

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

Public Notice

Public notice is hereby given that the Hillside Review Board of the City of St. George, Washington County, Utah, will hold a meeting at the referenced sites on Wednesday, March 27, 2024, commencing on-site at approximately 8:30 a.m.

The estimated site times are in bold. The agenda for the meeting is as follows:

Call to Order

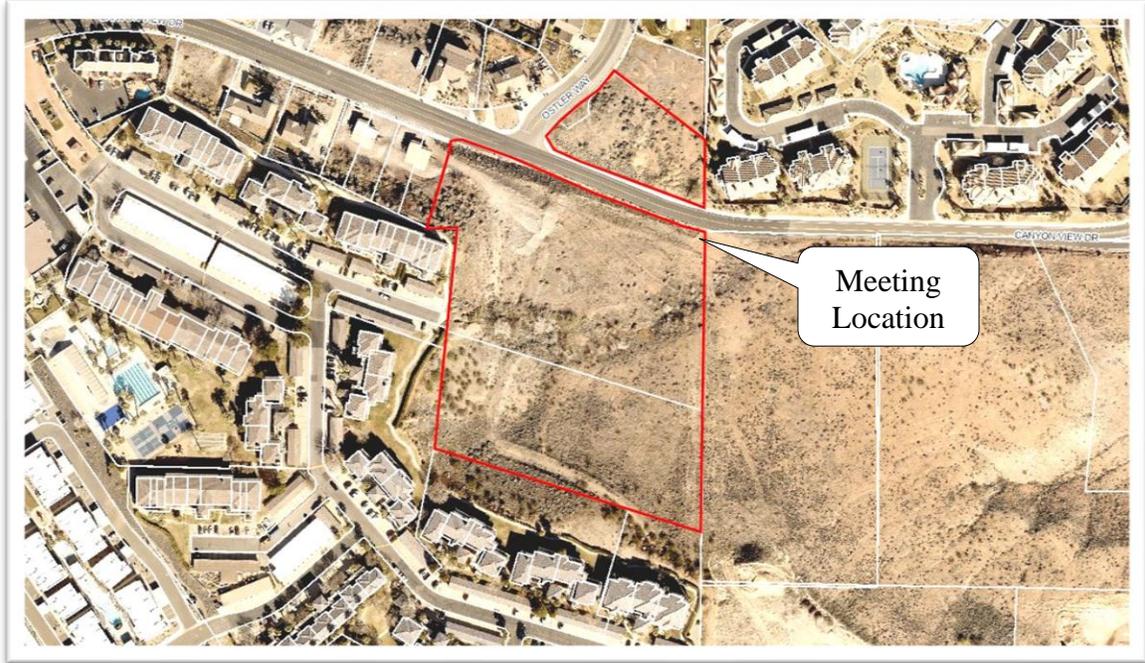
1. Consider a request for a hillside development permit in the hillside overlay zone and in areas exceeding 20% slope for a potential apartment complex along Canyon View Dr and the intersection of Ostler Way (see map below). The property is approximately 7.51 acres. **Meeting time is approximately 8:30 am at Canyon view Drive and Ostler Drive (see attached map for location).**
2. Consider a request for hillside review to define which areas of a recently annexed properties should be defined open space or other land use designations. The applicant is looking for Hillside Review Board's input prior to a General Plan amendment request. **Meeting time is approximately 9:00 am at the Silicon Way roundabout (see attached map for location).**
3. Approval of the February 28, 2024 and March 13, 2024 meeting minutes.

Monica Smith
Development Office Supervisor

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.

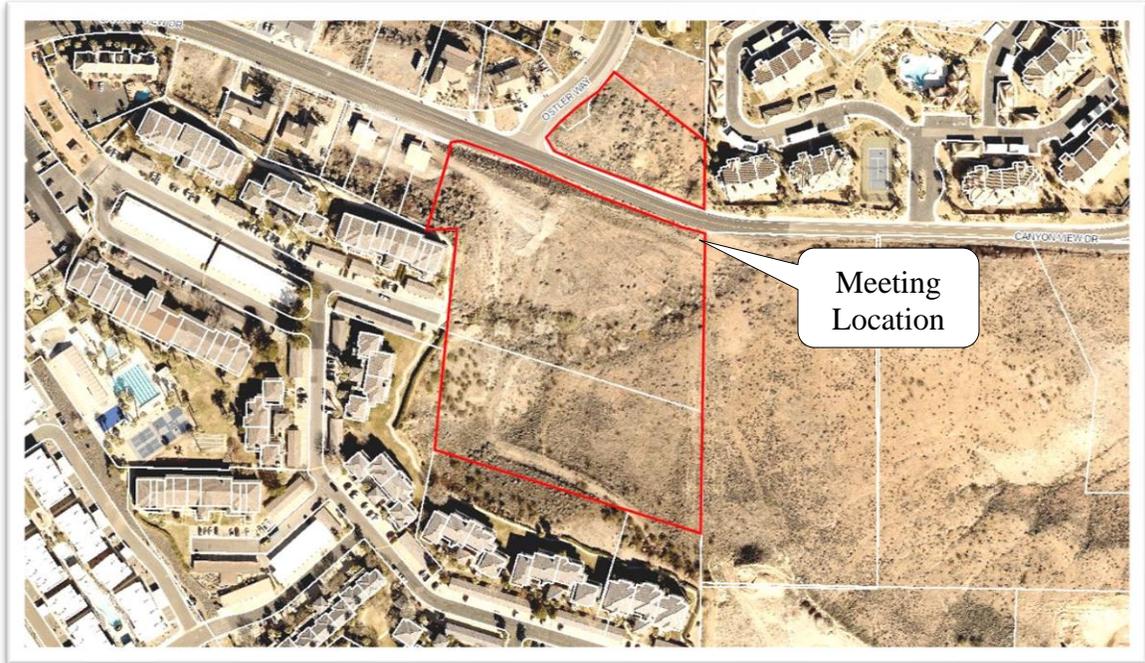
Item #1

Canyon View Dr and Ostler Dr



Item #1

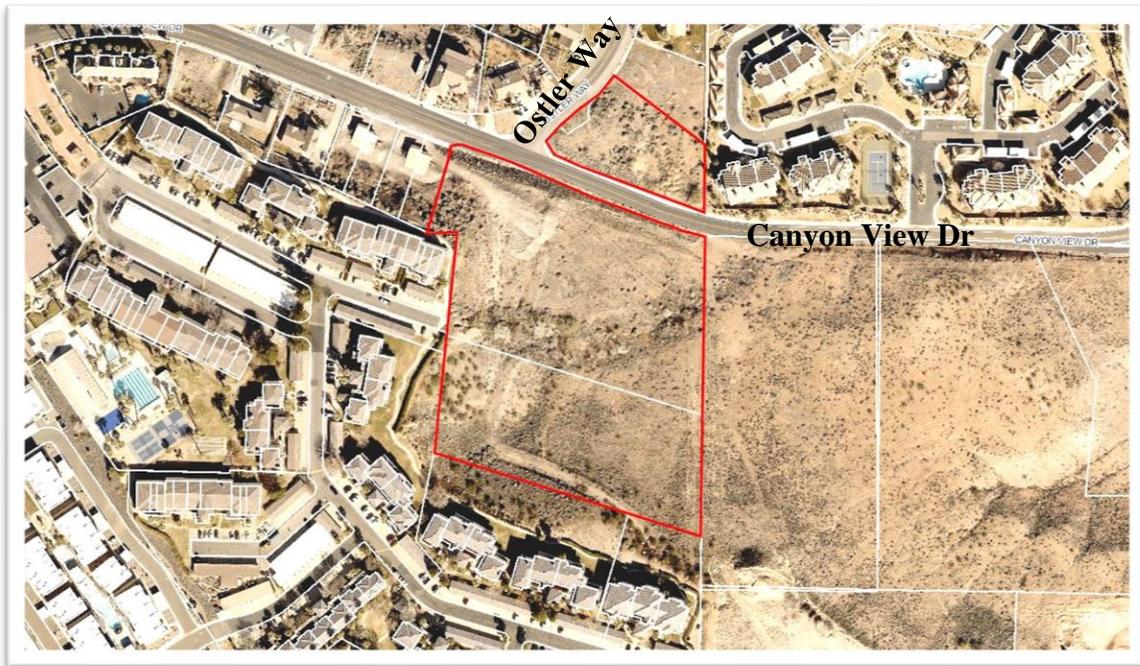
Canyon View Dr and Ostler Dr



HILLSIDE REVIEW BOARD AGENDA REPORT:

03/27/2024

Canyon View Apartments Hillside Development Permit (Case No. 2024-HS-004)	
Request:	A Hillside Development Permit to allow disturbance of areas in the 20-30%, 30-40% and 40% and above slope areas and review possible construction in a rockfall hazard overlay area.
Applicant:	Bush and Gudgell Inc Engineering.
Representative:	Rick Myer
Location:	Canyon View Dr and Ostler Way.
General Plan:	HDR (High Density Residential).
Existing Zoning:	R-3 (Multi-Family Residential).
Surrounding Zoning:	North R-1-10 (Single Family Residential, 10,000 ft ² lots).
	South PD-R (Planned Development Residential).
	East PD-R (Planned Development Residential).
	West PD-R (Planned Development Residential).
Land Area:	Approximately 7.51 acres.



BACKGROUND

This is a request to obtain a hillside permit for the property located at Canyon View Dr and Ostler Way. The applicants are proposing to build a new apartment development on this property. This property is in the hillside overlay. Section 10-13A-7 of the Zoning Regulations requires that all major development (i.e., cut greater than 4', etc.) on slopes above 20% requires a 'hillside development permit' granted by the City Council upon recommendation from the Hillside Review Board and the Planning Commission.

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 twenty-one percent (21%) to thirty percent (30%), development activity shall not disturb 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.

10-13B-2: Development in Geologic Hazard Areas

A. *Geologic Hazard Areas (UGS 1 – 4: subsections A1 through A4 of this section):* For any development in the city with a geologic hazard listed below, applicant shall submit a report prepared by a qualified, licensed geologist specializing in engineering geology, or a licensed civil engineer, trained and experienced in the practice of geotechnical engineering. Development in the geologic hazard overlay for high category rockfall areas shall be reviewed by the hillside review board.

1. Surface fault rupture and earthquake: well-defined Holocene, and well-defined fault areas, red and purple lines/categories (extending five hundred feet (500') on the downthrown side and two hundred fifty feet (250') on the upthrown side of each red/purple fault line).
2. Liquefaction: Very High category.
3. Landslide: Very High category.
4. Rockfall: High category.

B. *General Requirements for Development in a Geologic Hazard Area:*

1. Submit a site-specific report prepared by a qualified, licensed geologist specializing in engineering geology, or a licensed civil engineer, trained and experienced in the practice of geotechnical engineering with the following minimum requirements:
 - a. Identify all geologic hazard areas (UGS 1 – 4: subsections A1 through A4 of this section);
 - b. Identify any other geologic hazards, not listed above (UGS 1 – 4: subsections A1 through A4 of this section), which present an unacceptable risk to development;
 - c. Demonstrate which areas of the development are suitable for the proposed use;
 - d. Recommend specific measures necessary to make the land suitable for the proposed use;
 - e. Recommend the optimal placement of all structures, roadways, utilities, trails and infrastructure in relation to the geologic hazard area;
 - f. Slope stability analysis: conclusions and recommendations concerning the effects of material removal, introduction of water, both on and off site, including, where applicable, on mesa tops, seismic activity, and erosion on slope stability;

- g. Foundation investigation: conclusions and recommendations concerning the effects of soil conditions on foundation and structural stability, including bearing capacity, sheer strength, and shrink/swell potential of soils;
- h. Spring location: the location and yield of springs and seeps which shall be shown on the site plan;
- i. Structural features: structural features including any geological limitations;
- j. Surface hazards: existence of surface hazards including potential for rockfalls and toppling failures to cliffs, slopes and overhangs above the subject property; and
- k. Effect of geologic conditions: conclusions and recommendations regarding the effect of geologic conditions on the proposed development, together with recommendations identifying the means proposed to minimize any hazard to life or property, or adverse impact on the natural environment.

2. The city shall review the applicant's report. If the applicant's report is deemed adequate by the city engineer or designee, development may proceed if the report recommendations are followed. If the report is deemed incomplete or inadequate by the city engineer or designee, the development application shall be denied. If denied, the applicant may request an independent review, and the city engineer or designee may order a review by independent, qualified professionals. The professionals selected by the city shall review and prepare written findings and comments on the applicant's report. The cost of the independent, qualified professionals shall be paid to the city by applicant. Applicant may develop if the independent review and written findings and comments are implemented, in addition to any nonconflicting recommendations in the initial report of applicant. The city engineer or designee is the land use authority for the decision. The reports shall be specifically identified on the plat and available to all owners and interested parties.

3. All development shall be outside the geologic hazard areas in subsections A1 through A4 of this section, unless:

- a. The city has accepted applicant's report, prepared by a qualified, licensed geologist specializing in engineering geology or a licensed professional engineer trained and practicing in the field of geotechnical engineering, and it recommends development, and shows hazards can be adequately mitigated for the proposed land use;
- b. If the city has not accepted applicant's report, the applicant also adopts and implements the independent review and writing findings and comments, in addition to any nonconflicting recommendations in applicant's report;
- c. All report recommendations, and HDOZ permit conditions (when required), are adopted by the city and are conditions of development.

4. Hold the city harmless from all claims resulting from any damage related to development within a geologic hazard area by executing a "geologic hazard disclaimer of liability and agreement" and by placing a "notice of hazard" on the final plat.

5. The applicant may appeal a decision in accordance with chapter 3 of this title.

C. *Compliance*: No structure or land shall be constructed, located, extended, converted or altered without full compliance with the terms of this chapter and other applicable regulations.

D. *Abrogation and Greater Restrictions:* This chapter is not intended to repeal, abrogate or impair any existing easement, covenant or deed restriction; however, where this chapter and another ordinance, easement, covenant or deed restriction conflict or overlap, the more stringent restriction shall prevail.

E. *Interpretation:* In the interpretation and application of this chapter, all provisions are minimum requirements in addition to applicable provisions of this title.

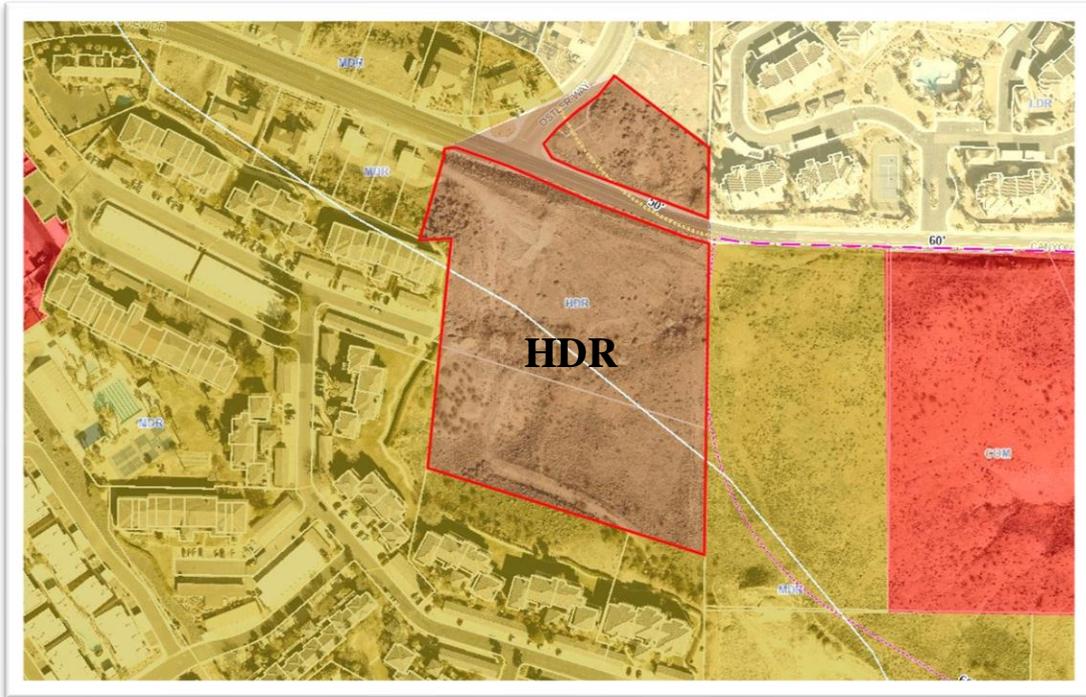
EXHIBITS PROVIDED

1. Exhibit A – Slope Analysis Map
“Exhibit A” Slope Analysis map.
2. Exhibit B – Cut Fill Heat Map
“Exhibit B” in the packet is the cut fill map.
3. Exhibit C – Preliminary Drainage Study
“Exhibit C” is a preliminary drainage study.
4. Exhibit D – Grading Plan
“Exhibit D” is the grading plan.
5. Exhibit E – Site Plan
“Exhibit E” is the proposed site plan.
6. Exhibit F – Landscape Plan
“Exhibit F” is the proposed landscape plan.

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).

General Plan – HDR– (High Density Residential)



Zoning –R-3 (Planned Development Residential)

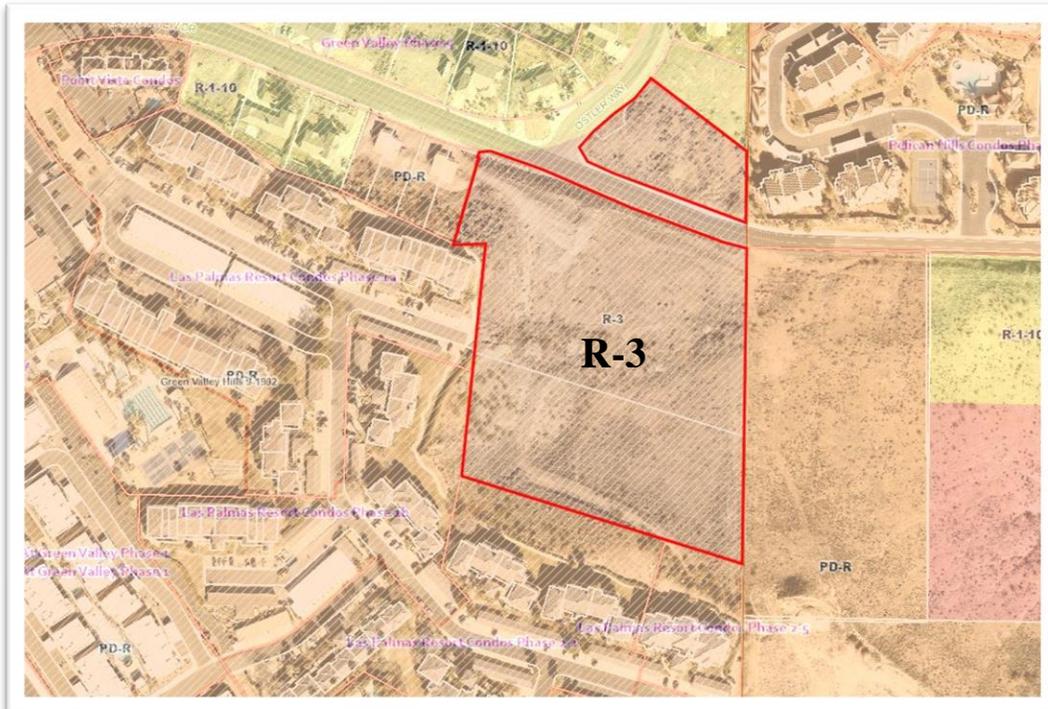


Exhibit A
Slope Analysis Map

Exhibit B
Cut Fill Heat Map

Exhibit C
Preliminary Drainage Study

Exhibit D
Grading Plan

Exhibit E
Site Plan

Exhibit F
Landscape Plan

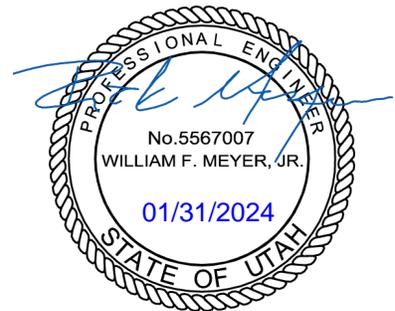
PRELIMINARY DRAINAGE STUDY
FOR
Canyon View Apartments
A Residential Development located in
St George, Utah



PREPARED BY: **Bush & Gudgell Engineering**



205 East Tabernacle Suite #4
St. George City, Utah 84770
Phone: (435) 673-2337
Fax: (435) 673-3161
www.bushandgudgell.com



Project Engineer

Rick Meyer, P.E.

Date

January 31, 2024

Job Number

B&G #221249

I. INTRODUCTION

The subject property is located in St George, Utah. Access to the property is granted from Canyon View Drive. The project site is located south of the intersection with Ostler Way. It is on parcels SG-6-2-35-433 and SG-6-2-35-3009.

The project is located within the northwest quarter of Section 35, Township 42 South, Range 16 West, Salt Lake Base and Meridian. The land is currently zoned R-3.

The purpose of the project is to grade and develop approximately 5.45 acres of the 6.56 acres of the parcels. See site plan in appendix. There is approximately 9.28 acres of offsite land that releases stormwater onto the property. The purpose of this study is to determine the magnitude of expected runoff and how to handle the water to avoid flooding or property damage.

In summary, the expected runoff through the site during the 100-year storm event is 15.56 cfs. There are several locations where this water will be released. Ultimately it will end up in Canyon View Drive after being detained. The detention system will be underground on the site. This will help prevent flooding downstream of the project.

In addition to the detention system, drainage swales will be constructed throughout the site to direct runoff where it needs to go. Dimensions of these swales vary by location. A map in the appendix shows the locations and dimensions of the swales.

II. METHODOLOGY

Software

Autodesk Storm and Sanitary Analysis (SSA) software was used to calculate runoff rates and volumes for the site. SSA uses the TR-55 method to calculate stormwater runoff. TR-55 uses rainfall rate, curve number, time of concentration, and area as inputs.

Model Setup

The rainfall rates were taken from the *City of St George Drainage Manual*. The 3-hour Farmer-Fletcher and 24-hour SCS Type II rainfall distributions were used for the three design storms used. The table below shows the rainfall intensities used in the model.

Design Rainfall Depths, inches	
10-year 3-hour	1.00
100-year 3-hour	1.64
100-year 24-hour	2.51

Curve number for the site is taken from a land use table that includes hydrologic soil group as a variable. A web soil survey was conducted to estimate the hydrologic soil group. The entire site is soil group D.

Terrain slopes and Manning’s roughness was used in SSA to calculate time of concentration.

III. RESULTS

The SSA model was run three times for the three rainfall rates (see above). Results can be seen in the table below. These are total post-development runoff rates before detention.

SSA Model Results		
Storm I.D.	Peak Flow, cfs	Total Runoff, cu ft
10-year 3-hour	5.81	22,122
100-year 3-hour	15.56	49,709
100-year 24-hour	20.46	92,142

Detention for the site will be calculated at a later time.

IV. CONCLUSION

Contributing area of this site is approximately 16 acres, including 9 acres from offsite and 7 acres onsite. This area has a potential for stormwater runoff, which will cause flooding and/or erosion if not properly handled. Three design storms were analyzed and drainage swales were designed to safely convey water through the site. The final site design will include underground detention east and west of the proposed building.

IV. APPENDICES

- A. Site Plan**
- B. SSA Model Schematic**
- C. SSA Model Hydrographs and Reports**
- D. Drainage Channel Calculations and Details**

Appendix A - Site Plan



GRADING NOTES

APPROXIMATELY 57,511 CU.YD. OF CUT, 6,246 CU.YD. OF FILL AND 51,265 CU.YD. OF EXPORT MATERIAL IS REQUIRED (FOR GRADING PERMIT ONLY). THE CONTRACTOR SHOULD VERIFY THE QUANTITIES FOR COMPLETION OF WORK. QUANTITIES ARE BASED ON FINISH GRADE OF ROADS & PADS.

ALL IMPORTED STRUCTURAL FILL SHALL BE APPROVED BY THE GEOTECHNICAL ENGINEER PRIOR TO DELIVERY TO THE SITE. ALL IMPORTED STRUCTURAL FILL SHALL BE PLACED IN 8-INCH LOOSE HORIZONTAL LIFTS AND COMPACTED TO A MINIMUM OF 95 PERCENT OF MAXIMUM DRY DENSITY (ASTM D-1557).

ALL EXCAVATION, GRADING AND FILL OPERATIONS WITHIN THE BUILDING AREA SHOULD BE OBSERVED BY THE GEOTECHNICAL ENGINEER TO VERIFY SUB-SOIL CONDITIONS AND DETERMINE ADEQUACY OF SITE PREPARATION, SUITABILITY OF FILL MATERIALS AND COMPLIANCE WITH COMPACTION REQUIREMENTS.

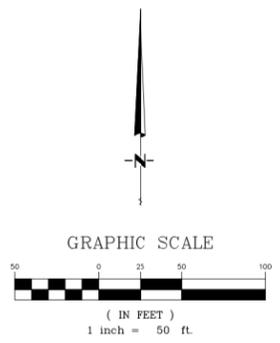
THE CONTRACTOR SHALL PROVIDE SUITABLE EQUIPMENT TO CONTROL DUST AND AIR POLLUTION CAUSED BY CONSTRUCTION OPERATIONS. THE CONTRACTOR SHALL ALSO PROVIDE SUITABLE MUD AND DIRT CONTAINMENT TO MAINTAIN THE WORK SITE. ACCESS ROADWAYS AND ADJACENT PROPERTIES IN A CLEAN CONDITION.

ALL EXCAVATION AND GRADING SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF ST. GEORGE CITY AND APPENDIX J OF THE INTERNATIONAL BUILDING CODE, 2018 EDITION, AND THE SPECIFICATIONS AND REQUIREMENTS INCLUDED IN THE GEOTECHNICAL STUDY.

GEOTECHNICAL ENGINEER TO PROVIDE GRADING COMPLETION REPORT TO CONFIRM WORK HAS BEEN PERFORMED IN CONFORMANCE WITH THEIR RECOMMENDATIONS.

OWNER IS RESPONSIBLE FOR ALL ON-SITE DRAINAGE AND DETENTION.

- LEGEND**
- - - - - EXISTING GROUND CONTOUR
 - FINISH GROUND CONTOUR
 - LOT LINE
 - ○ ○ ○ ○ RETAINING WALL
 - LANDSCAPE DRAINAGE SWALE
 - [PAD: 00.00] PAD ELEVATION IN FEET
 - [TW: 00.00] TOP OF WALL ELEVATION IN FEET
 - [BW: 00.00] BOTTOM OF EXPOSED WALL ELEVATION IN FEET
 - [FL: 00.00] FL = FLOW LINE
 - [TC: 00.00] TC = TOP OF CONCRETE
 - [TBC: 00.00] TBC = TOP BACK OF CURB
 - SLOPE IN RUN/RISE
 - CONTOUR ELEVATION IN FEET



OWNER / DEVELOPER
SHAKESPEARE DEVELOPMENT GROUP

BEN SHAKESPEARE
(435) 703-4164
37 W 1070 S STE 101
ST GEORGE, UTAH 84770

ENGINEERING CONTACT
BUSH AND GUDGELL, INC.
205 EAST TABERNAACLE #4
ST GEORGE, UT 84770

RICK MEYER - PROJECT MANAGER
(435)-673-2337



No.	Date	By	Revision

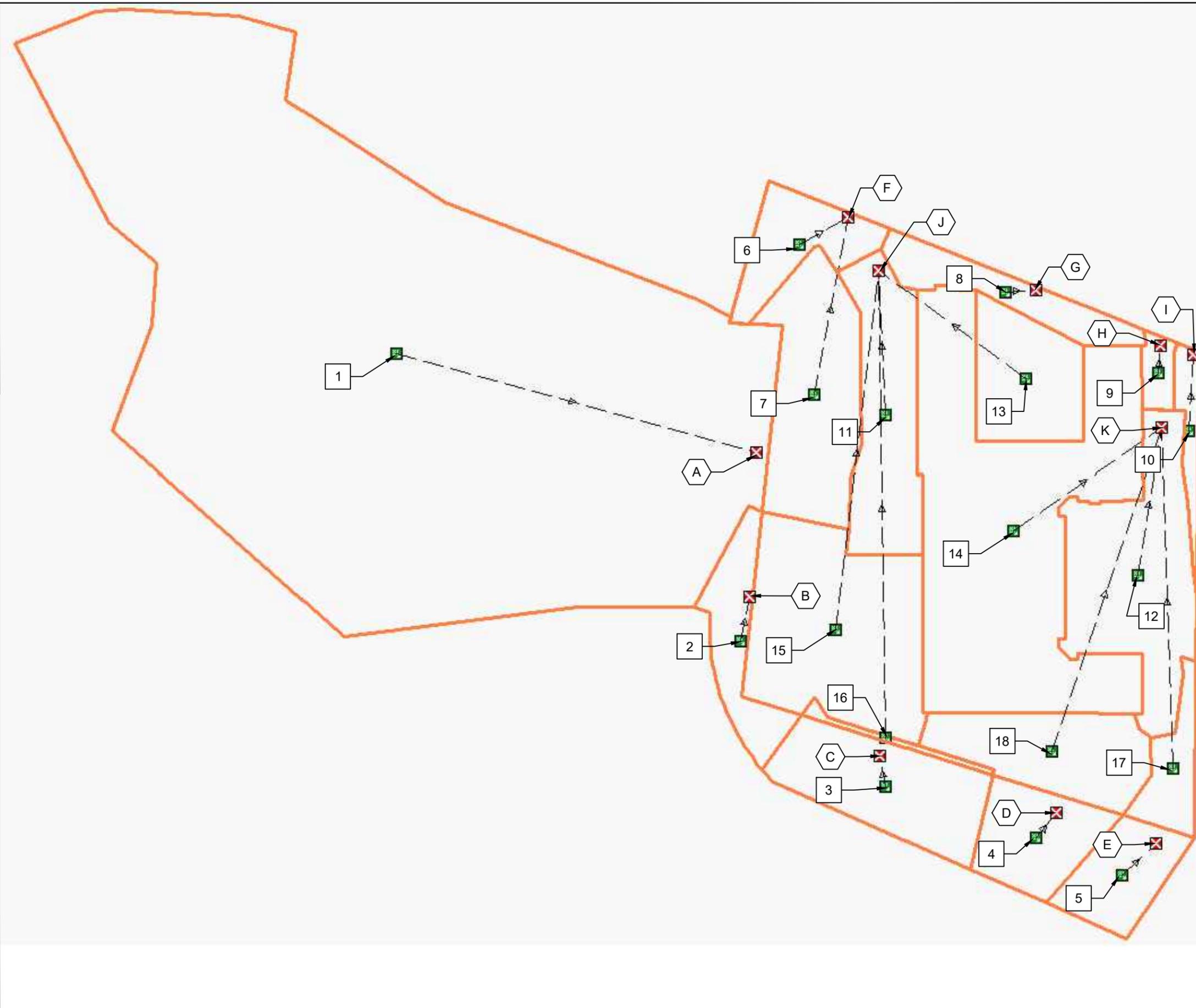
BUSH & GUDGELL, INC.
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www.bushandgudgell.com



DATE: JAN 2024	DRAWN: RM	APPROVED:	SCALE: NOTED	JOB NO.: 221018
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GRADING PLAN
CANYON VIEW APARTMENTS
ST GEORGE, UTAH

Appendix B – SSA Model Schematic



BASIN NAMES

1	BAS_OFF_LAS_PALMAS
2	BAS_OFF_01
3	BAS_OFF_02
4	BAS_OFF_03
5	BAS_OFF_04
6	BAS_BP_01
7	BAS_BP_02
8	BAS_BP_03
9	BAS_BP_04
10	BAS_BP_05
11	BAS_DRIVE_WEST
12	BAS_DRIVE_EAST
13	BAS_POOL
14	BAS_BLDG
15	BAS_LS_W_01
16	BAS_LS_W_02
17	BAS_LS_E_01
18	BAS_LS_E_02

OUTFALL NAMES

A	OUT_OFF_LAS_PALMAS
B	OUT_OFF_01
C	OUT_OFF_02
D	OUT_OFF_03
E	OUT_OFF_04
F	OUT_BP_1-2
G	OUT_BP_03
H	OUT_BP_04
I	OUT_BP_05
J	OUT_DRIVE_WEST
K	OUT_DRIVE_EAST

SSA MODEL SCHEMATIC
 CANYON VIEW APARTMENTS
 ST GEORGE, UTAH



BUSH & GUGGELL, INC.

Engineers - Planners - Surveyors

205 East Tabernacle Suite #4

St. George, Utah 84770

Phone (435) 673-2337 / Fax (435) 673-3161

Appendix C – SSA Model Hydrographs and Reports

Subbasin Hydrology

Subbasin : BAS_BLDG

Input Data

Area (ac) 1.80
 Peak Rate Factor 0.00
 Weighted Curve Number 98.00
 Rain Gage ID STGEORGE

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	1.80	D	98.00
Composite Area & Weighted CN	1.80		98.00

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$$

Where :

T_c = Time of Concentration (hr)
 n = Manning's roughness
 L_f = Flow Length (ft)
 P = 2 yr, 24 hr Rainfall (inches)
 S_f = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (S_f^{0.5}) (unpaved surface)
 V = 20.3282 * (S_f^{0.5}) (paved surface)
 V = 15.0 * (S_f^{0.5}) (grassed waterway surface)
 V = 10.0 * (S_f^{0.5}) (nearly bare & untilled surface)
 V = 9.0 * (S_f^{0.5}) (cultivated straight rows surface)
 V = 7.0 * (S_f^{0.5}) (short grass pasture surface)
 V = 5.0 * (S_f^{0.5}) (woodland surface)
 V = 2.5 * (S_f^{0.5}) (forest w/heavy litter surface)
 T_c = (L_f / V) / (3600 sec/hr)

Where:

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n
 R = A_q / W_p
 T_c = (L_f / V) / (3600 sec/hr)

Where :

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 R = Hydraulic Radius (ft)
 A_q = Flow Area (ft²)
 W_p = Wetted Perimeter (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)
 n = Manning's roughness

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	.2	0.00	0.00
Flow Length (ft) :	150	0.00	0.00
Slope (%) :	.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.1	0.00	0.00
Velocity (ft/sec) :	0.05	0.00	0.00
Computed Flow Time (min) :	50.66	0.00	0.00
Channel Flow Computations			
Manning's Roughness :	.01	0.00	0.00
Flow Length (ft) :	400	0.00	0.00
Channel Slope (%) :	.5	0.00	0.00
Cross Section Area (ft ²) :	1	0.00	0.00
Wetted Perimeter (ft) :	2	0.00	0.00
Velocity (ft/sec) :	6.64	0.00	0.00
Computed Flow Time (min) :	1.00	0.00	0.00
Total TOC (min)	51.66		

Subbasin Runoff Results

Total Rainfall (in)	1.64
Total Runoff (in)	1.42
Peak Runoff (cfs)	2.56
Weighted Curve Number	98.00
Time of Concentration (days hh:mm:ss)	0 00:51:40

Subbasin : BAS_BP_01

Input Data

Area (ac) 0.28
 Peak Rate Factor 0.00
 Weighted Curve Number 89.34
 Rain Gage ID STGEORGE

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	0.04	D	98.00
Natural western desert	0.24	D	88.00
Composite Area & Weighted CN	0.28		89.34

Time of Concentration

Sheet Flow Computations	Subarea	Subarea	Subarea
	A	B	C
Manning's Roughness :	.35	0.00	0.00
Flow Length (ft) :	50	0.00	0.00
Slope (%) :	30	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.1	0.00	0.00
Velocity (ft/sec) :	0.13	0.00	0.00
Computed Flow Time (min) :	6.40	0.00	0.00

Shallow Concentrated Flow Computations	Subarea	Subarea	Subarea
	A	B	C
Flow Length (ft) :	125	0.00	0.00
Slope (%) :	30	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	8.84	0.00	0.00
Computed Flow Time (min) :	0.24	0.00	0.00
Total TOC (min)	6.64		

Subbasin Runoff Results

Total Rainfall (in) 1.64
 Total Runoff (in) 0.76
 Peak Runoff (cfs) 0.41
 Weighted Curve Number 89.34
 Time of Concentration (days hh:mm:ss) 0 00:06:38

Subbasin : BAS_BP_02

Input Data

Area (ac) 0.62
 Peak Rate Factor 0.00
 Weighted Curve Number 88.00
 Rain Gage ID STGEORGE

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Natural western desert	0.62	D	88.00
Composite Area & Weighted CN	0.62		88.00

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	.35	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	30	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.1	0.00	0.00
Velocity (ft/sec) :	0.15	0.00	0.00
Computed Flow Time (min) :	11.14	0.00	0.00
Channel Flow Computations			
Manning's Roughness :	.055	0.00	0.00
Flow Length (ft) :	320	0.00	0.00
Channel Slope (%) :	.5	0.00	0.00
Cross Section Area (ft ²) :	1	0.00	0.00
Wetted Perimeter (ft) :	5	0.00	0.00
Velocity (ft/sec) :	0.66	0.00	0.00
Computed Flow Time (min) :	8.14	0.00	0.00
Total TOC (min)	19.28		

Subbasin Runoff Results

Total Rainfall (in) 1.64
 Total Runoff (in) 0.68
 Peak Runoff (cfs) 0.67
 Weighted Curve Number 88.00
 Time of Concentration (days hh:mm:ss) 0 00:19:17

Subbasin : BAS_BP_03

Input Data

Area (ac) 0.26
 Peak Rate Factor 0.00
 Weighted Curve Number 88.00
 Rain Gage ID STGEORGE

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Natural western desert	0.26	D	88.00
Composite Area & Weighted CN	0.26		88.00

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	.35	0.00	0.00
Flow Length (ft) :	50	0.00	0.00
Slope (%) :	30	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.1	0.00	0.00
Velocity (ft/sec) :	0.13	0.00	0.00
Computed Flow Time (min) :	6.40	0.00	0.00
Channel Flow Computations			
Manning's Roughness :	.015	0.00	0.00
Flow Length (ft) :	300	0.00	0.00
Channel Slope (%) :	8	0.00	0.00
Cross Section Area (ft ²) :	.5	0.00	0.00
Wetted Perimeter (ft) :	2	0.00	0.00
Velocity (ft/sec) :	11.15	0.00	0.00
Computed Flow Time (min) :	0.45	0.00	0.00
Total TOC (min)	6.85		

Subbasin Runoff Results

Total Rainfall (in) 1.64
 Total Runoff (in) 0.68
 Peak Runoff (cfs) 0.35
 Weighted Curve Number 88.00
 Time of Concentration (days hh:mm:ss) 0 00:06:51

Subbasin : BAS_BP_04

Input Data

Area (ac) 0.07
 Peak Rate Factor 0.00
 Weighted Curve Number 98.00
 Rain Gage ID STGEORGE

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	0.07	D	98.00
Composite Area & Weighted CN	0.07		98.00

Time of Concentration

Sheet Flow Computations	Subarea	Subarea	Subarea
	A	B	C
Manning's Roughness :	.02	0.00	0.00
Flow Length (ft) :	80	0.00	0.00
Slope (%) :	10	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.1	0.00	0.00
Velocity (ft/sec) :	0.91	0.00	0.00
Computed Flow Time (min) :	1.47	0.00	0.00
Total TOC (min)	1.47		

Subbasin Runoff Results

Total Rainfall (in) 1.64
 Total Runoff (in) 1.42
 Peak Runoff (cfs) 0.23
 Weighted Curve Number 98.00
 Time of Concentration (days hh:mm:ss) 0 00:01:28

Subbasin : BAS_BP_05

Input Data

Area (ac) 0.09
 Peak Rate Factor 0.00
 Weighted Curve Number 88.00
 Rain Gage ID STGEORGE

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Natural western desert	0.09	D	88.00
Composite Area & Weighted CN	0.09		88.00

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	.35	0.00	0.00
Flow Length (ft) :	30	0.00	0.00
Slope (%) :	20	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.1	0.00	0.00
Velocity (ft/sec) :	0.10	0.00	0.00
Computed Flow Time (min) :	5.00	0.00	0.00
Shallow Concentrated Flow Computations			
Flow Length (ft) :	200	0.00	0.00
Slope (%) :	5	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.61	0.00	0.00
Computed Flow Time (min) :	0.92	0.00	0.00
Total TOC (min)	5.92		

Subbasin Runoff Results

Total Rainfall (in) 1.64
 Total Runoff (in) 0.68
 Peak Runoff (cfs) 0.13
 Weighted Curve Number 88.00
 Time of Concentration (days hh:mm:ss) 0 00:05:55

Subbasin : BAS_DRIVE_E

Input Data

Area (ac) 0.77
 Peak Rate Factor 0.00
 Weighted Curve Number 91.60
 Rain Gage ID STGEORGE

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	0.50	D	98.00
> 75% grass cover, Good	0.27	D	80.00
Composite Area & Weighted CN	0.77		91.60

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	.2	0.00	0.00
Flow Length (ft) :	40	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.1	0.00	0.00
Velocity (ft/sec) :	0.07	0.00	0.00
Computed Flow Time (min) :	10.11	0.00	0.00

	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	.015	0.00	0.00
Flow Length (ft) :	335	0.00	0.00
Channel Slope (%) :	2	0.00	0.00
Cross Section Area (ft ²) :	1	0.00	0.00
Wetted Perimeter (ft) :	5	0.00	0.00
Velocity (ft/sec) :	4.80	0.00	0.00
Computed Flow Time (min) :	1.16	0.00	0.00
Total TOC (min)11.27			

Subbasin Runoff Results

Total Rainfall (in) 1.64
 Total Runoff (in) 0.89
 Peak Runoff (cfs) 1.36
 Weighted Curve Number 91.60
 Time of Concentration (days hh:mm:ss) 0 00:11:16

Subbasin : BAS_DRIVE_WEST

Input Data

Area (ac) 0.52
 Peak Rate Factor 0.00
 Weighted Curve Number 89.16
 Rain Gage ID STGEORGE

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	0.26	D	98.00
> 75% grass cover, Good	0.26	D	80.00
Composite Area & Weighted CN	0.52		89.16

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	.2	0.00	0.00
Flow Length (ft) :	50	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.1	0.00	0.00
Velocity (ft/sec) :	0.07	0.00	0.00
Computed Flow Time (min) :	12.08	0.00	0.00

	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	.015	0.00	0.00
Flow Length (ft) :	325	0.00	0.00
Channel Slope (%) :	1	0.00	0.00
Cross Section Area (ft ²) :	1	0.00	0.00
Wetted Perimeter (ft) :	5	0.00	0.00
Velocity (ft/sec) :	3.40	0.00	0.00
Computed Flow Time (min) :	1.59	0.00	0.00
Total TOC (min)13.68			

Subbasin Runoff Results

Total Rainfall (in) 1.64
 Total Runoff (in) 0.75
 Peak Runoff (cfs) 0.70
 Weighted Curve Number 89.16
 Time of Concentration (days hh:mm:ss) 0 00:13:41

Subbasin : BAS_LS_E_01

Input Data

Area (ac) 0.18
 Peak Rate Factor 0.00
 Weighted Curve Number 88.00
 Rain Gage ID STGEORGE

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Natural western desert	0.18	D	88.00
Composite Area & Weighted CN	0.18		88.00

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	.35	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	30	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.1	0.00	0.00
Velocity (ft/sec) :	0.15	0.00	0.00
Computed Flow Time (min) :	11.14	0.00	0.00
Channel Flow Computations			
Manning's Roughness :	.055	0.00	0.00
Flow Length (ft) :	125	0.00	0.00
Channel Slope (%) :	1	0.00	0.00
Cross Section Area (ft ²) :	1	0.00	0.00
Wetted Perimeter (ft) :	5	0.00	0.00
Velocity (ft/sec) :	0.93	0.00	0.00
Computed Flow Time (min) :	2.25	0.00	0.00
Total TOC (min)	13.39		

Subbasin Runoff Results

Total Rainfall (in) 1.64
 Total Runoff (in) 0.68
 Peak Runoff (cfs) 0.21
 Weighted Curve Number 88.00
 Time of Concentration (days hh:mm:ss) 0 00:13:23

Subbasin : BAS_LS_E_02

Input Data

Area (ac) 0.46
 Peak Rate Factor 0.00
 Weighted Curve Number 88.00
 Rain Gage ID STGEORGE

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Natural western desert	0.46	D	88.00
Composite Area & Weighted CN	0.46		88.00

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	.35	0.00	0.00
Flow Length (ft) :	30	0.00	0.00
Slope (%) :	30	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.1	0.00	0.00
Velocity (ft/sec) :	0.12	0.00	0.00
Computed Flow Time (min) :	4.25	0.00	0.00
Channel Flow Computations			
Manning's Roughness :	.055	0.00	0.00
Flow Length (ft) :	235	0.00	0.00
Channel Slope (%) :	1	0.00	0.00
Cross Section Area (ft ²) :	1	0.00	0.00
Wetted Perimeter (ft) :	5	0.00	0.00
Velocity (ft/sec) :	0.93	0.00	0.00
Computed Flow Time (min) :	4.23	0.00	0.00
Total TOC (min)	8.48		

Subbasin Runoff Results

Total Rainfall (in) 1.64
 Total Runoff (in) 0.68
 Peak Runoff (cfs) 0.61
 Weighted Curve Number 88.00
 Time of Concentration (days hh:mm:ss) 0 00:08:29

Subbasin : BAS_LS_W_01

Input Data

Area (ac) 0.92
 Peak Rate Factor 0.00
 Weighted Curve Number 80.43
 Rain Gage ID STGEORGE

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	0.02	D	98.00
> 75% grass cover, Good	0.89	D	80.00
Composite Area & Weighted CN	0.91		80.43

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	.35	0.00	0.00
Flow Length (ft) :	30	0.00	0.00
Slope (%) :	30	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.1	0.00	0.00
Velocity (ft/sec) :	0.12	0.00	0.00
Computed Flow Time (min) :	4.25	0.00	0.00

	Subarea	Subarea	Subarea
	A	B	C
Channel Flow Computations			
Manning's Roughness :	.055	0.00	0.00
Flow Length (ft) :	207	0.00	0.00
Channel Slope (%) :	1	0.00	0.00
Cross Section Area (ft ²) :	1	0.00	0.00
Wetted Perimeter (ft) :	5	0.00	0.00
Velocity (ft/sec) :	0.93	0.00	0.00
Computed Flow Time (min) :	3.72	0.00	0.00
Total TOC (min)7.98			

Subbasin Runoff Results

Total Rainfall (in) 1.64
 Total Runoff (in) 0.37
 Peak Runoff (cfs) 0.59
 Weighted Curve Number 80.43
 Time of Concentration (days hh:mm:ss) 0 00:07:59

Subbasin : BAS_LS_W_02

Input Data

Area (ac) 0.04
 Peak Rate Factor 0.00
 Weighted Curve Number 88.00
 Rain Gage ID STGEORGE

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Natural western desert	0.04	D	88.00
Composite Area & Weighted CN	0.04		88.00

Time of Concentration

Channel Flow Computations	Subarea	Subarea	Subarea
	A	B	C
Manning's Roughness :	.055	0.00	0.00
Flow Length (ft) :	215	0.00	0.00
Channel Slope (%) :	.5	0.00	0.00
Cross Section Area (ft ²) :	1	0.00	0.00
Wetted Perimeter (ft) :	5	0.00	0.00
Velocity (ft/sec) :	0.66	0.00	0.00
Computed Flow Time (min) :	5.47	0.00	0.00
Total TOC (min)	5.47		

Subbasin Runoff Results

Total Rainfall (in) 1.64
 Total Runoff (in) 0.68
 Peak Runoff (cfs) 0.05
 Weighted Curve Number 88.00
 Time of Concentration (days hh:mm:ss) 0 00:05:28

Subbasin : BAS_OFF_01

Input Data

Area (ac) 0.28
 Peak Rate Factor 0.00
 Weighted Curve Number 80.00
 Rain Gage ID STGEORGE

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
> 75% grass cover, Good	0.28	D	80.00
Composite Area & Weighted CN	0.28		80.00

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	.35	0.00	0.00
Flow Length (ft) :	50	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.1	0.00	0.00
Velocity (ft/sec) :	0.04	0.00	0.00
Computed Flow Time (min) :	18.90	0.00	0.00
Shallow Concentrated Flow Computations			
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0.00	0.00
Computed Flow Time (min) :	0.15	0.00	0.00
Total TOC (min)	19.05		

Subbasin Runoff Results

Total Rainfall (in) 1.64
 Total Runoff (in) 0.36
 Peak Runoff (cfs) 0.14
 Weighted Curve Number 80.00
 Time of Concentration (days hh:mm:ss) 0 00:19:03

Subbasin : BAS_OFF_02

Input Data

Area (ac) 0.52
 Peak Rate Factor 0.00
 Weighted Curve Number 80.00
 Rain Gage ID STGEORGE

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
> 75% grass cover, Good	0.52	D	80.00
Composite Area & Weighted CN	0.52		80.00

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	.35	0.00	0.00
Flow Length (ft) :	50	0.00	0.00
Slope (%) :	15	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.1	0.00	0.00
Velocity (ft/sec) :	0.10	0.00	0.00
Computed Flow Time (min) :	8.44	0.00	0.00
Shallow Concentrated Flow Computations			
Flow Length (ft) :	50	0.00	0.00
Slope (%) :	15	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	6.25	0.00	0.00
Computed Flow Time (min) :	0.13	0.00	0.00
Total TOC (min)	8.58		

Subbasin Runoff Results

Total Rainfall (in) 1.64
 Total Runoff (in) 0.36
 Peak Runoff (cfs) 0.32
 Weighted Curve Number 80.00
 Time of Concentration (days hh:mm:ss) 0 00:08:35

Subbasin : BAS_OFF_03

Input Data

Area (ac) 0.32
 Peak Rate Factor 0.00
 Weighted Curve Number 80.00
 Rain Gage ID STGEORGE

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
> 75% grass cover, Good	0.32	D	80.00
Composite Area & Weighted CN	0.32		80.00

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	.35	0.00	0.00
Flow Length (ft) :	50	0.00	0.00
Slope (%) :	15	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.1	0.00	0.00
Velocity (ft/sec) :	0.10	0.00	0.00
Computed Flow Time (min) :	8.44	0.00	0.00
Shallow Concentrated Flow Computations			
Flow Length (ft) :	70	0.00	0.00
Slope (%) :	15	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	6.25	0.00	0.00
Computed Flow Time (min) :	0.19	0.00	0.00
Total TOC (min)	8.63		

Subbasin Runoff Results

Total Rainfall (in) 1.64
 Total Runoff (in) 0.36
 Peak Runoff (cfs) 0.20
 Weighted Curve Number 80.00
 Time of Concentration (days hh:mm:ss) 0 00:08:38

Subbasin : BAS_OFF_04

Input Data

Area (ac) 0.27
 Peak Rate Factor 0.00
 Weighted Curve Number 80.00
 Rain Gage ID STGEORGE

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
> 75% grass cover, Good	0.27	D	80.00
Composite Area & Weighted CN	0.27		80.00

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	.35	0.00	0.00
Flow Length (ft) :	50	0.00	0.00
Slope (%) :	15	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.1	0.00	0.00
Velocity (ft/sec) :	0.10	0.00	0.00
Computed Flow Time (min) :	8.44	0.00	0.00
Shallow Concentrated Flow Computations			
Flow Length (ft) :	80	0.00	0.00
Slope (%) :	15	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	6.25	0.00	0.00
Computed Flow Time (min) :	0.21	0.00	0.00
Total TOC (min)	8.66		

Subbasin Runoff Results

Total Rainfall (in) 1.64
 Total Runoff (in) 0.36
 Peak Runoff (cfs) 0.17
 Weighted Curve Number 80.00
 Time of Concentration (days hh:mm:ss) 0 00:08:40

Subbasin : BAS_OFF_LAS_PALMAS

Input Data

Area (ac) 7.89
 Peak Rate Factor 0.00
 Weighted Curve Number 92.00
 Rain Gage ID STGEORGE

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
1/8 acre lots, 65% impervious	7.89	D	92.00
Composite Area & Weighted CN	7.89		92.00

Time of Concentration

	Subarea	Subarea	Subarea
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	.35	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.1	0.00	0.00
Velocity (ft/sec) :	0.05	0.00	0.00
Computed Flow Time (min) :	32.92	0.00	0.00
Shallow Concentrated Flow Computations			
Flow Length (ft) :	800	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.87	0.00	0.00
Computed Flow Time (min) :	4.65	0.00	0.00
Total TOC (min)	37.56		

Subbasin Runoff Results

Total Rainfall (in) 1.64
 Total Runoff (in) 0.92
 Peak Runoff (cfs) 8.50
 Weighted Curve Number 92.00
 Time of Concentration (days hh:mm:ss) 0 00:37:34

Subbasin : BAS_POOL

Input Data

Area (ac) 0.38
 Peak Rate Factor 0.00
 Weighted Curve Number 98.00
 Rain Gage ID STGEORGE

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	0.38	D	98.00
Composite Area & Weighted CN	0.38		98.00

Time of Concentration

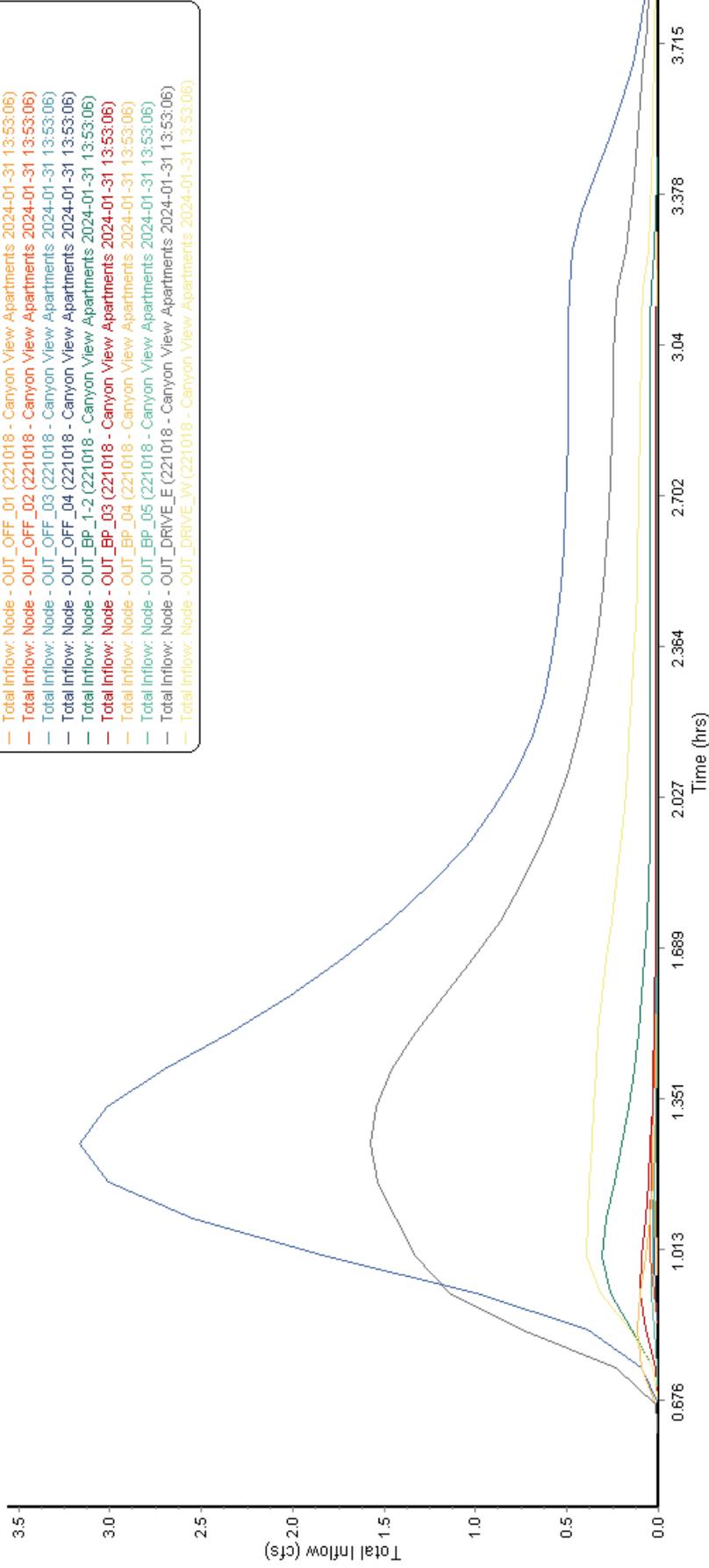
Sheet Flow Computations	Subarea	Subarea	Subarea
	A	B	C
Manning's Roughness :	.2	0.00	0.00
Flow Length (ft) :	215	0.00	0.00
Slope (%) :	.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.1	0.00	0.00
Velocity (ft/sec) :	0.05	0.00	0.00
Computed Flow Time (min) :	67.57	0.00	0.00
Total TOC (min)	67.57		

Subbasin Runoff Results

Total Rainfall (in) 1.64
 Total Runoff (in) 1.42
 Peak Runoff (cfs) 0.44
 Weighted Curve Number 98.00
 Time of Concentration (days hh:mm:ss) 0 01:07:34

10-year 3-hour, Farmer Fletcher HYDROGRAPHS

- Total Inflow: Node - OUT_OFF_LAS_PALMAS (221018 - Canyon View Apartments 2024-01-31 13:53:06)
- Total Inflow: Node - OUT_OFF_01 (221018 - Canyon View Apartments 2024-01-31 13:53:06)
- Total Inflow: Node - OUT_OFF_02 (221018 - Canyon View Apartments 2024-01-31 13:53:06)
- Total Inflow: Node - OUT_OFF_03 (221018 - Canyon View Apartments 2024-01-31 13:53:06)
- Total Inflow: Node - OUT_OFF_04 (221018 - Canyon View Apartments 2024-01-31 13:53:06)
- Total Inflow: Node - OUT_BP_1-2 (221018 - Canyon View Apartments 2024-01-31 13:53:06)
- Total Inflow: Node - OUT_BP_03 (221018 - Canyon View Apartments 2024-01-31 13:53:06)
- Total Inflow: Node - OUT_BP_04 (221018 - Canyon View Apartments 2024-01-31 13:53:06)
- Total Inflow: Node - OUT_BP_05 (221018 - Canyon View Apartments 2024-01-31 13:53:06)
- Total Inflow: Node - OUT_DRIVE_E (221018 - Canyon View Apartments 2024-01-31 13:53:06)
- Total Inflow: Node - OUT_DRIVE_W (221018 - Canyon View Apartments 2024-01-31 13:53:06)



Total Inflow Summary Table

Element ID	OUT_OFF_LAS_PALMAS	OUT_OFF_01	OUT_OFF_02	OUT_OFF_03	OUT_OFF_04	OUT_BP_1-2	OUT_BP_03	OUT_BP_04	OUT_BP_05	OUT_DRIVE_E	OUT_DRIVE_W
Maximum Total Inflow (cfs)	3.17	0.02	0.04	0.03	0.02	0.31	0.10	0.12	0.04	1.57	0.39
Minimum Total Inflow (cfs)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Event Mean Total Inflow (cfs)	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01
Duration of Exceedances (hrs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Duration of Deficits (hrs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Number of Exceedances	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Number of Deficits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Volume of Exceedance (ft³)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Volume of Deficit (ft³)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Inflow Volume (ft³)	11524.57	82.68	156.08	96.52	80.81	871.06	239.71	202.26	88.11	6818.33	1962.05
Detention Storage (ft³)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Time period
 From: 08/28/2018, 12:00:00 AM
 To: 09/01/2018, 12:00:00 AM

Thresholds
 Exceedance: 0
 Deficit: 0

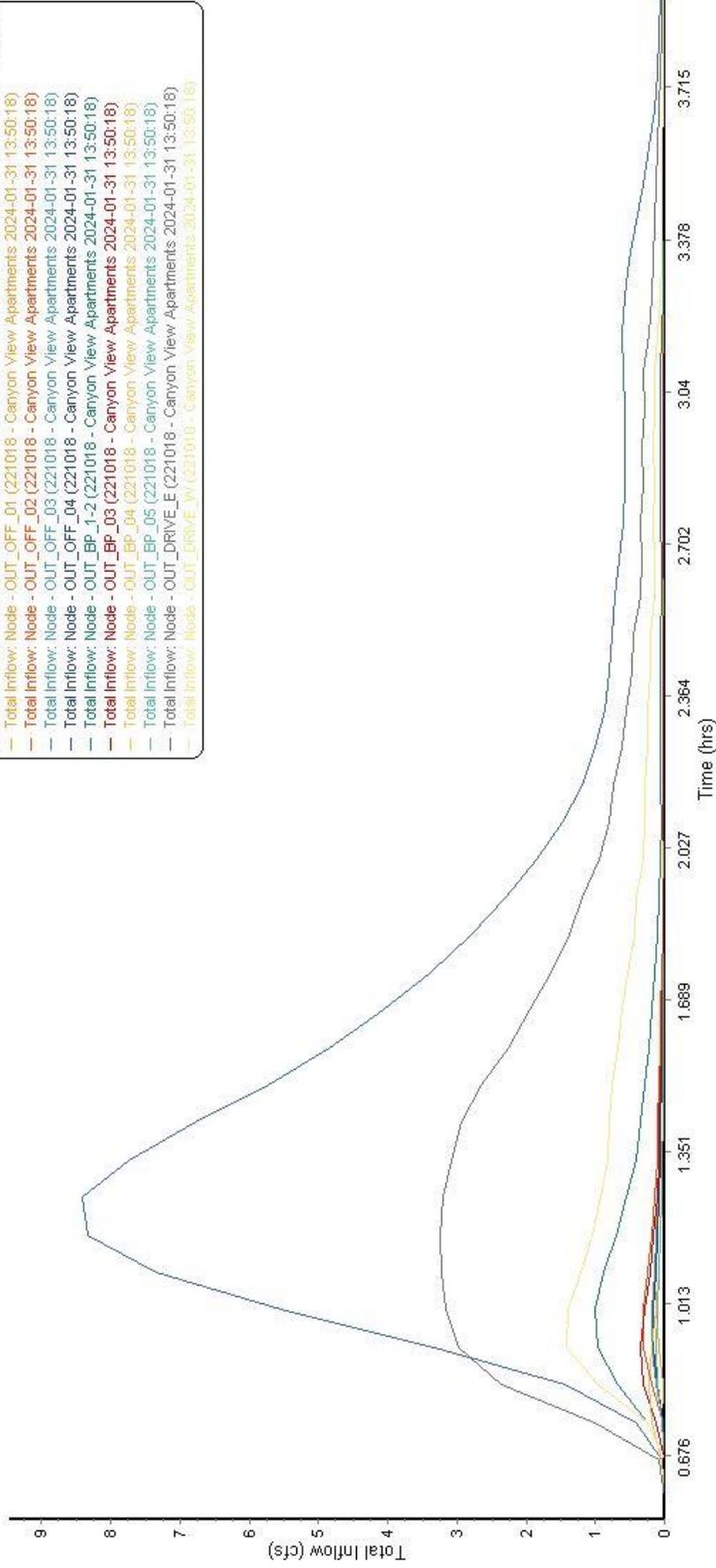
Detention storage
 Max. flow: 0

Subbasin Summary

SN Subbasin ID	Area (ac)	Peak Rate Factor	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1 BAS_BLDG	1.80	0.00	98.00	1.00	0.79	1.42	1.31	0 00:51:39
2 BAS_BP_01	0.28	0.00	89.34	1.00	0.30	0.08	0.13	0 00:10:00
3 BAS_BP_02	0.62	0.00	88.00	1.00	0.25	0.16	0.20	0 00:19:16
4 BAS_BP_03	0.26	0.00	88.00	1.00	0.25	0.07	0.10	0 00:10:00
5 BAS_BP_04	0.07	0.00	98.00	1.00	0.79	0.05	0.12	0 00:10:00
6 BAS_BP_05	0.09	0.00	88.00	1.00	0.25	0.02	0.04	0 00:10:00
7 BAS_DRIVE_E	0.77	0.00	91.60	1.00	0.39	0.30	0.49	0 00:11:16
8 BAS_DRIVE_WEST	0.52	0.00	89.16	1.00	0.29	0.15	0.22	0 00:13:40
9 BAS_LS_E_01	0.18	0.00	88.00	1.00	0.25	0.04	0.06	0 00:13:23
10 BAS_LS_E_02	0.46	0.00	88.00	1.00	0.25	0.12	0.18	0 00:10:00
11 BAS_LS_W_01	0.92	0.00	80.43	1.00	0.09	0.08	0.09	0 00:10:00
12 BAS_LS_W_02	0.04	0.00	88.00	1.00	0.25	0.01	0.02	0 00:10:00
13 BAS_OFF_01	0.28	0.00	80.00	1.00	0.08	0.02	0.02	0 00:19:03
14 BAS_OFF_02	0.52	0.00	80.00	1.00	0.08	0.04	0.05	0 00:10:00
15 BAS_OFF_03	0.32	0.00	80.00	1.00	0.08	0.03	0.03	0 00:10:00
16 BAS_OFF_04	0.27	0.00	80.00	1.00	0.08	0.02	0.02	0 00:10:00
17 BAS_OFF_LAS_PALMAS	7.89	0.00	92.00	1.00	0.40	3.18	3.17	0 00:37:33
18 BAS_POOL	0.38	0.00	98.00	1.00	0.79	0.30	0.23	0 01:07:34

100-year 3-hour, Farmer Fletcher HYDROGRAPHS

- Total Inflow: Node - OUT_OFF_LAS_PALMAS (221018) - Canyon View Apartments 2024-01-31 13:50:18)
- Total Inflow: Node - OUT_OFF_01 (221018) - Canyon View Apartments 2024-01-31 13:50:18)
- Total Inflow: Node - OUT_OFF_02 (221018) - Canyon View Apartments 2024-01-31 13:50:18)
- Total Inflow: Node - OUT_OFF_03 (221018) - Canyon View Apartments 2024-01-31 13:50:18)
- Total Inflow: Node - OUT_OFF_04 (221018) - Canyon View Apartments 2024-01-31 13:50:18)
- Total Inflow: Node - OUT_BP_1-2 (221018) - Canyon View Apartments 2024-01-31 13:50:18)
- Total Inflow: Node - OUT_BP_03 (221018) - Canyon View Apartments 2024-01-31 13:50:18)
- Total Inflow: Node - OUT_BP_04 (221018) - Canyon View Apartments 2024-01-31 13:50:18)
- Total Inflow: Node - OUT_BP_05 (221018) - Canyon View Apartments 2024-01-31 13:50:18)
- Total Inflow: Node - OUT_DRIVE_E (221018) - Canyon View Apartments 2024-01-31 13:50:18)
- Total Inflow: Node - OUT_DRIVE_W (221018) - Canyon View Apartments 2024-01-31 13:50:18)



Total Inflow Summary Table

Element ID	OUT_OFF_LAS_PALMAS	OUT_OFF_01	OUT_OFF_02	OUT_OFF_03	OUT_OFF_04	OUT_BP_1-2	OUT_BP_03	OUT_BP_04	OUT_BP_05	OUT_DRIVE_E	OUT_DRIVE_W
Maximum Total Inflow (cfs)	8.41	0.14	0.31	0.19	0.16	1.00	0.34	0.23	0.13	3.24	1.41
Minimum Total Inflow (cfs)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Event Mean Total Inflow (cfs)	0.08	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.01
Duration of Exceedances (hrs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Duration of Deficits (hrs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Number of Exceedances	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Number of Deficits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Volume of Exceedance (ft³)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Volume of Deficit (ft³)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Inflow Volume (ft³)	26363.04	356.01	669.95	414.3	348.1	2313.03	652.01	361.19	238.29	13324.82	4668.16
Detention Storage (ft³)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Time period
 From: 08/28/2018, 12:00:00 AM
 To: 09/01/2018, 12:00:00 AM

Thresholds
 Exceedance: 0
 Deficit: 0

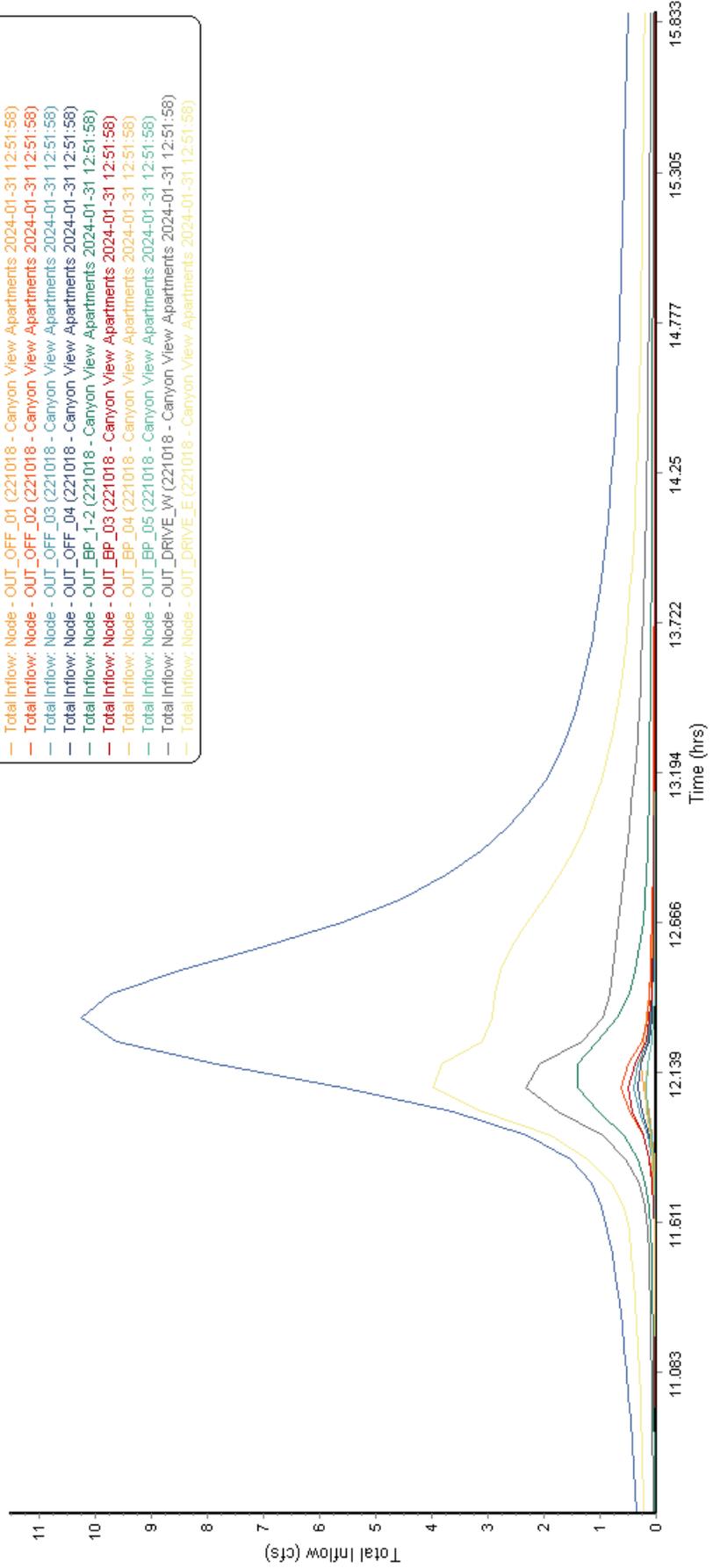
Detention storage
 Max flow: 0

Subbasin Summary

SN	Subbasin ID	Area	Peak Rate	Weighted Curve	Total Rainfall	Total Runoff	Total Runoff	Peak Runoff	Time of Concentration
		(ac)	Factor	Number	(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1	BAS_BLDG	1.80	0.00	98.00	1.64	1.42	2.55	2.56	0 00:51:39
2	BAS_BP_01	0.28	0.00	89.34	1.64	0.76	0.21	0.41	0 00:10:00
3	BAS_BP_02	0.62	0.00	88.00	1.64	0.68	0.43	0.67	0 00:19:16
4	BAS_BP_03	0.26	0.00	88.00	1.64	0.68	0.18	0.35	0 00:10:00
5	BAS_BP_04	0.07	0.00	98.00	1.64	1.42	0.10	0.23	0 00:10:00
6	BAS_BP_05	0.09	0.00	88.00	1.64	0.68	0.06	0.13	0 00:10:00
7	BAS_DRIVE_E	0.77	0.00	91.60	1.64	0.89	0.69	1.36	0 00:11:16
8	BAS_DRIVE_WEST	0.52	0.00	89.16	1.64	0.75	0.39	0.70	0 00:13:40
9	BAS_LS_E_01	0.18	0.00	88.00	1.64	0.68	0.12	0.21	0 00:13:23
10	BAS_LS_E_02	0.46	0.00	88.00	1.64	0.68	0.31	0.61	0 00:10:00
11	BAS_LS_W_01	0.92	0.00	80.43	1.64	0.37	0.34	0.59	0 00:10:00
12	BAS_LS_W_02	0.04	0.00	88.00	1.64	0.68	0.02	0.05	0 00:10:00
13	BAS_OFF_01	0.28	0.00	80.00	1.64	0.36	0.10	0.14	0 00:19:03
14	BAS_OFF_02	0.52	0.00	80.00	1.64	0.36	0.19	0.32	0 00:10:00
15	BAS_OFF_03	0.32	0.00	80.00	1.64	0.36	0.12	0.20	0 00:10:00
16	BAS_OFF_04	0.27	0.00	80.00	1.64	0.36	0.10	0.17	0 00:10:00
17	BAS_OFF_LAS_PALMAS	7.89	0.00	92.00	1.64	0.92	7.26	8.50	0 00:37:33
18	BAS_POOL	0.38	0.00	98.00	1.64	1.42	0.54	0.44	0 01:07:34

100-year 24-hour, SCS TYPE II HYDROGRAPHS

- Total Inflow: Node - OUT_OFF_LAS_PALMAS (221018 - Canyon View Apartments 2024-01-31 12:51:58)
- Total Inflow: Node - OUT_OFF_01 (221018 - Canyon View Apartments 2024-01-31 12:51:58)
- Total Inflow: Node - OUT_OFF_02 (221018 - Canyon View Apartments 2024-01-31 12:51:58)
- Total Inflow: Node - OUT_OFF_03 (221018 - Canyon View Apartments 2024-01-31 12:51:58)
- Total Inflow: Node - OUT_OFF_04 (221018 - Canyon View Apartments 2024-01-31 12:51:58)
- Total Inflow: Node - OUT_BP_1-2 (221018 - Canyon View Apartments 2024-01-31 12:51:58)
- Total Inflow: Node - OUT_BP_03 (221018 - Canyon View Apartments 2024-01-31 12:51:58)
- Total Inflow: Node - OUT_BP_04 (221018 - Canyon View Apartments 2024-01-31 12:51:58)
- Total Inflow: Node - OUT_BP_05 (221018 - Canyon View Apartments 2024-01-31 12:51:58)
- Total Inflow: Node - OUT_DRIVE_W (221018 - Canyon View Apartments 2024-01-31 12:51:58)
- Total Inflow: Node - OUT_DRIVE_E (221018 - Canyon View Apartments 2024-01-31 12:51:58)



Total Inflow Summary Table

Element ID	OUT_OFF_LAS_PALMAS	OUT_OFF_01	OUT_OFF_02	OUT_OFF_03	OUT_OFF_04	OUT_BP_1-2	OUT_BP_03	OUT_BP_04	OUT_BP_05	OUT_DRIVE_W	OUT_DRIVE_E
Maximum Total Inflow (cfs)	10.25	0.63	0.39	0.33	1.41	0.50	0.20	0.18	2.33	3.97	
Minimum Total Inflow (cfs)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Event Mean Total Inflow (cfs)	0.14	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.03	0.07	
Duration of Exceedances (hrs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Number of Exceedances	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Number of Deficits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Volume of Exceedance (ft³)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Volume of Deficit (ft³)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Total Inflow Volume (ft³)	48757.36	1680.73	1038.23	874.66	4648.73	1318.96	577.47	461	9136.92	22732.97	
Detention Storage (ft³)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

Time period

From: 08/28/2018, 12:00:00 AM

To: 09/01/2018, 12:00:00 AM

Thresholds

Exceedance: 0

Deficit: 0

Detention storage

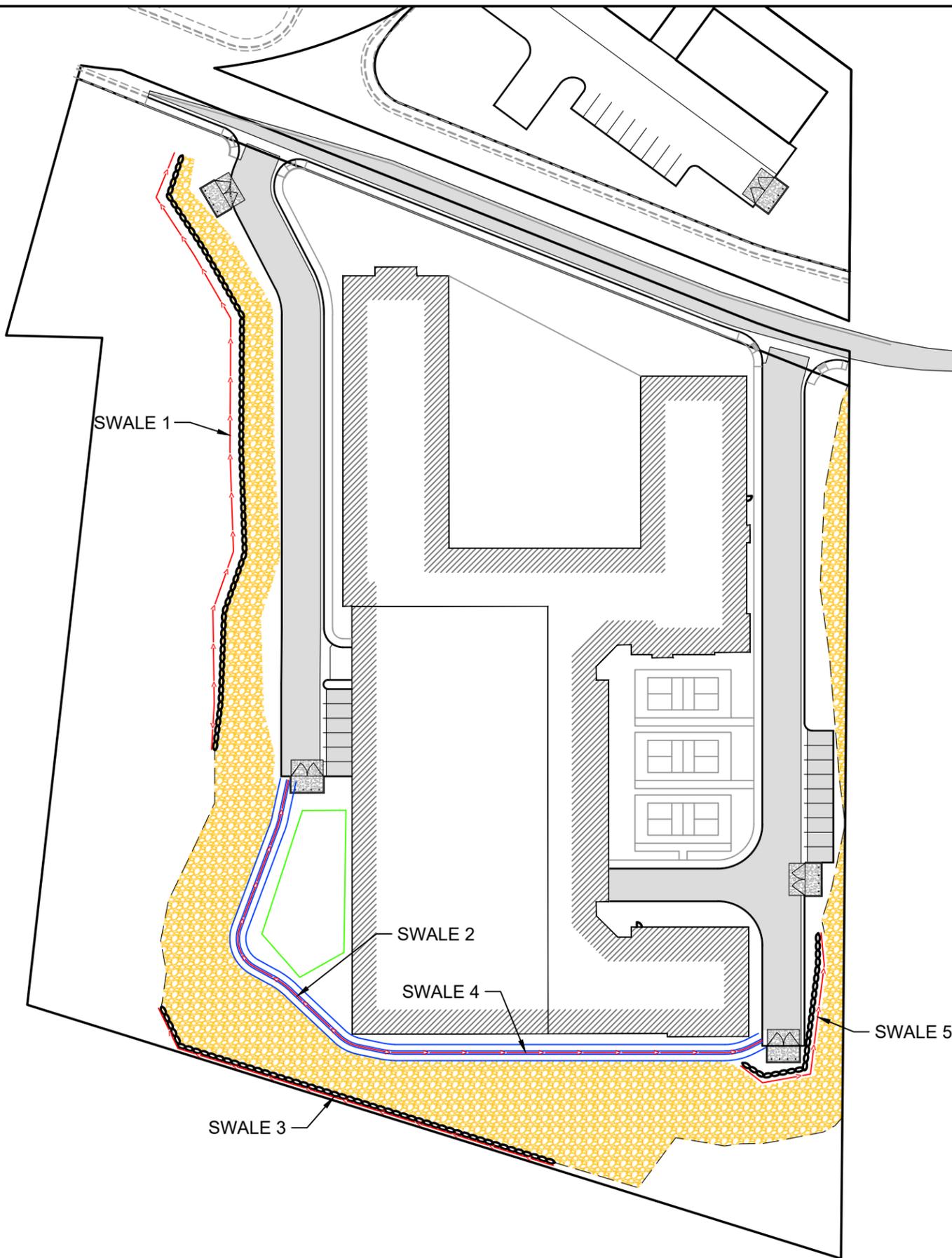
Max flow: 0

Subbasin Summary

SN Subbasin ID	Area (ac)	Peak Rate Factor	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1 BAS_BLDG	1.80	0.00	98.00	2.51	2.28	4.10	2.37	0 00:51:39
2 BAS_BP_01	0.28	0.00	89.34	2.51	1.49	0.41	0.57	0 00:10:00
3 BAS_BP_02	0.62	0.00	88.00	2.51	1.39	0.87	0.98	0 00:19:16
4 BAS_BP_03	0.26	0.00	88.00	2.51	1.39	0.36	0.51	0 00:10:00
5 BAS_BP_04	0.07	0.00	98.00	2.51	2.27	0.16	0.20	0 00:10:00
6 BAS_BP_05	0.09	0.00	88.00	2.51	1.38	0.13	0.18	0 00:10:00
7 BAS_DRIVE_E	0.77	0.00	91.60	2.51	1.67	1.29	1.71	0 00:11:16
8 BAS_DRIVE_WEST	0.52	0.00	89.16	2.51	1.48	0.77	0.98	0 00:13:40
9 BAS_LS_E_01	0.18	0.00	88.00	2.51	1.39	0.24	0.31	0 00:13:23
10 BAS_LS_E_02	0.46	0.00	88.00	2.51	1.39	0.64	0.89	0 00:10:00
11 BAS_LS_W_01	0.92	0.00	80.43	2.51	0.92	0.84	1.15	0 00:10:00
12 BAS_LS_W_02	0.04	0.00	88.00	2.51	1.31	0.05	0.07	0 00:10:00
13 BAS_OFF_01	0.28	0.00	80.00	2.51	0.90	0.25	0.27	0 00:19:03
14 BAS_OFF_02	0.52	0.00	80.00	2.51	0.90	0.47	0.63	0 00:10:00
15 BAS_OFF_03	0.32	0.00	80.00	2.51	0.90	0.29	0.39	0 00:10:00
16 BAS_OFF_04	0.27	0.00	80.00	2.51	0.90	0.24	0.33	0 00:10:00
17 BAS_OFF_LAS_PALMAS	7.89	0.00	92.00	2.51	1.70	13.43	10.26	0 00:37:33
18 BAS_POOL	0.38	0.00	98.00	2.51	2.28	0.87	0.41	0 01:07:34

Appendix D – Drainage Channel Calculations and Details

SCALE: 1" = 80'



SWALE INFO					
NAME	CONTRIBUTING BASINS	FLOW IN (CFS)	DEPTH	BOTTOM WIDTH	SIDE SLOPES
SWALE 1	BAS_OFF_LAS_PALMAS BAS_BP_01 BAS_BP_02	9.41	2'	2'	2:1
SWALE 2	BAS_LS_W_01 BAS_LS_W_02 BAS_OFF_01 BAS_OFF_02	1.07	2'	2'	2:1
SWALE 3	BAS_LS_W_02 BAS_OFF_02	0.36	1'	0'	2:1
SWALE 4	BAS_LS_E_02 BAS_OFF_03	0.80	2'	2'	2:1
SWALE 5	BAS_LS_E_01	0.21	1'	0'	2:1

SWALE LOCATIONS
CANYON VIEW APARTMENTS
ST GEORGE, UTAH



BUSH & GUGGELL, INC.

Engineers - Planners - Surveyors

205 East Tabernacle Suite #4

St. George, Utah 84770

Phone (435) 673-2337 / Fax (435) 673-3161

PROJECT: Canyon View Apartments
 SUBJECT: Drainage Swale Calcs

PROJECT NO: 221018
 ENGINEER: RM

DATE: 1/31/2024
 SHEET: _____

Swale 1 Calcs

Version: December 2010 / rmeyer
 File Name: CE_Civil_Open_Channel_Steady_State_Flow.xls
 Code Ref.: n/a

Choose Units	English ▼
Channel Section	Trapezoidal, Triangle, Square ▼
Choose Mannings n	0.040 Rough rocks ▼

Manning's Equation:

$$Q = \frac{\alpha * A^{5/3}}{n * P^{2/3}} \sqrt{S}$$

INPUT		
		Manning's n
y	1.00 ft	Water Depth
S	0.0088 ft/ft	Channel Slope
b	2 ft	Channel Bottom Width
mL	2 (horiz):1(vert)	Channel Side Slope, Left Side
mR	2 (horiz):1(vert)	Channel Side Slope, Right Side
OUTPUT		
Q	10.114 cfs	Open Channel Flow
V	2.529 ft/sec	
Tw	6.000 ft	Top Width (Gutter Spread)

S _s	2.8
D ₅₀	0.04 ft

PROJECT: Canyon View Apartments
 SUBJECT: Drainage Swale Calcs

PROJECT NO: 221018
 ENGINEER: RM

DATE: 1/31/2024
 SHEET: _____

Swale 2 Calcs

Version: December 2010 / rmeyer
 File Name: CE_Civil_Open_Channel_Steady_State_Flow.xls
 Code Ref.: n/a

Choose Units	English ▼
Channel Section	Trapezoidal, Triangle, Square ▼
Choose Mannings n	0.040 Rough rocks ▼

Manning's Equation:

$$Q = \frac{\alpha * A^{5/3}}{n * P^{2/3}} \sqrt{S}$$

INPUT		
		Manning's n
y	0.33 ft	Water Depth
S	0.0071 ft/ft	Channel Slope
b	2 ft	Channel Bottom Width
mL	2 (horiz):1(vert)	Channel Side Slope, Left Side
mR	2 (horiz):1(vert)	Channel Side Slope, Right Side
OUTPUT		
Q	1.098 cfs	Open Channel Flow
V	1.251 ft/sec	
Tw	3.320 ft	Top Width (Gutter Spread)

S _s	2.8
D ₅₀	0.01 ft

PROJECT: Canyon View Apartments
 SUBJECT: Drainage Swale Calcs

PROJECT NO: 221018
 ENGINEER: RM

DATE: 1/31/2024
 SHEET: _____

Swale 3 Calcs

Version: December 2010 / rmeyer
 File Name: CE_Civil_Open_Channel_Steady_State_Flow.xls
 Code Ref.: n/a

Choose Units	English	▼
Channel Section	Trapezoidal, Triangle, Sqaure	▼
Choose Mannings n	0.040 Rough rocks	▼

Manning's Equation:

$$Q = \frac{\alpha * A^{5/3}}{n * P^{2/3}} \sqrt{S}$$

INPUT		
		Manning's n
y	0.43 ft	Water Depth
S	0.0061 ft/ft	Channel Slope
b	0 ft	Channel Bottom Width
mL	2 (horiz):1(vert)	Channel Side Slope, Left Side
mR	2 (horiz):1(vert)	Channel Side Slope, Right Side
OUTPUT		
Q	0.357 cfs	Open Channel Flow
V	0.967 ft/sec	
Tw	1.720 ft	Top Width (Gutter Spread)

S _s	2.8
D ₅₀	0.01 ft

PROJECT: Canyon View Apartments
SUBJECT: Drainage Swale Calcs

PROJECT NO: 221018
ENGINEER: RM

DATE: 1/31/2024
SHEET: _____

Swale 4 Calcs

Version: December 2010 / rmeyer
File Name: CE_Civil_Open_Channel_Steady_State_Flow.xls
Code Ref.: n/a

Choose Units	English ▼
Channel Section	Trapezoidal, Triangle, Square ▼
Choose Mannings n	0.040 Rough rocks ▼

Manning's Equation:

$$Q = \frac{\alpha * A^{5/3}}{n * P^{2/3}} \sqrt{S}$$

INPUT		
		Manning's n
y	0.14 ft	Water Depth
S	0.0764 ft/ft	Channel Slope
b	2 ft	Channel Bottom Width
mL	2 (horiz):1(vert)	Channel Side Slope, Left Side
mR	2 (horiz):1(vert)	Channel Side Slope, Right Side
OUTPUT		
Q	0.804 cfs	Open Channel Flow
V	2.520 ft/sec	
Tw	2.560 ft	Top Width (Gutter Spread)

S _s	2.8
D ₅₀	0.09 ft

PROJECT: Canyon View Apartments
 SUBJECT: Drainage Swale Calcs

PROJECT NO: 221018
 ENGINEER: RM

DATE: 1/31/2024
 SHEET: _____

Swale 5 Calcs

Version: December 2010 / rmeyer
 File Name: CE_Civil_Open_Channel_Steady_State_Flow.xls
 Code Ref.: n/a

Choose Units	English	▼
Channel Section	Trapezoidal, Triangle, Sqaure	▼
Choose Mannings n	0.040 Rough rocks	▼

Manning's Equation:

$$Q = \frac{\alpha * A^{5/3}}{n * P^{2/3}} \sqrt{S}$$

INPUT		
		Manning's n
y	0.26 ft	Water Depth
S	0.0294 ft/ft	Channel Slope
b	0 ft	Channel Bottom Width
mL	2 (horiz):1(vert)	Channel Side Slope, Left Side
mR	2 (horiz):1(vert)	Channel Side Slope, Right Side
OUTPUT		
Q	0.205 cfs	Open Channel Flow
V	1.517 ft/sec	
Tw	1.040 ft	Top Width (Gutter Spread)

S _s	2.8
D ₅₀	0.02 ft



GRADING NOTES

APPROXIMATELY 57,511 CU.YD. OF CUT, 6,246 CU.YD. OF FILL AND 51,265 CU.YD. OF EXPORT MATERIAL IS REQUIRED (FOR GRADING PERMIT ONLY). THE CONTRACTOR SHOULD VERIFY THE QUANTITIES FOR COMPLETION OF WORK. QUANTITIES ARE BASED ON FINISH GRADE OF ROADS & PADS.

ALL IMPORTED STRUCTURAL FILL SHALL BE APPROVED BY THE GEOTECHNICAL ENGINEER PRIOR TO DELIVERY TO THE SITE. ALL IMPORTED STRUCTURAL FILL SHALL BE PLACED IN 8-INCH LOOSE HORIZONTAL LIFTS AND COMPACTED TO A MINIMUM OF 95 PERCENT OF MAXIMUM DRY DENSITY (ASTM D-1557).

ALL EXCAVATION, GRADING AND FILL OPERATIONS WITHIN THE BUILDING AREA SHOULD BE OBSERVED BY THE GEOTECHNICAL ENGINEER TO VERIFY SUB-SOIL CONDITIONS AND DETERMINE ADEQUACY OF SITE PREPARATION, SUITABILITY OF FILL MATERIALS AND COMPLIANCE WITH COMPACTION REQUIREMENTS.

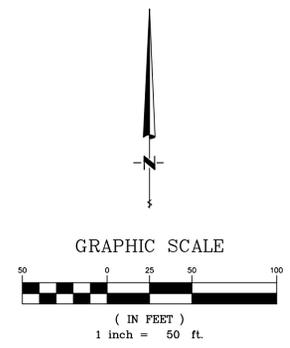
THE CONTRACTOR SHALL PROVIDE SUITABLE EQUIPMENT TO CONTROL DUST AND AIR POLLUTION CAUSED BY CONSTRUCTION OPERATIONS. THE CONTRACTOR SHALL ALSO PROVIDE SUITABLE MUD AND DIRT CONTAINMENT TO MAINTAIN THE WORK SITE, ACCESS ROADWAYS AND ADJACENT PROPERTIES IN A CLEAN CONDITION.

ALL EXCAVATION AND GRADING SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF ST. GEORGE CITY AND APPENDIX J OF THE INTERNATIONAL BUILDING CODE, 2018 EDITION, AND THE SPECIFICATIONS AND REQUIREMENTS INCLUDED IN THE GEOTECHNICAL STUDY.

GEOTECHNICAL ENGINEER TO PROVIDE GRADING COMPLETION REPORT TO CONFIRM WORK HAS BEEN PERFORMED IN CONFORMANCE WITH THEIR RECOMMENDATIONS.

OWNER IS RESPONSIBLE FOR ALL ON-SITE DRAINAGE AND DETENTION.

- LEGEND**
- - - - - EXISTING GROUND CONTOUR
 - FINISH GROUND CONTOUR
 - LOT LINE
 - ○ ○ ○ ○ RETAINING WALL
 - LANDSCAPE DRAINAGE SWALE
 - [PAD: 00.00] PAD ELEVATION IN FEET
 - [TW: 00.00] TOP OF WALL ELEVATION IN FEET
 - [BW: 00.00] BOTTOM OF EXPOSED WALL ELEVATION IN FEET
 - [FL: 00.00] FLOW LINE
 - [TC: 00.00] TC = TOP OF CONCRETE
 - [TBC: 00.00] TBC = TOP BACK OF CURB
 - SLOPE IN RUN:RISE
 - CONTOUR ELEVATION IN FEET



OWNER / DEVELOPER
SHAKESPEARE DEVELOPMENT GROUP

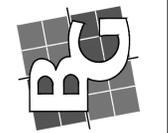
BEN SHAKESPEARE
(435) 703-4164
37 W 1070 S STE 101
ST GEORGE, UTAH 84770

ENGINEERING CONTACT
BUSH AND GUDGELL, INC.
205 EAST TABERNAACLE #4
ST GEORGE, UT 84770

RICK MEYER - PROJECT MANAGER
(435)-673-2337



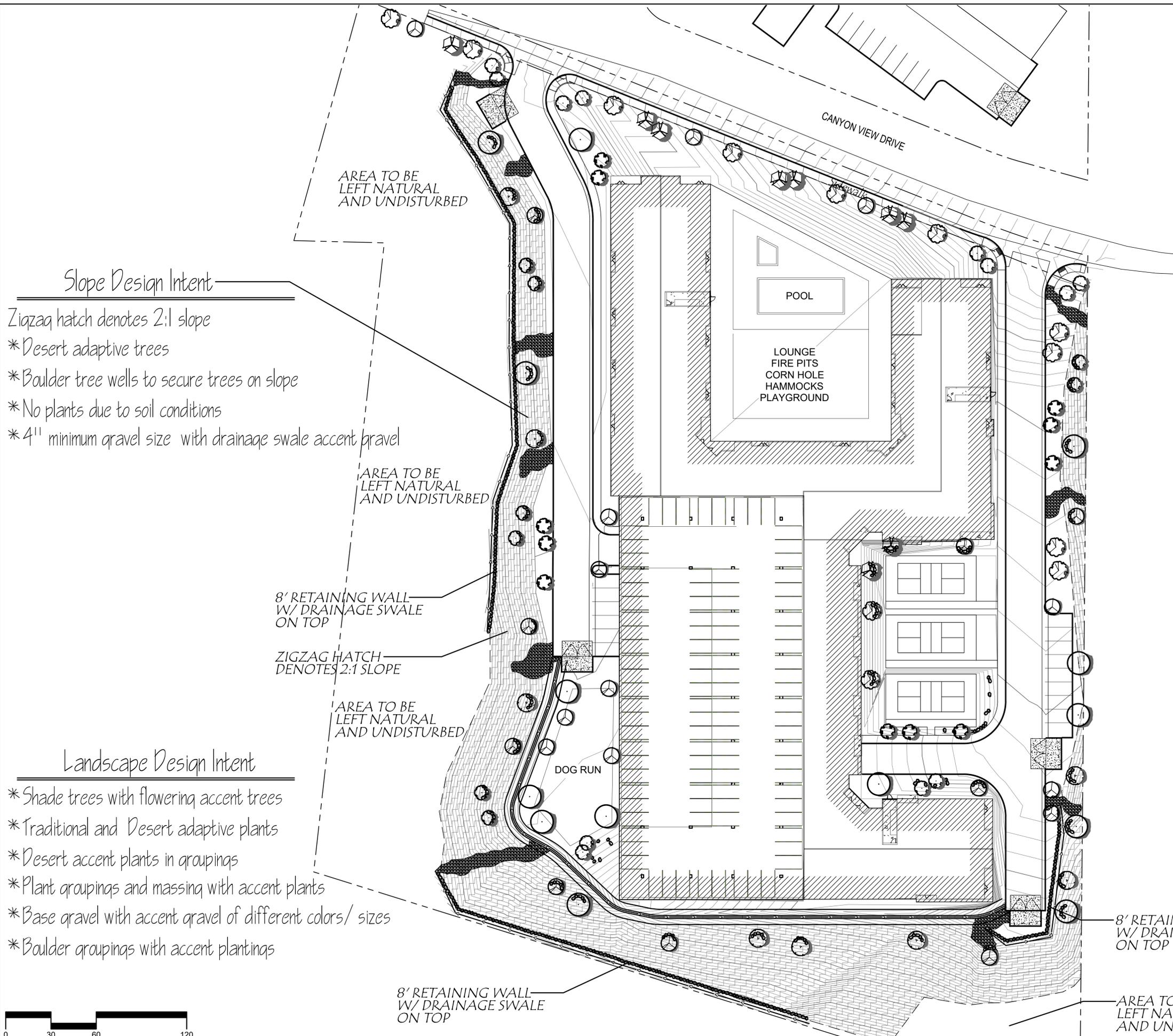
BUSH & GUDGELL, INC.
Engineers - Planners - Surveyors
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DATE: JAN 2024
DRAWN: RM
APPROVED:
SCALE: NOTED
JOB NO.: 221018

GRADING PLAN
CANYON VIEW APARTMENTS
ST GEORGE, UTAH

X:\221000-221999\221018 - Canyon View Apartments\Drawings\Exhibits\SLOPE ANALYSIS.dwg

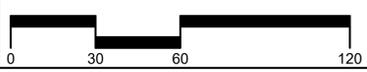


Slope Design Intent

- Zigzag hatch denotes 2:1 slope
- * Desert adaptive trees
- * Boulder tree wells to secure trees on slope
- * No plants due to soil conditions
- * 4" minimum gravel size with drainage swale accent gravel

Landscape Design Intent

- * Shade trees with flowering accent trees
- * Traditional and Desert adaptive plants
- * Desert accent plants in groupings
- * Plant groupings and massing with accent plants
- * Base gravel with accent gravel of different colors/ sizes
- * Boulder groupings with accent plantings



PLANT PALETTE

TREES - MEDIUM SHADE TREES

- NAME
- Chilopsis linearis* 'L. Hamilton'
Desert Willow
 - Olea europaea* 'Wilsonii'
Wilson Olive
 - Prosopis glandulosa* 'maverick'
Maverick Honey Mesquite
 - Quercus virginiana*
Live Oak
 - Pistachio chinensis*
Chinese Pistache

TREES - SMALL, ACCENT FLOWERING

- Vitex agnus-castus*
Chaste Tree
- Lagerstroemia indica*
Crepe Myrtle

PALMS - Pool area only

- Washingtonia filifera*
California Fan Palm
- Chamerops humilis*
Mediterranean Fan Palm

SHRUBS - TRADITIONAL

- NERIUM oleander* 'Hardy Red'
Hardy Dwarf Oleander
- ABELIA x grand.* 'Sunrise'
Sunrise Variegated Abelia
- Rosa x 'Noare'*
Flowering Carpet Rose
- ROSMARINUS o. 'Prostratus'*
Prostrate Rosemary

SHRUBS - DESERT ADAPTIVE

- LEUCOPHYLLUM langmaniae*
Lynn's Legacy Ranger
- LEUCOPHYLLUM f. 'Greencloud'*
Texas Ranger
- PEROVSKIA atriplicifolia*
Russian Sage
- SALVIA greggii*
Red Sage
- MUHLENBERGIA capillaris* 'R. Mist'
Regal Mist Deer Grass
- CHRYSACTINIA mexicana*
Damianita

DESERT ACCENTS

- DASYLIRION longissimum*
Toothless Desert Spoon
- DASYLIRION wheeleri*
Desert Spoon
- HESPERALOE parviflora*
Red Yucca
- AGAVE americana* 'Marginata'
Variegated Century Plant
- AGAVE parryi*
Parry's Agave
- Agave weberi*
Weber Agave

COSTANZA P5 ASSOCIATES
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 costanza@costanza.com



CANYON VIEW APARTMENTS
 CANYON VIEW DRIVE
 ST. GEORGE, UTAH

no.	revisions	dated by

Scale: 1" = 30'-0"
 Date: JAN. 22, 2024
 Drawn By: JUC
 Approved By: JUC

CANYON VIEW APARTMENTS
 LANDSCAPE SITE PLAN

North

Job No. MISC.

Sheet No. L-1

of 1

CANYON VIEW APARTMENTS
 CANYON VIEW DRIVE
 ST. GEORGE, UTAH
 24x36 SHEET FORMAT

HILLSIDE REVIEW BOARD AGENDA REPORT: 03/27/2024

Anderson-Wasatch GP Amendment Hillside Development Permit (Case No. 2024-HS-007)	
Request:	A Hillside Development Review to define which areas of a recently annexed area should be open space or other Land Use Designations. The applicant is looking for Hillside Review Board's input prior to a General Plan amendment.
Applicant:	Bob Hermandson, Bush & Gudgell
Location:	West of 1600 South and south of Divario
General Plan:	Mixed, FP (Flood Plain), MDR (Medium Density Residential), LDR (Low Density Residential), PF (Public Facility), COM (Commercial) and OS (open Space)
Existing Zoning:	M&G (Mining and Grazing)
Surrounding Zoning:	North PD-R (Planned Development Residential) & R-1-10 (Single Family Residential)
	South PD-R (Planned Development Residential) & M&G (Mining and Grazing)
	East PD-C (Planned Development Commercial)
	West M&G (Mining and Grazing) & Unincorporated County
Land Area:	Approximately 164 acres



BACKGROUND

On July 20, 2023, the subject property was annexed into St. George City having previously been in the unincorporated Washington County, or more specifically, that is the date the City Council approved the annexation. Prior to that, a master plan for the Tonaquint area had been adopted with the idea that the property would at some point be incorporated into the city.

The property is divided by two owners (north and south) which have worked together to come up with a comprehensive, though very conceptual plan for the property. However, the owners understand that there will be hillside, geologic, flood plain, and other items that need to be considered. For this purpose, the applicant is asking for the Hillside Review Board (HSRB) to weigh in on those items. After the HSRB has reviewed and made recommendations to the applicant, the intent is to revise the drawing to reflect areas that may need to be kept open space and which areas may be best suited for other development. That revised drawing will then proceed on to the Planning Commission and City Council. A full hillside review will be required in the future as individual development occurs.

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 twenty-one percent (21%) to thirty percent (30%), development activity shall not disturb 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.

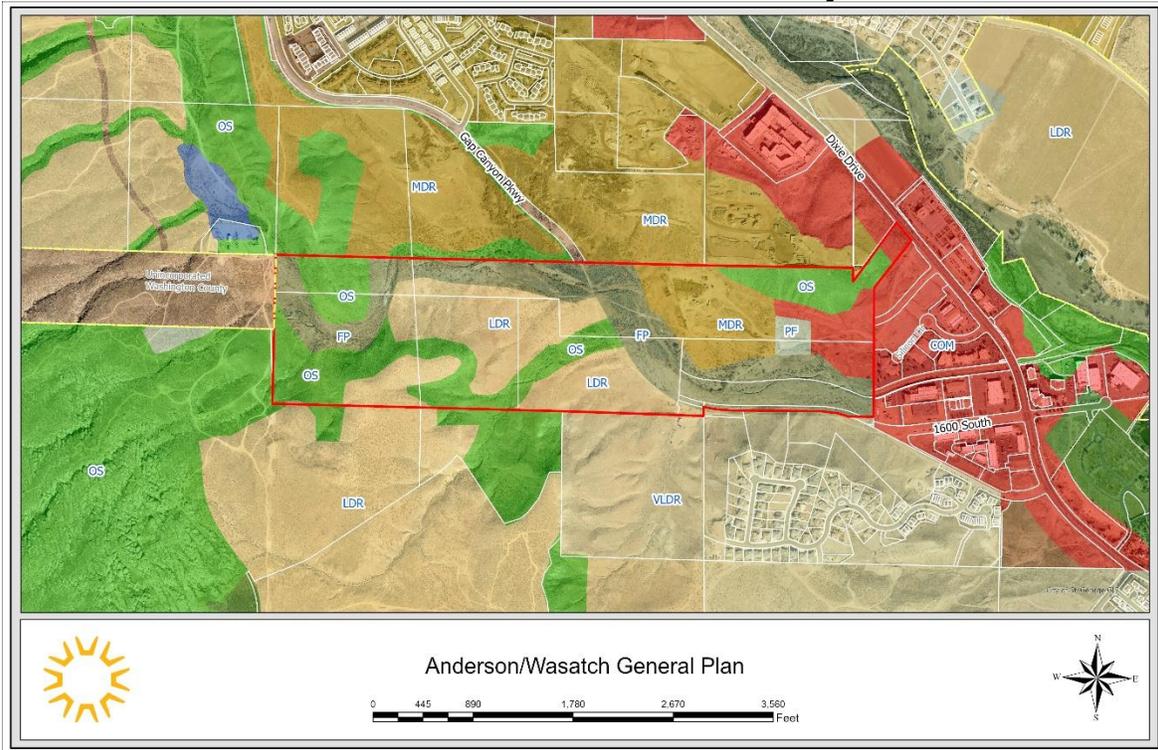
EXHIBITS PROVIDED

1. Exhibit A – General Plan Maps
“Exhibit A” in the packet are the maps the applicant supplied showing the existing and proposed General Plan maps. The proposed map will be revised based on HSRB discussion.
2. Exhibit B – Slope Analysis
“Exhibit B” in the packet is an analysis of the slope.

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).

General Plan – MDR – Medium Density Residential



Zoning – PD-R (Planned Development Residential)

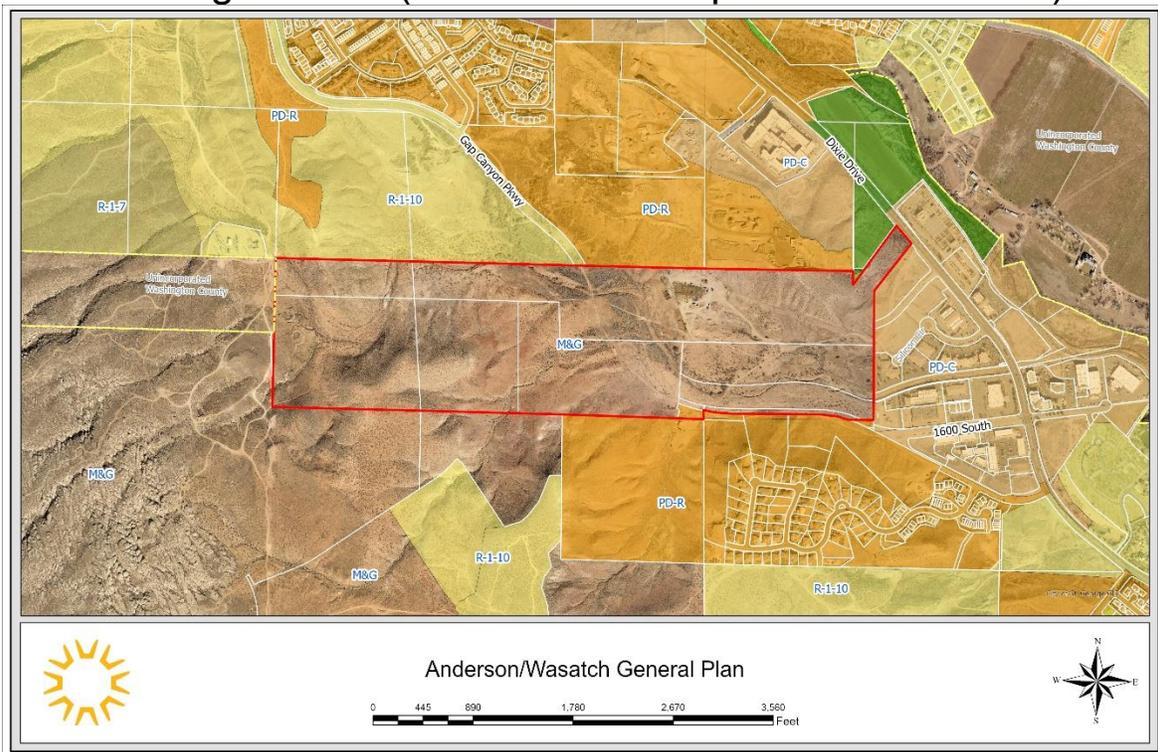
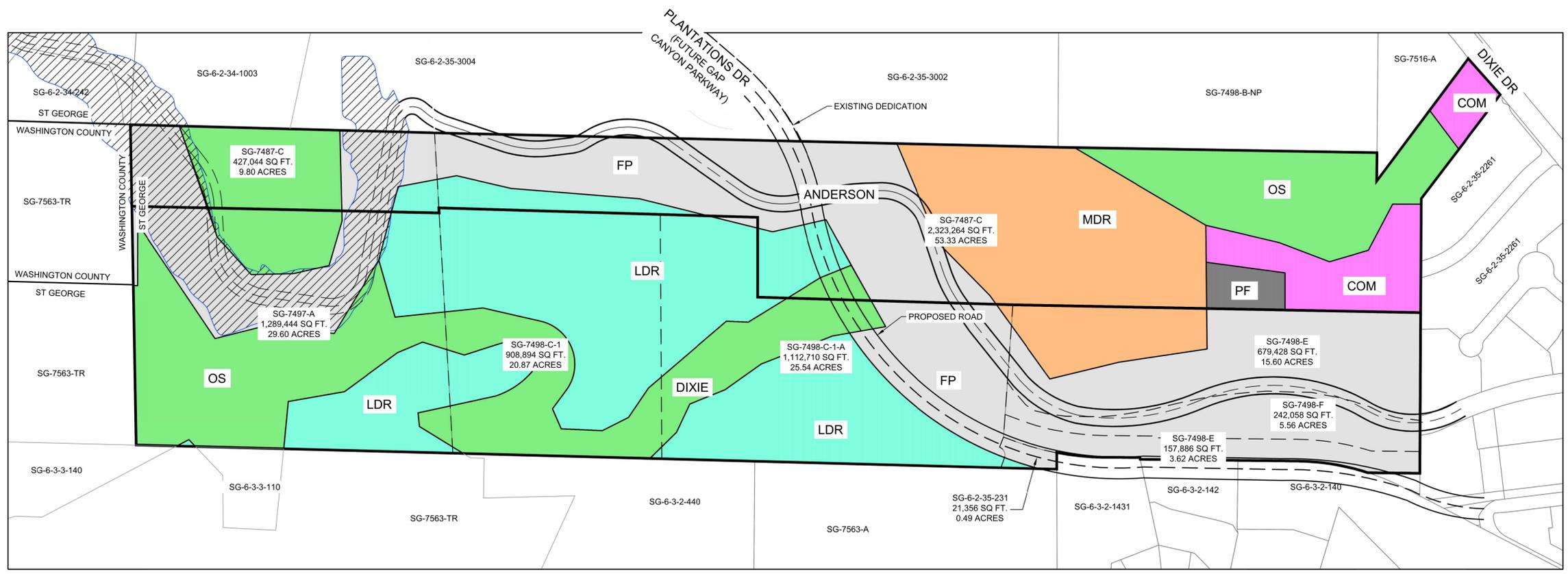
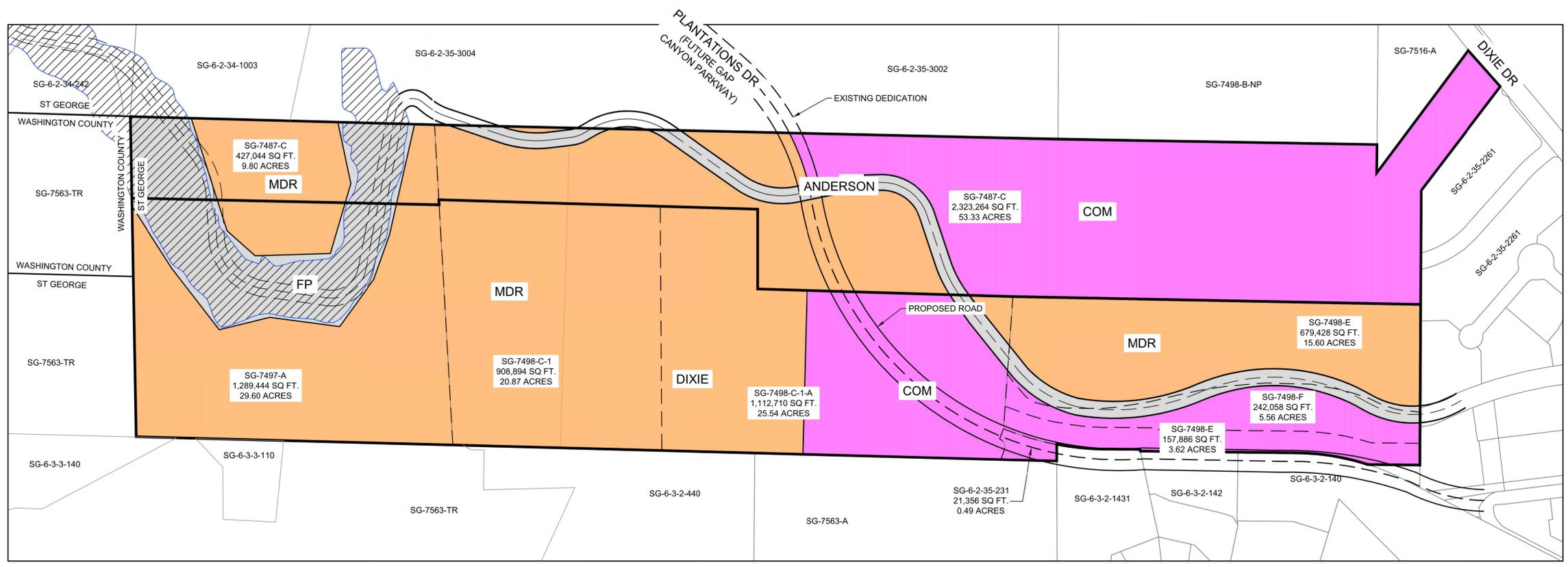


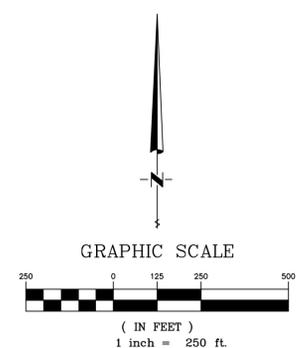
EXHIBIT A
General Plan Maps



EXISTING GENERAL PLAN



PROPOSED GENERAL PLAN



No.	Date	By	Revision

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DATE: FEB 2024
 DRAWN: JMG
 APPROVED: JEM
 SCALE: 1" = 250'
 JOB NO.: 231237

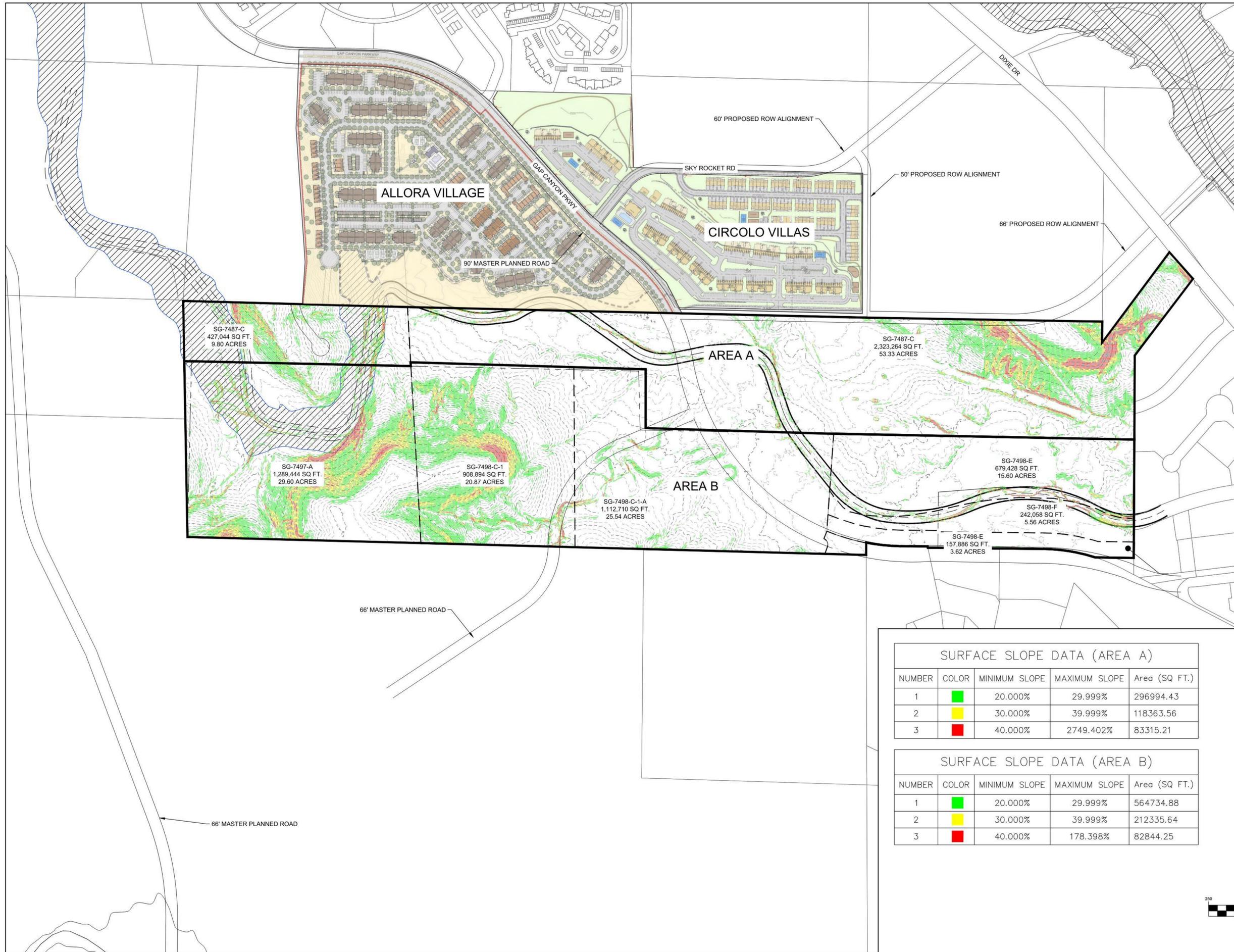
GP AMENDMENT EXHIBIT
 TONAQUINT DEVELOPMENT
 LOCATED IN ST GEORGE, UTAH

SHEET 1 OF 1 SHEETS
 FILE: EXHIBIT

X:\231000-231999\231237 - Anderson Concept\Drawings\General Plan\General Plan Amendment Exhibit.dwg

EXHIBIT B

Slope Analysis Map

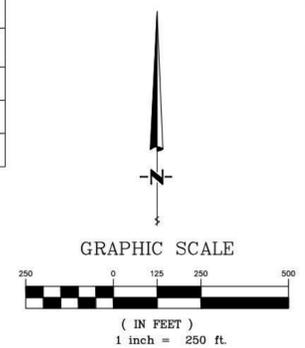


SURFACE SLOPE DATA (AREA A)

NUMBER	COLOR	MINIMUM SLOPE	MAXIMUM SLOPE	Area (SQ FT.)
1	■	20.000%	29.999%	296994.43
2	■	30.000%	39.999%	118363.56
3	■	40.000%	2749.402%	83315.21

SURFACE SLOPE DATA (AREA B)

NUMBER	COLOR	MINIMUM SLOPE	MAXIMUM SLOPE	Area (SQ FT.)
1	■	20.000%	29.999%	564734.88
2	■	30.000%	39.999%	212335.64
3	■	40.000%	178.398%	82844.25



No.	Date	By	Revision

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 JOB NO.: 231237

SLOPE ANALYSIS EXHIBIT
 TONQUINT DEVELOPMENT
 LOCATED IN ST GEORGE, UTAH

SHEET 1 OF 1 SHEETS
 FILE: EXHIBIT

1 **ST. GEORGE HILLSIDE REVIEW BOARD MINUTES**
2 **FEBRUARY 28, 2024 8:30 A.M.**
3 **ON SITE**
4

5 **PRESENT:**

6 **Board Member, Dave Black**
7 **Board Member, Jeff Mathis**
8 **Board Member, Russ Owens**
9 **Board Member, Kevin Holyoak arrived at approximately 8:40**

10
11 **EXCUSED:**

12 **Board Member, James Sullivan**

13
14 **STAFF MEMBERS PRESENT:**

15 **Assistant Public Works Director, Wes Jenkins**
16 **Planner III, Daniel Boles**
17 **Planner II, Brenda Hatch**
18 **City Attorney, Daniel Baldwin**

19
20 **OTHERS PRESENT:**

21 **Ryan Thomas, Mike Terry, Nick Ence, Rhett Beazer**

22
23 **APPOINT VICE CHAIR**

24 Board Member Black opened the meeting to appoint a vice chairman as the chairman
25 could not attend this meeting.

26
27 Link to motion: [00:00:00](#) [Recording 1]
28

29 **MOTION:**

30 Board Member Black made a motion to nominate Russ Owens as the Vice Chair.

31 **SECOND:**

32 Board Member Mathis seconded the motion.

33 **VOTE:**

34 Board Member Black called for a vote, as follows:

35
36 Board Member Black - aye
37 Board Member Mathis - aye
38 Board Member Owens - aye
39

40 The vote was unanimous and the motion carried.
41

42 **HILLSIDE DEVELOPMENT PERMIT:**

43 Consider a request for a hillside development permit in the hillside overlay zone and
44 in areas exceeding 20% slope and rockfall study area for a potential single-family lot
45 located at approximately just east of the Marblewood Drive/Walnut Canyon Drive
46 Intersection (see map below). The property is approximately 0.26 acres.
47

48 Link to presentation from Planner Dan Boles, including discussion between Mike Terry,
49 Ryan Thomas, Wes Jenkins, and the Hillside Review Board: [00:05:03](#) [Recording 1]
50

51 [Agenda packet \[Page 3\]](#)
52

53 Link to motion: [00:10:07](#) [Recording 1]

1
2
3 **MOTION:**

4 A motion was made by Board Member Dave Black to recommend the approval
5 of this new lot, we recognize that there was an isolated area that it showed a
6 steep slope but we believe it is isolated and it's not an issue and that the
7 approval is contingent upon an updated rockfall letter that is specific to this
8 lot by AGECE.

9 **SECOND:**

10 The motion was seconded by Board Member Jeff Mathis.

11 **VOTE:**

12 Vice Chair Russ Owens called for a vote, as follows:

13
14 Board Member Black - aye
15 Board Member Mathis - aye
16 Board Member Owens - aye
17 Board Member Holyoak - aye

18
19 The vote was unanimous and the motion carried.
20

21 **HILLSIDE DEVELOPMENT PERMIT:**

22 Consider a request for a hillside development permit in the hillside overlay zone and
23 in areas exceeding 20% slope and in a rockfall study zone for a potential hotel at
24 approximately 300 South 1470 East (see map below). The property is approximately
25 2.17 acres.

26
27 Link to presentation from Planner Dan Boles, including discussion between Rhett
28 Beazer, Nick Ence, Wes Jenkins, and the Hillside Review Board: [0:00:00](#) [Recording
29 2]

30
31 [Agenda packet \[Page 24\]](#)

32
33 Link to motion: [00:22:51](#) [Recording 2]
34

35 **MOTION:**

36 A motion was made by Board Member Black to table it until Landmark can
37 address the concerns on the stable 1:1 cut slopes on the north side of the
38 property and the east side of the property.

39 **SECOND:**

40 The motion was seconded by Board Member Jeff Mathis.

41 **VOTE:**

42 Vice Chair Owens called for a vote, as follows:

43
44 Board Member Black - aye
45 Board Member Mathis - aye
46 Board Member Owens - aye
47 Board Member Holyoak - aye

48
49 The vote was unanimous, and the motion carried.
50

51 **APPROVAL OF MINUTES:**

52 Approval of the meeting minutes from January 24, 2024, meeting.

1 [Agenda packet \[Page 142\]](#)

2
3 Link to motion: [00:28:58](#) [Recording 2]
4

5 **MOTION:**

6 A motion was made by Board Member Black to approve the minutes.

7 **SECOND:**

8 The motion was seconded by Board Member Mathis.

9 **VOTE:**

10 Vice Chair Owens called for a vote, as follows:

11 Board Member Black – aye
12 Board Member Mathis - aye
13 Board Member Owens - aye
14 Board Member Holyoak - aye
15

16
17 The vote was unanimous, and the motion carried.
18
19
20
21
22

23

Brenda Hatch, Planner II

5 Link to comments by Board Member Mathis, including discussion between Applicants
6 and Board Members: [00:11:48](#) [Recording 1]
7

8 Link to discussion between Board Members: [00:13:01](#) [Recording 1]
9

10 Agenda packet [Page 8]
11

12 Link to motion: [00:16:09](#) [Recording 1]
13
14

15 **MOTION:**

16 A motion was made by Board Member Mathis to recommend approval for this
17 project. There are some disturbed slopes greater than the 20-40% range but
18 are non-contiguous and that we find that they can be disturbed.
19

20 **SECOND:**

21 The motion was seconded by Board Member Black.

22 **VOTE:**

23 Chair Sullivan called for a vote, as follows:

24 Board Member Sullivan - aye
25 Board Member Mathis - aye
26 Board Member Holyoak - aye
27 Board Member Black - aye
28

29 The vote was unanimous and the motion carried.
30

31 **ZONING REGULATION AMENDMENT:**

32 **Zoning Regulation Amendment – Rock Walls:** The City of St. George would like to
33 consider a request to amend Title 10-18A, Rockery Walls, of the St. George City Code,
34 to make various changes to the rock wall portion of the zoning ordinance. Case No.
35 **2024-ZRA-005** (Staff – Dan Boles)
36

37 Link to discussion between Board Members: [00:17:43](#) [Recording 1]
38

39 Agenda packet [Page 244]
40

41 Link to motion: [01:23:50](#) [Recording 1]
42
43

44 **MOTION:**

45 A motion was made by Board Member Mathis to recommend approval of the
46 new ordinance with the following conditions, rockery walls and other retaining
47 walls will need to be engineering 4ft. and greater, maximum single tier height
48 for residential will be 10ft., but we will allow them to go up to a two-tier of
49 20ft. allowed in residential zones, in commercial and industrial we will allow
50 single tier walls of 12ft. with the double tier wall maximum up to 24ft. The
51 setback from face walls will be 10ft. The retaining walls be 3½ft we agree
52
53

5 with that recommendation, and subdivisions with 3½ft. or greater install
6 retaining walls in subdivisions with that difference in height between pads. We
7 recommend that a definition be provided and described, defining protective
8 slopes versus retaining slopes and how those are addressed, as far as the
9 protective slopes go. We recommend that water transmitting irrigation does
10 not be included in the tiers between the bottom and top tier, some
11 landscaping be installed there, but not anything that require irrigation and
12 water for the livelihood of the wall.

13 **SECOND:**

14 The motion was seconded by Board Member Black.

15 **VOTE:**

16 Chair Sullivan called for a vote, as follows:
17

18 Board Member Sullivan - aye
19 Board Member Mathis - aye
20 Board Member Black - aye
21 Board Member Holyoak - aye
22

23 The vote was unanimous and the motion carried
24

25 **HILLSIDE DEVELOPMENT PERMIT:**

26 **Heath Snow Property – ON SITE:** Heath Snow is requesting a Hillside Development
27 permit to adjust the location of the ridgeline and ridgeline setback on lot 32 of the
28 South Rim at Foremaster Ridge Phase 2 subdivision in anticipation of the construction
29 of a residential home. Case No. **2024-HS-006** (Staff – Dan Boles)
30

31 Link to re-convene by Chair Sullivan: [00:00:05](#) [Recording 2]
32

33 Link to discussion between Board Members and Applicant: [00:00:35](#) [Recording 2]
34

35 Agenda packet [Page 257]
36

37 Link to motion: [00:25:25](#) [Recording 2]
38
39

40 **MOTION:**

41 A motion was made by Board Member Mathis to recommend approval and the
42 movement of the ridgeline back to stipulated areas, 10½ft off the property
43 line to the south.

44 **SECOND:**

45 The motion was seconded by Board Member Holyoak.

46 **VOTE:**

47 Chair Sullivan called for a vote, as follows:
48

49 Board Member Sullivan - aye
50 Board Member Mathis - aye
51 Board Member Holyoak – aye
52

53 The vote was unanimous and the motion carried

5 The Hillside Review Board inadvertently approved minutes for the previous meeting,
6 however, the minutes were not on the agenda. The Hillside Review Board will put the
7 approval of the minutes on the agenda dated March 27, 2024.
8

9 **ADJOURN:**

10 Link to move to adjourn: [00:28:17](#) [Recording 2]
11

12 **MOTION:**

13 A motion was made by Chair Sullivan to adjourn.

14 **SECOND:**

15 The motion was seconded by Board Member Mathis.

16 **VOTE:**

17 Chair Sullivan called for a vote, as follows:
18

19 Board Member Sullivan - aye

20 Board Member Mathis - aye

21 Board Member Holyoak - aye
22

23 The vote was unanimous and the motion carried.
24
25
26
27

28 _____
Monica Smith, Secretary