
Analysis Method : 2006 IBC & ASCE 7-05
Steel Stress Grade
Fy : Steel Yield 36.0 ksi
E : Elastic Bending Modulus 29,000.0 ksi
Load Combination : Allowable Stress

Overall Column Height 10.0 ft
Top & Bottom Fixity Top & Bottom Pinned

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 10ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 10 ft, K = 1.0

Applied Loads

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

Column self weight included : 496.0 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 10.0 ft, D = 42.880, L = 75.360, S = 91.840 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.5988** : 1
Load Combination +D+0.750L+0.750S+H
Location of max.above base 0.0 ft
At maximum location values are . . .
Pu : Axial 168.78 k
Pn / Omega : Allowable 281.86 k
Mu-x : Applied 0.0 k-ft
Mn-x / Omega : Allowable 96.467 k-ft
Mu-y : Applied 0.0 k-ft
Mn-y / Omega : Allowable 96.467 k-ft

PASS Maximum Shear Stress Ratio = **0.0** : 1
Load Combination
Location of max.above base 0.0 ft
At maximum location values are . . .
Vu : Applied 0.0 k
Vn / Omega : Allowable 0.0 k

Maximum SERVICE Load Reactions . .
Top along X-X 0.0 k
Bottom along X-X 0.0 k
Top along Y-Y 0.0 k
Bottom along Y-Y 0.0 k

Maximum SERVICE Load Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination :
Along X-X 0.0 in at 0.0 ft above base
for load combination :

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
	Stress Ratio	Status	Location	Stress Ratio	Status	Location
+D	0.154	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+L+H	0.421	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+Lr+H	0.154	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+S+H	0.480	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750Lr+0.750L+H	0.354	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750L+0.750S+H	0.599	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750L+0.750S+0.750W+H	0.599	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750L+0.750S+0.5250E+H	0.599	PASS	0.00 ft	0.000	PASS	0.00 ft

Maximum Reactions - Unfactored

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		Y-Y Axis Reaction	
	@ Base	@ Top	@ Base	@ Top
D Only				
L Only				
S Only				
D+L+S				

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
D+L+S	0.0000 in	0.000 ft	0.000 in	0.000 ft

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:07PM

Steel Column

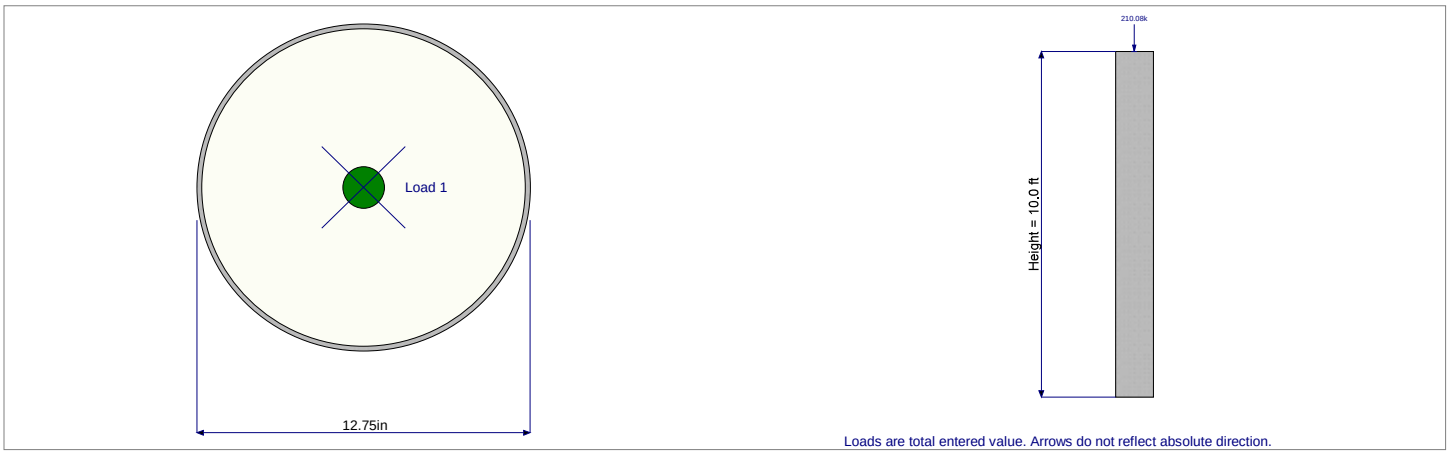
File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (C7) Interior Column Supporting C5 Above, B7

Steel Section Properties : Pipe12STD

Depth	=	12.750	in	I xx	=	262.00	in^4	J	=	523.000 in^4
Web Thick	=	0.000	in	S xx	=	41.00	in^3			
Flange Width	=	12.750	in	R xx	=	4.390	in			
Flange Thick	=	0.375	in							
Area	=	13.600	in^2	I yy	=	262.000	in^4			
Weight	=	49.600	plf	S yy	=	41.000	in^3			
				R yy	=	4.390	in			
Ycg	=	0.000	in							



Loads are total entered value. Arrows do not reflect absolute direction.

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

(C8) Exterior Columns Supporting C6 Above, B7, B8

$P_{dl} := 3230lbf + 1030lbf + 170lbf$ $P_{dl} = 4430 \cdot lbf$

$P_{ll} := 7190lbf + 1120lbf$ $P_{ll} = 8310 \cdot lbf$

$P_{sl} := 9400lbf$ $P_{sl} = 9400 \cdot lbf$

$h := 10ft$

$h_{xunb} := 0ft$

$h_{yunb} := 10ft$

$L_{brg} := \frac{(P_{dl} + P_{sl})}{625psi \cdot 5.5in}$ $L_{brg} = 4.02 \cdot in$

Existing: 8x8 DF-L No. 2
Condition: 30% of Capacity - Okay

(C9) Interior Column Supporting C7 Above, B7

$P_{dl} := 42880lbf + (16 \cdot 860lbf)$ $P_{dl} = 56640 \cdot lbf$

$P_{ll} := 75360lbf + (16 \cdot 860lbf)$ $P_{ll} = 89120 \cdot lbf$

$P_{sl} := 91840lbf$ $P_{sl} = 91840 \cdot lbf$

$h := 10ft$

$h_{xunb} := 10ft$

$h_{yunb} := 10ft$

$L_{brg} := \frac{(P_{dl} + P_{sl})}{625psi \cdot 5.5in}$ $L_{brg} = 43.19 \cdot in$

Existing: 12STD Steel Pipe
Condition: 69% of Capacity - Okay

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:07PM

Wood Column

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (C8) Exterior Columns Supporting C6 Above, B7, B8

General Information

Code Ref : 2006 IBC, ANSI / AF&PA NDS-2005

Analysis Method :	Allowable Stress Design
End Fixities	Top & Bottom Pinned
Overall Column Height	10.0 ft
(Used for non-slender calculations)	
Wood Species	DouglasFir-Larch
Wood Grade	No.2

Fb - Tension	900.0 psi	Fv	180.0 psi
Fb - Compr	900.0 psi	Ft	575.0 psi
Fc - Prll	1,350.0 psi	Density	32.210 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Load Combination 2006IBC&ASCE7-05

Wood Section Name	**8x8**
Wood Grading/Manuf.	Graded Lumber
Wood Member Type	Sawn

Exact Width	**7.50**	in
Exact Depth	**7.50**	in
Area	56.25	in^2
Ix	263.67	in^4
Iy	263.67	in^4

Allowable Stress Modification Factors

Cf or Cv for Bending	1.0
Cf or Cv for Compression	1.0
Cf or Cv for Tension	1.0
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No *(non-glb only)*

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling along X-X Axis
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 10 ft, K = 1.0

Applied Loads

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

Column self weight included : 125.82 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 10.0 ft, D = 4.430, L = 8.310, S = 9.40 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2969** : 1

Load Combination	+D+0.750L+0.750S+H
Governing NDS Formla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	17.838 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,067.97 psi

PASS Maximum Shear Stress Ratio = **0.0** : 1

Load Combination	+D+0.750L+0.750S+0.5250E+H
Location of max.above base	10.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	180.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination :	n/a			
Along X-X	0.0 in	at	0.0 ft	above base
for load combination :	n/a			

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension
Cf or Cv : Size based factors	1.000	1.000	

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
D+L+S	0.0000 in	0.000 ft	0.000 in	0.000 ft

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:07PM

Steel Column

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (C9) Interior Column Supporting C7 Above, B7

General Information

Code Ref : 2006 IBC, AISC Manual 13th Edition

Steel Section Name : **Pipe12STD**
Analysis Method : 2006 IBC & ASCE 7-05
Steel Stress Grade
Fy : Steel Yield 36.0 ksi
E : Elastic Bending Modulus 29,000.0 ksi
Load Combination : Allowable Stress

Overall Column Height 10.0 ft
Top & Bottom Fixity Top & Bottom Pinned

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 10ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 10 ft, K = 1.0

Applied Loads

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

Column self weight included : 496.0 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 10.0 ft, D = 56.640, L = 89.120, S = 91.840 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.6842** : 1
Load Combination +D+0.750L+0.750S+H
Location of max.above base 0.0 ft
At maximum location values are . . .
Pu : Axial 192.86 k
Pn / Omega : Allowable 281.86 k
Mu-x : Applied 0.0 k-ft
Mn-x / Omega : Allowable 96.467 k-ft
Mu-y : Applied 0.0 k-ft
Mn-y / Omega : Allowable 96.467 k-ft

PASS Maximum Shear Stress Ratio = **0.0** : 1
Load Combination
Location of max.above base 0.0 ft
At maximum location values are . . .
Vu : Applied 0.0 k
Vn / Omega : Allowable 0.0 k

Maximum SERVICE Load Reactions . .
Top along X-X 0.0 k
Bottom along X-X 0.0 k
Top along Y-Y 0.0 k
Bottom along Y-Y 0.0 k

Maximum SERVICE Load Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination :
Along X-X 0.0 in at 0.0 ft above base
for load combination :

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
	Stress Ratio	Status	Location	Stress Ratio	Status	Location
+D	0.203	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+L+H	0.519	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+Lr+H	0.203	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+S+H	0.529	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750Lr+0.750L+H	0.440	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750L+0.750S+H	0.684	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750L+0.750S+0.750W+H	0.684	PASS	0.00 ft	0.000	PASS	0.00 ft
+D+0.750L+0.750S+0.5250E+H	0.684	PASS	0.00 ft	0.000	PASS	0.00 ft

Maximum Reactions - Unfactored

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		Y-Y Axis Reaction	
	@ Base	@ Top	@ Base	@ Top
D Only				
L Only				
S Only				
D+L+S				

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
D+L+S	0.0000 in	0.000 ft	0.000 in	0.000 ft

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:07PM

Steel Column

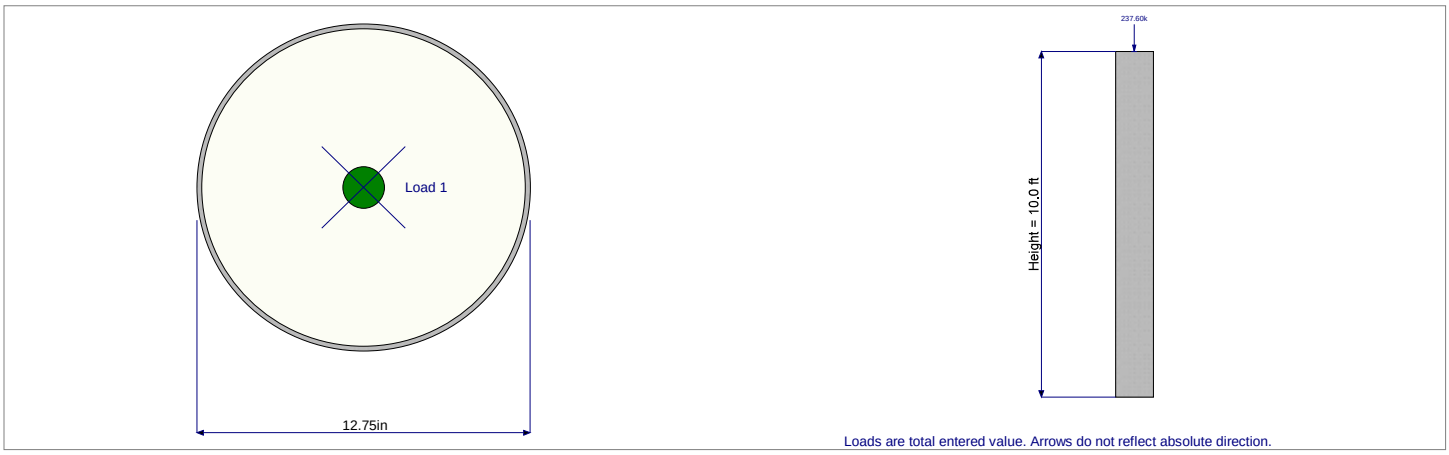
File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (C9) Interior Column Supporting C7 Above, B7

Steel Section Properties : Pipe12STD

Depth	=	12.750	in	I xx	=	262.00	in^4	J	=	523.000 in^4
Web Thick	=	0.000	in	S xx	=	41.00	in^3			
Flange Width	=	12.750	in	R xx	=	4.390	in			
Flange Thick	=	0.375	in							
Area	=	13.600	in^2	I yy	=	262.000	in^4			
Weight	=	49.600	plf	S yy	=	41.000	in^3			
				R yy	=	4.390	in			
Ycg	=	0.000	in							



Loads are total entered value. Arrows do not reflect absolute direction.

Sargent Engineers, Inc.
P.O. Box 441
1290 Arrowhead Plaza Way
Driggs, ID 83422
Tel:208-354-4400 Fax:208-354-4420

Project:
D09135.00
SVRA Silo
By:MH Date:10/15/2009

Subject:
Structural Calcs

(F1) Footing for C8 (Exterior Columns)

$P_{dl} := 4430lbf$ $P_{dl} = 4430 \cdot lbf$

$P_{ll} := 8310lbf$ $P_{ll} = 8310 \cdot lbf$

$P_{sl} := 9400lbf$ $P_{sl} = 9400 \cdot lbf$

$q_{brg} := 1500psf$

Existing: Unknown
Condition: 374% of Capacity
Required: 48"x48"x10" Square Ftg. w/ (5) #4 Bars Each Way

(F2) Footing for C9 (Interior Column)

$P_{dl} := 56640lbf$ $P_{dl} = 56640 \cdot lbf$

$P_{ll} := 89120lbf$ $P_{ll} = 89120 \cdot lbf$

$P_{sl} := 91840lbf$ $P_{sl} = 91840 \cdot lbf$

$q_{brg} := 1500psf$

Existing: Unknown
Condition: 374% of Capacity
Required: 13'x13'x24" Square Ftg. w/ (2) Mats of (17) #4 Bars Each Way

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:07PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — **License Owner : SARGENT ENGINEERS INC**

Description : (F1) Footing for C8 (Exterior Columns)

General Information

Calculations per IBC 2006, CBC 2007, ACI 318-05

Material Properties

f'c : Concrete 28 day strength	=	3.0	ksi
Fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
Φ Values Flexure	=	0.90	
Shear	=	0.850	

Analysis Settings

Min Steel % Bending Reinf.	=	0.00140	
Min Allow % Temp Reinf.	=	0.00180	
Min. Overturning Safety Factor	=	1.50	: 1
Min. Overturning Safety Factor	=	1.50	: 1
AutoCalc Footing Weight as DL	:	Yes	
AutoCalc Pedestal Weight as DL	:	No	

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

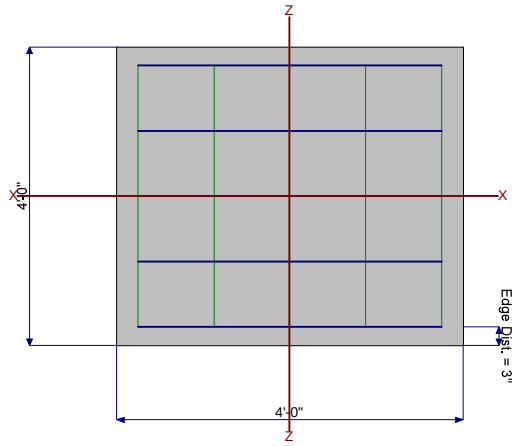
Reference Depth below Surface	=	4.0	ft
Allow. Pressure Increase per foot of depth	=		ksf
when base footing is below	=		ft

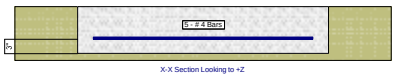
Increases based on footing Width

Allow. Pressure Increase per foot of width	=		ksf
when footing is wider than	=		ft

Dimensions

Width along X-X Axis	=	4.0	ft
Length along Z-Z Axi	=	4.0	ft
Footing Thicknes	=	10.0	in
Load location offset from footing center...			
ex : Along X-X Axis	=	0	in
ez : Along Z-Z Axis	=	0	in
Pedestal dimensions...			
px : Along X-X Axis	=		in
pz : Along Z-Z Axis	=		in
Height	=		in
Rebar Centerline to Edge of Concrete..			
at Bottom of footing	=	3.0	in





Reinforcing

Bars along X-X Axis			
Number of Bars	=	5.0	
Reinforcing Bar Size	=	# 4	
Bars along Z-Z Axis			
Number of Bars	=	5.0	
Reinforcing Bar Size	=	# 4	

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	4.430		8.310	9.40				k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:07PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (F1) Footing for C8 (Exterior Columns)

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8187	Soil Bearing	1.228 ksf	1.50 ksf	+D+0.750L+0.750S+0.5
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.4258	Z Flexure (+X)	3.353 k-ft	7.875 k-ft	+1.20D+0.50L+1.60S+0
PASS	0.4258	Z Flexure (-X)	3.353 k-ft	7.875 k-ft	+1.20D+0.50L+1.60S+0
PASS	0.4258	X Flexure (+Z)	3.353 k-ft	7.875 k-ft	+1.20D+0.50L+1.60S+0
PASS	0.4258	X Flexure (-Z)	3.353 k-ft	7.875 k-ft	+1.20D+0.50L+1.60S+0
PASS	0.3087	1-way Shear (+X)	28.748 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.3087	1-way Shear (-X)	28.748 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.3087	1-way Shear (+Z)	28.748 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.3087	1-way Shear (-Z)	28.748 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.7193	2-way Punching	133.95 psi	186.23 psi	+1.20D+0.50L+1.60S

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:07PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 — **License Owner : SARGENT ENGINEERS INC**

Description : (F2) Footing for C9 (Interior Column)

General Information

Calculations per IBC 2006, CBC 2007, ACI 318-05

Material Properties

f'c : Concrete 28 day strength	=	3.0	ksi
Fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
Φ Values Flexure	=	0.90	
Shear	=	0.850	

Analysis Settings

Min Steel % Bending Reinf.	=	0.00140	
Min Allow % Temp Reinf.	=	0.00180	
Min. Overturning Safety Factor	=	1.50	: 1
Min. Overturning Safety Factor	=	1.50	: 1
AutoCalc Footing Weight as DL	:	Yes	
AutoCalc Pedestal Weight as DL	:	No	

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

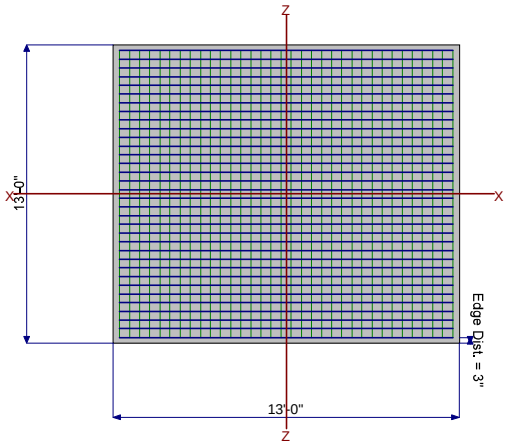
Reference Depth below Surface	=	4.0	ft
Allow. Pressure Increase per foot of depth	=		ksf
when base footing is below	=		ft

Increases based on footing Width

Allow. Pressure Increase per foot of width	=		ksf
when footing is wider than	=		ft

Dimensions

Width along X-X Axis	=	13.0	ft
Length along Z-Z Axi	=	13.0	ft
Footing Thicknes	=	24.0	in
Load location offset from footing center...			
ex : Along X-X Axis	=	0	in
ez : Along Z-Z Axis	=	0	in
Pedestal dimensions...			
px : Along X-X Axis	=		in
pz : Along Z-Z Axis	=		in
Height	=		in
Rebar Centerline to Edge of Concrete..			
at Bottom of footing	=	3.0	in



Reinforcing

Bars along X-X Axis		
Number of Bars	=	34.0
Reinforcing Bar Size	=	# 4
Bars along Z-Z Axis		
Number of Bars	=	34.0
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	56.640		89.120	91.840				k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

SARGENT

Sargent Engineers, Inc.

Title : Star Valley Ranch Association Silo Job # D09135.00
Dsgnr: Matt Hebdon
Project Desc.:

Project Notes :

Printed: 15 OCT 2009, 8:07PM

General Footing Design

File: C:\Documents and Settings\matth\Desktop\silo calcs.ec6
ENERCALC, INC. 1983-2008, Ver: 6.0.221

Lic. # : KW-06004540 **License Owner : SARGENT ENGINEERS INC**

Description : (F2) Footing for C9 (Interior Column)

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9520	Soil Bearing	1.428 ksf	1.50 ksf	+D+0.750L+0.750S+0.5
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.8047	Z Flexure (+X)	39.778 k-ft	49.431 k-ft	+1.20D+0.50L+1.60S
PASS	0.8047	Z Flexure (-X)	39.778 k-ft	49.431 k-ft	+1.20D+0.50L+1.60S
PASS	0.8047	X Flexure (+Z)	39.778 k-ft	49.431 k-ft	+1.20D+0.50L+1.60S
PASS	0.8047	X Flexure (-Z)	39.778 k-ft	49.431 k-ft	+1.20D+0.50L+1.60S
PASS	0.3756	1-way Shear (+X)	34.976 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.3756	1-way Shear (-X)	34.976 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.3756	1-way Shear (+Z)	34.976 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.3756	1-way Shear (-Z)	34.976 psi	93.113 psi	+1.20D+0.50L+1.60S
PASS	0.9481	2-way Punching	176.55 psi	186.23 psi	+1.20D+0.50L+1.60S