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

44 1/2 C/L POST FOR MANDOORS

Administrative Permit

Washoe County Code (WCC) Chapter 110, Article 808, Administrative Permit, provides methods for reviewing proposed uses which possess characteristics that require special appraisal in order to determine if the uses have the potential to adversely affect other land uses, transportation, or facilities in the vicinity. The Board of County Commissioners, 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 specify the terms under which commencement and operation of the use must comply. See WCC 110.808, for further information.

Development Application Submittal Requirements

1. **Fees:** See Master Fee Schedule. **Bring payment with your application to Community Services Department (CSD). Make check payable to Washoe County. (Note: All fees are waived for Administrative Permits for "temporary occupancy for the care of the infirm" [see Washoe County Code Section 110.310.35(g)]; however, the Administrative Permit Application process is still required.)**
2. **Development Application:** A completed Washoe County Development Application form.
3. **Owner Affidavit:** The Owner Affidavit must be signed and notarized by all owners of the property subject to the application request.
4. **Proof of Property Tax Payment:** The applicant must provide a written statement from the Washoe County Treasurer's Office indicating all property taxes for the current quarter of the fiscal year on the land have been paid.
5. **Application Materials:** The completed Administrative Permit Application materials. (Some Administrative Permits, due to the minor impact of the application, will not require some of the requirements. You are encouraged to meet with a planner to determine the applicability of individual requirements.)
6. **Site Plan Specifications:**
   a. Lot size with dimensions drawn using standard engineering scales (e.g. scale 1" = 100', 1" = 200', or 1" = 500') showing all streets and ingress/egress to the property.
   b. Show the location and configuration of all existing and proposed buildings (with distances from the property lines and from each other), all existing buildings that will remain (with distances from the property lines and from each other), all existing buildings that will be removed, and site improvements on a base map with existing and proposed topography expressed in intervals of no more than five (5) feet.
   c. Show the location and configuration of wells, septic systems and leach fields, overhead utilities, water and sewer lines, and all existing and proposed easements.
   d. Show locations of parking, landscaping, signage and lighting.
   e. The cross sections of all existing and proposed rights-of-way, streets, alleys or private access ways within the proposed development, proposed name and approximate grade of each, and approximate radius of all curves and diameter of each cul-de-sac.
   f. Property boundary lines, distances and bearings.
   g. Contours at five (5) foot intervals or two (2) foot intervals where, in the opinion of the County Engineer, topography is a major factor in the development.
   h. Indication of prominent landmarks, rock outcroppings, and natural foliage which will be deciding considerations in the design of the development.
   i. If any portion of the land within the boundary of the development is subject to inundation or storm water overflow, as shown on the adopted Federal Emergency Management Agency's Flood Boundary and Floodway Maps, that fact and the land so affected shall be clearly shown on the

map by a prominent note on each sheet, as well as width and direction of flow of each water course within the boundaries of the development.

j. Vicinity map showing the proposed development in relation to Interstate 80, Highway 395, I-580, or a major arterial. The vicinity map shall also include a north arrow.

k. Date, scale, and number of each sheet in relation to the total number of sheets, and the name of the person preparing the plans.

l. Location of snow storage areas sufficient to handle snow removed from public and private street, if above 5,500 feet.

m. All known areas of potential hazard (and the basis for delineation) shall be clearly designated on the map. Additionally, active fault lines (post-Holocene) shall be delineated on the map.

n. Location of areas with slopes greater than fifteen percent (15%) and thirty percent (30%).

o. Boundary of any wetland areas and/or floodplains within the project site.

p. Note by the project engineer or design professional indicating compliance with all applicable provisions of the Washoe County Development Code.

q. Significant Hydrological Resources. Indicate the critical and sensitive buffer zones according to Article 418 of the Washoe County Development Code.

7. **Additional Site Plan Specifications for Grading:**

a. Location and limits of all work to be done.

b. Existing contours and proposed contours.

c. Location of any structures on adjacent parcels that are within fifteen (15) feet of the work site's parcel boundary.

d. Existing draining (natural and man-made) and proposed drainage patterns.

e. Sufficient elevation data to show the drainage will work as proposed.

f. Quantities of excavation, fill, and disturbed surface area shall be calculated and shown on the site plan. **Areas under buildings and pavement need not be included in these calculations.**

g. Quantities of material proposed to be removed from the site must be shown. The proposed disposal area and the disposition of fill must be noted on the plan.

h. Limiting dimensions of cut and fill.

i. Proposed BMPs (Best Management Practices) for controlling water and wind erosion if a disturbed area is left undeveloped for more than thirty (30) days.

j. Cut and fill slopes setback from the property boundary.

k. Structure setbacks from a slope.

8. **Traffic Impact Report:** Traffic impact reports are required whenever the proposed development project will generate 80 or more weekday peak hour trips as determined using the latest edition Institute of Transportation Engineers (ITE) trip generation rates or other such sources as may be accepted by the Engineering and Capital Projects. Projects with less than 200 peak hour trips may not need to perform an impact analysis for future years. Traffic consultants are encouraged to contact Engineering and Capital Projects staff prior to preparing a traffic impact report.

9. **Floor Plan Specifications:**

a. If the project involves the use or construction of a building, include floor plans of the building(s).

b. If the project involves the construction of an addition to a building or expansion of previously constructed structures, include floor plans of the existing and proposed construction.

10. **Landscaping:** Landscaping plans may be required. If required, a landscape plan must include: a soils evaluation; color and type of building material, such as fencing material; type of plant material; location of plant material and proposed maintenance schedule; size of plant material at planting and size of plant material at full maturation; type and amount of mulch material; and an irrigation plan.

a. **Planting Plan Specifications.** The planting plan must include all necessary information to satisfy Washoe County Code Section 110.412.60 Planting Standards.

- Location, spacing, size, and genus and/or species of proposed plantings, and identification of existing plants.
- Existing vegetation, natural features, and site improvements on adjoining properties within ten (10) feet of the property line.
- Plant list which includes the following: quantity of proposed plants; existing plants to remain; number of proposed trees; number of existing trees to be preserved; amount of paved area; and the amount of turf.

b. **Irrigation Plan Specifications.** The irrigation plan must include all necessary information to satisfy Washoe County Code Section 110.412.65 Irrigation Standards.

- Location, size, and specifications of water source(s), water mains, meter(s), valves, and the controller.
- Temporary or permanent water irrigation systems.
- Specifications of irrigation equipment identified by manufacturer's name and equipment identification number.
- An approved backflow prevention device is required on all landscape irrigation systems.

11. **Signage Plan:** Show the location and configuration of all proposed signage including sign dimensions, sign materials, and methods and intensity of lighting.
12. **Lighting Plan:** Show the location and configuration of all proposed exterior lighting including a detail of the parking lot light fixtures, pole heights, security lighting, and wall mounted illumination fixtures. Parking lot areas shall be depicted showing lumen isolines demonstrating compliance with the provisions of the Washoe County Development Code.
13. **Building Elevations:** All buildings and structures including fences, walls, poles and monument signs proposed for construction within the project shall be clearly depicted in vertical architectural drawings provided in accurate architectural scale. All architectural elevations from all building faces shall be presented.
14. **Packets:** Three (3) packets and flash drive or DVD- any digital documents need to have a resolution of 300 dpi. One (1) packet must be labeled "Original" and contain a signed and notarized Owner Affidavit. Each packet shall include one (1) 8.5" x 11" reduction of any applicable site plan, development plan, and/or application map. These materials must be readable. Labeling on these reproductions should be no smaller than 8 point on the 8½ x 11" display. Large format sheets should be included in a slide pocket(s). Any specialized reports identified above shall be included as attachments or appendices and be annotated as such.

Notes:

(i) Application and map submittals must comply with all specific criteria as established in the Washoe County Development Code and/or the Nevada Revised Statutes.

(ii) Appropriate map engineering and building architectural scales are subject to the approval of Planning and Building and/or Engineering and Capital Projects.

(iii) All oversized maps and plans must be folded to a 9" x 12" size.

(iv) Based on the specific nature of the development request, Washoe County reserves the right to specify additional submittal packets, additional information and/or specialized studies to clarify the potential impacts and potential conditions of development to minimize or mitigate impacts resulting from the project. No application shall be processed until the information necessary to review and evaluate the proposed project is deemed complete by the Director of Planning and Building.

(v) **Labels:** If there is a mobile home park within five hundred (500) feet of the proposed project, the applicant is required to submit three (3) sets of mailing labels for every tenant residing in the mobile home park.

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.

Project Information	**Staff Assigned Case No.:**
Project Name: AG STORAGE BUILDING	
Project Description: 40'X50' POLE BARN / BUILDING	
Project Address: 16400 N RED ROCK RD RENO NV 89508	
Project Area (acres or square feet): 2000 SQ FT	
Project Location (with point of reference to major cross streets **AND** area locator): SOUTH WEST SECTION OF PARCEL # 078-212-02 WHICH IS LOCATED JUST EAST OFF OF N RED ROCK RD PARCEL IS DIRECTLY OFF RED ROCK RD,	

Assessor's Parcel No.(s):	Parcel Acreage:	Assessor's Parcel No.(s):	Parcel Acreage:
078-212-02	11,98		

Indicate any previous Washoe County approvals associated with this application:
Case No.(s).

Applicant Information (attach additional sheets if necessary)

Property Owner:	**Professional Consultant:**
Name: MATT & ANGIE BUSSELL	Name: TOM HOYLE
Address: 16400 N RED ROCK RD	Address: 2336 JACOBSEN LANE
RENO NV Zip: 89508	GARDNERVILLE NV Zip: 89410
Phone: 530-260-1468 Fax:	Phone: 775 782 5022 Fax: 775 782-6420
Email: UNLIMITEDMOTO @ GMAIL.COM	Email:
Cell: 530-260-1468 Other: 775 722-1885	Cell: 775 781 1245 Other:
Contact Person: MATT BUSSELL	Contact Person:
Applicant/Developer:	**Other Persons to be Contacted:**
Name: MATT & ANGIE BUSSELL	Name:
Address: 16400 N RED ROCK RD	Address:
RENO NV Zip: 89508	Zip:
Phone: 530-260-1468 Fax:	Phone: Fax:
Email: UNLIMITEDMOTO@GMAIL.COM	Email:
Cell: 530-260-1468 Other: 775 722 1885	Cell: Other:
Contact Person: MATT BUSSELL	Contact Person:

For Office Use Only

Date Received: Initial:	Planning Area:
County Commission District:	Master Plan Designation(s):
CAB(s):	Regulatory Zoning(s):

Property Owner Affidavit

Applicant Name: MATT BUSSELL

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)

I, MATT BUSSELL,
(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

Printed Name MATT BUSSELL

Signed _____ 10 JANUARY 2019

Address 16400 N RED ROCK RD

RENO NV 89508

Subscribed and sworn to before me this _____ day of _____, _____.

See Attached
Notary Public in and for said county and state

(Notary Stamp)

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

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, 20 19, by Matthew Bussell,
proved to me on the basis of satisfactory evidence to be the person(s) who appeared before me.

KATIE O'SULLIVAN
Notary Public – California
Lassen County
Commission # 2193936
My Comm. Expires May 24, 2021

(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).

Property Owner Affidavit

Applicant Name: Angelique Callegari

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)

I, Angelique Renee Callegari,
(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

Printed Name Angelique Callegari

Signed

Address 16400 N. Red Rock Rd
Reno, NV 89508

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

Notary Public in and for said county and state

My commission expires: 6/8/20

(Notary Stamp)

AMBER WELCH
Notary Public - State of Nevada
Appointment Recorded in Washoe County
No: 04-91512-2 - Expires June 8, 2020

*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, Ext. Color will be 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 RESOLOUTION CONSTRUCTION METHODS TO REDUCE ENVIORNMENTAL IMPACTS
EXTERIOR COLOR WILL BE SIMILAR EXISTING HOMES BUILDINGS 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

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 #	NONE	acre-feet per year	NONE
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.)

N/A

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 N/A	☐ No N/A

9. Community Services (provided and nearest facility):

a. Fire Station	
b. Health Care Facility	
c. Elementary School	
d. Middle School	N/A
e. High School	
f. Parks	
g. Library	
h. Citifare Bus Stop	

Washoe County Treasurer
P.O. Box 30039, Reno, NV 89520-3039
ph: (775) 328-2510 fax: (775) 328-2500
Email: tax@washoecounty.us

Washoe County Treasurer
Tammi Davis

Bill Detail

Back to Account Detail | Change of Address | Print this Page

Washoe County Parcel Information

Parcel ID	Status	Last Update
07821202	Active	1/3/2019 2:06:48 AM

Current Owner:
BUSSELL, MATTHEW
16400 N RED ROCK RD
RENO, NV 89508

SITUS:
16400 N RED ROCK RD
WCTY NV

Taxing District
9000

Geo CD:

Legal Description
Section 9 Lot 178 Block Range 18 SubdivisionName _UNSPECIFIED Township 23

Installments

Period	Due Date	Tax Year	Tax	Penalty/Fee	Interest	Total Due
INST 1	8/20/2018	2018	$0.00	$0.00	$0.00	$0.00
INST 2	10/1/2018	2018	$0.00	$0.00	$0.00	$0.00
INST 3	1/7/2019	2018	$0.00	$0.00	$0.00	$0.00
INST 4	3/4/2019	2018	$393.67	$0.00	$0.00	$393.67
		Total Due:	**$393.67**	**$0.00**	**$0.00**	**$393.67**

Tax Detail

	Gross Tax	Credit	Net Tax
State of Nevada	$108.14	($9.00)	$99.14
Washoe County	$885.31	($73.72)	$811.59
Washoe County Sc	$724.25	($60.30)	$663.95
Total Tax	**$1,717.70**	**($143.02)**	**$1,574.68**

Payment History

Tax Year	Bill Number	Receipt Number	Amount Paid	Last Paid
2018	2018072879	B18.119995	$393.67	10/3/2018
2018	2018072879	B18.1587	$393.67	7/17/2018
2018	2018072879	B18.170252	$393.67	12/31/2018

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).

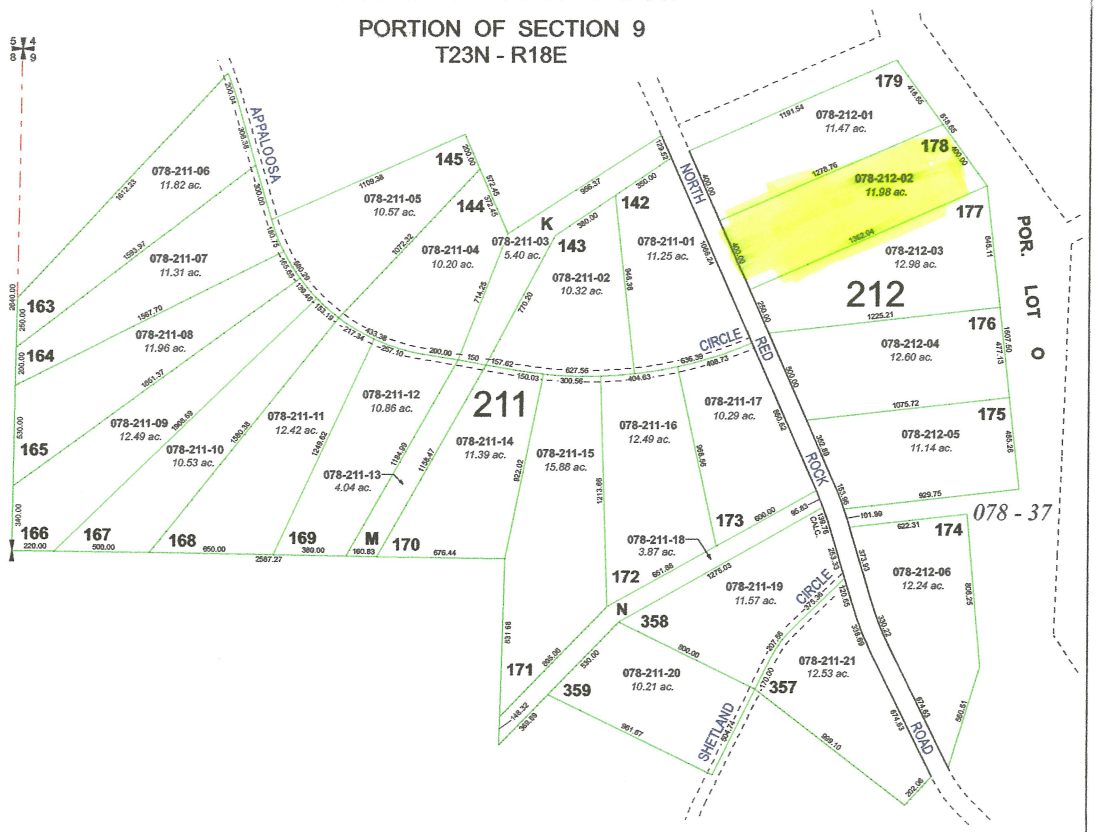
To submit your address change online click here

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

RECORD OF SURVEY # 687

PORTION OF SECTION 9
T23N - R18E



Assessor's Map Number
078-21

STATE OF NEVADA
WASHOE COUNTY
ASSESSOR'S OFFICE
Joshua G. Wilson, Assessor
1001 East Ninth Street
Building D
Reno, Nevada 89512
(775) 328-2231

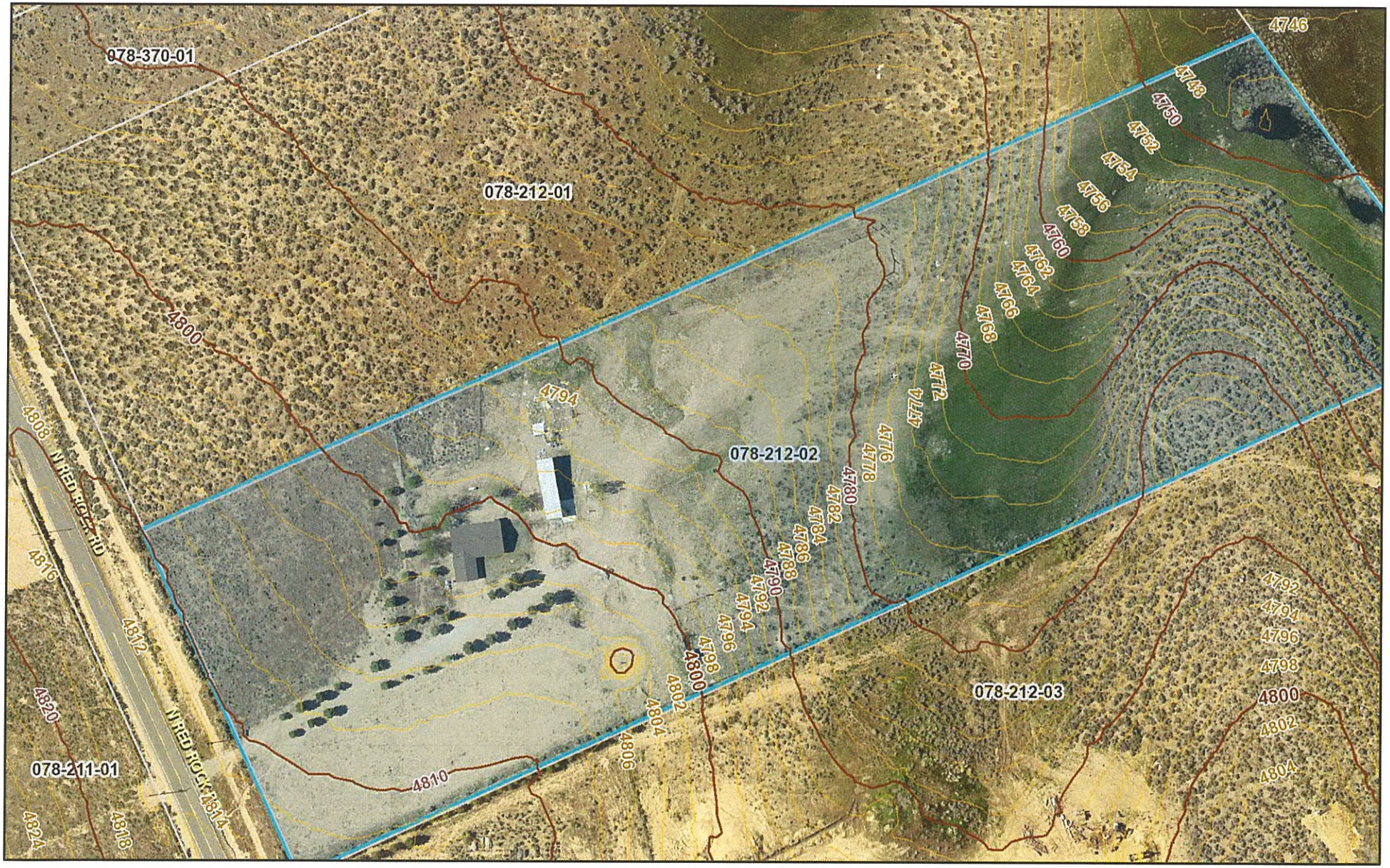
Feet
0 100 200 300 400 500
1 inch = 500 feet

created by: TWT 4/5/2011
last updated:
area previously shown on map(s)

NOTE: This map was prepared for the use of the Washoe County Assessor for assessment and illustrative purposes only. It does not represent a survey of the premises. No liability is assumed as to the sufficiency or accuracy of the data delineated hereon.

PARCEL # 078-212-02 11.98 Acres

16400 N RED ROCK RD
RENO NV 89508
MATT & ANGIE BUSSELL
530-260-1468



December 31, 2018

polygonLayer

- Override 1
- Reno Exerted SOI
- Reno SOI
- Reno City Boundary
- ___r___Reno City Boundary

APN

1:2,257

0 105 210 420 ft

0 30 60 120 m

Washoe County
Washoe County GIS

AG STORAGE BUILDING

BUILDING PAD DESC PAGE 1 OF 1

PARCEL # 078-212-02

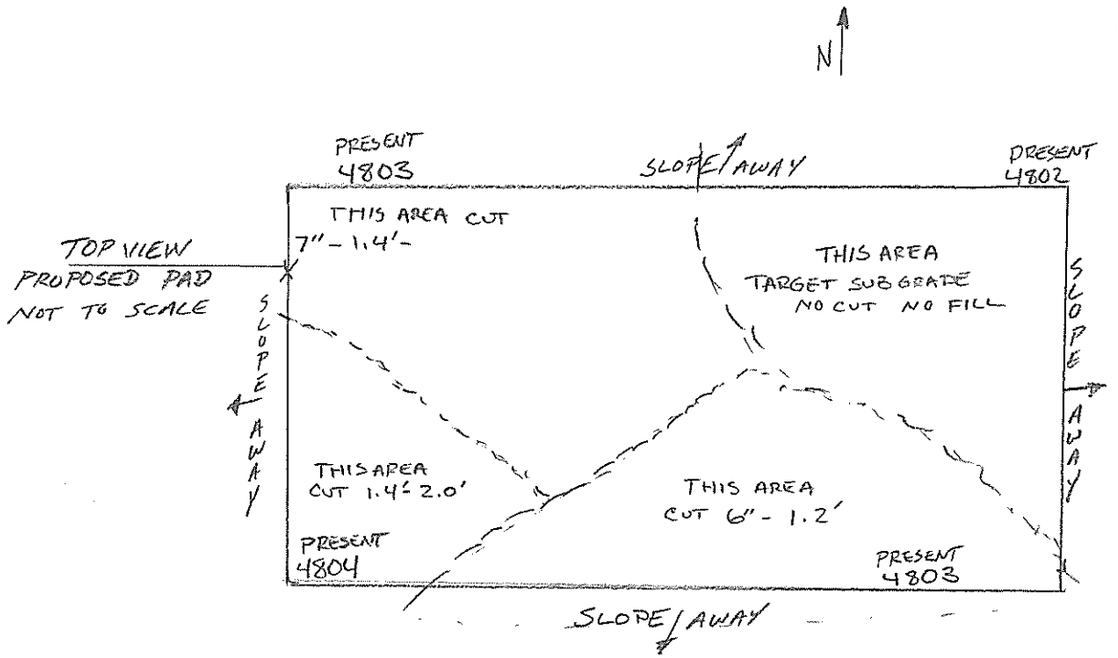
16400 N RED ROCK RD
RENO NV 89508

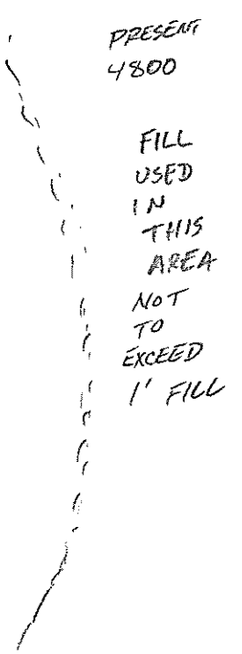
11.98 ACRES PARCEL

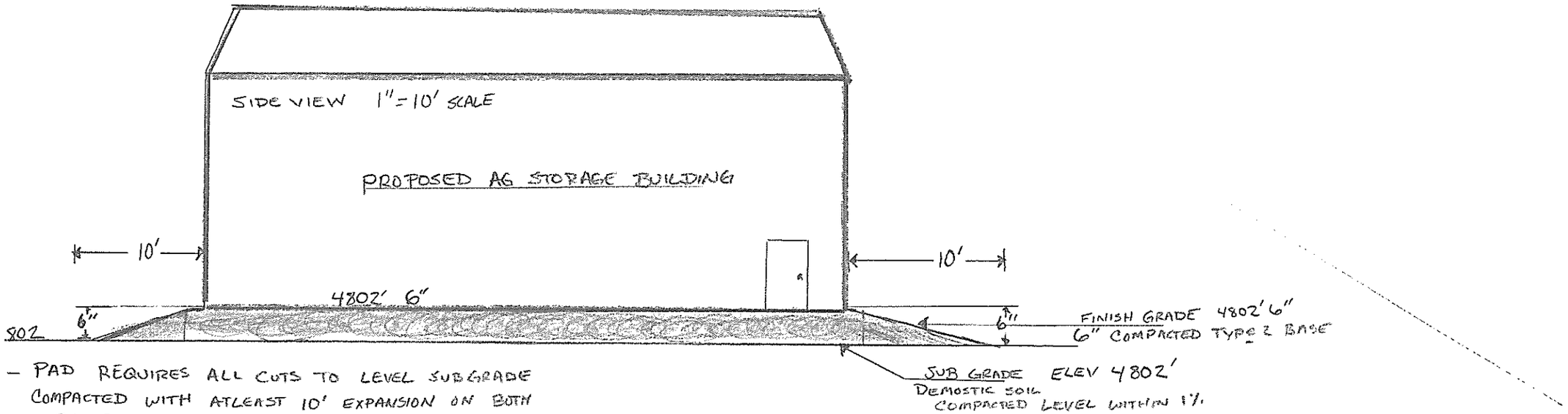
MATT & ANGIE BUSSELL
530-260-1468

DRAWN BY MATT BUSSELL

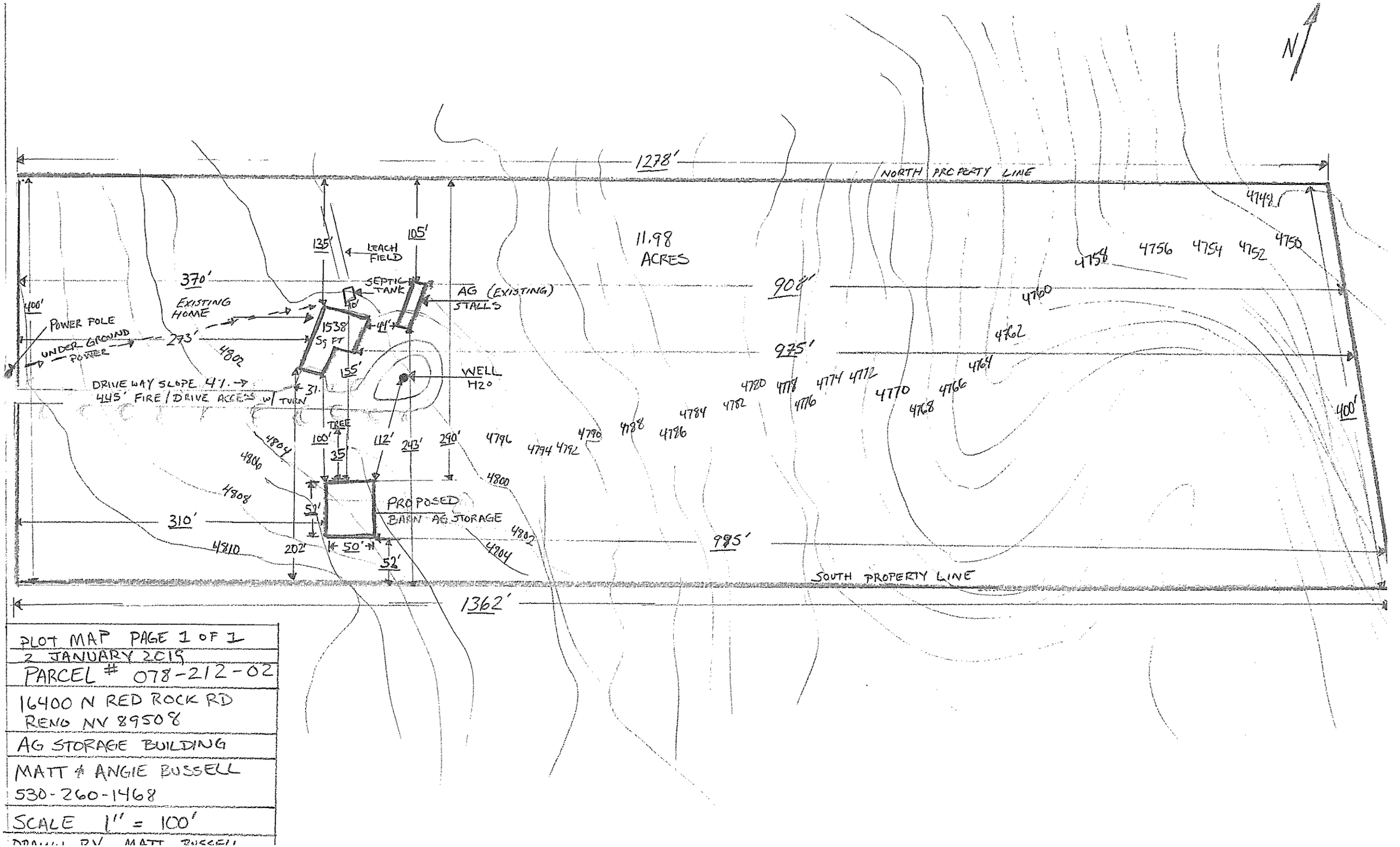
DATE 9 JANUARY 2019







- PAD REQUIRES ALL CUTS TO LEVEL SUBGRADE COMPACTED WITH ATLEAST 10' EXPANSION ON BOTH ENDS, BOTH SIDES,
- BUILDING STRUCTURE ON CUT ONLY NO FILL MATERIAL
- FILL FROM CUT WILL BE USED GREATER THAN 10' EAST OF BUILDING TO REDUCE SLOPE DUE TO EXISTING TOPO
- FILL WILL BE COMPACTED ALTHOUGH NOT IMPROVED UPON WITH STRUCTURE



PLOT MAP PAGE 1 OF 1

2 JANUARY 2019

PARCEL # 078-212-02

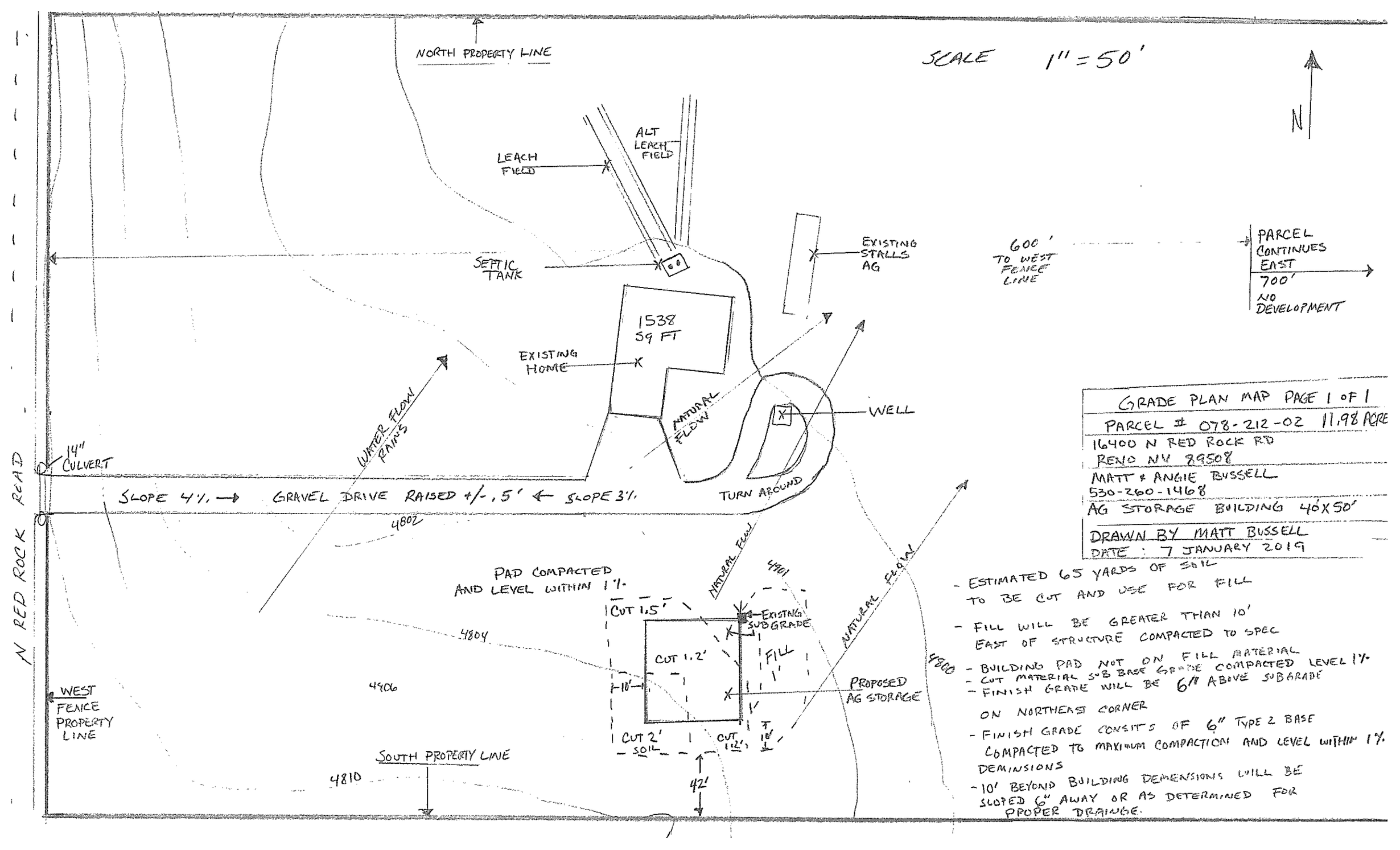
16400 N RED ROCK RD
RENO NV 89508

AG STORAGE BUILDING

MATT & ANGIE BUSSELL
530-260-1468

SCALE 1" = 100'

DRAWN BY MATT BUSSELL



GRADE PLAN MAP PAGE 1 OF 1

PARCEL # 078-212-02 11.98 ACRE

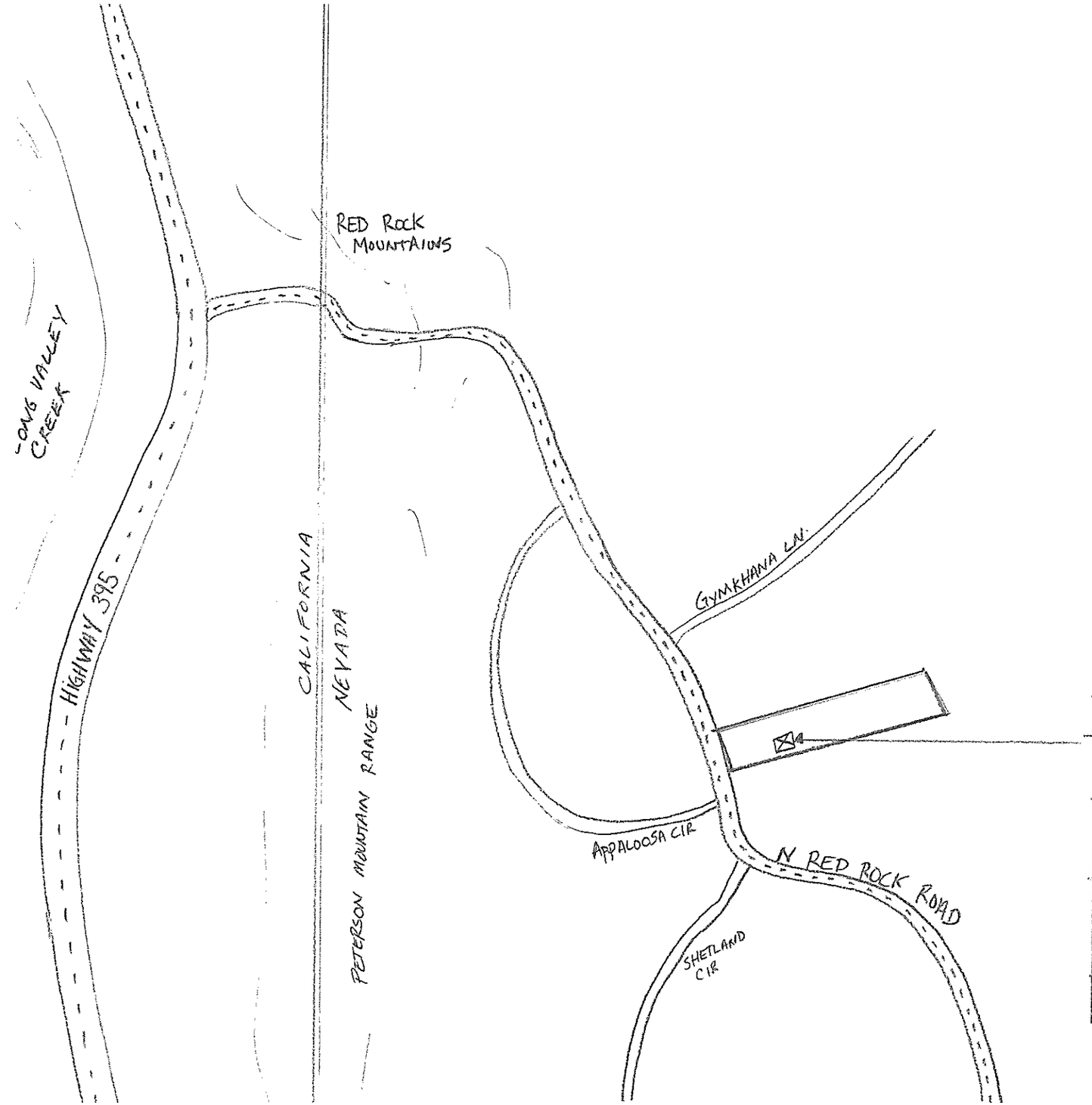
16400 N RED ROCK RD
RENO NV 89508

MATT & ANGIE BUSSELL
530-260-1468

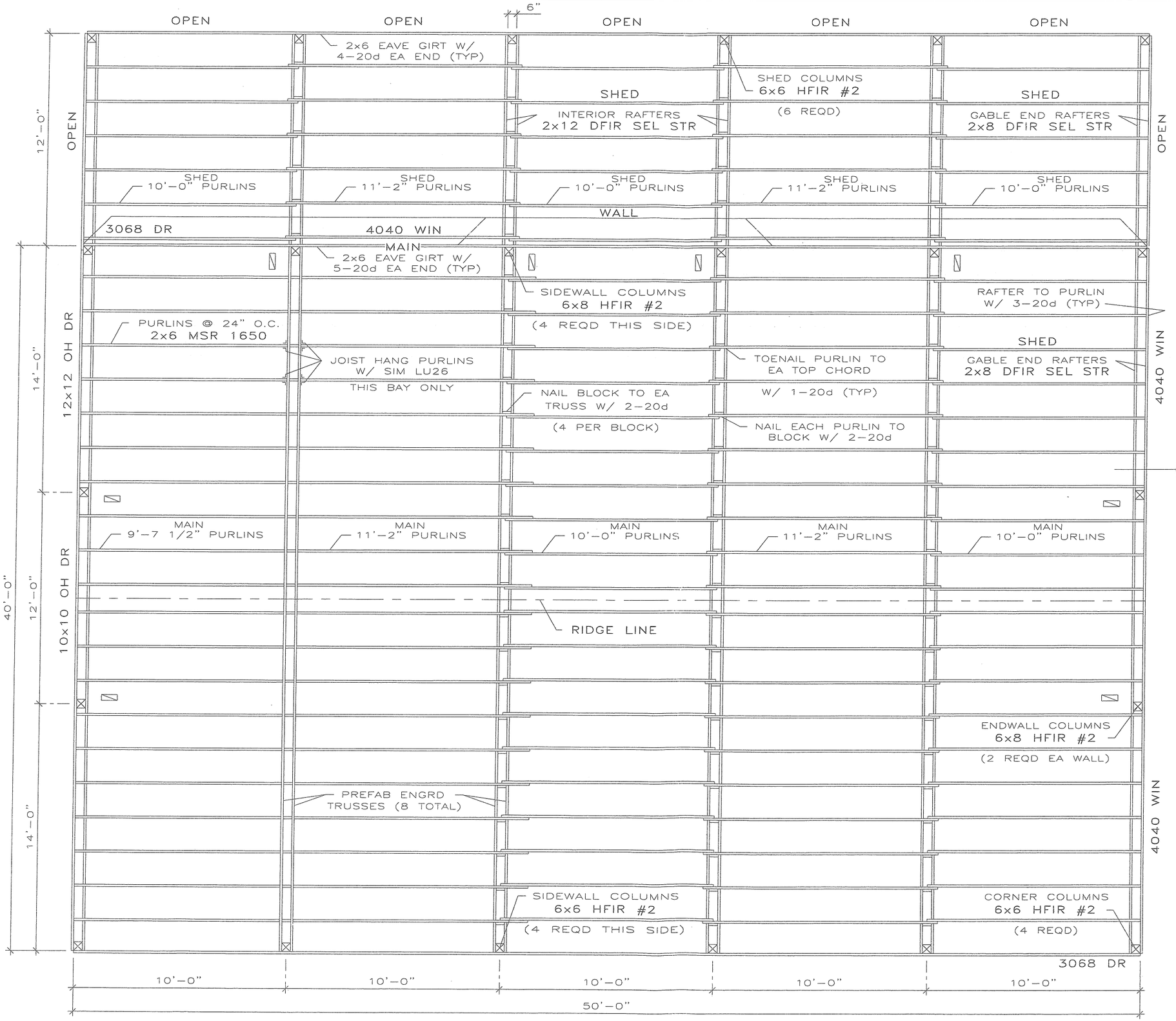
AG STORAGE BUILDING 40X50'

DRAWN BY MATT BUSSELL
DATE : 7 JANUARY 2019

- ESTIMATED 65 YARDS OF SOIL TO BE CUT AND USE FOR FILL
- FILL WILL BE GREATER THAN 10' EAST OF STRUCTURE COMPACTED TO SPEC
- BUILDING PAD NOT ON FILL MATERIAL
- CUT MATERIAL SUB BASE GRADE COMPACTED LEVEL 1%
- FINISH GRADE WILL BE 6" ABOVE SUBGRADE ON NORTHEAST CORNER
- FINISH GRADE CONSITS OF 6" TYPE 2 BASE COMPACTED TO MAXIMUM COMPACTION AND LEVEL WITHIN 1% DEMINSIONS
- 10' BEYOND BUILDING DEMENSIONS WILL BE SLOPED 6" AWAY OR AS DETERMINED FOR PROPER DRAINGE.



SITE MAP PAGE 1 OF 1 NOT TO SCALE
PROPOSED BUILDING SITE AG STORAGE BUILDING
PARCEL # 078-212-03
11.98 ACRES
16400 N. RED ROCK ROAD RENO NV 89508
MATT & ANGIE BUSSELL 530-260-1468
DRAWN BY MATT BUSSELL
DATE 8 JANUARY 2019



SHT 1 of 6

12.28.17

STATE OF NEVADA
PROFESSIONAL ENGINEER
NICHOLAS CLAY JASPER
CIVIL
No. 016520
Exp: 12/31/19

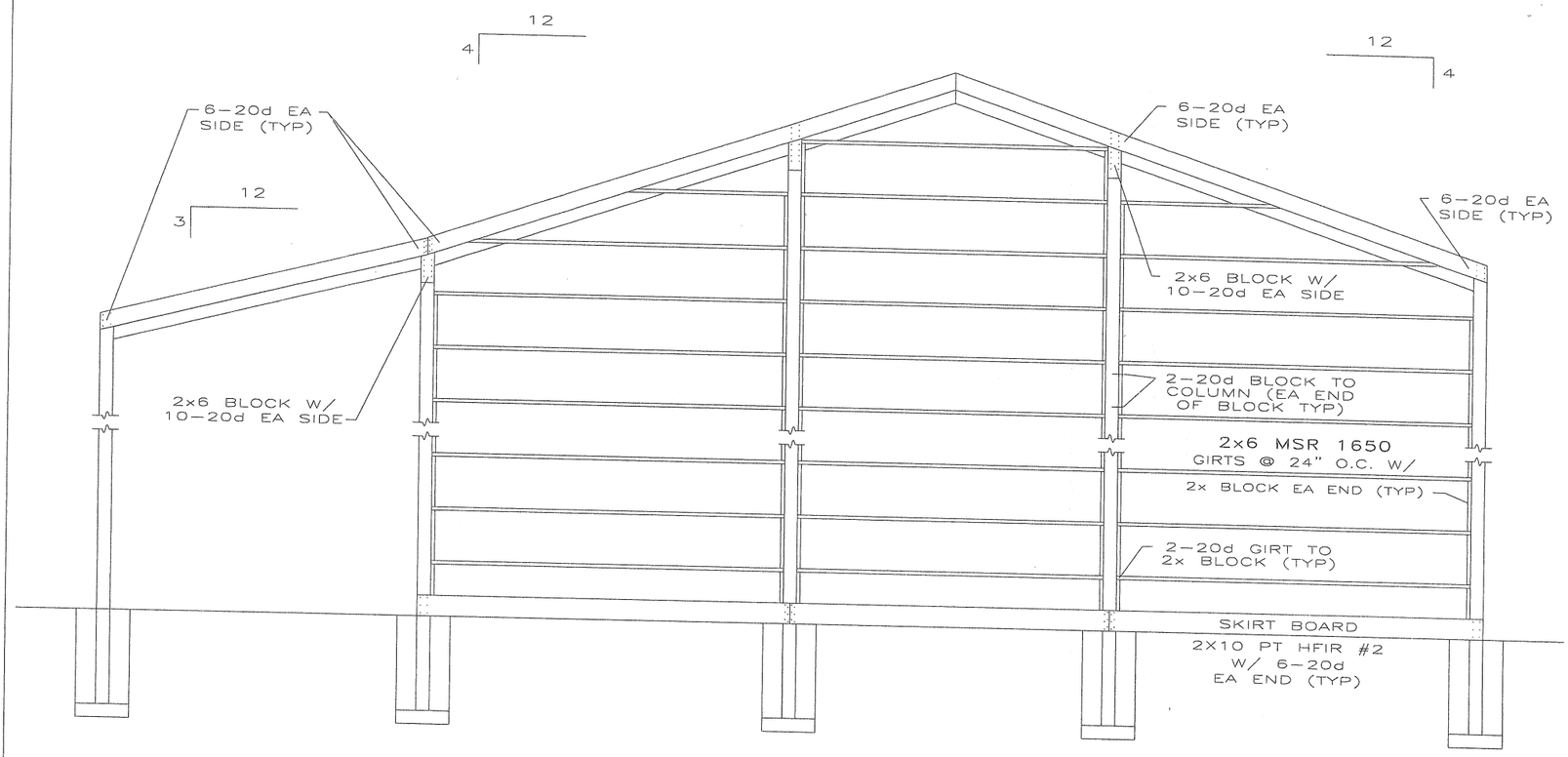
BUILDING SUPPLY
&
22175 S. HWY. 99E
CANBY, OREGON 97013
(503) 263-6953
(503) 266-7102 (FAX)

SCALE:	NONE		
RDO/RD	12/1/18		MW18233
			KIT

HOYLE CONST. FOR BUSSEL
16400 N. RED ROCK RD.
RENO, NEVADA
COUNTY: WASHOE

M & W BUILDING SUPPLY
CUSTOM POLE BUILDINGS
40' WIDE x 50' LONG x 14' EAVE
W/ 1 - 12' X 50' X 14' TO 11' SHED

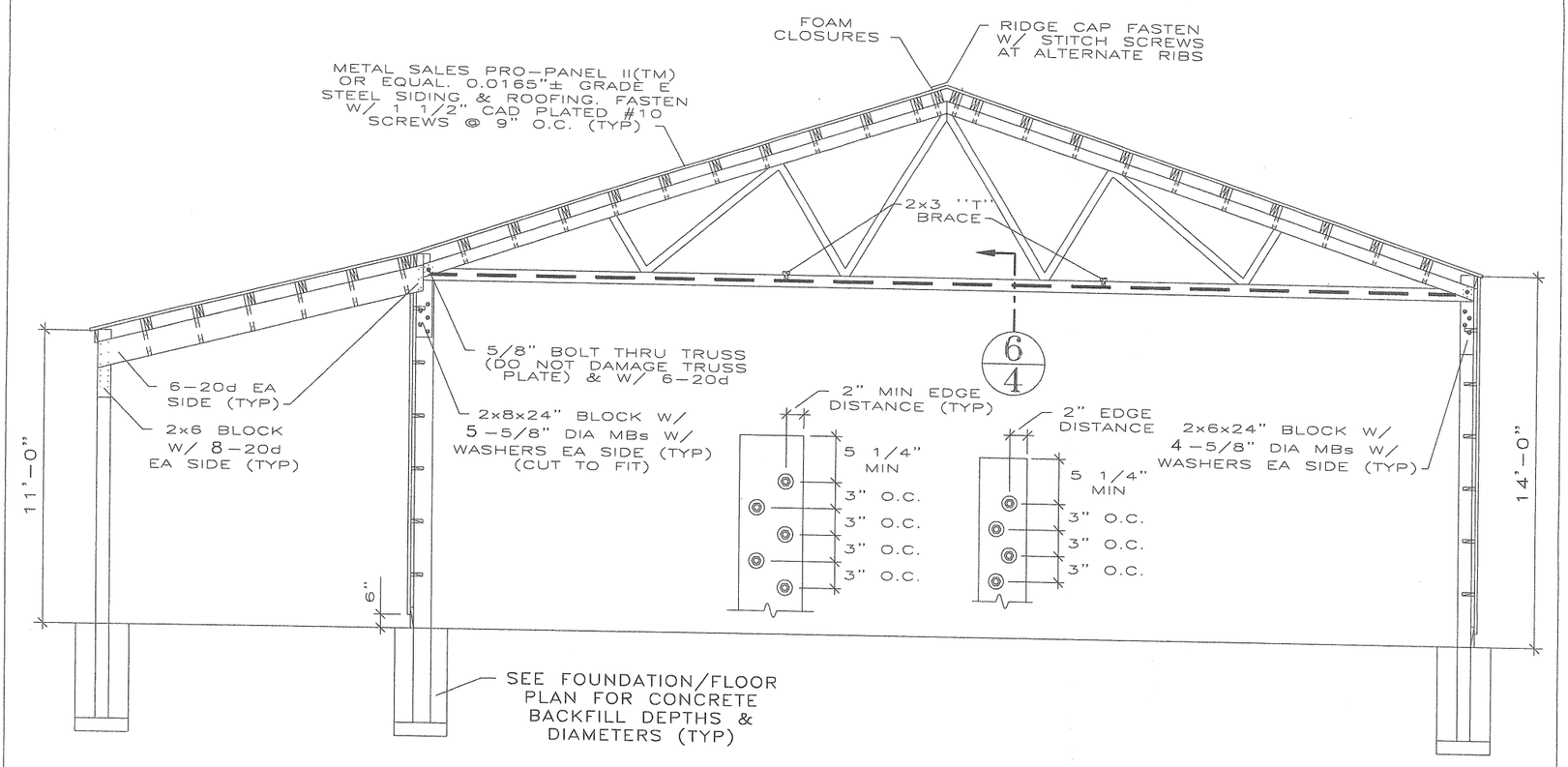
ROOF LOAD: LIVE	30 PSF
DEAD LOAD:	3 PSF
WIND LOAD: 130MPH	EXP: C
SEISMIC ZONE: D	
FOUNDATION PRESSURE:	1500 PSF
LAT. SOIL BEARING:	100 PSF
BUILDING DESIGN: 2012 I.B.C.	
CLOSED BUILDING	



ENDWALL FRAMING

NOTES:

SEE TRUSS DRAWINGS FOR DOUBLE TRUSS BLOCKING REQUIREMENTS AND WEB BLOCKING LOCATIONS, IF APPLICABLE.



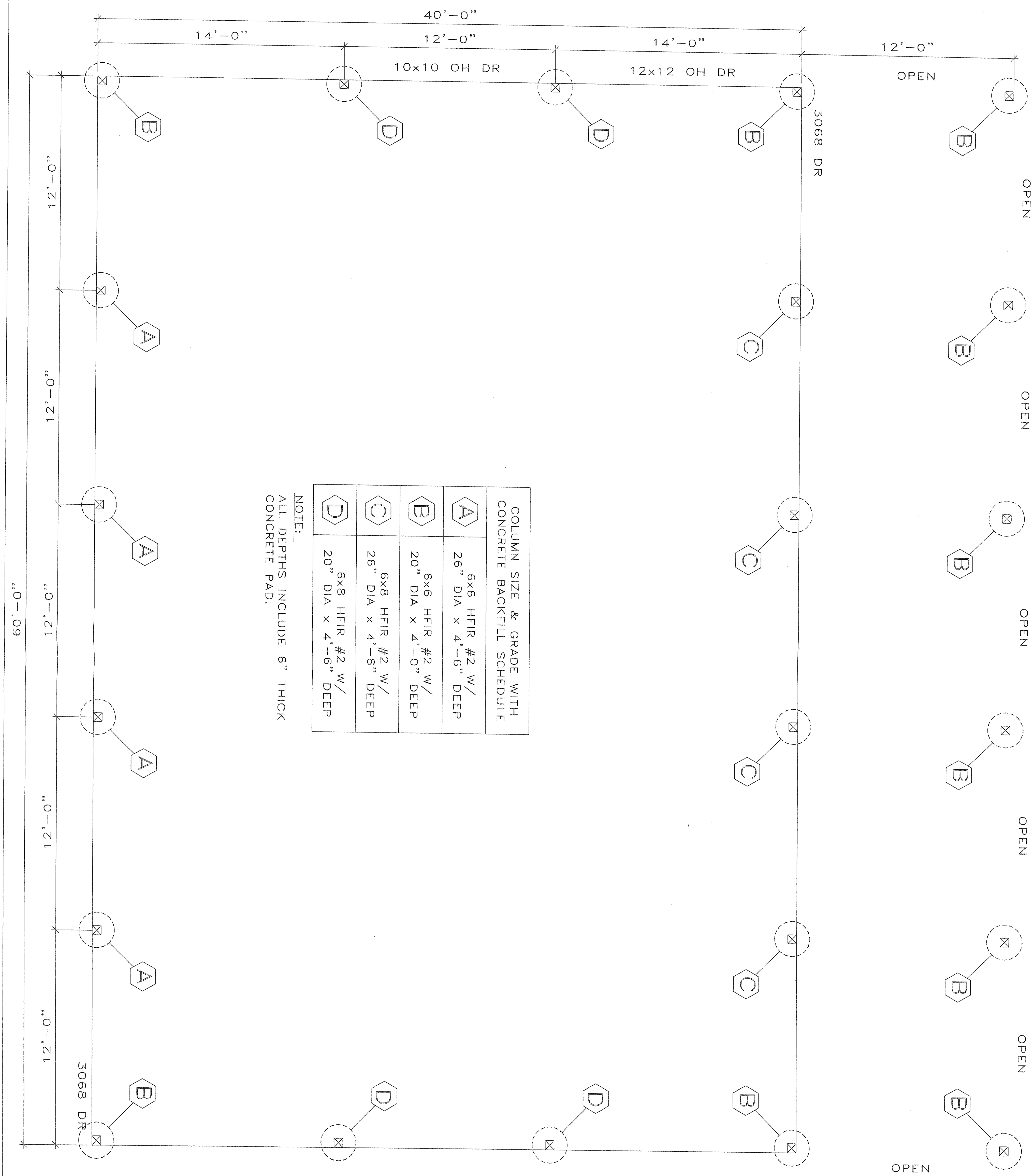
CROSS SECTION

SHT 2 of 6

12.28.18

M & W BUILDING SUPPLY CUSTOM POLE BUILDINGS 40' WIDE x 50' LONG x 14' EAVE W/ 1 - 12' X 50' X 14' TO 11' SHED	HOYLE CONST. FOR BUSSEL 16400 N. RED ROCK RD. RENO, NEVADA COUNTY: WASHOE	BUILDING SUPPLY & 22175 S. HWY. 99E CANBY, OREGON 97013 (503) 263-6953 (503) 266-7102 (FAX)
ROOF LOAD: LIVE 30 PSF DEAD LOAD: 3 PSF WIND LOAD: 130MPH EXP: C SEISMIC ZONE: D FOUNDATION PRESSURE: 1500 PSF LAT. SOIL BEARING: 100 PSF BUILDING DESIGN: 2012 I.B.C. CLOSED BUILDING	ENGINEERS DESIGN RESPONSIBILITIES ARE LIMITED EXCLUSIVELY TO THOSE DOCUMENTS BEARING HIS SEAL AND SIGNATURE. ANY ALTERATIONS TO THESE DOCUMENTS OR THE PHYSICAL STRUCTURE BY ANY PERSONS OR AGENCY SHALL VOID SAID DOCUMENTS AND RELIEVE ENGR OF DESIGN RESPONSIBILITY, AND MAY CREATE LIABILITY ISSUE FOR THEMSELVES DRAWINGS ARE FOR STRUCTURAL COMPLIANCE ONLY. THEY ARE NOT TO BE CONSTRUED AS HAVING BEEN PREPARED FOR BUILDING USE, OCCUPANCY AND/OR FIRE & LIFE-SAFETY REQUIREMENTS OF LOCAL CODES OR AGENCIES. SLAB & HAIRPINS SHOWN FOR CONSTRAINMENT ONLY. DESIGN MIX, THICKNESS, CJ's, & REINFORCEMENT BY OTHERS. THIS STRUCTURE HAS NOT BEEN DESIGNED FOR USE WITH INTERIOR FINISH MATERIALS SUBJECT TO DAMAGE OR FAILURE DUE TO LATERAL MOVEMENT	SCALE: NONE RDO/RD 12/17/18 KIT MW18233

PROFESSIONAL ENGINEER • STATE OF NEVADA
NICHOLAS CLAY JASPER
Exp: 6/30/19
CIVIL
No. 016520



COLUMN SIZE & GRADE WITH CONCRETE BACKFILL SCHEDULE	
A	6x6 HFIR #2 W/ 26" DIA x 4'–6" DEEP
B	6x6 HFIR #2 W/ 20" DIA x 4'–0" DEEP
C	6x8 HFIR #2 W/ 26" DIA x 4'–6" DEEP
D	6x8 HFIR #2 W/ 20" DIA x 4'–6" DEEP

NOTE:
ALL DEPTHS INCLUDE 6" THICK CONCRETE PAD.

FOUNDATION/FLOOR PLAN

M & W BUILDING SUPPLY
CUSTOM POLE BUILDINGS
40' WIDE x 50' LONG x 14' EAVE
W/ 1 - 12' X 50' X 14' TO 11' SHED

ROOF LOAD: LIVE 30 PSF
DEAD LOAD: 3 PSF
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SEISMIC ZONE: D
FOUNDATION PRESSURE: 1500 PSF
LAT. SOIL BEARING: 100 PSF
BUILDING DESIGN: 2012 I.B.C.
CLOSED BUILDING

HOYLE CONST. FOR BUSSEL
16400 N. RED ROCK RD.
RENO, NEVADA
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M & W BUILDING SUPPLY
22175 S. HWY. 99E
CANBY, OREGON 97013
(503) 263-6953
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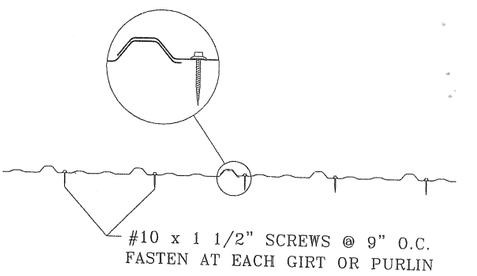
SCALE:	NONE
RDO/RO	12/17/18
KIT	MW18233

PROFESSIONAL ENGINEER STATE OF NEVADA
NICHOLAS CLAY JASPER
Exp: 6/30/19
CIVIL
No. 016520
12-28-18

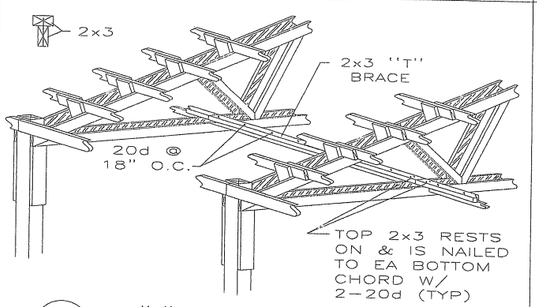
1. BUILDING PAD SHALL BE CONSTRUCTED ON LEVEL SOIL.
2. COLUMN FOOTING CONCRETE BACKFILL SHALL BE CASTE AGAINST EXISTING UNDISTURBED SOIL THE SIZE AND SHAPE SHOWN ON DRAWINGS. (U.O.N.)
3. ALL WORK SHALL BE IN ACCORDANCE WITH LOCAL CODES AND ORDINANCES AND THE LATEST EDITION OF THE I.B.C.
4. BOLT HEADS & NUTS BEARING ON WOOD SHALL HAVE STD. PLATE WASHERS. BOLTS SHALL BE ASTM A307. BOLT HOLE DIA. SHALL BE 1/16" LARGER THAN BOLT DIA.
5. STRUCTURAL STEEL SHAPES AND PLATES SHALL BE ASTM A36 UNLESS OTHERWISE NOTED.
6. REBAR SHALL BE GRADE 40 UNLESS OTHERWISE NOTED. (U.O.N.)
7. CONCRETE FOR FOOTINGS & SLABS f'c=2500 PSI
8. BEARING BLOCKS SHALL BE PRE-DRILLED PRIOR TO SETTING 20d NAILS
9. 20d NAILS SHALL BE GALV. BOX TYPE
10. BOLT HOLES SHALL BE DRILLED STRAIGHT AND PERPENDICULAR TO THE COLUMN FACE TO ASSURE FULL BOLT BEARING
11. SEE TRUSS DRAWINGS FOR DOUBLE TRUSS BLOCKING REQUIREMENTS
12. ALL 6x TIMBERS SHALL BE ROUGH SAWN AND TREATED TO 0.60 RET W/ CCA TYPE C.
13. NO OTHER MATERIALS SHALL BE USED W/O M&W BUILDING APPROVAL

1 NOTES

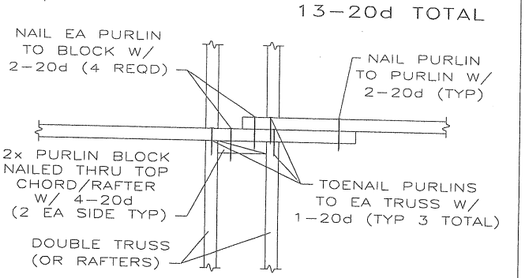


3 TYP. PANEL W/O EXTENDED LEG

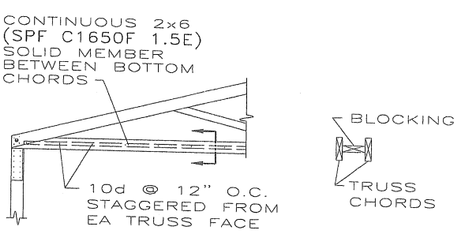
N.T.S.



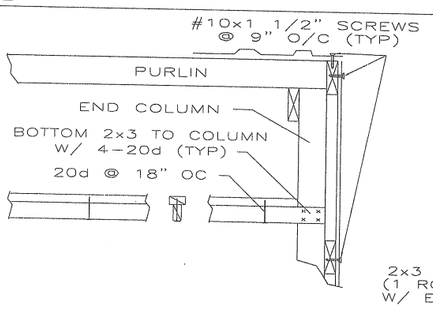
4 "T" BRACING DETAIL



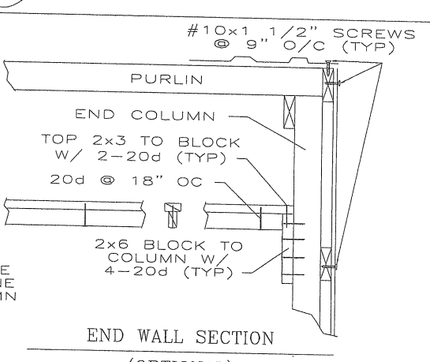
5 PURLIN BLOCK NAILING



6 BOTTOM CHORD SOLID BLOCKING



A END WALL SECTION



2x3 "T" BRACE (1 ROW) IN LINE W/ END COLUMN

END WALL SECTION (OPTIONAL)

SHT 4 of 6

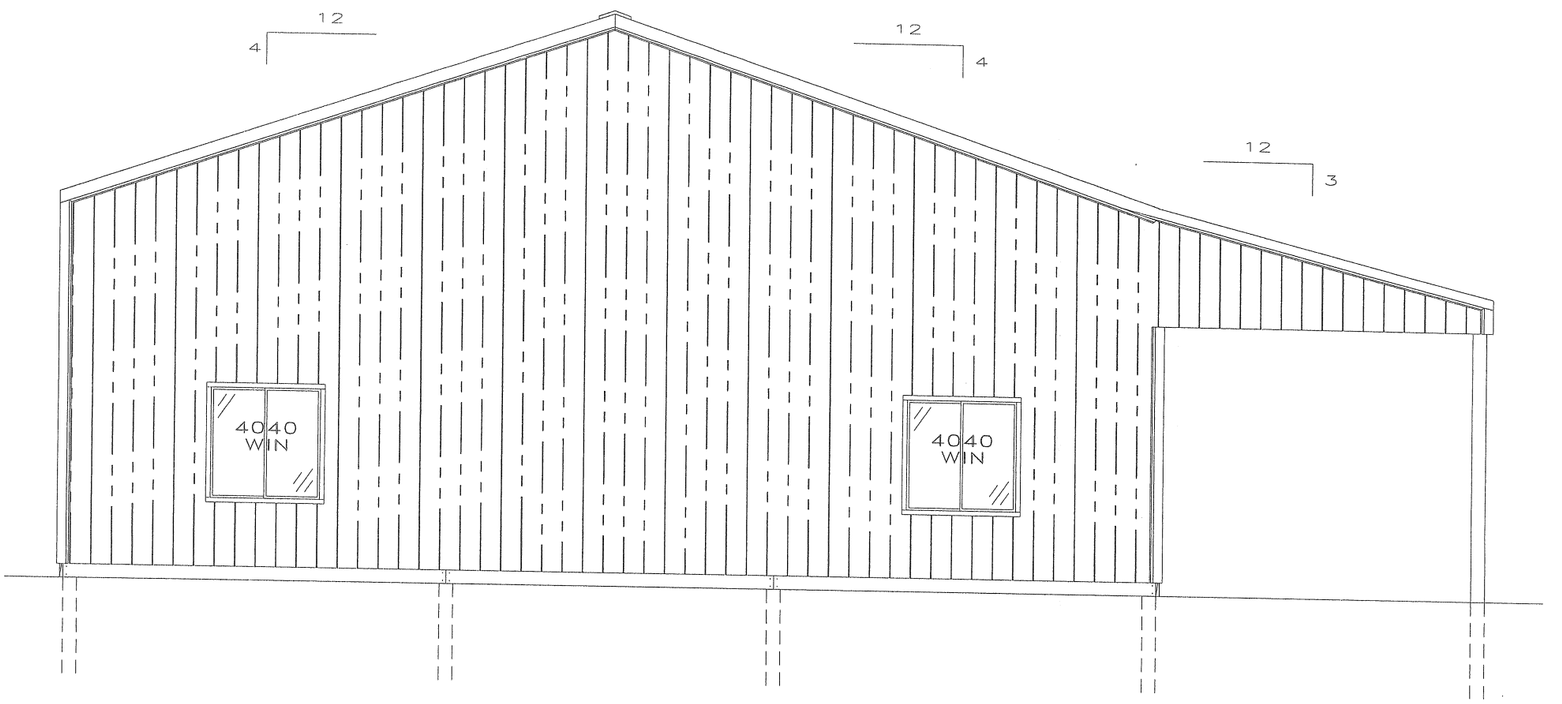
M & W BUILDING SUPPLY CUSTOM POLE BUILDINGS 40' WIDE x 50' LONG x 14' EAVE W/ 1 - 12' X 50' X 14' TO 11' SHED	HOYLE CONST. FOR BUSSEL 16400 N. RED ROCK RD. RENO, NEVADA COUNTY: WASHOE
ROOF LOAD: LIVE 30 PSF DEAD LOAD: 3 PSF WIND LOAD: 130MPH EXP: C SEISMIC ZONE: D FOUNDATION PRESSURE: 1500 PSF LAT. SOIL BEARING: 100 PSF BUILDING DESIGN: 2012 I.B.C. CLOSED BUILDING	ENGINEERS DESIGN RESPONSIBILITIES ARE LIMITED EXCLUSIVELY TO THOSE DOCUMENTS BEARING HIS SEAL AND SIGNATURE. ANY ALTERATIONS TO THESE DOCUMENTS OR THE PHYSICAL STRUCTURE BY ANY PERSONS OR AGENCY SHALL VOID SAID DOCUMENTS AND RELIEVE ENGR OF DESIGN RESPONSIBILITY, AND MAY CREATE LIABILITY ISSUE FOR THEMSELVES DRAWINGS ARE FOR STRUCTURAL COMPLIANCE ONLY. THEY ARE NOT TO BE CONSTRUED AS HAVING BEEN PREPARED FOR BUILDING USE, OCCUPANCY AND/OR FIRE & LIFE-SAFETY REQUIREMENTS OF LOCAL CODES OR AGENCIES. SLAB & HAIRPINS SHOWN FOR CONSTRAINMENT ONLY. DESIGN MIX, THICKNESS, CJ's, & REINFORCEMENT BY OTHERS. THIS STRUCTURE HAS NOT BEEN DESIGNED FOR USE WITH INTERIOR FINISH MATERIALS SUBJECT TO DAMAGE OR FAILURE DUE TO LATERAL MOVEMENT

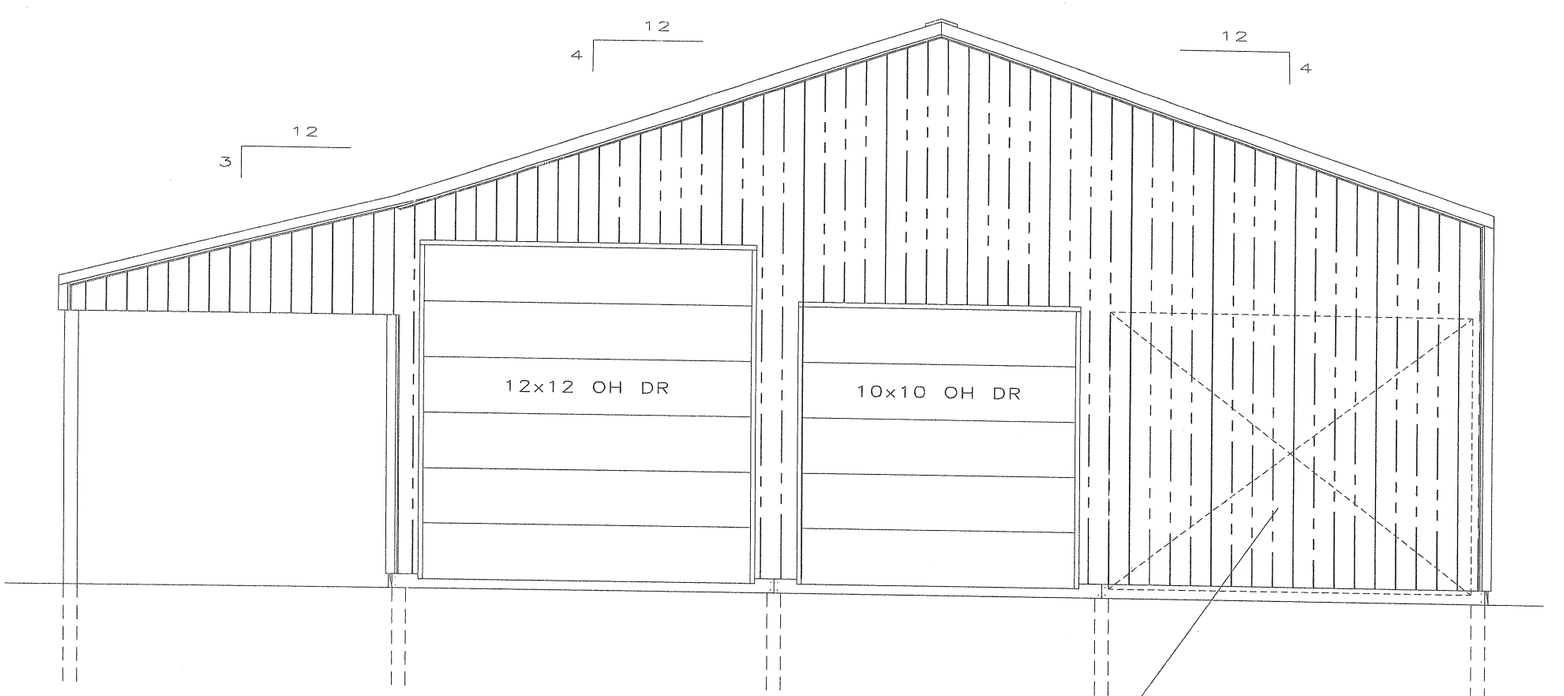
BUILDING SUPPLY & 22175 S. HWY. 99E CANBY, OREGON 97013 (503) 263-6953 (503) 266-7102 (FAX)

SCALE:	NONE
RDO/RD	12/1[illegible]/15
KIT	MW18233

PROFESSIONAL ENGINEER STATE OF NEVADA NICHOLAS CLAY JASPER Exp: 6/30/19 CIVIL No. 016520

12-28-1[illegible]





INSTALL 7/16" O.S.B. OR 1/2" CDX TO INSIDE FACE OF GIRTS TO TOP OF 10' OVERHEAD DOOR W/ 6d @ 4" O.C. EDGES & BOUNDARIES & @ 12" O.C. INTERIOR (W/ 2x BLOCKING AT PANEL EDGES) THIS BAY ONLY

12.28.12

SHT 5 of 6

M & W BUILDING SUPPLY
CUSTOM POLE BUILDINGS
40' WIDE x 50' LONG x 14' EAVE
W/ 1 - 12' X 50' X 14' TO 11' SHED

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CANBY, OREGON 97013
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SCALE:	NONE
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PROFESSIONAL ENGINEER STATE OF NEVADA
NICHOLAS CLAY JASPER
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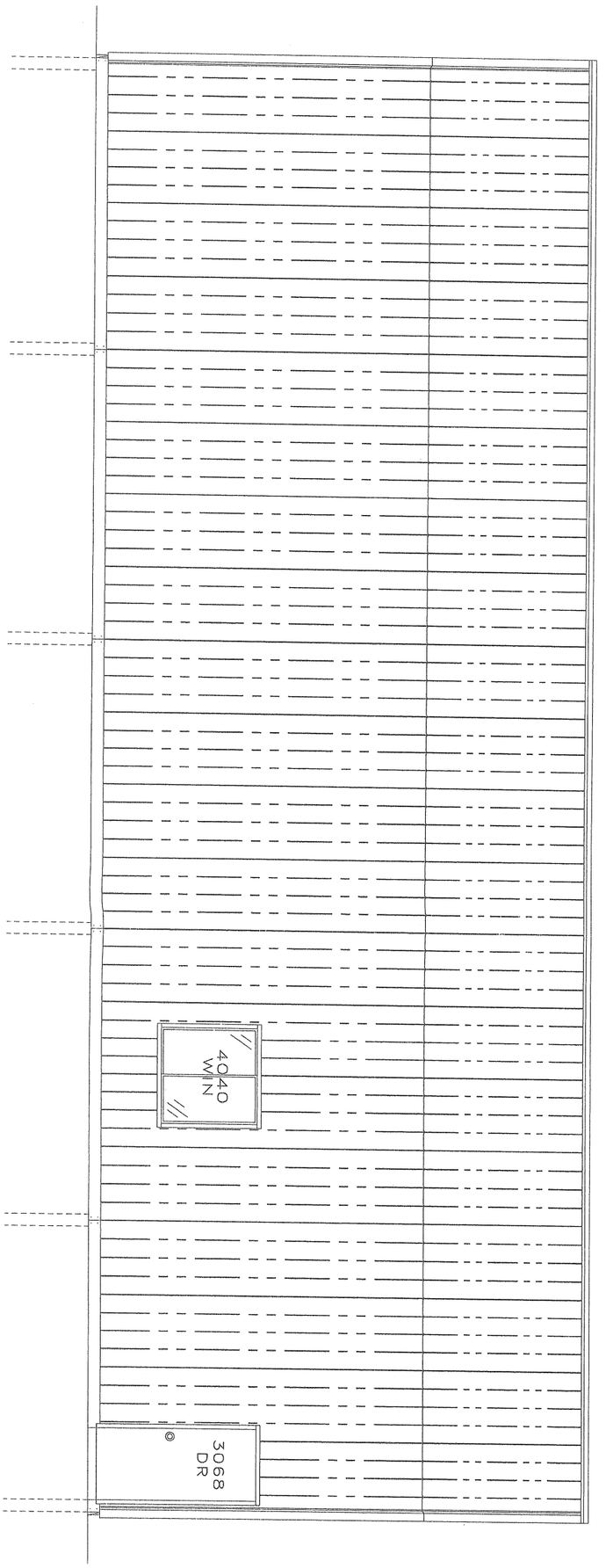

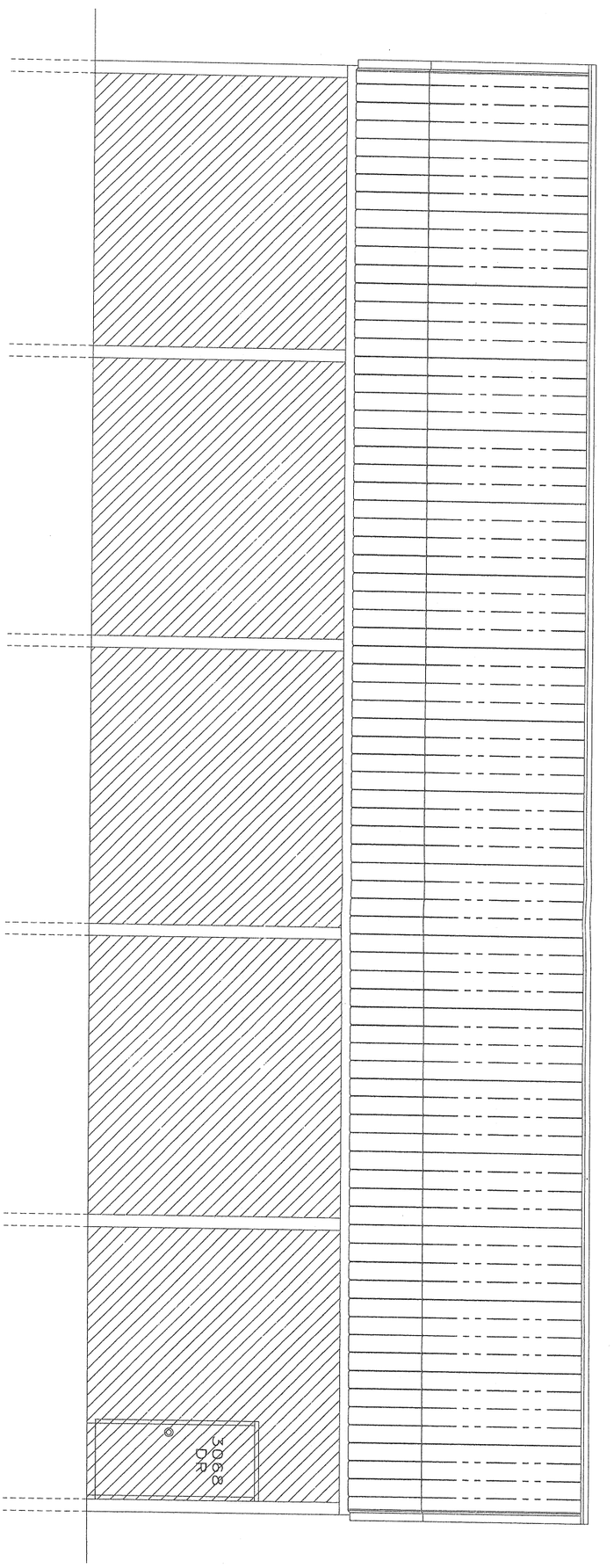

12.28.18

SHT 6 of 6

M & W BUILDING SUPPLY
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PROFESSIONAL ENGINEER • STATE OF NEVADA
NICHOLAS CLAY JASPER
Exp: 6/30/19
CIVIL
No. 016520

ALLIANCE ENGINEERING
Specialists in Post Frame Engineering

aeOregon.com
2700 Market St. NE
Salem, OR 97301
503 589-1727
FAX 503 589-1728

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.

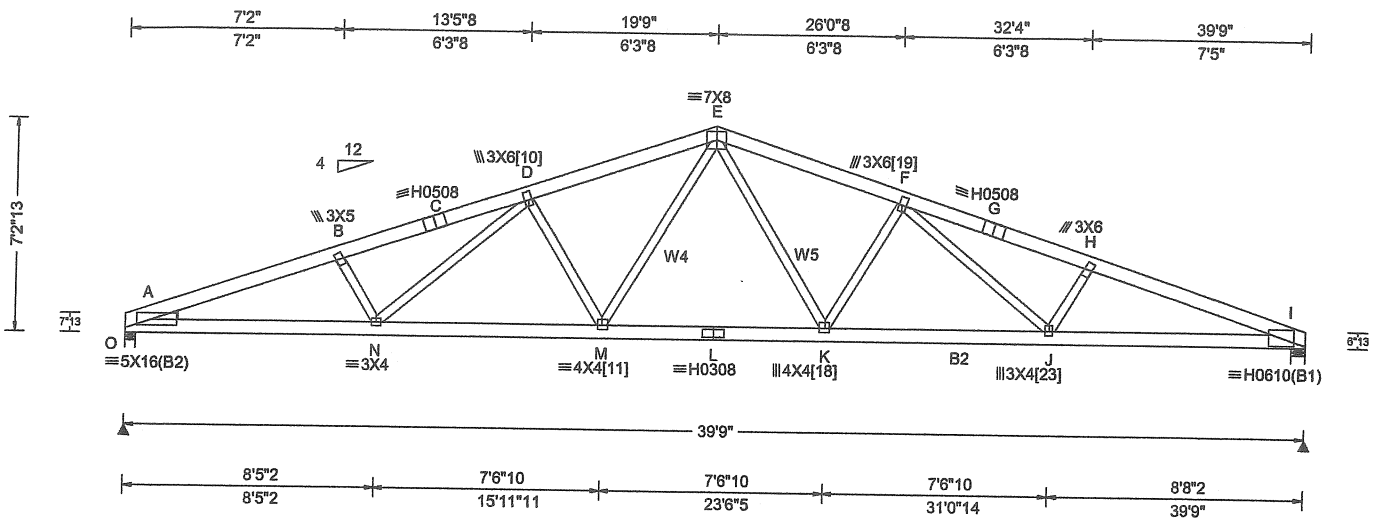
Sincerely,

Nicholas Jasper, PE
Civil Engineer/Principal

12.28.18

PROFESSIONAL ENGINEER · STATE OF NEVADA
NICHOLAS CLAY JASPER
Exp: 6/30/19
CIVIL
No. 016520

SEQN: 41622 T1 COMN FROM:	Ply: 1 Qty: 8	**Job Number:** 1812153MWB Bussel MW 182333 **Truss Label:** A-Bussel	Cust: R435 JRef: 1WH04350022 DrwNo: 353.18.1443.43223 CY / GWH 12/19/2018



Loading Criteria (psf)
TCLL: 30.00
TCDL: 5.00
BCLL: 0.00
BCDL: 1.00
Des Ld: 36.00
NCBCLL: 10.00
Soffit: 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 Kzt: NA
Mean Height: 15.00 ft
TCDL: 3.0 psf
BCDL: 0.6 psf
MWFRS Parallel Dist: 0 to h/2
C&C Dist a: 4.00 ft
Loc. from endwall: Any
GCpi: 0.18
Wind Duration: 1.60

Snow Criteria (Pg,Pf in PSF)
Pg: 30.0 Ct: 1.2 CAT: II
Pf: 25.2 Ce: 1.0
Lu: - Cs: 1.00
Snow Duration: 1.15

Code / Misc Criteria
Bldg Code: IRC 2015
TPI Std: 2014
Rep Fac: No
FT/RT/PT:6(0)/3(0)/1(0)
Plate Type(s):
WAVE, HS

Defl/CSI Criteria

PP Deflection in	loc	L/defl	L/#
VERT(LL): 0.607	K	780	315
VERT(CL): 0.734	K	645	236
HORZ(LL): 0.180	J	-	-
HORZ(TL): 0.217	J	-	-

Creep Factor: 2.0
Max TC CSI: 0.816
Max BC CSI: 0.971
Max Web CSI: 0.829

VIEW Ver: 18.02.00.1016.21

▲Maximum Reactions (lbs)

	Gravity			Non-Gravity		
Loc	R+	/ R-	/ Rh	/ Rw	/ U	/ RL
O	3604	/-	/-	/964	/1379	/421
I	3604	/-	/-	/972	/1379	/-

Wind reactions based on MWFRS
O Brg Width = 4.0 Min Req = 3.8
I Brg Width = 5.5 Min Req = 3.8
Bearings O & I are a rigid surface.
Members not listed have forces less than 375#

Maximum Top Chord Forces Per Ply (lbs)

Chords	Tens.	Comp.	Chords	Tens.	Comp.
A - B	5910	-8639	E - F	4867	-6656
B - C	5809	-8196	F - G	5979	-8257
C - D	5825	-8015	G - H	5964	-8438
D - E	4852	-6631	H - I	6080	-8948

Maximum Bot Chord Forces Per Ply (lbs)

Chords	Tens.	Comp.	Chords	Tens.	Comp.
A - N	8032	-5313	L - K	5297	-3212
N - M	6891	-4412	K - J	6948	-4452
M - L	5297	-3212	J - I	8313	-5496

Maximum Web Forces Per Ply (lbs)

Webs	Tens.	Comp.	Webs	Tens.	Comp.
B - N	736	-867	E - K	1799	-1274
N - D	1012	-868	K - F	1271	-1727
D - M	1230	-1675	F - J	1237	-1014
M - E	1757	-1239	J - H	832	-997

Lumber
Top chord 2x6 DF-L 1800f-1.8E
Bot chord 2x6 DF-L 2100f-1.8E :B2 2x6 DF-L 1800f-1.8E:
Webs 2x4 DF-L Standard :W4, W5 2x4 DF-L 1800f-1.8E:
:Lt Wedge 2x4 DF-L Standard:

Plating Notes
Handling stresses not considered for plates. Handling of this truss requires special care by truss manufacturer and installation contractor to prevent plate damage.

Plate Shift Table

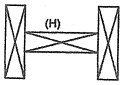
JT No	Plate Size	Shift		Chord Bite	JT No	Plate Size	Shift		Chord Bite
[10]	3X6	1.75	L	3.50	[11]	4X4	1.75	L	1.75
[18]	4X4	1.75	R	1.75	[19]	3X6	2.00	R	3.50
[23]	3X4	1.25	R	1.75					

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

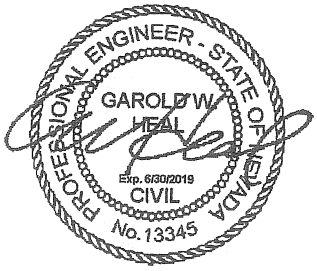
Purlins
In lieu of structural panels or rigid ceiling use purlins to brace TC @ 24" OC, BC @ 47" OC.

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

In lieu of purlins on the bottom chord at 47" o/c, the bottom chords of trusses placed each side of supporting poles may be braced with purlins at 19'9" o/c maximum spacing and H-brace blocking: (H) 2X6 DF-L #2 or better continuous reinforcing member (match pole width). Attach to each truss ply with 10D common nails (0.148"x3.0") at 12" o/c.



H-Brace section view



12/19/2018

WARNING READ AND FOLLOW ALL NOTES ON THIS DRAWING!
IMPORTANT FURNISH THIS DRAWING TO ALL CONTRACTORS INCLUDING THE INSTALLERS

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

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

For more information see this job's general notes page and these web sites: ALPINE: www.alpineitw.com; TPI: www.tpinst.org; SBCA: www.sbcindustry.com; ICC: www.iccsafe.org

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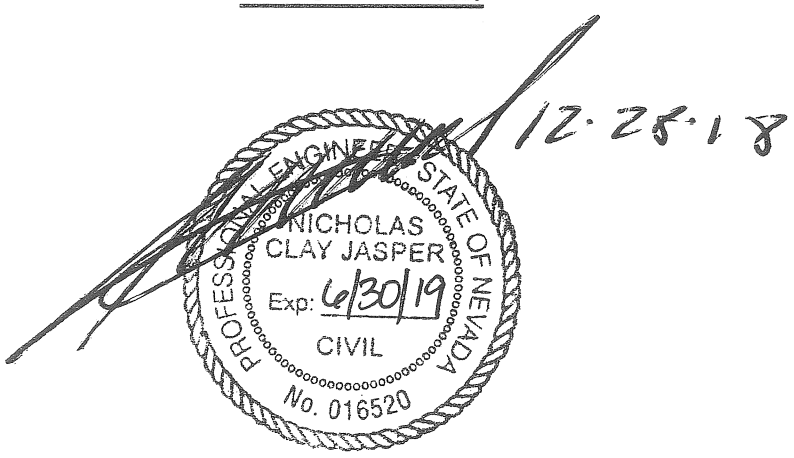
POST FRAME BUILDING STRUCTURAL CALCULATION

(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:



POST FRAME BUILDING

REFERENCES:

1. 2012 Edition of the International Building Code

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

3. 2012 Edition, National Design Specification (NDS) Supplement For Wood
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

$W_{bldg} := 40 \cdot ft$ Width of Building

$L_{bldg} := 50 \cdot ft$ Length of Building

$H_{bldg} := 14 \cdot ft$ Eave Height of Building

$O_{verhang} := 0 \cdot in$ Length of Eave Overhang

$W_{shed} := 12 \cdot ft$ Width of Eave Shed Roof

$L_{shed} := 50 \cdot ft$ Length of Eave Shed Roof

$H_{shed} := 11 \cdot ft$ Eave Height of Shed Roof

$R_{pitch} := 4$ / 12 Roof pitch

$R_{pitchS} := 3$ / 12 Roof pitch

$B_{ay} := 10 \cdot ft$ Greatest nominal spacing between eave wall posts

$WL_{gableopenings} := 26 \cdot ft$ Total width of openings in left gable wall

$WR_{gableopenings} := 10 \cdot ft$ Total width of openings in right gable wall

$WF_{eaveopenings} := 10 \cdot ft$ Total width of openings in front eave wall

$WR_{eaveopenings} := 20 \cdot ft$ Total width of openings in rear eave wall

Design Loads for Building:

Risk_Category := "II"

Wind Design Values:

Wind Speed: $V_{wind} = 130$ mph

Wind Exposure: $E_{xposure}$:= "C"

Seismic Design Values:

Site_class := "D"

$S_s := 1.337$ Mapped spectral acceleration for short period

$S_1 := 0.462$ Mapped spectral acceleration for 1 second period

$R_a := 2.5$ Response modification factor

Roof Load Design Values:

$p_g := 30 \cdot psf$ Ground snow load

$p_d = 3 \cdot psf$ Roof dead load Roof type is = "metal sheathing"

$p_{Lr} = 20 \cdot psf$ Roof live load

$p_{d2} := 1 \cdot psf$ 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_{post} := 6x6 Post Species := Hem-Fir Post Grade := 2

Purlin Properties:

Spurlin := Sx26

$Purlin_{species}$:= MSR

$Purlin_{grade}$:= 1650_1.5E $Purlin_{spacing} := 24 \cdot in$

Girt Properties:

Sgirt := Sx26

$Girt_{species}$:= MSR

$Girt_{grade}$:= 1650_1.5E $Girt_{spacing} = 24\,in$

Post Hole and Footing Design Values:

$q_{soil} := 1500 \cdot psf$ Assumed soil vertical bearing capacity

$S_{soil} = 100 \cdot psf$ Assumed soil lateral bearing capacity

$d_{ia\_footing} := 26in$ Main eave post footing diameter

Slab and backfill information

Concrete_slab := No

Backfill_type := Concrete 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.

$p_g = 30 \cdot psf$ Ground Snow Load (from above)

$R_{angle} = 18.43 \cdot deg$ Angle of roof

$C_e = 1.00$ Exposure factor

$C_t = 1.10$ Thermal Factor

$C_s = 1.00$ Roof slope factor

$I_s = 1.00$ Importance factor

1. Determine Roof Snow Loads:

$p_f := 0.7 \cdot C_e \cdot C_t \cdot I_s \cdot p_g$ Equation 1

$p_f = 23.1 \cdot psf$ Flat roof snow load; $Roof\_slope \leq 5deg$

$p_s := C_s \cdot p_f$ Equation 2

$p_s = 23.1 \cdot psf$ Sloped roof (balanced) snow load

2. Determine final snow load, p_{su}

$p_{su} = 30 \cdot psf$ **Final roof snow load**

WIND ANALYSIS:

Method 2 - Analytical Procedure

$V_{wind} = 130$ mph Wind Speed

$k_d = 0.85$ Wind Directionality Factor

$k_{zt} = 1.0$ Topographic Factor

$k_z = 0.849$ Wind Exposure Factor (windward)

$I_w = 1.00$ Importance factor

$$q_h := 0.00256 \cdot k_z \cdot k_{zt} \cdot k_d \cdot V_{asd}^{2} \cdot I_w$$

$q_h = 18.73 \cdot psf$ Velocity Pressure

Calculated Wind Pressures:

Windward Eave Wall:

$q_{ww} := q_h \cdot GC_{pfww}$

$q_{ww} = 9.67 \cdot psf$

Leeward Eave Wall:

$q_{lw} := q_h \cdot GC_{pflw}$

$q_{lw} = -7.78 \cdot psf$

Windward Gable Wall:

$q_{wwg} := q_h \cdot GC_{pfwwg}$

$q_{wwg} = 7.49 \cdot psf$

Leeward Gable Wall:

$q_{lwg} := q_h \cdot GC_{pflwg}$

$q_{lwg} = -5.43 \cdot psf$

Windward Roof:

$q_{wr} := q_h \cdot GC_{pfwr}$

$q_{wr} = -12.92 \cdot psf$

Leeward Roof:

$q_{lr} := q_h \cdot GC_{pflr}$

$q_{lr} = -8.78 \cdot psf$

Wall Elements:

$q_{we} := q_h \cdot GC_{pfw}$

$q_{we} = -14.98 \cdot psf$

Roof Elements:

$q_r := q_h \cdot GC_{pfr}$

$q_r = -14.98 \cdot psf$

Internal Wind Pressure (+/-):

$q_i := q_h \cdot GC_{pi}$

$q_i = 3.37 \cdot psf$

SEISMIC CALCULATIONS:

$S_s = 1.34$ Mapped spectral acceleration for short periods (from above)

$S_1 = 0.46$ Mapped spectral acceleration for 1-second period (from above)

$I_e = 1.0$ Importance factor

$R_a = 2.5$ Response modification factor (from above)

1. Determine the Seismic Design Category

a. Calculate S_{DS} and S_{D1}

For S_{DS}:

For $S_s = 1.34$

$F_a = 1.00$

$S_{MS} := S_s \cdot F_a$

$S_{MS} = 1.34$

$S_{DS} := \left(\frac{2}{3}\right) \cdot S_{MS}$

$S_{DS} = 0.89$

For S_{D1}:

For $S_1 = 0.46$

$F_v = 1.54$

$S_{M1} := S_1 \cdot F_v$

$S_{M1} = 0.711$

$S_{D1} := \left(\frac{2}{3}\right) \cdot S_{M1}$

$S_{D1} = 0.47$

Seismic_Design_Category = "D"

$H_{roof} = 6.667\,ft$

2. Determine the building parameters

$H_{roof.S} = 3\,ft$

Building dead load weight, W:

$$W := \left[W_{bldg} \cdot L_{bldg} \cdot \left[\left(p_{f\_s} \cdot .2\right) + p_d\right]\right] + \left[\left[2 \cdot \left(W_{bldg} + L_{bldg}\right) \cdot \frac{H_{bldg}}{2}\right] + \left(H_{roof} \cdot W_{bldg}\right)\right] \cdot p_d$$

$W = 10580.0\,lb$

$$W_S := \left[W_{shed} \cdot L_{shed} \cdot \left[\left(p_{f\_s} \cdot .2\right) + p_d\right]\right] + \left[\left(H_{roof.S} \cdot W_{shed}\right) \cdot p_d\right]$$

$W_S = 1908.0\,lb$

Building area, A_b:

$A_b := L_{bldg} \cdot \left(W_{bldg} + W_{shed}\right)$

$A_b = 2600\,ft^2$

3. Determine the shear force to be applied

a. Determine the fundamental period, T

$$T_a := .02 \cdot \left(\frac{H_{bldg} + \frac{H_{roof}}{2}}{ft} \right)^{0.75} \qquad T := T_a \qquad T = 0.17 \ s$$

b. Determine the Seismic Response Coefficient, C_s:

C_s is calculated as:

$$C_{s2} := \frac{\frac{S_{DS}}{R_a}}{I_e} \qquad C_{s2} = 0.357$$

But need not exceed:

$C_{s3} = 1.115$

But shall not be less than:

$C_{s1} = 0.039$

$C_s = 0.357$ Seismic Response Coefficient to used in determination of seismic base shear

c. Determine the Seismic Base Shear:

$V_{base\_shear} := C_s \cdot W$ $\qquad V_{base\_shear} = 3772 \cdot lb$

$V_{base\_shear2} := C_s \cdot W_S$ $\qquad V_{base\_shear2} = 680 \cdot lb$

4. Determine the seismic load on the building:

Since Seismic_Design_Category = "D" , $\rho = 1.3$

$E = 3433 \cdot lb$ Seismic load on building

$E_S = 619 \cdot lb$ 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 lb/in

STEP 2: CALCULATED ROOF DIAPHRAGM STIFFNESS OF THE TEST PANEL

c' = (E X t) / (2 X (1+V) X (g/p) + (K_2 / (b' X t)^2))

Where: E_{steel} = 27.5x10^6 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 in^4 sheet edge purlin fastening constant

STEP 2.2:

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

$$b_{new} := \frac{\frac{W_{bldg}}{2}}{\cos(\Theta)}$$

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

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

$b_{new} = 253 \cdot in$

$$c := \frac{E_{steel} \cdot t}{2.961 + \frac{K_2}{(b_{new} \cdot t)^2}} \qquad c = 6503 \cdot \frac{lb}{in}$$

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.

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

$a = 120 \cdot in$ $\quad c_h = 24675 \cdot \frac{lb}{in}$

STEP 3: DETERMINE THE STIFFNESS OF THE POST FRAME (k):
Since the connection between the posts and the rafters 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.

$k = 188 \cdot pli$

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:

$q_e = 17.45 \cdot psf$ wind load

$q_{wwpost} := q_e \cdot a$ $\quad q_{wwpost} = 14.54 \cdot pli$

$M_{wind} := \left(q_{wwpost} \cdot \frac{L_{post\_bndg}^{2}}{8} \right)$ $\quad M_{wind} = 44245 \cdot in \cdot lb$

$f_{wind} := \frac{M_{wind}}{S_{xeavepost}}$ $\quad f_{wind} = 615 \cdot psi$

$R := \left(3 \cdot q_{wwpost} \cdot \frac{L_{post\_bndg}}{8} \right)$ $\quad R = 851\,lb$

STEP 5: DETERMINE THE RATIO OF THE FRAME STIFFNESS TO THE ROOF STIFFNESS:
This ratio (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:

$Q := mD \cdot R$ $\quad Q = 832\,lb$

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.

$M_{dfl} = 3964 \cdot in \cdot lb$ $\quad f_{dfl} = 55 \cdot psi$

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

$M_{tot} := mD \cdot M_{wind} + M_{dfl}$ $\quad M_{tot} = 47218 \cdot in \cdot lb$

$f_{tot} := mD \cdot f_{wind} + f_{dfl}$ $\quad f_{tot} = 656 \cdot psi$

MAIN POST DESIGN: (Worst Case)

Calculate allowable unit compression stress, F_{cc}.

$F_{c1} = 575 \cdot psi$ $\quad F_c := F_{c1} \cdot C_{Mcpost} \cdot C_{tpost} \cdot C_{Fcpost} \cdot C_{ipost}$

$F_c = 575 \cdot psi$ Allowable compression stress including load factors

$L_{post\_bndg} = 156 \cdot in$ Bending length of post

$d_{post} = 6 \cdot in$ Minimum unbraced dimension of post

$K_e := 0.8$ $\quad c := 0.8$ $\quad E_{min\_wood} = 400000 \cdot psi$ $\quad E'_{min} := E_{min\_wood} \cdot C_{MEpost} \cdot C_{tpostE} \cdot C_{ipostE}$

$l_e := K_e \cdot L_{post\_bndg}$ $\quad l_e = 124.8 \cdot in$ $\quad E'_{min} = 400000 \cdot psi$

$$F_{cE} := \frac{0.822 \cdot E'_{min}}{\left(\frac{l_e}{d_{post}}\right)^2} \qquad F_{cE} = 760 \cdot psi$$

Load duration factors (C_D):

$C_{Dconst} = 1.25$ $\quad C_{Dwind} = 1.60$

$C_{Dsnow} = 1.15$

Calculate Column Stability Factor, C_p:

$$C_p := \left(\frac{1 + \frac{F_{cE}}{F_c \cdot C_D}}{2 \cdot c}\right) - \sqrt{\left(\frac{1 + \frac{F_{cE}}{F_c \cdot C_D}}{2 \cdot c}\right)^2 - \frac{\frac{F_{cE}}{F_c \cdot C_D}}{c}}$$

$C_{p\_Lr} = 0.71$ $\quad C_{p\_Snow} = 0.74$ $\quad C_{p\_Wind} = 0.62$

$F_{cc\_Lr} := F_c \cdot C_{Dconst} \cdot C_{p\_Lr}$ $\quad F_{cc\_Lr} = 510 \cdot psi$ Allowable compression stress on the post; load case 1

$F_{cc\_Snow} := F_c \cdot C_{Dsnow} \cdot C_{p\_Snow}$ $\quad F_{cc\_Snow} = 487 \cdot psi$ Allowable compression stress on the post; load case 2

$F_{cc\_Wind} := F_c \cdot C_{Dwind} \cdot C_{p\_Wind}$ $\quad F_{cc\_Wind} = 572 \cdot psi$ Allowable compression stress on the post; all load cases except load cases 1 and 2

$W_{roof} = 34 \cdot psf$ Total roof loading

$P_{deadpost} = 1040\,lb$ Axial loading per post due to roof dead load

$P_{Lroofpost} = 5200 \cdot lb$ Axial loading per post due to live roof load

$P_{snowpost} = 7800\,lb$ Axial loading per post due to roof snow load (load case 2)

$P_{snowpost\_fs} = 6006\,lb$ Axial loading per post due to roof snow load (load case 5)

$F_b := F_{b1} \cdot C_{Dwind} \cdot C_{Mbpost} \cdot C_{tpost} \cdot C_{Lpost} \cdot C_{Fbpost} \cdot C_{fupost} \cdot C_{ipost}$

$F_b = 920 \cdot psi$ Allowable bending stress per post including load factors

Check Load Cases:

Load Case 1: Dead Load + Live Roof Load

$f_{b1} := 0$ $\quad f_{b1} = 0 \cdot psi$ Actual bending stress on post

$f_c := \frac{P_{deadpost} + P_{Lroofpost}}{A_{post}}$ $\quad f_c = 173 \cdot psi$ Actual compression stress per post

$CCFALI1 := \left(\frac{f_c}{F_{cc\_Lr}}\right)$ $\quad CCFALI1 = 0.34$

Load Case 2: Dead Load + Snow Load

$f_{b1} := 0$ $\quad f_{b1} = 0 \cdot psi$ Actual bending stress on post

$f_c := \frac{P_{deadpost} + P_{snowpost}}{A_{post}}$ $\quad f_c = 246 \cdot psi$ Actual compression stress per post

$CCFALI2 := \left(\frac{f_c}{F_{cc\_Snow}}\right)$ $\quad CCFALI2 = 0.50$

Load Case 3: Dead Load + 0.6 * Wind Load

$f_{b1} := f_{tot}$ $\quad f_{b1} = 656 \cdot psi$ Actual bending stress on post

$f_c := \frac{P_{deadpost}}{A_{post}}$ $\quad f_c = 29 \cdot psi$ Actual compression stress per post

$CCFALI3 := \left[\left(\frac{f_c}{F_{cc\_Wind}}\right)^2 + \frac{f_{b1}}{F_b \cdot \left(1 - \frac{f_c}{F_{cE}}\right)}\right]$ $\quad CCFALI3 = 0.74$

Check Load Cases - cont'd:

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

$f_{b1} := 0.75 \cdot (f_{tot})$ $f_{b1} = 492 \cdot psi$ Actual bending stress on post

$f_c := \frac{P_{deadpost} + 0.75 \cdot P_{Lroofpost}}{A_{post}}$ $f_c = 137 \cdot psi$ Actual compression stress per post

$$CCFALI4 := \left[\left(\frac{f_c}{F_{cc\_Wind}} \right)^2 + \frac{f_{b1}}{F_b \cdot \left(1 - \frac{f_c}{F_{cE}} \right)} \right]$$ $CCFALI4 = 0.71$

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

$f_{b1} := 0.75 \cdot (f_{tot})$ $f_{b1} = 492 \cdot psi$ Actual bending stress on post

$f_c := \frac{P_{deadpost} + 0.75 \cdot P_{snowpost\_fs}}{A_{post}}$ $f_c = 154 \cdot psi$ Actual compression stress per post

$$CCFALI5 := \left[\left(\frac{f_c}{F_{cc\_Wind}} \right)^2 + \frac{f_{b1}}{F_b \cdot \left(1 - \frac{f_c}{F_{cE}} \right)} \right]$$ $CCFALI5 = 0.74$

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

$f_{b1} := f_{tot}$ $f_{b1} = 656 \cdot psi$ Actual bending stress on post

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

$$CCFALI6 := \left[\left(\frac{f_c}{F_{cc\_Wind}} \right)^2 + \frac{f_{b1}}{F_b \cdot \left(1 - \frac{f_c}{F_{cE}} \right)} \right]$$ $CCFALI6 = 0.73$

$CCFALI = 0.74$ 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:

$q_e = 17.5 \cdot psf$ Eave wall wind pressure from above $q_{roof} = 4.8 \cdot psf$ roof wind

$$Veave\_wind := \frac{\left(0.375 \cdot mD \cdot H_{bldg} \cdot L_{bldg} \cdot q_e\right) + \left(H_{roof} \cdot L_{bldg} \cdot q_{roof}\right)}{2} \qquad Veave\_wind = 3039\,lb$$

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

$$Veave\_seismic := \frac{E}{2} + \frac{E_S}{2} \qquad Veave\_seismic = 2026\,lb$$

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

The controlling load = "Veave_wind" . Therefore, $V_{gable\_shear} = 3039\,lb$

V_{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.

$$vl_{gablewall} := \frac{V_{gable\_shear}}{W_{bldg} - WL_{gableopenings}} \qquad vl_{gablewall} = 217 \cdot plf$$ Left gable shear load

$$vr_{gablewall} := \frac{V_{gable\_shear}}{W_{bldg} - WR_{gableopenings}} \qquad vr_{gablewall} = 101 \cdot plf$$ Right gable shear load

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

$vl_{gablewall} \le 300$ plf — Then install 7/16" OSB, 1/2" CDX plywood or 5/8" T1-11 exterior wood sheathing with 6d nails at 4" o.c. boundary and 12" o.c. field. Provide 2X blocking at all panel edges.

$vr_{gablewall} \le 142$ plf — Use 29 gauge metal sheathing. Install per the Typical Panel detail as shown on the 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:

$q_g = 12.9 \cdot psf$ Gable wall wind pressure $H_{roof} = 6.7\,ft$

$$Vgable\_wind := \frac{0.375 \cdot mD \cdot H_{bldg} \cdot W_{bldg} \cdot q_g + 0.5 \cdot H_{roof} \cdot W_{bldg} \cdot q_g}{2}$$

$Vgable\_wind = 2188\,lb$

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

$$Vgable\_seismic := \frac{E}{2} + E_S$$

$Vgable\_seismic = 2335\,lb$

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

The controlling load = "Vgable_seismic" . Therefore, $V_{eave\_shear} = 2335\,lb$

V_{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.

$$vf_{eavewall} := \frac{V_{eave\_shear}}{L_{bldg} - WF_{eaveopenings}}$$ $vf_{eavewall} = 58 \cdot plf$ Front eave shear load

$$vr_{eavewall} := \frac{V_{eave\_shear}}{L_{bldg} - WR_{eaveopenings}}$$ $vr_{eavewall} = 78 \cdot plf$ Rear eave shear load

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

$vf_{eavewall} \le 142$ plf

$vr_{eavewall} \le 142$ plf

Use 29 gauge metal sheathing. Install per the Typical Panel detail as shown on the 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"

$V_a = 773\,lb$ Lateral shear load at the ground line

$M_a = 1967\,lb \cdot ft$ Moment at the ground line

$d_{ia\_footing} = 2.17\,ft$ Main post footing diameter

$S_{soil} = 100 \cdot psf$ 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.

$d_{epth\_post} = 2.6\,ft$ 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.

Veave_wind = 3039 lb Calculated from above

$$C_{post} := \frac{Veave\_wind \cdot H_{bldg}}{W_{bldg} - W_{gableopenings}}$$ $C_{post} = 3039\,lb$ 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:

$$R_{oof} := \frac{B_{ay}}{2} \cdot W_{bldg} \cdot 2psf$$ $R_{oof} = 400\,lb$ Dead load of roof

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

$G_{able\_wall} = 939\,lb$ Dead load of gable wall

$$P_{osts} := \left(H_{bldg} + d_{epth\_gable\_footing} \right) \cdot W_{post}$$ $d_{epth\_gable\_footing} = 4.0\,ft$ gable post embedment depth

$P_{osts} = 157\,lb$ Weight of post

$d_{ia\_gable\_footing} = 1.5\,ft$ Diameter of gable wall posthole footing

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

Backfill = 910 lb 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).

$$Wt_{tot} := G_{able\_wall} + R_{oof} + P_{osts} + Backfill + P_{skinGU}$$

$Wt_{tot} = 3290\,lb$ Total resistance for gable wall panel uplift. Since Wt_{tot} is greater than the gable wall panel uplift, C_{post}, 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.

$q_{soil} = 1500 \cdot psf$ Soil bearing capacity for footing

$d_{ia\_footing} = 2.2\,ft$ Footing diameter

$A_{footing} := \pi \cdot \left(\frac{d_{ia\_footing}^{2}}{4} \right)$ $A_{footing} = 3.69\,ft^2$ Footing area

$P_{ost\_depth} = 4.0\,ft$ Minimum required post embedment depth

$P_{footing} := A_{footing} \cdot q_{soil} \cdot d_{factor}$ $P_{footing} = 9402\,lb$ End bearing capacity of footing

$P_{snow} = 8840\,lb$ Total footing load

Note that the end bearing capacity ($P_{footing}$) is greater than the snow load (P_{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.

$q_{wegirt} = 3.06 \cdot pli$ $L_{girt\_span} = 114 \cdot in$ Orientation = "Commercial"

$M_{girt} := q_{wegirt} \cdot \frac{L_{girt\_span}^2}{8}$ $M_{girt} = 4970 \cdot in \cdot lb$ Bending moment in the girt

$f_{bgirt} := \frac{M_{girt}}{S_{girt}}$ $f_{bgirt} = 657 \cdot psi$ Stress applied to the girt

Determine the allowable member stress including load factors.

$F_{bGirt} = 1650 \cdot psi$ $C_{Dwind} = 1.60$ $C_{Mbgirt} = 1.00$ $C_{tgirt} = 1.00$ $C_{Lgirt} = 0.99$

$C_{Fgirt} = 1.00$ $C_{fugirt} = 1.00$ $C_{rgirt} = 1.15$

$F_{bgirt} := F_{bGirt} \cdot C_{Dwind} \cdot C_{Mbgirt} \cdot C_{tgirt} \cdot C_{Lgirt} \cdot C_{Fgirt} \cdot C_{fugirt} \cdot C_{rgirt}$ $F_{bgirt} = 2999 \cdot psi$ > f_{bGirt} 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" $Purlin_{spacing} = 24 \cdot in$ o.c.

$L_{purlin\_span} = 111 \cdot in$

$w_{purlin} = 5.34 \cdot pli$ Maximum combined distributed roof load along top edge of purlin

$M_{purlin} := \frac{w_{purlin} \cdot L_{purlin\_span}^2}{8}$ $M_{purlin} = 8218 \cdot in \cdot lb$ Bending moment in the purlin

$f_{bpurlin} := \frac{M_{purlin}}{S_{purlin}}$ $f_{bpurlin} = 1087 \cdot psi$ Bending stress applied to the purlin

Determine the allowable member stress including load factors

$F_{bPurlin} = 1650 \cdot psi$ $C_{Dsnow} = 1.15$ $C_{Mbpurlin} = 1.00$ $C_{tpurlin} = 1.00$ $C_{Lpurlin} = 1.00$

$C_{Fpurlin} = 1.00$ $C_{fupurlin} = 1.00$ $C_{rpurlin} = 1.15$

$F_{bpurlin} := F_{bPurlin} \cdot C_{Dsnow} \cdot C_{Mbpurlin} \cdot C_{tpurlin} \cdot C_{Lpurlin} \cdot C_{Fpurlin} \cdot C_{fupurlin} \cdot C_{rpurlin}$

$F_{bpurlin} = 2182 \cdot psi$ > $f_{bpurlin}$ 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

$z_{Tbolt\_58} = 1590\,lb$ Shear capacity for 5/8" dia. bolts

$z_{Tbolt\_34} = 2190\,lb$ Shear capacity for 3/4" dia. bolts

$z_{Tbolt\_10} = 3600\,lb$ Shear capacity for 1" dia. bolts

$z_{Tnail\_16d} = 122\,lb$ Shear capacity for 16d nails

$z_{Tnail\_20d} = 147\,lb$ Shear capacity for 20d nails

$P_{Tcorbel} = 6800\,lb$ Combined snow, or live roof, and dead loads on corbels

If 5/8 dia. bolts are used:

$N_{bolts58} = 3.7$ Number of 5/8" dia. bolts required in the corbel block, if used.

If 3/4 dia. bolts are used:

$N_{bolts34} = 2.7$ Number of 3/4" dia. bolts required in the corbel block, if used.

If 1 dia. bolts are used:

$N_{bolts10} = 1.6$ Number of 1" dia. bolts required in the corbel block, if used.

If 20d nails are to be used:

$N_{ails20d} = 20.1$ Number of 20d nails required in each corbel block, if used.

If 16d nails are to be used:

$N_{ails16d} = 24.2$ 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.

$Rafter\_style :=$ Double $\quad S_{rafter} :=$ 2x12 $\quad Rafter_{grade} :=$ Sel-Struc

$Rafter_{species} :=$ Doug-Fir $\quad L_{rafter\_span} = 138.0\,in$

$w_{rafter} = 27.5\,pli$ Maximum combined distributed roof load along top edge of rafter

$$M_{rafter} := \frac{w_{rafter} \cdot L_{rafter\_span}^{2}}{8} \qquad M_{rafter} = 65464\,in \cdot lb$$ Bending moment in the rafter

$$f_{brafter} := \frac{M_{rafter}}{S_{xrafter} \cdot Rafter_{qty}} \qquad f_{brafter} = 1034\,psi$$ Bending stress applied to the rafter

Determine the allowable member stress including load factors

$F_{bRafter} = 1500\,psi \quad C_{Dsnow} = 1.15 \quad C_{Mbrafter} = 1.00 \quad C_{trafter} = 1.00 \quad C_{Lrafter} = 0.95$

$C_{Frafter} = 1.00 \quad C_{furafter} = 1.00 \quad C_{rrafter} = 1.00$

$F_{brafter} := F_{bRafter} \cdot C_{Dsnow} \cdot C_{Mbrafter} \cdot C_{trafter} \cdot C_{Lrafter} \cdot C_{Frafter} \cdot C_{furafter} \cdot C_{rrafter}$

$F_{brafter} = 1646\,psi > f_{brafter}$ 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

$z_{Rbolt\_58} = 1590\,lb$ Shear capacity for 5/8" dia. bolts

$z_{Rbolt\_34} = 2190\,lb$ Shear capacity for 3/4" dia. bolts

$z_{Rbolt\_10} = 3600\,lb$ Shear capacity for 1" dia. bolts

$z_{Rnail\_16d} = 122\,lb$ Shear capacity for 16d nails

$z_{Rnail\_20d} = 147\,lb$ Shear capacity for 20d nails

$P_{snow\_eave} = 2040\,lb$ Combined snow, or live roof, and dead loads on eave corbels

$P_{snow\_int} = 2040\,lb$ Combined snow, or live roof, and dead loads on interior corbels

If 5/8 dia. bolts are used:

$N_{bolts58\_eave} = 1.1$ Number of 5/8" dia. bolts required in the rafter corbel block at the eave

$N_{bolts58\_int} = 1.1$ Number of 5/8" dia. bolts required in the rafter corbel block at the interior post

If 3/4 dia. bolts are used:

$N_{bolts34\_eave} = 0.8$ Number of 3/4" dia. bolts required in the rafter corbel block at the eave

$N_{bolts34\_int} = 0.8$ Number of 3/4" dia. bolts required in the rafter corbel block at the interior post

If 1 dia. bolts are used:

$N_{bolts10\_eave} = 0.5$ Number of 1" dia. bolts required in the rafter corbel block at the eave

$N_{bolts10\_int} = 0.5$ Number of 1" dia. bolts required in the rafter corbel block at the interior post

If 20d nails are to be used:

$N_{ails20d\_eave} = 6.0$ Number of 20d nails required in each corbel block at the eave

$N_{ails20d\_int} = 6.0$ Number of 20d nails required in each corbel block at the interior post

If 16d nails are to be used:

$N_{ails16d\_eave} = 7.3$ Number of 16d nails required in each corbel block at the eave

$N_{ails16d\_int} = 7.3$ 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.

$q_{soil} = 1500\,psf$ Soil bearing capacity for footing

$d_{ia\_footing\_SE} = 1.7\,ft$ Footing diameter

$A_{footing\_SE} := \pi \cdot \left(\frac{d_{ia\_footing\_SE}^{2}}{4} \right)$ $A_{footing\_SE} = 2.18\,ft^2$ Footing area

$P_{ost\_depth\_SE} = 3.5\,ft$ Minimum required post embedment depth

$P_{footing\_SE} := A_{footing\_SE} \cdot q_{soil} \cdot d_{factor\_SE}$ $P_{footing\_SE} = 4909\,lb$ End bearing capacity of footing

$P_{snow\_eave} = 2040\,lb$ Total footing load

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

Check uplift on shed eave post:

$P_{ul\_SE} := \left(\frac{W_{shed}}{2} + O_{verhang} \right) \cdot B_{ay} \cdot |q_{ul}|$ $P_{ul\_SE} = 978\,lb$ 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:

$Wt_{post\_hole\_SE} := 150 \cdot pcf \cdot P_{ost\_depth\_SE} \cdot (A_{footing\_SE} - A_{66})$ $Wt_{post\_hole\_SE} = 1014\,lb$ Weight of concrete in post hole

$W_{ulr\_SE} := \left[\left(\frac{W_{shed}}{2} + O_{verhang} \right) + H_{shed} \right] \cdot B_{ay} \cdot 2 \cdot psf + Wt_{post\_hole\_SE}$ $W_{ulr\_SE} = 1354\,lb$ Total uplift resistance

Note that the total uplift resistance (W_{ulr_SE}) is greater than the uplift load (P_{ul_SE}). This is OK.

SUMMARY OF RESULTS:

Building Dimensions

$W_{bldg} = 40\,ft$ Width of Building

$L_{bldg} = 50\,ft$ Length of Building

$H_{bldg} = 14\,ft$ Eave Height of Building

$O_{verhang} = 0 \cdot in$ Length of Eave Overhang

$R_{pitch} = 4$ / 12 Roof pitch

Building Design Loads

Ground_snow_load = 30·psf

Roof_dead_load = 3·psf

Wind_speed = 130·mph

Wind_exposure = "C"

Seismic_Design_Category = "D"

Post Details

Post_size = "6x6"

Post_grade = "#2 Hem-Fir"

Usage = 74 % Combined stress usage of post

Footing Details:

Post_is = "not constrained by a concrete slab"

Postdepth = 4.0 ft Design Post Depth

$d_{ia\_footing} = 2.2\,ft$ Design Footing Diameter

Footingusage = 94 % Stress usage of footing

Shear Wall Details:

$v_{gablewall} = 217 \cdot plf$ Max. shear in gable wall

$v_{eavewall} = 78 \cdot plf$ Max. shear in eave wall

Girt Details:

Girt_usage = "22 % Stress usage of wall girt"

Orientation = "Commercial"

Purlin Details:

Purlin_usage = 50 % Stress usage of roof purlin

Corbel Block Bolts:

$N_{bolts58} = 3.7$ Number of 5/8" dia. bolts required in the corbel block, if used.

$N_{bolts34} = 2.7$ Number of 3/4" dia. bolts required in the corbel block, if used.

$N_{bolts10} = 1.6$ Number of 1" dia. bolts required in the corbel block, if used.

$N_{ails20d} = 20.1$ Number of 20d nails required in each corbel block, if used.

$N_{ails16d} = 24.2$ Number of 16d nails required in each corbel block, if used.

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.