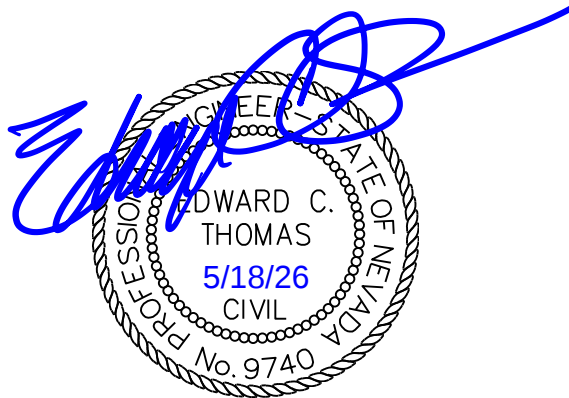


TECHNICAL DRAINAGE LETTER
For
SAND CREEK SUBDIVISION #2, PHASE 1 FINAL MAP



EXP. 6/30/2028

Prepared For:
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JN 12144.001
April 2026

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1. INTRODUCTION

This document is presented as a Technical Drainage Letter in support of the Sand Creek Subdivision #2, Phase 1 development and will provide calculations for the impacts for the Sand Creek Subdivision #2, Phase 1 improvements located in unincorporated Churchill County, Nevada. This letter is provided, as required, by the Churchill County (County).

The project site is located south of Casey Road and west of Pine Road. Access to the proposed subdivision will be from Casey Road (north entrance) and the northern terminus of Eagle Rock Road (south entrance). The subject development, lies within parcel numbers 008-792-11 and 95, which falls within the Northwest $\frac{1}{4}$, Section 335, Township 19 North, Range 28 East, Mount Diablo Meridian, Fallon, Churchill County, Nevada. The existing parcels are 4.29 and 43.03 acres, respectively. They are currently zoned with a zoning designation of R-1 (Single Family Residential).

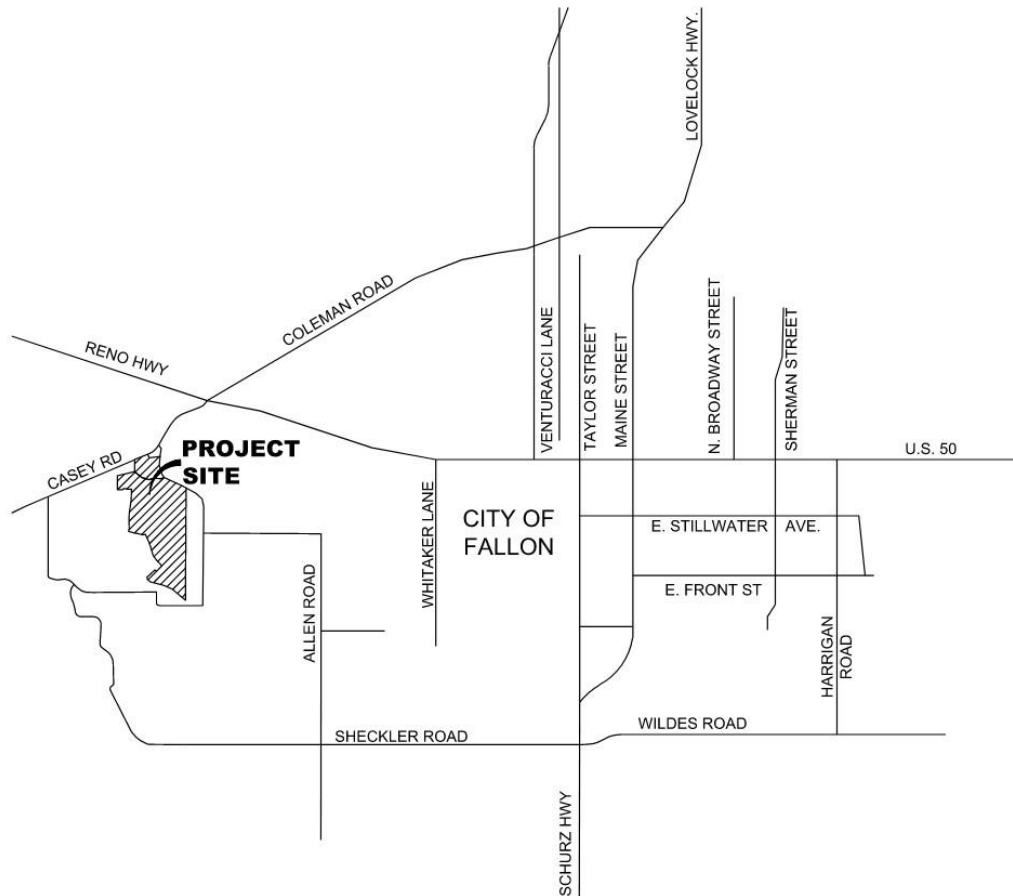


Figure 1: Vicinity Map

2. METHODOLOGY & PARAMETERS

The Rational Formula Method was used to generate peak discharges for all drainage hydrologic basins. The peak discharges for the project were calculated using:

$$\text{Design Discharge, } Q = C I A$$

Where:

- Q = Peak rate of runoff (cfs),
- A = Contributing basin area (acres),
- C = Runoff coefficient (unitless),
- I = Average rainfall intensity for a duration equal to the T_c (in/hr),
- T_c = Time of concentration (minutes).

The Rational Method was used to determine the peak flows for this analysis. The runoff coefficient for existing conditions was determined as Undeveloped Areas, Range, with a runoff coefficient of 0.20 and 0.50 in the 25-year and 100-year storm events, respectively. Composite runoff coefficients were computed for proposed conditions using the Range coefficients described above, Pavement coefficients of 0.88 and 0.93, Roof coefficients of 0.85 and 0.87, and lawn coefficients of 0.10 and 0.50. For purposes of hydrologic calculations, it was assumed that front yards would be lawn area, back yards would be range, and each lot would have an average of 2500 sq. ft. of roof area and 320 sq. ft. of paved driveway

The storm intensity and precipitation depths are derived from data provided by the NOAA Atlas 14, Point Precipitation Frequency Estimates. See Appendix B for drainage calculations and NOAA Tables. Time of concentration was determined using the SCS method.

3. HYDROLOGIC ANALYSIS

3.1. Existing Project Description

Sand Creek Subdivision #2, Phase 1 is predominately an undeveloped site, previously an agriculture field and is vegetated with weeds, brush, grass (approximately 30% cover) and a few existing trees. There is an existing irrigation canal that bisects the proposed subdivision, with Phase 1 to the north and Phase 2 to the south. Grades on the site are extremely flat and generally drain from north to south with a small portion draining to the north toward Casey Road. An irrigation canal borders the northeast edge of the site. Evidence of abandoned irrigation ditches cross portions of the site. The development is bordered on the northwest and north by existing single-family residences. Eagle Rock Road terminates at the southwest corner of the Phase 1 site and will be extended with Sand Creek Subdivision #2, Phase 1.

The Geotechnical Update and Reliance Letter for Old Stone Ranch, dated May 20, 2022 and prepared by Westex Consulting Engineers indicates that soils are sandy in nature. Infiltration rates were computed at one minute per inch. Where groundwater was encountered, it was found to be at a depth of 8.5 feet below existing grade.

The existing drainage analysis for the project area is shown in the Existing Drainage Display in Appendix C, analyzes the undeveloped site. The Phase 1 site is broken into three general drainage discharge points: south toward the Eagle Rock Road development (E1), and south toward future units of Sand Creek (E2), and North to Casey Road (E3).

Subbasin	Acres	25-Year	100-Year
		Q (cfs)	Q (cfs)
E1	2.20	0.99	3.64
E2	3.59	1.62	5.94
E3	1.89	0.99	3.64
Total	7.68	3.47	12.71

Table 1: Summary of Existing Runoff

3.2. Proposed Project Description

Phase 1 improvements consist of 25 single family lot-sale home sites and the construction curb, gutter, sidewalk, AC paving and utility infrastructure. Residential pad grading will be prepared with Phase 1. The front 70 feet of each residential parcel will be graded to drain to the street. The rear remainder of the parcel will be graded to drain to individual, shallow infiltration basins on each parcel. The basins have been sized to contain the volume of runoff from the 100-year storm without flooding the home or overflowing onto neighboring properties. The Westex geotechnical letter indicates good infiltration rates in native soils. Runoff reaching the streets will be transported as gutter flow to either Casey Road, Eagle Rock Road, or south toward future units of Sand Creek. Runoff reaching Eagle Rock Road will be routed south to an existing retention basin at the south end of Elizabeth Parkway. Runoff routed toward future units of Sand Creek will be collected in a temporary retention pond to the south of Phase 1. In the future, runoff will be routed to the existing retention pond at the south end of Elizabeth parkway.

The proposed drainage analysis for the project area is shown in the Proposed Drainage Plan in Appendix C. As with the existing calculations the proposed Phase 1 site is broken into three general drainage discharge points: south toward the Eagle Rock Road development (E1), and south toward the temporary retention basin in future units of Sand Creek (E2), and North to Casey Road (E3).

Subbasin	Acres	25-Year		100-Year	
		Q (cfs)	V (Cu. Ft)	Q (cfs)	V (Cu. Ft)
P1	1.90	2.82		4.98	9,404
P2	2.70	3.92	24,993	7.03	40,332
P3	0.33	0.30		0.70	15,147
Total	4.93	7.04		12.71	

Table 2: Summary of Proposed Runoff

Runoff routed toward the Eagle Rock development has been increased as a result of a larger area being routed in that direction and an increase in impervious ground cover. Runoff routed toward future units of Sand Creek has been increased. Peak runoff reaching Casey Road has been reduced in the 25-year storm partly by routing more runoff toward future units of Sand Creek and partly by on-parcel retention. 100-

year runoff to Casey Road is unchanged. The overall peak runoff leaving the project site has been increased.

The volume of runoff is shown for Basin P2. A temporary retention basin has been sized to contain the runoff from the 100-year storm from Basin P2. The basin is designed at a depth of four feet, which will ensure that the bottom of the basin is above groundwater.

3.3. FEMA FIRM Panels

The property is mapped on FIRM panels 32001C1727 F, dated September 26, 2008 and 32001C0731F, dated September 26, 2008. The entire site is mapped within an unshaded Zone X, which is defined as areas determined to be outside the 500-year floodplain. A FIRMette of the project site is included in Appendix A.

4. CONCLUSIONS

The proposed subdivision will increase the total amount of runoff generated by the proposed road improvements and single-family residences. Runoff being routed to Casey Road has been reduced. Runoff being routed toward Eagle Rock Road has been increased, but it is being routed to the existing stormwater retention basin at the south end of Elizabeth Parkway. A temporary retention basin has been sized to contain all runoff being routed toward future units of Sand Creek. Ultimately, this basin will be removed, and runoff will be routed to the existing retention basin at the south end of Elizabeth parkway. The rear of each parcel will be graded to retain all runoff generated on each parcel. It is recommended that a percolation test be performed in the actual location of each retention basin prior to construction to ensure that infiltration rates are appropriate. This project includes no piped stormwater infrastructure.

The design and hydrologic studies of the proposed development and improvements have been conducted in compliance with the drainage guidelines for Churchill County.

APPENDIX A

BACKGROUND DATA

National Flood Hazard Layer FIRMette



118°49'3"W 39°28'42"N



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

Cross Sections with 1% Annual Chance Water Surface Elevation

- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

OTHER FEATURES

- Digital Data Available
- No Digital Data Available
- Unmapped

MAP PANELS

- Digital Data Available
- No Digital Data Available
- Unmapped

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 **4/16/2026 at 7:41 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.



NOAA Atlas 14, Volume 1, Version 5
Location name: Fallon, Nevada, USA*
Latitude: 39.4718°, Longitude: -118.8111°
Elevation: 3977 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

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**PRECIPITATION
INTENSITY (IN/HR)**

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	1.07 (0.888-1.31)	1.34 (1.13-1.64)	1.84 (1.52-2.24)	2.28 (1.87-2.77)	2.98 (2.38-3.62)	3.61 (2.80-4.43)	4.34 (3.28-5.35)	5.21 (3.78-6.50)	6.55 (4.50-8.39)	7.75 (5.09-10.1)
10-min	0.816 (0.678-0.996)	1.03 (0.858-1.25)	1.39 (1.16-1.70)	1.73 (1.43-2.11)	2.26 (1.81-2.76)	2.75 (2.13-3.37)	3.31 (2.49-4.07)	3.97 (2.87-4.94)	4.99 (3.43-6.38)	5.90 (3.87-7.66)
15-min	0.672 (0.560-0.824)	0.848 (0.708-1.04)	1.15 (0.956-1.41)	1.43 (1.18-1.74)	1.87 (1.50-2.28)	2.27 (1.76-2.78)	2.73 (2.06-3.37)	3.28 (2.37-4.09)	4.12 (2.83-5.28)	4.88 (3.20-6.33)
30-min	0.452 (0.376-0.554)	0.570 (0.476-0.696)	0.776 (0.644-0.948)	0.964 (0.794-1.17)	1.26 (1.01-1.54)	1.53 (1.19-1.87)	1.84 (1.39-2.27)	2.21 (1.60-2.75)	2.78 (1.91-3.55)	3.29 (2.15-4.26)
60-min	0.280 (0.233-0.343)	0.353 (0.295-0.431)	0.480 (0.399-0.587)	0.596 (0.491-0.725)	0.779 (0.623-0.951)	0.946 (0.734-1.16)	1.14 (0.858-1.40)	1.37 (0.989-1.70)	1.72 (1.18-2.20)	2.03 (1.33-2.64)
2-hr	0.176 (0.150-0.213)	0.222 (0.188-0.268)	0.291 (0.245-0.351)	0.351 (0.291-0.422)	0.441 (0.357-0.532)	0.518 (0.412-0.629)	0.607 (0.469-0.744)	0.711 (0.534-0.881)	0.878 (0.631-1.11)	1.03 (0.713-1.32)
3-hr	0.134 (0.114-0.159)	0.169 (0.145-0.202)	0.220 (0.186-0.261)	0.261 (0.219-0.310)	0.320 (0.265-0.379)	0.370 (0.300-0.442)	0.427 (0.339-0.515)	0.494 (0.383-0.603)	0.602 (0.452-0.748)	0.696 (0.510-0.890)
6-hr	0.083 (0.071-0.097)	0.105 (0.090-0.123)	0.135 (0.115-0.159)	0.160 (0.135-0.187)	0.194 (0.162-0.228)	0.222 (0.183-0.262)	0.251 (0.203-0.300)	0.286 (0.226-0.345)	0.338 (0.259-0.415)	0.382 (0.285-0.479)
12-hr	0.048 (0.042-0.056)	0.062 (0.053-0.071)	0.080 (0.069-0.093)	0.095 (0.082-0.109)	0.115 (0.098-0.132)	0.130 (0.110-0.151)	0.146 (0.121-0.172)	0.163 (0.133-0.194)	0.187 (0.148-0.225)	0.207 (0.160-0.254)
24-hr	0.027 (0.024-0.029)	0.034 (0.031-0.037)	0.045 (0.041-0.049)	0.053 (0.049-0.058)	0.065 (0.059-0.070)	0.074 (0.067-0.080)	0.083 (0.075-0.091)	0.093 (0.083-0.102)	0.106 (0.093-0.117)	0.117 (0.102-0.130)
2-day	0.014 (0.013-0.015)	0.018 (0.017-0.020)	0.024 (0.022-0.026)	0.028 (0.026-0.031)	0.035 (0.031-0.038)	0.039 (0.036-0.043)	0.044 (0.040-0.049)	0.049 (0.044-0.054)	0.056 (0.049-0.063)	0.062 (0.053-0.069)
3-day	0.010 (0.009-0.011)	0.012 (0.011-0.014)	0.016 (0.015-0.018)	0.020 (0.018-0.021)	0.024 (0.022-0.026)	0.027 (0.024-0.029)	0.030 (0.027-0.033)	0.034 (0.030-0.037)	0.038 (0.034-0.042)	0.042 (0.036-0.047)
4-day	0.007 (0.007-0.008)	0.010 (0.009-0.011)	0.013 (0.012-0.014)	0.015 (0.014-0.016)	0.018 (0.017-0.020)	0.021 (0.019-0.022)	0.023 (0.021-0.025)	0.026 (0.023-0.028)	0.029 (0.026-0.032)	0.032 (0.028-0.035)
7-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)	0.011 (0.010-0.012)	0.013 (0.011-0.014)	0.014 (0.013-0.015)	0.016 (0.014-0.017)	0.018 (0.016-0.019)	0.019 (0.017-0.021)
10-day	0.003 (0.003-0.004)	0.004 (0.004-0.005)	0.006 (0.005-0.006)	0.007 (0.006-0.008)	0.008 (0.008-0.009)	0.010 (0.009-0.010)	0.011 (0.010-0.012)	0.012 (0.011-0.013)	0.013 (0.012-0.015)	0.014 (0.013-0.016)
20-day	0.002 (0.002-0.002)	0.002 (0.002-0.003)	0.003 (0.003-0.004)	0.004 (0.004-0.004)	0.005 (0.004-0.005)	0.005 (0.005-0.006)	0.006 (0.005-0.007)	0.007 (0.006-0.007)	0.007 (0.006-0.008)	0.008 (0.007-0.009)
30-day	0.001 (0.001-0.001)	0.002 (0.002-0.002)	0.002 (0.002-0.003)	0.003 (0.003-0.003)	0.003 (0.003-0.004)	0.004 (0.003-0.004)	0.004 (0.004-0.005)	0.005 (0.004-0.005)	0.005 (0.005-0.006)	0.006 (0.005-0.006)
45-day	0.001 (0.001-0.001)	0.001 (0.001-0.001)	0.002 (0.002-0.002)	0.002 (0.002-0.002)	0.003 (0.002-0.003)	0.003 (0.003-0.003)	0.003 (0.003-0.004)	0.004 (0.003-0.004)	0.004 (0.004-0.004)	0.004 (0.004-0.005)
60-day	0.001 (0.001-0.001)	0.001 (0.001-0.001)	0.001 (0.001-0.002)	0.002 (0.002-0.002)	0.002 (0.002-0.002)	0.002 (0.002-0.003)	0.003 (0.002-0.003)	0.003 (0.003-0.003)	0.003 (0.003-0.004)	0.003 (0.003-0.004)

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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PF graphical



NOAA Atlas 14, Volume 1, Version 5
Location name: Fallon, Nevada, USA*
Latitude: 39.4718°, Longitude: -118.8111°
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POINT PRECIPITATION FREQUENCY ESTIMATES

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NOAA, National Weather Service, Silver Spring, Maryland

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**PRECIPITATION
DEPTH (IN)**

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.089 (0.074-0.109)	0.112 (0.094-0.137)	0.153 (0.127-0.187)	0.190 (0.156-0.231)	0.248 (0.198-0.302)	0.301 (0.233-0.369)	0.362 (0.273-0.446)	0.434 (0.315-0.542)	0.546 (0.375-0.699)	0.646 (0.424-0.838)
10-min	0.136 (0.113-0.166)	0.171 (0.143-0.209)	0.232 (0.193-0.284)	0.288 (0.238-0.351)	0.377 (0.302-0.460)	0.458 (0.355-0.561)	0.551 (0.415-0.679)	0.661 (0.479-0.824)	0.832 (0.571-1.06)	0.984 (0.645-1.28)
15-min	0.168 (0.140-0.206)	0.212 (0.177-0.259)	0.288 (0.239-0.352)	0.358 (0.295-0.435)	0.467 (0.374-0.571)	0.568 (0.440-0.696)	0.683 (0.515-0.842)	0.819 (0.593-1.02)	1.03 (0.708-1.32)	1.22 (0.800-1.58)
30-min	0.226 (0.188-0.277)	0.285 (0.238-0.348)	0.388 (0.322-0.474)	0.482 (0.397-0.586)	0.629 (0.503-0.768)	0.764 (0.593-0.937)	0.920 (0.693-1.13)	1.10 (0.799-1.38)	1.39 (0.953-1.78)	1.64 (1.08-2.13)
60-min	0.280 (0.233-0.343)	0.353 (0.295-0.431)	0.480 (0.399-0.587)	0.596 (0.491-0.725)	0.779 (0.623-0.951)	0.946 (0.734-1.16)	1.14 (0.858-1.40)	1.37 (0.989-1.70)	1.72 (1.18-2.20)	2.03 (1.33-2.64)
2-hr	0.353 (0.300-0.426)	0.445 (0.377-0.536)	0.583 (0.490-0.703)	0.703 (0.583-0.845)	0.883 (0.715-1.06)	1.04 (0.824-1.26)	1.21 (0.939-1.49)	1.42 (1.07-1.76)	1.76 (1.26-2.22)	2.06 (1.43-2.65)
3-hr	0.405 (0.345-0.480)	0.510 (0.438-0.607)	0.661 (0.561-0.786)	0.785 (0.659-0.931)	0.962 (0.796-1.14)	1.11 (0.902-1.33)	1.28 (1.02-1.55)	1.48 (1.15-1.81)	1.81 (1.36-2.25)	2.09 (1.53-2.67)
6-hr	0.499 (0.430-0.584)	0.629 (0.540-0.741)	0.810 (0.694-0.953)	0.959 (0.814-1.12)	1.16 (0.976-1.37)	1.33 (1.10-1.57)	1.51 (1.22-1.80)	1.72 (1.36-2.07)	2.02 (1.55-2.49)	2.29 (1.71-2.87)
12-hr	0.586 (0.511-0.675)	0.747 (0.649-0.863)	0.972 (0.843-1.12)	1.15 (0.991-1.32)	1.39 (1.18-1.60)	1.57 (1.33-1.83)	1.77 (1.47-2.08)	1.97 (1.61-2.34)	2.25 (1.78-2.72)	2.50 (1.94-3.07)
24-hr	0.650 (0.594-0.704)	0.832 (0.764-0.904)	1.09 (0.999-1.18)	1.29 (1.18-1.40)	1.57 (1.43-1.70)	1.78 (1.61-1.94)	2.01 (1.80-2.19)	2.24 (1.99-2.45)	2.57 (2.25-2.82)	2.82 (2.45-3.12)
2-day	0.702 (0.645-0.768)	0.895 (0.821-0.980)	1.18 (1.08-1.28)	1.39 (1.27-1.52)	1.69 (1.53-1.84)	1.92 (1.73-2.09)	2.16 (1.93-2.35)	2.40 (2.12-2.63)	2.73 (2.38-3.03)	2.99 (2.58-3.34)
3-day	0.731 (0.675-0.797)	0.934 (0.861-1.02)	1.22 (1.13-1.33)	1.44 (1.32-1.57)	1.74 (1.59-1.89)	1.98 (1.79-2.14)	2.22 (2.00-2.41)	2.46 (2.19-2.70)	2.80 (2.45-3.09)	3.06 (2.65-3.40)
4-day	0.761 (0.706-0.825)	0.973 (0.902-1.06)	1.27 (1.17-1.38)	1.49 (1.37-1.62)	1.80 (1.65-1.94)	2.04 (1.85-2.20)	2.28 (2.06-2.47)	2.53 (2.26-2.76)	2.87 (2.53-3.15)	3.12 (2.72-3.45)
7-day	0.839 (0.776-0.909)	1.07 (0.998-1.16)	1.39 (1.28-1.50)	1.63 (1.51-1.77)	1.96 (1.80-2.11)	2.20 (2.01-2.38)	2.45 (2.23-2.65)	2.70 (2.43-2.94)	3.02 (2.69-3.32)	3.28 (2.88-3.61)
10-day	0.914 (0.845-0.995)	1.17 (1.07-1.27)	1.53 (1.41-1.66)	1.79 (1.65-1.95)	2.15 (1.96-2.33)	2.41 (2.20-2.63)	2.69 (2.43-2.93)	2.96 (2.66-3.24)	3.32 (2.94-3.66)	3.59 (3.16-3.98)
20-day	1.09 (1.00-1.18)	1.40 (1.28-1.52)	1.82 (1.68-1.97)	2.13 (1.95-2.31)	2.53 (2.31-2.74)	2.82 (2.57-3.07)	3.12 (2.82-3.39)	3.41 (3.06-3.72)	3.78 (3.36-4.16)	4.06 (3.57-4.48)
30-day	1.22 (1.13-1.32)	1.57 (1.46-1.70)	2.04 (1.89-2.20)	2.38 (2.20-2.57)	2.82 (2.59-3.04)	3.15 (2.88-3.41)	3.47 (3.15-3.77)	3.78 (3.42-4.12)	4.18 (3.75-4.59)	4.47 (3.98-4.93)
45-day	1.42 (1.32-1.54)	1.83 (1.70-1.97)	2.38 (2.21-2.57)	2.78 (2.58-2.99)	3.29 (3.04-3.54)	3.66 (3.36-3.94)	4.02 (3.67-4.34)	4.36 (3.97-4.72)	4.78 (4.34-5.20)	5.08 (4.58-5.54)
60-day	1.60 (1.49-1.73)	2.05 (1.91-2.21)	2.68 (2.50-2.88)	3.13 (2.91-3.36)	3.71 (3.43-3.98)	4.13 (3.81-4.44)	4.53 (4.16-4.88)	4.92 (4.50-5.32)	5.41 (4.90-5.88)	5.74 (5.18-6.29)

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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PF graphical

APPENDIX B

HYDROLOGIC CALCULATIONS

SAND CREEK PHASE 1 RUNOFF COEFFICIENTS - EXISTING CONDITIONS

Landcover Classification	C ₂₅	C ₁₀₀
Rangeland	0.20	0.50

Subbasin ID	E1	E2	E3	Onsite Total
Drainage Direction	South to Eagle Rock	South to Sandcreek	North to Casey	
Area, A [ac]	2.20	3.59	1.89	7.68

Composite Areas [ac]	Rangeland	2.20	3.59	1.89	7.68
	0				0.00
	0				0.00
	0				0.00
	0				0.00
	0				0.00

Area Check	✓	✓	✓	✓
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Composite C ₅	0.20	0.20	0.20	0.20
Composite C ₁₀₀	0.50	0.50	0.50	0.50

SAND CREEK PHASE 1 RUNOFF RATES - EXISTING CONDITIONS

		Subbasin ID	E1	E2	E3	Onsite Total
		Drainage Direction	South to Eagle Rock	South to Sandcreek	North to Casey	0
		Area, A [sf]	95832	156380.4	82328.4	334540.8
		Area, A [ac]	2.20	3.59	1.89	7.68

Coef.	C	Composite C ₅	0.20	0.20	0.20	0.20
		Composite C ₁₀₀	0.50	0.50	0.50	0.50

Initial Overland	T _i	Flow Runoff Coefficient, C _s "R"	0.20	0.20	0.20	0.20
		Flow Length, L [ft] ¹	0			
		Elevation Change				
		Land Slope, s [%]	-	-	-	-
		Initial Overland Time: T_i [min]	0.00	0.00	0.00	0.00

Travel Time	T _t	Flow Length, L [ft]	285	430	211	430
		Elevation Change	1.6	5.25	3.71	5.25
		Channel Slope, s [%]	0.30	1.22	1.76	1.22
		Average Velocity, V ₅ [ft/s] ³	0.72	1.20	2.75	1.20
		Travel Time: T_t [min]	6.60	5.97	1.28	5.97

ToC & Intensity	T _c	Time of Concentration, T _c [min]	6.60	5.97	1.28	5.97
		Required? - Y/N	N	N	N	N
	Urban. Check	Total Length: L _{total} [ft]	-	-	-	-
		Time of Concentration, Check, T _{c,check} [min]	-	-	-	-
		Final ToC, T_{c,final} [min]	10.00	10.00	10.00	10.00
	I ²	5-yr Intensity I ₅ [in/hr]	1.39	1.39	1.39	1.39
		25-yr Intensity I ₂₅ [in/hr]	2.26	2.26	2.26	2.26
		100-yr Intensity I ₁₀₀ [in/hr]	3.31	3.31	3.31	3.31

Flow	Q	5-yr Flow, Q ₅ [cfs]	0.61	1.00	0.53	2.14
		25-yr Flow, Q ₂₅ [cfs]	0.99	1.62	0.85	3.47
		100-yr Flow, Q₁₀₀ [cfs]	3.64	5.94	3.13	12.71

SAND CREEK PHASE 1 RUNOFF COEFFICIENTS - PROPOSED CONDITIONS

Landcover Classification	C ₂₅	C ₁₀₀
Rangeland	0.20	0.50
Pavement	0.88	0.93
Roof	0.85	0.87
Lawn	0.10	0.50

Assume: 2500 sq. ft. of roof and 320 sf of paved parking per contributing parcel

Subbasin ID	P1	P2	P3	Onsite Total
Drainage Direction	South to Eagle Rock	South to Sancreek	North to Casey	
Area, A [ac]	1.90	2.70	0.33	4.93

Composite Areas [ac]	Rangeland	0.00	0.00	0.12	0.12
	Pavement	0.75	1.11	0.11	1.97
	Roof	0.63	0.80		1.43
	Lawn	0.52	0.79	0.10	1.41
	0				0.00
	0				0.00

Area Check	✓	✓	✓	✓
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Composite C ₂₅	0.66	0.64	0.40	0.63
Composite C ₁₀₀	0.79	0.79	0.64	0.78

11 parcels 14 parcels

SAND CREEK PHASE 1 RUNOFF - PROPOSED CONDITIONS

		Subbasin ID	P1	P2	P3	Onsite Total
		Drainage Direction	South to Eagle Rock	South to Sancreek	North to Casey	0
		Area, A [sf]	82764	117612	14374.8	214750.8
		Area, A [ac]	1.90	2.70	0.33	4.93

Coef.	C	Composite C ₅	0.66	0.64	0.40	0.63
		Composite C ₁₀₀	0.79	0.79	0.64	0.78

Initial Overland	T _i	Flow Runoff Coefficient, C _s "R"	0.62	0.61	0.28	0.61
		Flow Length, L [ft] ¹	0			
		Elevation Change				
		Land Slope, s [%]	-	-	-	-
		Initial Overland Time: T_i [min]	0.00	0.00	0.00	0.00

Travel Time	T _t	Flow Length, L [ft]	635	505	180	505
		Elevation Change	6.11	1.93	2.91	1.93
		Channel Slope, s [%]	0.96	0.38	1.62	0.38
		Average Velocity, V ₅ [ft/s] ³	2.00	1.40	2.60	1.40
		Travel Time: T_t [min]	5.29	6.01	1.15	6.01

ToC & Intensity	T _c	Time of Concentration, T _c [min]	5.29	6.01	1.15	6.01
		Required? - Y/N	N	N	N	N
	Urban. Check	Total Length: L _{total} [ft]	-	-	-	-
		Time of Concentration, Check, T _{c,check} [min]	-	-	-	-
		Final ToC, T_{c,final} [min]	10.00	10.00	10.00	10.00
	I ²	5-yr Intensity I ₅ [in/hr]	1.39	1.39	1.39	1.39
		25-yr Intensity I ₂₅ [in/hr]	2.26	2.26	2.26	2.26
		100-yr Intensity I ₁₀₀ [in/hr]	3.31	3.31	3.31	3.31

Flow	Q	5-yr Flow, Q ₅ [cfs]	1.73	2.41	0.18	4.33
		25-yr Flow, Q ₂₅ [cfs]	2.82	3.92	0.30	7.04
		100-yr Flow, Q₁₀₀ [cfs]	4.98	7.03	0.70	12.71

SAND CREEK PHASE 1 - RETENTION ESTIMATES

Landcover Classification	C ₂₅	C ₁₀₀
Rangeland	0.20	0.50
Pavement	0.88	0.93
Roof	0.85	0.87
Lawn	0.10	0.50

24-hr Precipitation (in)

P ₂₅	P ₁₀₀
1.57	2.01

Assume: 2500 sq. ft. of roof and 320 sf
of paved parking per contributing parcel

Subbasin ID	P2	
Drainage Direction	South to Eagle Rock	
Area, A [ac]	2.70	

Composite Areas [ac]	Rangeland	0.00	
	Pavement	1.00	
	Roof	0.80	
	Lawn	0.90	
	0		
	0		

Area Check	✓	
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Composite C₂₅	0.61	
Composite C₁₀₀	0.77	

Storage Volume (cf)	
V₂₅	9403.52
V₁₀₀	15147.12

APPENDIX C

DRAINAGE EXHIBITS

