Knoll Drive
Special Use Permit

December 20, 2018

LUMOS & ASSOCIATES

9222 Prototype Drive
Reno, Nevada 89521
Tel. 775.827.6111
www.lumosinc.com

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Maps

PROJECT DESCRIPTION

PROJECT SUMMARY

Owner:	Britton Family 2006 Trust
APN Number:	007-131-19 & 007-131-20
Request:	This is a request for Special Use Permit for hillside development to allow for grading on a slope greater than 33%.
Location:	The ±4.49-acre site is located on the west side of Knoll Drive and north of Canyon Drive.
Zoning:	SF1A
Master Plan:	Low Density Residential

PROJECT BACKGROUND

This request is for a special use permit for hillside development to allow for a driveway and building pad for single family home on slopes greater than 33 percent. The ±4.49 acre site consists of two parcels (APN 007-131-19 & 007-131-20) and is located north of Kings Canyon Road and west of Knoll Drive. The property is currently two separate parcels, and upon approval of the special use permit, an application for a lot line deletion will be submitted to combine the two parcels into one. No additional variances or special use permits are requested with this application.

The planned home is a single story, 3 bedroom, 2 ½ bath family residence comprised of approximately 2,966 square feet. The peak of the roof is projected to be 25 feet in height. The grading has been designed to preserve as many of the natural features as possible, and honor the significance of the natural beauty of the hillside. This includes the many rock outcroppings which exist on the property. Existing slopes on the property range from 12% to 38%, generally sloping to the east. There are existing residences southeast of the property on Canyon Drive and to the south at the corner of Knoll Drive and Canyon Drive. At the northeast end of Knoll Drive, another existing residence is developed on a ±4.29 acre parcel.

The site has been designed to provide for a 12-foot wide driveway, which will begin near the north end of Knoll Drive, near the north end of the property and maintain a grade less than 12 percent. The driveway climbs the hill with three gentle turns, and terminates at the building pad, near the center of the property. While a U-shaped driveway is desired, it is not achievable if the maximum slope is to be less than 12 percent. The driveway will be approximately 1,010-feet in length, and will include two 10-foot wide x 30-foot long turnouts, for fire protection. The driveway terminates at the house pad and incorporates a hammerhead design for fire truck turnaround movements.

Drainage

The hillside will be stabilized with three sections of 4-foot (maximum height) retaining walls along the edge of the driveway. The total length of the three retaining walls will be approximately 670-feet. Drainage ditches with swales will be constructed on both sides of the walls, comprised of 2-foot wide and 9-inch deep gravel drainage swales. Ditches will be

protected with an 8 oz. geotextile overlain with dry rubble or class 150 rip-rap. All ditches have enough capacity to convey the 5-year and 100-year storm runoff to Knoll Drive. Sediment control has been addressed through a series of check dams to be installed every 15-feet on slopes greater than 10 percent.

To handle runoff, class 150 rip-rap, approximately 1-foot deep, will be placed at the channel outflows. This occurs on the north and south ends of the property and drains water into an existing ditch along Knoll Drive.

Grading

Grading has been minimized in an effort to preserve the character of the hillside, and complement natural forms of the land. Much of the lower half of the property will be left undisturbed. Cut volumes are anticipated to be approximately 16,725 cubic yards with fill volumes of 6,558 cubic yards for a net cut area of 10,168 cubic yards. Disturbed areas will be revegetated with soil inoculants, wood fiber mulch, tackifiers and a seed mix, all within 30 days of disturbance.

Fire Protection

The driveway has been designed with two vehicle turnouts, measuring 10-feet wide by 30-feet long. The driveway ends at the building pad where a hammerhead provides for safe firetruck access and turning capabilities. A minimum of 30-feet of defensible space protection is provided around the building pad. The building pad is approximately 80-feet from the west property line and 60-feet from the south property line.

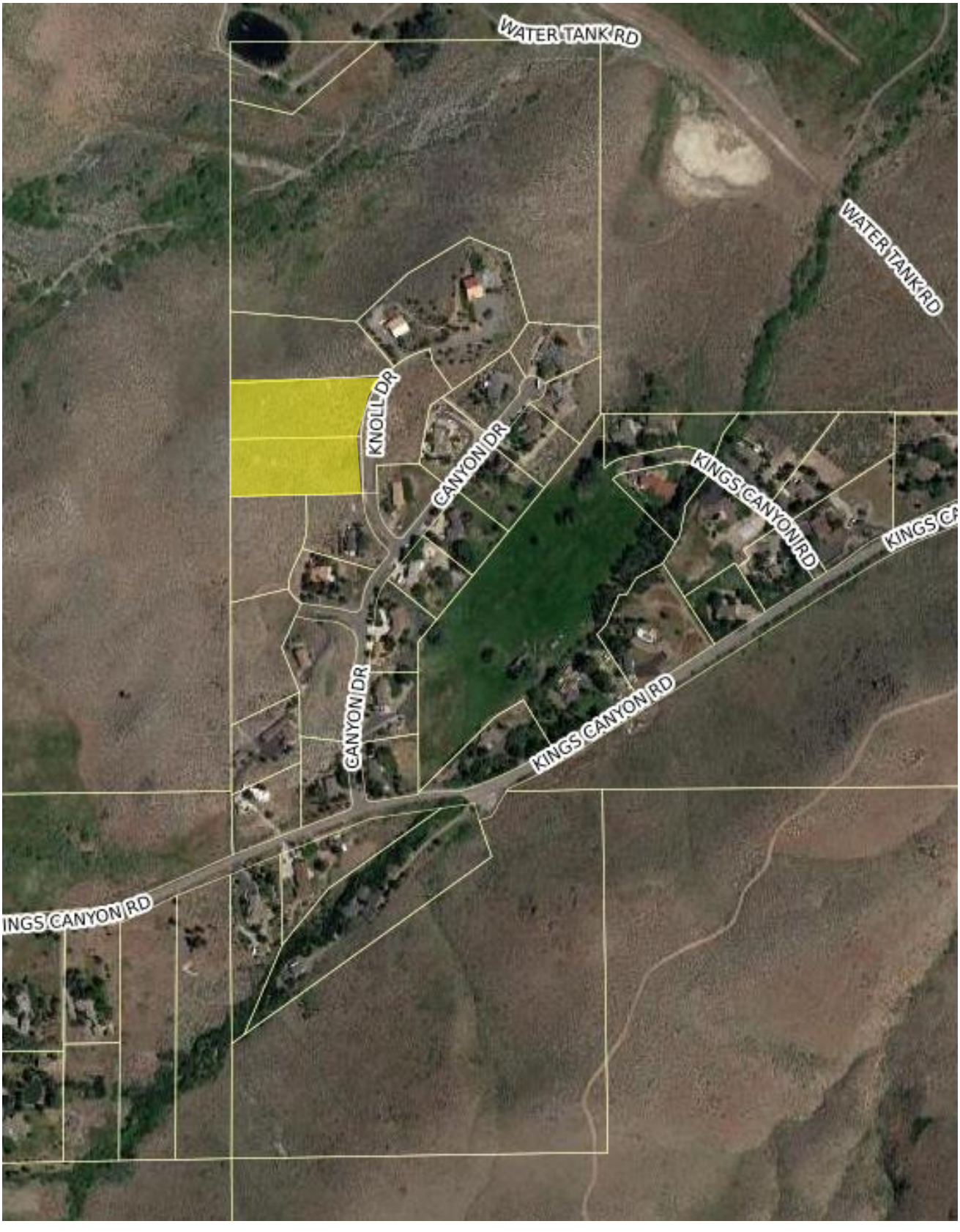
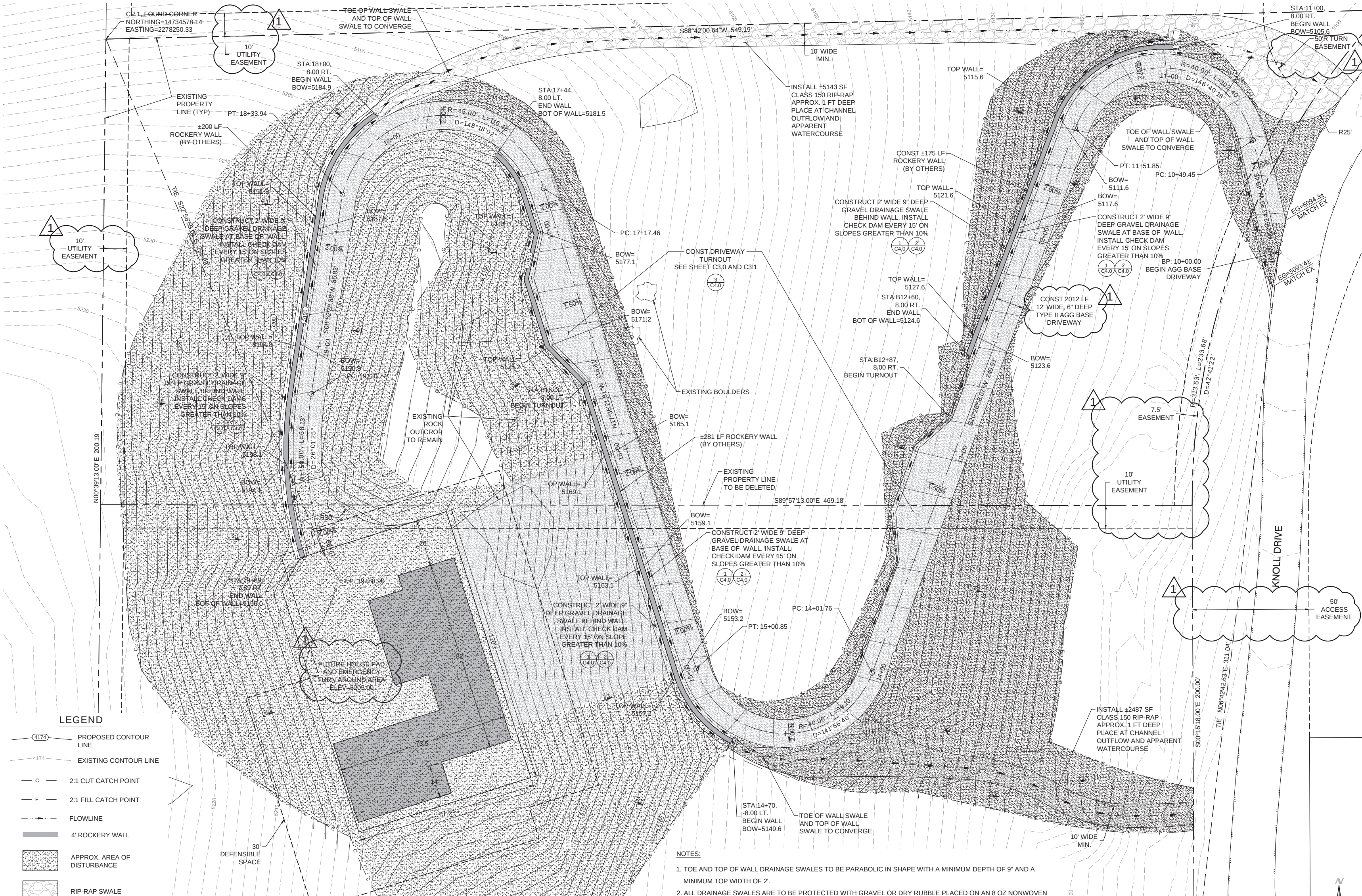


Figure 1 - Vicinity Map

Figure 2 – Zoning Map

Figure 3 - Grading Plan



CONTROL TABLE				
CONTROL POINT NO.	NORTHING	EASTING	ELEVATION	DESCREITION
1	14734578.14'	2278250'-3.96"	5191.99	FOUND 5/8" REBAR & TAG
2	14734177.58'	2278718'-1.44"	5081.88	

NOTES:

1. TOE AND TOP OF WALL DRAINAGE SWALES TO BE PARABOLIC IN SHAPE WITH A MINIMUM DEPTH OF 9" AND A MINIMUM TOP WIDTH OF 2'.
2. ALL DRAINAGE SWALES ARE TO BE PROTECTED WITH GRAVEL OR DRY RUBBLE PLACED ON AN 8 OZ NONWOVEN GEOTEXTILE. ANCHOR GEOTEXTILE AT WALL PER WALL DESIGN.
3. SWALES ARE TO BE COMPACTED TO 90% OF MAXIMUM DRY DENSITY AND WITHIN 2% OF OPTIMUM MOISTURE CONTENT BEFORE THE PLACEMENT OF GRAVEL OR DRY RUBBLE.
4. GRADING CONTRACTOR SHALL STRIP TOPSOIL FROM SITE AND STOCKPILE FOR PLACEMENT AFTER GRADES ARE ESTABLISHED. ALL AREAS TO BE SEEDED SHALL INCLUDE A 4" LAYER OF TOPSOIL, MINIMUM. SEE REVEGETATION SPECIFICATIONS ON SHEET C4.0.

LUMOS & ASSOCIATES
9222 PROTOTYPE DRIVE
RENO, NV 89521
TEL: 775.827.6111
WWW.LUMOSINC.COM

PROFESSIONAL ENGINEER RYAN SPREEMAN Exp. 6/30/20 CIVIL No. 023420 STATE OF NEVADA
12-18-18

JACK AND COLLEEN BRITTON
KNOLL DRIVE SITE GRADING PROJECT GRADING PLAN
CARSON CITY NEVADA

REV	DATE	DESCRIPTION	BY
1	12/18	CITY COMMENTS	RS

PERMIT SET
OCTOBER 30, 2018

BAR IS 1 INCH ON ORIGINAL DRAWING
0 20'
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

C2.0

DRAWN BY: KLN
DESIGNED BY: KLN
CHECKED BY: RS
JOB NO.: 9407.000

Figure 4 - East and West Building Elevations

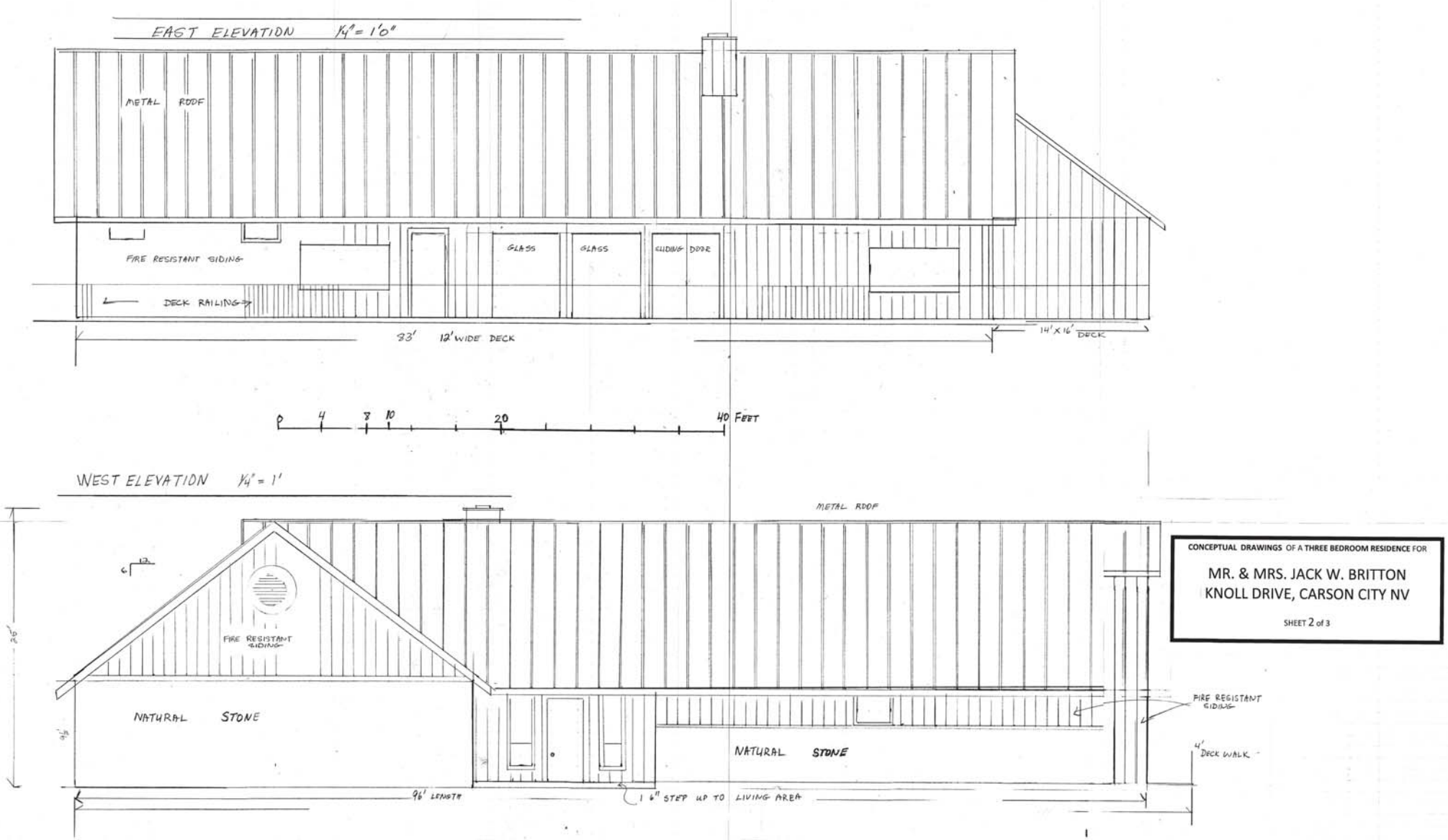
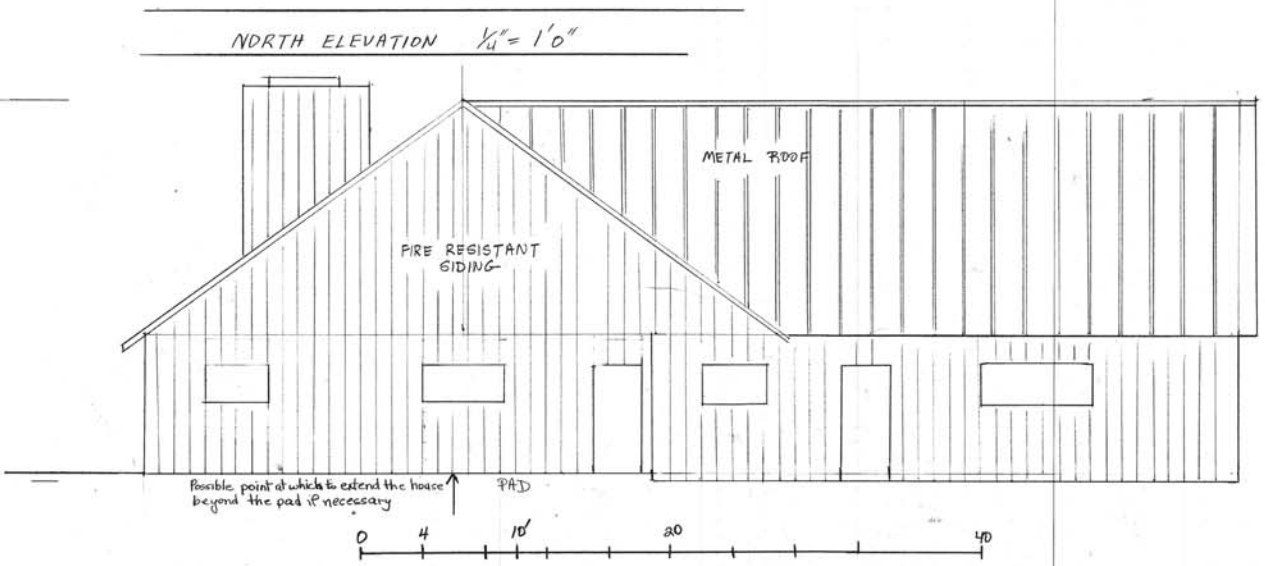
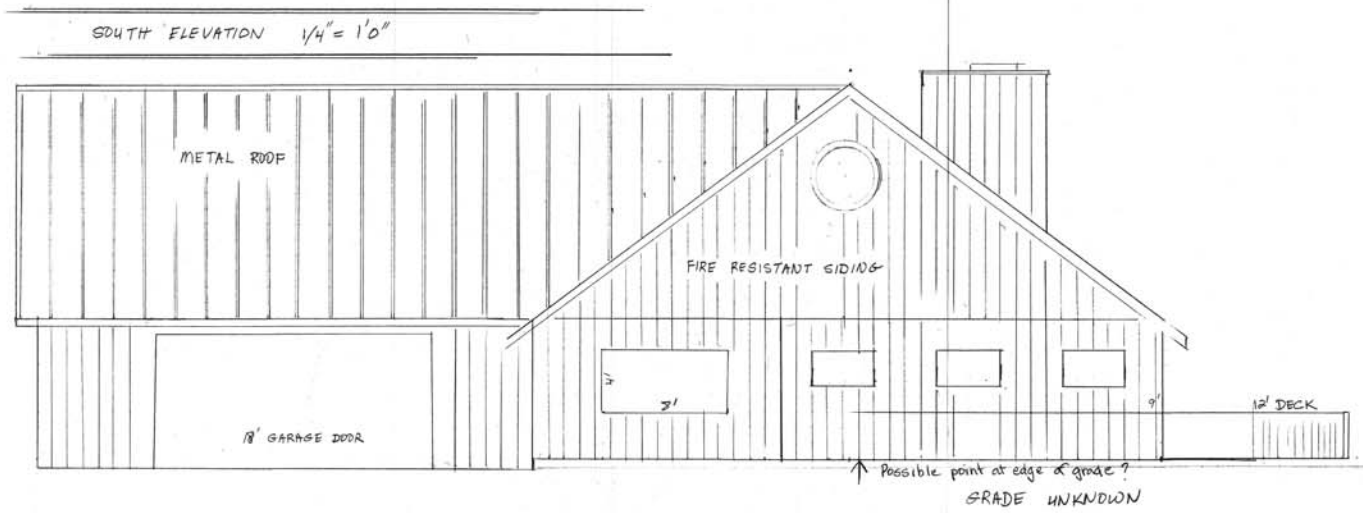


Figure 5 - North and South Building Elevations



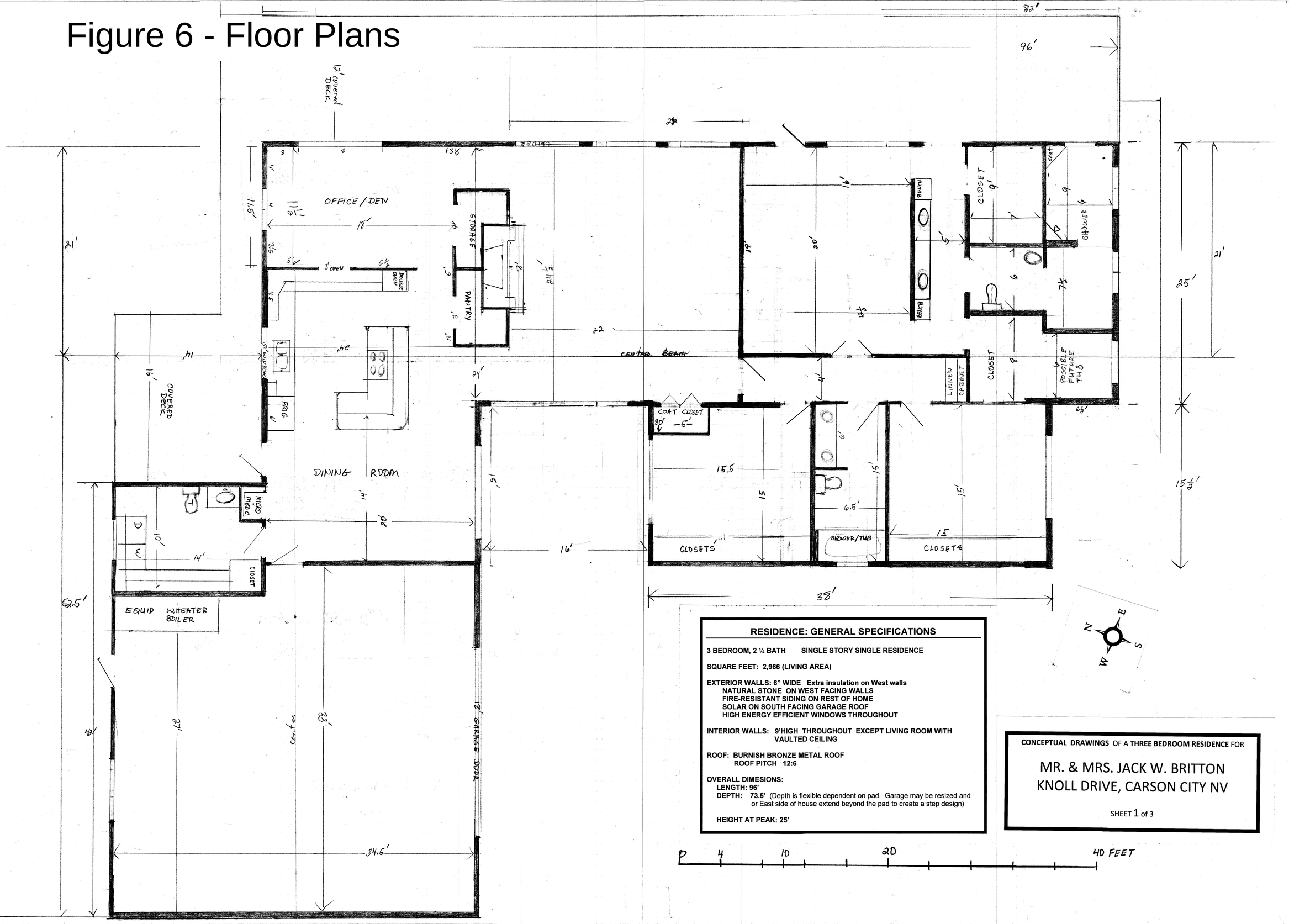


CONCEPTUAL DRAWINGS OF A THREE BEDROOM RESIDENCE FOR

MR. & MRS. JACK W. BRITTON
KNOLL DRIVE, CARSON CITY NV

SHEET 3 of 3

Figure 6 - Floor Plans



RESIDENCE: GENERAL SPECIFICATIONS

3 BEDROOM, 2 ½ BATH SINGLE STORY SINGLE RESIDENCE

SQUARE FEET: 2,966 (LIVING AREA)

EXTERIOR WALLS: 6" WIDE Extra insulation on West walls
NATURAL STONE ON WEST FACING WALLS
FIRE-RESISTANT SIDING ON REST OF HOME
SOLAR ON SOUTH FACING GARAGE ROOF
HIGH ENERGY EFFICIENT WINDOWS THROUGHOUT

INTERIOR WALLS: 9'HIGH THROUGHOUT EXCEPT LIVING ROOM WITH VAULTED CEILING

ROOF: BURNISH BRONZE METAL ROOF
ROOF PITCH 12:6

OVERALL DIMESIONS:
LENGTH: 96'
DEPTH: 73.5' (Depth is flexible dependent on pad. Garage may be resized and or East side of house extend beyond the pad to create a step design)

HEIGHT AT PEAK: 25'

CONCEPTUAL DRAWINGS OF A **THREE BEDROOM RESIDENCE** FOR

MR. & MRS. JACK W. BRITTON
KNOLL DRIVE, CARSON CITY NV

FINDINGS

In order to approve a Special Use Permit application, the Planning Commission shall find the following:

Findings:

1. The project <u>will be consistent</u> with the objectives of the Master Plan elements.

Response: The project is consistent with the following Master Plan elements:

Balanced Land Use Pattern: Project meets the provisions of the Growth Management Ordinance (1.1d, Municipal Code 18.12).

Protect existing site features, as appropriate, including mature trees or other character-defining features (1.4c).

Protect environmentally sensitive areas through proper setbacks, dedication or other mechanisms (3.1b).

The subject property is located in the King Canyon Park development, an interface between open space and residential. One of the guiding principles of the city's balanced land use pattern is stewardship of natural, environmentally, and visually sensitive areas. This includes prominent hillsides surrounding the community. Knoll is one of those hillsides. Eventually, the single story, single family residence planned for this property will honor the significance of the natural beauty of the hillside and seeks to keep it in its natural state, as much as possible. The house will nestle into the knoll itself and be unobtrusive. The design is intended to preserve as many of the natural features as possible, including rock outcroppings.

In addition, the construction of a driveway on the property will minimize the impact of potential fire disasters in a fire prone area (1.4a)(1.5a.b), by providing the fire department with easier emergency access from Knoll Drive to City owned land along the western border of the subject property.

2. Will not be detrimental to the use, peaceful enjoyment, economic value, or development of surrounding properties or the general neighborhood; and is compatible with and preserves the character and integrity of adjacent development and neighborhoods or includes improvements or modifications either on-site or within the public right-of-way to mitigate development related to adverse impacts such as noise, vibrations, fumes, odors, dust, glare or physical activity.

Response: The proposed development is consistent with existing single family homes in the surrounding neighborhood. The Kings Canyon Park development serves as an interface between Public/Quasi-Public land and urban development. Properties range in size from 1 to 24 acres. The entire west border of the subject property and the development is Public/Quasi-

Public land owned by the City. The majority of development within this area is also constrained with slopes and steep terrain. The grading plan has been designed to work with the terrain, rather than against the terrain. The driveway width and maximum slope of 12 percent is consistent with the Code provisions for hillside development. The driveway also provides two separate turnout pockets and a hammerhead design at the terminus of the driveway for fire safety and access.

3. The project will have little or no detrimental effect on vehicular or pedestrian traffic.

Response: The project will have little or no detrimental effect on vehicular or pedestrian traffic in the area. The special use permit will allow for grading on slopes greater than 33 percent. The site grading is in compliance with the hillside development code and grading has been limited to areas needed for the driveway and building pad, where feasible. This request should be no impacts on vehicular or pedestrian traffic.

4. Will not overburden existing public services and facilities, including schools, police and fire protection, water, sanitary sewer, public roads, storm drainage and other public improvements.

Response: The project will allow for one single family residence and will have minimal impacts on local schools. Schools servicing this area include Bordewich-Bray Elementary, Carson Middle School and Carson High School.

The project is not anticipated to negatively impact police service, as the request is only for one home.

The driveway width and maximum slope of 12 percent is consistent with the Code provisions for hillside development. The driveway also provides two separate turnout pockets and a hammerhead design at the terminus of the driveway for fire safety and vehicle turnaround.

The property will be served by a private well. Adequate water supply for fire suppression will also be addressed later in the building permit process. The project will be serviced by a private septic system. Perk tests performed on the property at various locations were very favorable. The results are included in the geotech report.

The proposed grading on the 4.5 acre property will be designed in accordance with Carson City Municipal Code and Development Standards. Best Management Practices techniques will be implemented to manage the quantity and improve the quality of storm water runoff, minimize erosion, and minimize potential discharges to adjacent properties. As designed, the project will not have a detrimental effect on surrounding properties in terms of storm water. On-site flows will be managed with ditches at the tops and bottoms of all retaining walls and check dams will be installed where velocities become excessive. Rip-rap will be placed on all slopes where storm water is directed.

5. Meets the definition and specific standards set forth elsewhere in Carson City Municipal Code, Title 18 for such particular use and meets the purpose statement of that district.

Response: This project meets the purpose statement of CCMC Title 18.04.045 (SF1A). The purpose of the SF1A, SF2A and SF21 districts are to provide for the development of low-density, large lot and single-family detached residential units. The SF1A, SF2A and SF21 districts are consistent with the policies of the suburban residential category of the master plan. It also meets the requirements for CCMC Title 18.08.010 - Hillside Development. As designed, this project will protect the public health, safety, welfare, and resources of Carson City. Strict adherence to the code, will minimize any potential risk of landslides, erosion, sedimentation, and aesthetic degradation of the natural environment.

6. This project will not be detrimental to the public health, safety, convenience and welfare.

Response: The project will not be detrimental to the public health, safety, convenience or welfare. Two parcels will be merged into one lot and a single family residence will be developed. The site has been designed so that grading is limited for the purpose of the driveway and pad site, preserving the remainder of the property in its natural state. All disturbed land will be revegetated and returned to a natural environment.

7. This project will not result in material damage or prejudice to other property in the vicinity, as a result of proposed mitigation measures.

Response: The property will be graded to meet the hillside development regulations and to reduce grading impacts, where feasible. Drainage for this project is designed in accordance with Carson City Municipal Code and Development Standards. Best Management Practice techniques will be implemented to manage and improve the quality of storm water runoff, minimize erosion, and minimize potential discharges to adjacent properties. As designed, the project will not have a detrimental effect on surrounding properties in terms of storm water. All disturbed areas will be revegetated using soil amendments, soil inoculants, seeding and application of wood fiber mulch with tackifiers, within 30 days from the disturbance.

To ensure the preservation of the natural character of the hillside to complement the natural forms of the land, every effort has been made in the grading plan to minimize grading and cut and fill operations. All cuts and fills will be rounded off in order to avoid the appearance of scaring.

Figure 7 – Site Photos

Carson City Planning Division
108 E. Proctor Street · Carson City NV 89701
Phone: (775) 887-2180 • E-mail: planning@carson.org

FILE # SUP - 18 -

APPLICANT	PHONE #
Jack & Colleen Britton	707-486-3944
MAILING ADDRESS, CITY, STATE, ZIP	
3937 Sierra Vista Drive Vacaville, CA 95688	
EMAIL ADDRESS	
jwbritton181@gmail.com	
PROPERTY OWNER	**PHONE #**
Jack & Colleen Britton	707-486-3944
MAILING ADDRESS, CITY, STATE, ZIP	
3937 Sierra Vista Drive Vacaville, CA 95688	
EMAIL ADDRESS	
jwbritton181@gmail.com	
APPLICANT AGENT/REPRESENTATIVE	**PHONE #**
Lumos & Assoc./Angela Fuss	775-827-6111
MAILING ADRESS, CITY STATE, ZIP	
9222 Prototype Drive, Reno, NV 89521	
EMAIL ADDRESS	
afuss@lumosinc.com	

FOR OFFICE USE ONLY:

CCMC 18.02.080

SPECIAL USE PERMIT

FEE*: **$2,450.00 MAJOR**
$2,200.00 MINOR (Residential zoning districts)
+ noticing fee
***Due after application is deemed complete by staff**

SUBMITTAL PACKET – 4 Complete Packets (1 Unbound Original and 3 Copies) including:

- Application Form
- Detailed Written Project Description
- Site Plan
- Building Elevation Drawings and Floor Plans
- Special Use Permit Findings
- Master Plan Policy Checklist
- Applicant's Acknowledgment Statement
- Documentation of Taxes Paid-to-Date
- Project Impact Reports (Engineering)

CD or USB DRIVE with complete application in PDF

Application Received and Reviewed By:

Submittal Deadline: See attached Planning Commission application submittal schedule.

Note: Submittals must be of sufficient clarity and detail for all departments to adequately review the request. Additional information may be required.

Project's Assessor Parcel Number(s):	Street Address	
007-131-19, 007-131-20	19 & 20 Knoll Drive, Carson City, NV 89703	
Project's Master Plan Designation	**Project's Current Zoning**	**Nearest Major Cross Street(s)**
Low Density Residential	SF1A	Canyon Drive

Please provide a brief description of your proposed project and/or proposed use below. Provide additional pages to describe your request in more detail.
This is a request for a Special Use Permit for hillside development to allow for grading on a slope greater than 33%.

PROPERTY OWNER'S AFFIDAVIT

I, Shirley Colleen Britton, being duly deposed, do hereby affirm that I am the record owner of the subject property, and that I have knowledge of, and I agree to, the filing of this application.

Shirley Colleen Britton — Signature
3937 Sierra Vista Dr. Vacaville, CA — Address
12/12/18 — Date

Use additional page(s) if necessary for additional owners.

STATE OF NEVADA)
COUNTY)

On December 12, 2018, Shirley Colleen Britton, personally appeared before me, a notary public, personally known (or proved) to me to be the person whose name is subscribed to the foregoing document and who acknowledged to me that he/she executed the foregoing document.

Notary Public

KRISTIN LYNN NUNES
NOTARY PUBLIC
STATE OF NEVADA
No. 16-4412-5 My Appt. Exp. Nov. 29, 2020

NOTE: If your project is located within the Historic District or airport area, it may need to be scheduled before the Historic Resources Commission or the Airport Authority in addition to being scheduled for review by the Planning Commission. Planning staff can help you make this determination.

Carson City Planning Division
108 E. Proctor Street · Carson City NV 89701
Phone: (775) 887-2180 • E-mail: planning@carson.org

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APPLICANT Jack & Colleen Britton	**PHONE #** 707-486-3944
MAILING ADDRESS, CITY, STATE, ZIP 3937 Sierra Vista Drive	Vacaville, CA 95688
EMAIL ADDRESS jwbritton181@gmail.com	
PROPERTY OWNER Jack & Colleen Britton	**PHONE #** 707-486-3944
MAILING ADDRESS, CITY, STATE, ZIP 3937 Sierra Vista Drive	Vacaville, CA 95688
EMAIL ADDRESS jwbritton181@gmail.com	
APPLICANT AGENT/REPRESENTATIVE Lumos & Assoc./Angela Fuss	**PHONE #** 775-827-6111
MAILING ADRESS, CITY STATE, ZIP 9222 Prototype Drive, Reno, NV 89521	
EMAIL ADDRESS afuss@lumosinc.com	

FOR OFFICE USE ONLY:

CCMC 18.02.080

SPECIAL USE PERMIT

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CD or USB DRIVE with complete application in PDF

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_____

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Signature _____ Address 3937 SIERRA VISTA DR VACAVILLE CA. 95688 Date 12/12/18

Use additional page(s) if necessary for additional owners.

STATE OF NEVADA)
COUNTY)

On December 12, 2018, Jack W Britton, personally appeared before me, a notary public, personally known (or proved) to me to be the person whose name is subscribed to the foregoing document and who acknowledged to me that he/she executed the foregoing document.

Notary Public

KRISTIN LYNN NUNES
NOTARY PUBLIC
STATE OF NEVADA
No. 16-4412-5 My Appt. Exp. Nov. 29, 2020

NOTE: If your project is located within the Historic District or airport area, it may need to be scheduled before the Historic Resources Commission or the Airport Authority in addition to being scheduled for review by the Planning Commission. Planning staff can help you make this determination.

ACKNOWLEDGMENT OF APPLICANT

I certify that the forgoing statements are true and correct to the best of my knowledge and belief. I agree to fully with all conditions as established by the Planning Commission. I am aware that this permit becomes null and void if the use of is not initiated within one-year of the date of the Planning Commission's approval; and I understand that this permit may be revoked for violation of any of the conditions of approval. I further understand that approval of this application does not exempt me from all City code requirements.

Applicant's Signature	Print Name	Date
	JACK W BRITTON	12/12/18
	Shirley Colleen Britton	12/12/18

Master Plan Policy Checklist

Special Use Permits & Major Project Reviews & Administrative Permits

PURPOSE

The purpose of a development checklist is to provide a list of questions that address whether a development proposal is in conformance with the goals and objectives of the 2006 Carson City Master Plan that are related to non-residential and multi-family residential development. This checklist is designed for developers, staff, and decision-makers and is intended to be used as a guide only.

Development Name: Britton Family SF Residence - GRADING

Reviewed By: _____

Date of Review: _____

DEVELOPMENT CHECKLIST

The following five themes are those themes that appear in the Carson City Master Plan and which reflect the community's vision at a broad policy level. Each theme looks at how a proposed development can help achieve the goals of the Carson City Master Plan. A check mark indicates that the proposed development meets the applicable Master Plan policy. The Policy Number is indicated at the end of each policy statement summary. Refer to the Comprehensive Master Plan for complete policy language.

CHAPTER 3: A BALANCED LAND USE PATTERN

The Carson City Master Plan seeks to establish a balance of land uses within the community by providing employment opportunities, a diverse choice of housing, recreational opportunities, and retail services.

Is or does the proposed development:

- [X] Meet the provisions of the Growth Management Ordinance (1.1d, Municipal Code 18.12)?
- [ ] Use sustainable building materials and construction techniques to promote water and energy conservation (1.1e, f)?
- [ ] Located in a priority infill development area (1.2a)?
- [ ] Provide pathway connections and easements consistent with the adopted Unified Pathways Master Plan and maintain access to adjacent public lands (1.4a)?

- [x] Protect existing site features, as appropriate, including mature trees or other character-defining features (1.4c)?
- [ ] At adjacent county boundaries or adjacent to public lands, coordinated with the applicable agency with regards to compatibility, access and amenities (1.5a, b)?
- [ ] In identified Mixed-Use areas, promote mixed-use development patterns as appropriate for the surrounding context consistent with the land use descriptions of the applicable Mixed-Use designation, and meet the intent of the Mixed-Use Evaluation Criteria (2.1b, 2.2b, 2.3b, Land Use Districts, Appendix C)?
- [x] Meet adopted standards (e.g. setbacks) for transitions between non-residential and residential zoning districts (2.1d)?
- [x] Protect environmentally sensitive areas through proper setbacks, dedication, or other mechanisms (3.1b)?
- [x] Sited outside the primary floodplain and away from geologic hazard areas or follows the required setbacks or other mitigation measures (3.3d, e)?
- [x] Provide for levels of services (i.e. water, sewer, road improvements, sidewalks, etc.) consistent with the Land Use designation and adequate for the proposed development (Land Use table descriptions)?
- [ ] If located within an identified Specific Plan Area (SPA), meet the applicable policies of that SPA (Land Use Map, Chapter 8)?

CHAPTER 4: EQUITABLE DISTRIBUTION OF RECREATIONAL OPPORTUNITIES

The Carson City Master Plan seeks to continue providing a diverse range of park and recreational opportunities to include facilities and programming for all ages and varying interests to serve both existing and future neighborhoods.

Is or does the proposed development:

- [ ] Provide park facilities commensurate with the demand created and consistent with the City's adopted standards (4.1b)?
- [ ] Consistent with the Open Space Master Plan and Carson River Master Plan (4.3a)?

CHAPTER 5: ECONOMIC VITALITY

The Carson City Master Plan seeks to maintain its strong diversified economic base by promoting principles which focus on retaining and enhancing the strong employment base, include a broader range of retail services in targeted areas, and include the roles of technology, tourism, recreational amenities, and other economic strengths vital to a successful community.

Is or does the proposed development:

- ☐ Encourage a citywide housing mix consistent with the labor force and non-labor force populations (5.1j)
- ☐ Encourage the development of regional retail centers (5.2a)
- ☐ Encourage reuse or redevelopment of underused retail spaces (5.2b)?
- ☐ Support heritage tourism activities, particularly those associated with historic resources, cultural institutions and the State Capitol (5.4a)?
- ☐ Promote revitalization of the Downtown core (5.6a)?
- ☐ Incorporate additional housing in and around Downtown, including lofts, condominiums, duplexes, live-work units (5.6c)?

CHAPTER 6: LIVABLE NEIGHBORHOODS AND ACTIVITY CENTERS

The Carson City Master Plan seeks to promote safe, attractive and diverse neighborhoods, compact mixed-use activity centers, and a vibrant, pedestrian-friendly Downtown.

Is or does the proposed development:

- ☒ Use durable, long-lasting building materials (6.1a)?
- ☐ Promote variety and visual interest through the incorporation of varied building styles and colors, garage orientation and other features (6.1b)?
- ☐ Provide variety and visual interest through the incorporation of well-articulated building facades, clearly identified entrances and pedestrian connections, landscaping and other features consistent with the Development Standards (6.1c)?
- ☐ Provide appropriate height, density and setback transitions and connectivity to surrounding development to ensure compatibility with surrounding development for infill projects or adjacent to existing rural neighborhoods (6.2a, 9.3b 9.4a)?
- ☐ If located in an identified Mixed-Use Activity Center area, contain the appropriate mix, size and density of land uses consistent with the Mixed-Use district policies (7.1a, b)?
- ☐ If located Downtown:
  - o Integrate an appropriate mix and density of uses (8.1a, e)?
  - o Include buildings at the appropriate scale for the applicable Downtown Character Area (8.1b)?
  - o Incorporate appropriate public spaces, plazas and other amenities (8.1d)?
- ☐ Incorporate a mix of housing models and densities appropriate for the project location and size (9.1a)?

CHAPTER 7: A CONNECTED CITY

The Carson City Master Plan seeks promote a sense of community by linking its many neighborhoods, employment areas, activity centers, parks, recreational

amenities and schools with an extensive system of interconnected roadways, multi-use pathways, bicycle facilities, and sidewalks.

Is or does the proposed development:

- ☐ Promote transit-supportive development patterns (e.g. mixed-use, pedestrian-oriented, higher density) along major travel corridors to facilitate future transit (11.2b)?
- ☐ Maintain and enhance roadway connections and networks consistent with the Transportation Master Plan (11.2c)?
- ☐ Provide appropriate pathways through the development and to surrounding lands, including parks and public lands, consistent with the Unified Pathways Master Plan (12.1a, c)?

CARSON CITY
Capital of Nevada

Treasurer Home | Assessor Data Inquiry | Back to Last Page

Secured Tax Inquiry Detail for Parcel # 007-131-19

Property Location: KNOLL DR, SEC 13 15/19
Billed to: BRITTON FAMILY 2006 TRUST
% JACK & SHIRLEY BRITTON, TT
3937 SIERRA VISTA DR
VACAVILLE, CA 95688-0000

Tax Year: 2018-19
Roll #: 002233
District: 2.5
Tax Service:
Land Use Code: 120

Code Table

Outstanding Taxes:

Prior Year	Tax	Penalty/Interest	Total	Amount Paid	Total Due
Current Year					**No Taxes Owing**
08/20/18	292.40		292.40	292.40	.00
10/01/18	291.00		291.00	291.00	.00
01/07/19	291.00		291.00	291.00	.00
03/04/19	291.00		291.00	291.00	.00
Totals:	**1,165.40**	**.00**	**1,165.40**	**1,165.40**	

Payment Cart | History

Additional Information

	2018-19	2017-18	2016-17	2015-16	2014-15
Tax Rate	3.5700	3.5700	3.5200	3.5200	3.5400
Tax Cap Percent	4.2	2.6	.2	3.2	3.0
Abatement Amount	1,180.81	1,223.36	925.13		38.25
Recapture Amount	109.25	109.25	109.25		

CARSON CITY
Capital of Nevada

Treasurer Home | Assessor Data Inquiry | Back to Last Page

Secured Tax Inquiry Detail for Parcel # 007-131-20

Property Location: KNOLL DR, SEC 13 15/19 S2 SW4
Billed to: BRITTON FAMILY 2006 TRUST
% JACK & SHIRLEY BRITTON, TT
3937 SIERRA VISTA DR
VACAVILLE, CA 95688-0000

Tax Year: 2018-19
Roll #: 002234
District: 2.5
Tax Service:
Land Use Code: 120

Code Table

Outstanding Taxes:

Prior Year	Tax	Penalty/Interest	Total	Amount Paid	Total Due
Current Year					**No Taxes Owing**
08/20/18	292.40		292.40	292.40	.00
10/01/18	291.00		291.00	291.00	.00
01/07/19	291.00		291.00	291.00	.00
03/04/19	291.00		291.00	291.00	.00
Totals:	**1,165.40**	**.00**	**1,165.40**	**1,165.40**	

Payment Cart | History

Additional Information

	2018-19	2017-18	2016-17	2015-16	2014-15
Tax Rate	3.5700	3.5700	3.5200	3.5200	3.5400
Tax Cap Percent	4.2	2.6	.2	3.2	3.0
Abatement Amount	1,180.81	1,223.36	925.13		38.25
Recapture Amount	109.25	109.25	109.25		

DRAINAGE STUDY

for

19 & 20 Knoll Drive Site Grading
Carson City, Nevada

Prepared For:

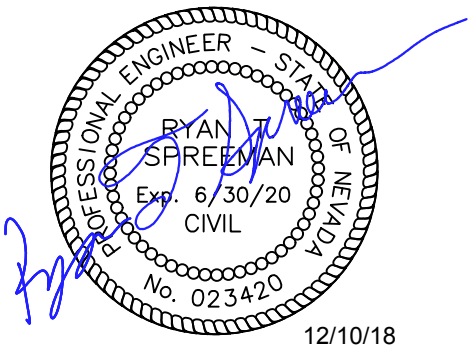
Jack and Colleen Britton
3937 Sierra Vista Dr.
Vacaville, CA 95688

Prepared By:

Lumos and Associates, Inc.
308 N. Curry Street, Suite 200
Carson City, NV 89703

JN: 9407.001

Edited: December 2018



12/10/18

TABLE OF CONTENTS

SECTION **PAGE NO.**

APPENDIX

I. INTRODUCTION

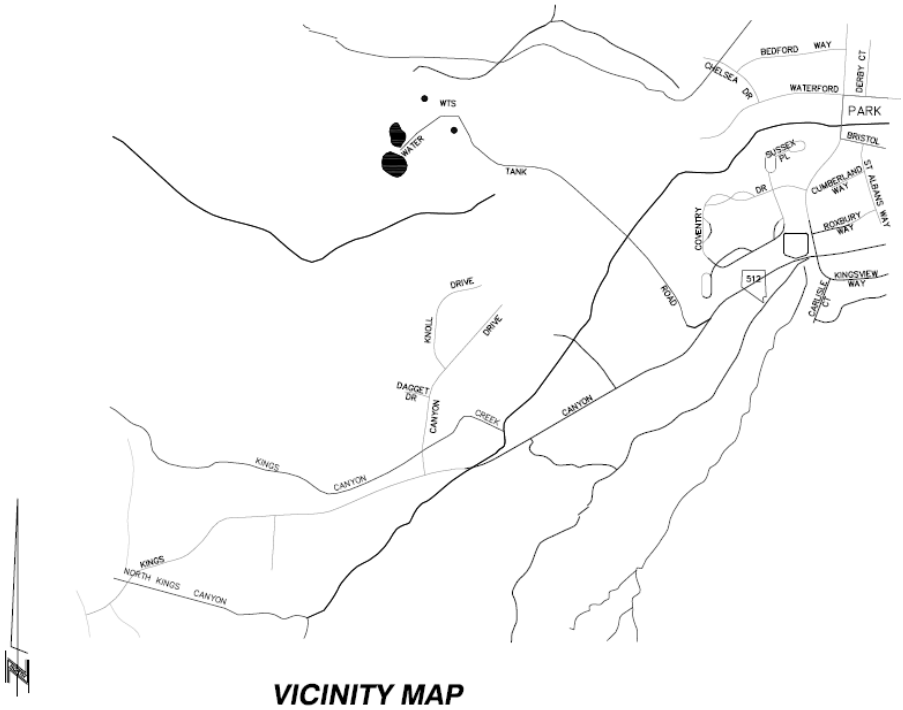
A. Description of Project

This conceptual drainage report identifies the existing and conceptually proposed site conditions, and the potential drainage improvements for approximately 4.5 acres of land (APN 007-131-19 and APN 001-131-20) located in Section 13, Township 15N, Range 19E of the Mount Diablo Meridian. An access driveway is to be graded into the existing site using retaining walls to stabilize slopes. This study has been conducted in accordance with the Carson City Municipal Code and Carson City Development Standards.

B. Existing Site Conditions

The property and surrounding land are currently undeveloped and overgrown with brush and weeds. There are existing residences southeast of the property on Canyon Drive. The existing site and surrounding undeveloped areas are steep with existing slopes ranging from 12% to 38% and generally slopes to the east. Off-site flows will be generated from the undeveloped area to the west and will be discussed in subsequent sections of this report.

C. General Location Map



VICINITY MAP

II. EXISTING AND PROPOSED HYDROLOGY

A. Drainage Basin Boundaries

The project is divided into an onsite and offsite subbasin. The 4.5 acre onsite subbasin (Existing Onsite 1) includes the property in its entirety. The 0.5-acre offsite area (Offsite 1) includes the western hillside to the ridgeline. See Figure 1 in Appendix B for the existing drainage boundaries.

B. Design Storm and 100 year, 24-hr Flow Calculations

The Autodesk Hydraflow Hydrographs Extension and Rational Method was used to calculate runoff flowrates. NOAA Atlas 14 was used to select the intensities for all hydrologic return periods and can be found in Appendix D. Flowrates for the proposed and existing areas are shown in Table 1:

Table 1: Flow Calculations

Basin	Existing (cfs)		Proposed (cfs)	
	5-Year	100-Year	5-Year	100-Year
Offsite 1	0.23	0.56	0.23	0.56
Onsite 1	2.19	5.23	2.19	5.23

No impervious area has been added for the grading activities that will take place on the project site; therefore, the runoff flowrates for the existing condition and proposed grading will remain the same. Preliminary calculations were performed in order to determine the adequacy of the ditches adjacent to the driveway and at the top of the retaining walls to convey the 5-year storm in accordance with Carson City development standards. All ditches have enough capacity to convey the 5-year and 100-year storms to Knoll drive. Slopes on the subject property where runoff will be directed are required to be riprapped as shown on Figure 1 in Appendix B. Calculations and hydrographs are provided in Appendix C.

C. On-site and Downstream Drainage

The onsite and offsite subbasins have slopes that range from 12% to 38% and flow to the east. Ditches will be installed at the top and bottom of the retaining walls on site and will be parabolic in shape with an approximate depth of 9 inches. All ditches will be protected with an 8 oz. geotextile overlain with dry rubble or Class 150 riprap. In areas

where the driveway exceeds 10%, check dams will be required with minimum spacing of 15 feet. Estimated channel flows and velocities can be found in Table 2:

Table 2: Channel flow rates and velocities.

	Slope	Q_5 (cfs)	V_5 (fps)	Q_{100} (cfs)	V_{100} (fps)
Top Wall 1	11.8%	0.25	3.7	0.59	4.8
Toe Wall 1	10.9%	0.29	3.8	0.69	4.9
Top Wall 2	11.4%	0.53	4.6	1.27	5.9
Toe Wall 2	12.0%	0.08	2.7	0.18	3.4
Top Wall 3	3.5%	0.22	2.3	0.52	3.0
Toe Wall 3	3.3%	0.16	2.1	0.38	2.7

Because there is no additional runoff created by the proposed improvements, no additional improvements on Knoll Drive will be required. Stormwater is discharged to Knoll Drive and is then conveyed to Canyon Drive by roadside ditches.

D. Floodplain

The project site is located outside of the 100-year floodplain. A FEMA Firm panel for the project location is included in Appendix A.

III. PROPOSED DRAINAGE FACILITIES

A. Routing of Flow in and/or around Site

Onsite Flow

Ditches at the tops and bottoms of the retaining walls, and adjacent to the driveway will convey stormwater toward Knoll Drive. Check dams will be installed where velocities become excessive. Riprap will be placed on all slopes where stormwater is directed.

Offsite Flow

Off-site flows from the north and west will be combined with on-site flows and will be conveyed by the same ditches described above.

B. Mitigation Measures

Best Management Practices techniques should be implemented to manage the quantity and improve the quality of storm water runoff, minimize local erosion, and minimize potential discharges to adjacent properties.

C. Floodplain Modification

Site improvements will not require any modification of the floodplain.

D. Exhibit

A drainage plan showing the proposed improvements and drainage features is included in Appendix B.

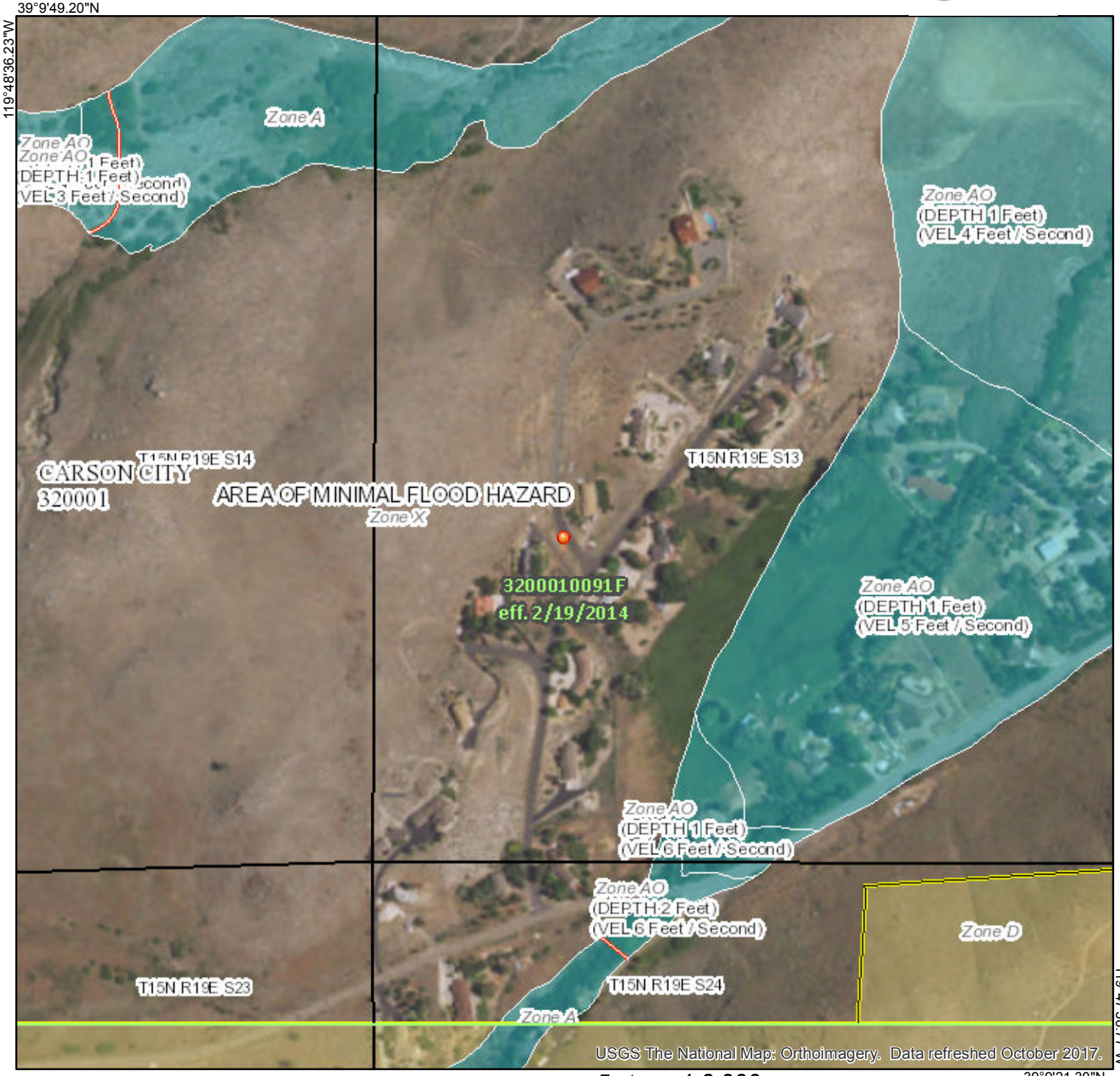
IV. CONCLUSION

The proposed grading on the 4.5 acre property will be designed in accordance with Carson City Municipal Code and Carson City Development Standards. The project will not have a detrimental effect on surrounding properties in terms of storm water. It is recommended that the drainage condition of the site is reanalyzed once the site is developed further.

APPENDIX A – MAPS

National Flood Hazard Layer FIRMette

FEMA



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

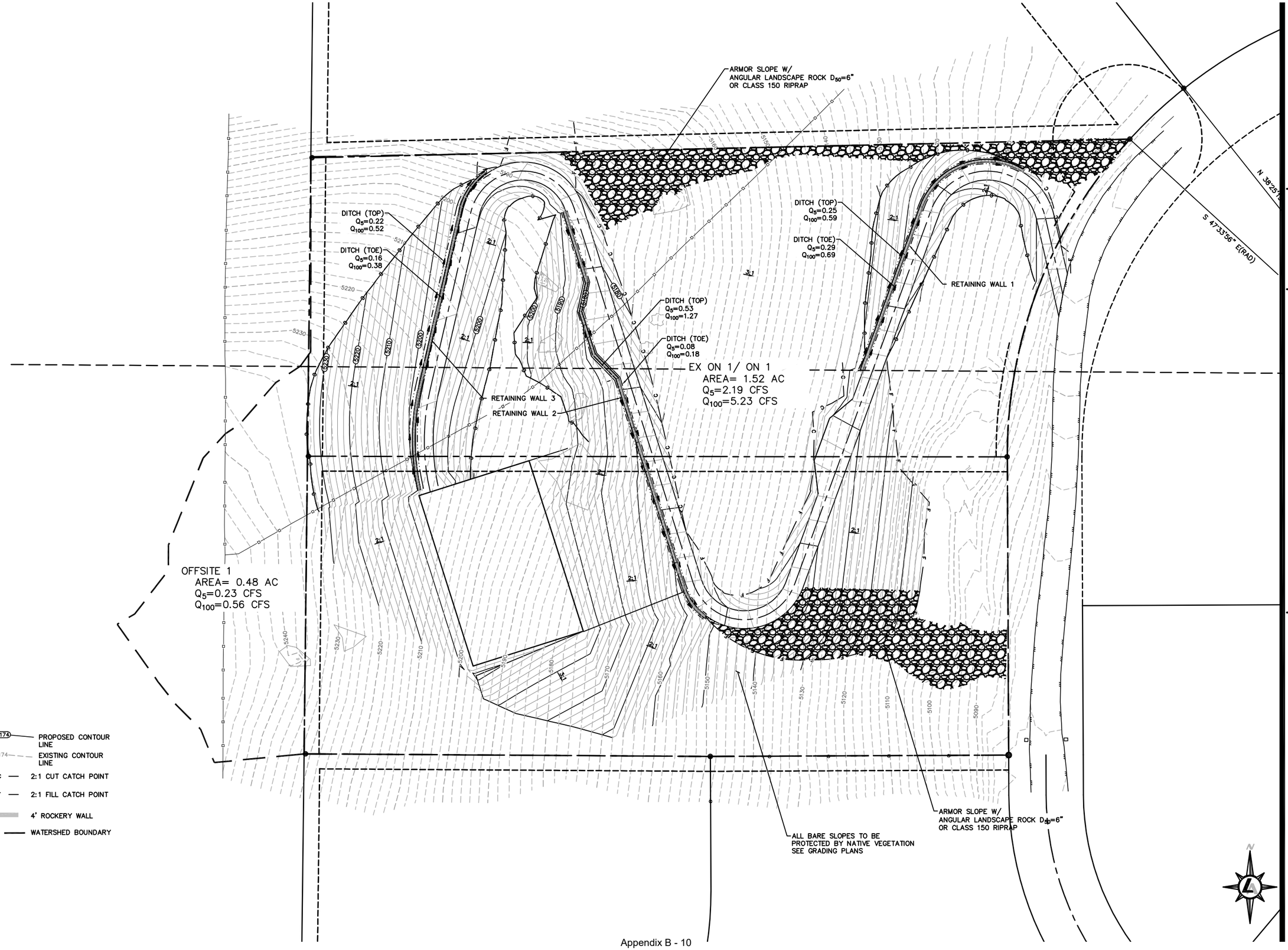
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/19/2018 at 12:04:35 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX B – DRAINAGE PLAN



LUMOS & ASSOCIATES
9222 PROTOTYPE DRIVE
RENO, NV 89521
TEL: 775.827.6111
WWW.LUMOSINC.COM

JACK AND COLLEEN BRITTON

KNOLL DRIVE
CONCEPTUAL DRAINAGE STUDY
EXISTING/PROPOSED DRAINAGE

CARSON CITY, NEVADA

REV	DATE	DESCRIPTION	BY

OCTOBER 2018

BAR IS 1 INCH ON ORIGINAL DRAWING
0 30'
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

FIG 1

DRAWN BY:	KLN
DESIGNED BY:	KLN
CHECKED BY:	TR
JOB NO.:	9407.000

L:\LAPro\9407.001 - 19 & 20 Knoll Drive Site Grading Plan\DWG\Civil3D\9407001 Hydro.dwg,SITE PLAN, 10/23/2018 04:04 pm rspreeman

APPENDIX C – HYDROLOGY CALCULATIONS

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12 Monday, 10 / 22 / 2018

Hyd. No. 1

Offsite 1

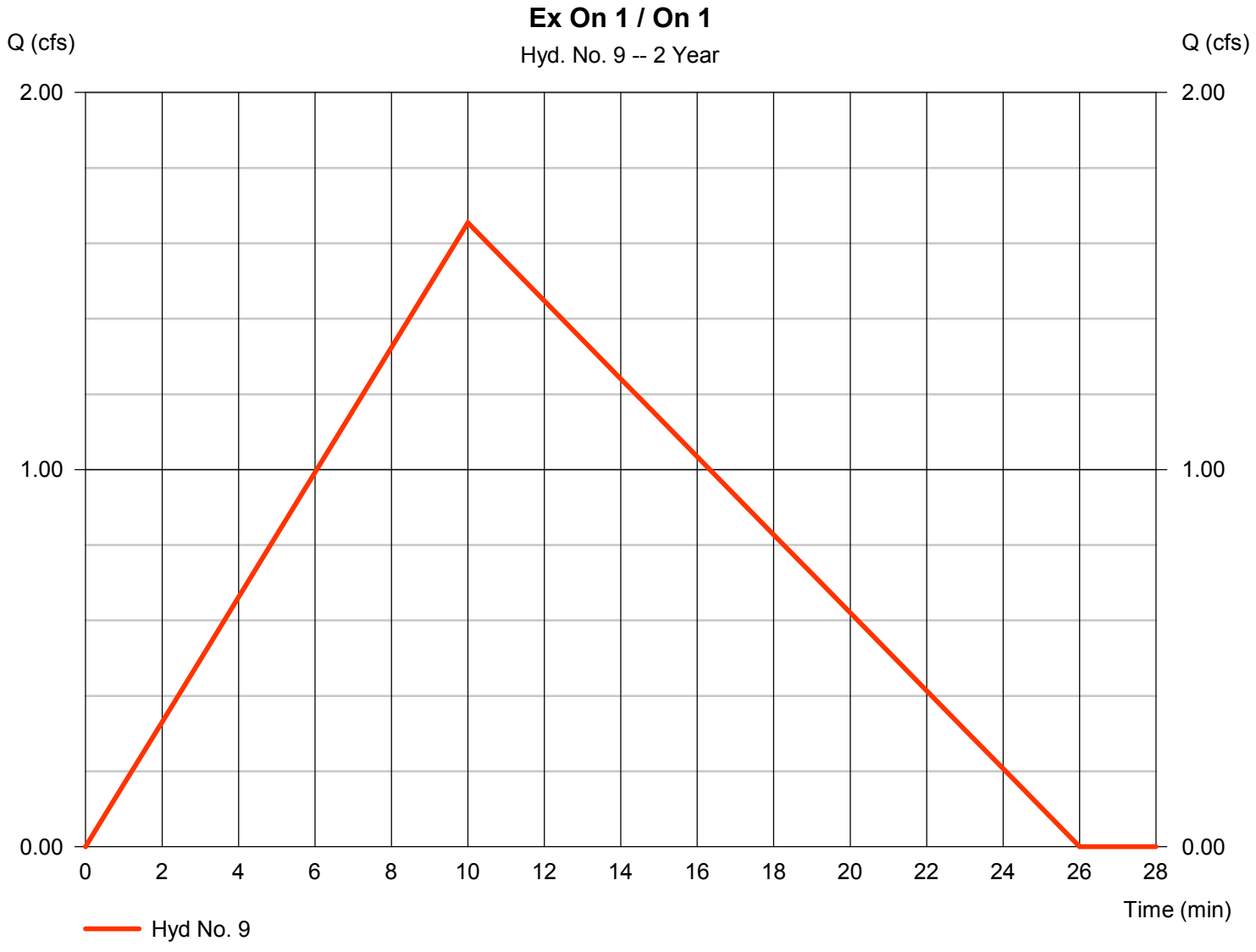
Hydrograph type	= Rational	Peak discharge	= 0.177 cfs
Storm frequency	= 2 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 142 cuft
Drainage area	= 0.480 ac	Runoff coeff.	= 0.3
Intensity	= 1.226 in/hr	Tc by User	= 10.00 min
IDF Curve	= Knoll Drive.IDF	Asc/Rec limb fact	= 1/1.67

Hydrograph Report

Hyd. No. 9

Ex On 1 / On 1

Hydrograph type	=	Rational	Peak discharge	=	1.655 cfs
Storm frequency	=	2 yrs	Time to peak	=	10 min
Time interval	=	1 min	Hyd. volume	=	1,325 cuft
Drainage area	=	4.499 ac	Runoff coeff.	=	0.3
Intensity	=	1.226 in/hr	Tc by User	=	10.00 min
IDF Curve	=	Knoll Drive.IDF	Asc/Rec limb fact	=	1/1.67



Hydrograph Report

Hyd. No. 1

Offsite 1

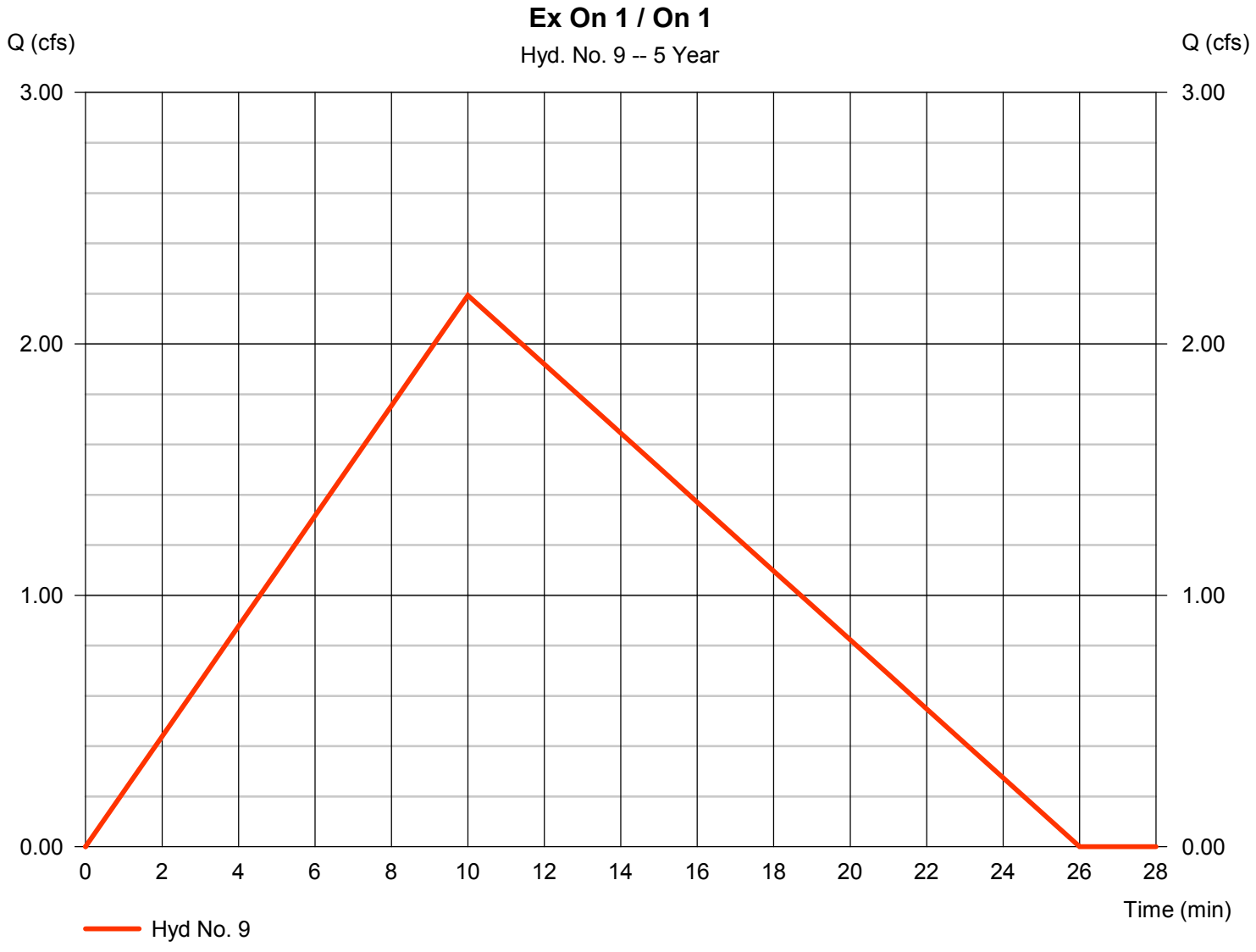
Hydrograph type	=	Rational	Peak discharge	=	0.234 cfs
Storm frequency	=	5 yrs	Time to peak	=	10 min
Time interval	=	1 min	Hyd. volume	=	188 cuft
Drainage area	=	0.480 ac	Runoff coeff.	=	0.3
Intensity	=	1.625 in/hr	Tc by User	=	10.00 min
IDF Curve	=	Knoll Drive.IDF	Asc/Rec limb fact	=	1/1.67

Hydrograph Report

Hyd. No. 9

Ex On 1 / On 1

Hydrograph type	=	Rational	Peak discharge	=	2.193 cfs
Storm frequency	=	5 yrs	Time to peak	=	10 min
Time interval	=	1 min	Hyd. volume	=	1,757 cuft
Drainage area	=	4.499 ac	Runoff coeff.	=	0.3
Intensity	=	1.625 in/hr	Tc by User	=	10.00 min
IDF Curve	=	Knoll Drive.IDF	Asc/Rec limb fact	=	1/1.67



Hydrograph Report

Hyd. No. 1

Offsite 1

Hydrograph type	=	Rational	Peak discharge	=	0.379 cfs
Storm frequency	=	25 yrs	Time to peak	=	10 min
Time interval	=	1 min	Hyd. volume	=	304 cuft
Drainage area	=	0.480 ac	Runoff coeff.	=	0.3
Intensity	=	2.633 in/hr	Tc by User	=	10.00 min
IDF Curve	=	Knoll Drive.IDF	Asc/Rec limb fact	=	1/1.67

Hydrograph Report

Hyd. No. 9

Ex On 1 / On 1

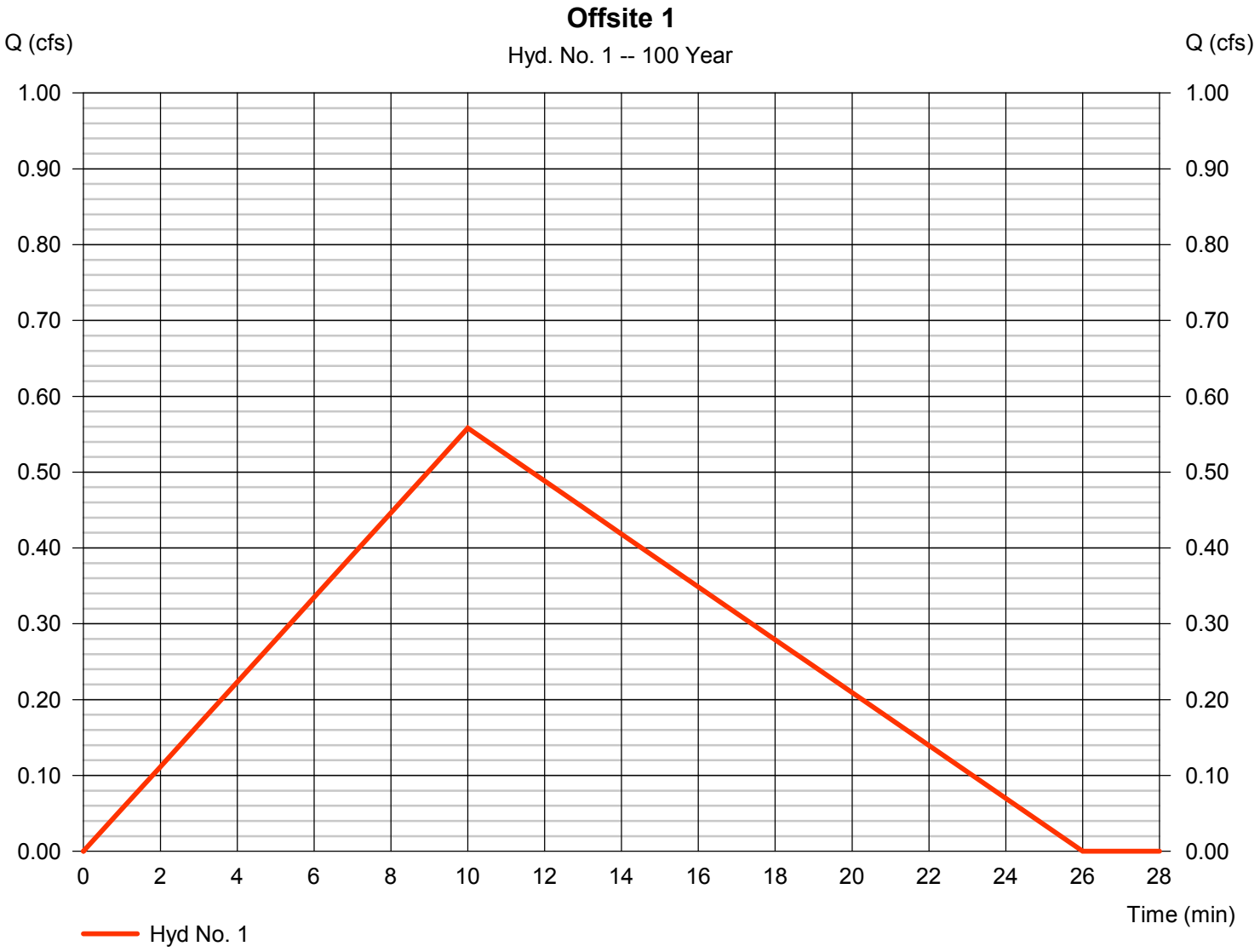
Hydrograph type	=	Rational	Peak discharge	=	3.554 cfs
Storm frequency	=	25 yrs	Time to peak	=	10 min
Time interval	=	1 min	Hyd. volume	=	2,847 cuft
Drainage area	=	4.499 ac	Runoff coeff.	=	0.3
Intensity	=	2.633 in/hr	Tc by User	=	10.00 min
IDF Curve	=	Knoll Drive.IDF	Asc/Rec limb fact	=	1/1.67

Hydrograph Report

Hyd. No. 1

Offsite 1

Hydrograph type	=	Rational	Peak discharge	=	0.558 cfs
Storm frequency	=	100 yrs	Time to peak	=	10 min
Time interval	=	1 min	Hyd. volume	=	447 cuft
Drainage area	=	0.480 ac	Runoff coeff.	=	0.3
Intensity	=	3.872 in/hr	Tc by User	=	10.00 min
IDF Curve	=	Knoll Drive.IDF	Asc/Rec limb fact	=	1/1.67

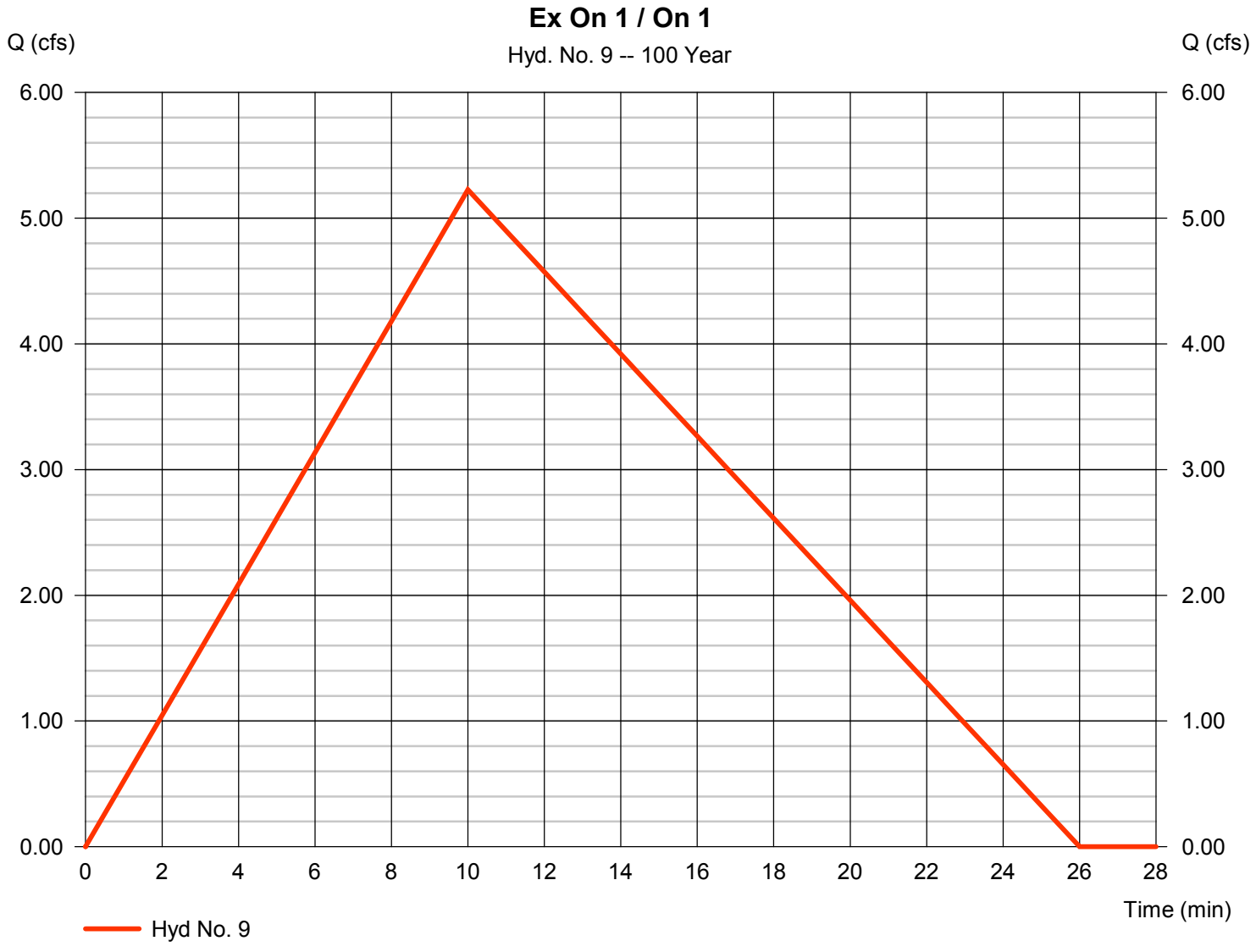


Hydrograph Report

Hyd. No. 9

Ex On 1 / On 1

Hydrograph type	= Rational	Peak discharge	= 5.226 cfs
Storm frequency	= 100 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 4,186 cuft
Drainage area	= 4.499 ac	Runoff coeff.	= 0.3
Intensity	= 3.872 in/hr	Tc by User	= 10.00 min
IDF Curve	= Knoll Drive.IDF	Asc/Rec limb fact	= 1/1.67



Parabolic Channel (Untitled1.fm8) Report

Solve For	Roughness Coefficient	Channel Slope (ft/ft)	Constructed Depth (ft)
Normal Depth	0.025	0.12000	0.75
Normal Depth	0.025	0.12000	0.75
Normal Depth	0.025	0.10900	0.75
Normal Depth	0.025	0.11800	0.75
Normal Depth	0.025	0.03300	0.75
Normal Depth	0.025	0.03500	0.75

Normal Depth (ft)	Constructed Top Width (ft)	Discharge (ft^3/s)	Flow Area (ft^2)
0.11	2.00	0.18	0.05
0.56	2.00	5.90	0.64
0.20	2.00	0.69	0.14
0.19	2.00	0.59	0.12
0.20	2.00	0.38	0.14
0.23	2.00	0.52	0.17

Wetted Perimeter (ft)	Hydraulic Radius (ft)	Top Width (ft)	Critical Depth (ft)
0.79	0.07	0.75	0.16
2.12	0.30	1.72	0.91
1.14	0.12	1.04	0.31
1.08	0.11	1.00	0.29
1.14	0.12	1.04	0.23
1.23	0.14	1.12	0.27

Critical Slope (ft/ft)	Velocity (ft/s)	Froude Number	Flow Type

Parabolic Channel (Untitled1.fm8) Report

Critical Slope (ft/ft)	Velocity (ft/s)	Froude Number	Flow Type
0.02355	3.40	2.26	Supercritical
0.01674	9.24	2.68	Supercritical
0.01998	4.88	2.34	Supercritical
0.02041	4.80	2.40	Supercritical
0.01998	2.69	1.29	Supercritical
0.01939	3.00	1.34	Supercritical

APPENDIX D – NOAA FREQUENCY ESTIMATES

NOAA Atlas 14, Volume 1, Version 5
Location name: Carson City, Nevada, USA*
Latitude: 39.1599°, Longitude: -119.8048°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**1.27** (1.10-1.50)	**1.58** (1.39-1.88)	**2.10** (1.81-2.48)	**2.59** (2.22-3.06)	**3.40** (2.82-4.01)	**4.13** (3.31-4.90)	**4.99** (3.88-5.99)	**6.04** (4.50-7.36)	**7.70** (5.42-9.60)	**9.23** (6.18-11.7)
10-min	**0.972** (0.840-1.14)	**1.21** (1.06-1.43)	**1.60** (1.38-1.89)	**1.97** (1.69-2.32)	**2.58** (2.14-3.05)	**3.13** (2.52-3.73)	**3.80** (2.95-4.55)	**4.60** (3.43-5.60)	**5.86** (4.13-7.31)	**7.03** (4.70-8.93)
15-min	**0.804** (0.696-0.944)	**1.00** (0.872-1.18)	**1.32** (1.14-1.56)	**1.63** (1.40-1.92)	**2.14** (1.77-2.52)	**2.59** (2.08-3.08)	**3.14** (2.44-3.77)	**3.80** (2.83-4.63)	**4.84** (3.41-6.04)	**5.81** (3.89-7.38)
30-min	**0.540** (0.468-0.636)	**0.672** (0.588-0.796)	**0.890** (0.768-1.05)	**1.10** (0.940-1.29)	**1.44** (1.19-1.70)	**1.75** (1.40-2.07)	**2.12** (1.64-2.54)	**2.56** (1.91-3.12)	**3.26** (2.30-4.07)	**3.91** (2.62-4.97)
60-min	**0.334** (0.290-0.393)	**0.416** (0.364-0.492)	**0.551** (0.475-0.650)	**0.679** (0.581-0.800)	**0.889** (0.737-1.05)	**1.08** (0.868-1.28)	**1.31** (1.02-1.57)	**1.58** (1.18-1.93)	**2.02** (1.42-2.52)	**2.42** (1.62-3.08)
2-hr	**0.228** (0.204-0.260)	**0.282** (0.252-0.320)	**0.356** (0.316-0.404)	**0.422** (0.372-0.480)	**0.522** (0.446-0.594)	**0.609** (0.511-0.702)	**0.710** (0.580-0.829)	**0.832** (0.658-0.985)	**1.04** (0.790-1.26)	**1.24** (0.907-1.55)
3-hr	**0.184** (0.167-0.206)	**0.229** (0.208-0.257)	**0.285** (0.256-0.318)	**0.330** (0.295-0.368)	**0.394** (0.347-0.443)	**0.449** (0.388-0.509)	**0.510** (0.432-0.584)	**0.589** (0.488-0.685)	**0.717** (0.577-0.851)	**0.843** (0.661-1.05)
6-hr	**0.134** (0.121-0.149)	**0.166** (0.151-0.186)	**0.205** (0.184-0.227)	**0.235** (0.210-0.261)	**0.275** (0.243-0.307)	**0.306** (0.267-0.344)	**0.337** (0.289-0.383)	**0.373** (0.315-0.429)	**0.425** (0.350-0.496)	**0.470** (0.380-0.559)
12-hr	**0.092** (0.082-0.102)	**0.115** (0.103-0.129)	**0.143** (0.128-0.160)	**0.166** (0.147-0.185)	**0.196** (0.172-0.221)	**0.219** (0.189-0.248)	**0.242** (0.207-0.278)	**0.266** (0.223-0.309)	**0.298** (0.244-0.353)	**0.323** (0.259-0.387)
24-hr	**0.062** (0.056-0.069)	**0.078** (0.070-0.087)	**0.099** (0.089-0.110)	**0.115** (0.103-0.128)	**0.138** (0.123-0.154)	**0.157** (0.139-0.174)	**0.176** (0.155-0.196)	**0.196** (0.171-0.220)	**0.223** (0.192-0.252)	**0.245** (0.208-0.279)
2-day	**0.039** (0.034-0.044)	**0.049** (0.043-0.055)	**0.063** (0.056-0.071)	**0.074** (0.065-0.084)	**0.090** (0.079-0.102)	**0.103** (0.090-0.117)	**0.117** (0.101-0.133)	**0.131** (0.112-0.151)	**0.152** (0.127-0.176)	**0.168** (0.139-0.197)
3-day	**0.029** (0.025-0.033)	**0.036** (0.032-0.041)	**0.047** (0.041-0.054)	**0.056** (0.049-0.064)	**0.068** (0.060-0.078)	**0.079** (0.068-0.090)	**0.089** (0.077-0.103)	**0.101** (0.086-0.116)	**0.117** (0.098-0.136)	**0.131** (0.107-0.153)
4-day	**0.024** (0.021-0.027)	**0.030** (0.027-0.035)	**0.039** (0.034-0.045)	**0.047** (0.041-0.054)	**0.058** (0.050-0.066)	**0.066** (0.057-0.076)	**0.076** (0.064-0.087)	**0.086** (0.072-0.099)	**0.100** (0.083-0.117)	**0.112** (0.091-0.131)
7-day	**0.016** (0.014-0.018)	**0.021** (0.018-0.023)	**0.027** (0.024-0.031)	**0.032** (0.028-0.037)	**0.039** (0.034-0.045)	**0.045** (0.039-0.052)	**0.052** (0.044-0.059)	**0.058** (0.049-0.067)	**0.068** (0.056-0.079)	**0.075** (0.062-0.088)
10-day	**0.013** (0.011-0.015)	**0.016** (0.014-0.019)	**0.022** (0.019-0.025)	**0.026** (0.022-0.029)	**0.031** (0.027-0.036)	**0.036** (0.031-0.041)	**0.040** (0.034-0.046)	**0.045** (0.038-0.052)	**0.052** (0.043-0.060)	**0.057** (0.047-0.067)
20-day	**0.008** (0.007-0.009)	**0.011** (0.009-0.012)	**0.014** (0.012-0.015)	**0.016** (0.014-0.018)	**0.019** (0.017-0.022)	**0.022** (0.019-0.025)	**0.025** (0.021-0.028)	**0.027** (0.023-0.031)	**0.031** (0.026-0.035)	**0.033** (0.028-0.039)
30-day	**0.006** (0.006-0.007)	**0.008** (0.007-0.009)	**0.011** (0.009-0.012)	**0.013** (0.011-0.014)	**0.015** (0.013-0.017)	**0.017** (0.015-0.019)	**0.019** (0.017-0.022)	**0.021** (0.018-0.024)	**0.024** (0.020-0.027)	**0.026** (0.022-0.030)
45-day	**0.005** (0.005-0.006)	**0.007** (0.006-0.007)	**0.009** (0.008-0.010)	**0.010** (0.009-0.011)	**0.012** (0.011-0.014)	**0.014** (0.012-0.015)	**0.015** (0.013-0.017)	**0.016** (0.014-0.019)	**0.018** (0.016-0.021)	**0.020** (0.017-0.023)
60-day	**0.004** (0.004-0.005)	**0.006** (0.005-0.006)	**0.008** (0.007-0.008)	**0.009** (0.008-0.010)	**0.010** (0.009-0.012)	**0.011** (0.010-0.013)	**0.013** (0.011-0.014)	**0.014** (0.012-0.016)	**0.015** (0.013-0.017)	**0.016** (0.014-0.018)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Carson City Area, Nevada

October 19, 2018

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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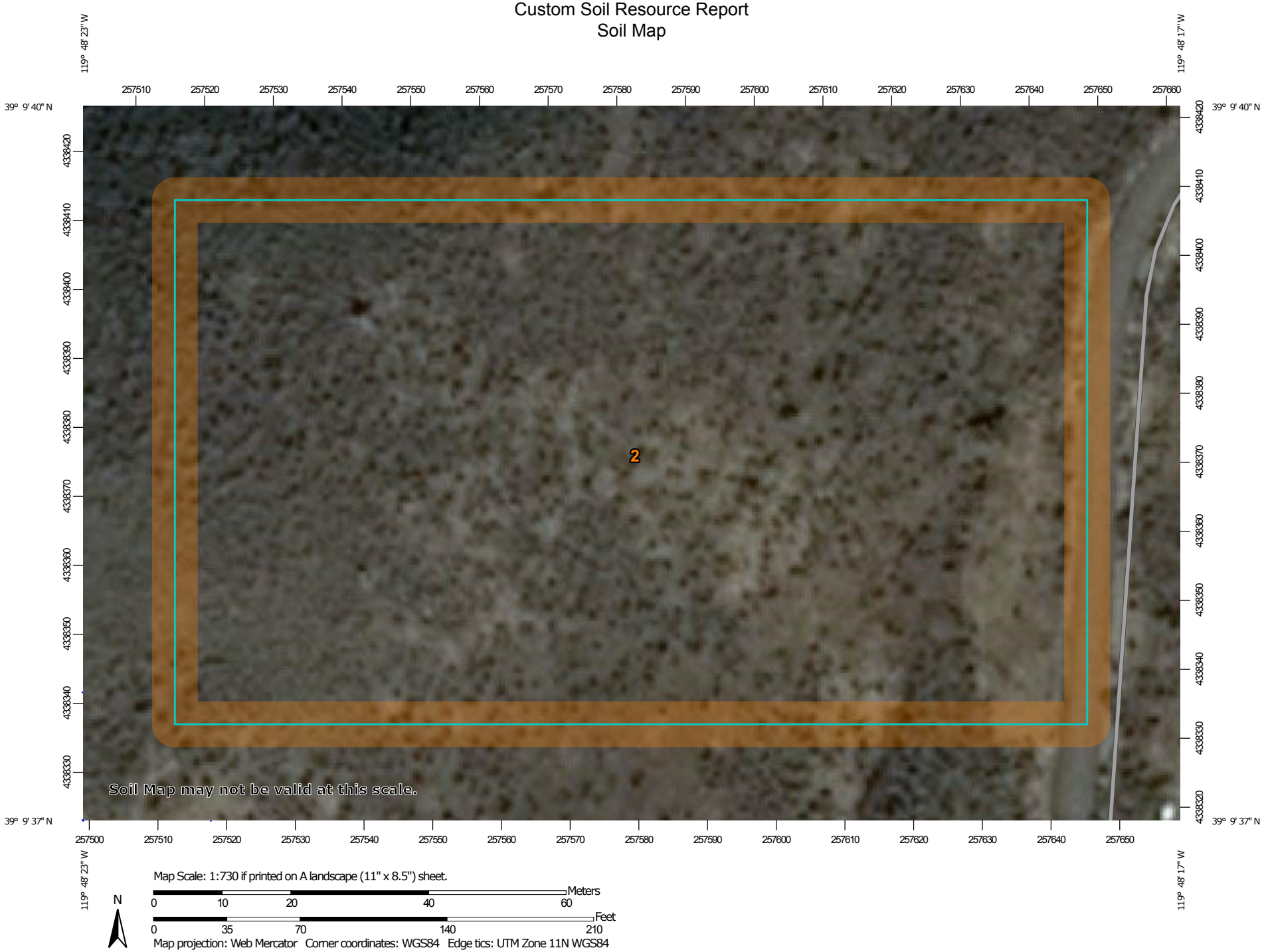
Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.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119° 48' 17" W
39° 9' 40" N
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Map Scale: 1:730 if printed on A landscape (11" x 8.5") sheet.
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60
Feet
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35
70
140
210
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Carson City Area, Nevada
Survey Area Data: Version 12, Sep 17, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
2	Aldax variant-Rock outcrop complex, 30 to 50 percent slopes	2.5	100.0%
Totals for Area of Interest		**2.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Carson City Area, Nevada

2—Aldax variant-Rock outcrop complex, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: 2nnnb
Elevation: 6,000 to 7,000 feet
Mean annual precipitation: 20 to 35 inches
Mean annual air temperature: 44 to 45 degrees F
Frost-free period: 55 to 75 days
Farmland classification: Not prime farmland

Map Unit Composition

Aldax variant and similar soils: 65 percent
Rock outcrop: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Aldax Variant

Setting

Landform: Mountain slopes
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Colluvium derived from metavolcanics and/or residuum weathered from metavolcanics

Typical profile

H1 - 0 to 5 inches: very stony very fine sandy loam
H2 - 5 to 15 inches: very gravelly very fine sandy loam
Cr - 15 to 60 inches: bedrock

Properties and qualities

Slope: 30 to 50 percent
Percent of area covered with surface fragments: 10.0 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: Pinus Jeffreyi/ Artemisia Tridentata Ssp. Vaseyana-Purshia (F022AY130NV)
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Ridges

Down-slope shape: Convex
Across-slope shape: Convex

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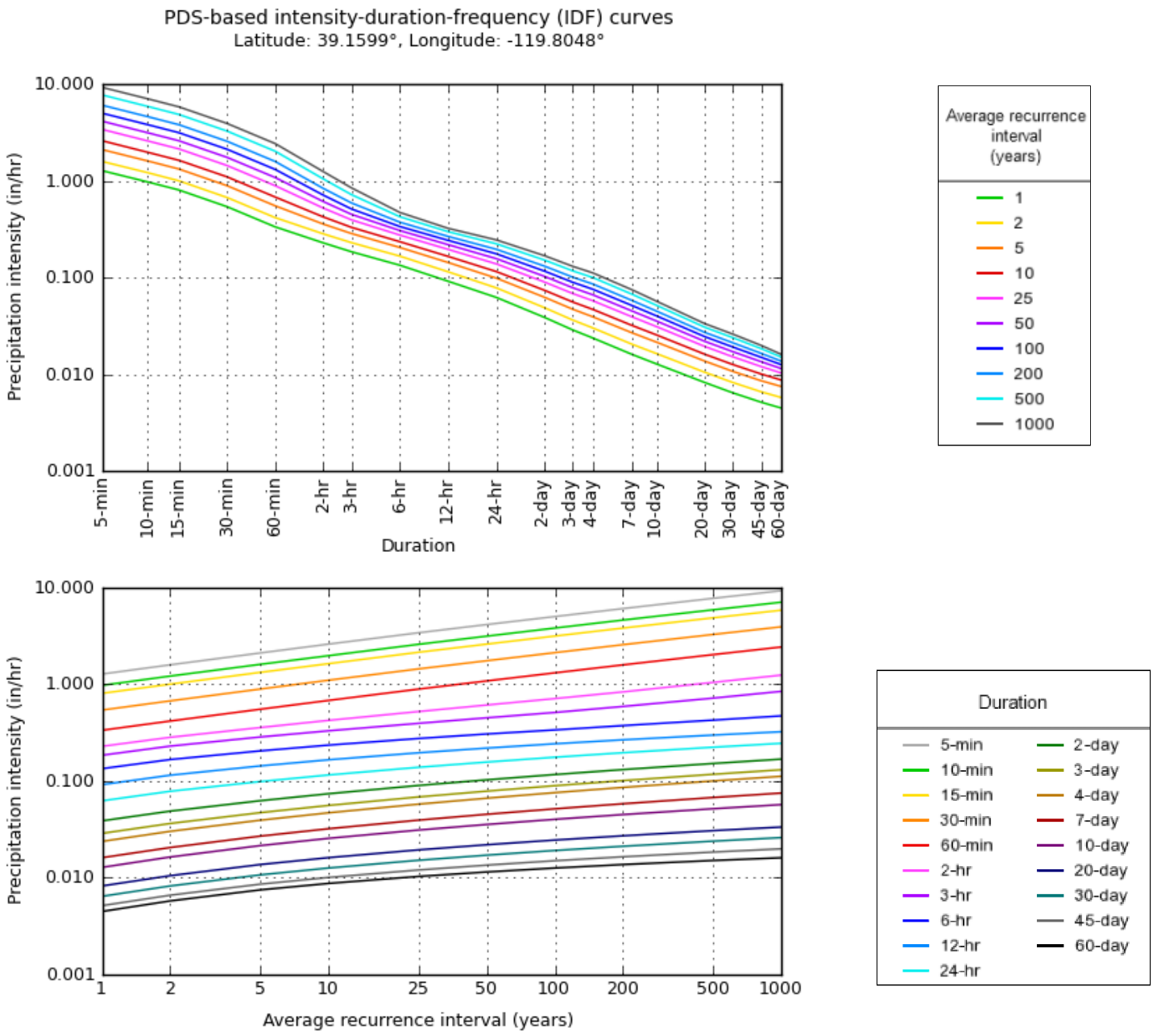
PF graphical



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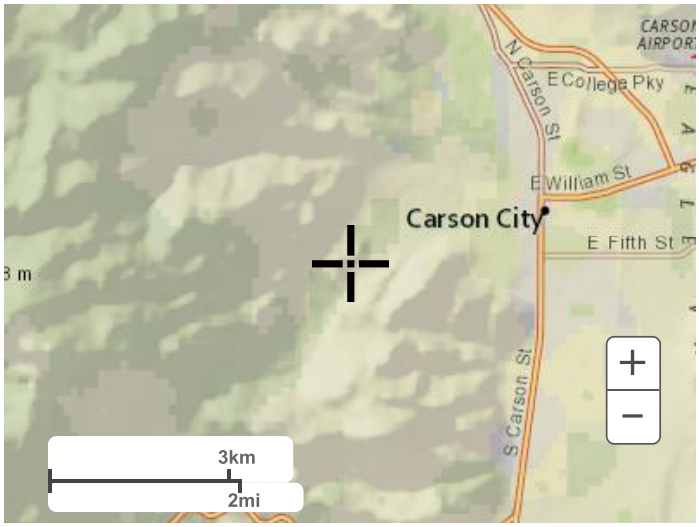
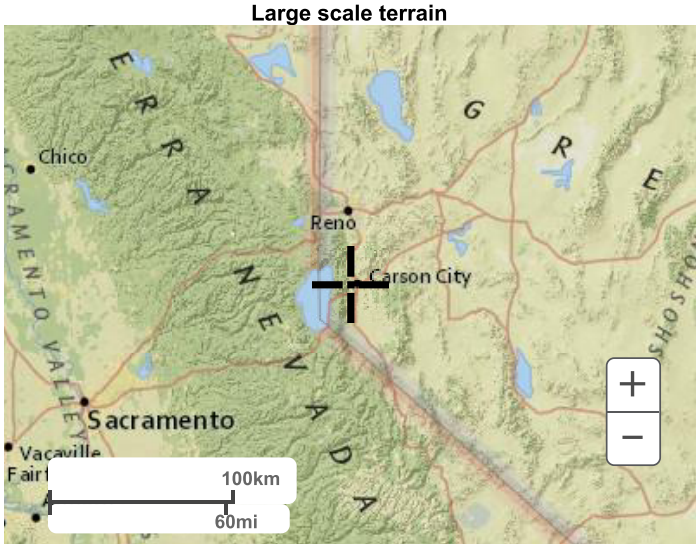
Small scale terrain



Large scale terrain



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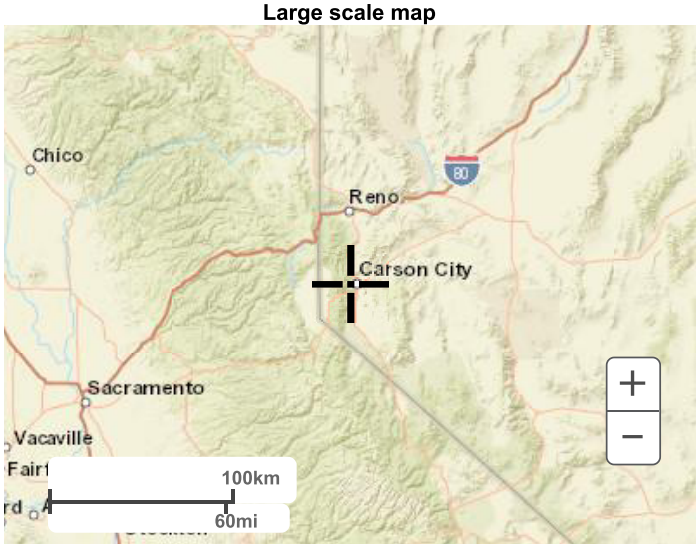
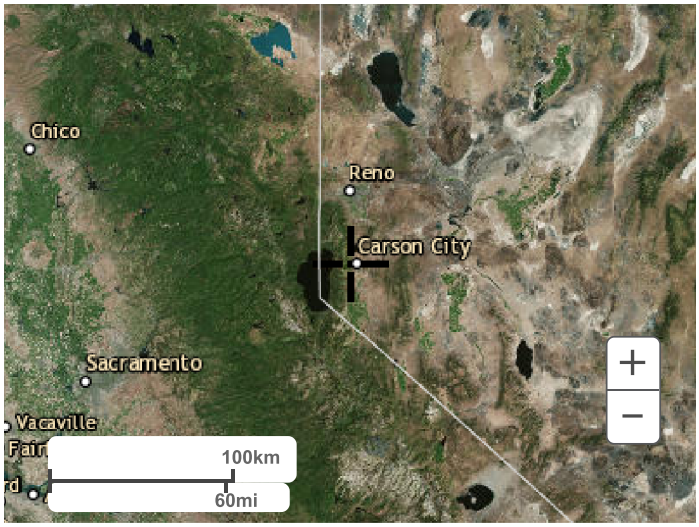


Large scale aerial



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