ADMINISTRATIVE PERMIT CASE NUMBER: WADMIN19-0001 (Matt and Angie Bussell Detached Accessory Structure)

BRIEF SUMMARY OF REQUEST: Detached Accessory Structure 2000 square feet in size, that is larger than the main dwelling on the parcel, which is 1538 square feet in size.

STAFF PLANNER: Planner’s Name: Roger Pelham, Senior Planner Phone Number: 775.328.3622 E-mail: rpelham@washoecounty.us

CASE DESCRIPTION
For possible action, hearing, and discussion to approve an Administrative Permit to allow the construction of a Detached Accessory Structure 2000 square feet in size, that is larger than the main dwelling on the parcel, which is 1538 square feet in size. The proposed structure is a “Kit Pole Building for Agricultural and Storage Use.” The structure is proposed to be located on the western portion of the parcel, to the south of the existing dwelling.

Applicant: Matt and Angie Bussell
Property Owner: Matt and Angie Bussell
Location: 16400 Red Rock Road, approximately 300 feet north of its intersection with Appaloosa Circle
APN: 078-212-02
Parcel Size: ± 11.98 Acres
Master Plan: Rural Residential (RR)
Regulatory Zone: Low Density Rural (LDR)
Area Plan: North Valleys
Citizen Advisory Board: North Valleys
Development Code: Authorized in Article 306, Accessory Uses and Structures
Commission District: 5 – Commissioner Herman

POSSIBLE MOTION
I move that, after giving reasoned consideration to the information contained in the staff report and information received during the public hearing, the Board of Adjustment approve Administrative Permit Case Number WADMIN19-0001 for Matt and Angie Bussell, having made all five findings in accordance with Washoe County Development Code Section 110.808.25.

(Motion with Findings on Page 8)
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**Administrative Permit Definition**

The purpose of an Administrative Permit is to provide a method of review for a proposed use which possess characteristics that requires a thorough appraisal in order to determine if the use has the potential to adversely affect other land uses, transportation or facilities in the vicinity. The Board of Adjustment or the Hearing Examiner may require conditions of approval necessary to eliminate, mitigate, or minimize to an acceptable level any potentially adverse effects of a use, or to specify the terms under which commencement and operation of the use must comply. Prior to approving an application for an administrative permit, the Board of Adjustment must find that all of the required findings, if applicable, are true.

The Conditions of Approval for Administrative Permit Case Number WADMIN19-0001 is attached to this staff report at Exhibit A, and will be included with the Action Order, if approval is granted.

The subject property is designated as Low Density Rural (LDR). Detached accessory structures, larger than the main dwelling on the same parcel of land are permissible in the LDR zone, subject to the approval of an Administrative Permit in accordance with WCC 110.306.
VICINITY MAP
Site Plan

Building Elevations
Project Evaluation

The section of the Washoe County Development Code that is relevant to this Administrative Permit request follows:

Section 110.306.10 Detached Accessory Structures. Detached accessory structures are defined in Article 304, Use Classification System, under Section 110.304.15, Residential Use Types. The following development requirements shall apply to detached accessory structures:

(d) Size. A proposal to establish a detached accessory structure that is larger (i.e. has more square footage or a larger building footprint) than the existing main structure shall require the approval of an Administrative Permit (pursuant to Article 808), to include review of building height and architectural compatibility with surrounding dwellings, prior to the issuance of a building permit. Parcels 40 acres in size or larger in the General Rural (GR) and General Rural Agricultural (GRA) Regulatory Zones, and all parcels in the Commercial and Industrial Regulatory Zones, are exempt from this requirement.

The proposed detached accessory structure is within the allowed building height for the LDR regulatory zone. The proposed detached accessory structure is architecturally compatible with surrounding development patterns and is proposed to be painted the same color as the dwelling on the same parcel of land. There is no significant topography that would create impacts upon surrounding dwellings due to construction of the proposed detached accessory structure.
North Valleys Citizen Advisory Board (NVCAB)

The proposed project was presented by the applicant’s representative at the regularly scheduled Citizen Advisory Board meeting on February 11, 2019. The CAB took action to recommend approval of the administrative permit as requested. No concerns were expressed by the CAB.

Reviewing Agencies

The following agencies received a copy of the project application for review and evaluation.

- Washoe County Community Services Department
  - Engineering and Capital Projects Division
  - Planning and Building Division
- Washoe County Health District
  - Air Quality Management Division
  - Environmental Health Services Division
- Regional Transportation Commission
- Washoe-Storey Conservation District

Two of the six above-listed agencies/departments provided comments and/or recommended conditions of approval in response to their evaluation of the project application. A summary of each agency’s comments and/or recommended conditions of approval and their contact information is provided. The Conditions of Approval document is attached to this staff report and will be included with the Action Order.

- Washoe County Planning and Building Division addressed technical requirements for Fire Code, and general requirements for Administrative Permits.
  Contact – Dan Holly, 775.328.2027, dholly@washoecounty.us and Roger Pelham, 775.328.3622 rpelham@washoecounty.us
- Washoe County Engineering addressed technical requirements for grading and drainage in conjunction with submission of required building permits.
  Contact – Leo Vesely, 775.328.2041, lvesely@washoecounty.us

Staff Comment on Required Findings

WCC 110.808.25 requires that all of the following findings be made to the satisfaction of the Washoe County Board of Adjustment before granting approval of the administrative permit request. Staff has completed an analysis of the application and has determined that the proposal is in compliance with the required findings as follows:

1. Consistency. That the proposed use is consistent with the action programs, policies, standards and maps of the Master Plan and the North Valleys Area Plan.
   
   Staff Comment: There are no policies or action programs within the North Valleys Area Plan that prohibit the construction of a detached accessory structure that is larger than the main dwelling on the same parcel of land. The construction of a detached accessory structure that is larger than the main dwelling on the same parcel of land is permissible subject to the approval of this Administrative Permit within the LDR regulatory zone.

2. Improvements. That adequate utilities, roadway improvements, sanitation, water supply, drainage, and other necessary facilities have been provided, the proposed improvements are properly related to existing and proposed roadways, and an adequate public facilities determination has been made in accordance with Division Seven.
Staff Comment: There are utilities, roadway improvements, sanitation, water supply, drainage, and other necessary facilities existing at this time. The proposed detached accessory structure that is larger than the main dwelling on the same parcel of land will not create additional impact upon those facilities.

3. Site Suitability. That the site is physically suitable for a detached accessory structure that is larger than the main dwelling on the same parcel of land, and for the intensity of such a development.

Staff Comment: Detached accessory structures that are larger than the main dwelling on the same parcel of land are common in the surrounding area. The site is physically suitable for a detached accessory structure that is larger than the main dwelling on the same parcel of land, and for the intensity of such a development.

4. Issuance Not Detrimental. That issuance of the permit will not be significantly detrimental to the public health, safety or welfare; injurious to the property or improvements of adjacent properties; or detrimental to the character of the surrounding area.

Staff Comment: The location proposed for the detached accessory structure that is larger than the main dwelling on the same parcel of land, maintains a setback from all property lines that is greater than the minimum requirements of the LDR regulatory zone and thus issuance of the permit will not be significantly detrimental to the public health, safety or welfare; injurious to the property or improvements of adjacent properties; or detrimental to the character of the surrounding area.

5. Effect on a Military Installation. Issuance of the permit will not have a detrimental effect on the location, purpose or mission of the military installation.

Staff Comment: There is no military installation in the area required to be noticed for this administrative permit, therefore there is no detrimental effect on the location, purpose or mission of a military installation.

Recommendation
Those agencies which reviewed the application recommended conditions in support of approval of the project. Therefore, after a thorough analysis and review, Administrative Permit Case Number WADMIN19-0001 for Matt and Angie Bussell is being recommended for approval with conditions. Staff offers the following motion for the Board’s consideration.

Motion
I move that, after giving reasoned consideration to the information contained in the staff report and information received during the public hearing, the Board of Adjustment approve Administrative Permit Case Number WADMIN19-0001 for Matt and Angie Bussell, having made all five findings in accordance with Washoe County Development Code Section 110.808.25:

1. Consistency. That the proposed use is consistent with the action programs, policies, standards and maps of the Master Plan and the North Valleys Area Plan;

2. Improvements. That adequate utilities, roadway improvements, sanitation, water supply, drainage, and other necessary facilities have been provided, the proposed improvements are properly related to existing and proposed roadways, and an adequate public facilities determination has been made in accordance with Division Seven;

3. Site Suitability. That the site is physically suitable for a detached accessory structure, larger than the dwelling on the same parcel of land, and for the intensity of such a development;
4. **Issuance Not Detrimental.** That issuance of the permit will not be significantly detrimental to the public health, safety or welfare; injurious to the property or improvements of adjacent properties; or detrimental to the character of the surrounding area;

5. **Effect on a Military Installation.** Issuance of the permit will not have a detrimental effect on the location, purpose or mission of the military installation.

**Appeal Process**

Board of Adjustment action will be effective 10 calendar days after the written decision is filed with the Secretary to the Board of Adjustment and mailed to the original applicant, unless the action is appealed to the Washoe County Board of County Commissioners, in which case the outcome of the appeal shall be determined by the Washoe County Board of County Commissioners. Any appeal must be filed in writing with the Planning and Building Division within 10 calendar days from the date the written decision is filed with the Secretary to the Board of Adjustment and mailed to the original applicant.

Applicant/Property Owner: Matt and Angie Bussell
16400 Red Rock Road
Reno, NV 89508

Representatives: Tom Hoyle
2336 Jacobsen Lane
Gardnerville, NV 89410
The project approved under Administrative Permit Case Number WADMIN19-0001 shall be carried out in accordance with the Conditions of Approval granted by the Board of Adjustment on March 7, 2019. Conditions of Approval are requirements placed on a permit or development by each reviewing agency. These Conditions of Approval may require submittal of documents, applications, fees, inspections, amendments to plans, and more. These conditions do not relieve the applicant of the obligation to obtain any other approvals and licenses from relevant authorities required under any other act or to abide by all other generally applicable Codes, and neither these conditions nor the approval by the County of this project/use override or negate any other applicable restrictions on uses or development on the property.

Unless otherwise specified, all conditions related to the approval of this Administrative Permit shall be met or financial assurance must be provided to satisfy the conditions of approval prior to issuance of a grading or building permit. The agency responsible for determining compliance with a specific condition shall determine whether the condition must be fully completed or whether the applicant shall be offered the option of providing financial assurance. All agreements, easements, or other documentation required by these conditions shall have a copy filed with the County Engineer and the Planning and Building Division.

Compliance with the conditions of approval related to this Administrative Permit is the responsibility of the applicant, his/her successor in interest, and all owners, assignees, and occupants of the property and their successors in interest. Failure to comply with any of the conditions imposed in the approval of the Administrative Permit may result in the initiation of revocation procedures.

Operational Conditions are subject to review by the Planning and Building Division prior to the renewal of a business license each year. Failure to adhere to the Operational Conditions may result in the Planning and Building Division recommending that the business license not be renewed until conditions are complied with to the satisfaction of Washoe County.

Washoe County reserves the right to review and revise the conditions of approval related to this Administrative Permit should it be determined that a subsequent license or permit issued by Washoe County violates the intent of this approval.

For the purpose of conditions imposed by Washoe County, “may” is permissive and “shall” or “must” is mandatory.

Conditions of Approval are usually complied with at different stages of the proposed project. Those stages are typically:

- Prior to permit issuance (i.e., grading permits, building permits, etc.).
- Prior to obtaining a final inspection and/or a certificate of occupancy.
- Prior to the issuance of a business license or other permits/licenses.
- Some “Conditions of Approval” are referred to as “Operational Conditions.” These conditions must be continually complied with for the life of the project or business.
FOLLOWING ARE CONDITIONS OF APPROVAL REQUIRED BY THE REVIEWING AGENCIES. EACH CONDITION MUST BE MET TO THE SATISFACTION OF THE ISSUING AGENCY.

Washoe County Planning and Building Division

1. The following conditions are requirements of the Planning and Building Division, which shall be responsible for determining compliance with these conditions.

   Contact: Roger Pelham, Senior Planner, 775.328.3622, rpelham@washoecounty.us and Dan Holly, Plans Examiner, 775.328.2027, dholly@washoecounty.us

   a. The applicant shall demonstrate substantial conformance to the plans approved as part of this administrative permit. Planning and Building shall determine compliance with this condition.

   b. The applicant shall submit complete construction plans and building permits shall be issued within two (2) years from the date of approval by Washoe County. The applicant shall complete construction within the time specified by the building permits. Compliance with this condition shall be determined by Planning and Building.

   c. The applicant shall attach a copy of the Action Order approving this project to all administrative permit applications (including building permits) applied for as part of this administrative permit.

   d. A note shall be placed on all construction drawings and grading plans stating:

      NOTE: Should any cairn or grave of a Native American be discovered during site development, work shall temporarily be halted at the specific site and the Sheriff’s Office as well as the State Historic Preservation Office of the Department of Conservation and Natural Resources shall be immediately notified per NRS 383.170.

   e. This property is in a High fire risk area and the design must comply with those requirements at the time of submittal for building permits.

   f. The following Operational Conditions shall be required for the life of the business:

      i. This administrative permit shall remain in effect until or unless it is revoked or is inactive for one year.

      ii. Failure to comply with any of the conditions of approval shall render this approval null and void.

Washoe County Engineering and Capital Projects

2. The following conditions are requirements of the Engineering Division, which shall be responsible for determining compliance with these conditions.

   Contact: Leo R. Vesely, P.E., 775.328.2041, lvesely@washoecounty.us

   a. A complete set of construction improvement drawings, including an on-site grading plan, shall be submitted when applying for a building/grading permit. Any necessary grading shall comply with County Code Article 438, Grading Standards and all drainage shall comply with County Code Article 420, Storm Drainage Standards. Silts shall be controlled on-site and not allowed onto adjacent property.

*** End of Conditions ***
Roger: I have reviewed this application on behalf of building and have no major concerns. This property is in a High fire risk area and the design will need to comply with those requirements at the time of submittal. Thank You,

Dan Holly
Plans Examiner Supervisor, Planning and Building Division | Community Services Department
dholly@washoecounty.us | Office: (775) 328-2027
1001 E. Ninth St., Bldg. A, Reno, NV 89512

From: Behnam, Vahid
To: Pelham, Roger
Subject: Administrative Permit Case Number WADMIN19-0001 (Matt and Angie Bussell Detached Accessory Structure)
Date: Friday, January 25, 2019 2:03:42 PM
Attachments: Administrative Permit Case Number WADMIN19-0001 (Matt and Angie Bussell Detached Accessory Structure).docx

Roger: my quick review did not indicate any water fixtures or water line extension to the Barn. Therefore, I have no conditions. If WRONG please let me know so that I can amend.
INTEROFFICE MEMORANDUM

DATE: February 6, 2019

TO: Roger Pelham, Senior Planner, Planning and Building Division
FROM: Leo N. Vesely, P.E., Engineering and Capital Projects Division

SUBJECT: WADMIN19-0001
APN 078-212-02
Matt and Angie Bussell Detached Accessory Structure

GENERAL PROJECT DISCUSSION

Washoe County Engineering staff has reviewed the above referenced application. The Engineering and Capital Projects Division recommends approval with the following comments and conditions of approval which supplement applicable County Code and are based upon our review of the application. The County Engineer shall determine compliance with the following conditions of approval.

For questions related to sections below, please see the contact name provided.

GENERAL CONDITIONS

Contact Information: Leo Vesely, P.E. (775) 328-2041

1. A complete set of construction improvement drawings, including an on-site grading plan, shall be submitted when applying for a building/grading permit. Any necessary grading shall comply with County Code Article 438, Grading Standards and all drainage shall comply with County Code Article 420, Storm Drainage Standards. Silts shall be controlled on-site and not allowed onto adjacent property.

LRV/Lrv
Admin. Permit Case Number WADMIN19-0001
(Bussell Detached Accessory Structure)

37 Parcels selected at 1500 feet.

Subject Site

Mailing Label Map

February 2017

Source: Planning and Development Division

Community Services Department
Planning and Development Division
WASHOE COUNTY NEVADA

WADMIN19-0001
EXHIBIT C
Community Services Department
Planning and Building
ADMINISTRATIVE PERMIT APPLICATION
(Care for the Infirm see page 8)

Community Services Department
Planning and Building
1001 E. Ninth St., Bldg. A
Reno, NV 89512-2845
Telephone: 775.328.6100
Washoe County Development Application

Your entire application is a public record. If you have a concern about releasing personal information, please contact Planning and Building staff at 775.328.6100.

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<tbody>
<tr>
<td>Project Name:</td>
<td>AG STORAGE BUILDING</td>
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<tr>
<td>Project Description:</td>
<td>40' x 50' POLE BARN/BUILDING</td>
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<td>Project Address:</td>
<td>16400 N RED ROCK RD RENO NV 89508</td>
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<tr>
<td>Project Area (acres or square feet):</td>
<td>2000 50 FT</td>
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<td>Project Location (with point of reference to major cross streets AND area locator):</td>
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<td>Parcel Acreage:</td>
<td>11.98</td>
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Indicate any previous Washoe County approvals associated with this application:
Case No.(s):

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<th>Applicant Information (attach additional sheets if necessary)</th>
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<tr>
<td>Property Owner:</td>
</tr>
<tr>
<td>Name: MATT &amp; ANGIE BUSELL</td>
</tr>
<tr>
<td>Address: 16400 N RED ROCK RD RENO NV</td>
</tr>
<tr>
<td>Phone: 530-260-1468 Fax:</td>
</tr>
<tr>
<td>Email: UNLIMITEDMOTO @ GMAIL.COM</td>
</tr>
<tr>
<td>Cell: 530-260-1468 Other: 775 722-1885</td>
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<td>Contact Person: MATT BUSSELL</td>
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<tr>
<td>Name: MATT &amp; ANGIE BUSELL</td>
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<td>Contact Person: MATT BUSSELL</td>
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For Office Use Only

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<td>Master Plan Designation(s):</td>
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<tr>
<td>CAB(s):</td>
<td>Regulatory Zoning(s):</td>
</tr>
</tbody>
</table>

December 2018
Property Owner Affidavit

Applicant Name: MATT RUSSELL

The receipt of this application at the time of submittal does not guarantee the application complies with all requirements of the Washoe County Development Code, the Washoe County Master Plan or the applicable area plan, the applicable regulatory zoning, or that the application is deemed complete and will be processed.

STATE OF NEVADA  )
COUNTY OF WASHOE  )

________________________
MATT RUSSELL

(please print name)

being duly sworn, depose and say that I am the owner* of the property or properties involved in this application as listed below and that the foregoing statements and answers herein contained and the information herewith submitted are in all respects complete, true, and correct to the best of my knowledge and belief. I understand that no assurance or guarantee can be given by members of Planning and Building.

(A separate Affidavit must be provided by each property owner named in the title report.)

Assessor Parcel Number(s): 078-212-02

________________________
MATT RUSSELL

Signed 10 JANUARY 2019

Address 16400 N RED PECKER
RENO NV 89508

Subscribed and sworn to before me this
day of ______________, ______________

________________________
Notary Public in and for said county and state

My commission expires: ____________________

*Owner refers to the following: (Please mark appropriate box.)

☐ Owner
☐ Corporate Officer/Partner (Provide copy of record document indicating authority to sign.)
☐ Power of Attorney (Provide copy of Power of Attorney.)
☐ Owner Agent (Provide notarized letter from property owner giving legal authority to agent.)
☐ Property Agent (Provide copy of record document indicating authority to sign.)
☐ Letter from Government Agency with Stewardship

December 2018
A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California  
County of Lassen  

Subscribed and sworn to (or affirmed) before me on this 10th day of January, 2019, by Matthew Bussell  

proved to me on the basis of satisfactory evidence to be the person(s) who appeared before me.

(Seal)  
Signature  

This certificate is attached to a Property Owner Affidavit  

dated 10 January 2019, of 10 pages, also signed by  
(name of other signer if any)  

WADMIN19-0001  
EXHIBIT D
Property Owner Affidavit

Applicant Name: Angelique Callagari

The receipt of this application at the time of submittal does not guarantee the application complies with all requirements of the Washoe County Development Code, the Washoe County Master Plan or the applicable area plan, the applicable regulatory zoning, or that the application is deemed complete and will be processed.

STATE OF NEVADA
COUNTY OF WASHOE

Angelique Renee Callagari
(please print name)

being duly sworn, deposed and say that I am the owner of the property or properties involved in this application as listed below and that the foregoing statements and answers herein contained and the information herewith submitted are in all respects complete, true, and correct to the best of my knowledge and belief. I understand that no assurance or guarantee can be given by members of Planning and Building.

(A separate Affidavit must be provided by each property owner named in the title report.)

Assessor Parcel Number(s): 078-212-02

Printed Name: Angelique Callagari

Signed:

Address: 11780 N. Red Rock Rd.

Subscribed and sworn to before me this 10th day of January, 2019

Amber Welch
Notary Public in and for said county and state

My commission expires: 08/18/20

(Notary Stamp)

*Owner refers to the following: (Please mark appropriate box.)

☐ Owner
☐ Corporate Officer/Partner (Provide copy of record document indicating authority to sign.)
☐ Power of Attorney (Provide copy of Power of Attorney.)
☐ Owner Agent (Provide notarized letter from property owner giving legal authority to agent.)
☐ Property Agent (Provide copy of record document indicating authority to sign.)
☐ Letter from Government Agency with Stewardship
Administrative Permit Application  
Supplemental Information  
(All required information may be separately attached) 

1. What is the type of project or use being requested?  

KIT POLE BUILDING FOR AG / STORAGE USE  

2. What section of the Washoe County code requires the Administrative permit required?  

PLANNING DEPT  

3. What currently developed portions of the property or existing structures are going to be used with this permit?  

NONE  

4. What improvements (e.g. new structures, roadway improvements, utilities, sanitation, water supply, drainage, parking, signs, etc.) will have to be constructed or installed and what is the projected time frame for the completion of each?  

KIT POLE BARN ONLY  
PROJECT COMPLETION BY OCT 2019  

5. Is there a phasing schedule for the construction and completion of the project?  

MARCH 2019 PREP GROUND, SITE PREP  
MAY 2019 BEGIN CONSTRUCTION KIT - COMPLETION OCT 2019  

6. What physical characteristics of your location and/or premises are especially suited to deal with the impacts and the intensity of your proposed use?  

MAJORITY OF ADJOINING PARCELS ARE VACANT, PROPOSED PARCEL TOPOGRAPHY IS MAJORITY LEVEL. EXISTING BUILDINGS ON PARCEL AND ADJOINING PARCELS ARE FAR BETWEEN EX. CLEAR VIEW SIMILAR TO EXISTING STRUCTURES IN THIS AREA  

7. What are the anticipated beneficial aspects or effect your project will have on adjacent properties and the community?  

IMPROVED APPEARANCE OF PARCEL ORDERLY STORAGE OF AG SUPPLIES. KEEPING ITEMS SECURED, WINDS BLOWING ITEMS TO OTHER PARCELS  

8. What will you do to minimize the anticipated negative impacts or effect your project will have on adjacent properties?  

ANY IMPACTS SHALL BE COMMUNICATED, ADDRESSED AND FOUND RESOLUTION CONSTRUCTION METHODS TO REDUCE ENVIRONMENTAL IMPACTS EXTERIOR COLOR WILL BE SIMILAR EXISTING PARCEL COLORS IN THIS AREA  

9. Please describe any operational parameters and/or voluntary conditions of approval to be imposed on the administrative permit to address community impacts.  

NONE  

Washoe County Planning and Building  
ADMINISTRATIVE PERMIT DEVELOPMENT SUPPLEMENTAL INFORMATION  
December 2018
10. How many improved parking spaces, both on-site and off-site, are available or will be provided? (Please indicate on site plan.)

   NONE

11. What types of landscaping (e.g., shrubs, trees, fencing, painting scheme, etc.) are proposed? (Please indicate location on site plan.)

   NONE

12. What type of signs and lighting will be provided? On a separate sheet, show a depiction (height, width, construction materials, colors, illumination methods, lighting intensity, base landscaping, etc.) of each sign and the typical lighting standards. (Please indicate location of signs and lights on site plan.)

   NONE

13. Are there any restrictive covenants, recorded conditions, or deed restrictions (CC&Rs) that apply to the area subject to the administrative permit request? (If so, please attach a copy.)

   □ Yes    ☑ No

14. Utilities:

   a. Sewer Service    SEPTIC SYSTEM ON SITE
   b. Water Service    WELL DOMESTIC ON SITE

   For most uses, the Washoe County Code, Chapter 110, Article 422, Water and Sewer Resource Requirements, requires the dedication of water rights to Washoe County. Please indicate the type and quantity of water rights you have available should dedication be required:

   c. Permit #         acre-feet per year
   d. Certificate #    acre-feet per year
   e. Surface Claim #  acre-feet per year
   f. Other, #         acre-feet per year

   Title of those rights (as filed with the State Engineer in the Division of Water Resources of the Department of Conservation and Natural Resources):

   NONE
Administrative Permit Application
Supplemental Information
for Care of the Infirm

(All required information, to include the physician's signed affidavit, is considered a public record and will be treated as such by Washoe County. Information may be attached separately)

1. Name of the Infirm:

N/A

2. Name of Nevada licensed physician identifying the need for on-premise care and the physician's estimate as to the length of on-premise care required (attach physician's signed affidavit, form on page 12):

N/A

3. Name(s) of the Caregiver(s):

N/A

4. Describe the type and size of recreational vehicle or self-contained travel trailer that is proposed for use as a temporary residence of the caregiver. (Attach a site map showing the proposed location.)

N/A

5. Describe the arrangements/methods proposed for the temporary provision of:
   a. Water Service:

N/A
b. Sewage (Sanitary Sewer) Service:

n/a

c. Garbage (Solid Waste) Service:

n/a

d. Electricity:

n/a

e. Natural Gas:

n/a

6. What will you do to minimize the anticipated negative impacts or effect your waiver will have on adjacent properties?

n/a
7. What types of landscaping (e.g. shrubs, trees, fencing, painting scheme, etc.) are proposed? (Please indicate location on site plan.)

8. Are there any restrictive covenants, recorded conditions, or deed restrictions (CC&Rs) that apply to the area subject to the administrative permit request? (If so, please attach a copy.)

   □ Yes  ☒ No

9. Community Services (provided and nearest facility):

   a. Fire Station
   b. Health Care Facility
   c. Elementary School
   d. Middle School  ☒
   e. High School
   f. Parks
   g. Library
   h. Citifare Bus Stop
## Bill Detail

### Pay By Check

Please make checks payable to:
**WASHOE COUNTY TREASURER**

**Mailing Address:**
P.O. Box 30039
Reno, NV 89520-3039

**Overnight Address:**
1001 E. Ninth St., Ste D140
Reno, NV 89512-2845

### Change of Address

All requests for a mailing address change must be submitted in writing, including a signature (unless using the online form).

To submit your address change online, click here.

Address change requests may also be faxed to: (775) 328-2500

Address change requests may also be mailed to: Washoe County Treasurer
P O Box 30039
Reno, NV 89520-3039

### Legal Description

Section 9 Lot 178 Block Range 18 SubdivisionName_UNSPECIFIED Township 23

### Installments

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**Total Due:** **$393.67**

### Tax Detail

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**Total Tax:** **$1,717.70**

**($143.02)** |

### Payment History

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The Washoe County Treasurer's Office makes every effort to produce and publish the most current and accurate information possible. No warranties, expressed or implied, are provided for the data herein, its use, or its interpretation. If you have any questions, please contact us at (775) 328-2510 or tax@washoeCounty.us

This site is best viewed using Google Chrome, Internet Explorer 11, Mozilla Firefox or Safari.


WADMIN19-0001

EXHIBIT D
WADMIN19-0001
EXHIBIT D

RECORD OF SURVEY # 687
PORTION OF SECTION 9
T23N - R18E

PARCEL # 078-212-02  11.98 Acres
16400 N RED ROCK RD
RENO NV 89508
MATT & ANGIE BUSSELL
530-260-1468
AG STORAGE BUILDING

PARCEL # 078-21E-02
17400 N RED ROCK RD
POHATCONG TWP., NJ 07444

11.98 ACRES PARCEL
MATT & ANGIE MURPHY
530-230-1268
DRAWN BY MATT MURPHY
DATE 9 JANUARY 2019

- PAD REQUIRE ALL CUTS TO LEVEL SUBGRADE
  COMPANIED WITH MINIMUM 10" EXPANSION ON BOTH
  ENDS, BOTH SIDES.
- BUILDING STRUCTURE ON CUT ONLY, NO FILL MATERIAL
  FILL FROM CUT WILL BE USED UPWARD THAN 10' EAST
  AND/OR BUILDING TO REDUCE SLOPE ON TO EXISTING TRIP
  FILL WILL BE COMPACTED ADEQUATELY NOT TRANSFERRED
  UPON NEXT STRUCTURE
GRADE PLAN AND PROF 1 OF 1

PARCEL # DTB-316-02 11.74 ACRE

ILEA IN RED RAGE RD
PENNO NY 35376

MATT JUNIO RUSSELL
A000-2016-35

NO STORAGE BUILDING 40X50

DRAWN BY MATT JUNIO RUSSELL
DATE: 7 JANUARY 2019

- Estimated 4.5 YARDS OF SOIL
- Fill will be greater than 10'
- East of east-west connect to NWC
- Building pad not on fill material
- South pad will be 6' above grade

on northeast corner
- Final grade consists of 6' top & bay
- Graded to ensure connection and level within 1%
- Grading - Will not be done until fill is complete

1' behind building perennials will be sized of away or as determined by proper drainage.
COLUMN SIZE & GRADE WITH CONCRETE BACKFILL SCHEDULE

A: 6x6 HFR #3 W/ 28" DIA x 4'-0" DEEP
B: 6x6 HFR #3 W/ 28" DIA x 4'-0" DEEP
C: 6x6 HFR #3 W/ 28" DIA x 4'-0" DEEP
D: 6x6 HFR #3 W/ 30" DIA x 4'-0" DEEP

NOTE:
ALL DEPTHS INCLUDE 6" THICK CONCRETE PAD.
December 28, 2018

Washoe County Department of Building & Safety
1001 E 9th St
P.O. Box 11130
Reno, NV 89520-0027

Truss Submittal Certification Letter

Alliance Engineering Job No.: MW18233
Building Owner: Bussel
Building Address: 16400 N Red Rock Rd., Reno, NV 89508
Contractor: Hoyle Construction
Truss Manufacturer: Oregon Truss
Trusses: A-Bussel
Dated: 12/19/2018

To Washoe County Department of Building & Safety,

This letter is to certify that I have reviewed the attached truss calculations for the above address, prior to submitting to the building department, and find them to be in compliance with or exceeding the plans and specifications (including, but not limited to, connections, truss loads, load path, bearing points, etc).

Note: Any deviations from the approved plans must be submitted to the Washoe County Building and Safety Division for review.

If you have any questions, please contact me.

Sincerely,

Nicholas Jasper, PE
Civil Engineer/Principal

[Signature]

[Seal]
**Loading Criteria (psf)**

- TCCL: 30.00
- TCDL: 5.00
- BCCL: 0.00
- BCDL: 1.00
- Des Ld: 38.00
- NCBCLL: 10.00
- Softl: 2.00
- Load Duration: 1.15
- Spacing: 60.0*  

**Wind Criteria**

- Wind Std: ASCE 7-10
- Speed: 130 mph
- Enclosure: Closed
- Risk Category: II
- EXP: C; Kt: NA
- Mean Height: 150.0 ft
- TCDL: 3.0 psf
- BCDL: 0.6 psf
- MWFRS Paral Dist: 0 to h/2
- C&D Nat: 4.0 ft
- Loc, from endwall: Any
- GCp: 0.19
- Wind Duration: 1.60

**Snow Criteria (PPI in PSF)**

- PPI: 30.00
- C1: 1.2
- C2: 1.0
- Pf: 25.2
- CC: C1
- Luc: 1.00
- Snow Duration: 1.15

**Code / Mise Criteria**

- Bidg Code: IRC 2015
- TPI Std: 2014
- Rep Fac: No
- FRT/PT(0/0)(0)(0/1/0)
- Plate Type(s): WAVE, HS

**Def or CIST Criteria**

- PP Deflection in loc L/d or L/3
- VERT(LL): 0.897 K 760 315
- VERT(CL): 0.734 K 845 238
- HORIZ(L): 0.180 J -
- HORIZ(TL): 0.217 J -
- Creep Factor: 2.0
- Max TC SI: 0.816
- Max BC SI: 0.971
- Max Web SC: 0.820
- MAX WEB SC: 0.829

**Maximum Reactions (lbs)**

- Loc: Rv / R/ / Rh / Rw / U / RL
- O: 3604 -
- I: 3604 -
- Wind reactions based on MWFRS
- O: Brg Width = 4.0 Min Req = 3.8
- I: Brg Width = 5.0 Min Req = 3.8
- Bearings O & I are rigid surface.
- Members not rated have forces less than 375lbs

**Maximum Top chord Forces Per (lbs)**

- Chords / Tens. Comp. / Chords / Tens. Comp.
  - A - E: 5010 - 8658
  - F - G: 5079 - 8627
  - H - I: 5052 - 8638
  - J - K: 5052 - 8580

**Maximum Web Forces Per (lbs)**

- Chords / Tens. Comp. / Chords / Tens. Comp.
  - B - N: 736 - 997
  - K - E: 1799 - 1274
  - N - D: 1012 - 1277
  - K - F: 1237 - 1014
  - M - E: 1767 - 1239
  - J - H: 832 - 997

**Lumber**

- Top chord 2x8 DF-L 1800x1.8E
- Bot chord 2x8 DF-L 2100x1.8E: #2 2x8 DF-L 1800x1.8E
- Weba 2x4 DF-L Standard: #W4, W5 2x4 DF-L 1800x1.8E
- Li Wedge 2x4 DF-L Standard:

**Plating Notes**

- Handle stressors not considered for plate. Handling of this truss requires special care by the truss manufacturer and installation contractor to prevent plate damage.

**Plate Shift Table**

<table>
<thead>
<tr>
<th>JT</th>
<th>Plate</th>
<th>JT</th>
<th>Plate</th>
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<tr>
<td>23</td>
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<td>1.75</td>
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</table>

**Loading**

- Bottom chord checked for 10.00 psf non-consistent bottom chord live load applied per IRC-15 section 301.5.

**Purlins**

- In lieu of structural panels or rigid ceiling use purlins to brace To at 24" OC, BC at 47" OC.

**Wind**

- Member design based on both MWFRS and C&C.

**WARNING**

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

Trusses require extreme care in fabrication, handling, shipping, installing, and bracing. Refer to and follow the latest edition of BCSI: Building Component Safety Information, by TPI and SCAIA as safety instructions prior to performing these functions. Installers shall provide temporary attached rigid ceilings. Locations shown for permanent staple restraint of webs shall have been braced installed per BCSI sections 303, 310, or 311.

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

For more information see the job's general note tabs and the web sites: ALPINE: www.alpinelv.com, TPI: www.tpiindustry.com, C&C: www.candcc.com

**12/19/2018**

**Owens Travis**

1780 S2 Walling Rd.
Dayton, OH 45414
(937) 585-8170 Ext.
POST FRAME BUILDING
STRUCTURAL CALCULATION
(This structure has been analyzed and designed for structural adequacy only.)

PROJECT No.
MW18233

OWNER:
Hoyle Const for Bussel
16400 N Red Rock Rd
Reno, NV 89508

ENGINEER:

[Signature]

12.25.18

NICHOLAS CLAY JASPER
CIVIL
STATE OF NEVADA
Exp: 4/30/19
No. 016520
POST FRAME BUILDING

REFERENCES:


2. ASCE 7-10 - Minimum Design Loads for Buildings and Other Structures
   American Society of Civil Engineers, 2011

   Construction, American Wood Council, 2011

4. ASABE EP486.2 - Shallow Post and Pier Foundation Design
   American Society of Agricultural and Biological Engineers, 2012
**DESIGN INPUT VALUES:**

**Building Dimensions**
- $W_{bldg} := 40$-ft  
  Width of Building
- $L_{bldg} := 50$-ft  
  Length of Building
- $H_{bldg} := 14$-ft  
  Eave Height of Building
- $O_{overhang} := 0$-in  
  Length of Eave Overhang
- $W_{shed} := 12$-ft  
  Width of Eave Shed Roof
- $L_{shed} := 50$-ft  
  Length of Eave Shed Roof
- $H_{shed} := 11$-ft  
  Eave Height of Shed Roof
- $R_{pitch} := 4$ / 12  
  Roof pitch
- $R_{pitch2} := 3$ / 12  
  Roof pitch
- $B_{xy} := 10$-ft  
  Greatest nominal spacing between eave wall posts
- $W_{Lgableopenings} := 26$-ft  
  Total width of openings in left gable wall
- $W_{Rgableopenings} := 10$-ft  
  Total width of openings in right gable wall
- $W_{Faveopenings} := 10$-ft  
  Total width of openings in front eave wall
- $W_{Raveopenings} := 20$-ft  
  Total width of openings in rear eave wall

**Design Loads for Building:**
- Risk Category := [ ] [ ]

**Wind Design Values:**
- Wind Speed:
  - $V_{wind} = 130$ mph
- Wind Exposure:
  - $E_{exposure} := $ [ ] [ ]

**Seismic Design Values:**
- Site class := [ ] [ ]
  - $S_a := 1.337$  
    Mapped spectral acceleration for short period
  - $S_1 := 0.462$  
    Mapped spectral acceleration for 1 second period
  - $R_g := 2.5$  
    Response modification factor

**Roof Load Design Values:**
- $p_g := 30$-psf  
  Ground snow load
- $p_d := 3$-psf  
  Roof dead load
- $p_{Lr} := 20$-psf  
  Roof live load
- $p_{d2} := 1$-psf  
  Additional truss bottom chord dead load (if applicable)
DESIGN INPUT VALUES (Continued):

Structural Members for Building:

Eave Post Properties: (Solid rough-sawn post unless otherwise specified)

\[ S_{\text{post}} = 6 \times 6 \quad \text{Post Species} = \text{Hem-Fir} \quad \text{Post Grade} = 2 \]

Purlin Properties:

\[ S_{\text{purlin}} : \text{Sx26} \]
\[ \text{Purlin species} = \text{MSR} \quad \text{Purlin grade} = 1650_1.5E \quad \text{Purlin spacing} = 24\text{-in} \]

Girt Properties:

\[ S_{\text{girt}} : \text{Sx26} \]
\[ \text{Girt species} = \text{MSR} \quad \text{Girt grade} = 1650_1.5E \quad \text{Girt spacing} = 24\text{-in} \]

Post Hole and Footing Design Values:

\[ q_{\text{soil}} = 1500\text{-psf} \quad \text{Assumed soil vertical bearing capacity} \]
\[ S_{\text{soil}} = 100\text{-psf} \quad \text{Assumed soil lateral bearing capacity} \]
\[ d_{\text{a footing}} = 26\text{in} \quad \text{Main eave post footing diameter} \]

Slab and backfill information

\[ \text{Concrete slab} = \text{No} \quad \text{Backfill type} = \text{Concrete} \quad \text{Main eave post hole backfill} \]

(GO TO LAST PAGE FOR SUMMARY OF RESULTS)
SNOW LOAD ANALYSIS:
For roof slopes greater than 5 degrees, and less than 70 degrees.

\[ p_g = 30\text{-psf} \quad \text{Ground Snow Load (from above)} \]

\[ R_{\text{angle}} = 18.43\text{-deg} \quad \text{Angle of roof} \]

\[ C_e = 1.00 \quad \text{Exposure factor} \]

\[ C_t = 1.10 \quad \text{Thermal Factor} \]

\[ C_s = 1.00 \quad \text{Roof slope factor} \]

\[ I_a = 1.00 \quad \text{Importance factor} \]

1. Determine Roof Snow Loads:

\[ p_r := 0.7 \cdot C_e \cdot C_t \cdot I_a \cdot p_g \quad \text{Equation 1} \]

\[ p_r = 23.1\text{-psf} \quad \text{Flat roof snow load; Roof_slope} \leq 5\text{deg} \]

\[ p_s := C_s \cdot p_r \quad \text{Equation 2} \]

\[ p_s = 23.1\text{-psf} \quad \text{Sloped roof (balanced) snow load} \]

2. Determine final snow load, \( p_{su} \)

\[ p_{su} = 30\text{-psf} \quad \text{Final roof snow load} \]
**WIND ANALYSIS:**

**Method 2 - Analytical Procedure**

\[ V_{\text{wind}} = 130 \text{ mph} \]  
Wind Speed

\[ k_d = 0.85 \]  
Wind Directionality Factor

\[ k_s = 1.0 \]  
Topographic Factor

\[ k_z = 0.849 \]  
Wind Exposure Factor (windward)

\[ I_w = 1.00 \]  
Importance factor

\[ q_h := 0.00256 \cdot k_z \cdot k_d \cdot V_{\text{asf}}^2 \cdot I_w \]

\[ q_h = 18.73 \text{ psf} \]  
Velocity Pressure

**Calculated Wind Pressures:**

**Windward Eave Wall:**

\[ q_{\text{ww}} := q_h \cdot GC_{\text{pfw}} \]

\[ q_{\text{ww}} = 9.67 \text{ psf} \]

**Windward Gable Wall:**

\[ q_{\text{wgg}} := q_h \cdot GC_{\text{pfwgg}} \]

\[ q_{\text{wgg}} = 7.49 \text{ psf} \]

**Windward Roof:**

\[ q_{\text{wr}} := q_h \cdot GC_{\text{pfwr}} \]

\[ q_{\text{wr}} = -12.92 \text{ psf} \]

**Wall Elements:**

\[ q_{\text{wc}} := q_h \cdot GC_{\text{pfw}} \]

\[ q_{\text{wc}} = -14.98 \text{ psf} \]

**Internal Wind Pressure (+/-):**

\[ q_i := q_h \cdot GC_{\text{pi}} \]

\[ q_i = 3.37 \text{ psf} \]

**Leeward Eave Wall:**

\[ q_{\text{lw}} := q_h \cdot GC_{\text{pfw}} \]

\[ q_{\text{lw}} = -7.78 \text{ psf} \]

**Leeward Gable Wall:**

\[ q_{\text{lwgg}} := q_h \cdot GC_{\text{pfwgg}} \]

\[ q_{\text{lwgg}} = -5.43 \text{ psf} \]

**Leeward Roof:**

\[ q_{\text{lr}} := q_h \cdot GC_{\text{pftr}} \]

\[ q_{\text{lr}} = -8.78 \text{ psf} \]

**Roof Elements:**

\[ q_r := q_h \cdot GC_{\text{pfr}} \]

\[ q_r = -14.98 \text{ psf} \]
SEISMIC CALCULATIONS:

\[ S_s = 1.34 \quad \text{Mapped spectral acceleration for short periods (from above)} \]

\[ S_1 = 0.46 \quad \text{Mapped spectral acceleration for 1-second period (from above)} \]

\[ I_e = 1.0 \quad \text{Importance factor} \]

\[ R_s = 2.5 \quad \text{Response modification factor (from above)} \]

1. **Determine the Seismic Design Category**

a. **Calculate \( S_{DS} \) and \( S_{D1} \)**

For \( S_{DS} \):

\[ S_s = 1.34 \]

\[ F_s = 1.00 \]

\[ S_{MS} := S_s F_s \]

\[ S_{MS} = 1.34 \]

\[ S_{DS} := \left( \frac{2}{3} \right) S_{MS} \]

\[ S_{DS} = 0.89 \]

For \( S_{D1} \):

\[ S_1 = 0.46 \]

\[ F_v = 1.54 \]

\[ S_{MI} := S_1 F_v \]

\[ S_{MI} = 0.711 \]

\[ S_{D1} := \left( \frac{2}{3} \right) S_{MI} \]

\[ S_{D1} = 0.47 \]

Seismic Design Category = "D"

2. **Determine the building parameters**

Building dead load weight, \( W \):

\[
W := \left[ W_{bldg} L_{bldg} \left( p_f + p_d \right) \right] + \left[ \left( \frac{2}{3} \left( W_{bldg} + L_{bldg} \right) H_{bldg} \right] + \left( H_{roof} W_{bldg} \right) \right] p_d
\]

\[ W = 10580.0 \text{ lb} \]

Building snow load weight, \( W_s \):

\[
W_s := \left[ W_{shed} L_{shed} \left( p_f + p_d \right) \right] + \left[ \left( H_{roof} W_{shed} \right) \right] p_d
\]

\[ W_s = 1908.0 \text{ lb} \]

Building area, \( A_b \):

\[ A_b := L_{bldg} \left( W_{bldg} + W_{shed} \right) \]

\[ A_b = 2600 \text{ ft}^2 \]
3. Determine the shear force to be applied
   a. Determine the fundamental period, T
      
      \[ T_a := 0.02 \left( \frac{H_{\text{bldg}} + H_{\text{roof}}}{2 \text{ ft}} \right)^{0.75} \]
      \[ T := T_a \quad T = 0.17 \text{ s} \]

   b. Determine the Seismic Response Coefficient, \( C_s \):
      
      \[ C_s \] is calculated as:
      
      \[ C_{s2} := \frac{S_{DS}}{R_a} \]
      \[ C_{s2} = 0.357 \]
      
      But need not exceed:
      \[ C_{s3} = 1.115 \]
      But shall not be less than:
      \[ C_{u1} = 0.039 \]

      \[ C_s = 0.357 \] Seismic Response Coefficient to used in determination of seismic base shear

   c. Determine the Seismic Base Shear:
      
      \[ V_{\text{base,shear}} := C_s W \]
      \[ V_{\text{base,shear}} = 3772 \text{ lb} \]
      \[ V_{\text{base,shear2}} := C_s W_S \]
      \[ V_{\text{base,shear2}} = 680 \text{ lb} \]

4. Determine the seismic load on the building:

Since \( \text{Seismic Design Category} = "D" \), \( \rho = 1.3 \)

\[ E = 3433 \text{ lb} \] Seismic load on building

\[ E_S = 619 \text{ lb} \] Seismic load on eave shed roof
BUILDING MODEL:

STEP 1: DETERMINE THE SHEAR STIFFNESS OF THE TEST PANEL
This procedure relies on tests conducted by the National Frame Builders Association.

The test was conducted using 29 gauge ribbed steel panels. These ribbed steel panels are similar to Strongpanel, Norclad, and Delta-Rib which are in common use by builders in this area. The material and section properties for the test panels are thus reasonable and will be used throughout.

The stiffness of the test panel was calculated to be: $c = 2166 \text{ lb/in}$

STEP 2: CALCULATED ROOF DIAPHRAGM STIFFNESS OF THE TEST PANEL

$$c' = \frac{(E \times t)}{(2 \times (1+V) \times (g/p) + (K_2 / (b' \times t)^2))}$$

Where:

- $E_{\text{steel}} = 27.5 \times 10^6 \text{ psi}$ (modulus of elasticity for steel)
- $t = 0.017''$ (thickness of 29 gauge steel)
- $V = 0.3$ (Poisson’s Ratio for steel)
- $g/p = 1.139$ ratio of sheathing corrugation length to corrugation pitch
- $b' = 144''$ (12'-0'' length of test panel)

**STEP 2.1**

This equation was set equal to the stiffness of the test panel (2166 lb/in) and the unknown value ($K_2$) was solved for.

$$K_2 = 1275 \text{ in}^4 \text{ sheet edge purlin fastening constant}$$

**STEP 2.2:**

Use new building width to determine stiffness of new roof diaphragm ($c_0$):

$$W_{\text{bild}} \quad K_2 := 1275 \text{ in}^4 \quad \Theta = 18.43\cdot\text{deg} \quad \text{Angle of roof pitch from horizontal}$$

$$t := 0.017\cdot\text{in} \quad E_{\text{steel}} := 27500000\cdot\text{psi}$$

$$b_{\text{new}} = 253\cdot\text{in}$$

$$c := \frac{E_{\text{steel}} \cdot t}{2.961 \cdot \frac{K_2}{(b_{\text{new}} \cdot t)^2}}$$

$$c = 6503 \cdot \frac{\text{lb}}{\text{in}}$$

**STEP 2.3 & 2.4:**

Calculate the equivalent horizontal roof stiffness ($c_h$) for the full roof:

Since $c_h$ is for the full roof, the roof length must be ratioed by the aspect ratio of the roof panel ($b/a$) where "a" is the truss spacing in inches.

$$a := B_{\text{ey}} \quad c_h := 2 \cdot c \cdot \cos(\Theta) \cdot \frac{b_{\text{new}}}{a}$$

$$a = 120\cdot\text{in} \quad c_h = 24675 \cdot \frac{\text{lb}}{\text{in}}$$
STEP 3: DETERMINE THE STIFFNESS OF THE POST FRAME (k):
Since the connection between the posts and the rafter can be assumed to be a pinned joint, the model for the post frame can be assumed to be the sum of two cantilevers (the posts) that act in parallel. The stiffness of the post frame can be calculated from the amount of force required to deflect the system one inch. The spring constant (k) in pounds per inch of deflection results directly.

\[ k = 188 \text{ pli} \]

STEP 4: DETERMINE THE TOTAL SIDE SWAY FORCE (R):
Apply wind loads to the walls to determine the moment, fiber stress and end reaction at prop point R.

Calculate Total Wind Load:

\[ q_w = 17.45 \text{-psi wind load} \]

\[ q_{w,\text{post}} := q_w \cdot a \quad q_{w,\text{post}} = 14.54 \text{ pli} \]

\[ M_{\text{wind}} := \left( q_{w,\text{post}} \cdot \frac{L_{\text{post, bdg}}^2}{8} \right) \quad M_{\text{wind}} = 44245 \text{-in-lb} \]

\[ f_{\text{wind}} := \frac{M_{\text{wind}}}{S_{\text{w,post}}} \quad f_{\text{wind}} = 615 \text{-psi} \]

\[ R := 3 \cdot q_{w,\text{post}} \cdot \frac{L_{\text{post, bdg}}}{8} \quad R = 851 \text{ lb} \]

STEP 5: DETERMINE THE RATIO OF THE FRAME STIFFNESS TO THE ROOF STIFFNESS:
This ratio \( \frac{k}{c_h} \) will be used to determine the side sway force modifiers.

\[ \frac{k}{c_h} = 0.008 \]

STEP 6: DETERMINE SIDE SWAY RESISTANCE FORCE:

\[ mD = 0.978 \]

STEP 7: DETERMINE THE ROOF DIAPHRAGM SIDE SWAY RESISTANCE FORCE:

\[ Q := mD \cdot R \quad Q = 832 \text{ lb} \]

Since not all of the total side sway force \( R \) is resisted by the roof diaphragm, some translation will occur at the top of the post. The distributed load that is not resisted by the roof diaphragm will apply additional moment and fiber stress to the post.

\[ M_{\text{eff}} = 3964 \text{-in-lb} \quad f_{\text{eff}} = 55 \text{-psi} \]

Calculate the total moment and the total fiber stress in the post.

\[ M_{\text{tot}} := mD \cdot M_{\text{wind}} + M_{\text{eff}} \quad M_{\text{tot}} = 47218 \text{-in-lb} \]

\[ f_{\text{tot}} := mD \cdot f_{\text{wind}} + f_{\text{eff}} \quad f_{\text{tot}} = 656 \text{-psi} \]
MAIN POST DESIGN: (Worst Case)

Calculate allowable unit compression stress, \( F_{cc} \):

\[
F_{cc} = 575 \text{-psi} \quad F_c := F_{cc} \cdot C_{Ms}\text{post} \cdot C_{t}\text{post} \cdot C_{F}\text{post} \cdot C_{ipost} \\
F_{c} = 575 \text{-psi} \quad \text{Allowable compression stress including load factors}
\]

\[
l_{\text{post\_bdg}} = 156\text{-in} \quad \text{Bending length of post} \\
d_{\text{post}} = 6\text{-in} \quad \text{Minimum unbraced dimension of post} \\
K_e := 0.8 \quad c := 0.8 \quad E_{\text{min\_wood}} = 400000 \text{-psi} \quad F_{\text{min}} := F_{\text{min\_wood}} \cdot C_{M}\text{post} \cdot C_{t}\text{post} \cdot C_{F}\text{post} \cdot C_{ipost} \\
L_e := K_e \cdot l_{\text{post\_bdg}} \quad L_e = 124.8\text{-in} \quad E_{\text{min}} = 400000\text{-psi} \\
F_{cb} := 0.822 \cdot F_{\text{min}} \quad \left( \frac{L_e}{d_{\text{post}}} \right)^2 \\
F_{cb} = 760\text{-psi} \quad \text{Load duration factors (C_D):} \\
C_{Dconst} = 1.25 \quad C_{D\text{wind}} = 1.60 \\
C_{D\text{snow}} = 1.15
\]

Calculate Column Stability Factor, \( C_p \):

\[
C_p := \left( \frac{1 + \frac{F_{cb}}{F_{c} C_D}}{2 \cdot c} \right)^2 - \left( \frac{1 + \frac{F_{cb}}{F_{c} C_D}}{2 \cdot c} \right)^2 - \frac{F_{cb}}{c} \\
C_p_{Lr} = 0.71 \quad C_p_{Snow} = 0.74 \quad C_p_{Wind} = 0.62
\]

\[
F_{cc,Lr} := F_c C_{D\text{const}} C_p_{Lr} \quad F_{cc,Lr} = 510\text{-psi} \quad \text{Allowable compression stress on the post; load case 1} \\
F_{cc,Snow} := F_c C_{D\text{snow}} C_p_{Snow} \quad F_{cc,Snow} = 487\text{-psi} \quad \text{Allowable compression stress on the post; load case 2} \\
F_{cc,\text{Wind}} := F_c C_{D\text{wind}} C_p_{Wind} \quad F_{cc,\text{Wind}} = 572\text{-psi} \quad \text{Allowable compression stress on the post; all load cases except load cases 1 and 2}
\]

\[
W_{\text{roof}} = 34\text{-psf} \quad \text{Total roof loading} \\
P_{\text{dead post}} = 1040\text{-lb} \quad \text{Axial loading per post due to roof dead load} \\
P_{\text{LooD post}} = 5200\text{-lb} \quad \text{Axial loading per post due to live roof load} \\
P_{\text{snow post}} = 7800\text{-lb} \quad \text{Axial loading per post due to roof snow load} \quad \text{(load case 2)} \\
P_{\text{snow post,fs}} = 6006\text{-lb} \quad \text{Axial loading per post due to roof snow load} \quad \text{(load case 5)} \\
F_b := F_{b1} C_{D\text{wind}} C_{M}\text{post} C_{t}\text{post} C_{F}\text{post} C_{ipost} C_{ipost} \\
F_b = 920\text{-psi} \quad \text{Allowable bending stress per post including load factors}
\]
Check Load Cases:

Load Case 1: Dead Load + Live Roof Load

\[ f_{b1} := 0 \quad f_{b1} = 0 \text{-psi} \]

\[ f_c := \frac{P_{\text{deadpost}} + P_{\text{roofpost}}}{A_{\text{post}}} \quad f_c = 173 \text{-psi} \]

\[ \text{CCFAL1} := \left( \frac{f_c}{f_{\text{cc,LR}}^{\text{LR}}} \right) \quad \text{CCFAL1} = 0.34 \]

Load Case 2: Dead Load + Snow Load

\[ f_{b1} := 0 \quad f_{b1} = 0 \text{-psi} \]

\[ f_c := \frac{P_{\text{deadpost}} + P_{\text{snowpost}}}{A_{\text{post}}} \quad f_c = 246 \text{-psi} \]

\[ \text{CCFAL2} := \left( \frac{f_c}{f_{\text{cc,snow}}} \right) \quad \text{CCFAL2} = 0.50 \]

Load Case 3: Dead Load + 0.6 * Wind Load

\[ f_{b1} := f_{\text{tot}} \quad f_{b1} = 656 \text{-psi} \]

\[ f_c := \frac{P_{\text{deadpost}}}{A_{\text{post}}} \quad f_c = 29 \text{-psi} \]

\[ \text{CCFAL3} := \left( \frac{f_c}{f_{\text{cc,wind}}} \right)^2 + \frac{f_{b1}}{F_b \left( 1 - \frac{f_c}{f_{\text{cc,LR}}} \right)} \quad \text{CCFAL3} = 0.74 \]
Check Load Cases - cont’d:

Load Case 4: Dead Load + 0.75 * (0.6 * Wind Load) + 0.75 * Live Roof Load

\[ f_{b1} := 0.75 \left( f_{tot} \right) \]
\[ f_{b1} = 492 \text{ psi} \]  Actual bending stress on post

\[ f_c := \frac{P_{\text{deadpost}} + 0.75 \cdot P_{\text{windpost}}}{A_{\text{post}}} \]
\[ f_c = 137 \text{ psi} \]  Actual compression stress per post

\[ CCFALI4 := \left[ \left( \frac{f_c}{F_{c,\text{Wind}}} \right)^2 + \frac{f_{b1}}{F_b \left( 1 - \frac{f_c}{F_{c,E}} \right)} \right] \]
CCFALI4 = 0.71

Load Case 5: Dead Load + 0.75 * (0.6 * Wind Load) + 0.75 * Snow Load

\[ f_{b1} := 0.75 \left( f_{tot} \right) \]
\[ f_{b1} = 492 \text{ psi} \]  Actual bending stress on post

\[ f_c := \frac{P_{\text{deadpost}} + 0.75 \cdot P_{\text{snowpost}} \cdot f_s}{A_{\text{post}}} \]
\[ f_c = 154 \text{ psi} \]  Actual compression stress per post

\[ CCFALI5 := \left[ \left( \frac{f_c}{F_{c,\text{Wind}}} \right)^2 + \frac{f_{b1}}{F_b \left( 1 - \frac{f_c}{F_{c,E}} \right)} \right] \]
CCFALI5 = 0.74

Load Case 6: 0.6 * Dead Load + 0.6 * Wind Load

\[ f_{b1} := f_{tot} \]
\[ f_{b1} = 656 \text{ psi} \]  Actual bending stress on post

\[ f_c := \frac{0.6 \cdot P_{\text{deadpost}}}{A_{\text{post}}} \]
\[ f_c = 17 \text{ psi} \]  Actual compression stress per post

\[ CCFALI6 := \left[ \left( \frac{f_c}{F_{c,\text{Wind}}} \right)^2 + \frac{f_{b1}}{F_b \left( 1 - \frac{f_c}{F_{c,E}} \right)} \right] \]
CCFALI6 = 0.73

CCFALI = 0.74  Less than or equal to 1.00 thus OK
DETERMINE GABLE WALL SHEAR LOADS:

1. Determine the wind load on the eave wall to be resisted by the gable wall in shear:

\[ q_{e} = 17.5 \text{ psf} \] 
\[ q_{\text{roof}} = 4.8 \text{ psf} \] 
\[ q_{\text{ave.wind}} := \left(0.375 \cdot m^2 \cdot H_{\text{bldg}} \cdot L_{\text{bldg}} \cdot q_{e}\right) + \left(H_{\text{roof}} \cdot L_{\text{bldg}} \cdot q_{\text{roof}}\right) \div 2 \] 
\[ q_{\text{ave.wind}} = 3039 \text{ lb} \]

2. Determine the seismic load to be resisted by the gable wall in shear:

\[ q_{\text{ave.seismic}} := \frac{E_{F}}{2} + \frac{E_{S}}{2} \] 
\[ q_{\text{ave.seismic}} = 2026 \text{ lb} \]

3. Determine the controlling load to be resisted by the gable wall in shear:

The controlling load = "Veave_wind". Therefore, \( V_{\text{gable.shear}} = 3039 \text{ lb} \)

\( V_{\text{gable.shear}} \) is the shear load that is transmitted through the roof diaphragm to each gable wall. Normalize the load to a per foot basis.

\[ v_{l\text{gablewall}} := \frac{V_{\text{gable.shear}}}{W_{\text{bldg}} - W_{L_{\text{gablenopenings}}} \text{ Left gable shear load}} \] 
\[ v_{l\text{gablewall}} = 217 \text{ plf} \]

\[ v_{r\text{gablewall}} := \frac{V_{\text{gable.shear}}}{W_{\text{bldg}} - W_{R_{\text{gablenopenings}}} \text{ Right gable shear load}} \] 
\[ v_{r\text{gablewall}} = 101 \text{ plf} \]

The gable wall diaphragms can resist the shear loads as follows:

\[ v_{l\text{gablewall}} \leq 300 \text{ plf} \]

Then install 7/16" OSB, 1/2" CDX plywood or 5/8" T1-11 exterior wood sheathing with 8d nails at 4" o.c. boundary and 12" o.c. field. Provide 2X blocking at all panel edges.

\[ v_{r\text{gablewall}} \leq 142 \text{ plf} \]

Use 29 gauge metal sheathing. Install per the Typical Panel detail as shown on the engineered drawing package.
DETERMINE EAVE WALL SHEAR LOADS:

1. Determine the wind load on the gable wall to be resisted by the eave wall in shear:

\[ q_g = 12.9 \text{ psf} \quad \text{Gable wall wind pressure} \]

\[ V_{\text{gable\_wind}} = \frac{0.375 \cdot m \cdot D \cdot W_{\text{bldg}} \cdot q_g \cdot H_{\text{roof}} \cdot W_{\text{bldg}} \cdot q_g}{2} \]

\[ V_{\text{gable\_wind}} = 2188 \text{ lb} \]

2. Determine the seismic load to be resisted by the eave wall in shear:

\[ V_{\text{gable\_seismic}} = \frac{E}{2} + E_s \]

\[ V_{\text{gable\_seismic}} = 2335 \text{ lb} \]

3. Determine the controlling load to be resisted by the eave wall in shear:

The controlling load = “\( V_{\text{gable\_seismic}} \)”. Therefore, \( V_{\text{eave\_shear}} = 2335 \text{ lb} \)

\( V_{\text{eave\_shear}} \) is the shear load that is transmitted through the roof diaphragm to each eave wall. Normalize the load to a per foot basis.

\[ v_{\text{f\_eavewall}} := \frac{V_{\text{eave\_shear}}}{L_{\text{bldg}} - W_{\text{eave\_openings}}} \]

\[ v_{\text{f\_eavewall}} = 58 \text{ plf} \]

Front eave shear load

\[ v_{\text{r\_eavewall}} := \frac{V_{\text{eave\_shear}}}{L_{\text{bldg}} - W_{\text{r\_eave\_openings}}} \]

\[ v_{\text{r\_eavewall}} = 78 \text{ plf} \]

Rear eave shear load

The eave wall diaphragms can resist the shear loads as follows:

\[ v_{\text{f\_eavewall}} \leq 142 \text{ plf} \]

Use 29 gauge metal sheathing. Install per the Typical Panel detail as shown on the engineered drawing package.
EMBEDMENT FOR MAIN POST:
Calculate the minimum required post embedment depth for lateral loading for the main posts.

Post_is = "not constrained by a concrete slab"

\[ V_s = 773 \text{ lb} \quad \text{Lateral shear load at the ground line} \]

\[ M_s = 1967 \text{ lb-ft} \quad \text{Moment at the ground line} \]

\[ d_{la,footing} = 2.17 \text{ ft} \quad \text{Main post footing diameter} \]

\[ S_{soil} = 100 \text{ psf} \quad \text{Lateral capacity of soil} \]

Trial depth = 1.5 ft - The starting depth of the post hole depth. The final post hole depth is determined by iterating to a final depth.

\[ d_{depth,post} = 2.6 \text{ ft} \quad \text{This is the minimum required post embedment depth for lateral loading} \]

Gable wall uplift due to shear loading on gable wall shear panel:
Calculate uplift pullout of the gable wall posts due to shear loads on the gable walls.

\[ V_{eave\_wind} = 3039 \text{ lb} \quad \text{Calculated from above} \]

\[ C_{post} = \frac{V_{eave\_wind \cdot H_{bldg}}}{W_{bldg} - W_{gableopenings}} \quad C_{post} = 3039 \text{ lb} \quad \text{This is the uplift load on one gable wall post} \]

Assume a dead load weight of roof and wall area to be 2.0 psf. The area of the roof and wall that will tend to keep the gable wall post in the ground will be as follows:

\[ R_{roof} := \frac{B_{wy}}{2} \cdot W_{bldg} \cdot 2\text{psf} \quad R_{roof} = 400 \text{ lb} \quad \text{Dead load of roof} \]

\[ G_{gable\_wall} := \left[ H_{bldg} \left( W_{bldg} - W_{gableopenings} \right) + \left( H_{roof} \cdot \frac{W_{bldg}}{2} \right) + \left( H_{bldg} \cdot \frac{2 \cdot B_{wy}}{2} \right) \right] \cdot 2\text{psf} \]

\[ G_{gable\_wall} = 939 \text{ lb} \quad \text{Dead load of gable wall} \]

\[ P_{outs} := \left( H_{bldg} + d_{depth\_gable\_footing} \right) \cdot W_{post} \]

\[ d_{depth\_gable\_footing} = 4.0 \text{ ft} \quad \text{gable post embedment depth} \]

\[ P_{outs} = 157 \text{ lb} \quad \text{Weight of post} \]

\[ d_{la\_gable\_footing} = 1.5 \text{ ft} \quad \text{Diameter of gable wall posthole footing} \]

Concrete backfill in the gable end posts is = *required* to resist gable wall panel uplift.

\[ \text{Backfill} = 910 \text{ lb} \quad \text{Gable post backfill weight if gable end post hole is backfilled with concrete (0 if granular or native soil backfill. Concrete backfill may or may not be required to resist gable wall panel uplift).} \]

\[ W_{tot} := G_{gable\_wall} + R_{roof} + P_{outs} + \text{Backfill} + P_{skinGU} \]

\[ W_{tot} = 3290 \text{ lb} \quad \text{Total resistance for gable wall panel uplift. Since } W_{tot} \text{ is greater than the gable wall panel uplift, } C_{post}, \text{ the gable wall footing is adequate.} \]
FOOTING DESIGN FOR MAIN POST: (With Shed Loads)
Determine the footing size and depth for vertical bearing for the main posts.

\[ q_{	ext{soil}} = 1500 \text{ psf} \quad \text{Soil bearing capacity for footing} \]

\[ d_{b, \text{footing}} = 2.2 \text{ ft} \quad \text{Footing diameter} \]

\[ A_{\text{footing}} = \pi \left( \frac{d_{b, \text{footing}}}{4} \right)^2 \quad A_{\text{footing}} = 3.69 \text{ ft}^2 \quad \text{Footing area} \]

\[ P_{\text{cat depth}} = 4.0 \text{ ft} \quad \text{Minimum required post embedment depth} \]

\[ P_{\text{footing}} = A_{\text{footing}} \cdot q_{\text{soil}} \cdot d_{b, \text{footing}} \quad P_{\text{footing}} = 9402 \text{ lb} \quad \text{End bearing capacity of footing} \]

\[ P_{\text{snow}} = 8840 \text{ lb} \quad \text{Total footing load} \]

Note that the end bearing capacity \( P_{\text{footing}} \) is greater than the snow load \( P_{\text{snow}} \). This is OK.
GIRT DESIGN:
The girts will simple span between posts and loaded horizontally for wind. Calculate bending stress due to wind loading and determine the adequacy of the girts.

\[ q_{\text{web}} = 3.06 \text{ pli} \quad L_{\text{girt span}} = 114 \text{-in} \quad \text{Orientation} = \text{"Commercial"} \]

\[ M_{\text{girt}} := \frac{q_{\text{web}} L_{\text{girt span}}^2}{8} \quad \text{Bending moment in the girt} \]

\[ f_{\text{girt}} := \frac{M_{\text{girt}}}{S_{\text{girt}}} \quad f_{\text{girt}} = 657 \text{-psi} \quad \text{Stress applied to the girt} \]

Determine the allowable member stress including load factors.

\[ F_{b\text{girt}} = 1650 \text{-psi} \quad C_{\text{Dwind}} = 1.60 \quad C_{\text{Mgirt}} = 1.00 \quad C_{\text{tgirt}} = 1.00 \quad C_{\text{Lgirt}} = 0.99 \]

\[ C_{\text{fgirt}} = 1.00 \quad C_{\text{fgirt}} = 1.00 \quad C_{\text{rgirt}} = 1.15 \]

\[ F_{b\text{girt}} := F_{b\text{girt}} \cdot C_{\text{Dwind}} \cdot C_{\text{Mgirt}} \cdot C_{\text{tgirt}} \cdot C_{\text{Lgirt}} \cdot C_{\text{fgirt}} \cdot C_{\text{fgirt}} \cdot C_{\text{rgirt}} \quad F_{b\text{girt}} = 2999 \text{-psi} > f_{\text{girt}} \quad \text{This is OK.} \]

PURLIN DESIGN: (Worst Case)
The purlins simply span between pairs of trusses or rafters. Determine the adequacy of the purlins.

Purlin = "2x6" \quad \text{Purlin spacing} = 24 \text{-in o.c.}

\[ L_{\text{purlin span}} = 111 \text{-in} \]

\[ w_{\text{purlin}} = 5.34 \text{-pli} \quad \text{Maximum combined distributed roof load along top edge of purlin} \]

\[ M_{\text{purlin}} := \frac{w_{\text{purlin}} L_{\text{purlin span}}^2}{8} \quad M_{\text{purlin}} = 8218 \text{-in-lb} \quad \text{Bending moment in the purlin} \]

\[ f_{\text{purlin}} := \frac{M_{\text{purlin}}}{S_{\text{purlin}}} \quad f_{\text{purlin}} = 1087 \text{-psi} \quad \text{Bending stress applied to the purlin} \]

Determine the allowable member stress including load factors

\[ F_{b\text{purlin}} = 1650 \text{-psi} \quad C_{\text{Dsnow}} = 1.15 \quad C_{\text{Mpurlin}} = 1.00 \quad C_{\text{tpurlin}} = 1.00 \quad C_{\text{Lpurlin}} = 1.00 \]

\[ C_{\text{fpurlin}} = 1.00 \quad C_{\text{fpurlin}} = 1.00 \quad C_{\text{rpurlin}} = 1.15 \]

\[ F_{b\text{purlin}} := F_{b\text{purlin}} \cdot C_{\text{Dsnow}} \cdot C_{\text{Mpurlin}} \cdot C_{\text{tpurlin}} \cdot C_{\text{Lpurlin}} \cdot C_{\text{fpurlin}} \cdot C_{\text{fpurlin}} \cdot C_{\text{rpurlin}} \quad F_{b\text{purlin}} = 2182 \text{-psi} > f_{\text{purlin}} \quad \text{This is OK} \]
MAIN POST CORBEL BLOCK DESIGN:
Determine the required number and size of bolts required in the main post corbel block.

Allowable fastener shear capacities

\[ z_{\text{Bolt}, 5/8} = 1590 \text{ lb} \quad \text{Shear capacity for 5/8" dia. bolts} \]
\[ z_{\text{Bolt}, 3/4} = 2190 \text{ lb} \quad \text{Shear capacity for 3/4" dia. bolts} \]
\[ z_{\text{Bolt}, 1} = 3600 \text{ lb} \quad \text{Shear capacity for 1" dia. bolts} \]
\[ z_{\text{Nail}, 16d} = 122 \text{ lb} \quad \text{Shear capacity for 16d nails} \]
\[ z_{\text{Nail}, 20d} = 147 \text{ lb} \quad \text{Shear capacity for 20d nails} \]

\[ P_{\text{Corbel}} = 6800 \text{ lb} \quad \text{Combined snow, or live roof, and dead loads on corbels} \]

If 5/8 dia. bolts are used:

\[ N_{\text{bolts58}} = 3.7 \quad \text{Number of 5/8" dia. bolts required in the corbel block, if used.} \]

If 3/4 dia. bolts are used:

\[ N_{\text{bolts34}} = 2.7 \quad \text{Number of 3/4" dia. bolts required in the corbel block, if used.} \]

If 1 dia. bolts are used:

\[ N_{\text{bolts10}} = 1.6 \quad \text{Number of 1" dia. bolts required in the corbel block, if used.} \]

If 20d nails are to be used:

\[ N_{\text{Nail20d}} = 20.1 \quad \text{Number of 20d nails required in each corbel block, if used.} \]

If 16d nails are to be used:

\[ N_{\text{Nail16d}} = 24.2 \quad \text{Number of 16d nails required in each corbel block, if used.} \]
SHED RAFTER DESIGN:
Determine the required section for intermediate building or shed rafters. The rafters will simple span between posts. It will be assumed that both ends are pinned.

\[
\text{Rafter\_style := Double} \quad \text{S_{rafter} := 2x12} \quad \text{Rafter\_grade := Sel-Struct}
\]

\[
\text{Rafter\_species := Doug-Fir} \quad \text{L_{rafter\_span} = 138.0\,in}
\]

\[
\text{w_{rafter} = 27.5\,pli} \quad \text{Maximum combined distributed roof load along top edge of rafter}
\]

\[
M_{rafter} := \frac{w_{rafter} L_{rafter\_span}^2}{8} \quad M_{rafter} = 65464\,\text{in}\cdot\text{lb} \quad \text{Bending moment in the rafter}
\]

\[
\text{f_{rafter} :=} \frac{M_{rafter}}{S_{rafter} \cdot Rafter\_gty} \quad f_{rafter} = 1034\,\text{psi} \quad \text{Bending stress applied to the rafter}
\]

Determine the allowable member stress including load factors

\[
F_{brafter} = 1500\,\text{psi} \quad C_{D\text{onew}} = 1.15 \quad C_{M\text{bbrafter}} = 1.00 \quad C_{rafter} = 1.00 \quad C_{Lrafter} = 0.95
\]

\[
C_{Prafter} = 1.00 \quad C_{Furafter} = 1.00 \quad C_{rerafter} = 1.00
\]

\[
F_{brafter} := F_{brafter} C_{D\text{onew}} C_{M\text{bbrafter}} C_{rafter} C_{Lrafter} C_{Prafter} C_{Furafter} C_{rerafter}
\]

\[
F_{brafter} = 1646\,\text{psi} \quad > f_{brafter} \quad \text{This is OK}
\]
RAFTER CORBEL BLOCK DESIGN:
Determine the required number and size of bolts required in the rafter corbel block.

Allowable fastener shear capacities

\[ z_{\text{b bolt 5/8}} = 1590 \text{ lb} \quad \text{Shear capacity for 5/8" dia. bolts} \]
\[ z_{\text{b bolt 3/4}} = 2190 \text{ lb} \quad \text{Shear capacity for 3/4" dia. bolts} \]
\[ z_{\text{b bolt 1"}} = 3600 \text{ lb} \quad \text{Shear capacity for 1" dia. bolts} \]
\[ z_{\text{R nail 16d}} = 122 \text{ lb} \quad \text{Shear capacity for 16d nails} \]
\[ z_{\text{R nail 20d}} = 147 \text{ lb} \quad \text{Shear capacity for 20d nails} \]

\[ P_{\text{snow eve}} = 2040 \text{ lb} \quad \text{Combined snow, or live roof, and dead loads on eave corbels} \]
\[ P_{\text{snow int}} = 2040 \text{ lb} \quad \text{Combined snow, or live roof, and dead loads on interior corbels} \]

If 5/8 dia. bolts are used:
\[ N_{\text{bolts 5/8 eve}} = 1.1 \quad \text{Number of 5/8" dia. bolts required in the rafter corbel block at the eave} \]
\[ N_{\text{bolts 5/8 int}} = 1.1 \quad \text{Number of 5/8" dia. bolts required in the rafter corbel block at the interior post} \]

If 3/4 dia. bolts are used:
\[ N_{\text{bolts 3/4 eve}} = 0.8 \quad \text{Number of 3/4" dia. bolts required in the rafter corbel block at the eave} \]
\[ N_{\text{bolts 3/4 int}} = 0.8 \quad \text{Number of 3/4" dia. bolts required in the rafter corbel block at the interior post} \]

If 1 dia. bolts are used:
\[ N_{\text{bolts 10 eve}} = 0.5 \quad \text{Number of 1" dia. bolts required in the rafter corbel block at the eave} \]
\[ N_{\text{bolts 10 int}} = 0.5 \quad \text{Number of 1" dia. bolts required in the rafter corbel block at the interior post} \]

If 20d nails are to be used:
\[ N_{\text{nail 20d eve}} = 6.0 \quad \text{Number of 20d nails required in each corbel block at the eave} \]
\[ N_{\text{nail 20d int}} = 6.0 \quad \text{Number of 20d nails required in each corbel block at the interior post} \]

If 16d nails are to be used:
\[ N_{\text{nail 16d eve}} = 7.3 \quad \text{Number of 16d nails required in each corbel block at the eave} \]
\[ N_{\text{nail 16d int}} = 7.3 \quad \text{Number of 16d nails required in each corbel block at the interior post} \]
FOOTING DESIGN FOR SHED EAVE POST:

Determine the footing size and depth for vertical bearing for the shed posts.

\[ q_{\text{soil}} = 1500 \text{ psf} \quad \text{Soil bearing capacity for footing} \]
\[ d_{\text{be_footing SE}} = 1.7 \text{ ft} \quad \text{Footing diameter} \]

\[ A_{\text{footing SE}} = \pi \left( \frac{d_{\text{be_footing SE}}^2}{4} \right) \]
\[ A_{\text{footing SE}} = 2.18 \text{ ft}^2 \quad \text{Footing area} \]

\[ P_{\text{ext_depth SE}} = 3.5 \text{ ft} \quad \text{Minimum required post embedment depth} \]

\[ P_{\text{footing SE}} := A_{\text{footing SE}} \cdot q_{\text{soil}} \cdot d_{\text{factor SE}} \quad P_{\text{footing SE}} = 4909 \text{ lb} \quad \text{End bearing capacity of footing} \]

\[ P_{\text{snow_eave}} = 2040 \text{ lb} \quad \text{Total footing load} \]

Note that the end bearing capacity \( P_{\text{footing SE}} \) is greater than the snow load \( P_{\text{snow_eave}} \). This is OK.

Check uplift on shed eave post:

\[ P_{\text{ul SE}} := \left( \frac{W_{\text{shed}}}{2} + O_{\text{verhang}} \right) \cdot B_{\text{eave}} \cdot q_{\text{ul}} \quad P_{\text{ul SE}} = 978 \text{ lb} \quad \text{This is the uplift on one shed eave post} \]

Assume a total weight of roof and wall area to be 2.0 psf. The area of the roof and wall that will tend to keep the truss post in the ground will be as follows:

\[ W_{\text{post_hole SE}} := 150.0 \text{pcf} \cdot P_{\text{ext_depth SE}} \cdot \left( A_{\text{footing SE}} - A_{60} \right) \quad W_{\text{post_hole SE}} = 1014 \text{ lb} \quad \text{Weight of concrete in post hole} \]

\[ W_{\text{ul SE}} := \left[ \left( \frac{W_{\text{shed}}}{2} + O_{\text{verhang}} \right) + H_{\text{shed}} \right] \cdot B_{\text{eave}} \cdot 2 \cdot \text{psf} + W_{\text{post_hole SE}} \quad W_{\text{ul SE}} = 1354 \text{ lb} \quad \text{Total uplift resistance} \]

Note that the total uplift resistance \( W_{\text{ul SE}} \) is greater than the uplift load \( P_{\text{ul SE}} \). This is OK.
SUMMARY OF RESULTS:

Building Dimensions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tr>
<td>W&lt;sub&gt;bdg&lt;/sub&gt;</td>
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<td>L&lt;sub&gt;bdg&lt;/sub&gt;</td>
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<td>H&lt;sub&gt;bdg&lt;/sub&gt;</td>
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<tr>
<td>Overhang</td>
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Building Design Loads

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<td>Ground_snow_load</td>
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<tr>
<td>Roof_dead_load</td>
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Post Details

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Shear Wall Details:

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Girt Details:

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Purlin Details:

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Corbel Block Bolts:

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SPECIAL NOTE:
The drawings attendant to this calculation shall not be modified by the builder unless authorized in writing by the engineer. No special inspections are required. No structural observation by the design engineer is required.