NOTICE OF MEETING
HILLSIDE REVIEW BOARD
CITY OF ST. GEORGE
WASHINGTON COUNTY, UTAH

Public Notice

Notice is hereby given that the Hillside Review Board of the City of St. George, Washington County, Utah, will hold a meeting at the reference site on **Wednesday, October 28, 2026**, commencing on site at **approximately 1150 West, north of Curly Hollow Drive, at 8:30 a.m.**

The agenda for the meeting is as follows:

Call to Order
Call for disclosure of conflicts of interest

1. **Horizon Ridge** - This is a request to obtain a Hillside Development Permit to allow disturbance of areas in the 20-30%, 30-40% and 40% and above slope areas. This application is required to develop single-family homes. **Meeting time is approximately 8:30 am at 1150 West, north of Curly Hollow Dr.**

2. **Minutes**

   Consider a request to approve the meeting minutes from the August 26, 2026, meeting.

   Angie Jessop – Development Services

REASONABLE ACCOMMODATION: The City of St. George will make efforts to provide reasonable accommodations to disabled members of the public in accessing City programs. Please contact the City Human Resources Office at (435) 627-4674 at least 24 hours in advance if you have special needs.

Meeting Location



St.George
Community Development

Item 1
Hillside Permit

HILLSIDE REVIEW BOARD AGENDA REPORT: **10/28/2026**

Horizon Ridge Hillside Development Permit (Case No. 2026-HS-008)		
Request:	Hillside Development Permit to allow disturbance of areas in the 20-30%, 30-40% and 40% and above slope areas. This application is required to develop single-family homes.	
Applicant:	American Consulting and Engineering	
Representative:	Austin Chappell	
Location:	Generally located north of Curly Hollow Drive and south of Province Way	
General Plan:	LDR (Low Density Residential) & MDR (Medium Density Residential)	
Existing Zoning:	R-1 (Single Family Residential, no minimum lot size)	
Surrounding Zoning:	North	PD-R (Planned Development Residential)
	South	PD-R (Planned Development Residential) and R-1-8 (Single-Family Residential, 8,000 ft^2 minimum lot size)
	East	R-1-8 (Single Family Residential, 8,000 ft^2 minimum lot size) and R-1-10 (Single-Family Residential, 10,000 ft^2 minimum lot size)
	West	G&G (Gravel & Grazing)
Land Area:	35.67 Acres	



BACKGROUND

This is a request to obtain a hillside permit for the property generally located north of Curly Hollow Drive and south of Province Way. (See Exhibit A, Vicinity Map). The City Council recently approved a zone change to an R-1 (Single-Family Residential with no minimum lot size requirement) zone on October 1, 2026. The R-1 zone is a recently adopted residential zone that was approved by the City Council on March 25, 2026. The R-1 zone provides flexibility in lot sizes by eliminating lot area requirements. However, the density must still meet the General Plan designation of MDR (Medium Density Residential), no more than 9 units per acre and LDR (Low Density Residential), no more than 4 units per acre.

According to the documents provided, portions of the Horizon Ridge Subdivision feature hillside topography. The most prominent hillside feature will be preserved as open space for natural amenity. Other areas with 20% to 40% slopes, and isolated sections exceeding 40%, are located primarily between Lots 807 - 615 and Lots 114-121. The applicant contends these slopes do not form a significant landform that materially contributes to the development's hillside character and has submitted grading and drainage plans detailing the proposed cut slopes.

The applicant has provided a Slope Summary showing the approximate proposed disturbed area for your analysis. This summary shows the following buildable areas:

SLOPE TABLE

#	MIN SLOPE	MAX SLOPE	COLOR	AREA (AC)	DIST. (AC)	% TOT.
1	0.00%	20.00%		32.65	32.12	98.38%
2	20.00%	30.00%		2.53	2.28	90.12%
3	30.00%	40.00%		0.42	0.30	71.43%
4	40.00%	66.56%		0.07	0.03	42.86%

The Hillside Review Board will visit the site to determine what conditions exist on the ground and if there are any unique features that should be protected. They will look at the proposed concept plans, grading plans, Geotechnical reports, slope maps and make a recommendation to the Planning Commission who will in turn make a recommendation to the City Council.

APPLICABLE ORDINANCE(S) *(Selected portions)*

10-13A-1: Density and Disturbance Standards

A. The hillside development overlay zone (HDOZ) limits development densities and provides specific development incentives to transfer

underlying zone densities from hillsides (sending areas) to less steep slopes or more safe development areas (receiving areas), within a development.

B. For those portions of a proposed development with natural slopes twenty percent (20%) or less, development density follows the density and development standards in the underlying zone.

C. For those portions of a proposed development with natural slopes from 3disturb more than thirty percent (30%) of the parcel within this slope category.

D. For those portions of a proposed development with natural slopes from thirty-one percent (31%) to forty percent (40%), development activity shall not disturb more than five percent (5%) of the area within this slope category.

E. A proposed development may not disturb slopes in excess of forty percent (40%).

10-13A-2: Slope and Slope Areas Determined

A. Slope shall be determined for each significant portion of development parcel.

B. *Procedure:* The applicant shall map the location of the natural slope by using the following procedure:

1. *Preparation of Contour Maps:* The applicant shall submit an accurate, current contour map, prepared and certified by a licensed professional engineer or surveyor, which shows all land contours at intervals no greater than five feet (5'), drawn at a one-inch equals one hundred feet (1" = 100') scale maximum.

2. *Verification through Field Surveys:* The city engineer or designee may require the applicant to submit a field survey to verify the accuracy of the contour map.

C. *Determination of Slope Areas:* Using the contour map, natural slopes shall be calculated using points identified as natural slopes of twenty percent (20%), thirty percent (30%), and forty percent (40%), and shall be located on the contour map and connected by a continuous line. That area bounded by said lines and intersecting property lines shall be used for determining project density. Small washes or outcrops, which have slopes distinctly different from surrounding property, and are not part of the contiguous topography, may be excluded from the slope determination.

EXHIBITS PROVIDED

1. Exhibit A – Applicant Narrative
   "Exhibit A" in the packet is the Applicant Narrative.

2. Exhibit B – Development Plan
   "Exhibit B" in the packet is the Development Plan.

3. Exhibit C – Phase 1 & 2 Drainage Study
   "Exhibit C" in the packet is the Phase 1 & 2 Drainage Study.

4. Exhibit D – Geotechnical Study
   "Exhibit D" in the packet is the Geotechnical report.

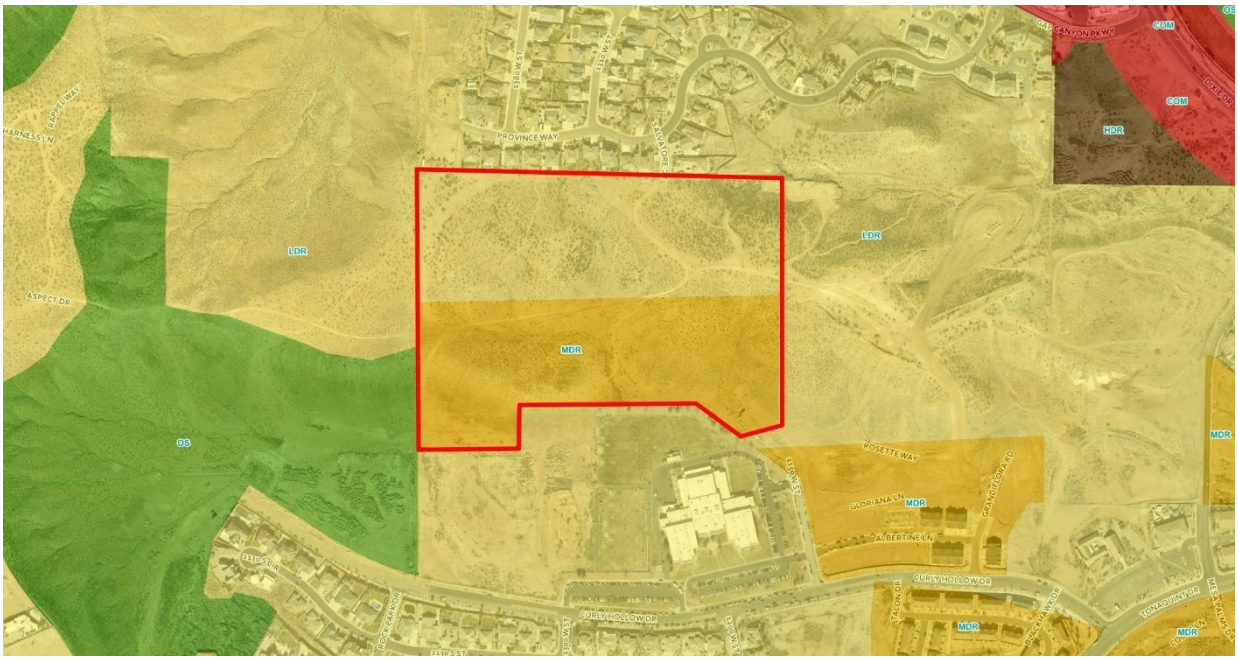
RECOMMENDATION

Section 10-13A-8(B)(1) of the "Hillside Review Board Powers and Duties" states that the Hillside Board can make recommendations to "adopt, modify or reject a proposal" to the Planning Commission (PC).

FINDINGS

1. The proposed development generally aligns with the intent of the Hillside Development Overlay Zone in that it concentrates density in more buildable areas while limiting disturbance on steeper slopes.
2. The proposed density remains below the maximum allowed under the General Plan designation.

General Plan – LDR - Low Density Residential & MDR – Medium Density Residential



Zoning – R1 - (Single Family Residential, no minimum lot size)

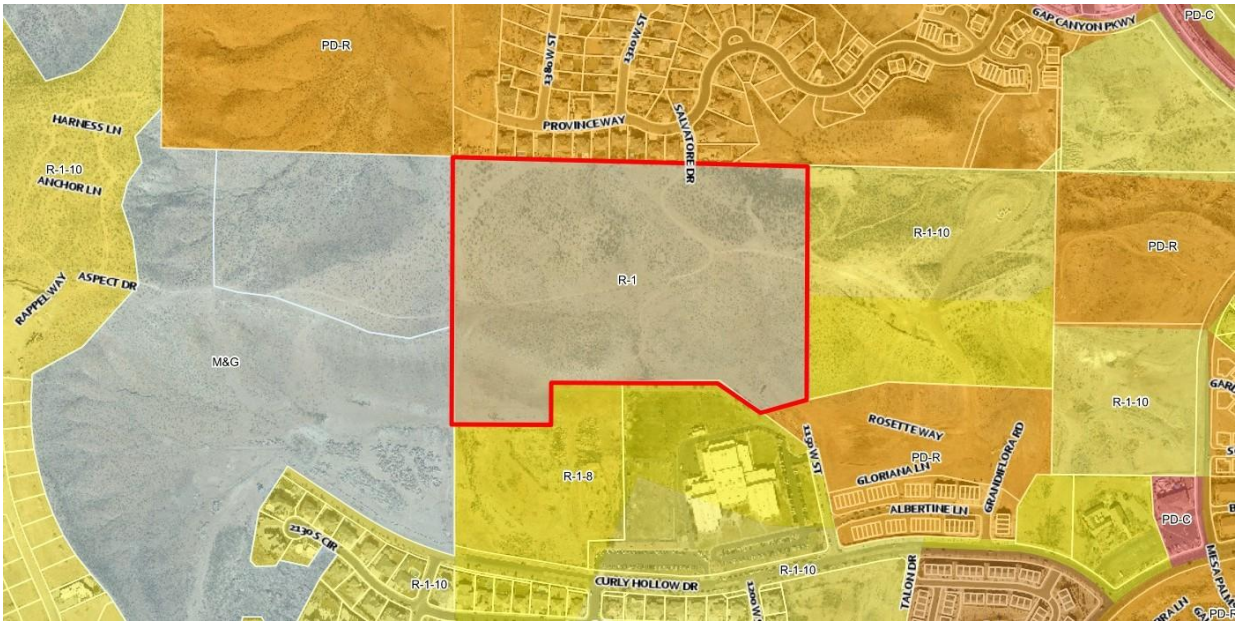


EXHIBIT A

Applicant Narrative

NARRATIVE

The proposed development of Parcel **SG-6-3-2-2001** as a single-family residential neighborhood is consistent with the property's **R-1 zoning designation** and provides an appropriate land-use transition immediately north of Dixie Intermediate School.

The applicant intends to develop the property in a manner that respects the hillside environment while providing safe, functional, and attractive homes. Through thoughtful site planning, grading, drainage, slope stabilization, and building placement, the project will create a cohesive development compatible with the surrounding community.

The applicant recognizes that portions of the property contain hillside features that warrant consideration under the City's Hillside Development Ordinance. The prominent hillside feature within the proposed open space will be preserved and incorporated into the overall site design as a natural open-space amenity. Other isolated and non-contiguous slopes throughout the property do not appear to represent significant hillside landforms and can be appropriately incorporated into the overall development.

Other areas identified for hillside consideration, including slopes generally between Lots **807 and 615** and Lots **114 and 121**, are different in character. While these areas contain contiguous slopes ranging from approximately 20 to 40 percent, with limited areas exceeding 40 percent, they do not form a prominent or significant landform that contributes substantially to the overall hillside character of the property. **Rock Park Drive**, a master-planned roadway, is planned to pass through one of those same sloped areas. It will require grading and modification of the existing topography to construct the roadway. A public walking trail is planned along the south property boundary, with a two-tiered retaining wall system to accommodate the elevation difference and provide a safe, functional connection along the property. Incorporating these improvements into the overall grading plan provides an opportunity to create a coordinated and stabilized transition rather than maintaining an isolated hillside feature that would ultimately be interrupted by required public infrastructure.

The applicant believes these areas should be evaluated based on their overall prominence, physical character, relationship to the surrounding topography, and planned public improvements rather than slope percentage alone. The proposed grading plan will provide stable building areas, appropriate drainage and erosion control, safe access, public trail connectivity, and cohesive transitions between residential development and preserved open space.

Accordingly, the applicant respectfully requests that the prominent hillside feature within the proposed open space be preserved, while the isolated slopes and less prominent contiguous slope areas be permitted to be incorporated into the grading plan, including the necessary grading associated with the planned public trail and **Rock Park Drive**, subject to all applicable City safety, drainage, geotechnical, stabilization, and hillside development requirements.

The applicant respectfully requests approval of the Hillside Development Application subject to compliance with all applicable City of St. George zoning, subdivision, engineering, building, grading, drainage, and hillside development requirements.

EXHIBIT B

Development Plan

HORIZON RIDGE

ST. GEORGE, UTAH

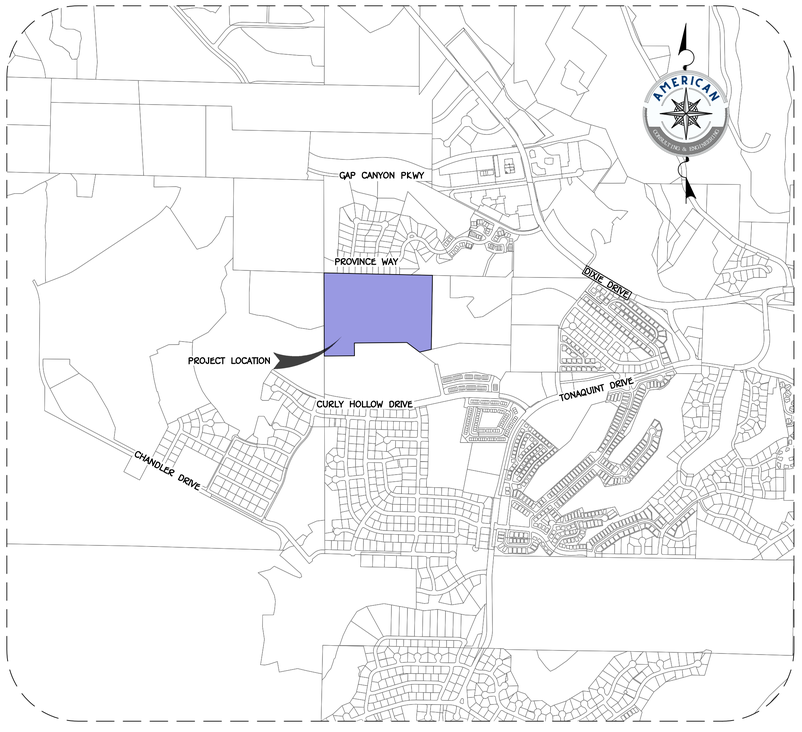
HILLSIDE DEVELOPMENT PERMIT

SEPTEMBER 2026

LEGAL DESCRIPTION

BEGINNING AT A POINT AT THE MOST NORTHWEST CORNER OF PARCEL NO. SG-6-3-2-1213 SAID POINT ALSO BEING ON THE SOUTH LINE OF PARCEL NO. SG-6-3-2-1221, SAID POINT LIES NORTH 00°55'32" EAST ALONG THE SECTION LINE 1,349.93 FEET, AND WEST 1,110.43 FEET, FROM THE EAST QUARTER CORNER OF SECTION 2, TOWNSHIP 43 SOUTH, RANGE 16 WEST, SALT LAKE BASE AND MERIDIAN; RUNNING THENCE SOUTH 00°56'50" WEST ALONG THE WEST LINE OF SAID PARCEL 1,035.30 FEET TO A POINT ON THE NORTH LINE OF ROCKLAND TOWNHOMES SUBDIVISION PHASE 1 AS ON FILE WITH THE WASHINGTON COUNTY RECORDER'S OFFICE; THENCE SOUTH 77°20'32" WEST ALONG SAID NORTH LINE OF ROCKLAND TOWNHOMES SUBDIVISION 167.44 FEET TO A POINT ON THE EAST LINE OF PARCEL NO. SG-6-3-2-132; THENCE ALONG SAID PARCEL THE FOLLOWING FOUR (4) COURSES: 1) NORTH 53°14'04" WEST 222.18 FEET, 2) SOUTH 89°30'48" WEST 733.96 FEET, 3) SOUTH 00°29'12" EAST 179.31 FEET AND 4) SOUTH 89°30'46" WEST 422.41 FEET TO A POINT ON THE EAST LINE OF PARCEL NO. SG-6-3-2-420 SAID POINT ALSO BEING ON THE QUARTER SECTION LINE OF AFORESAID SECTION; THENCE NORTH 00°09'59" WEST 1162.94 FEET ALONG SAID EAST LINE, THE QUARTER SECTION LINE AND THE EAST LINE OF PARCEL NO. SG-6-3-2-421 TO THE MOST SOUTHEAST CORNER OF PARCEL NO. SG-7563-A SAID POINT ALSO BEING THE MOST SOUTHWEST CORNER OF PARCEL NO. SG-6-3-2-147; THENCE SOUTH 88°40'49" EAST 1,517.06 FEET ALONG THE SOUTH LINE OF PARCEL NO. SG-6-3-2-147 SAID SOUTH LINE ALSO BEING THE SOUTH LINE OF TUSCAN HEIGHTS SUBDIVISION AS ON FILE WITH THE WASHINGTON COUNTY RECORDER'S OFFICE, TUSCAN HILLS PHASE 3 SUBDIVISION AS ON FILE WITH THE WASHINGTON COUNTY RECORDER'S OFFICE, TUSCAN HILLS PHASE 2 AMENDED SUBDIVISION AS ON FILE WITH THE WASHINGTON COUNTY RECORDER'S OFFICE, AND PARCEL NO. SG-6-3-2-1221 TO THE POINT OF BEGINNING.

CONTAINING 1,553,736 SQUARE FEET OR 35.67 ACRES.



VICINITY MAP

SECTION 8, T 42 S, R 16 W, SLB&M

0 1000' 2000'

SCALE: 1" = 1000'

OWNER-APPLICANT

HORIZON RIDGE HOLDINGS LLC
3040 LIMESTONE DR.
ST. GEORGE, UT 84790
CONTACT: TIM STEWART
PHONE: (435) 703-4302
EMAIL: tim@stewartutah.com

CIVIL ENGINEER

AMERICAN CONSULTING & ENGINEERING
1173 S. 250 W. SUITE 504
ST. GEORGE, UT 84770
CONTACT: TONY CARTER
PHONE: (435) 288-3330
EMAIL: tony@aceutah.com

GEOTECH ENGINEER

APPLIED GEOTECHNICAL (AGEC)
1420 SOUTH 270 EAST
ST. GEORGE, UT 84790
CONTACT: WAYNE ROGERS, P.E.
PHONE: (435) 673-6850
EMAIL: rogers@agecinc.com

SURVEYOR

AMERICAN CONSULTING & ENGINEERING
1173 S. 250 W. SUITE 504
ST. GEORGE, UT 84770
CONTACT: ADAM ALLEN
PHONE: (435) 288-3330
EMAIL: adam@aceutah.com

SITE DATA		
DESCRIPTION	DATA	
CURRENT ZONING	R-1	
TAX ID/PARCEL NUMBER(S)	SG-6-3-2001	
TOTAL AREA	35.67	ACRES
NO. OF LOTS/UNITS	224	UNITS
DENSITY	6.28	D.U./ACRE

SITE AREA INFORMATION		
DESCRIPTION	ACRE	PERCENT
PRIVATELY OWNED AREA	22.46	62.97
COMMON AREA	3.67	10.29
LIMITED COMMON AREA	0.00	0.00
PUBLIC STREETS	9.54	26.75
PRIVATE STREETS	0.00	0.00
TOTAL	35.67	100.00

SHEET INDEX

#	SHEET	DESCRIPTION
1	H.1.1	COVER
2	H.2.1	SLOPE ANALYSIS PLAN
3	H.3.1	OVERALL SITE PLAN
4	H.4.1	EARTHWORK PLAN
5	H.4.2	GRADING PLAN I
6	H.4.3	GRADING PLAN II
7	H.4.4	GRADING PLAN III
8	H.4.5	GRADING PLAN IV
9	H.5.1	SITE PHOTOS I
10	H.5.2	SITE PHOTOS II
11	H.5.3	STIE PHOTOS III

REVISIONS

NO.	DATE	DESCRIPTION

PRELIMINARY
NOT FOR
CONSTRUCTION

AMERICAN CONSULTING & ENGINEERING
(435) 288-3330
www.aceutah.com
1173 S. 250 W. #504
ST. GEORGE, UT

HORIZON RIDGE
SECTION 8, T 42 S, R 16 W, SLB&M
ST. GEORGE, UTAH

COVER
HILLSIDE DEVELOPMENT PERMIT

JOB #	25-046
DRAWN BY:	CF
CHECKED BY:	TC
DATE:	09/08/2026

H.1.1

SHEET: 1 OF: 11



LEGEND:

- SHEET MATCH LINE
- PHASE LINE
- PROPOSED PARCEL BOUNDARY
- EXISTING/ADJACENT PARCEL BOUNDARY
- 3000 EXISTING GROUND MAJOR CONTOUR
- 3001 EXISTING GROUND MINOR CONTOUR
- 20%-30% SLOPES
- 30%-40% SLOPES
- 40%+ SLOPES

SLOPE TABLE

NUMBER	MIN SLOPE	MAX SLOPE	COLOR	AREA S.F.
1	21.00%	29.99%		88,114
2	30.00%	39.99%		18,100
3	40.00%	99999900.00%		5,182

REVISIONS

NO.	DATE	DESCRIPTION

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AMERICAN CONSULTING & ENGINEERING
1173 S. 250 W. #504
ST. GEORGE, UT
(435) 288-3320
www.ae-utah.com

HORIZON RIDGE

SECTION 8, T 42 S, R 16 W, SLB&M
ST. GEORGE, UTAH

SLOPE ANALYSIS PLAN

HILLSIDE DEVELOPMENT PERMIT

JOB #	25-046
DRAWN BY:	CF
CHECKED BY:	TC
DATE:	09/08/2026

H.2.1

SHEET: 2 OF: 11

SG-7563-A
PLANETBOYS LLC

SG-6-3-2-147
CJL HOLDINGS LLC

NORTH QUARTER CORNER SECTION 2
TOWNSHIP 43 SOUTH, 16 WEST, SLB&M
FOUND 3" BLM BRASS CAP 1968

655.91 (TIE)

BASIS OF BEARINGS
S 89°22'26" E 2652.00'
(CORNER TO CORNER)

TUSCAN HILLS SUBDIVISION

SG-6-3-2-1213
TUSCAN HILLS OWNERS ASSN.

NE CORNER SECTION 2
TOWNSHIP 43 SOUTH,
16 WEST, SLB&M
FOUND 3" WASH CO.
BRASS CAP ILLEGIBLE

SG-6-3-2-1224
COBALT INVESTMENTS LLC

TO BE DEDICATED TO ST. GEORGE CITY

SG-6-3-2-421
QUALITY DEVELOPMENT LLC

SG-6-3-2-1213
ST. GEORGE CITY

SG-6-3-2-420
QUALITY DEVELOPMENT LLC

SG-6-3-2-132
WASHINGTON COUNTY
BOARD OF EDUCATION

SG-RLT-1-A-1
COBLT INVESTMENTS LLC

ROCKLAND TOWNHOMES

CURLY HOLLOW DRIVE
(45' PUBLIC ROW)

ROCK PARK DRIVE (50' PUBLIC ROW)
HORIZON CREST WAY (45' PUBLIC ROW)
COPPER MESA LANE (45' PUBLIC ROW)
SUNRISE BLUFF DRIVE (45' PUBLIC ROW)
CANYON VISTA LANE (45' PUBLIC ROW)
OVERLOOK DRIVE (45' PUBLIC ROW)
JUNIPER POINT WAY (45' PUBLIC ROW)
PINNACLE RIDGE WAY (45' PUBLIC ROW)
1150 WEST (50' PUBLIC ROW)
SALVATORE DRIVE (50' PUBLIC ROW)
SUMMIT VIEW DRIVE (50' PUBLIC ROW)
DESERT SKYE DRIVE (50' PUBLIC ROW)
HIGHLAND RIDGE COURT (45' PUBLIC ROW)

PHASE 1
PHASE 2
PHASE 3
PHASE 4
PHASE 5
PHASE 6
PHASE 7
PHASE 8
PHASE 9
PHASE 10

OPEN SPACE
43,706 SF (1.00 AC)

PROPOSED DETENTION BASIN TO BE DEDICATED TO ST. GEORGE CITY

PROPOSED DETENTION BASIN TO BE DEDICATED TO ST. GEORGE CITY

10' TRAIL

0 80' 160'
SCALE: 1" = 80'

LEGEND:

- SHEET MATCH LINE
- PHASE LINE
- PROPOSED PARCEL BOUNDARY
- EXISTING/ADJACENT PARCEL BOUNDARY
- PROPOSED CENTERLINE ALIGNMENT
- EXISTING CENTERLINE ALIGNMENT
- PROPOSED EASEMENT
- EXISTING EASEMENT
- SURVEY SECTION LINE
- CONC/CMU RETAINING WALL (SEE GRADING)
- EXISTING CONC/CMU RETAINING WALL
- ROCK RETAINING WALL (SEE GRADING)
- EXISTING ROCK RETAINING WALL
- PROPOSED FENCE
- EXISTING FENCE
- SURVEY SECTION CORNER MONUMENT
- ADA PARKING SPACE
- X.X" ASPHALT OVER X.X" BASE PAVEMENT SECTION
- X.X" ASPHALT OVER X.X" BASE PAVEMENT SECTION
- CONCRETE SURFACE
- LANDSCAPE AREA (TO BE DEDICATED TO CITY)
- EXISTING LANDSCAPE AREA
- CLASS I SURVEY MONUMENT
- CLASS II SURVEY MONUMENT
- CORNER PEDESTRIAN RAMP
- STANDARD STREET SIGN
- STANDARD STOP SIGN
- END OF ROAD MARKERS

REVISIONS			
NO.	DATE	DESCRIPTION	

PRELIMINARY
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CONSTRUCTION

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1173 S. 250 W. #204
ST. GEORGE, UT
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HORIZON RIDGE
SECTION 8, T 42 S, R 16 W, SLB&M
ST. GEORGE, UTAH

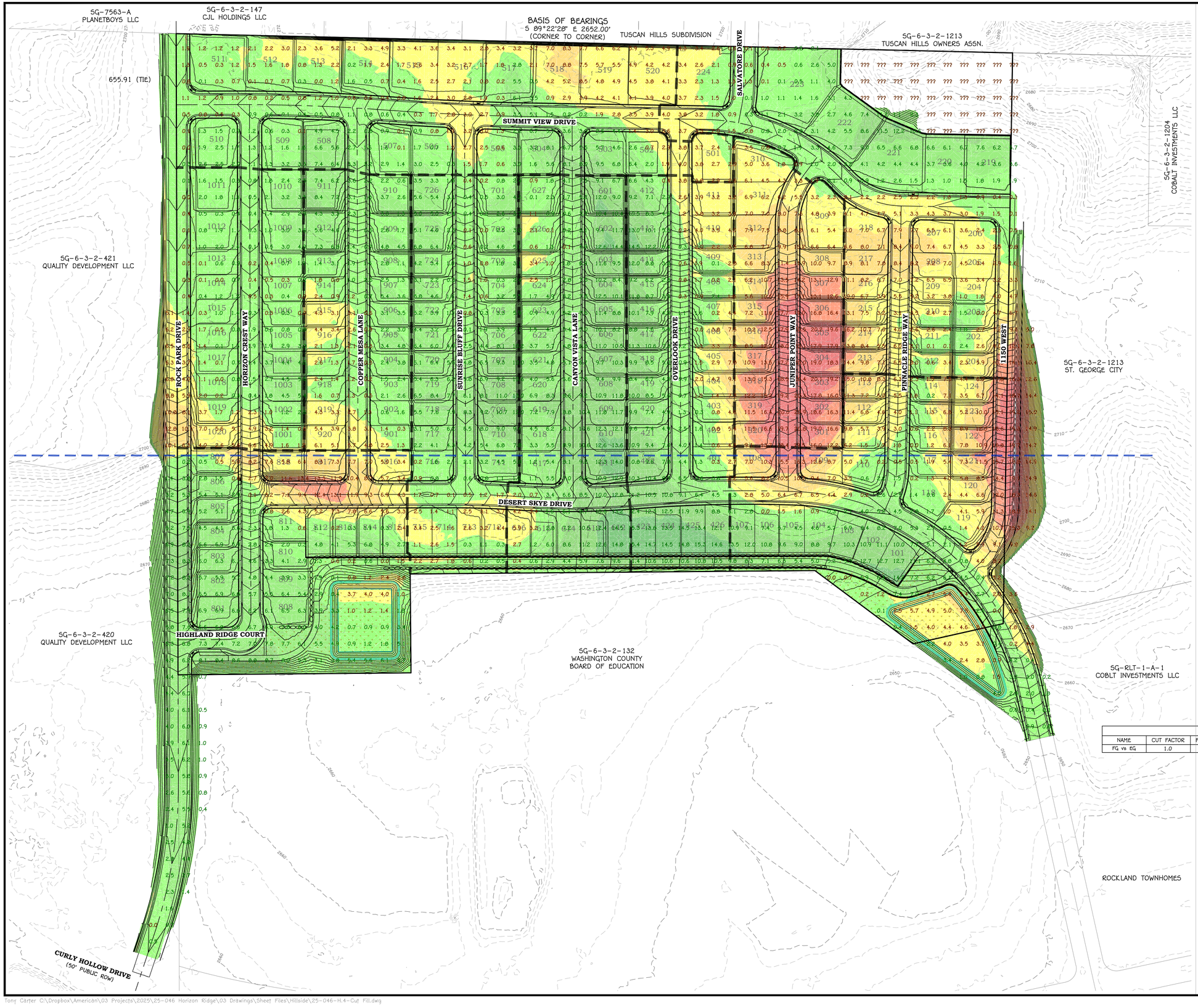
OVERALL SITE PLAN
HILLSIDE DEVELOPMENT PERMIT

JOB #	25-046
DRAWN BY:	CF
CHECKED BY:	TC
DATE:	09/08/2026

H.3.1

SHEET: 3 OF: 11

Tony Carter C:\Dropbox\American\03 Projects\2025\25-046 Horizon Ridge\03 Drawings\Sheet Files\Hillside\25-046-H.3-Site.dwg



LEGEND:

- SHEET MATCH LINE
- PHASE LINE
- PROPOSED PARCEL BOUNDARY
- EXISTING/ADJACENT PARCEL BOUNDARY
- PROPOSED CENTERLINE ALIGNMENT
- EXISTING CENTERLINE ALIGNMENT
- EXISTING CONC/CMU RETAINING WALL
- EXISTING ROCK RETAINING WALL
- GRADING LIMITS OF DISTURBANCE
- 3000 EXISTING GROUND MAJOR CONTOUR
- 3001 EXISTING GROUND MINOR CONTOUR
- 3000 FINISH GROUND MAJOR CONTOUR
- 3001 FINISH GROUND MINOR CONTOUR
- PROPOSED DRAINAGE FLOWLINE
- EXISTING DRAINAGE FLOWLINE
- ROCK BOULDER RETAINING WALL
- CONC/CMU RETAINING WALL
- CURB INLET SINGLE CATCH BASIN
- CURB INLET DOUBLE CATCH BASIN
- STORM DRAIN MANHOLE
- GRATE INLET AREA DRAIN BOX
- FLARED END SECTION

ELEVATIONS TABLE

NUMBER	MIN. ELEVATION	MAX. ELEVATION	COLOR
1	-22.000	-17.000	
2	-17.000	-12.000	
3	-12.000	-7.000	
4	-7.000	-2.000	
5	-2.000	3.000	
6	3.000	8.000	
7	8.000	13.000	
8	13.000	18.000	

CUT / FILL SUMMARY

NAME	CUT FACTOR	FILL FACTOR	2D AREA (s.f.)	CUT (cu.yds.)	FILL (cu.yds.)	NET (cu.yds.)
FG vs EG	1.0	1.0	1,654,177	146,462	149,978	3,516

0 80' 160'
SCALE: 1" = 80'

REVISIONS

NO.	DESCRIPTION	DATE

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HORIZON RIDGE

SECTION 8, T 42 S, R 16 W, SLB&M
ST. GEORGE, UTAH

EARTHWORK PLAN

HILLSIDE DEVELOPMENT PERMIT

JOB # 25-046
DRAWN BY: CF
CHECKED BY: TC
DATE: 09/08/2026

H.4.1

SHEET: 4 OF: 11

Tony Carter C:\Dropbox\American\03 Projects\2025\25-046 Horizon Ridge\03 Drawings\Sheet Files\Hillside\25-046-H.4-Cut Fill.dwg

SG-7563-A
PLANETBOYS LLC

SG-6-3-2-147
CJL HOLDINGS LLC

TUSCAN HILLS SUBDIVISION

MATCHLINE
(SEE SHEET H.4.3)

SG-6-3-2-421
QUALITY DEVELOPMENT LLC

SG-6-3-2-420
QUALITY DEVELOPMENT LLC

MATCHLINE
(SEE SHEET H.4.4)

ROCK PARK DRIVE
(50' PUBLIC ROW)

HORIZON CREST WAY
(45' PUBLIC ROW)

COPPER MESA LANE
(45' PUBLIC ROW)

SUNRISE BLUFF DRIVE
(45' PUBLIC ROW)

CANYON VISTA LANE
(45' PUBLIC ROW)

PHASE 10

PHASE 9

PHASE 8

PHASE 5

PHASE 7

PHASE 6

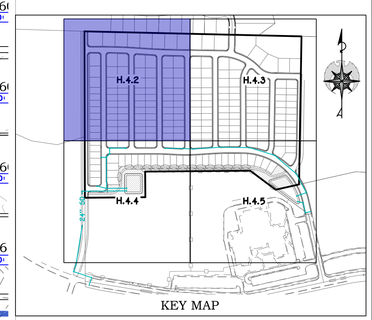
MAX 7' ROCKERY WALL

8-FT MAX WALL

511 PAD: 2708.8
512 PAD: 2710.4
513 PAD: 2712.3
514 PAD: 2716.2
515 PAD: 2718.2
516 PAD: 2718.1
517 PAD: 2716.3
518 PAD: 2713.8
510 PAD: 2708.2
509 PAD: 2708.2
508 PAD: 2713.2
507 PAD: 2713.1
506 PAD: 2716.8
505 PAD: 2716.8
504 PAD: 2712.9
1011 PAD: 2706.4
1010 PAD: 2706.3
911 PAD: 2711.4
910 PAD: 2711.0
726 PAD: 2715.7
701 PAD: 2715.6
627 PAD: 2709.8
1012 PAD: 2704.4
1009 PAD: 2704.4
912 PAD: 2706.2
909 PAD: 2705.8
725 PAD: 2711.6
702 PAD: 2711.5
626 PAD: 2704.7
1013 PAD: 2702.6
1008 PAD: 2702.5
913 PAD: 2700.5
908 PAD: 2700.5
724 PAD: 2707.0
703 PAD: 2706.9
625 PAD: 2699.6
1014 PAD: 2701.5
1007 PAD: 2701.4
914 PAD: 2698.0
907 PAD: 2698.0
723 PAD: 2704.1
704 PAD: 2704.0
624 PAD: 2696.3
1015 PAD: 2700.4
1006 PAD: 2700.3
915 PAD: 2695.6
906 PAD: 2695.6
722 PAD: 2701.2
705 PAD: 2701.1
623 PAD: 2693.0
1016 PAD: 2699.3
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622 PAD: 2689.8
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917 PAD: 2690.9
904 PAD: 2690.9
720 PAD: 2695.3
707 PAD: 2695.2
621 PAD: 2687.3
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807 PAD: 2688.7
818 PAD: 2688.3
817 PAD: 2685.5
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716 PAD: 2688.7
711 PAD: 2688.7
617 PAD: 2682.8

LEGEND:

- SHEET MATCH LINE
- PHASE LINE
- PROPOSED PARCEL BOUNDARY
- EXISTING/ADJACENT PARCEL BOUNDARY
- PROPOSED CENTERLINE ALIGNMENT
- EXISTING CENTERLINE ALIGNMENT
- EXISTING CONC/CMU RETAINING WALL
- EXISTING ROCK RETAINING WALL
- GRADING LIMITS OF DISTURBANCE
- 3000 EXISTING GROUND MAJOR CONTOUR
- 3001 EXISTING GROUND MINOR CONTOUR
- 3000 FINISH GROUND MAJOR CONTOUR
- 3001 FINISH GROUND MINOR CONTOUR
- PROPOSED DRAINAGE FLOWLINE
- EXISTING DRAINAGE FLOWLINE
- ROCK BOULDER RETAINING WALL
- CONC/CMU RETAINING WALL
- CURB INLET SINGLE CATCH BASIN
- CURB INLET DOUBLE CATCH BASIN
- STORM DRAIN MANHOLE
- GRATE INLET AREA DRAIN BOX
- FLARED END SECTION



KEY MAP

0 40' 80'
SCALE: 1" = 40'

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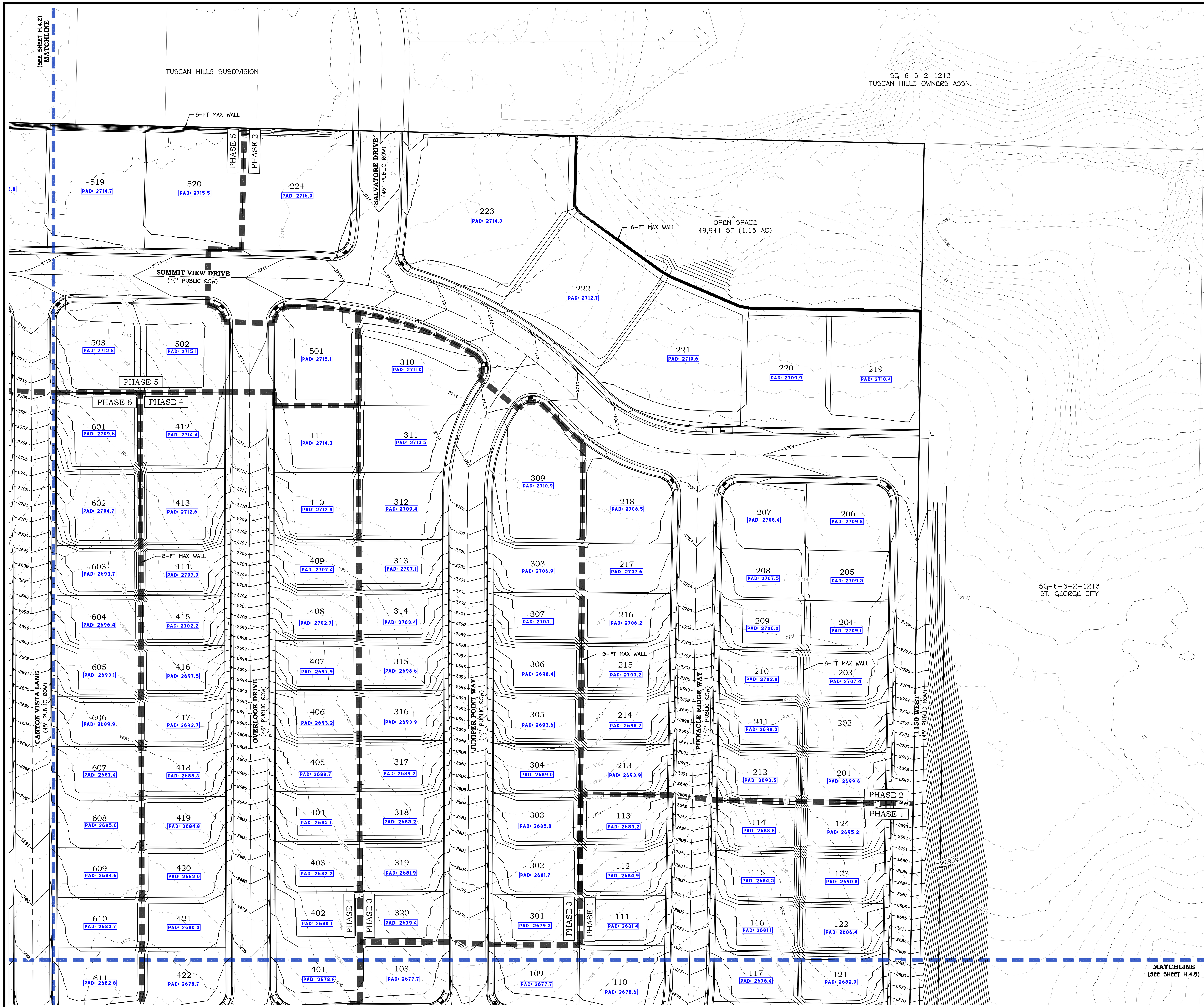
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H.4.2

SHEET: 5 OF: 11



LEGEND:

- SHEET MATCH LINE
- PHASE LINE
- PROPOSED PARCEL BOUNDARY
- EXISTING/ADJACENT PARCEL BOUNDARY
- PROPOSED CENTERLINE ALIGNMENT
- EXISTING CENTERLINE ALIGNMENT
- EXISTING CONC/CMU RETAINING WALL
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- GRADING LIMITS OF DISTURBANCE
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- 3000 FINISH GROUND MAJOR CONTOUR
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- ROCK BOULDER RETAINING WALL
- CONC/CMU RETAINING WALL
- CURB INLET SINGLE CATCH BASIN
- CURB INLET DOUBLE CATCH BASIN
- SD STORM DRAIN MANHOLE
- GRATE INLET AREA DRAIN BOX
- FLARED END SECTION



KEY MAP

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H.4.3

SHEET: 6 OF: 11

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MATCHLINE

SG-6-3-2-420
QUALITY DEVELOPMENT LLC

SG-6-3-2-132
WASHINGTON COUNTY
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(SEE SHEET H.4.5)

ROCK PARK DRIVE
(50' PUBLIC ROW)

HORIZON CREST WAY
(45' PUBLIC ROW)

COPPER MESA LANE
(45' PUBLIC ROW)

SUNRISE BLUFF DRIVE
(45' PUBLIC ROW)

CANYON VISTA LANE
(45' PUBLIC ROW)

DESERT SKYE DRIVE
(45' PUBLIC ROW)

HIGHLAND RIDGE COURT
(45' PUBLIC ROW)

PHASE 9
PHASE 8
PHASE 7
PHASE 7
PHASE 6

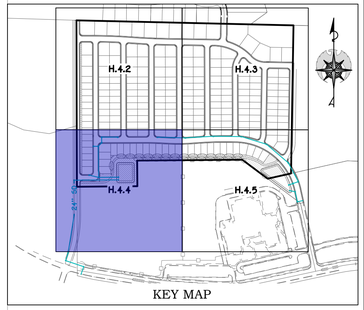
PROPOSED
DETENTION BASIN

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710 PAD: 2689.5
618 PAD: 2683.7
807 PAD: 2688.7
818 PAD: 2688.3
817 PAD: 2685.3
816 PAD: 2685.3
716 PAD: 2688.7
711 PAD: 2688.7
617 PAD: 2682.8
806 PAD: 2684.9
805 PAD: 2681.0
804 PAD: 2677.4
803 PAD: 2674.6
802 PAD: 2672.5
801 PAD: 2671.2
811 PAD: 2678.2
812 PAD: 2681.8
813 PAD: 2684.3
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715 PAD: 2689.7
714 PAD: 2689.6
713 PAD: 2688.4
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616 PAD: 2685.5
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613 PAD: 2681.2
810 PAD: 2675.1
809 PAD: 2672.7
808 PAD: 2671.2

-33.71%
-31.95%
-40.03%
0.00%

LEGEND:

- SHEET MATCH LINE
- PHASE LINE
- PROPOSED PARCEL BOUNDARY
- EXISTING/ADJACENT PARCEL BOUNDARY
- PROPOSED CENTERLINE ALIGNMENT
- EXISTING CENTERLINE ALIGNMENT
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- STORM DRAIN MANHOLE
- GRATE INLET AREA DRAIN BOX
- FLARED END SECTION



KEY MAP

0 40' 80'
SCALE: 1" = 40'

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H.4.4

SHEET: 7 OF: 11

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(SEE SHEET H.4.3)
MATCHLINE

(SEE SHEET H.4.4)
MATCHLINE

CANYON VISTA LANE (45' PUBLIC ROW)
OVERLOOK DRIVE (45' PUBLIC ROW)
JUNIPER POINT WAY (45' PUBLIC ROW)
PINNACLE RIDGE WAY (45' PUBLIC ROW)
1150 WEST (45' PUBLIC ROW)
DESERT SKYE DRIVE (45' PUBLIC ROW)

PHASE 1
PHASE 3
PHASE 4
PHASE 6

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613 PAD: 2681.2
614 PAD: 2682.6
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8-FT MAX WALL
8-FT MAX WALL
3.97%
13.45%
PROPOSED DETENTION BASIN

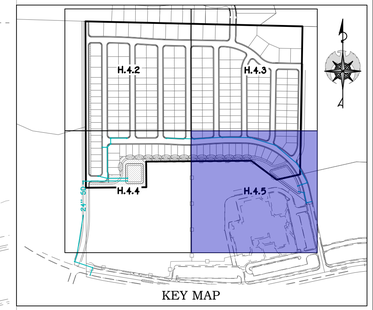
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- PROPOSED PARCEL BOUNDARY
- EXISTING/ADJACENT PARCEL BOUNDARY
- PROPOSED CENTERLINE ALIGNMENT
- EXISTING CENTERLINE ALIGNMENT
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- FLARED END SECTION



KEY MAP

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SHEET: 8 OF: 11

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SITE PHOTOS I
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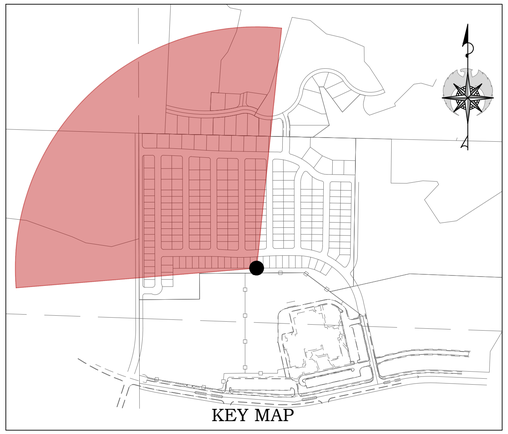
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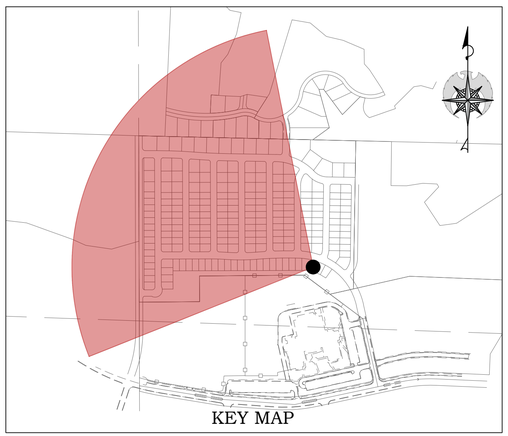
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H.5.2

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STIE PHOTOS III

HILLSIDE DEVELOPMENT PERMIT

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H.5.3

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EXHIBIT C

Phase 1 & 2
Drainage Study

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DRAINAGE REPORT

FOR: HORIZON RIDGE

PROJECT NO: ACE-25-046

DATE: September 4, 2026

PREPARED BY:

American Consulting & Engineering, LLC
Contact: Engineer Name
1173 South 250 West, Suite 504
St. George, UT 84770
Phone: (435) 288-3330
Email: tony@aceutah.com

Engineer's Seal

PREPARED FOR:

Horizon Ridge Holdings LLC
Contact: Tim Stewart
3040 Limestone Drive
St. George, UT 84790
Phone: (435) 703-4302
Email: tim@stewartutah.com

LOCATED IN:

St.George
THE BRIGHTER SIDE

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III. ON-SITE DRAINAGE 4
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I. PROPERTY DESCRIPTION

The subject property consists of approximately 35.67 acres and is located at the intersection of Curly Hollow Drive & 1150 West, north of Dixie Intermediate School in St. George, Washington County, Utah. A vicinity map of the property is shown in Figure 1 below.

The site is currently vacant and is characterized by moderately sloping terrain. Existing drainage patterns across the site generally consist of sheet flow moving in a north to south direction. Runoff is conveyed across the site via a combination of natural and/or man-made drainage features.

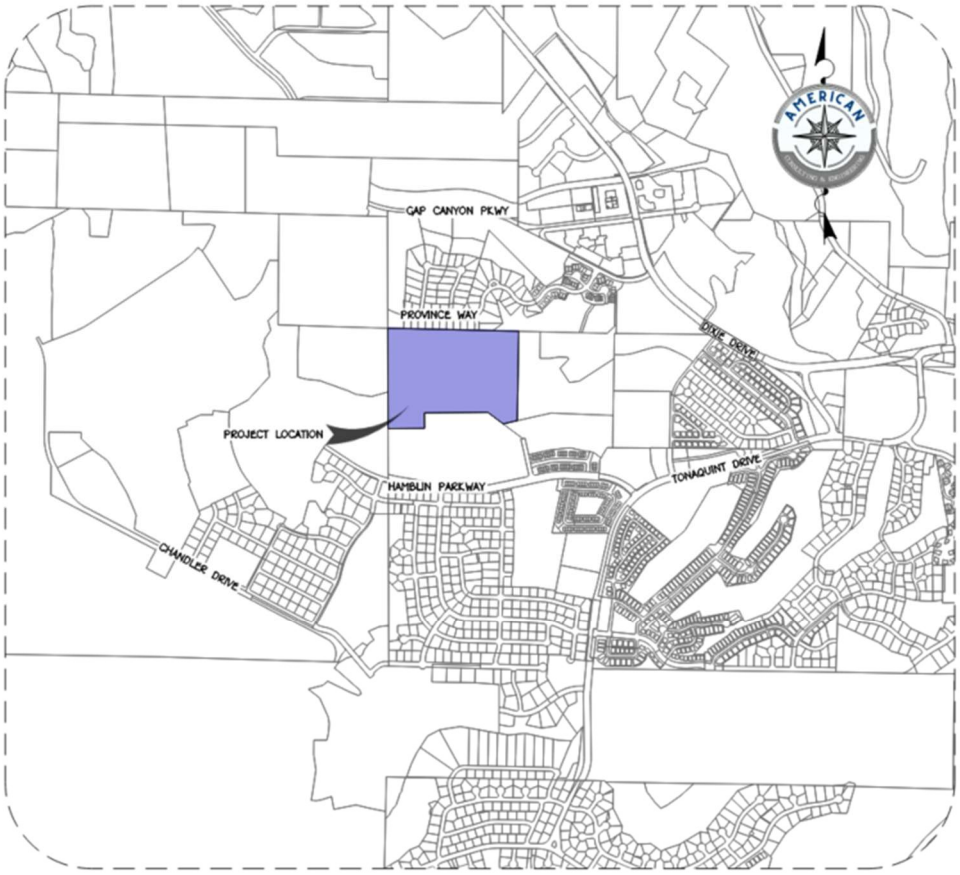


Figure 1: Vicinity Map

II. OFF-SITE DRAINAGE

The project site is influenced by offsite drainage originating from upstream areas beyond the project boundaries. Offsite flows generally consist of overland sheet flow and concentrated runoff conveyed through existing natural washes, drainage swales, and/or adjacent roadways.

Based on available topographic mapping and field observations, runoff from the upstream basin enters the site at identified points along the project limits and continues in a generally downstream direction consistent with existing drainage patterns. The contributing offsite drainage basin has been evaluated as part of this report to ensure that the proposed development adequately accounts for these flows.

A. Upstream:

The proposed design maintains existing drainage pathways for upstream offsite runoff and conveys flows through the site without obstruction or adverse impact. Where necessary, drainage facilities such as swales, storm drain systems, or channels are incorporated to safely route offsite flows through or around the development.

B. Downstream:

The project is designed to avoid increasing runoff or causing adverse impacts to downstream properties. Offsite flows are analyzed in conjunction with onsite runoff to ensure that all drainage facilities are appropriately sized and that post-development conditions do not negatively affect adjacent or downstream areas.

III. ON-SITE DRAINAGE

Drainage within the project site is currently characterized by sheet flow that generally follow existing topography in a north to south direction. Runoff is generated from precipitation events and conveyed across the site via natural overland flow and minor topographic depressions.

A. Pre-Developed:

Under existing (pre-developed) conditions, the project site is characterized by vacant land with drainage occurring primarily as sheet flow and shallow concentrated flow following the natural topography. Surface runoff generally flows in a north to south direction toward adjacent properties.

The site exhibits minimal impervious area, resulting in relatively low runoff coefficients and slower runoff response during storm events. Existing drainage is conveyed through a combination of natural features such as shallow swales, depressions, and/or ephemeral washes, with no formal storm drain infrastructure present. Minor ponding may occur in localized low-lying areas during larger storm events; however, runoff generally continues downstream without significant obstruction.

B. Post-Developed:

Under proposed (post-developed) conditions, the site will be developed as a single-family residential subdivision introducing impervious surfaces such as roofs, roadways, driveways, and parking areas, which will increase runoff rates and volumes.

Drainage patterns will be modified through site grading to provide positive drainage and direct runoff toward designated collection and conveyance systems. Stormwater runoff will be managed using a combination of engineered drainage facilities, including:

- Curb and Gutter Systems
- Catch Basins and Area Drains
- Storm Drain Piping Systems
- Open Swales and/or Channels
- Detention/Retention Facilities

Runoff from the developed site will be routed to detention basins and public storm drain system**.** The proposed storm drain system is designed to safely convey flows from on-site areas while maintaining hydraulic capacity during design storm events.

Post-development peak flows are controlled by detention/retention basins to match or not exceed pre-development conditions in accordance with local jurisdiction requirements. The overall drainage design ensures that runoff is conveyed without causing adverse impacts to the site or downstream properties.

IV. MASTER PLANNED DRAINAGE

The project site is located within an area governed by the adopted Master Drainage Plan that identifies regional facilities for stormwater conveyance. The proposed development is designed to conform to this plan by maintaining drainage patterns, directing runoff to designated facilities, and providing necessary improvements or easements. Interim measures are included where regional facilities are not yet constructed. The project is consistent with the master plan and will not adversely impact downstream systems.

V. FEMA FLOODPLAIN

Based on the FEMA Floodplain Map #49053C1028G the site is designated as Zone X, which is defined as an Area of Minimal Flood Hazard. The referenced FEMA Floodplain Map is included in Appendix D.

VI. DRAINAGE STUDIES

Available drainage studies, including regional master drainage plans, FEMA Flood Insurance Studies, and prior approved drainage reports, were reviewed to identify upstream basin characteristics, peak discharge rates, and downstream system capacities. These studies were used to inform hydrologic modeling assumptions and to verify consistency with regional drainage planning efforts.

Where appropriate, design flows and basin parameters were compared to those presented in previous studies. Any variations were evaluated and updated using current topographic data, rainfall information, and accepted hydrologic methods. The resulting analysis reflects current site conditions while maintaining general consistency with previously established drainage planning documents.

VII. PROPOSED DRAINAGE FACILITIES

The overall stormwater management approach for this site is based on conveying the 10-year storm through inlets and pipes and the 100-year storm within the roadways. General runoff patterns within the development include draining the on-site runoff to the nearest curb and gutter which will then convey runoff to strategically placed catch basin curb inlets.

A. Grading:

Site grading is designed to establish positive drainage across the property and to direct runoff toward designated collection and conveyance points. Finished grades are configured to minimize ponding, prevent adverse impacts to adjacent properties, and maintain or improve existing drainage patterns where feasible. Grading also defines drainage sub-basins used in hydrologic analysis and supports efficient routing of stormwater to inlets, swales, or detention facilities.

B. Roadway Improvements:

Proposed roadway improvements include curb and gutter systems designed to collect and convey stormwater runoff along street corridors. Flow within roadways is directed to catch basins or curb inlets located at low points and along longitudinal grades. Roadway profiles and cross slopes are designed to limit spread and maintain safe vehicular access during storm events while efficiently routing runoff to the storm drain system.

C. Conveyance Improvements:

Stormwater runoff is conveyed through the site using a combination of closed conduit systems and open channels, including:

- Catch Basins and Area Drains
- Storm Drain Piping Systems
- Open Swales or Channels
- Culverts and Headwalls
- Energy Dissipation Features (e.g., riprap, outlet protection)

The conveyance system is designed to accommodate design storm events and to safely route both on-site and tributary off-site flows to approved discharge points.

D. Detention/Storage Facilities:

Where required, stormwater detention or retention facilities are incorporated to manage post-development runoff rates and volumes. These facilities are designed to:

- Temporarily store stormwater during peak runoff conditions
- Reduce peak discharge rates to acceptable levels
- Release flows in a controlled manner via outlet control structures
- Provide emergency overflow pathways for larger storm events

Detention basins are sized based on hydrologic analysis and are integrated into the overall drainage system to ensure compliance with applicable criteria and to prevent adverse downstream impacts.

VIII. FLOOD & FEMA COMPLIANCE

Storm drain design and calculations have been completed in accordance with the City of St. George Master Plan, City of St. George Drainage Manual, and City of St. George Standard Specifications.

FEMA floodplain map #49053C1028G indicates that the proposed development is designated as Zone X, which is defined as an Area of Minimal Flood Hazard.

IX. RUNOFF COMPUTATIONS

Runoff computations for the project site were performed using accepted hydrologic methodologies consistent with applicable jurisdictional standards. Drainage basins were delineated based on existing and proposed topography, and key parameters including drainage area, runoff coefficients, curve numbers, and time of concentration were determined for each basin.

Peak runoff rates were calculated for the required design storm events using the SCS Curve Number Method. Rainfall data was obtained from the Drainage Manual.

Pre-development and post-development runoff conditions were evaluated and compared to assess the impacts of the proposed development. Where necessary, detention or other stormwater management measures have been incorporated to mitigate increases in peak discharge and ensure compliance with applicable drainage requirements.

See sub-sections below for a summary of inputs, calculations, and results. The complete set of calculations and reports are provided in Appendix B.

A. Hydrological Model:

Autodesk's Hydraflow Hydrographs Extension software is used to estimate pre-developed and post-developed peak runoff rates.

B. Hydrological Model Inputs:

Autodesk's Hydraflow Hydrograph Extension software requires the following inputs and parameters for each drainage basin/sub-basin.

1. Drainage Area (see Appendix A)
2. SCS Curve Number (weighted)
3. Lag Time (min)
4. Rainfall Depth (inches)
5. Storm Distribution

Inputs noted above are described in subsequent sections of this report and are partially summarized in the tables shown below:

1. Drainage Area:

Watershed areas for both pre and post developed conditions are included in Appendix A.

2. SCS Curve Number:

The existing pre-developed ground cover consists of primarily natural desert terrain common in undisturbed areas of Washington County. Soil data obtained from the USDA Web Soil Survey shows the site soils are comprised of mostly:

- EB (Eroded land-Shalet complex, warm) HSG = D
- JaC (Junction fine sandy loam, 2 to 5 percent slopes), HSG = A
- WBD (Winkel gravelly fine sandy loam, 1 to 8 percent slopes), HSG = D

Post-development Curve Numbers were assigned based on proposed land uses, soil conditions, and impervious coverage. Composite CN values were calculated for each drainage basin and used to estimate runoff under the post-developed conditions.

Weighted SCS curve numbers for both pre and post-developed conditions are calculated using the following equation:

$$CN\ (weighted) = \frac{\sum CN\ x\ A}{\sum A}$$

3. Lag Time:

For drainage areas less than 2,000 acres, the lag time can be calculated using the following equation:

$$L = \frac{l^{0.8}\left(\frac{1000}{CN} - 9\right)^{0.7}}{1900(S)^{0.5}}$$

- ⇨ L = lag time (hour)
- ⇨ L = longest flow path length of subarea (ft)
- ⇨ CN = SCS curve number
- ⇨ S = average slope along longest flow path of subarea (%)

4. Rainfall Depth:

Design Storm	3-hour (in)	24-hour (in)
10-year	n/a	1.61
100-year	1.66 in	2.38

Source: Rainfall depths obtained from the Drainage Manual.

5. Design Storms and Distribution:

In accordance with the Construction and Design Standard Specifications the following design storms are used in this analysis:

- 10-year, 24-hour
- 100-year, 3-hour
- 100-year, 24-hour

The SCS Type II design storm distribution is used for the 10-year and 100-year 24-hour storms. The Farmer-Fletcher design storm distribution included in the Drainage Manual is used for the 100-year 3-hour storm.

C. Hydrological Model Summary:

Pre-Developed Inputs			
Basin ID	**Area (acres)**	**CN**	**Lag Time (min)**
Pre-1	35.66	88	6.39

Pre-Developed Results			
Basin ID	**10-year 24-hour (cfs)**	**100-year 3-hour (cfs)**	**100-year 24-hour (cfs)**
Pre-1	33.73		65.88

Post-Developed Inputs			
Basin ID	**Area (acres)**	**CN**	**Lag Time (min)**
Post-West	11.4	92	7.84
Post-East	24.27	92	10.48

Post-Developed Results			
Basin ID	**10-year 24-hour (cfs)**	**100-year 3-hour (cfs)**	**100-year 24-hour (cfs)**
Post-West	14.72		25.73
Post-East	31.34		54.79

Post-Developed After Detention Results			
Basin ID	**10-year 24-hour (cfs)**	**100-year 3-hour (cfs)**	**100-year 24-hour (cfs)**
Combined Post-Developed	20.62		45.38

Model results indicate that post-development conditions increase runoff rates and volumes due to the introduction of impervious surfaces. Where necessary, detention and stormwater management facilities have been incorporated to mitigate increases in peak flows.

With the proposed detention/retention storage measures in place, post-development discharge rates are maintained at or below pre-development levels in accordance with jurisdictional requirements, and the system performs within acceptable design criteria.

Overall, the hydrologic model demonstrates that the proposed drainage system adequately manages runoff and does not result in adverse impacts to downstream properties or infrastructure.

See Section 9.D below for detention/storage facility design parameters.

D. Detention/Storage Facility

Detention facilities are designed to store and control post-development runoff, limiting discharge rates to acceptable levels. The system includes properly sized storage volume, controlled outlet structures, and emergency overflow provisions. The following summarizes the proposed detention/storage facility:

East Detention Facility Design Parameters	
Bottom Elevation	2655’
Orifice-1	24” @ 2655’
Orifice-2	
Outlet	24” @ 2655
Riser Structure	5x5 Pre-Cast Box
Riser Crest Elevation	2657.2’
Riser Crest Length	20’
Spillway Elevation	
Side Slopes	3:1
10-year HWL	2656.48’
10-year Storage Volume	19,732 Cu. ft.
100-year HWL	2657.29’
100-year Storage Volume	31,192 Cu. ft.

West Detention Facility Design Parameters	
Bottom Elevation	2660’
Orifice-1	12” @ 2661.5’
Orifice-2	
Outlet	30” @ 2658’
Riser Structure	5x5 Pre-Cast Box
Riser Crest Elevation	2662.70’
Riser Crest Length	20’
Spillway Elevation	
Side Slopes	3:1
10-year HWL	2661.67’
10-year Storage Volume	23,915 Cu. ft.
100-year HWL	2662.20’
100-year Storage Volume	32,192 Cu. ft.

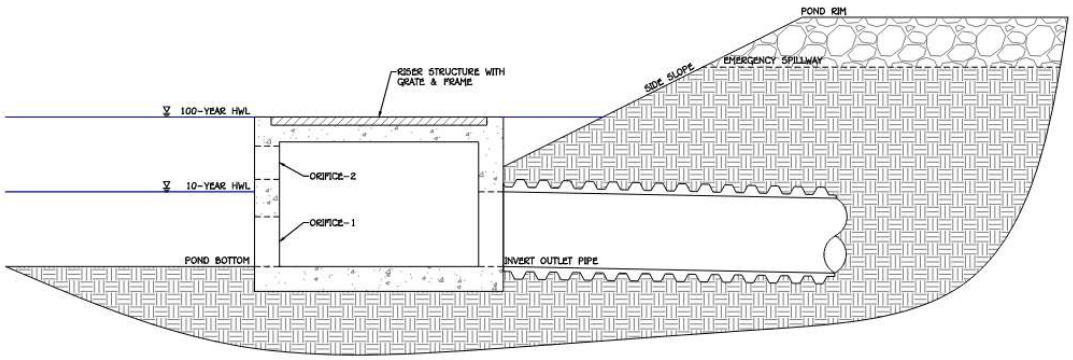


Figure 2: Detention Outlet Structure

In the event of an emergency the detention pond will provide a spillway capable of releasing the un-detained maximum post-developed peak flow. The proposed spillway will need to be constructed to meet the following design parameters.

Emergency Spillway Design Parameters	
Bottom Elevation	
Rim Elevation	
Depth	
Side Slopes	
Bottom Width	
Capacity	

X. DRAINAGE FACILITY DESIGN COMPUTATIONS

Hydraulic design computations were completed to verify the capacity and performance of each drainage facility. Storm drain pipes were sized based on contributing flow rates, pipe slope, hydraulic grade line considerations, and allowable velocities. Inlets and catch basins were evaluated for interception capacity and spacing. Open channels and swales were analyzed to confirm adequate conveyance capacity, acceptable flow depth, and non-erosive velocities.

The Rational Method is used to size all proposed inlets, pipes, and roadways. The 10-year design storm applies to all inlets and pipes and the 100-year design storm applies to all roadways and channels.

$Q = c\ x\ i$ x A

- ⇨ Q = maximum rate of runoff (cfs)
- ⇨ i = rainfall intensity (inches/hour)
- ⇨ A = drainage basin area (acres)
- ⇨ c = weighted runoff coefficient

Rainfall intensities for the applicable design storm were obtained from the NOAA Atlas 14. A copy of the complete NOAA Atlas 14 Rainfall Intensity table is provided in Appendix F for reference. A duration (time of concentration) of 15 minutes is conservatively used in this analysis.

- ⇨ 10-year = 2.00 in/hr
- ⇨ 100-year = 3.68 in/hr

Areas for each drainage basin are shown in Appendix A. The selected runoff coefficient for basins within the property boundary is based on the Medium Density Single Family Residential land use category and is obtained from the Drainage Manual. The resulting peak flows for each drainage basin are summarized in the table below.

Rational Method Peak Flows				
Basin ID	**A (acre)**	**c**	**Q_{10} (cfs)**	**Q_{100} (cfs)**

The proposed storm drainpipe network and corresponding peak flows noted above are entered into Autodesk's Storm Sewers program to model the capacity and performance of the proposed storm drain system.

The completed design computations demonstrate that the proposed drainage facilities are adequately sized to accommodate the design flows, maintain positive drainage, and prevent adverse impacts to adjacent and downstream properties. Detailed computational data and supporting model output are included in Appendix C.

XI. EASEMENTS AND RIGHT-OF-WAY

The proposed drainage system will be contained within the public street right-of-way so no additional easements will be required.

XII. FEMA CALCULATIONS

None. Not Applicable.

XIII. LOW IMPACT DEVELOPMENT (LID)

Low Impact Development (LID) principles were considered in the preparation of this drainage analysis in accordance with regional stormwater management guidance applicable to Washington County. Consistent with local and state requirements, the project design evaluates opportunities to retain and treat the water quality volume, currently defined as the 80th percentile storm event. LID strategies such as on-site retention, bioretention facilities, infiltration areas, and/or permeable surfaces have been considered where feasible, taking into account site constraints including soil conditions, topography, groundwater depth, and proposed land use.

Overall, the proposed approach is intended to align with current LID guidance while maintaining effective and safe stormwater conveyance for the developed condition. For additional LID information please refer to the accompanying Storm Water Quality Report.

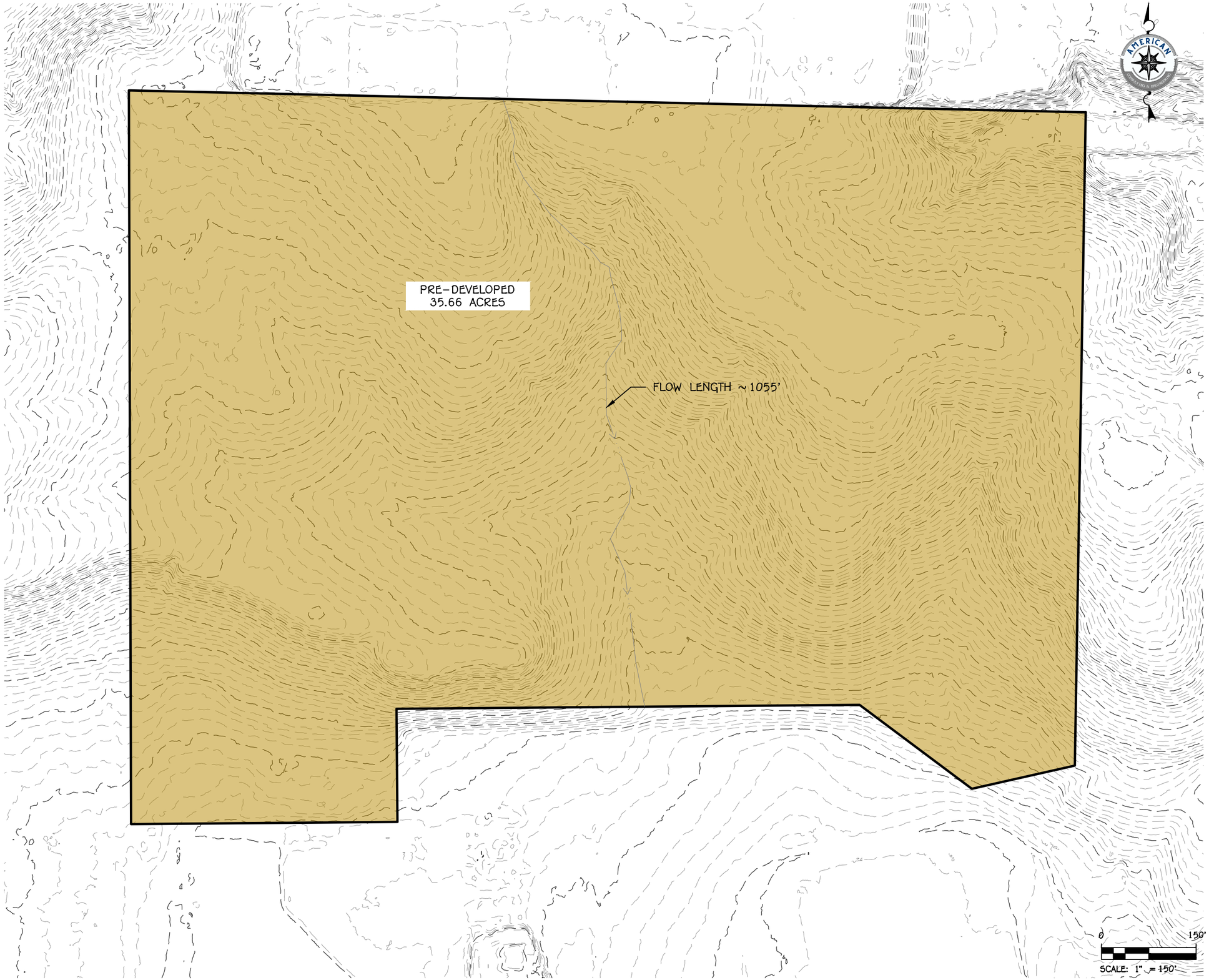
XIV. CONCLUSIONS

The hydrologic and hydraulic analyses performed for this project demonstrate that the proposed drainage facilities are adequate to safely convey and manage stormwater runoff under design storm conditions. The incorporation of grading improvements, storm drain systems, and detention/storage facilities ensures that post-development peak discharge rates are controlled in accordance with applicable criteria.

The proposed development maintains compatibility with existing and planned drainage patterns, does not create adverse impacts to upstream or downstream properties, and is consistent with applicable local standards and master drainage plans. All hydrologic and hydraulic computations used to develop this drainage study were performed using the

current standard of care and engineering best management practices. Based on the findings of this report, the proposed drainage system is considered acceptable by American Consulting & Engineering.

APPENDIX A: DRAINAGE CONTROL PLAN



LAND COVERAGE AREAS
OPEN SPACE POOR
OPEN SPACE POOR
OPEN SPACE POOR
IMPERVIOUS
PAVED STREETS W/ DITCHES
STREETS GRAVEL
STREETS DIRT
DESERT URBAN NATURAL
DESERT URBAN ARTIFICIAL
URBAN COMMERCIAL
URBAN INDUSTRIAL
URBAN NEWLY GRADED
RESIDENTIAL TOWNHOMES
RESIDENTIAL APARTMENTS
RESIDENTIAL < 6,000 S.F.
RESIDENTIAL 7,000 S.F.
RESIDENTIAL 8,000 S.F.
RESIDENTIAL 10,000 S.F.
RESIDENTIAL 14,000 S.F.
RESIDENTIAL 20,000 S.F.
RESIDENTIAL 40,000 S.F.
RESIDENTIAL 80,000 S.F.
DESERT SHRUB POOR
DESERT SHRUB FAIR
DESERT SHRUB GOOD

LEGEND

- DRAINAGE AREA BOUNDARY
- PROPOSED FLOWLINE
- EXISTING FLOWLINE
- 2500 FINISH GROUND MAJOR
- 2501 FINISH GROUND MINOR
- 2500 EXISTING GROUND MAJOR
- 2501 EXISTING GROUND MINOR
- PROPOSED ROCK WALL
- EXISTING ROCK WALL
- SD PROPOSED STORM DRAIN
- SD EXISTING STORM DRAIN
- SINGLE CATCH BASIN
- DOUBLE CATCH BASIN
- AREA DRAIN
- SD STORM DRAIN MANHOLE
- FLARED END SECTION

REVISIONS		
NO.	DATE	DESCRIPTION

PRELIMINARY
NOT FOR
CONSTRUCTION

AMERICAN CONSULTING & ENGINEERING
1173 S. 250 W. #204
ST. GEORGE, UT
(435) 288-3230
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HORIZON RIDGE
SECTION 8, T 42 S, R 16 W, SLB&M
ST. GEORGE, UTAH

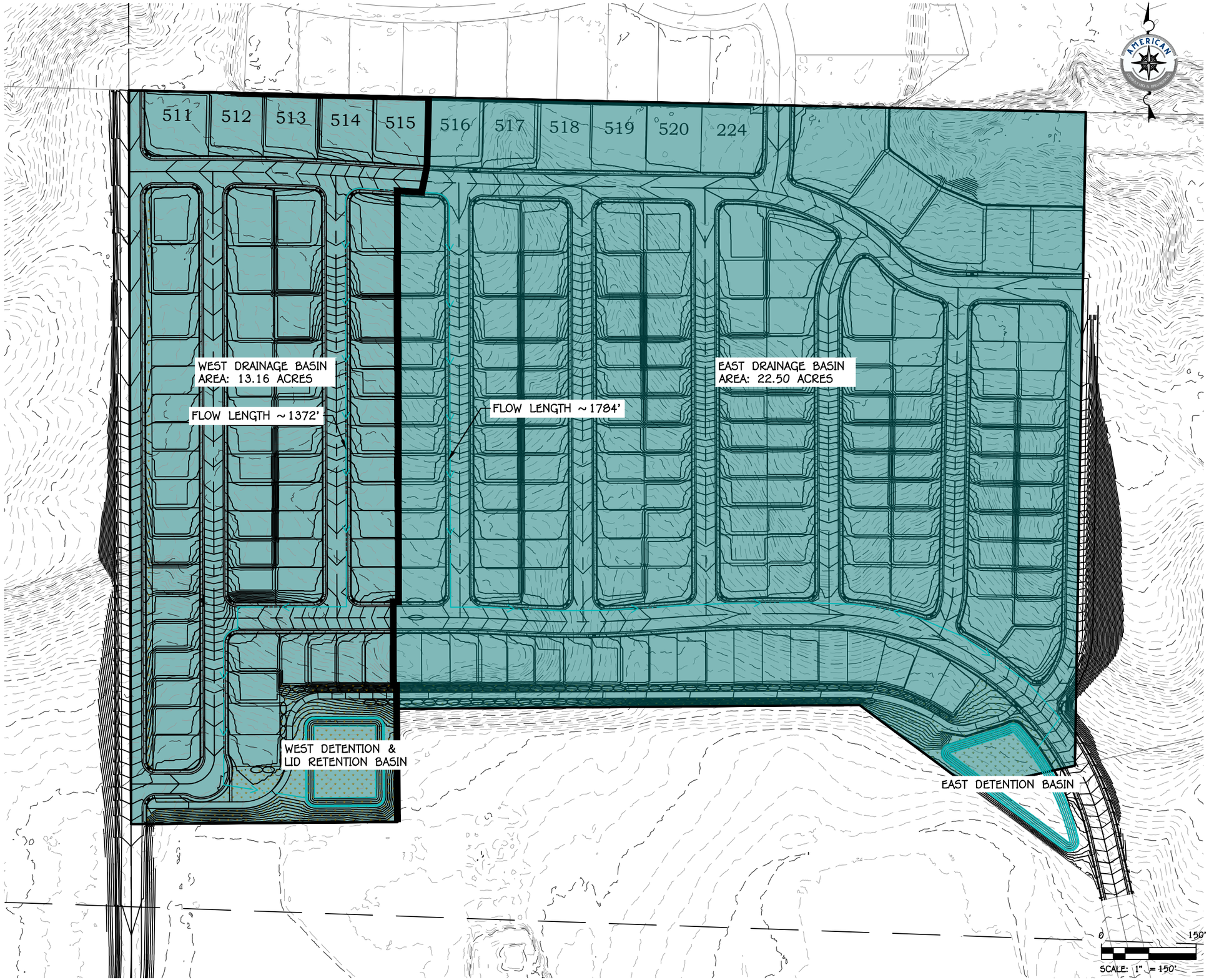
PRE-DEVELOPED DRAINAGE BASIN MAP
DRAINAGE REPORT EXHIBIT

JOB #	YY-000
DRAWN BY:	SSA
CHECKED BY:	ARC
DATE:	09/04/2026

A.1

SHEET: 1 OF: 2

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LAND COVERAGE AREAS
OPEN SPACE POOR
OPEN SPACE POOR
OPEN SPACE POOR
IMPERVIOUS
PAVED STREETS W/ DITCHES
STREETS GRAVEL
STREETS DIRT
DESERT URBAN NATURAL
DESERT URBAN ARTIFICIAL
URBAN COMMERCIAL
URBAN INDUSTRIAL
URBAN NEWLY GRADED
RESIDENTIAL TOWNHOMES
RESIDENTIAL APARTMENTS
RESIDENTIAL < 6,000 S.F.
RESIDENTIAL 7,000 S.F.
RESIDENTIAL 8,000 S.F.
RESIDENTIAL 10,000 S.F.
RESIDENTIAL 14,000 S.F.
RESIDENTIAL 20,000 S.F.
RESIDENTIAL 40,000 S.F.
RESIDENTIAL 80,000 S.F.
DESERT SHRUB POOR
DESERT SHRUB FAIR
DESERT SHRUB GOOD

LEGEND

- DRAINAGE AREA BOUNDARY
- PROPOSED FLOWLINE
- EXISTING FLOWLINE
- 2500 FINISH GROUND MAJOR
- 2501 FINISH GROUND MINOR
- 2500 EXISTING GROUND MAJOR
- 2501 EXISTING GROUND MINOR
- PROPOSED ROCK WALL
- EXISTING ROCK WALL
- SD PROPOSED STORM DRAIN
- SD EXISTING STORM DRAIN
- SINGLE CATCH BASIN
- DOUBLE CATCH BASIN
- AREA DRAIN
- 58 STORM DRAIN MANHOLE
- FLARED END SECTION

REVISIONS			
NO.	DATE	DESCRIPTION	

PRELIMINARY
NOT FOR
CONSTRUCTION

AMERICAN CONSULTING & ENGINEERING
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HORIZON RIDGE
SECTION 8, T 42 S, R 16 W, SLB&M
ST. GEORGE, UTAH

POST-DEVELOPED DRAINAGE BASIN MAP
DRAINAGE REPORT EXHIBIT

JOB #	YY-000
DRAWN BY:	SSA
CHECKED BY:	ARC
DATE:	09/04/2026

A.2

SHEET: 2 OF: 2

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APPENDIX B: HYDROLOGY CALCULATIONS

FOR: Horizon Ridge

ENGINEER: TC DATE: 8/25/2021

CHECKED: DATE:

PRE-DEVELOPED DRAINAGE BASIN AREAS & CURVE NUMBER

Equations:

$$CN_{weighted} = \frac{\sum CN\ x\ A}{\sum A}$$

Where:

CN = SCS runoff curve number

A = drainage basin area

HSG = hydrological soil group (calculation assumes group D unless noted otherwise)

CN	88	0	0	0	0	0	0	0	0	0	0	0	0			
HSG	D															
COVER TYPE	Desert Shrub - Poor															
BASIN ID	**BASIN AREAS (acre)**													**ΣA**	**Σ(CN x A)**	**$CN_{weighted}$**
Pre-1	35.66													35.66	3138.08	88.00

AMERICAN CONSULTING & ENGINEERING	FOR:	Horizon Ridge
	ENGINEER:	TC DATE: 8/25/2021
	CHECKED:	DATE:

PRE-DEVELOPED LAG TIME

Equations:

For drainage areas less than 2,000 acres, the lag time can be calculated using the following equation:

$$L = \frac{l^{0.8}\left(\frac{1000}{CN} - 9\right)^{0.7}}{1900(S)^{0.5}}$$

Where:

L = lag time
I = longest length of subarea
CN = SCS curve number
S = average slope along longest length

BASIN ID	Length (ft)	High Elev (ft)	Low Elev (ft)	S (%)	CN	Lag Time (hr)	**Lag Time (min)**
Pre-1	1055.00	2721.00	2662.00	5.59%	88.00	0.11	**6.39**

FOR: Horizon Ridge

ENGINEER: TC DATE: 8/25/2021

CHECKED: DATE:

POST-DEVELOPED DRAINAGE BASIN AREAS & CURVE NUMBER

Equations:

$$CN_{weighted} = \frac{\sum CN \; x \; A}{\sum A}$$

Where:

CN = SCS runoff curve number

A = drainage basin area

HSG = hydrological soil group (calculation assumes group D unless noted otherwise)

CN	92	0	0	0	0	0	0	0	0	0	0	0	0			
HSG	D									C						
COVER TYPE	Residential - < 6,000 SF Lots															
BASIN ID	**BASIN AREAS (acre)**													**ΣA**	**Σ(CN x A)**	**$CN_{weighted}$**
Post-West	11.40													11.40	1048.80	92.00
Post-East	24.27													24.27	2232.84	92.00
-														0.00	-	-

AMERICAN CONSULTING & ENGINEERING	FOR:	Horizon Ridge
	ENGINEER:	TC DATE: 8/25/2021
	CHECKED:	DATE:

POST-DEVELOPED LAG TIME

Equations:

For drainage areas less than 2,000 acres, the lag time can be calculated using the following equation:

$$L = \frac{l^{0.8}\left(\frac{1000}{CN} - 9\right)^{0.7}}{1900(S)^{0.5}}$$

Where:

L = lag time
l = longest length of subarea
CN = SCS curve number
S = average slope along longest length

BASIN ID	l (ft)	High Elev (ft)	Low Elev (ft)	S (%)	CN	Lag Time (hr)	**Lag Time (min)**
Post-West	1372.85	2717.00	2661.00	4.08%	92.00	0.13	**7.84**
Post-East	1784.38	2717.00	2655.00	3.47%	92.00	0.17	**10.48**

AMERICAN
CONSULTING & ENGINEERING

FOR: Horizon Ridge

ENGINEER: TC DATE: 8/25/2021

CHECKED: DATE:

PRE-DEVELOPED HYDROGRAPH SUMMARY

Rainfall Depths (inches)	1.61	1.66	2.38

	PRE-DEVELOPED INPUTS				AUTODESK HYDROGRAPH RESULTS		
BASIN ID	Area (acre)	CN	Lag Time (min)	Tc (min)	10-year,24-Hour (cfs)	100-year, 3-hour (cfs)	100-year, 24-hour (cfs)
Pre-1	35.66	88.00	6.39	-	33.73	0.00	65.88
-	0.00	-	-	-			

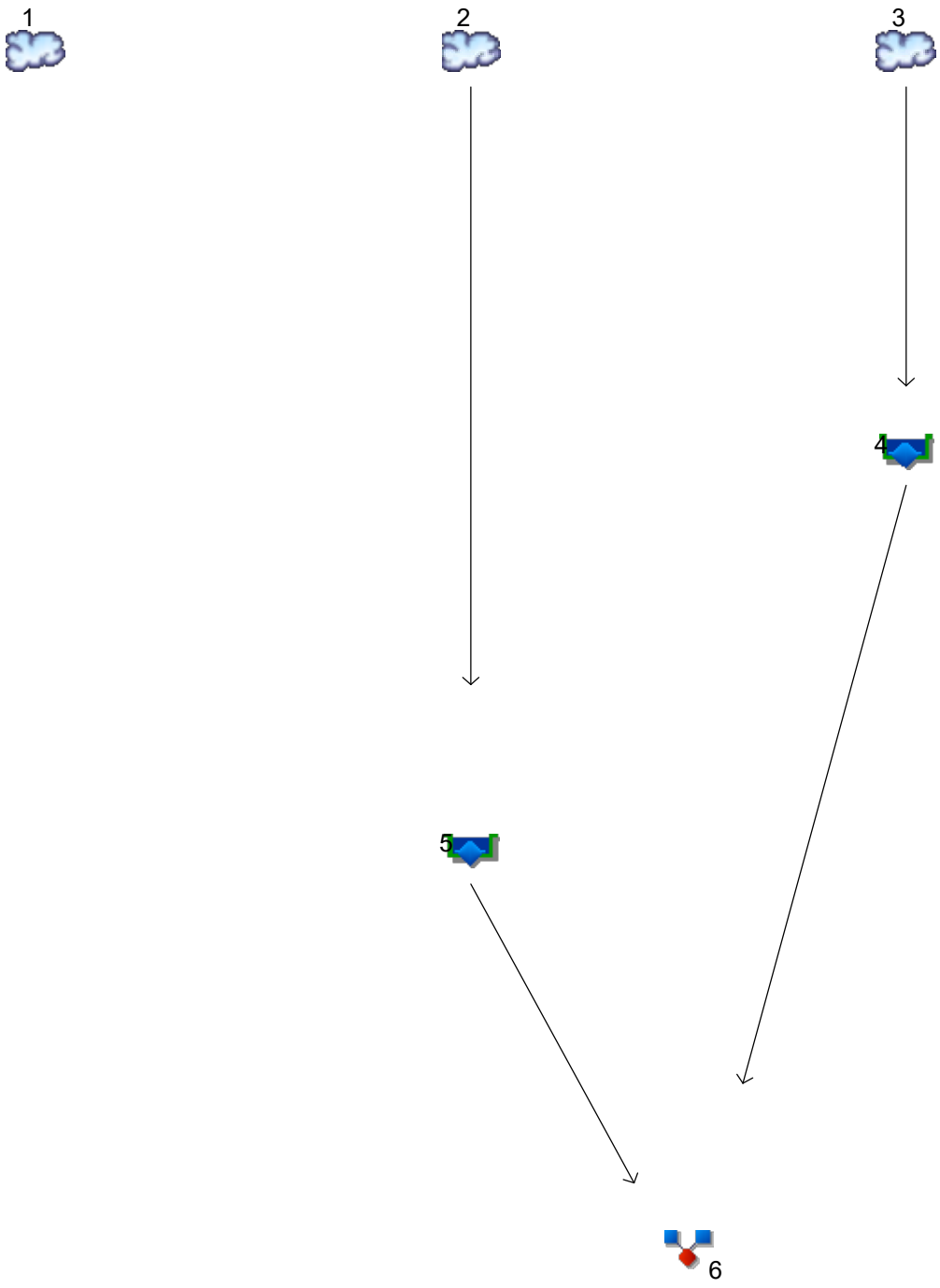
Maximum Peak Flow (cfs)	33.73	0.00	65.88

POST-DEVELOPED HYDROGRAPH SUMMARY

	HYDRAFLOW INPUTS				AUTODESK HYDROGRAPH RESULTS		
BASIN ID	Area (acre)	CN	Lag Time (min)	Tc (min)	10-year,24-Hour (cfs)	100-year, 3-hour (cfs)	100-year, 24-hour (cfs)
Post-West	11.40	92.00	7.84	-	14.72	0.00	25.73
Post-East	24.27	92.00	10.48	-	31.34	0.00	54.79

Combined Maximum Peak Flow (cfs)	46.06	0.00	80.52
Maximum Peak Flow after Detention (cfs)	**20.62**	**0.00**	**45.38**
Pre-Developed vs. Post-Developed at P.O.I. (cfs)	**-13.11**	**0.00**	**-20.50**

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	Pre-1
2	SCS Runoff	Post-West
3	SCS Runoff	Post-East
4	Reservoir	East Pond
5	Reservoir	West Pond
6	Combine	Post Combined

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)							Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	-------	-------	-------	33.73	-------	-------	65.88	Pre-1
2	SCS Runoff	------	-------	-------	-------	-------	14.72	-------	-------	25.73	Post-West
3	SCS Runoff	------	-------	-------	-------	-------	31.34	-------	-------	54.79	Post-East
4	Reservoir	3	-------	-------	-------	-------	20.62	-------	-------	36.12	East Pond
5	Reservoir	2	-------	-------	-------	-------	0.822	-------	-------	9.965	West Pond
6	Combine	4, 5	-------	-------	-------	-------	20.62	-------	-------	45.38	Post Combined

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

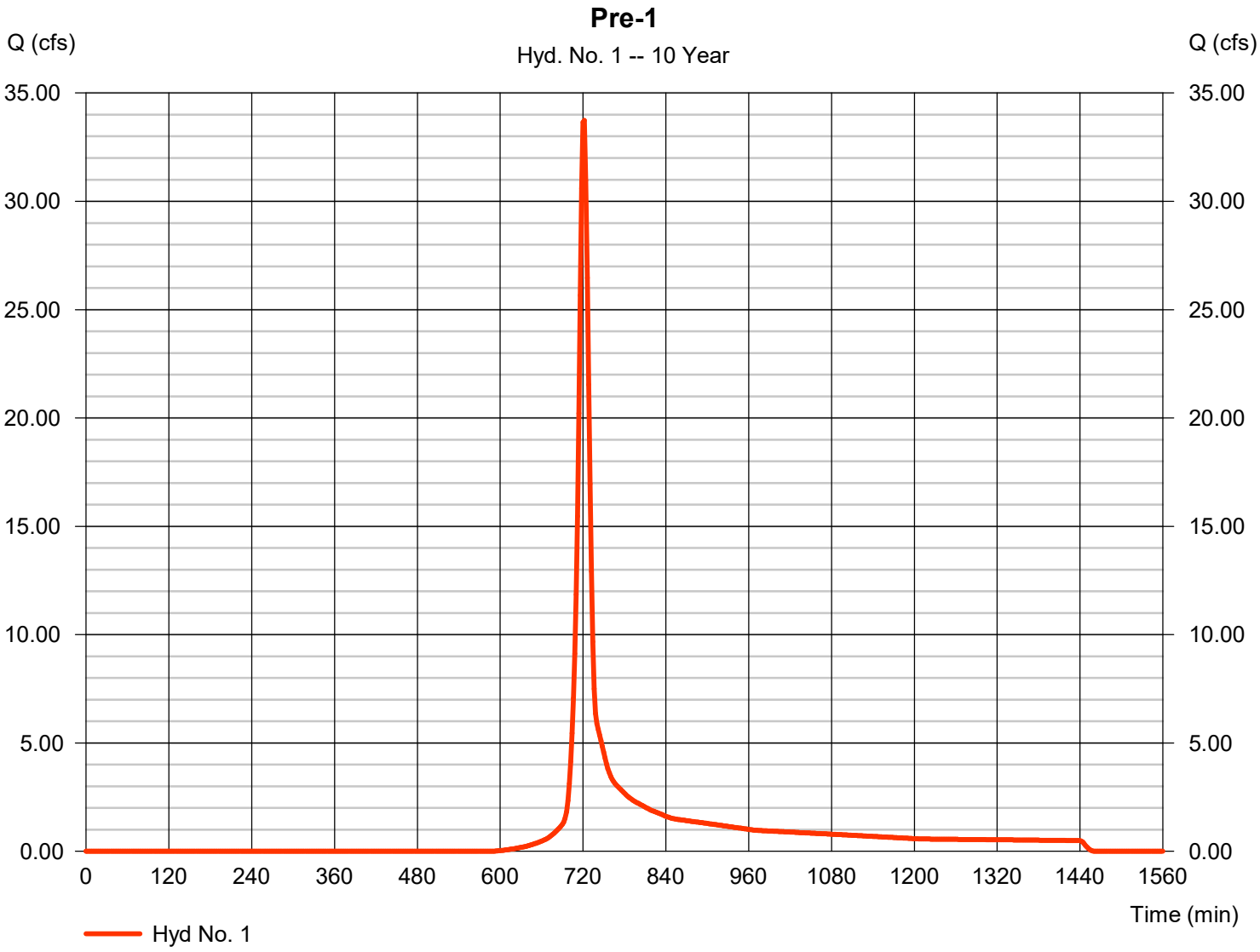
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	33.73	2	722	88,386	------	------	------	Pre-1
2	SCS Runoff	14.72	2	720	38,172	------	------	------	Post-West
3	SCS Runoff	31.34	2	720	81,266	------	------	------	Post-East
4	Reservoir	20.62	2	728	81,256	3	2656.48	19,732	East Pond
5	Reservoir	0.822	2	804	16,876	2	2661.67	23,915	West Pond
6	Combine	20.62	2	728	98,132	4, 5	------	------	Post Combined

Hydrograph Report

Hyd. No. 1

Pre-1

Hydrograph type	=	SCS Runoff	Peak discharge	=	33.73 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	88,386 cuft
Drainage area	=	35.660 ac	Curve number	=	88
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	1.61 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

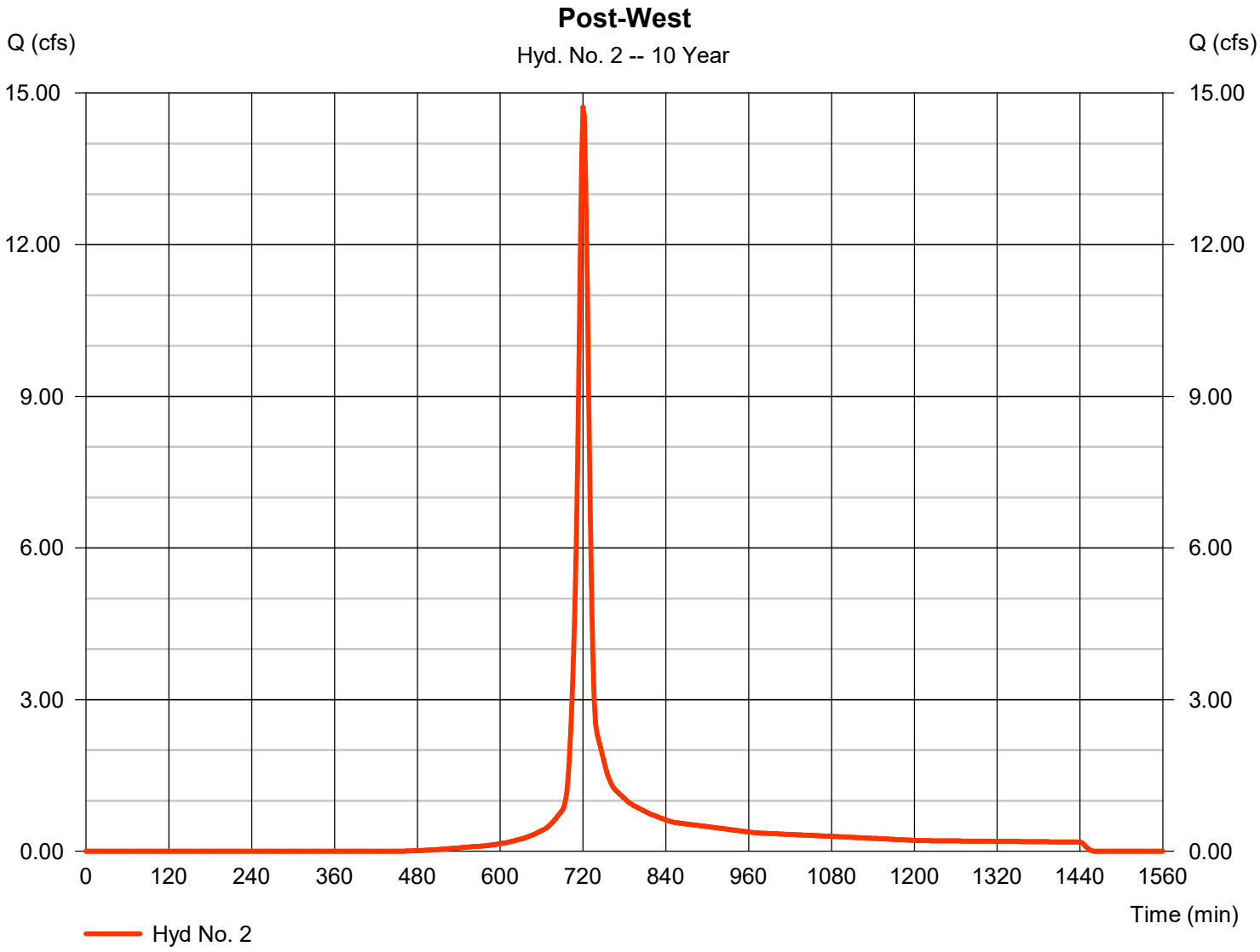


Hydrograph Report

Hyd. No. 2

Post-West

Hydrograph type	=	SCS Runoff	Peak discharge	=	14.72 cfs
Storm frequency	=	10 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	38,172 cuft
Drainage area	=	11.400 ac	Curve number	=	92
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	1.61 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

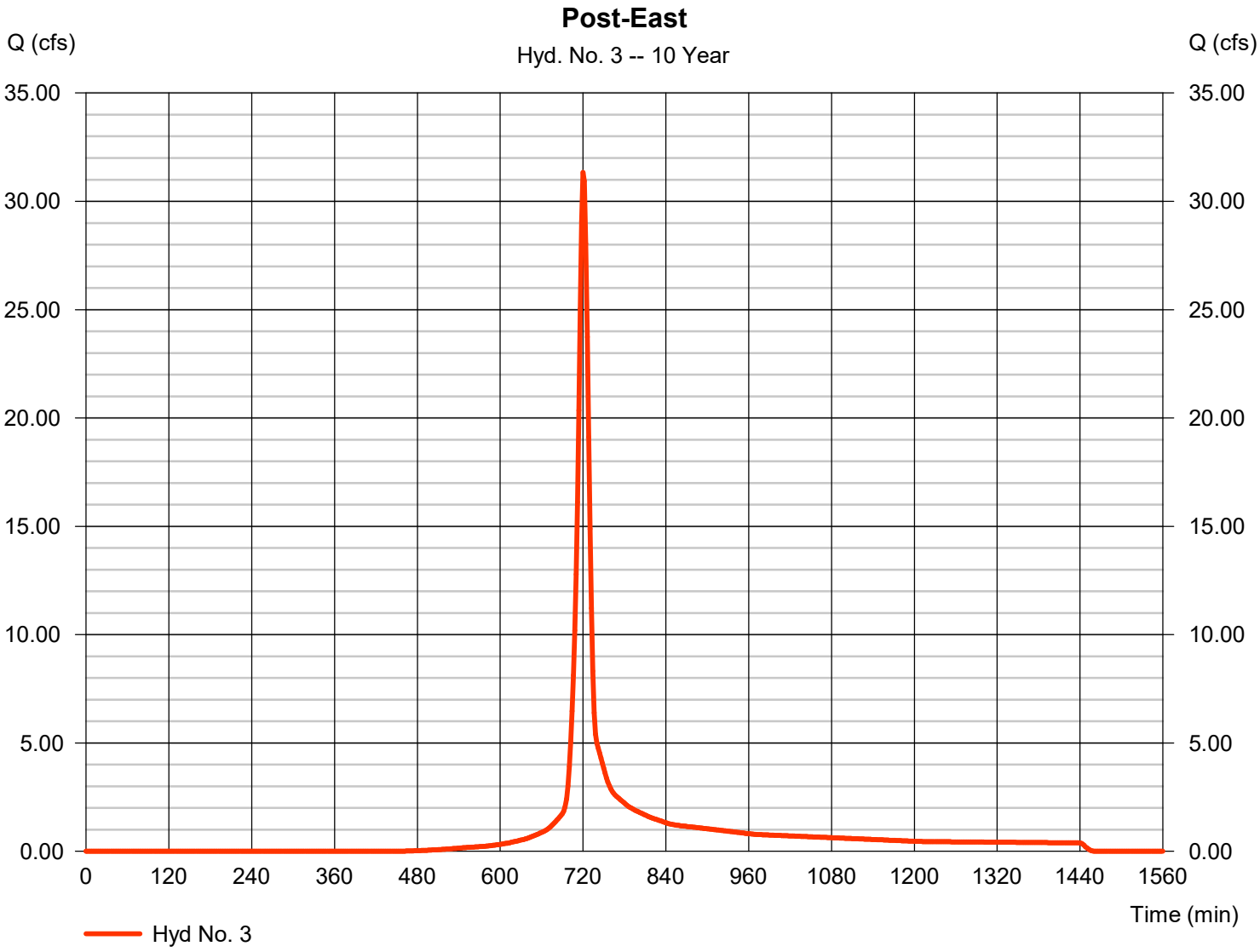


Hydrograph Report

Hyd. No. 3

Post-East

Hydrograph type	=	SCS Runoff	Peak discharge	=	31.34 cfs
Storm frequency	=	10 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	81,266 cuft
Drainage area	=	24.270 ac	Curve number	=	92
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	11.00 min
Total precip.	=	1.61 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



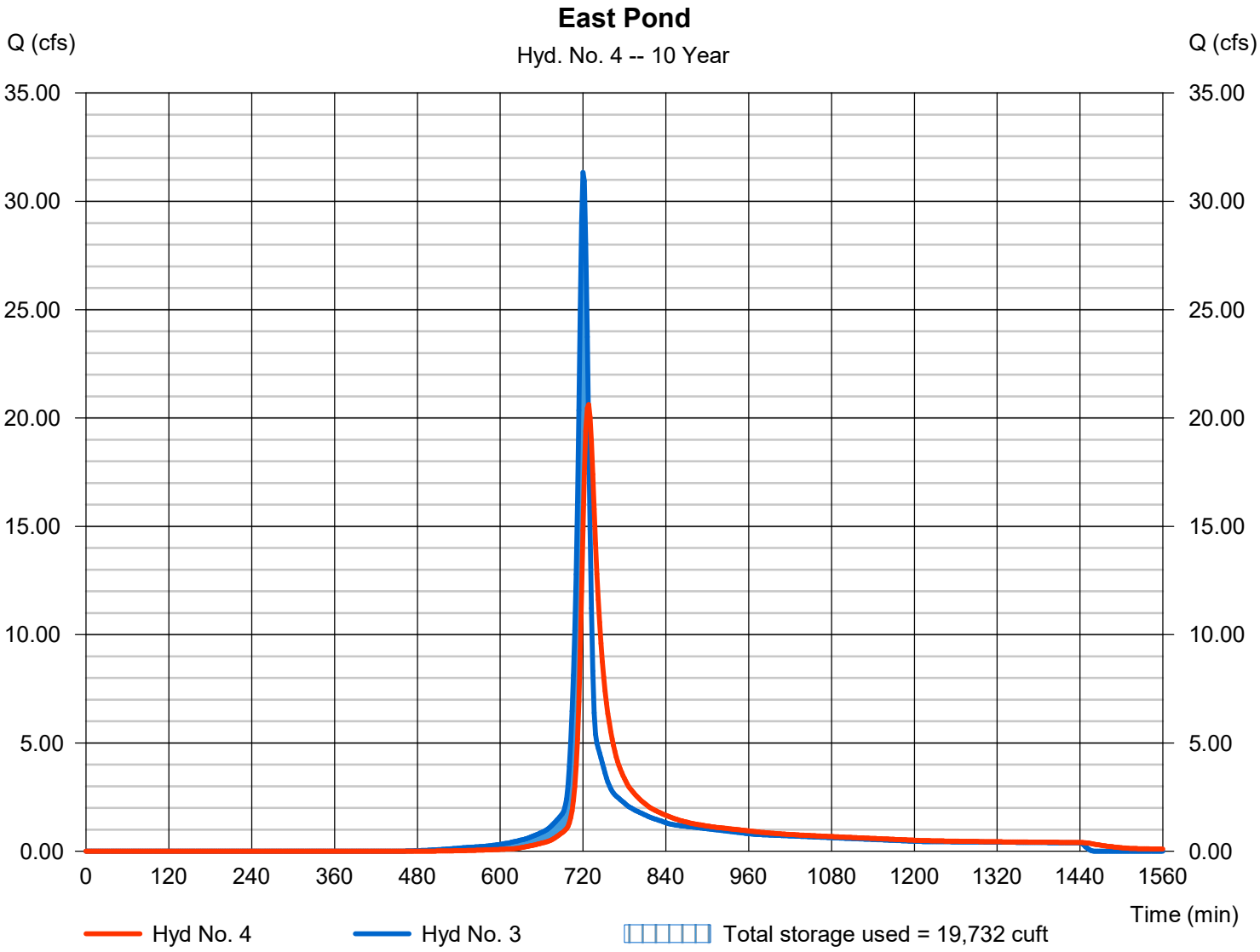
Hydrograph Report

Hyd. No. 4

East Pond

Hydrograph type	=	Reservoir	Peak discharge	=	20.62 cfs
Storm frequency	=	10 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	81,256 cuft
Inflow hyd. No.	=	3 - Post-East	Max. Elevation	=	2656.48 ft
Reservoir name	=	East Pond	Max. Storage	=	19,732 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - East Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 2655.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2655.00	11,995	0	0
1.00	2656.00	13,645	12,810	12,810
2.00	2657.00	15,352	14,489	27,299
3.00	2658.00	17,116	16,224	43,523
4.00	2659.00	18,936	18,016	61,539

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	24.00	0.00	0.00
Span (in)	= 24.00	24.00	0.00	0.00
No. Barrels	= 1	2	0	0
Invert El. (ft)	= 2655.00	2655.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 20.00	0.00	0.00	0.00
Crest El. (ft)	= 2657.20	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	2655.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.00	12,810	2656.00	0.00	10.72 ic	---	---	0.00	---	---	---	---	---	10.72
2.00	27,299	2657.00	0.00	30.25 ic	---	---	0.00	---	---	---	---	---	30.25
3.00	43,523	2658.00	21.04 ic	42.78 ic	---	---	21.04 s	---	---	---	---	---	63.81
4.00	61,539	2659.00	26.15 ic	52.39 ic	---	---	26.10 s	---	---	---	---	---	78.49

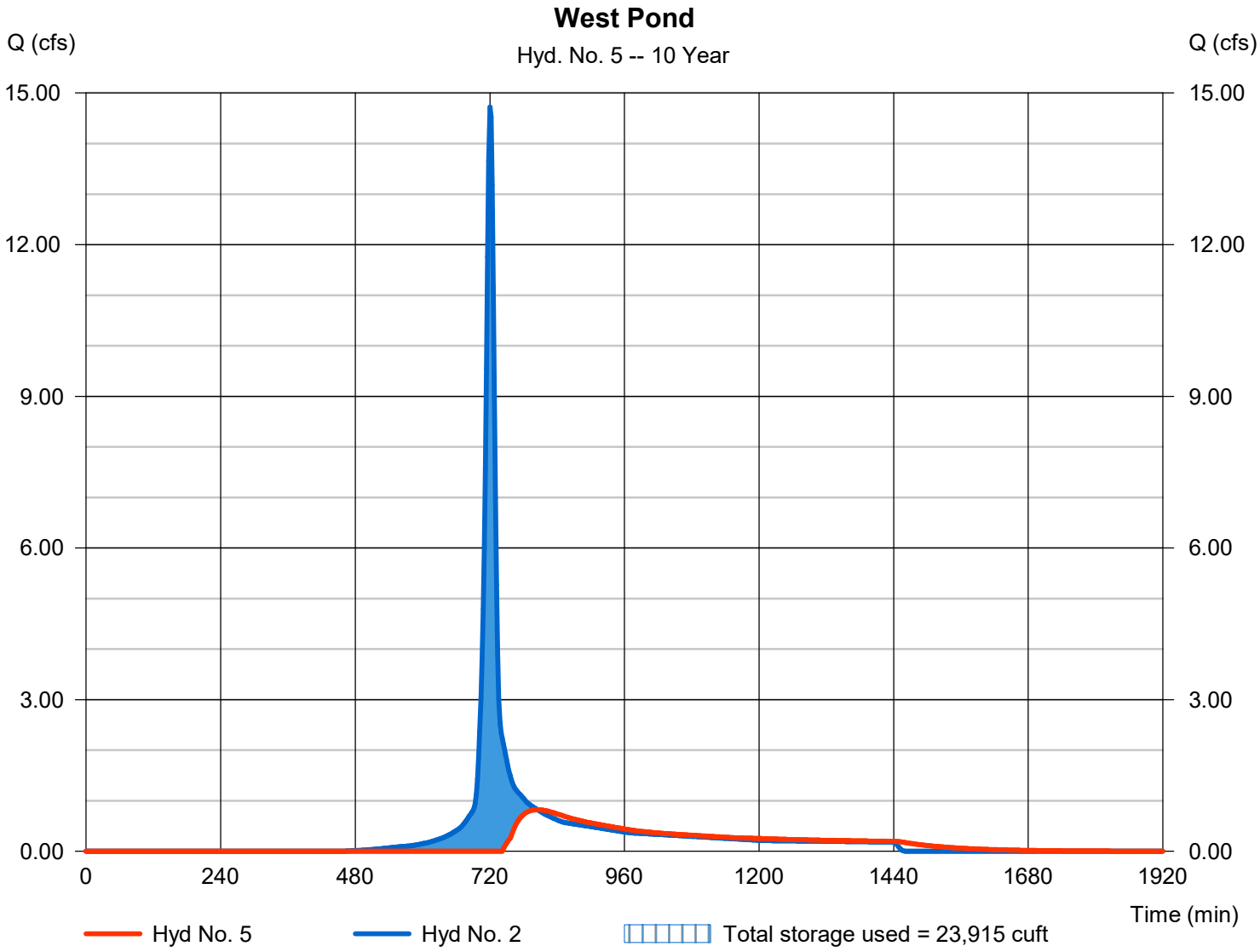
Hydrograph Report

Hyd. No. 5

West Pond

Hydrograph type	=	Reservoir	Peak discharge	=	0.822 cfs
Storm frequency	=	10 yrs	Time to peak	=	804 min
Time interval	=	2 min	Hyd. volume	=	16,876 cuft
Inflow hyd. No.	=	2 - Post-West	Max. Elevation	=	2661.67 ft
Reservoir name	=	West Pond	Max. Storage	=	23,915 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - West Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 2660.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2660.00	12,943	0	0
1.00	2661.00	14,442	13,684	13,684
2.00	2662.00	15,997	15,211	28,896
3.00	2663.00	17,609	16,795	45,690
4.00	2664.00	19,277	18,435	64,125

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 30.00	12.00	0.00	0.00
Span (in)	= 30.00	12.00	0.00	0.00
No. Barrels	= 1	6	1	0
Invert El. (ft)	= 2658.00	2661.50	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 5.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 20.00	0.00	0.00	0.00
Crest El. (ft)	= 2662.70	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

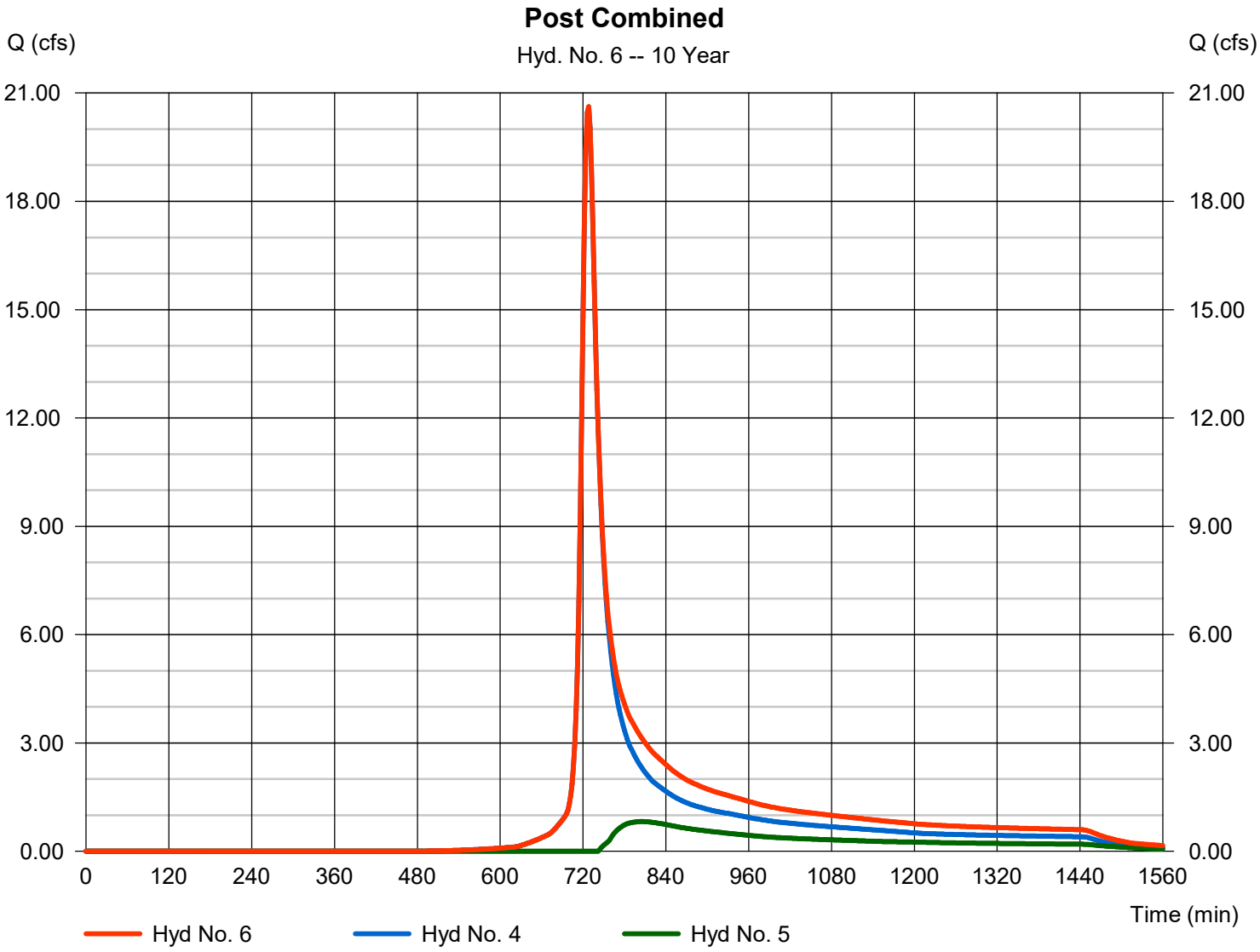
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	2660.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.00	13,684	2661.00	20.28 ic	0.00	---	---	0.00	---	---	---	---	---	0.000
2.00	28,896	2662.00	20.28 ic	5.68 ic	---	---	0.00	---	---	---	---	---	5.684
3.00	45,690	2663.00	20.28 ic	22.69 ic	---	---	10.95	---	---	---	---	---	33.63
4.00	64,125	2664.00	50.64 ic	32.08 ic	---	---	50.64 s	---	---	---	---	---	82.72

Hydrograph Report

Hyd. No. 6

Post Combined

Hydrograph type	= Combine	Peak discharge	= 20.62 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 98,132 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

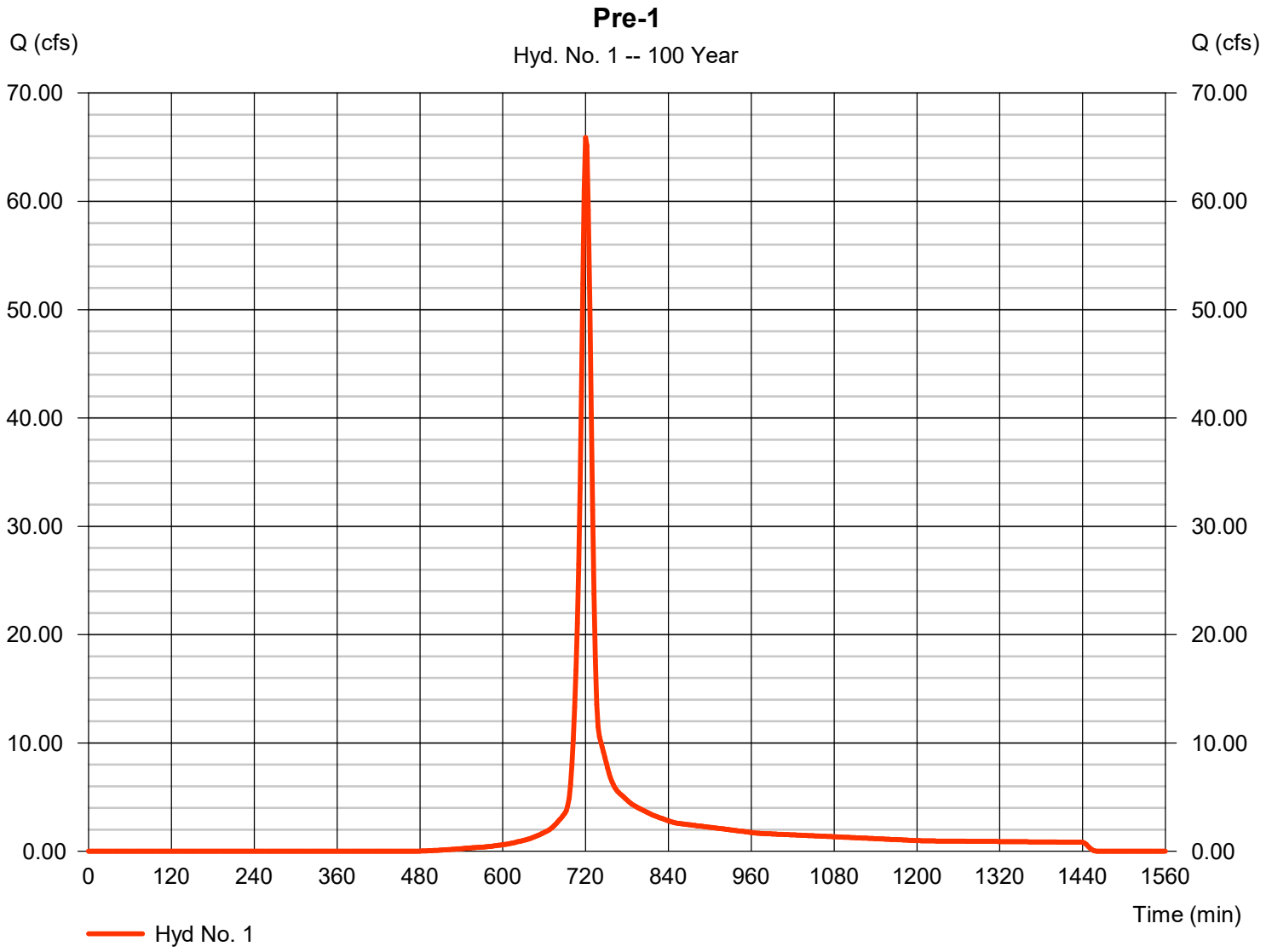
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	65.88	2	720	170,785	------	------	------	Pre-1
2	SCS Runoff	25.73	2	720	67,528	------	------	------	Post-West
3	SCS Runoff	54.79	2	720	143,764	------	------	------	Post-East
4	Reservoir	36.12	2	728	143,753	3	2657.29	31,938	East Pond
5	Reservoir	9.965	2	732	46,232	2	2662.20	32,192	West Pond
6	Combine	45.38	2	728	189,986	4, 5	------	------	Post Combined

Hydrograph Report

Hyd. No. 1

Pre-1

Hydrograph type	=	SCS Runoff	Peak discharge	=	65.88 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	170,785 cuft
Drainage area	=	35.660 ac	Curve number	=	88
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	2.38 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

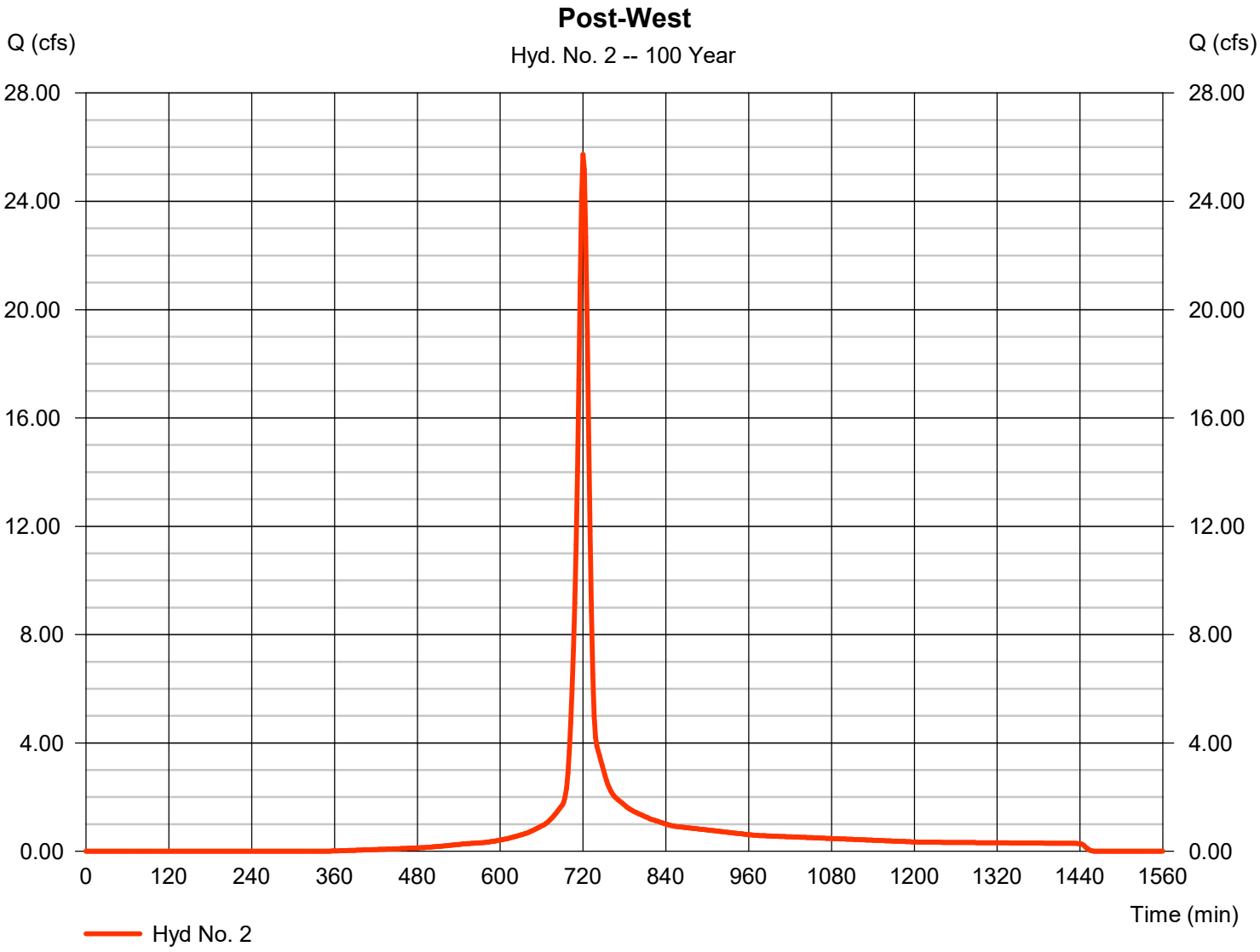


Hydrograph Report

Hyd. No. 2

Post-West

Hydrograph type	=	SCS Runoff	Peak discharge	=	25.73 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	67,528 cuft
Drainage area	=	11.400 ac	Curve number	=	92
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	2.38 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

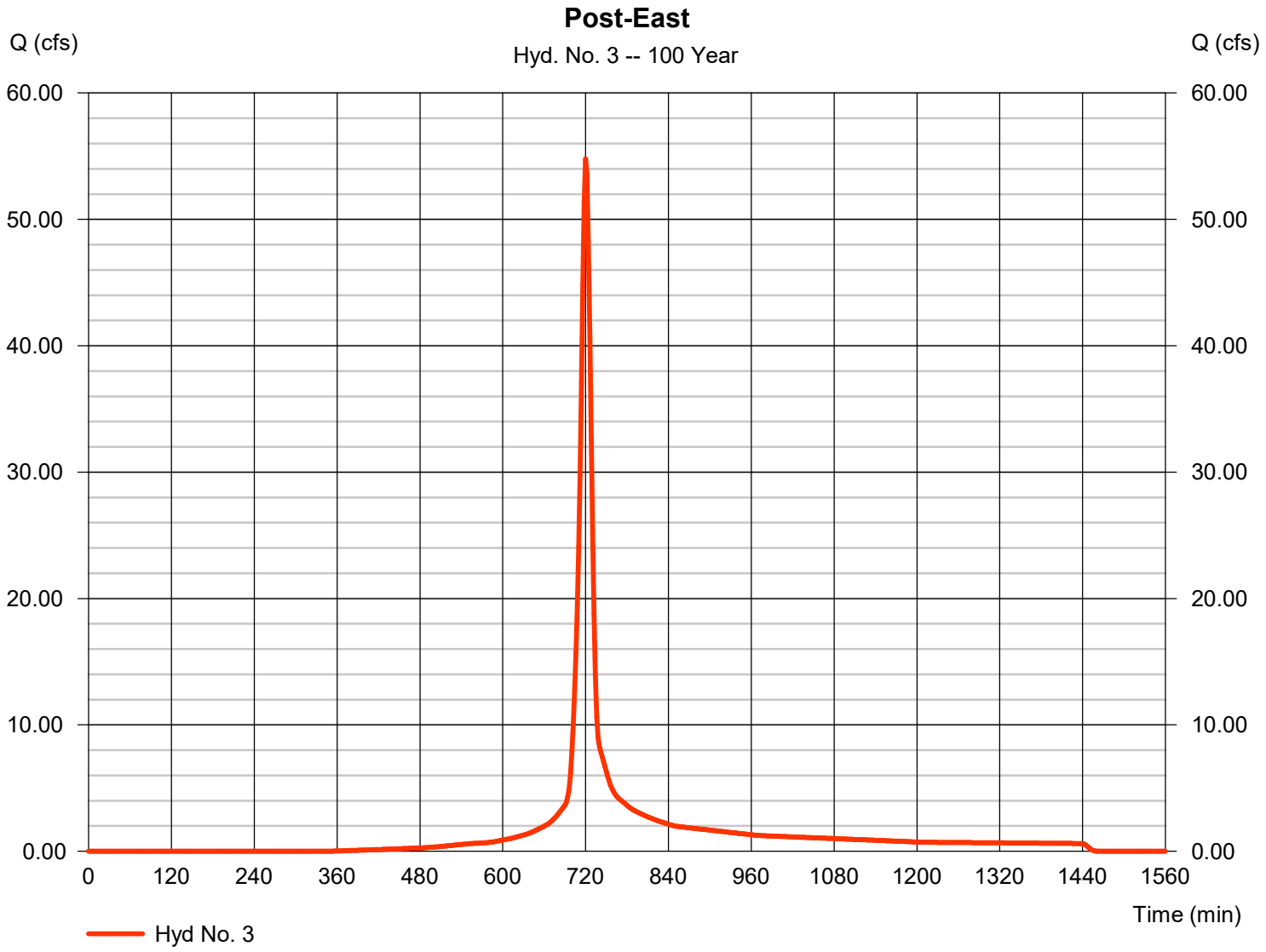


Hydrograph Report

Hyd. No. 3

Post-East

Hydrograph type	=	SCS Runoff	Peak discharge	=	54.79 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	143,764 cuft
Drainage area	=	24.270 ac	Curve number	=	92
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	11.00 min
Total precip.	=	2.38 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



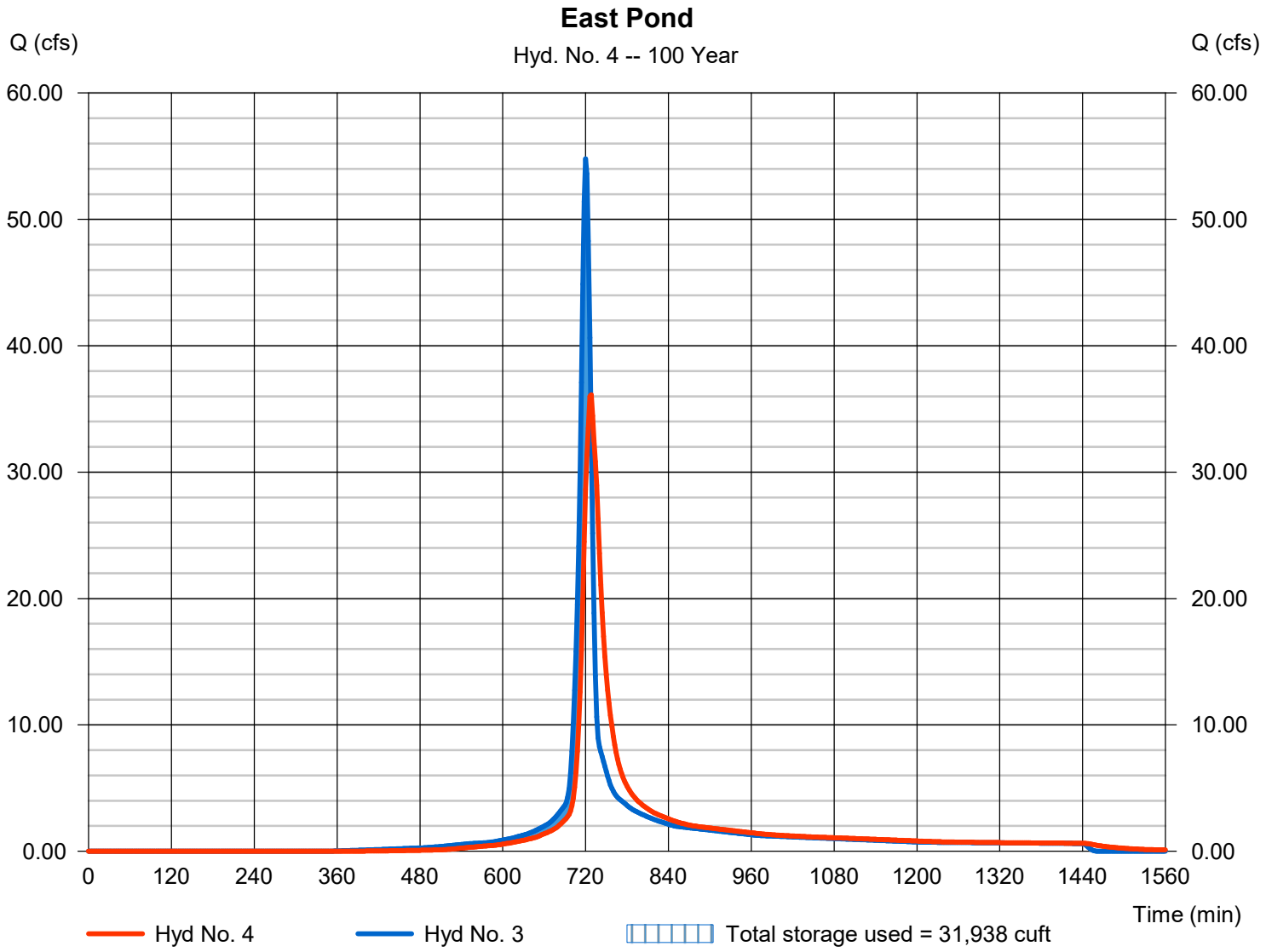
Hydrograph Report

Hyd. No. 4

East Pond

Hydrograph type	=	Reservoir	Peak discharge	=	36.12 cfs
Storm frequency	=	100 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	143,753 cuft
Inflow hyd. No.	=	3 - Post-East	Max. Elevation	=	2657.29 ft
Reservoir name	=	East Pond	Max. Storage	=	31,938 cuft

Storage Indication method used.



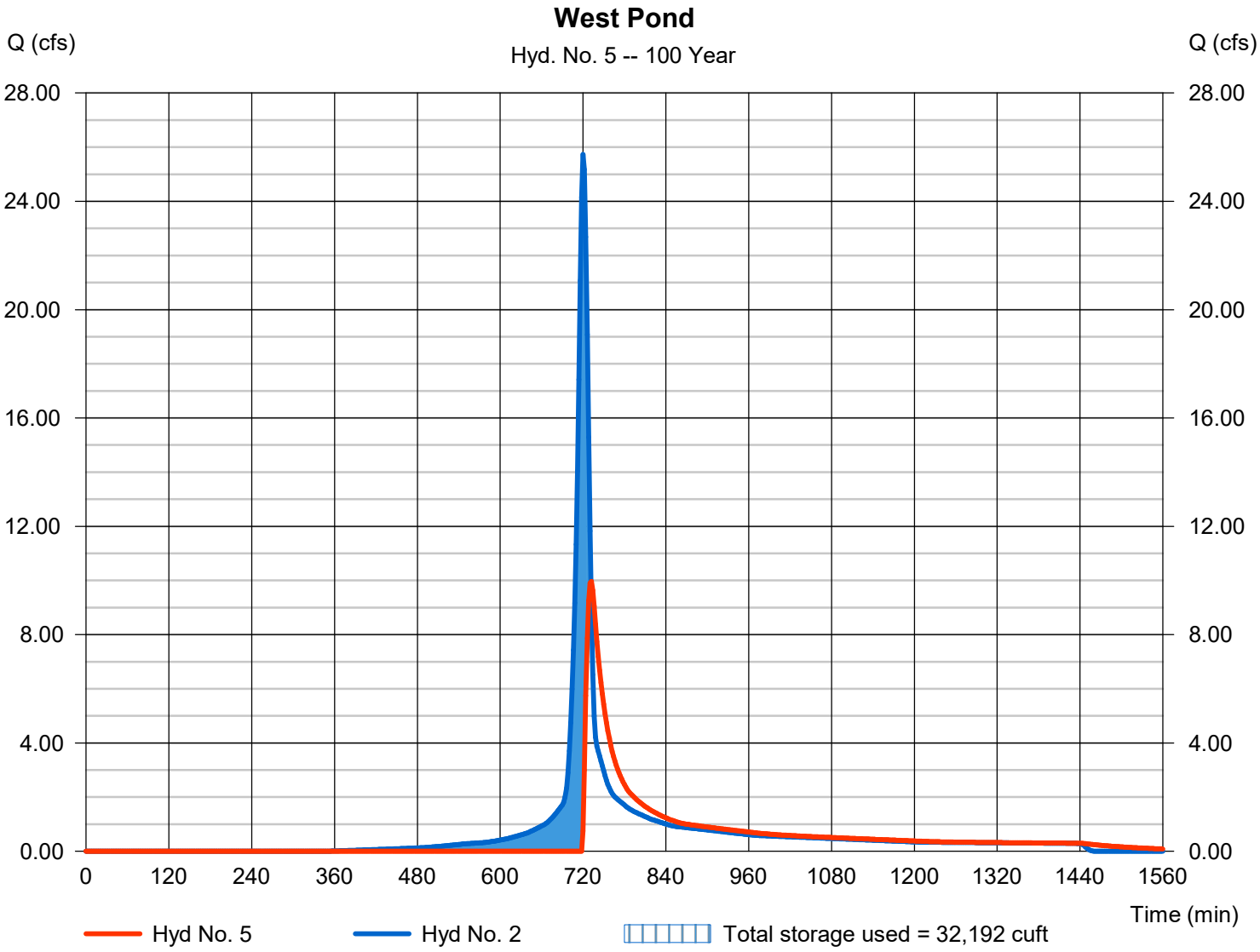
Hydrograph Report

Hyd. No. 5

West Pond

Hydrograph type	=	Reservoir	Peak discharge	=	9.965 cfs
Storm frequency	=	100 yrs	Time to peak	=	732 min
Time interval	=	2 min	Hyd. volume	=	46,232 cuft
Inflow hyd. No.	=	2 - Post-West	Max. Elevation	=	2662.20 ft
Reservoir name	=	West Pond	Max. Storage	=	32,192 cuft

Storage Indication method used.

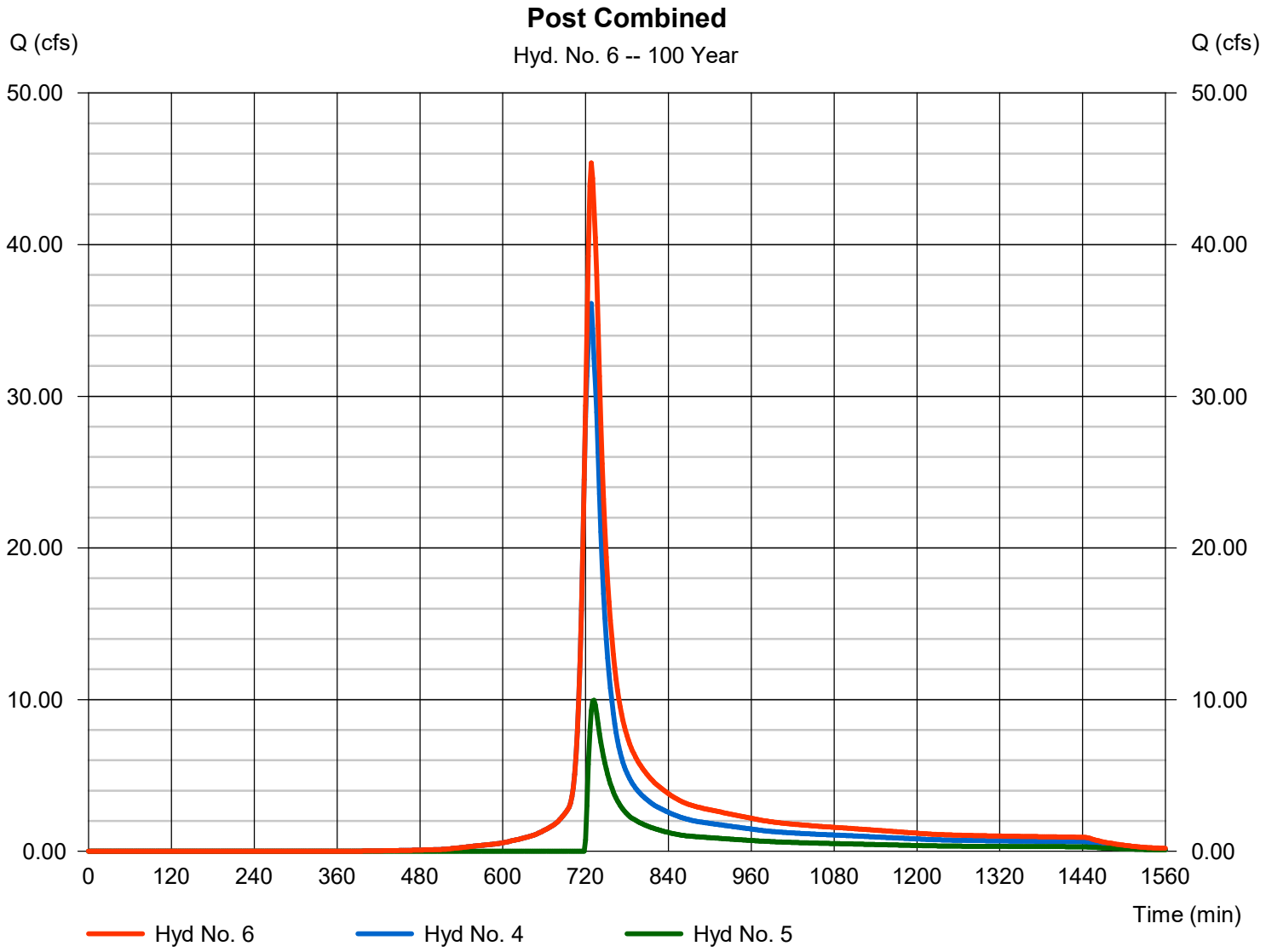


Hydrograph Report

Hyd. No. 6

Post Combined

Hydrograph type	= Combine	Peak discharge	= 45.38 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 189,986 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 0.000 ac



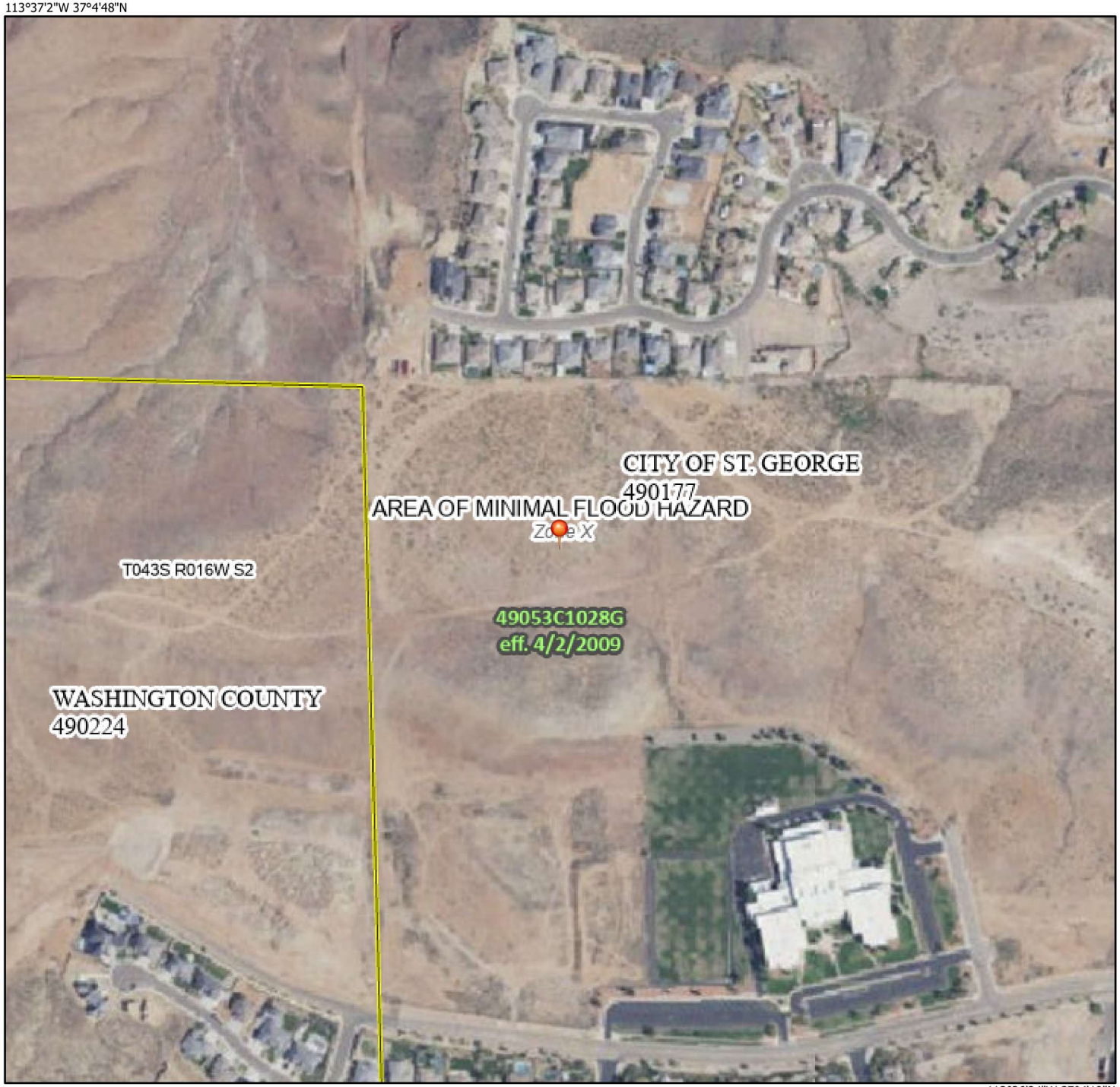
APPENCIX C: HYDRAULIC CALCULATIONS

APPENDIX D: FEMA MAP

National Flood Hazard Layer FIRMette

FEMA

113°37'2"W 37°4'48"N



113°36'24"W 37°4'19"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

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 Cross Sections with 1% Annual Chance
- 17.5 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.

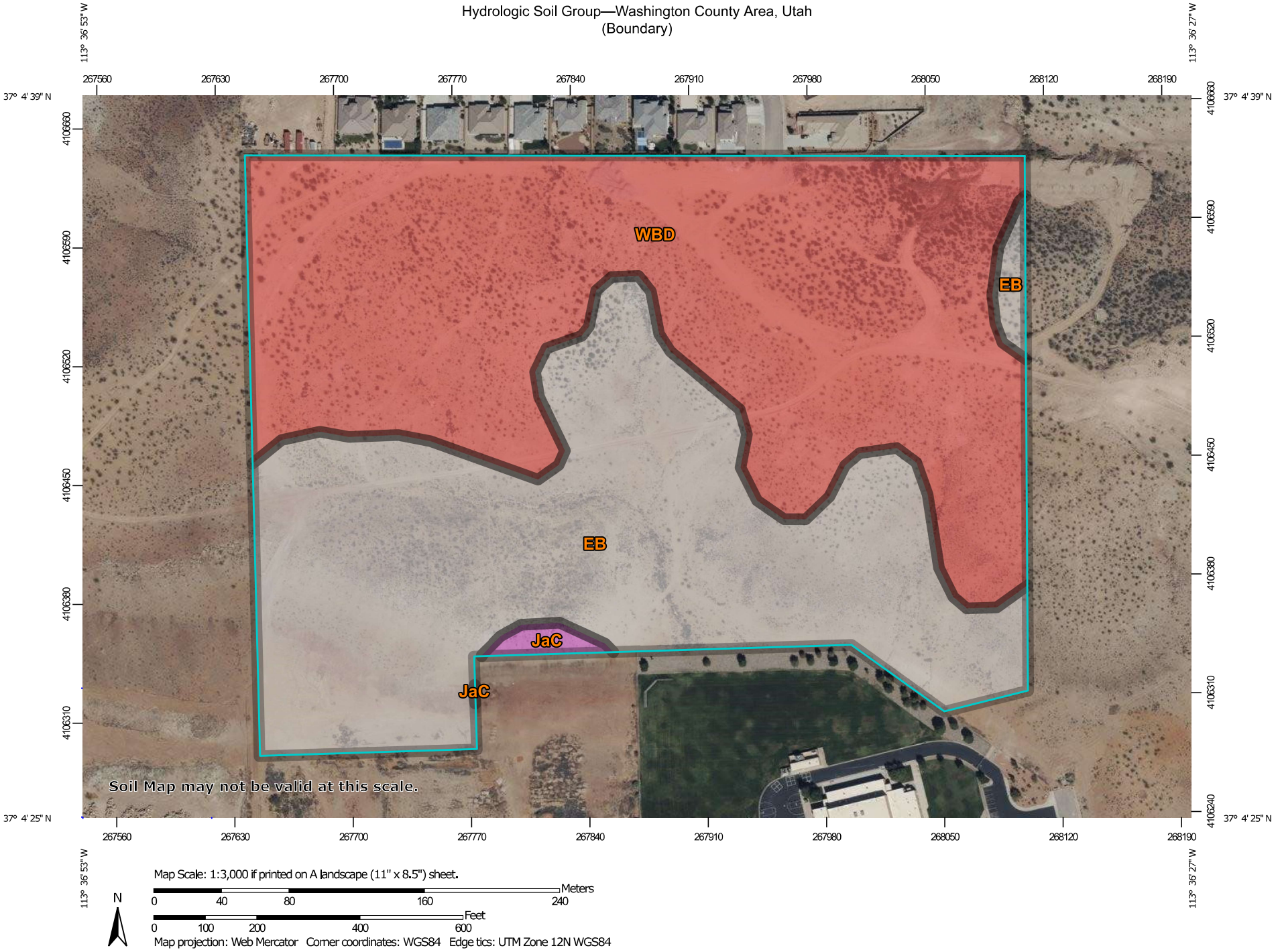
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/7/2026 at 3:25 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 E: USDA WEB SOIL SURVEY DATA

Hydrologic Soil Group—Washington County Area, Utah
(Boundary)



Map Scale: 1:3,000 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 40 80 160 240

Feet
0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

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: Washington County Area, Utah
Survey Area Data: Version 19, Aug 27, 2025

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

Date(s) aerial images were photographed: Sep 8, 2022—Sep 29, 2022

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
EB	Eroded land-Shalet complex, warm		16.2	45.4%
JaC	Junction fine sandy loam, 2 to 5 percent slopes	A	0.2	0.7%
WBD	Winkel gravelly fine sandy loam, 1 to 8 percent slopes	D	19.2	53.9%
Totals for Area of Interest			**35.7**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX F: NOAA RAINFALL DATA

NOAA Atlas 14, Volume 1, Version 5
Location name: St. George, Utah, USA*
Latitude: 37.0757°, Longitude: -113.6105°
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)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.125 (0.107-0.146)	0.160 (0.139-0.189)	0.217 (0.186-0.253)	0.266 (0.227-0.312)	0.343 (0.289-0.401)	0.410 (0.340-0.480)	0.487 (0.395-0.574)	0.574 (0.452-0.679)	0.707 (0.535-0.853)	0.822 (0.605-0.999)
10-min	0.190 (0.164-0.222)	0.243 (0.212-0.287)	0.330 (0.284-0.385)	0.404 (0.346-0.475)	0.522 (0.440-0.611)	0.624 (0.517-0.732)	0.742 (0.601-0.874)	0.874 (0.688-1.03)	1.08 (0.815-1.30)	1.25 (0.922-1.52)
15-min	0.236 (0.203-0.275)	0.301 (0.263-0.355)	0.408 (0.352-0.477)	0.501 (0.429-0.589)	0.648 (0.545-0.757)	0.774 (0.642-0.907)	0.920 (0.745-1.08)	1.08 (0.853-1.28)	1.34 (1.01-1.61)	1.55 (1.14-1.88)
30-min	0.317 (0.273-0.371)	0.406 (0.353-0.478)	0.550 (0.473-0.643)	0.675 (0.578-0.794)	0.872 (0.734-1.02)	1.04 (0.864-1.22)	1.24 (1.00-1.46)	1.46 (1.15-1.73)	1.80 (1.36-2.17)	2.09 (1.54-2.54)
60-min	0.392 (0.338-0.459)	0.502 (0.437-0.592)	0.680 (0.586-0.796)	0.836 (0.715-0.982)	1.08 (0.909-1.26)	1.29 (1.07-1.51)	1.53 (1.24-1.80)	1.80 (1.42-2.14)	2.22 (1.68-2.68)	2.59 (1.90-3.14)
2-hr	0.475 (0.419-0.544)	0.590 (0.523-0.682)	0.772 (0.683-0.888)	0.934 (0.819-1.07)	1.18 (1.02-1.36)	1.39 (1.18-1.60)	1.63 (1.35-1.88)	1.90 (1.54-2.22)	2.31 (1.80-2.73)	2.66 (2.02-3.18)
3-hr	0.526 (0.470-0.596)	0.656 (0.588-0.747)	0.843 (0.755-0.957)	1.00 (0.891-1.13)	1.24 (1.09-1.41)	1.44 (1.24-1.64)	1.66 (1.41-1.90)	1.91 (1.59-2.24)	2.31 (1.86-2.76)	2.67 (2.08-3.21)
6-hr	0.653 (0.587-0.735)	0.816 (0.739-0.922)	1.04 (0.935-1.17)	1.22 (1.09-1.38)	1.49 (1.31-1.68)	1.71 (1.49-1.94)	1.95 (1.67-2.23)	2.22 (1.87-2.56)	2.63 (2.14-3.07)	2.97 (2.36-3.52)
12-hr	0.785 (0.710-0.874)	0.985 (0.889-1.10)	1.24 (1.11-1.38)	1.45 (1.30-1.61)	1.73 (1.54-1.92)	1.95 (1.71-2.18)	2.18 (1.89-2.45)	2.42 (2.07-2.75)	2.76 (2.31-3.17)	3.06 (2.51-3.56)
24-hr	0.898 (0.835-0.962)	1.12 (1.04-1.20)	1.39 (1.30-1.49)	1.61 (1.51-1.72)	1.91 (1.78-2.04)	2.14 (1.98-2.29)	2.38 (2.18-2.54)	2.61 (2.39-2.80)	2.93 (2.66-3.20)	3.18 (2.86-3.59)
2-day	0.978 (0.919-1.04)	1.22 (1.14-1.30)	1.51 (1.42-1.61)	1.74 (1.64-1.85)	2.05 (1.92-2.18)	2.29 (2.14-2.43)	2.53 (2.35-2.69)	2.77 (2.57-2.96)	3.09 (2.84-3.31)	3.34 (3.05-3.62)
3-day	1.04 (0.979-1.10)	1.29 (1.22-1.37)	1.60 (1.51-1.69)	1.84 (1.74-1.94)	2.16 (2.04-2.28)	2.41 (2.26-2.54)	2.66 (2.49-2.81)	2.91 (2.71-3.09)	3.24 (2.99-3.45)	3.49 (3.20-3.75)
4-day	1.10 (1.04-1.16)	1.36 (1.29-1.45)	1.68 (1.60-1.78)	1.93 (1.83-2.03)	2.27 (2.15-2.38)	2.53 (2.39-2.66)	2.79 (2.62-2.94)	3.05 (2.85-3.22)	3.39 (3.14-3.59)	3.65 (3.36-3.88)
7-day	1.25 (1.18-1.33)	1.55 (1.46-1.65)	1.91 (1.80-2.02)	2.18 (2.07-2.30)	2.55 (2.41-2.68)	2.82 (2.66-2.96)	3.08 (2.90-3.24)	3.34 (3.13-3.51)	3.66 (3.42-3.87)	3.89 (3.62-4.13)
10-day	1.38 (1.29-1.47)	1.72 (1.62-1.83)	2.12 (2.00-2.25)	2.43 (2.29-2.57)	2.84 (2.67-2.99)	3.13 (2.95-3.31)	3.43 (3.21-3.62)	3.71 (3.47-3.94)	4.07 (3.78-4.33)	4.33 (4.01-4.63)
20-day	1.70 (1.60-1.82)	2.13 (2.00-2.27)	2.61 (2.46-2.77)	2.96 (2.79-3.14)	3.39 (3.19-3.59)	3.69 (3.47-3.91)	3.98 (3.73-4.21)	4.23 (3.96-4.49)	4.54 (4.24-4.82)	4.73 (4.42-5.03)
30-day	2.02 (1.89-2.16)	2.52 (2.36-2.68)	3.09 (2.90-3.29)	3.51 (3.30-3.73)	4.03 (3.79-4.28)	4.40 (4.13-4.67)	4.75 (4.45-5.04)	5.07 (4.74-5.39)	5.46 (5.08-5.81)	5.72 (5.31-6.11)
45-day	2.41 (2.24-2.59)	3.01 (2.80-3.24)	3.72 (3.47-3.98)	4.24 (3.95-4.52)	4.88 (4.56-5.18)	5.34 (4.98-5.66)	5.76 (5.37-6.11)	6.14 (5.72-6.53)	6.58 (6.13-7.00)	6.85 (6.39-7.32)
60-day	2.73 (2.53-2.93)	3.40 (3.16-3.66)	4.20 (3.91-4.50)	4.78 (4.45-5.10)	5.50 (5.12-5.87)	6.00 (5.58-6.41)	6.48 (6.01-6.92)	6.91 (6.41-7.39)	7.41 (6.86-7.95)	7.72 (7.14-8.31)

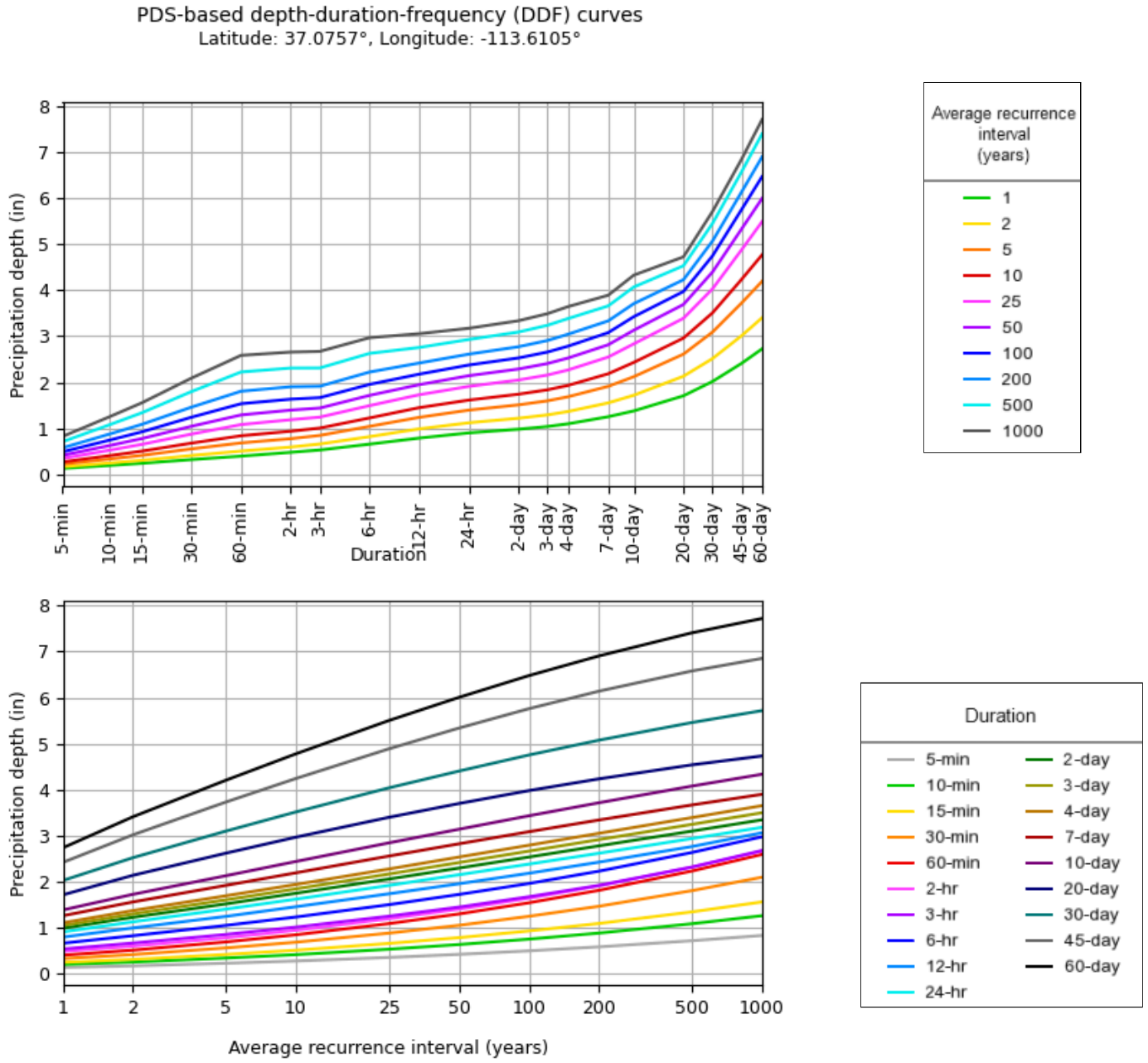
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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.

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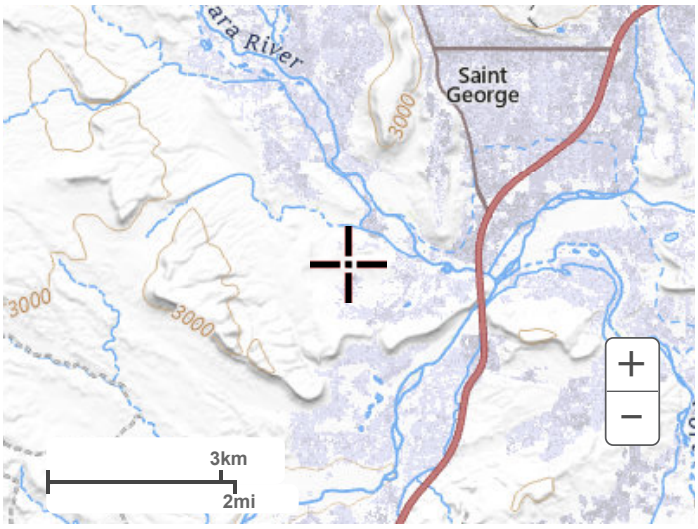
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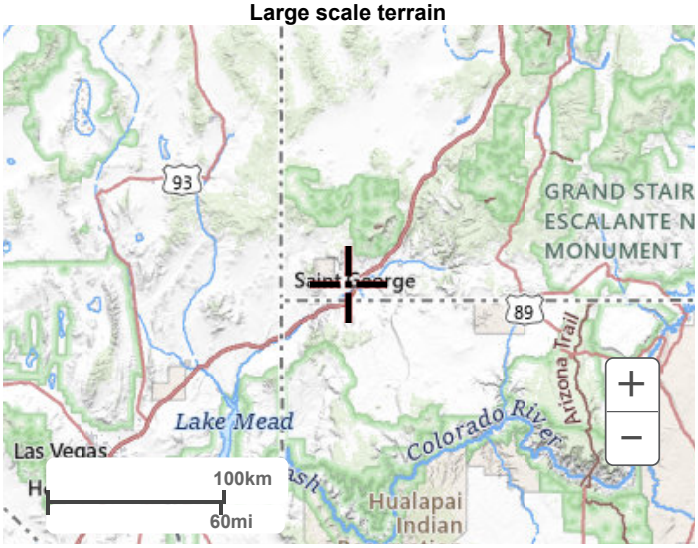
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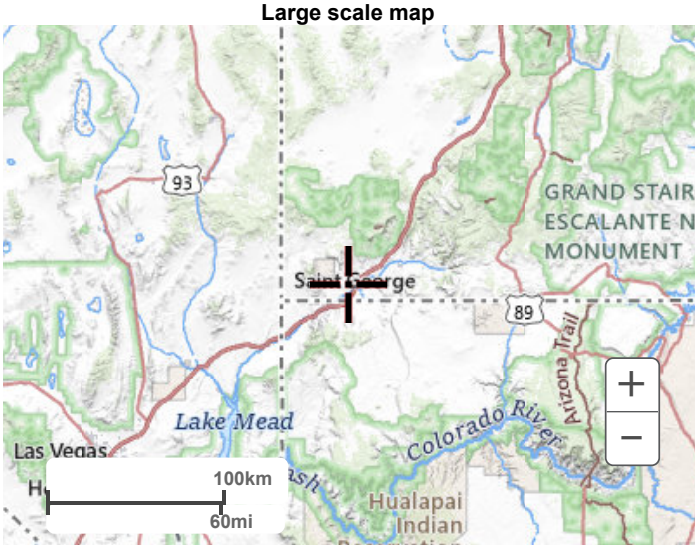
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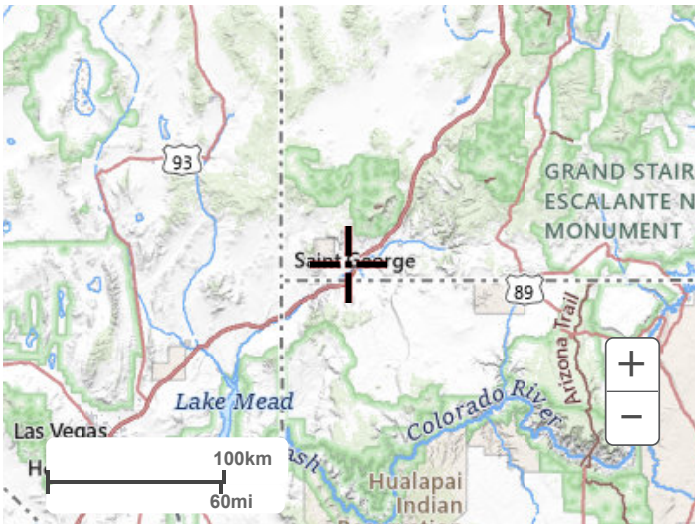
Large scale terrain



Large scale map



Large scale aerial



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Location name: St. George, Utah, USA*
Latitude: 37.0757°, Longitude: -113.6105°
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	**1.50** (1.28-1.75)	**1.92** (1.67-2.27)	**2.60** (2.23-3.04)	**3.19** (2.72-3.74)	**4.12** (3.47-4.81)	**4.92** (4.08-5.76)	**5.84** (4.74-6.89)	**6.89** (5.42-8.15)	**8.48** (6.42-10.2)	**9.86** (7.26-12.0)
10-min	**1.14** (0.984-1.33)	**1.46** (1.27-1.72)	**1.98** (1.70-2.31)	**2.42** (2.08-2.85)	**3.13** (2.64-3.67)	**3.74** (3.10-4.39)	**4.45** (3.61-5.24)	**5.24** (4.13-6.20)	**6.46** (4.89-7.78)	**7.51** (5.53-9.13)
15-min	**0.944** (0.812-1.10)	**1.20** (1.05-1.42)	**1.63** (1.41-1.91)	**2.00** (1.72-2.36)	**2.59** (2.18-3.03)	**3.10** (2.57-3.63)	**3.68** (2.98-4.33)	**4.33** (3.41-5.12)	**5.34** (4.04-6.43)	**6.21** (4.57-7.54)
30-min	**0.634** (0.546-0.742)	**0.812** (0.706-0.956)	**1.10** (0.946-1.29)	**1.35** (1.16-1.59)	**1.74** (1.47-2.04)	**2.08** (1.73-2.44)	**2.48** (2.01-2.92)	**2.92** (2.30-3.45)	**3.59** (2.72-4.33)	**4.18** (3.08-5.08)
60-min	**0.392** (0.338-0.459)	**0.502** (0.437-0.592)	**0.680** (0.586-0.796)	**0.836** (0.715-0.982)	**1.08** (0.909-1.26)	**1.29** (1.07-1.51)	**1.53** (1.24-1.80)	**1.80** (1.42-2.14)	**2.22** (1.68-2.68)	**2.59** (1.90-3.14)
2-hr	**0.237** (0.209-0.272)	**0.295** (0.261-0.341)	**0.386** (0.341-0.444)	**0.467** (0.409-0.537)	**0.592** (0.511-0.678)	**0.697** (0.591-0.798)	**0.816** (0.676-0.941)	**0.951** (0.769-1.11)	**1.15** (0.900-1.36)	**1.33** (1.01-1.59)
3-hr	**0.175** (0.156-0.198)	**0.218** (0.195-0.248)	**0.280** (0.251-0.318)	**0.333** (0.296-0.377)	**0.413** (0.362-0.468)	**0.479** (0.413-0.544)	**0.554** (0.469-0.633)	**0.637** (0.528-0.744)	**0.769** (0.617-0.917)	**0.889** (0.693-1.07)
6-hr	**0.109** (0.098-0.122)	**0.136** (0.123-0.153)	**0.173** (0.156-0.195)	**0.204** (0.182-0.230)	**0.248** (0.219-0.280)	**0.286** (0.248-0.323)	**0.326** (0.279-0.372)	**0.371** (0.311-0.426)	**0.438** (0.357-0.513)	**0.495** (0.394-0.587)
12-hr	**0.065** (0.058-0.072)	**0.081** (0.073-0.091)	**0.102** (0.092-0.114)	**0.120** (0.107-0.133)	**0.143** (0.127-0.159)	**0.161** (0.141-0.181)	**0.180** (0.156-0.203)	**0.200** (0.171-0.228)	**0.228** (0.191-0.263)	**0.253** (0.208-0.295)
24-hr	**0.037** (0.034-0.040)	**0.046** (0.043-0.050)	**0.058** (0.054-0.062)	**0.067** (0.062-0.071)	**0.079** (0.073-0.085)	**0.089** (0.082-0.095)	**0.098** (0.091-0.105)	**0.108** (0.099-0.116)	**0.122** (0.110-0.133)	**0.132** (0.119-0.149)
2-day	**0.020** (0.019-0.021)	**0.025** (0.023-0.027)	**0.031** (0.029-0.033)	**0.036** (0.034-0.038)	**0.042** (0.040-0.045)	**0.047** (0.044-0.050)	**0.052** (0.049-0.056)	**0.057** (0.053-0.061)	**0.064** (0.059-0.068)	**0.069** (0.063-0.075)
3-day	**0.014** (0.013-0.015)	**0.017** (0.016-0.019)	**0.022** (0.020-0.023)	**0.025** (0.024-0.026)	**0.029** (0.028-0.031)	**0.033** (0.031-0.035)	**0.036** (0.034-0.039)	**0.040** (0.037-0.042)	**0.045** (0.041-0.047)	**0.048** (0.044-0.052)
4-day	**0.011** (0.010-0.012)	**0.014** (0.013-0.015)	**0.017** (0.016-0.018)	**0.020** (0.019-0.021)	**0.023** (0.022-0.024)	**0.026** (0.024-0.027)	**0.029** (0.027-0.030)	**0.031** (0.029-0.033)	**0.035** (0.032-0.037)	**0.037** (0.034-0.040)
7-day	**0.007** (0.007-0.007)	**0.009** (0.008-0.009)	**0.011** (0.010-0.012)	**0.013** (0.012-0.013)	**0.015** (0.014-0.015)	**0.016** (0.015-0.017)	**0.018** (0.017-0.019)	**0.019** (0.018-0.020)	**0.021** (0.020-0.023)	**0.023** (0.021-0.024)
10-day	**0.005** (0.005-0.006)	**0.007** (0.006-0.007)	**0.008** (0.008-0.009)	**0.010** (0.009-0.010)	**0.011** (0.011-0.012)	**0.013** (0.012-0.013)	**0.014** (0.013-0.015)	**0.015** (0.014-0.016)	**0.016** (0.015-0.018)	**0.018** (0.016-0.019)
20-day	**0.003** (0.003-0.003)	**0.004** (0.004-0.004)	**0.005** (0.005-0.005)	**0.006** (0.005-0.006)	**0.007** (0.006-0.007)	**0.007** (0.007-0.008)	**0.008** (0.007-0.008)	**0.008** (0.008-0.009)	**0.009** (0.008-0.010)	**0.009** (0.009-0.010)
30-day	**0.002** (0.002-0.002)	**0.003** (0.003-0.003)	**0.004** (0.004-0.004)	**0.004** (0.004-0.005)	**0.005** (0.005-0.005)	**0.006** (0.005-0.006)	**0.006** (0.006-0.006)	**0.007** (0.006-0.007)	**0.007** (0.007-0.008)	**0.007** (0.007-0.008)
45-day	**0.002** (0.002-0.002)	**0.002** (0.002-0.002)	**0.003** (0.003-0.003)	**0.003** (0.003-0.004)	**0.004** (0.004-0.004)	**0.004** (0.004-0.005)	**0.005** (0.004-0.005)	**0.005** (0.005-0.006)	**0.006** (0.005-0.006)	**0.006** (0.005-0.006)
60-day	**0.001** (0.001-0.002)	**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** (0.004-0.004)	**0.004** (0.004-0.005)	**0.005** (0.004-0.005)	**0.005** (0.004-0.005)

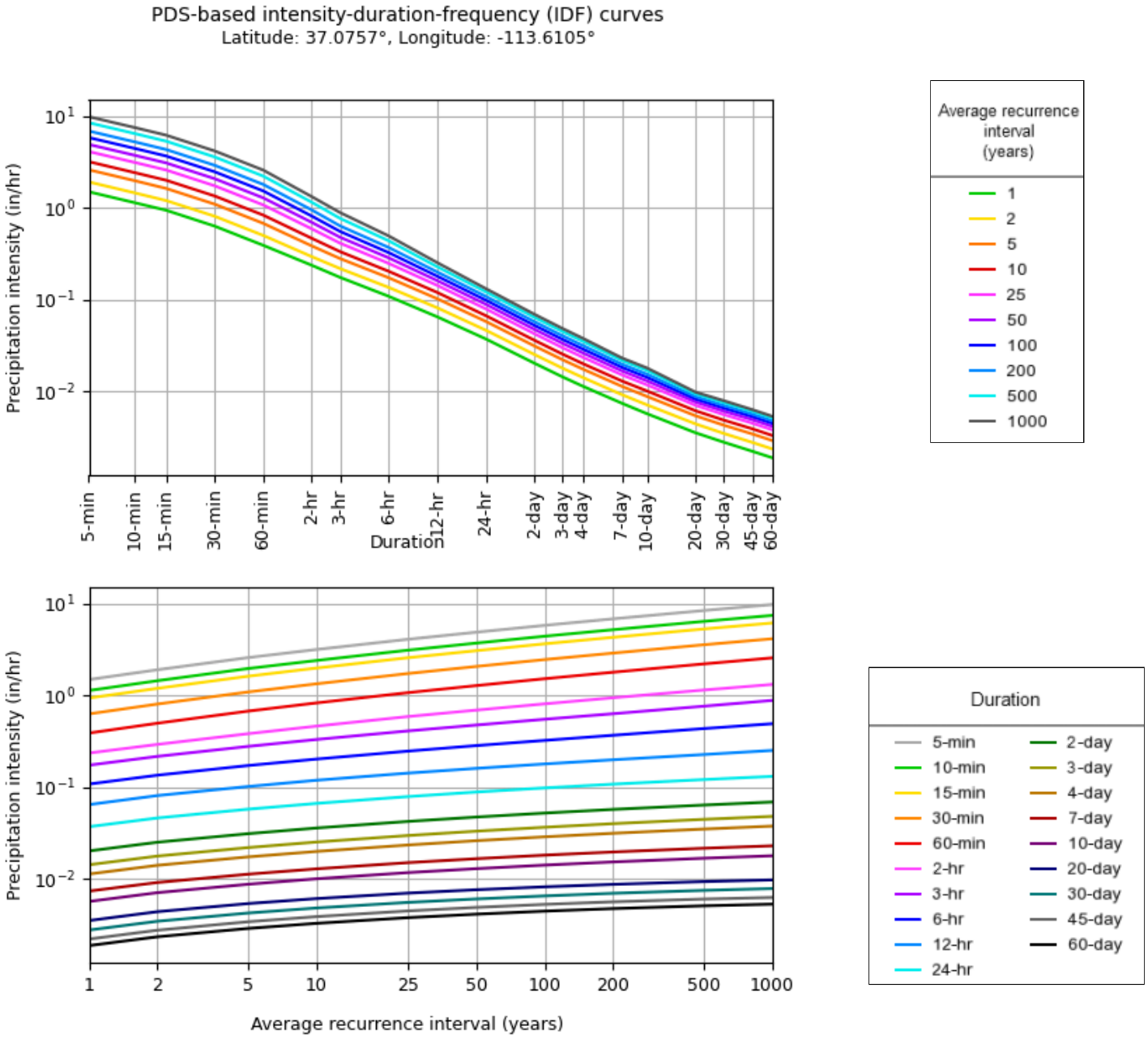
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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.

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PF graphical



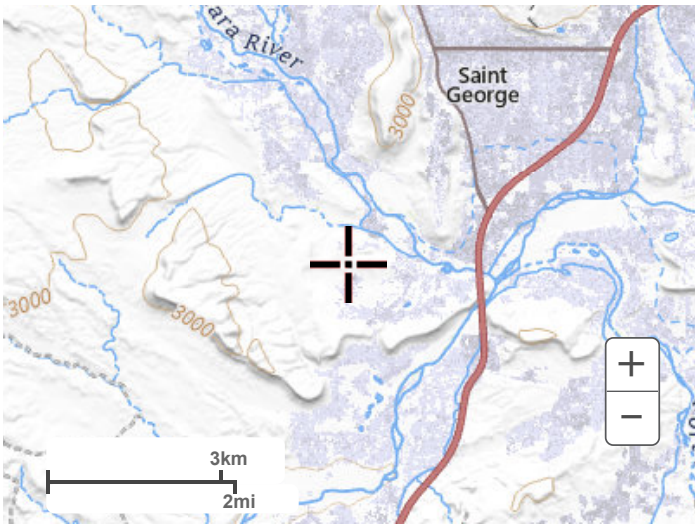
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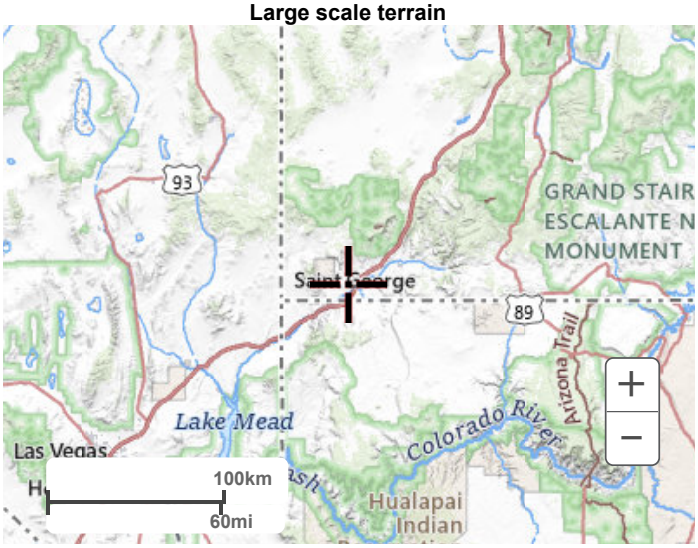
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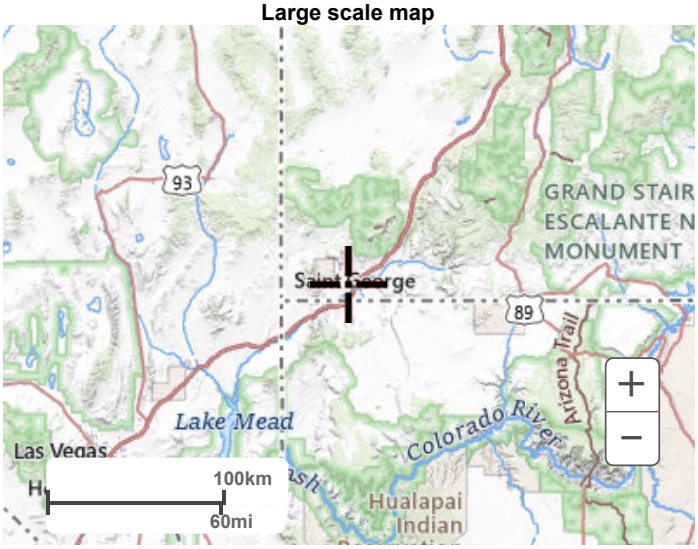
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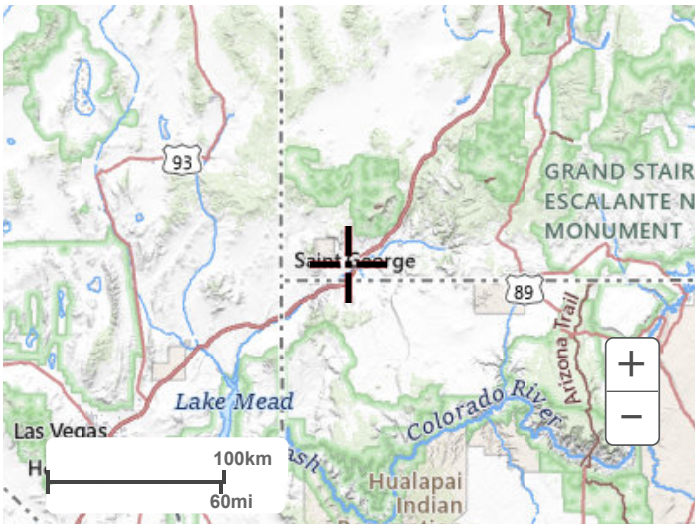
Large scale terrain



Large scale map



Large scale aerial



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Questions?: HDSC.Questions@noaa.gov

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EXHIBIT D

Geotechnical Study

Applied GeoTech

GEOTECHNICAL INVESTIGATION
HILLSIDE EVALUATION

HORIZON RIDGE

ST. GEORGE, UTAH

PREPARED FOR:

STEWART ENTERPRISES, LC
720 SOUTH RIVER ROAD, SUITE A115
ST. GEORGE, UTAH

ATTENTION: TIM STEWART

PROJECT NO. 2260671 **OCTOBER 21, 2026**

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SUMMARY

1. Applied Geotechnical Engineering Consultants, Inc., was requested to provide geotechnical study for Hillside Review within the St. George City Hillside Development requirements for the proposed Horizon Ridge Project located in St. George, Utah as shown on Figure 1. The project consists of residential development with 225 lots varying in size.

2. AGEC has previously evaluated the property in 2017 where 8 borings were drilled and 6 test pits were excavated. In addition, AGEC has reviewed the adjacent studies that include Rockland Townhomes, Dixie Intermediate School and a Future Elementary School, along with Tuscan Hills to the north. The previous locations on or adjacent the property are shown in Figure 2. The property is mapped geologically as a potential for expansive mudstone known in the area as "blue clay". The material is part of the Petrified Forest Member of the Chinle Formation. The mapping indicates it is at the surface of the site on the southwest portion of the property and is concealed below alluvial soils on the remainder of the site. The borings were drilled into the bedrock to determine the types of bedrock.

3. Subsurface conditions encountered in the exploratory borings and test pits generally consist of silty sand and gravel overlying mudstone bedrock. Occasional layers of sandstone bedrock were also encountered. The thickness of the sand and gravel is shown adjacent each exploration on Figure 2. The mudstone varied from weather and soft near the surface to moderately hard to hard generally increasing with depth. The boring and test pit logs are shown on Figures 3 through 5 with the Legend and Notes to Boring and Test Pits on Figure 5.

4. Groundwater was not encountered within the borings and test pits to the depths investigated. The general area is known for perched groundwater conditions following development of the area.

5. AGEC has reviewed the proposed grading plan which indicates approximately 146,500 cubic yards of cut and a fill of 150,000 cubic yards of fill. Based on the earthwork plan, also shown on Figure 2, the cuts will vary up to 20 feet and will primarily be within two ridges on the east center portion of the property. The fills will vary up to approximately 15 feet with the deeper fill along the south portion of the property adjacent the Dixie Intermediate School.

6. Due to the expansive mudstone, the subgrade through areas where the expansive mudstone is less than 15 feet in depth will require over-excavation prior to filling. AGEC recommends additional exploration to refine these areas. We anticipate that the majority of the southern portion of the property will require over-excavation. AGEC will provide additional exploration to refine the lots where the removal process is necessary.

7. Due to the slope on the south side of the property and the amount of fill being placed, it will be necessary to bench horizontal benches in the fill zone prior to

placing the fill materials. The benches will likely be provided when the over-excavation of the expansive mudstone is conducted. We recommend that at least the entire depth of the lot be prepared along the south edge adjacent to the school property with a flat or horizontal bench that will allow the replacement materials to be placed in a uniform matter. We also recommend that as a part of the rock walls that are planned along the slope the geogrid extend into the lot an additional 20 feet beyond the traditional 80 percent of the height for the rock wall. The geogrid may be placed at 2-foot vertical intervals similar to the rock wall geogrid. Details of the rock wall design will include the additional geogrid placement along this area as a part of the construction drawings.

8. The proposed residences may be supported on conventional spread and spot footings with slab-on-grade floors supported on a zone of properly compacted, structural fill underlain by a properly prepared subgrade as recommended in the Subgrade preparation section of this report.

9. The on-site non mudstone soils may be re-used as suitable site grading and structural fill. The mudstone materials may be re-used when mixed with other non-expansive materials at a ratio of 2:1 (non-expansive material to mudstone) up to within 5 feet of the pad grade in the building pad area. The upper 5 feet (pad) should consist of properly compacted non clay, imported or on site suitable structural fill. The on-site sand and gravel materials are suitable for structural fill. Mudstone or clay soils should not be placed in the upper 5 feet of the building pad.

10. Positive drainage of the surface soils within the development is critical and should be maintained throughout the development. We recommend (as much as possible) the piping of surface drainage and in no case should be ponding of water be allowed adjacent to or up-gradient of residences. Landscaping that requires irrigation should be limited to assist in reducing potential to increase the perched groundwater conditions and wetting of the underlying expansive mudstone, particularly in pavement areas where the full depth of mudstone is not removed.

9. Detailed recommendations for subgrade preparation, materials, foundations, and drainage are included in the report.

10. The information provided in this summary should not be used independent of that provided within the body of this report.

SCOPE

This report presents the results of a geotechnical investigation for Hillside Review Purposes for St. George City Hillside Review of the proposed Horizon Ridge Residential Development to be located in Washington County, Utah, as shown in Figure 1. The property is located in the Tonaquint area north of Dixie Intermediate School and south of Tuscan Hills. This report presents the subsurface conditions encountered, laboratory test results, and recommendations for geological hazards and geotechnical aspects of the project.

Field exploration from previous studies was utilized to define the subsurface conditions and to obtain samples for laboratory testing. Information obtained from the field and laboratory was used to define conditions at the site and to develop recommendations for the proposed construction.

This report has been prepared to summarize the data obtained during the study and to present our conclusions and recommendations based on the proposed construction and the subsurface conditions encountered. Design parameters and a discussion of geotechnical engineering considerations related to construction are included in the report.

SITE CONDITIONS

The subject site consists of approximately 35 acres of property located north of the Dixie Intermediate School and south of Tuscan Hills Residential development. The site is located on a gradual sloping hillside with approximately 60 feet of elevation change from the north to the south. The property consists of several ridges or ravines with a flatter ridge or bench area along the north or top. There is also a graded slope along the south edge adjacent to the school property. There are multiple graded locations or two track, dirt roads around the property. The site is slightly vegetated with occasional small brush, grasses and desert type vegetation.

The Tuscan Hills Residential development is located to the north and is generally level on the top of the ridge. To the north east is vacant property and further to south on the east side is the Rockland Townhome project. To the west is vacant property.

FIELD STUDY

In 2017 AGEC evaluated the property by drilling 8 borings and excavating 6 test pits at the approximate locations shown on Figure 2. The borings were drilled with a truck mounted drilling rig using solid stem augers to advance the boring. The test pits were excavated with a rubber tire backhoe. Periodic samples were taken and the subsurface profile was logged and soil samples were obtained at this time for laboratory testing.

GEOLOGY

The geologic conditions at the site were evaluated based on a review of geologic literature, aerial photographs and a site reconnaissance.

A. Regional Geology

The site is located within the transition zone between the Colorado Plateau and Basin and Range physiographic provinces of southwestern Utah. The regional geology consists predominantly of gently to moderately deformed Mesozoic sedimentary rocks that have been locally folded and faulted during the Late Cretaceous Sevier Orogeny and subsequently affected by late Cenozoic extensional faulting. The prominent regional structural feature in the vicinity is the northeast-trending Virgin anticline, with associated thrust and high-angle faulting. The Hurricane fault lies to the east and represents a major down-to-the-west normal fault forming the structural boundary between the Colorado Plateau and the Basin and Range transition zone.

Bedrock in the vicinity is structurally associated with the Virgin anticline. The Petrified Forest Member of the Chinle Formation is mapped on the surface of portions of the site.

B. Stratigraphy of the Area

The Triassic Chinle Formation is exposed in the region on both limbs of the Virgin anticline. The Chinle Formation is approximately 800 feet thick regionally and consists of interbedded sedimentary units that include conglomeratic sandstone, sandstone, siltstone, mudstone, and claystone, with locally prominent variegated red, purple, gray, and green beds.

The Chinle Formation can result in variable rock-mass strength, excavation characteristics, and bearing conditions. Fine-grained, clay-rich intervals may soften upon wetting and may exhibit shrink-swell behavior, while sandstone and conglomerate beds may be comparatively resistant or locally cemented. The presence, thickness, and engineering characteristics of individual Chinle members at the site are defined through subsurface exploration.

GEOLOGIC HAZARDS

Based on review of geologic literature and site reconnaissance, the following information is provided concerning geologic hazards.

A. **Faulting and Seismicity**

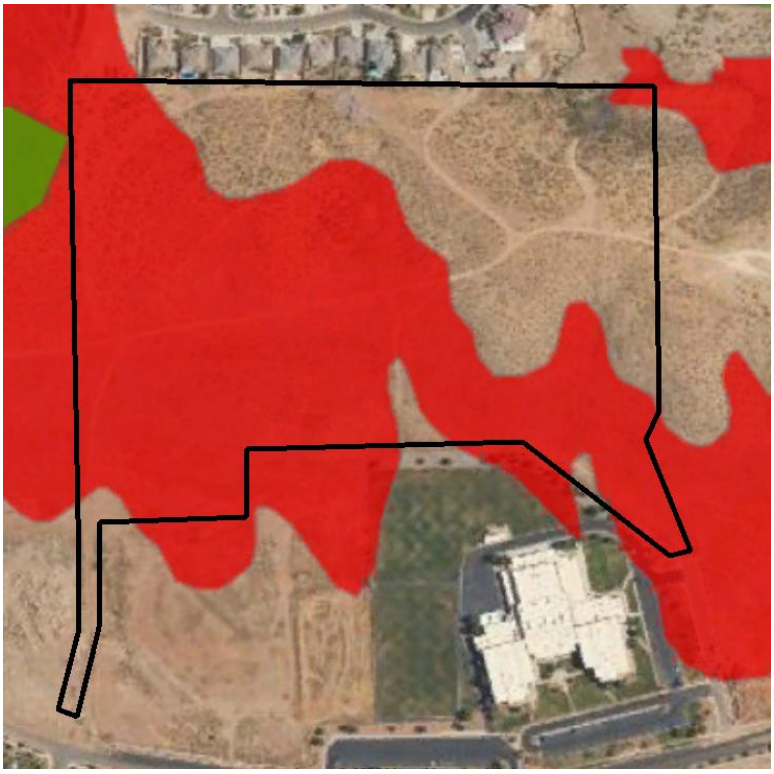
The most relevant structure near the site is a mapped, well constrained fault that is identified to be less than 130,000 years old located southwest of the property approximately ¼ mile. AGEC has evaluated the fault during a previous study for the property near the fault and found no additional activity at that location.

B. **Landslides/Slope Instability**

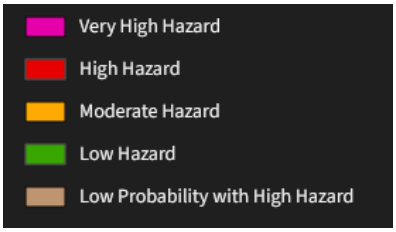
Based on the geologic hazards portal within the Utah Geologic Survey website, the site is mapped as varying from non to high for potential landslides. The mapping is based on the underlying Chinle formation and the history of landslides within this formation on existing slopes.

AGEC has evaluated the site, and the existing conditions do not indicate a concern for landslides or slope instability. Based on the proposed grading and the historical concerns for perching groundwater after development occurs, the proposed grading should be conducted to reduce the natural slopes of the underlying mudstone surface that is potentially a concern for wetting. The bedrock dipping indicates that the bedrock at the site is dipping down to the north to northeast at approximately 7 degrees. The dipping into the hillside is also a benefit to the slope stability of the property. AGEC will provide additional grading guidance for flattening the surface of the mudstone prior to placing fill along the larger planned fill slopes along the south edge of the site adjacent to the school property. In addition, the standard geogrid for the rock wall design will be extended into the lot and placed in the fill

zone up to 20 feet beyond the original 80% height of the rock wall. This detail will be provided with the rock wall design in the construction drawings.



Geologic Hazard Landslide Potential Map



Ket to above Hazard map

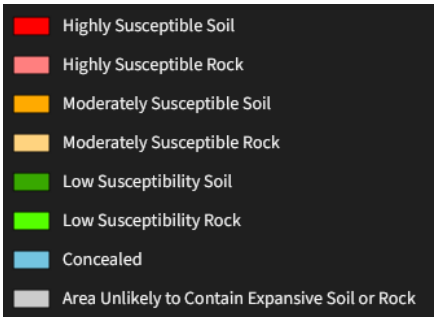
C. **Expansive Soil/Bedrock**

The geologic mapping along with our subsurface investigation and laboratory testing confirms the risk of expansive bedrock on the site is present. It will be addressed by implementing special grading recommendations to properly support structures.

The mapping below indicates the area of the potential hazard for the property. The site is mapped as a high hazards and also concealed, which is where the surface is overlying the expansive materials.



Geologic Hazard Expansive Soil/Rock Map



Key to above Hazard Map

Base on review of the other potential hazards on the site, there are minor concerns for erosion, that will be addresses in the site grading along with hard rock, that is anticipated for excavation purposes.

SUBSURFACE SOIL CONDITIONS

Subsurface conditions encountered in the exploratory borings and test pits generally consist of silty sand and gravel overlying mudstone bedrock. Occasional layers of sandstone bedrock were also encountered. The thickness of the sand and gravel is shown adjacent each exploration on Figure 2. The mudstone varied from weather and soft near the surface to moderately hard to hard generally increasing with depth. The boring and test

pit logs are shown on Figures 3 through 5 with the Legend and Notes to Boring and Test Pits on Figure 5.

SUBSURFACE WATER

Groundwater was not encountered within the depth investigated at the time of the explorations. Due to the underlying mudstone surface, the general area is known for perching of groundwater over the bedrock following development and the use of landscaping and surface drainage. Fluctuation in groundwater level may occur over time. An evaluation of such fluctuations is beyond the scope of this report.

PROPOSED CONSTRUCTION

We understand it is proposed to construct single family residences as shown in Figure 2. The grading of the site is also shown as a cut and fill map on Figure 2. GEC has reviewed the proposed grading plan which indicates approximately 146,500 cubic yards of cut and a fill of 150,000 cubic yards of fill. Based on the earthwork plan, also shown on Figure 2, the cuts will vary up to 20 feet and will primarily be within two ridges on the east center portion of the property. The fills will vary up to approximately 15 feet with the deeper fill along the south portion of the property adjacent to the Dixie Intermediate School.

We anticipate the residences will utilize wood framing with a stucco and/or rock veneer and likely use a tile. The buildings are proposed to be supported on conventional spread and spot footings with concrete slab on grade floors supported on properly prepared building pads. We anticipate wall loads will be less than 3 kips per linear foot (klf) and column loads will be less than 50 kips.

The site will include associated utilities. Interior roads are typically 45 to 50-foot public right of way, which is considered a Traffic Index of 5.5.

If the proposed construction, building loads or anticipated traffic conditions are significantly different from those listed, we should be notified so that we can reevaluate our recommendations.

RECOMMENDATIONS

Based on our experience in the area, the subsurface conditions encountered, laboratory test results, and the proposed construction, the following recommendations are provided:

A. Site Grading

General: Prior to placing site grading fill or concrete, the site should be grubbed to remove the near surface vegetation and soil containing roots and organics.

1. Subgrade Preparation

a. <u>Lots where the pad grade is within 15 feet of expansive mudstone</u>

Based on the anticipated grading and the subsurface conditions observed, we recommend that the pads where expansive mudstone is less than 15 feet, that the pad be over-excavated to provide a separation of at least 17 feet following removal of the underlying mudstone. The lower 2 feet of mudstone may be moisture condition and replaced in the bottom of the excavation.

AGEC will be conducting additional exploration and comparing the findings with the proposed grading to refine the location of the lots that will require deep over-excavation. The southern portion of the site is primarily within that area.

b. <u>Lots where the pad grade is > 15 feet from expansive mudstone</u>

The remainder of the site may be prepared by removing approximately 2 feet of loose surficial materials and then scarifying and recompacting the upper 12 inches.

c. Roadways and Flatwork(sidewalks)

The subgrade within the roadways and flatwork in areas of expansive soils should be prepared by removing a minimum of 4 feet below pavement subgrade. The 4 feet may be replaced with mixed materials up to within one foot of subgrade. The mixed materials should be the 2:1 mixture described in the materials section below.

Where the expansive soil is greater than 4 feet below subgrade, the subgrade should be prepared by scarifying, moisture conditioning and compacting 12 inches of the subgrade soil.

2. Excavation

In general, we anticipate that the bedrock at the site will likely require heavy duty excavation equipment. Portions of the bedrock, particularly the sandstone will be very difficult to excavate and may require use of rock hammer on a large excavator.

3. Grading Slopes and Trenches

The following table provides the maximum recommended slope steepness for a given slope condition. Slopes should include benches in accordance with the 2024 IBC.

Slope Condition	Maximum Slope (Horizontal:Vertical)
Permanent Cut Slopes in Overburden Soils	2:1
Unretained, Properly Compacted Fill	2:1
Permanent Cut Slopes in Moderately Hard Bedrock	¼ :1
Utility Trenches in Bedrock (OSHA Soil Class A)	½:1

Fill slopes should be graded by overbuilding and then cutting back to the desired grade to provide a compacted slope face. Fill placed on existing slopes steeper than 3:1 should be placed using a benching procedure to key the fill into the existing slope. Benches should be of sufficient width to allow adequate area for the compaction equipment.

Steeper trenches may require the use of shoring or a trench box to provide a safe work environment. Safe trench excavation is the responsibility of the contractor.

4. Materials

The on-site non-mudstone soils may be re-used as site grading and structural fill. The mudstone may be re-used within the bottom 2 feet of

the replacement zone and mixed with non-mudstone materials in the upper zone to within 5 feet of the pad grade. Typically a 2:1 (non-mudstone to mudstone) mix is suitable.

Imported materials should consist of non-expansive, granular soil. Listed below are the materials recommended for imported fill.

Area	Fill Type	Recommendations
Imported Materials		
Foundations/slabs	Site grading/ structural fill	-200 <40%, LL <30% Maximum size: 4 inches
Underslab (upper 4 inches)	Base Course	-200 <14% Maximum size: 1 inch

-200 = Percent Passing the No. 200 Sieve
LL = Liquid Limit

5. Compaction

Compaction of non-mudstone materials placed at the site should equal or exceed the following minimum densities when compared to the maximum dry density as determined by the listed method:

Area	Percent Compaction
Subgrade	90
Pad Fill	95
Footings	95
Site Grading	95
Utility Trenches	95
Wall Backfill	95

To facilitate the compaction process, the overburden soil should be moisture conditioned to within 2 percentage points of the optimum moisture content as determined by ASTM D-1557 prior to placement.

Fill should be placed in loose lift thicknesses which do not exceed the capacity of the equipment being utilized. Generally, 6 to 8-inch loose lifts are adequate. Lift thickness should be reduced to 4-inches for hand compaction equipment. Greater thickness may be used for larger compaction equipment.

Our experience with processed clay has shown that the material may be placed with track equipment. The compaction should be within the specified range. Additional compaction above the recommended zone may result in additional heave.

6. Surface Drainage General Recommendations

Positive site drainage should be maintained during the course of construction. After construction has been completed, positive drainage of the surface water away from the buildings in each direction must be maintained. To reduce infiltration adjacent to foundations we recommend the following:

a. If a soil slope exists, a minimum slope of 6 inches in the first 10 feet from the perimeters of the residences should be provided. Hard surfaces may also be used to direct water away from buildings.

b. Roof drainage systems should be used to discharge away from the buildings to prevent ponding adjacent to foundations. We recommend piping roof drainage off site or into storm drains.

c. Landscaping requiring water should be considered to not be placed adjacent to foundations or within 10 feet of foundations.

7. Surface Drainage- Low Impact Development (LID)

AGEC has reviewed the planned areas for surface infiltration areas shown as LID on the grading plans and the Dixie Storm Water Coalition Guide (DSWCG)

for Low Impact Development dated June 20, 2020, and provided the following evaluation:

Using the following reference for determining the USDA mapped soil type https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm. AGEC has encountered shallow bedrock during our investigation throughout the majority of the site. The bedrock would likely result in a perching of groundwater for retention basins. A Soil Class Group of "D" may be used for design. Using the DSWCG, Figure 2 (flow chart), and based on the soil types and conditions, Steps 1-3 are "NO", due to the shallow bedrock for the majority of the site. It should be noted that we recommend piping water away from structures to streets or storm drains. The following parameters may be used in the application-Template form.

Subsurface Information	
Groundwater	
Depth to Groundwater (ft)	>25 ft
Historical High Depth to Groundwater if known (ft)	>25 ft
Source	Geotech Study
Groundwater Contamination at Site:	N/A
Soil Information	
Infiltration Rate (in/hr)*	<1
Hydrologic Soil Group:	D
Source:	USDA Web Site Ref. above
Soil Contamination at Site:	N/A

* Estimated based on soil type and *https://www.ucea.net/copy-of-wet-swales-7*

B. Foundations

Recommendations for design of conventional foundations supported on a properly prepared subgrade are provided below.

1. Bearing Material and Foundation Type

   The proposed structures may be supported on conventional spread and spot footings bearing on a properly prepared subgrade as recommended in the Subgrade Preparation section of this report.

2. Bearing Pressures

   Spread footings bearing on bedrock or on properly compacted structural fill may be designed for a net allowable bearing pressure of 2,000 psf.

3. Footing Width and Embedment

   Footings should have a minimum width of 18 inches, and exterior or unheated footings should be embedded at least 20 inches below the lowest adjacent grade.

4. Temporary Loading Conditions

   The allowable bearing pressure may be increased by one-third for temporary loading conditions such as wind or seismic loads.

5. Settlement

   We estimate that the total settlement will be less than 1 inch for footings designed as indicated above due to the load of the structure. Differential settlement is estimated to be approximately ½ inch.

6. Foundation Base

   The base of excavations should be cleared of loose or deleterious material prior to placement of fill or concrete.

C. Concrete Slabs

1. Slab Support

   Slabs should be supported on a properly prepared subgrade as recommended in the Subgrade Preparation section of this report.

2. Under Slab Gravel

   A 4-inch layer of base course should be placed below the concrete slabs to provide a firmer and more stable subgrade and to promote even curing of the concrete.

3. Vapor Barrier

   A vapor barrier should be placed below slabs in areas which will receive sensitive floor coverings or coverings which are impermeable.

4. Exterior and Garage Flatwork

   Flatwork should be supported on a properly prepared subgrade as recommended in the Subgrade Preparation Section of this report. The owners should be aware that exterior flatwork may move where expansive soil is present and is exposed to water. To reduce concerns for flatwork movement causing distress to the structures, the flatwork should be separated from the main structure and allow for unrestrained vertical movement. This generally is accomplished by providing a construction joint between the concrete flatwork and the wall/slab with a heavy felt board.

D. Lateral Earth Pressures

1. Lateral Resistance for Footings

   Lateral resistance for spread footings is controlled by sliding resistance developed between the footing and the subgrade soil. An ultimate friction value of 0.45 may be used in design for ultimate lateral resistance of footings bearing on on-site properly compacted structural fill.

2. Retaining Structures

   The following equivalent fluid weights are given for design of subgrade walls and retaining structures. The active condition is where the wall moves away

from the soil. The passive condition is where the wall moves into the soil and the at-rest condition is where the wall does not move. We recommend the basement walls be designed in an at-rest condition.

The values listed below assume a horizontal surface adjacent to the top and bottom of the wall.

Description	Active	At-Rest	Passive
On site soil - Equivalent Fluid Weight	35 pcf	55 pcf	300 pcf
On site soil - Earth Pressure Coefficient	0.28	0.44	--

The above values account for the lateral earth pressures due to the soil and level backfill conditions and do not account for hydrostatic pressures or surcharge loads.

Lateral loading should be increased to account for surcharge loading using the appropriate earth pressure coefficient and a rectangular distribution if structures are placed above the wall and are within a horizontal distance equal to the height of the wall. If the ground surface slopes up away from the wall, the equivalent fluid weights should also be increased.

Care should be taken to prevent percolation of surface water into the backfill material adjacent to the retaining walls. The risk of hydrostatic buildup can be reduced by placing a subdrain behind the walls consisting of free-draining gravel wrapped in a filter fabric.

3. Seismic Conditions

Under seismic conditions, the equivalent fluid weights should be modified as follows according to a Simplified Seed and Whitman (1970) approximation to the Mononobe-Okabe method assuming a level backfill condition:

Lateral Earth Pressure Condition	Seismic Modification - Prob of Exceedance 2% in 50 years
	Clay Backfill
Active	10 pcf increase
At-rest	no increase
Passive	22 pcf decrease

The seismic increases and decreases assume an adjusted peak ground acceleration (PGA) of 0.31g using the Mononobe-Okabe pressure distribution. The resultant of the seismic increase should be placed up from the base of the wall one-third the height of the wall.

4. Safety Factors

The values recommended assume mobilization of the soil to achieve the assumed soil strength. Conventional safety factors used for structural analysis for such items as overturning and sliding resistance should be used in design.

E. Seismicity

1. Seismicity/Building Code Parameters

Listed below is a summary of the site parameters as required by the 2024 International Building Code and ASCE 7-22:

Description	IBC 2024[1]
Site Class	default[2]
PGA_M - Site-modified peak ground	0.28g
S_{DS} - site-modified design ground motion	0.46
S_{D1} - site-modified design ground motion	0.27g

[1]Values obtained from information provided by the ASCE Hazard tool at https://ascehazardtool.org based on ASCE/SEI 7-22.

[2]Default site class, defined as the most critical of Site Classes C, CD, and D, was selected, as soil/rock properties are not known in sufficient detail to determine site class based on in-situ measurements.

We can provide the following upon request:

- A multi-period response spectrum as per ASCE 7-22
- In-situ shear-wave velocity measurements, to better define site class, at an additional fee.

F. Soil Corrosion

Our experience in the area indicates that the on-site soils, bedrock, and many import soil sources contain water soluble sulfate concentrations in sufficient concentration to be corrosive to concrete. Therefore, we recommend concrete elements that will be exposed to the on-site soils be designed in accordance with provisions provided in the American Concrete Institute Manual of Concrete Practice (ACI) 318-19 and Section 1904.1 of the 2021 International Building Code. Tables 4.2.1 and 4.3.1 of ACI 318-19 should be referenced for design of concrete elements utilizing a Sulfate Exposure Class of S2.

Consideration should also be given to cathodic protection of buried metal pipes. We recommend utilizing PVC pipes where local building codes allow.

G. Roadway-Pavements

1. Subgrade Support

   We anticipate that the subgrade materials beneath the pavement areas will consist of silty sand and fill materials. A California Bearing Ratio (CBR) of 10 percent was assumed for a properly compacted subgrade for purposes of design.

2. Pavement Thickness

   Based on provided pavement sections from previous projects, a 20-year design life, and AASHTO design methods, the following pavement sections are recommended.

	Pavement Section Thicknesses (inches)	
Location	**Asphaltic Concrete**	**Base Course**
Parking Areas	3	6

3. Pavement Materials

   The pavement materials should meet St. George City specifications for gradation and quality. The pavement thicknesses indicated above assume that the base course is a high-quality material with a CBR of at least 50 percent and the asphaltic concrete has a minimum Marshall stability of 1,800 pounds. Other materials may be considered for use in the pavement section. The use of other materials may result in other pavement material thicknesses.

4. Drainage

   The collection and diversion of drainage away from the pavement surface is extremely important to the satisfactory performance of the pavement section. Proper drainage should be provided.

H. Construction Testing and Observations

We recommend testing fill, concrete, and asphalt materials at a frequency which meets or exceeds St. George City minimum testing frequency requirements for city improvements. We also recommend the following testing and observations be done as a minimum.

1. Verify the subgrade is properly prepared/compacted in accordance with the recommendations provided in the Subgrade Preparation section of this report.

2. Conduct compaction testing on fill placed below foundations, in building pads, and paved areas. We recommend testing each foot of fill placed.

3. Conduct special inspections on the proposed building as required by the 2024 International Building Code and the structural engineer.

I. Geotechnical Recommendation Review

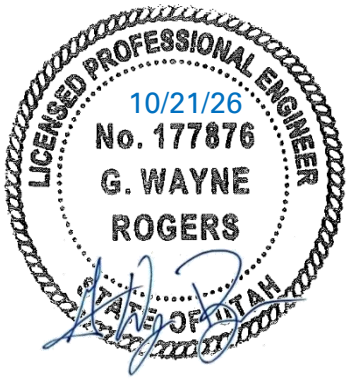
The client should familiarize themselves with the information contained in this report. If specific questions arise or if the client does not fully understand the conclusions/recommendations provided, AGEC should be contacted to provide clarification.

LIMITATIONS

This report has been prepared in accordance with generally accepted soil and foundation engineering practices in the area for the use of the client for design purposes. The conclusions and recommendations included within the report are based on the borings drilled and test pits excavated, laboratory test results and our experience in the area. Variations in the subsurface conditions may not become evident until excavation is conducted. If the subsurface conditions or groundwater level are found to be significantly different from those described above, we should be notified to reevaluate our recommendations.

Sincerely,

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.



G. Wayne Rogers, P.E.

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REFERENCES

Utah Geological Survey (UGS) Geologic Map M-251DM (2011) of the St. George 7.5 quadrangle, Washington County, Utah," was published in 2022 by Hayden and Willis

Utah Geological Survey (UGS) , Geologic Hazards Portal, https://maps.geology.utah.gov/hazards

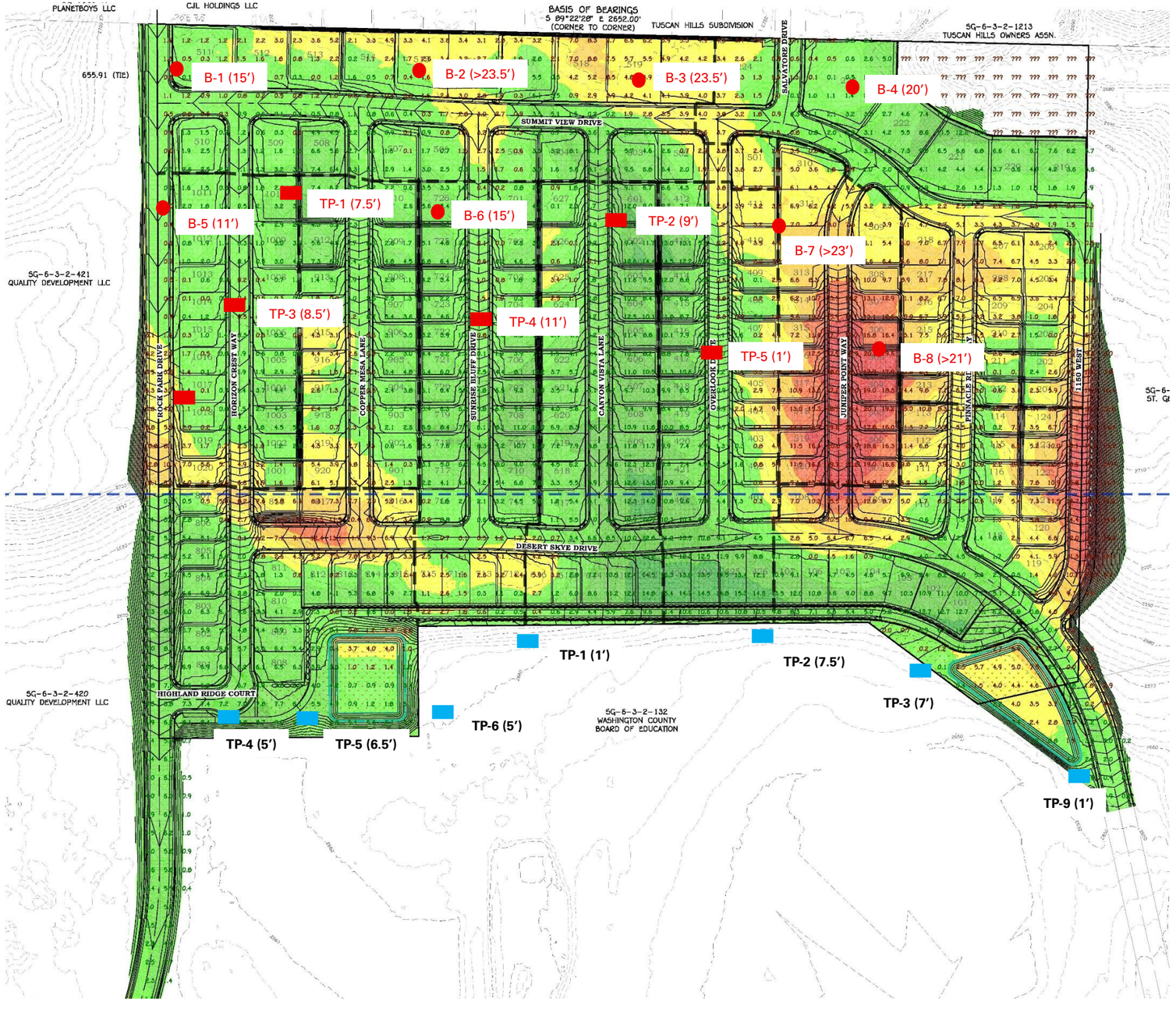


HORIZON RIDGE
ST. GEORGE , UTAH

N

NOT TO SCALE

2260671	AGEC	Site Location Map	Figure 1



ELEVATIONS TABLE			
NUMBER	MIN. ELEVATION	MAX. ELEVATION	COLOR
1	-22.000	-17.000	
2	-17.000	-12.000	
3	-12.000	-7.000	
4	-7.000	-2.000	
5	-2.000	3.000	
6	3.000	8.000	
7	8.000	13.000	
8	13.000	18.000	

N

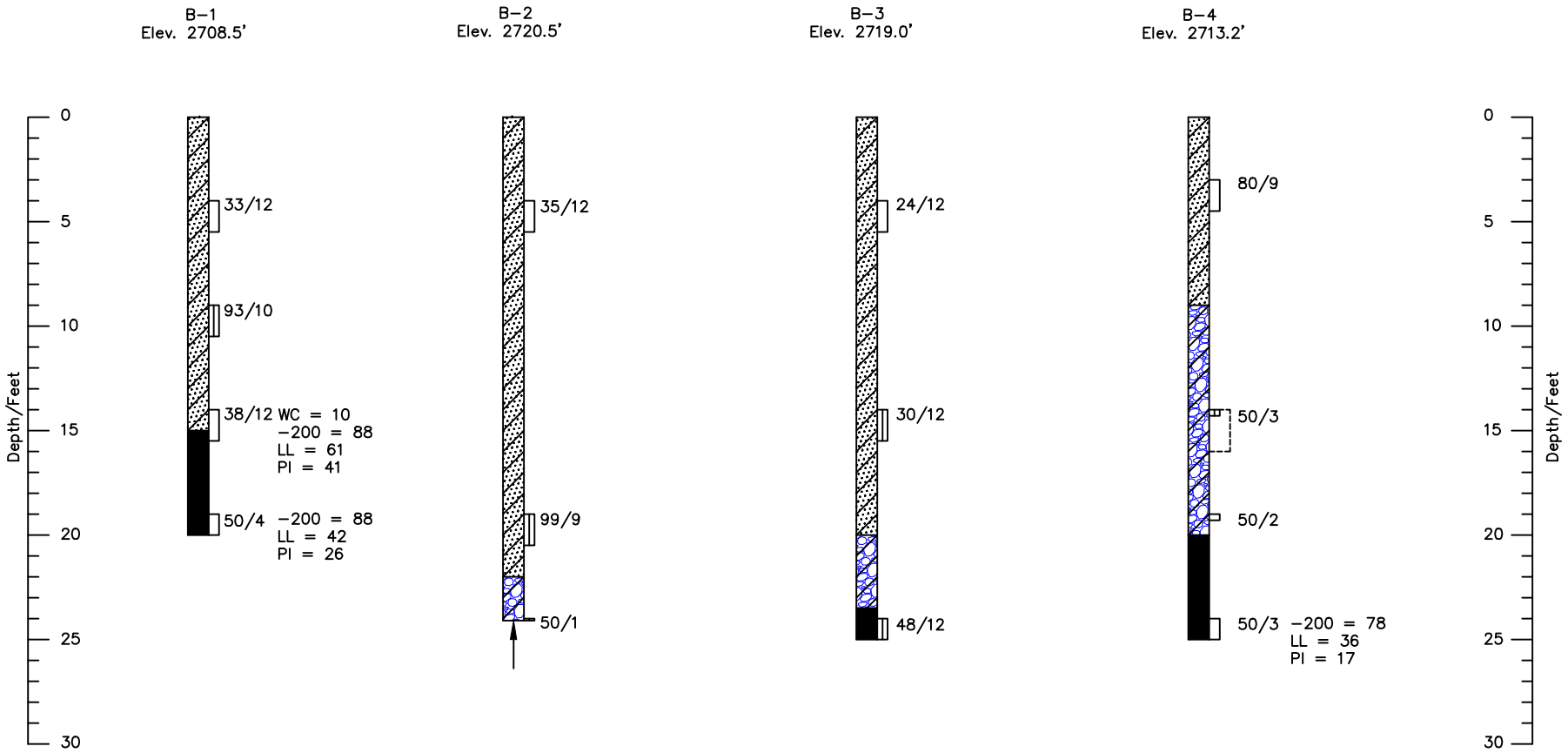
NO SCALE

Approximate Test Pit Location 2005 School Study

Approximate Test Pit Location 2017 Study

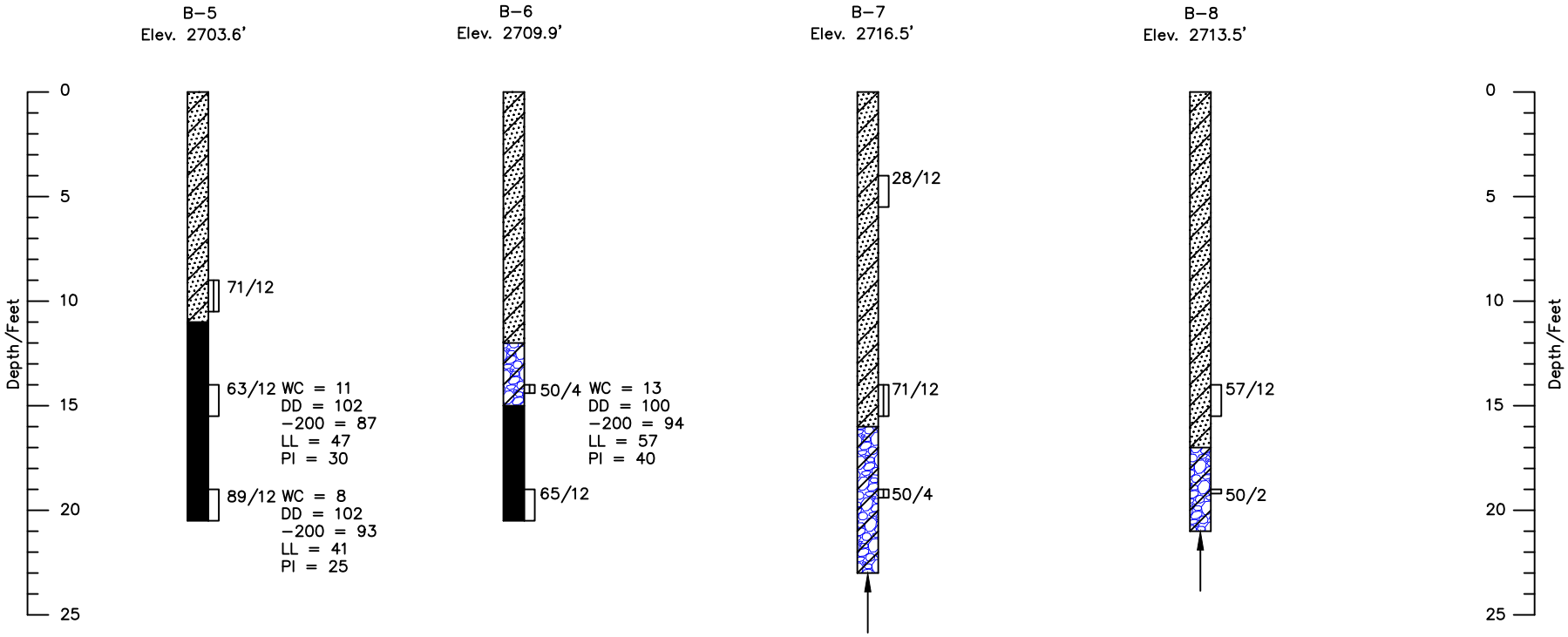
Approximate Boring Location 2017 Study

2260671	AGEC	Site Plan – Earthwork Cut-Fill Map Exploration Locations	Figure 2



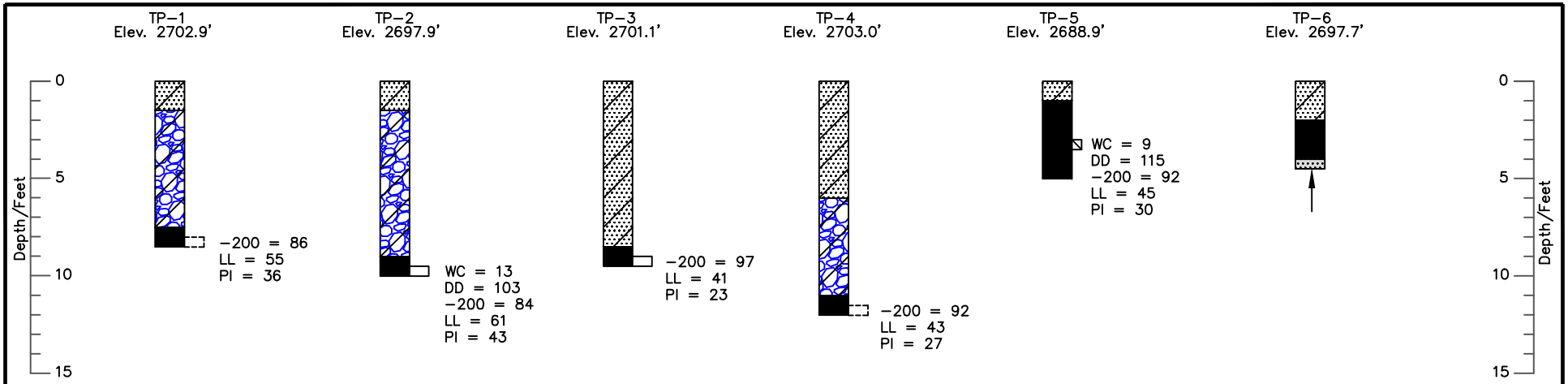
See Figure 5 for Legend and Notes

2260671	AGEC	Logs of Exploratory Borings	Figure 3



See Figure 5 for Legend and Notes

2260671	AGEC	Logs of Exploratory Borings	Figure 4



LEGEND:

Silty Sand with Sand (SM); loose B–1 upper 1 to 3 feet, then dense to very dense, slightly moist, red to brown.

Silty Gravel with Sand (GM); dense, slightly cemented, occasional cobbles, slightly moist.

Mudstone; (blue clay), moderately hard, moist, clay, purple, red.

Sandstone; hard, dry to slightly moist, red to brown to yellow.

10/12 California drive sample taken. The symbol 10/12 indicates that 10 blows from a 140 pound hammer falling 30 inches were required to drive the sampler 12 inches.

Indicates core sample taken.

Indicates relatively undisturbed hand drive sample taken.

Indicates relatively undisturbed block sample taken.

Indicates disturbed sample taken.

NOTES:

1. The borings were drilled on May 24, 2017 with a truck mounted drill rig equipped with 7–inch hollow–stem augers. The test pits were excavated on July 26, 2017 with a rubber tire backhoe.
2. The locations of the borings and test pits were measured by pacing from features shown on the site plan provided.
3. The elevations of the boring and test pits were measured by interpolating between contours shown on the site plan provided.
4. The boring and test pit locations and elevations should be considered accurate only to the degree implied by the method used.
5. The lines between the materials shown on the boring and test pit logs represent the approximate boundaries between material types and the transitions may be gradual.
6. Free water was not encountered in the borings or test pits at the time of drilling/ excavation.
7. WC = water content (%);
   DD = dry density (pcf);
   –200 = percent passing No. 200 sieve;
   LL = liquid limit (%);
   PI = plasticity index (%);

ST. GEORGE HILLSIDE REVIEW BOARD MINUTES
August 26, 2026, 8:30 A.M.
ON SITE, 2 locations

PRESENT:
Hillside Review Board Member, Dave Black
Hillside Review Board Member, Hugo Angeles
Hillside Review Board Member, Jeff Mathis
Hillside Review Board Member, Kevin Holyoak

EXCUSED:
Hillside Review Board Chair James Sullivan

STAFF MEMBERS PRESENT:
Assistant Public Works Director, Wes Jenkins
Community Development Director, Carol Winner
City Landscape Architect, Mark Goble (present at location #1, absent at location #2)
Planner, Brenda Hatch (present at location #1, absent at location #2)
Planner Brian Dean
Assistant City Attorney, Alicia Carlton
Development Office Supervisor, Angie Jessop

OTHERS IN ATTENDANCE:
Location #1
Applicant Representative Tyrell Fife

Location #2
Applicant Ken Miller
Applicant Curt Gordon

SITE #1, Southeast parking lot on Medical Center Drive

Link to Call to Order by Board Vice Chair Angeles 00:00:00
Link to Roll Call 00:00:20

ITEM 1
IHC St George Regional Hospital Parking Lot Expansion
A request to obtain a Hillside Development Permit to allow disturbance of areas in the 20-30%, 30-40% and 40% and above slope areas for a parking lot expansion to add 137 additional parking spaces to the off-site parking lot. The applicant is Great Basin Engineering, and the representative is Heather Avner. Case number 2026-HS-006

Agenda Packet [Page 4]

Link to presentation by Wes Jenkins and discussion with Hillside Review Board members and staff 00:01:29

Link to motion 00:10:32

DRAFT

MOTION:

A motion was made by Board Member Black recommend for approval the plan for the St George Regional Hospital Parking Lot Expansion Project, with the following conditions. 1, they need to have an updated GeoTechnical report done that is site-specific that is current and addresses the specific site of the project. And 2, that they consider looking at the cut-slope at the rear of the project where it extends up the hill; it could maybe be minimized with the construction of a rockery or retaining wall, that has rocks similar in nature to the basalt in the area that would match with the landscaping that they have planned. We have looked at the slope map and any slopes that were 20-30 % or greater than 30%, in our opinion, are non-contiguous, or either man-made and isolated and they shouldn't be considered steep slopes for this project.

SECOND:

The motion was seconded by Board Member Mathis.

Link to discussion on the motion 00:12:23

VOTE:

Board Vice Chair Angeles called for a vote, as follows:

Chair Sullivan – absent
Board Member Mathis – aye
Board Member Angeles –aye
Board Member Black –aye
Board Member Holyoak – aye

The vote is unanimous. Motion carries.

Adjourn from this location to Site #2 location 00:16:10

SITE #2, southeast end of Joey Way in Desert Canyons

Link to Call to Order by Board Vice Chair Angeles 00:00:00
Link to Roll Call 00:00:12

ITEM 2

Desert Haven

A request to obtain a Hillside Development Permit to allow disturbance of areas in the 20-30%, 30-40%, and 40% and above slope areas, to develop single-family homes. The applicant is DSG Engineering and the representative is Ken Miller. Case No. 2026-HS-007

Agenda Packet [Page 225]

Link to presentation by applicant Ken Miller and discussion with Hillside Review Board Members and staff 00:01:01
Exhibit A (see below)

Link to motion 00:16:12

DRAFT

MOTION:

A motion was made by Board Member Black to recommend for approval the disturbance to the hillside as proposed of the Desert Haven subdivision with the following conditions. 1, that they have an update to the Geotechnical letter or report that addresses the proposed grading plan, that brings it current to date and addresses recommended cut and fill slope stability. We also understand that the plan cuts will be mitigated with a rock armoring material of basalt or natural type cobble to mitigate the scaring.

SECOND:

The motion was seconded by Board Member Holyoak.

VOTE:

Board Vice Chair Angeles called for a vote, as follows:

Chair Sullivan – absent
Board Member Mathis – aye
Board Member Angeles –aye
Board Member Black –aye
Board Member Holyoak – aye

The vote is unanimous. Motion carries.

APPROVAL OF MINUTES:

Consider a request to approve the minutes from the July 22, 2026 meeting

Agenda Packet [page 333]

Link to motion 00:18:00

MOTION:

A motion was made by Board Member Mathis to approve the minutes from the July 22, 2026 meeting.

SECOND:

The motion was seconded by Board Member Black.

VOTE:

Board Vice Chair Angeles called for a vote, as follows:

Chair Sullivan – absent
Board Member Mathis – aye
Board Member Angeles –aye
Board Member Black – aye
Board Member Holyoak – aye

The vote is unanimous and the motion carries

MOTION:

A motion was made by Board Member Mathis to adjourn.

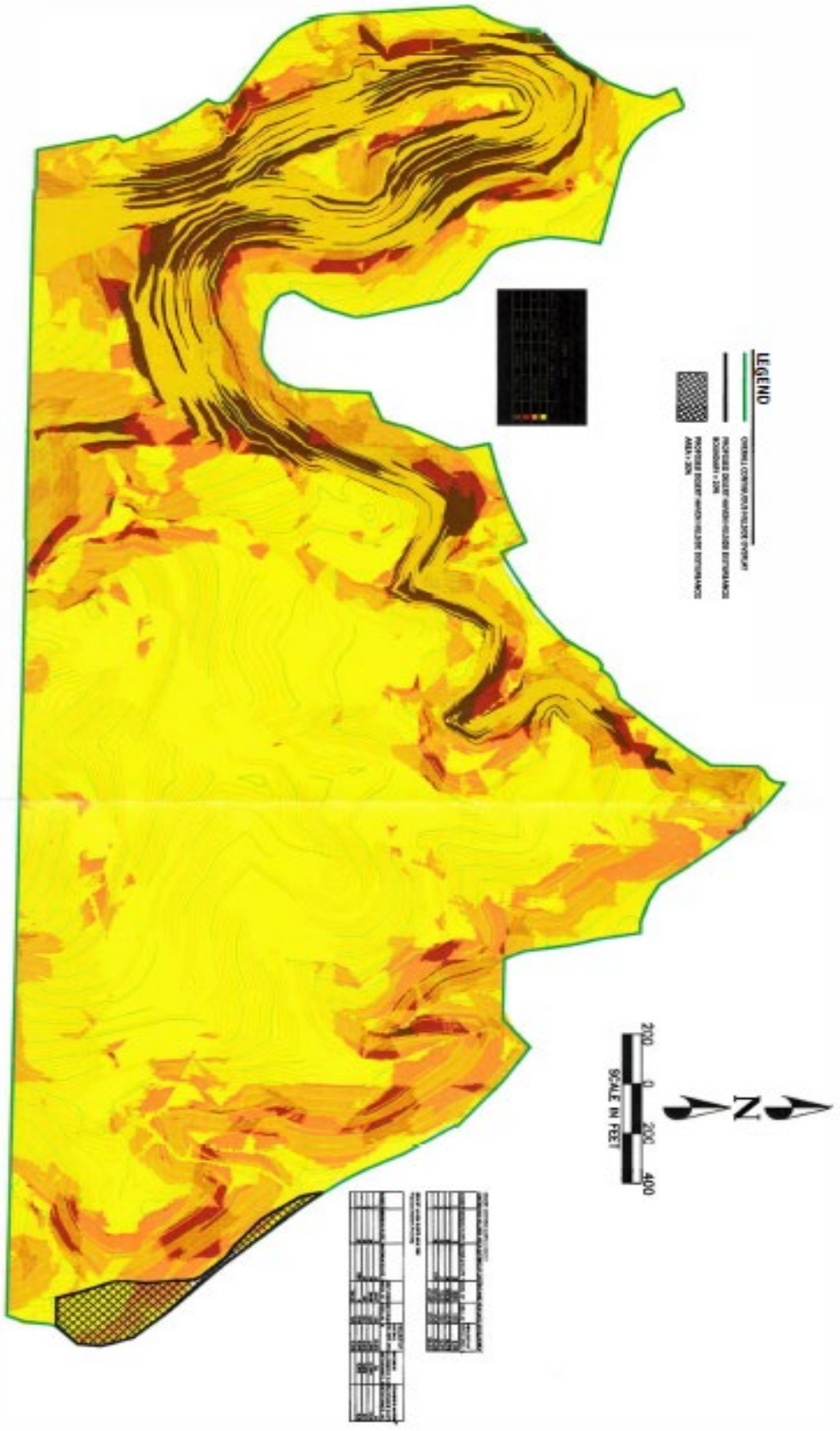
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/s/

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Angie Jessop, Development Office Supervisor

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DEVELOPMENT SOLUTIONS, INC.
CIVIL ENGINEERS, LAND SURVEYORS, LAND PLANNERS

DESERT HAVEN
AT DESERT CANYONS
ST. GEORGE, UTAH

SLOPE MAP

1 OF 1 TOTAL