NOTICE OF MEETING
PLANNING COMMISSION
CITY OF ST. GEORGE
WASHINGTON COUNTY, UTAH

Public Notice

Notice is hereby given that the Planning Commission of the City of St. George, Washington County, Utah, will hold a **Planning Commission** meeting in the City Council Chambers, 61 South Main St, St George, Utah, on **Tuesday, April 14, 2026,** commencing at **5:00 p.m**.

The agenda for the meeting is as follows:
Call to Order
Flag Salute
Call for Disclosures

1. **HILLSIDE DEVELOPMENT PERMIT Trails East HS –** Consider a request for a hillside development permit to allow disturbance of areas in the 20-30%, 30-40% and 40% and above slope areas for property generally located east of Highway 18, between approximately 3200 North and 4300 North. The applicant is Civil Science, and the representative is Brandee Walker. Case No. 2026-HS-002 (Staff – Dan Boles)

2. **ZONE CHANGE- Trails East PD-R– PUBLIC HEARING** Consider a request to change the zoning from G&G (Gravel & Grazing) to PD-R (Planned Development Residential) on approximately 207 acres. The property is generally located east of Highway 18, between approximately 3400 North and 4200 North. The applicant is Civil Science, and the representative is Brandee Walker. Case No. 2026-ZC-004 (Staff – Dan Boles)

3. **ZONE CHANGE- Trails East TNZ– PUBLIC HEARING** Consider a request to change the zoning from G&G (Gravel & Grazing) to PD-TNZ (Planned Development Traditional Neighborhood Zone) on approximately 10 acres. The property is generally located east of Highway 18, between approximately 3400 North and 4200 North. The applicant is Civil Science, and the representative is Brandee Walker. Case No. 2026-ZC-003 (Staff – Dan Boles)

4. **ZONE CHANGE- Zion Bible Church – PUBLIC HEARING** Consider a request to change the zoning from ASBP (Airport Supporting Business Park) to C-2 (Highway Commercial) on approximately .23 acres. The property is generally located south of Flowers Way and north of Southern Parkway. The applicant is Civil Science, and the representative is Brandee Walker. Case No. 2026-ZC-005 (Staff – Brenda Hatch)

5. **ZONE CHANGE- Woodhaven Estates Amended & Extended – PUBLIC HEARING** Consider a request to change the zoning from A-1 (Agricultural 40,000 sq. ft. minimum lots) to RE-37.5 (Residential Estates 37,500 sq. ft. minimum lots) on approximately 2.87 acres. The property is generally located on 3430 East at approximately 2300 South. The applicant is Civil Science, and the representative is Brandee Walker. Case No. 2026-ZC-006 (Staff – Brenda Hatch)

6. **HILLSIDE DEVELOPMENT PERMIT Rath ADA ADU –** Consider a request for a hillside development permit to adjust the designation of the ridgeline setback on parcel SG-6-3-12-4311 from "Cuesta" to "Ridgeline" to reduce the ridgeline setback from 100' to 30' for a residential ADU. The applicant is Gregory Rath. Case No. 2026-HS-001 (Staff – Wes Jenkins)

7. **PRELIMINARY PLAT Desert Corner Commercial Subdivision–** Consider a request for a preliminary plat for a 9-building commercial subdivision totaling approximately 6.62 acres. The applicant is DSG Engineering Inc., and the representative is Ken Miller. Case No. 2026-PP-008 (Staff – Brian Dean)

8. **PRELIMINARY PLAT Desert Color Commercial Phase 5 –** Consider a request for a preliminary plat for the purpose of a two-lot commercial subdivision in the Desert Color Development. The applicant is Bush & Gudgell Inc., and the representative is Bob Hermandson. Case No. 2026-PP-009 (Staff – Brenda Hatch)

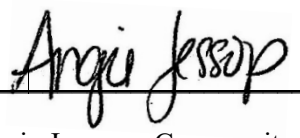
9. MINUTES

Consider a request to approve the minutes from the March 24, 2026, meeting.

10. CITY COUNCIL ACTIONS

Report on items heard at the April 2, 2026, City Council meeting.

1. *White Dome Apartments*
2. *Avenidas at Hidden Valley Ph 3&4*
3. *Mojave Crossing Amendment*
4. *Dixie Dr.GPA*



April 10, 2026

Angie Jessop – Community Development Office Supervisor Date

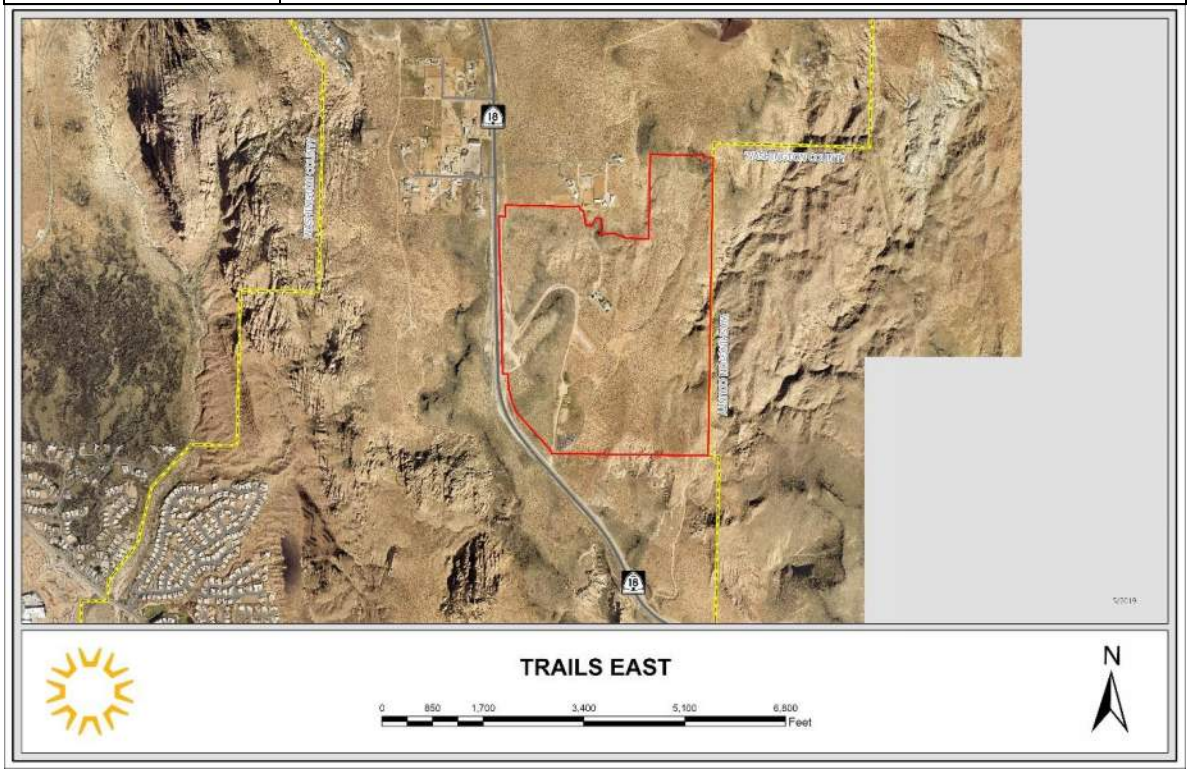
Reasonable Accommodation: The City of St. George will make efforts to provide reasonable accommodations to disabled members of the public in accessing City programs. Please contact the City Human Resources Office at (435) 627-4674 at least 24 hours in advance if you have special needs.

St.George
Community Development

Item 1
Hillside Permit

HILLSIDE REVIEW BOARD AGENDA REPORT: **03/31/2026**
PLANNING COMMISSION AGENDA REPORT: **04/14/2026**

Trails East Hillside Development Permit (Case No. 2026-HS-002)		
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 in order to develop the property into multi-family and single-family homes. There will be a commercial element in the future.	
Applicant:	Civil Science	
Representative:	Brandee Walker	
Location:	East side of Highway 18, between approximately 3200 North and 4300 North	
General Plan:	LDR (Low Density Residential) & COM (Commercial)	
Existing Zoning:	G&G (Gravel & Grazing)	
Surrounding Zoning:	North	PD-TNZ (Planned Development Traditional Neighborhood Zone), RE-12.5 (Residential Estates, 12,500 ft^2 lots) and G&G (Gravel & Grazing)
	South	R-1-10 (Single Family Residential 10,000 sq ft lots)
	East	Washington County
	West	Across Hwy 18 G&G (Gravel & Grazing)
Land Area:	333 Acres	



BACKGROUND

The applicant is the owner of what was once known and approved as The Trails. The Trails zoning was approved in 2006 and was designed with 925 single-family units throughout the approximately 333-acre site. In March of 2026, the current owner of the property went through the process to change the General Plan on approximately 108 acres on the southern portion of the 333 acres of total property. The108 acres went from LDR (Low Density Residential) to COM (Commercial). While the Hillside Review Board will be considering the Commercial portion of the property, for density purposes, the Commercial portion has been removed from the calculation.

Regarding the remaining 224 acres to be used for residential development: the applicant has removed the non-buildable property from the equation. That leaves the following total buildable area:

0% - 20%	254.33		100%	254.33
21% - 30%	36.75		30%	11.02
31% - 40%	19.31		5%	0.97
41% +	22.29		0%	0
Total:	332.68			266.32

After removing the 107.6 acres of buildable commercial property, the total buildable residential acreage is 15.72 acres. The site will have two primary areas of residential development. The first area is next to the highway and will consist of small single-family homes, townhomes and stacked apartments. The larger, second area will consist of all single-family homes. Each will require a zone change. Overall, the density is restricted to 4.0 units per acre. At a total of 607 units over 158.72 buildable acres, the project would yield an overall density of 3.82 units per acre.

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 – Development Map
   "Exhibit A" are drawings submitted to the City on August 15, 2024.

2. Exhibit B – Grading Plan
   "Exhibit C" in the packet is the Grading Plan.

3. Exhibit C – Illustrative Plan
   "Exhibit D" in the packet is an analysis of the slope.

4. Exhibit E – Phase 1 & 2 Drainage Study
   "Exhibit E" in the packet is a letter provided by AGEC

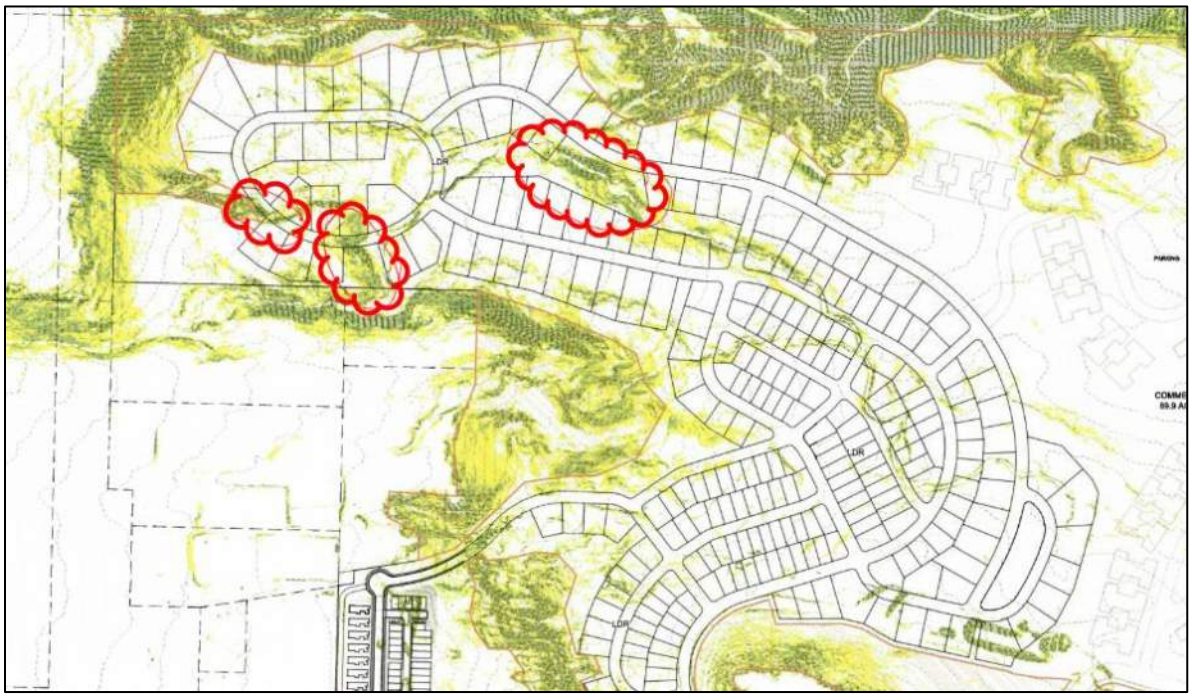
5. Exhibit E – Geotechnical Study
   "Exhibit E" in the packet is the Geotechnical report

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).

Hillside Review Board Meeting

On March 31, 2026, the Hillside Review Board (HSRB) held a public meeting to discuss the request for a hillside permit. The HSRB approved of the development but wanted to revisit the areas circled in red once the plats for those areas were submitted.



From the HSRB meeting minutes:

> A motion was made by Board Member Mathis to recommend approval for the residential areas, primary focus on this one was the West side, more high density development area. But also looking at the overall general map to the east and to the north, the west side does not see any issues or concerns necessarily. We will have commercial later, in some of the other areas. We do have a couple areas of concern, as we move further to the north and east, where we have some over 40% slopes that we would like to look at again, as more design gets put together and we are able to access that in an easier manner. We have circled three areas of concern that we want to view, Brandee (Walker) has the map [Exhibit A] and we will look at it in the future. Besides that, there are a few other areas inside the development that has non-contiguous areas that we are not concerned about, that is not out-cropping or anything that wouldn't meet ordinance.

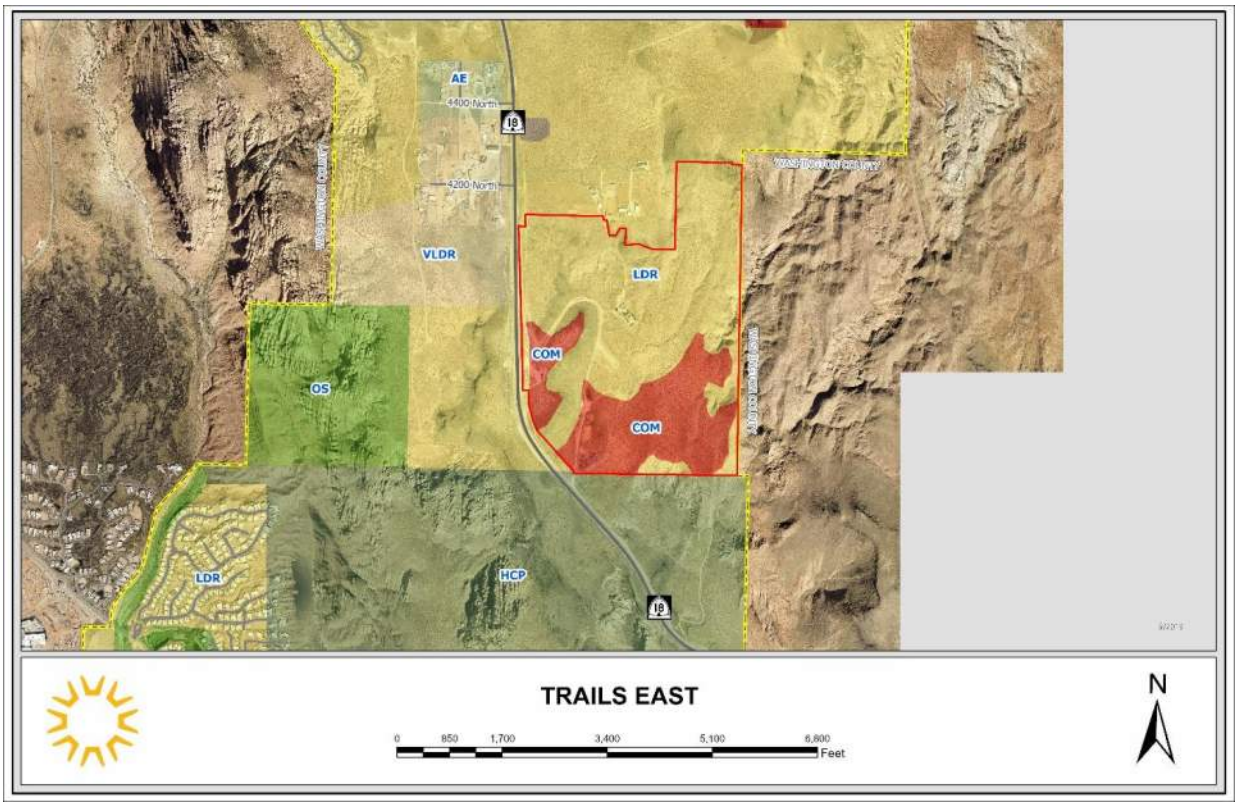
MODEL MOTION

"I move that we recommend to the City Council, approval of the Trails East hillside permit, application number 2026-HS-002, based on the findings and subject to the recommendations of the Hillside Review Board as listed in the staff report."

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. Based on the materials provided, including the slope analysis and grading plans, the project appears to stay within the allowable disturbance thresholds for slopes between 20% and 40%, and avoids disturbance in areas exceeding 40% slope, consistent with City ordinance requirements.
3. The proposed density of approximately 3.82 units per acre remains below the maximum allowed under the General Plan designation.

General Plan – LDR - Low Density Residential



Zoning – G&G - (Gravel & Grazing)

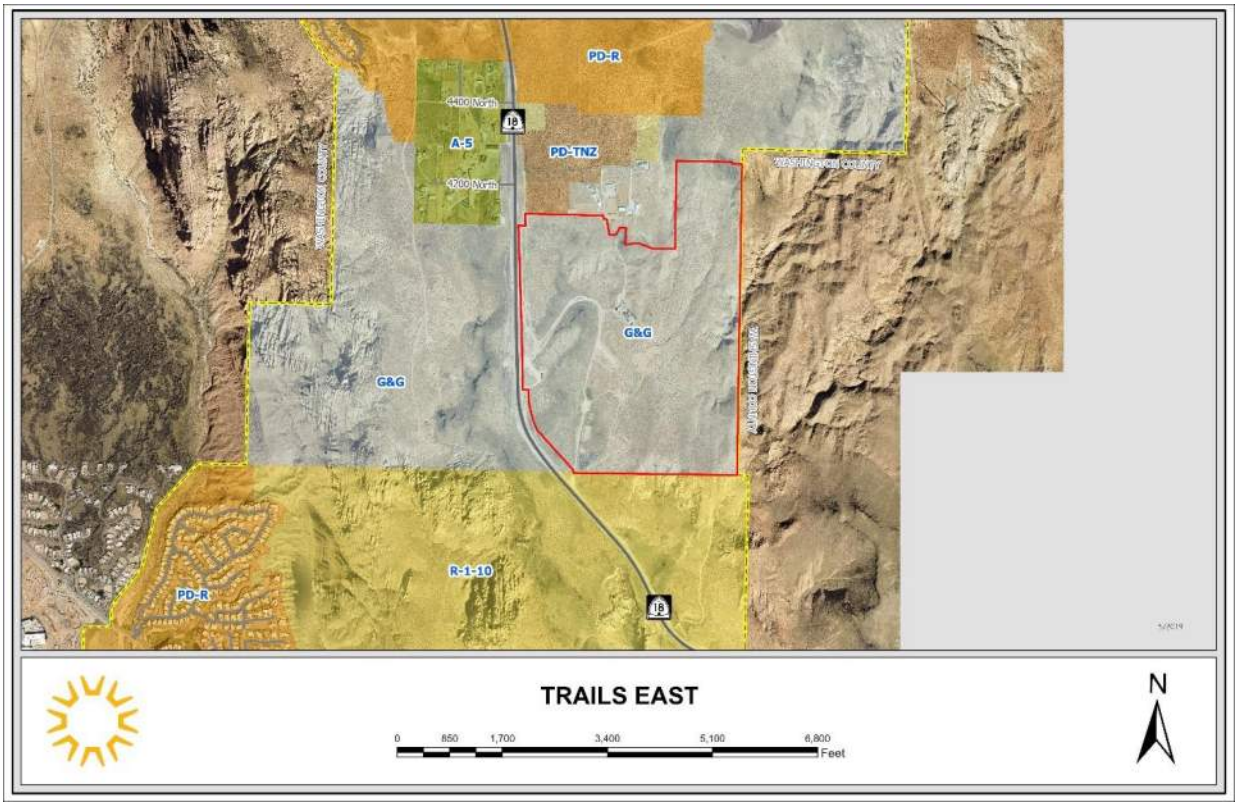


EXHIBIT A

Development Map



1453 S. DIXIE DRIVE, SUITE 150
ST. GEORGE, UT 84770
435.986.0100

CivilScience

DEVELOPMENT MAP
TRAILS EAST
LOCATED IN ST. GEORGE, UTAH

PD-R AREA = 214.35 ACRES

DEVELOPABLE AREA = 148.92 ACRES (HILLSIDE LIMITS)

UNITS = 575 TOTAL
- 269 SINGLE FAMILY
- 82 TOWNHOMES
- 224 APARTMENTS

DENSITY = 3.9 D.U./ACRE (575/148.92)

OPEN SPACE:
- DEVELOPED AMENITIES = 1.9 ACRES
- DEVELOPED LANDSCAPE = 3.5 ACRES
- NATURAL OPEN SPACE = 106.1 ACRES
- TOTAL = 111.5 ACRES (48%)

PD-TNZ AREA = 10.0 ACRES

DEVELOPABLE AREA = 9.7 ACRES (-0.3 HILLSIDE)

UNITS = 32
- 17 SINGLE FAMILY
- 15 TOWNHOMES

DENSITY = 3.2 D.U./ACRE

HILLSIDE AREA NOT DISTURBED = 77.3 ACRES

Developable Area Table	
Slopes	Area (Acres)
0% -20%	254.33
20% - 30%	36.75
30% - 40%	19.31
40% - Vertical	22.29
	332.65

Use Table				
Use	Area (Acres)	Develop (Acres)	Units	Density
TNZ	10.0	9.7	32	3.2 DU/Ac
PD-R	214.35	148.92	575	3.9 DU/Ac
PD-C	108.3	107.6	NA	NA
	332.65	266.33		

Slopes Table			
Minimum Slope	Maximum Slope	Area (Acres)	Color
0%	20%	254.33	
20%	30%	36.75	
30%	40%	19.31	
40%	VERTICAL	22.29	
		332.65	

0 200 100 400
SCALE: 1" = 200'
(SCALE ONLY VALID FOR 24" x 36" PAPER)

DEVELOPMENT MAP
TRAILS EAST

PROJ. #: IF25589
DRAWN BY: BLW
DATED: 03/17/2026
SCALE OF SHEET
HOR SCALE: 1" = 200'

SHEET
C3

EXHIBIT B

Grading Plan

THE TRAILS - PHASES 1 & 2

GRADING PLANS

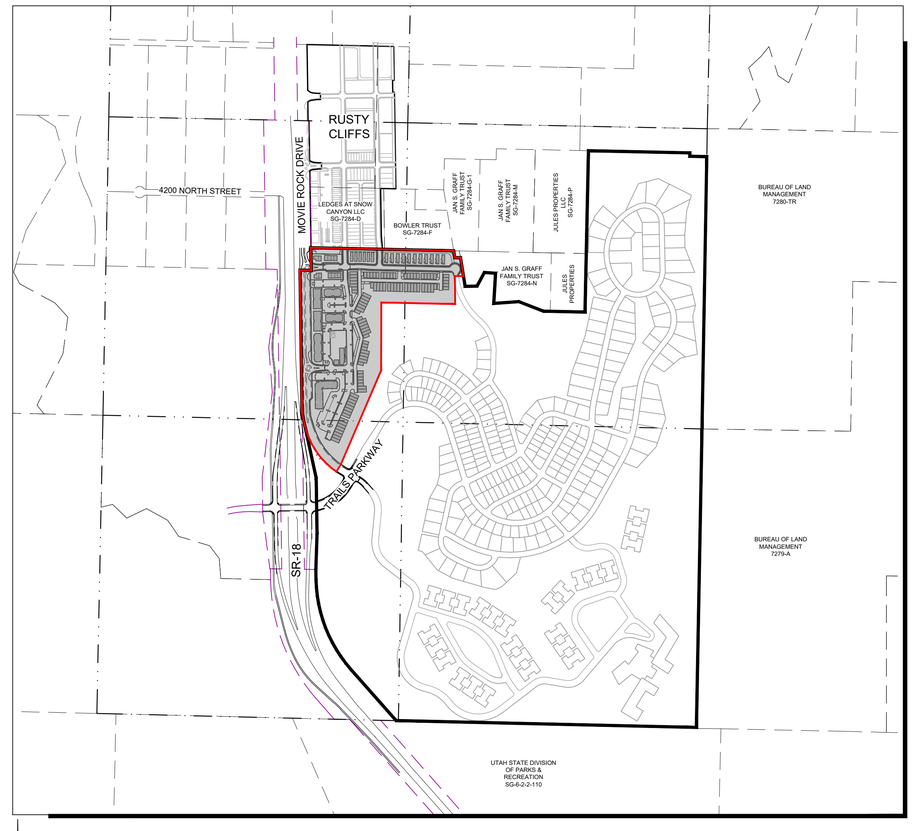
HILLSIDE DEVELOPMENT PERMIT

LOCATED IN ST. GEORGE, UTAH

PARCEL SG-7284-B-1-A

SECTION 35, TOWNSHIP 41 SOUTH, RANGE 16 WEST

SHEET NO.	SHEET DESCRIPTION
C1	COVER SHEET
C2	OVERALL SITE PLAN
C3	GRADING PLAN - PHASES 1 & 2
C4	GRADING PLAN - SHEET 1
C5	GRADING PLAN - SHEET 2
C6	GRADING PLAN - SHEET 3
C7	GRADING PLAN - SHEET 4
C8	GRADING PLAN - SHEET 5
C9	GRADING PLAN - SHEET 6
C10	GRADING PLAN - SHEET 7
C11	GRADING PLAN - SHEET 8
C12	GRADING PLAN - SHEET 9
C13	GRADING PLAN - SHEET 10
C14	GRADING PLAN - SHEET 11
C15	CROSS SECTION - SHEET 1
C16	CROSS SECTION - SHEET 2
C17	CROSS SECTION - SHEET 3



PROJECT MAP
(N.T.S.)

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Engineers / Surveyors / Solutions
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ST. GEORGE, UT 84770
435.986.0100

HELOS GROUP
TRAILS DEVELOPMENT QOZB LLC
3940 NORTH TRAVERSE MNT BLVD STE 200
LEHI, UT 84043

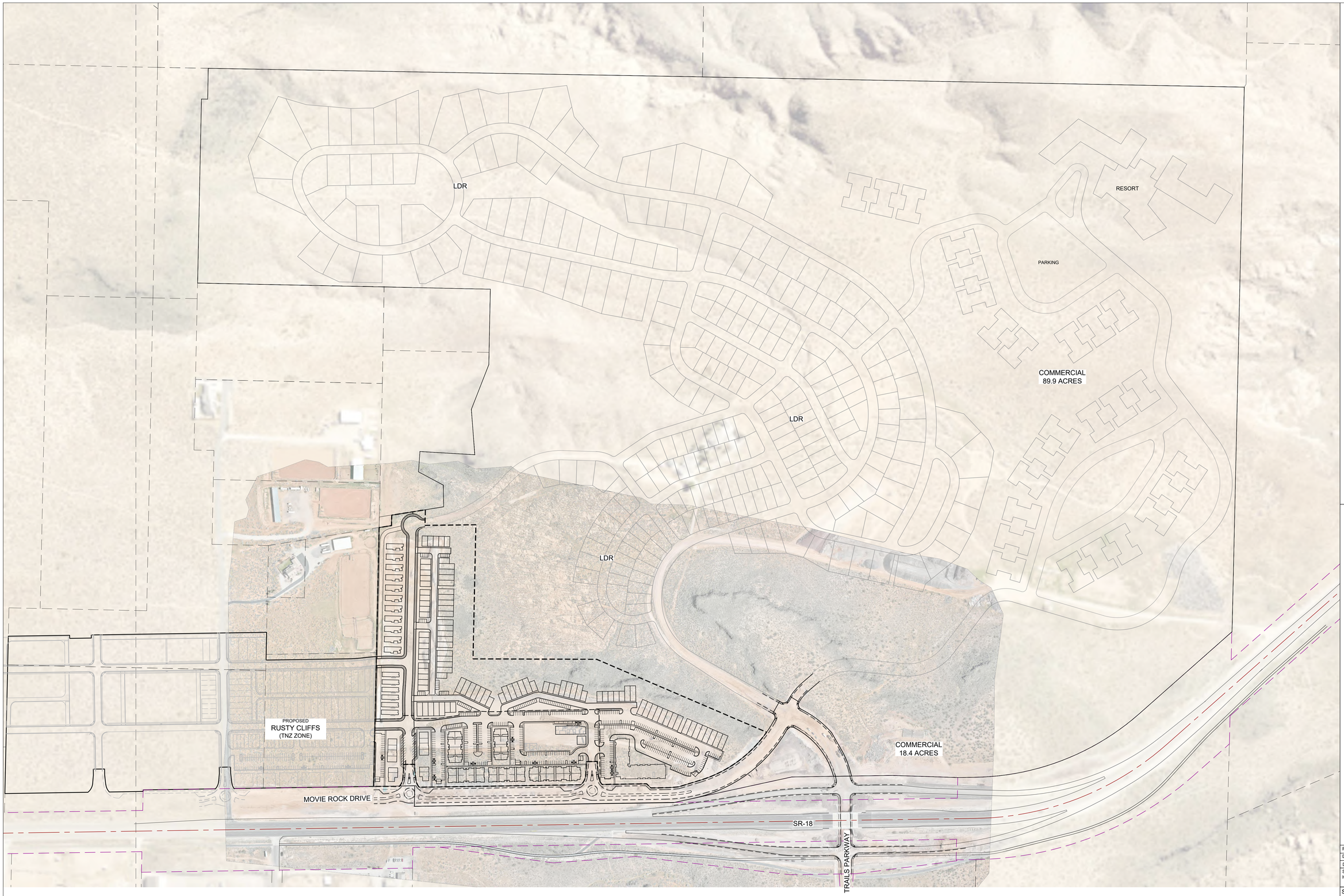
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HILLSIDE DEVELOPMENT PERMIT
THE TRAILS - PHASES 1 & 2
LOCATED IN ST. GEORGE, UTAH

PROJ. #: IF25589
DRAWN BY: BLW
DATED: 03/11/2026
SHEET
C1



0 100 200 400

SCALE: 1" = 200'

(SCALE ONLY VALID FOR 24" x 36" PAPER)

OVERALL SITE PLAN
THE TRAILS EAST

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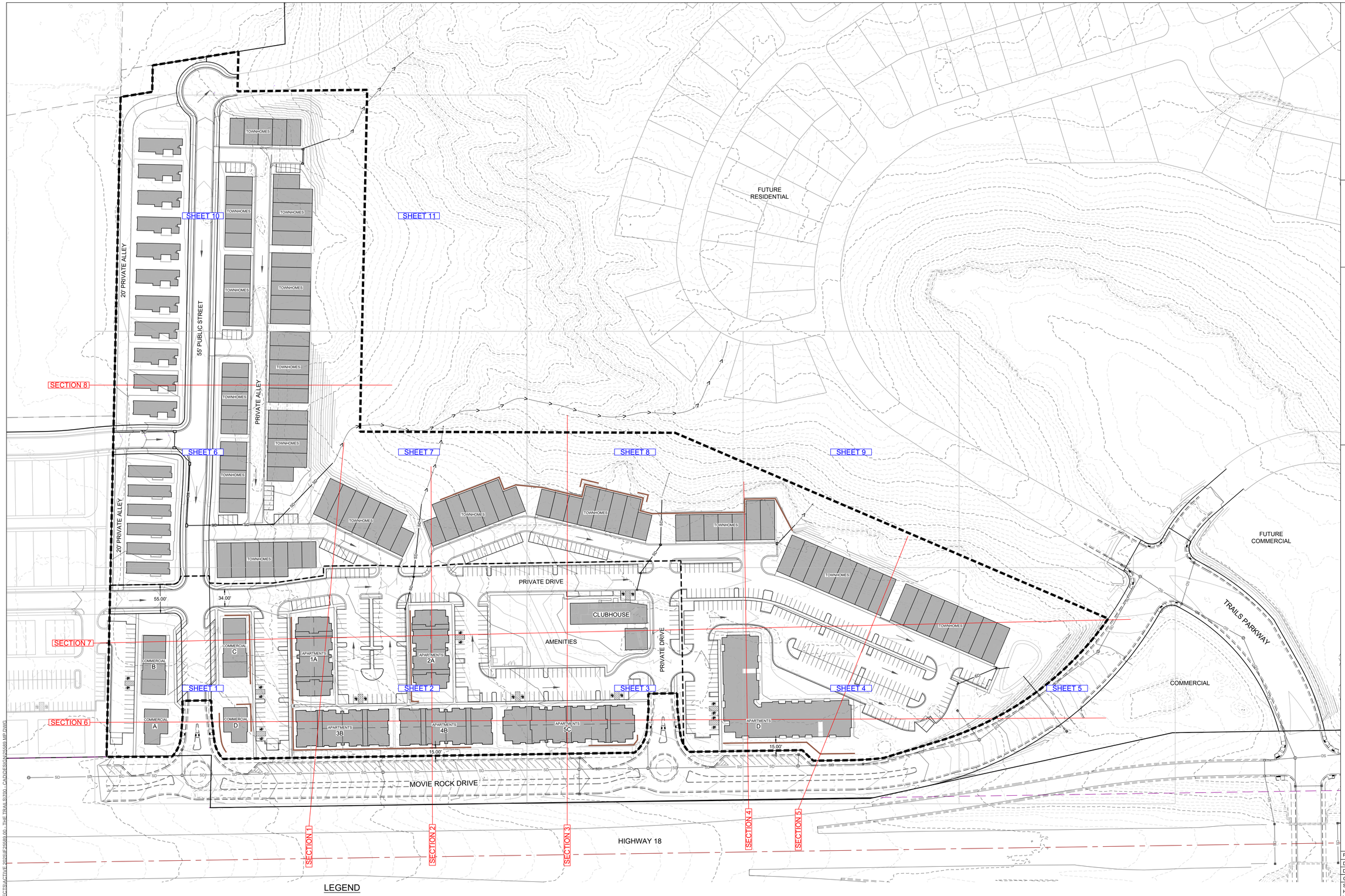
CivilScience

OVERALL SITE PLAN
THE TRAILS EAST
LOCATED IN ST. GEORGE, UTAH

PROJ. #: IF25589
DRAWN BY: BLW
DATED: 03/10/2026
SCALE OF SHEET HOR SCALE: 1" = 200'

SHEET

C2



LEGEND

- EXISTING GROUND CONTOUR
- FINISH GRADE CONTOUR
- PROJECT BOUNDARY
- SD — INSTALL STORM DRAIN
- INSTALL RETAINING WALL
- DRAINAGE FLOW DIRECTION

0 40 80 160

SCALE: 1" = 80'

(SCALE ONLY VALID FOR 24" x 36" PAPER)

GRADING PLAN - PHASES 1 & 2
THE TRAILS

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	REVISION			

GRADING PLAN - PHASES 1 & 2

THE TRAILS

LOCATED IN ST. GEORGE, UTAH

PROJ. #:	Fx. 25589
DATE:	03/10/2026
DESIGN BY:	BLW
CHECKED BY:	RB
SCALE OF SHEET	
HOR SCALE:	1" = 80'
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SHEET

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NOTES

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 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 GRADE CONTOUR
- PROJECT BOUNDARY
- PROPOSED CURB & GUTTER
- EXISTING CURB & GUTTER
- SD — INSTALL STORM DRAIN (PER PLAN)
- INSTALL DRAINAGE SWALE
- INSTALL RETAINING WALL (HEIGHT PER PLAN)
- STORM WATER DETENTION AREA
- DRAINAGE FLOW DIRECTION
- FFE: 00.00 — FINISH FLOOR ELEVATION
- LOCATION / ELEVATION — SPOT ELEVATION

TBC	TOP BACK OF CURB
TOW	FINISH GRADE AT TOP OF WALL
BOW	FINISH GRADE AT BOTTOM OF WALL
TOA	TOP OF ASPHALT
GB	GRADE BREAK
FG	FINISHED GRADE
FL	FLOW LINE
TOC	TOP OF CONCRETE

N

0 10 20 40

SCALE: 1" = 20'

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	REVISION			

GRADING PLAN - SHEET 1

THE TRAILS

LOCATED IN ST. GEORGE, UTAH

PROJ. #:	Fx. 25589
DATE:	03/10/2026
DESIGN BY:	BLW
CHECKED BY:	RB
SCALE OF SHEET	
HOR SCALE:	1" = 40'
VER SCALE:	N/A

SHEET

C4

PATH: L:\UTAH\PROJECTS\ACTIVE 2025\P25589.00 - THE TRAILS\700 - CAD\DESIGN\25589 MP.DWG



NOTES

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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 GRADE CONTOUR
	PROJECT BOUNDARY
	PROPOSED CURB & GUTTER
	EXISTING CURB & GUTTER
SD	INSTALL STORM DRAIN (PER PLAN)
	INSTALL DRAINAGE SWALE
	INSTALL RETAINING WALL (HEIGHT PER PLAN)
	STORM WATER DETENTION AREA
	DRAINAGE FLOW DIRECTION
FFE: 00.00	FINISH FLOOR ELEVATION
LOCATION ELEVATION	SPOT ELEVATION
TBC	TOP BACK OF CURB
TOW	FINISH GRADE AT TOP OF WALL
BOW	FINISH GRADE AT BOTTOM OF WALL
TOA	TOP OF ASPHALT
GB	GRADE BREAK
FG	FINISHED GRADE
FL	FLOW LINE
TOC	TOP OF CONCRETE

0 10 20 40
SCALE: 1" = 20'
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	REVISION			

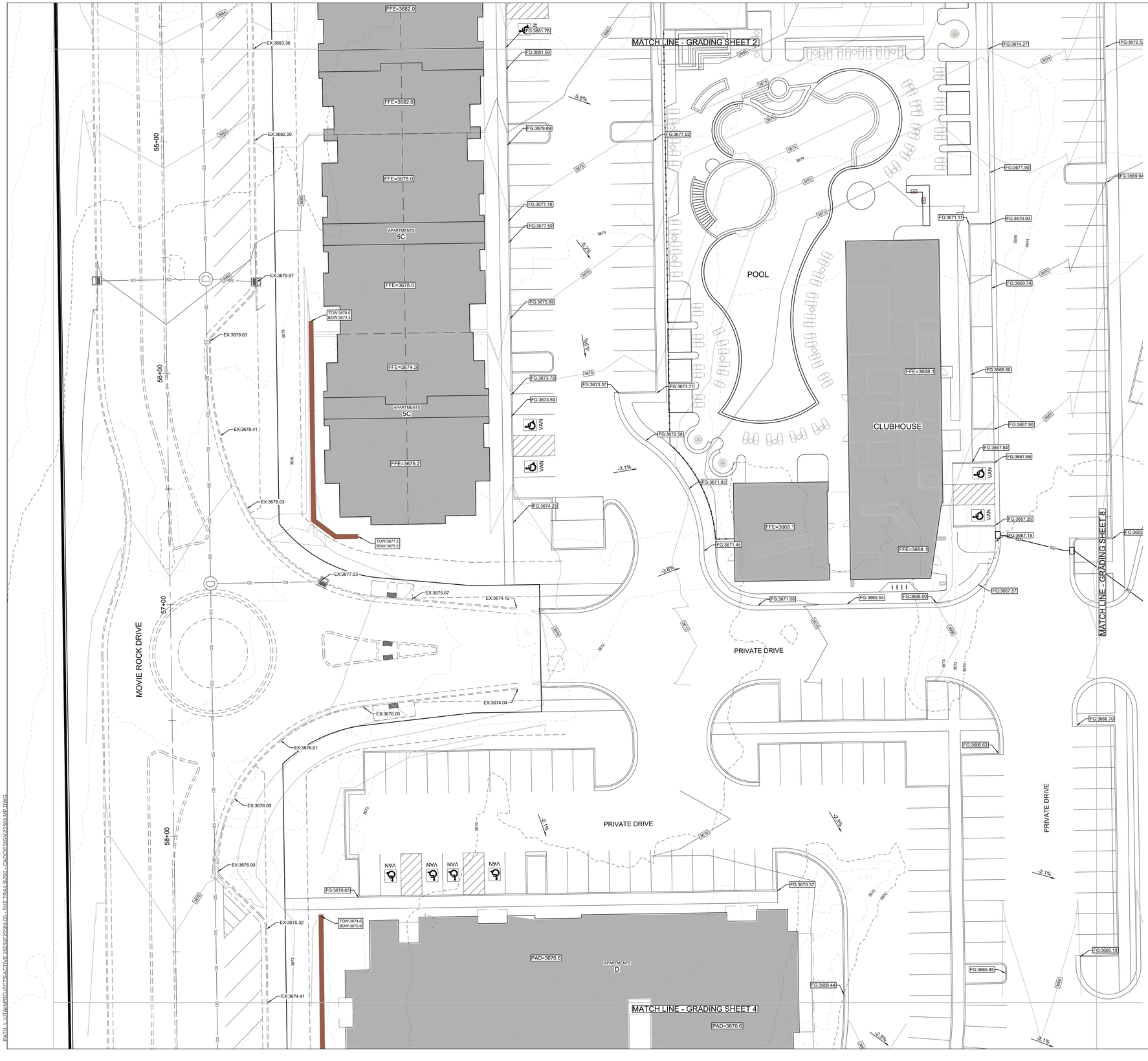
GRADING PLAN - SHEET 2

THE TRAILS
LOCATED IN ST. GEORGE, UTAH

PROJ. #:	Fx. 25589
DATE:	03/10/2026
DESIGN BY:	BLW
CHECKED BY:	RB
SCALE OF SHEET	
HOR SCALE:	1" = 20'
VER SCALE:	N/A

SHEET
C5

PATH: L:\UTAH\PROJECTS\ACTIVE 2025\#25589.00_THE TRAILS\700_CADD\DESIGN\25589 MP.DWG



NOTES

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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 GRADE CONTOUR
- PROJECT BOUNDARY
- PROPOSED CURB & GUTTER
- EXISTING CURB & GUTTER
- SD — INSTALL STORM DRAIN (PER PLAN)
- INSTALL DRAINAGE SWALE
- INSTALL RETAINING WALL (HEIGHT PER PLAN)
- STORM WATER DETENTION AREA
- DRAINAGE FLOW DIRECTION
- FFE: 00.00 — FINISH FLOOR ELEVATION
- LOCATION ELEVATION — SPOT ELEVATION

TBC	TOP BACK OF CURB
TOW	FINISH GRADE AT TOP OF WALL
BOW	FINISH GRADE AT BOTTOM OF WALL
TOA	TOP OF ASPHALT
GB	GRADE BREAK
FG	FINISHED GRADE
FL	FLOW LINE
TOC	TOP OF CONCRETE

SCALE: 1" = 20'
(SCALE ONLY VALID FOR 24" x 36" PAPER)

Know what's below. Call before you dig.

CivilScience
Engineers / Surveyors / Solutions
1453 S. DIXIE DRIVE, SUITE 150
ST. GEORGE, UT 84770
435.986.0100

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NO.	DESCRIPTION	BY	APPR.	DATE
	REVISION			

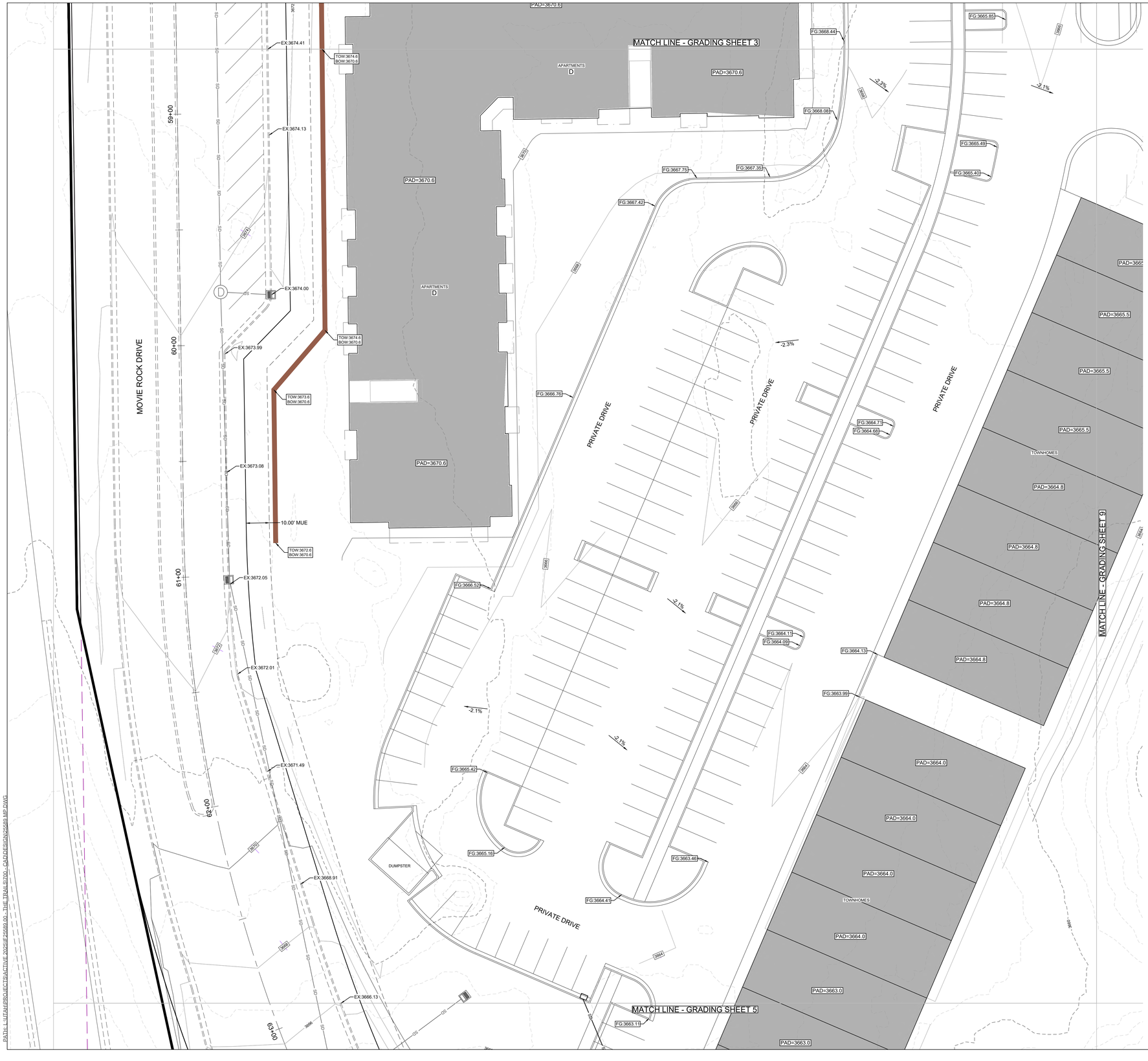
GRADING PLAN - SHEET 3

THE TRAILS
LOCATED IN ST. GEORGE, UTAH

PROJ. #:	Fx. 25589
DATE:	03/10/2026
DESIGN BY:	BLW
CHECKED BY:	RB
SCALE OF SHEET	
HOR SCALE:	1" = 20'
VER SCALE:	N/A

SHEET
C6

PATH: L:\UTAH\PROJECTS\ACTIVE 2025\F 25589.00 - THE TRAILS\700 - CAD\DESIGN\25589 MP.DWG



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LEGEND

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- FINISH GRADE CONTOUR
- PROJECT BOUNDARY
- PROPOSED CURB & GUTTER
- EXISTING CURB & GUTTER
- SD — INSTALL STORM DRAIN (PER PLAN)
- INSTALL DRAINAGE SWALE
- INSTALL RETAINING WALL (HEIGHT PER PLAN)
- STORM WATER DETENTION AREA
- DRAINAGE FLOW DIRECTION
- FFE: 00.00 — FINISH FLOOR ELEVATION
- LOCATION ELEVATION — SPOT ELEVATION

TBC	TOP BACK OF CURB
TOW	FINISH GRADE AT TOP OF WALL
BOW	FINISH GRADE AT BOTTOM OF WALL
TOA	TOP OF ASPHALT
GB	GRADE BREAK
FG	FINISHED GRADE
FL	FLOW LINE
TOC	TOP OF CONCRETE

N

0 10 20 40

SCALE: 1" = 20'

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NO.	DESCRIPTION	BY	APR.	DATE
	REVISION			

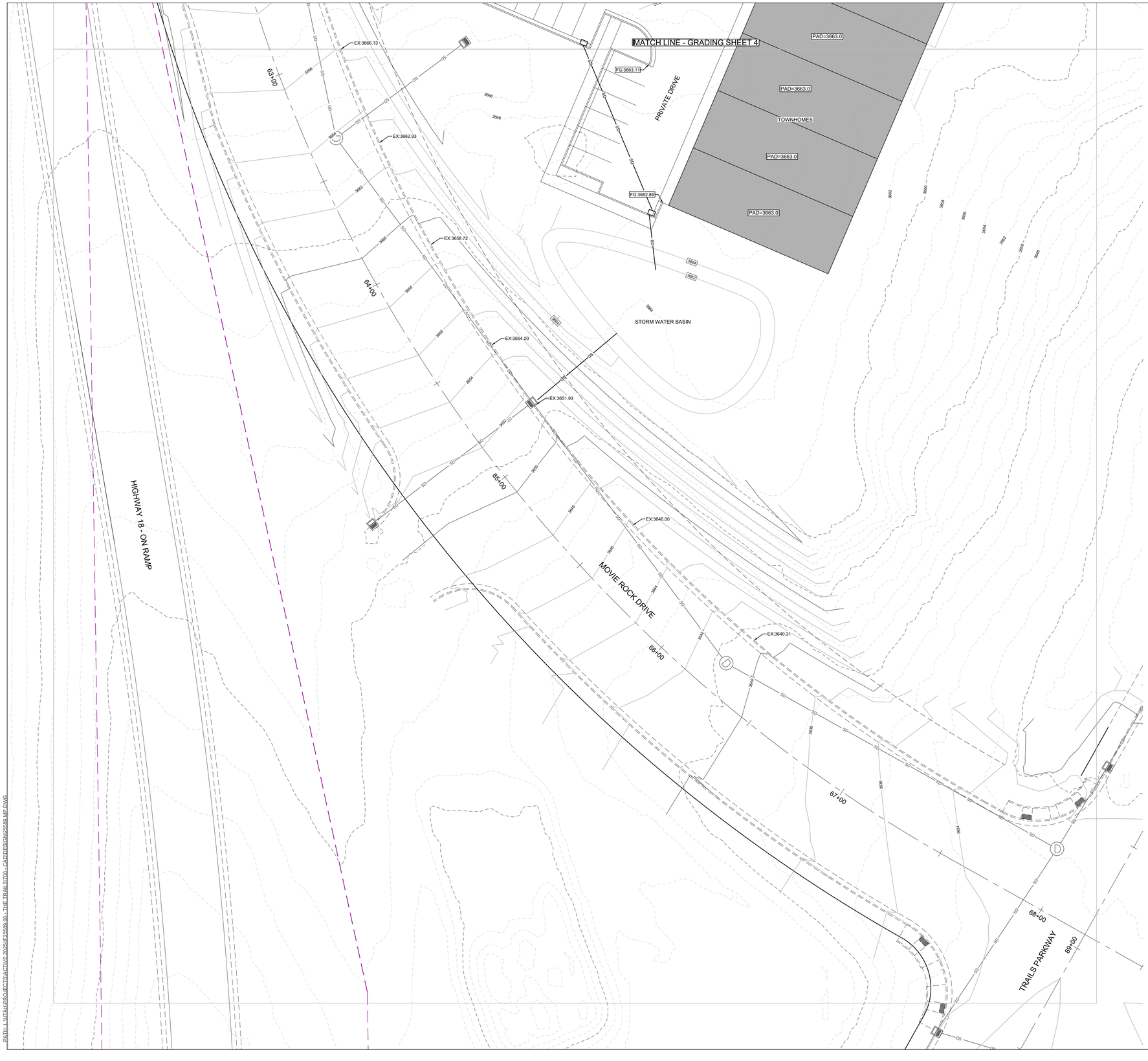
GRADING PLAN - SHEET 4

THE TRAILS

LOCATED IN ST. GEORGE, UTAH

PROJ. #:	Fx. 25589
DATE:	03/10/2026
DESIGN BY:	BLW
CHECKED BY:	RB
SCALE OF SHEET	
HOR SCALE:	1" = 20'
VER SCALE:	N/A
SHEET	C7

PATH: I:\UTAH\PROJECTS\ACTIVE 2025\F25589.00 - THE TRAILS\700 - CAD\DES\CNX25589 MP.DWG



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LEGEND

- EXISTING GROUND CONTOUR
- FINISH GRADE CONTOUR
- PROJECT BOUNDARY
- PROPOSED CURB & GUTTER
- EXISTING CURB & GUTTER
- SD — INSTALL STORM DRAIN (PER PLAN)
- INSTALL DRAINAGE SWALE
- INSTALL RETAINING WALL (HEIGHT PER PLAN)
- STORM WATER DETENTION AREA
- DRAINAGE FLOW DIRECTION
- FFE: 00.00 — FINISH FLOOR ELEVATION
- LOCATION ELEVATION — SPOT ELEVATION

TBC	TOP BACK OF CURB
TOW	FINISH GRADE AT TOP OF WALL
BOW	FINISH GRADE AT BOTTOM OF WALL
TOA	TOP OF ASPHALT
GB	GRADE BREAK
FG	FINISHED GRADE
FL	FLOW LINE
TOC	TOP OF CONCRETE

SCALE: 1" = 20'
(SCALE ONLY VALID FOR 24" x 36" PAPER)

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NO.	DESCRIPTION	BY	APR.	DATE
	REVISION			

GRADING PLAN - SHEET 5

THE TRAILS
LOCATED IN ST. GEORGE, UTAH

PROJ. #:	Fx. 25589
DATE:	03/10/2026
DESIGN BY:	BLW
CHECKED BY:	RB
SCALE OF SHEET	
HOR SCALE:	1" = 20'
VER SCALE:	N/A

SHEET
C8

PATH: I:\UTAH\PROJECTS\ACTIVE 2025\F25589.00 - THE TRAILS\700 - CAD\DES\GN\25589 MP.DWG

RUSTY CLIFFS

BOWLER TRUST

PRIVATE ALLEY

PRIVATE ALLEY

55' PUBLIC STREET

55' PUBLIC STREET

PRIVATE ALLEY

PRIVATE ALLEY

PRIVATE ALLEY

MATCH LINE - GRADING SHEET 11

MATCH LINE - GRADING SHEET 10

MATCH LINE - GRADING SHEET 7

TOWNHOMES

TOWNHOMES

TOWNHOMES

TOWNHOMES

PAD=3709.4 PAD=3710.5 PAD=3711.3 PAD=3711.6 PAD=3711.8 PAD=3712.1

PAD=3711.2 PAD=3710.0 PAD=3708.7 PAD=3708.0

PAD=3701.5 PAD=3702.5 PAD=3701.5 PAD=3702.0

FFE=3703.5 FFE=3702.5 FFE=3701.0 FFE=3699.7 FFE=3698.1 FFE=3696.5 FFE=3694.9

FG:3708.48 FG:3709.58 FG:3710.67 FG:3711.41 FG:3711.67 FG:3711.86

FG:3711.53 FG:3711.16 FG:3709.93 FG:3708.70 FG:3708.03

FG:3705.09 FG:3705.39 FG:3705.96 FG:3706.41 FG:3706.91 FG:3706.55

PC: 2+45.66 PRC: 3+48.31 PT: 4+42.18

3+00 4+00 5+00 6+00 7+00

FG:3705.78 FG:3706.06 FG:3706.42 FG:3707.07 FG:3706.38

FG:3703.83 FG:3702.51 FG:3701.16 FG:3699.77 FG:3698.18 FG:3696.56 FG:3695.61 FG:3694.94 FG:3693.98 FG:3693.27

FG:3700.55 FG:3701.58 FG:3702.72

FG:3700.50 FG:3701.53 FG:3701.98

FG:3696.15

NOTES

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LEGEND

	EXISTING GROUND CONTOUR
	FINISH GRADE CONTOUR
	PROJECT BOUNDARY
	PROPOSED CURB & GUTTER
	EXISTING CURB & GUTTER
SD	INSTALL STORM DRAIN (PER PLAN)
	INSTALL DRAINAGE SWALE
	INSTALL RETAINING WALL (HEIGHT PER PLAN)
	STORM WATER DETENTION AREA
	DRAINAGE FLOW DIRECTION
FFE= 00.00	FINISH FLOOR ELEVATION
LOCATION ELEVATION	SPOT ELEVATION
TBC	TOP BACK OF CURB
TOW	FINISH GRADE AT TOP OF WALL
BOW	FINISH GRADE AT BOTTOM OF WALL
TOA	TOP OF ASPHALT
GB	GRADE BREAK
FG	FINISHED GRADE
FL	FLOW LINE
TOC	TOP OF CONCRETE

SCALE: 1" = 20'
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NO.	DESCRIPTION	BY	APR.	DATE
	REVISION			

GRADING PLAN - SHEET 6

THE TRAILS

LOCATED IN ST. GEORGE, UTAH

PROJ. #:	Fx. 25589
DATE:	03/10/2026
DESIGN BY:	BLW
CHECKED BY:	RB
SCALE OF SHEET HOR SCALE:	1" = 20'
VER SCALE:	N/A

SHEET

C9

PATH: L:\UTAH\PROJECTS\ACTIVE 2025\#25589.00 - THE TRAILS\700 - CAD\DESIGN\25589 MP.DWG



NOTES

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LEGEND

	EXISTING GROUND CONTOUR
	FINISH GRADE CONTOUR
	PROJECT BOUNDARY
	PROPOSED CURB & GUTTER
	EXISTING CURB & GUTTER
SD	INSTALL STORM DRAIN (PER PLAN)
	INSTALL DRAINAGE SWALE
	INSTALL RETAINING WALL (HEIGHT PER PLAN)
	STORM WATER DETENTION AREA
	DRAINAGE FLOW DIRECTION
FFE: 00.00	FINISH FLOOR ELEVATION
LOCATION ELEVATION	SPOT ELEVATION
TBC	TOP BACK OF CURB
TOW	FINISH GRADE AT TOP OF WALL
BOW	FINISH GRADE AT BOTTOM OF WALL
TOA	TOP OF ASPHALT
GB	GRADE BREAK
FG	FINISHED GRADE
FL	FLOW LINE
TOC	TOP OF CONCRETE

SCALE: 1" = 20'
(SCALE ONLY VALID FOR 24" x 36" PAPER)

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Engineers / Surveyors / Solutions
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ST. GEORGE, UT 84770
435.986.0100

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NO.	DESCRIPTION	BY	APR.	DATE
	REVISION			

GRADING PLAN - SHEET 7

THE TRAILS
LOCATED IN ST. GEORGE, UTAH

PROJ. #:	Fx. 25589
DATE:	03/10/2026
DESIGN BY:	BLW
CHECKED BY:	RB
SCALE OF SHEET	
HOR SCALE:	1" = 20'
VER SCALE:	N/A

SHEET

C10

PATH: L:\UTAH\PROJECTS\ACTIVE 2025\#25589.00 - THE TRAILS\700 - CAD\DESIGN\25589 MP.DWG



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LEGEND

- EXISTING GROUND CONTOUR
- FINISH GRADE CONTOUR
- PROJECT BOUNDARY
- PROPOSED CURB & GUTTER
- EXISTING CURB & GUTTER
- SD — INSTALL STORM DRAIN (PER PLAN)
- INSTALL DRAINAGE SWALE
- INSTALL RETAINING WALL (HEIGHT PER PLAN)
- STORM WATER DETENTION AREA
- DRAINAGE FLOW DIRECTION
- FFE: 00.00 — FINISH FLOOR ELEVATION
- LOCATION ELEVATION — SPOT ELEVATION

TBC	TOP BACK OF CURB
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BOW	FINISH GRADE AT BOTTOM OF WALL
TOA	TOP OF ASPHALT
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FL	FLOW LINE
TOC	TOP OF CONCRETE

N

0 10 20 40

SCALE: 1" = 20'

(SCALE ONLY VALID FOR 24" x 36" PAPER)

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Engineers / Surveyors / Solutions
1453 S. DIXIE DRIVE, SUITE 150
ST. GEORGE, UT 84770
435.986.0100

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NO.	DESCRIPTION	BY	APR.	DATE
	REVISION			

GRADING PLAN - SHEET 8

THE TRAILS

LOCATED IN ST. GEORGE, UTAH

PROJ. #:	Fx. 25589
DATE:	03/10/2026
DESIGN BY:	BLW
CHECKED BY:	RB
SCALE OF SHEET	
HOR SCALE:	1" = 20'
VER SCALE:	N/A
SHEET	C11

P:\PATH_L:\UTAH\PROJECTS\ACTIVE 2025\P25589.00 - THE TRAILS\700 - CAD\DESIGN\25589 MP.DWG



NOTES

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LEGEND

	EXISTING GROUND CONTOUR
	FINISH GRADE CONTOUR
	PROJECT BOUNDARY
	PROPOSED CURB & GUTTER
	EXISTING CURB & GUTTER
SD	INSTALL STORM DRAIN (PER PLAN)
	INSTALL DRAINAGE SWALE
	INSTALL RETAINING WALL (HEIGHT PER PLAN)
	STORM WATER DETENTION AREA
	DRAINAGE FLOW DIRECTION
FFE: 00.00	FINISH FLOOR ELEVATION
LOCATION ELEVATION	SPOT ELEVATION
TBC	TOP BACK OF CURB
TOW	FINISH GRADE AT TOP OF WALL
BOW	FINISH GRADE AT BOTTOM OF WALL
TOA	TOP OF ASPHALT
GB	GRADE BREAK
FG	FINISHED GRADE
FL	FLOW LINE
TOC	TOP OF CONCRETE

N

0 10 20 40

SCALE: 1" = 20'

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NO.	DESCRIPTION	BY	APR	DATE
	REVISION			

GRADING PLAN - SHEET 9

THE TRAILS

LOCATED IN ST. GEORGE, UTAH

PROJ. #:	Fx. 25589
DATE:	03/10/2026
DESIGN BY:	BLW
CHECKED BY:	RB
SCALE OF SHEET	
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OWNER IS RESPONSIBLE FOR ALL ON-SITE DRAINAGE AND DETENTION.

LEGEND

	EXISTING GROUND CONTOUR
	FINISH GRADE CONTOUR
	PROJECT BOUNDARY
	PROPOSED CURB & GUTTER
	EXISTING CURB & GUTTER
SD	INSTALL STORM DRAIN (PER PLAN)
	INSTALL DRAINAGE SWALE
	INSTALL RETAINING WALL (HEIGHT PER PLAN)
	STORM WATER DETENTION AREA
	DRAINAGE FLOW DIRECTION
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LOCATION ELEVATION	SPOT ELEVATION

TBC	TOP BACK OF CURB
TOW	FINISH GRADE AT TOP OF WALL
BOW	FINISH GRADE AT BOTTOM OF WALL
TOA	TOP OF ASPHALT
GB	GRADE BREAK
FG	FINISHED GRADE
FL	FLOW LINE
TOC	TOP OF CONCRETE

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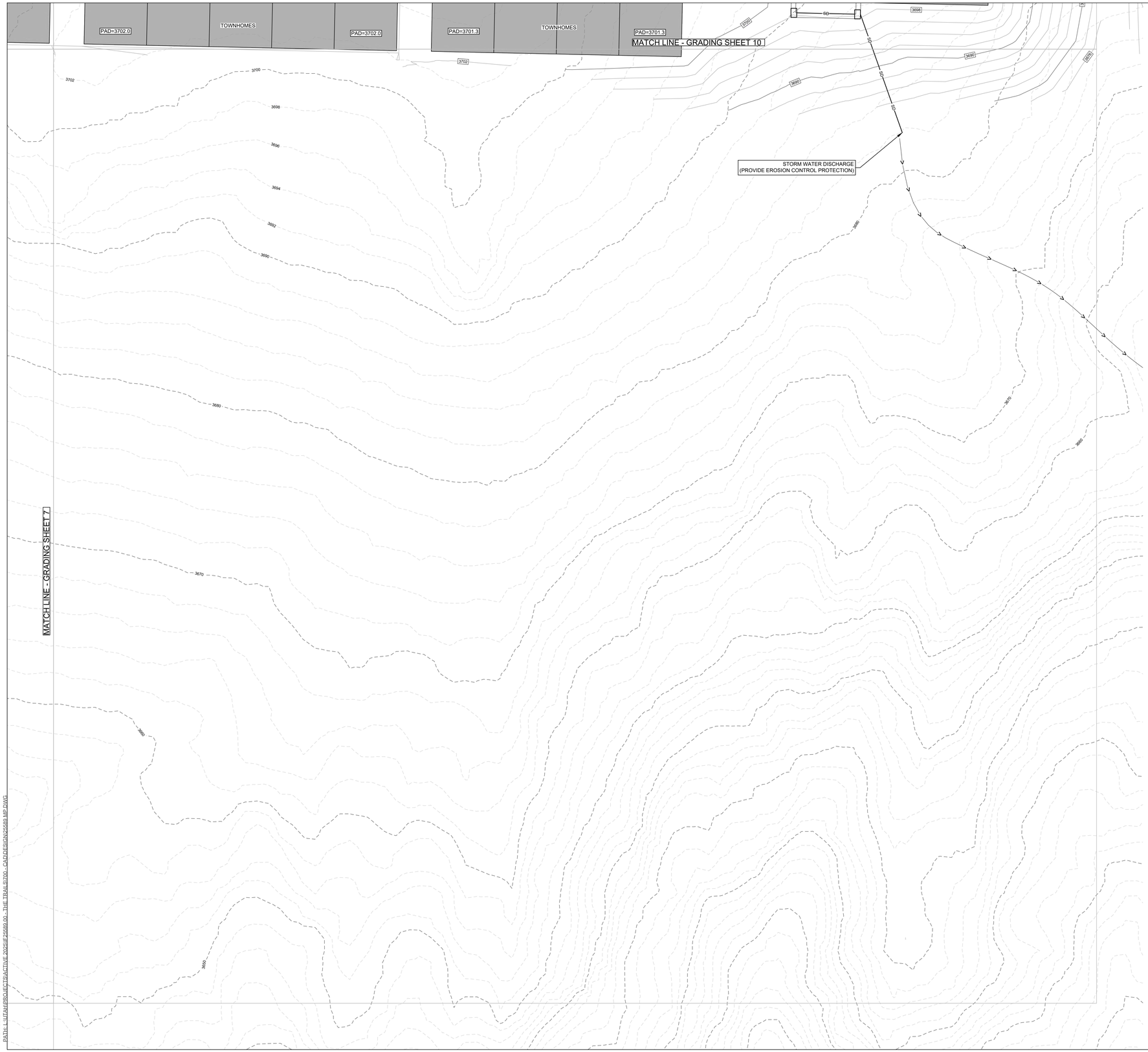
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- FINISH GRADE CONTOUR
- PROJECT BOUNDARY
- PROPOSED CURB & GUTTER
- EXISTING CURB & GUTTER
- SD — INSTALL STORM DRAIN (PER PLAN)
- INSTALL DRAINAGE SWALE
- INSTALL RETAINING WALL (HEIGHT PER PLAN)
- STORM WATER DETENTION AREA
- DRAINAGE FLOW DIRECTION
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- LOCATION ELEVATION — SPOT ELEVATION

TBC	TOP BACK OF CURB
TOW	FINISH GRADE AT TOP OF WALL
BOW	FINISH GRADE AT BOTTOM OF WALL
TOA	TOP OF ASPHALT
GB	GRADE BREAK
FG	FINISHED GRADE
FL	FLOW LINE
TOC	TOP OF CONCRETE

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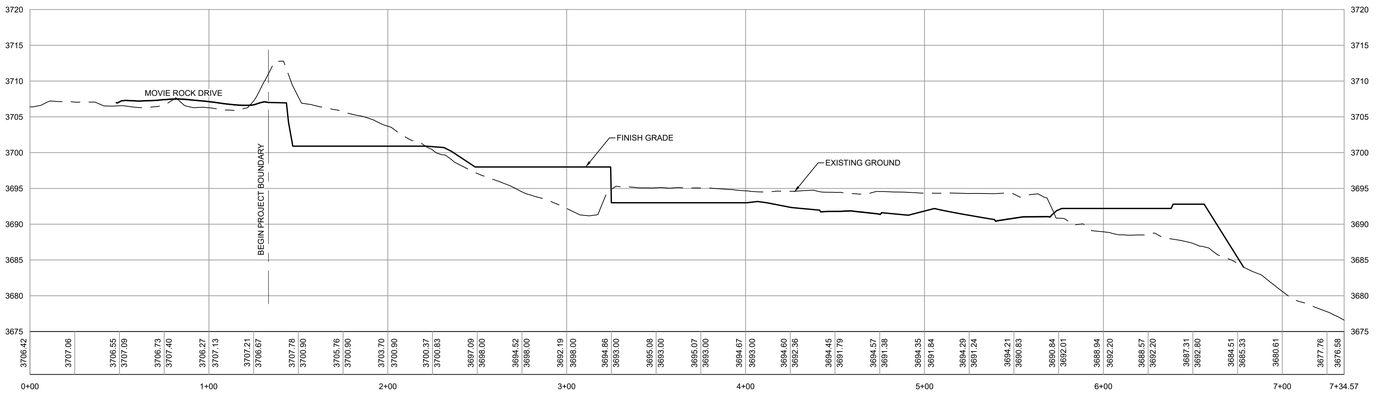
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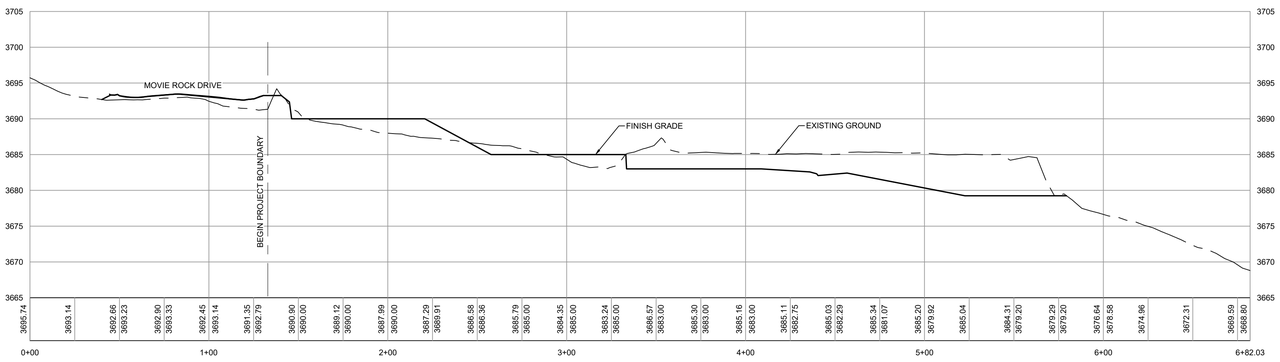
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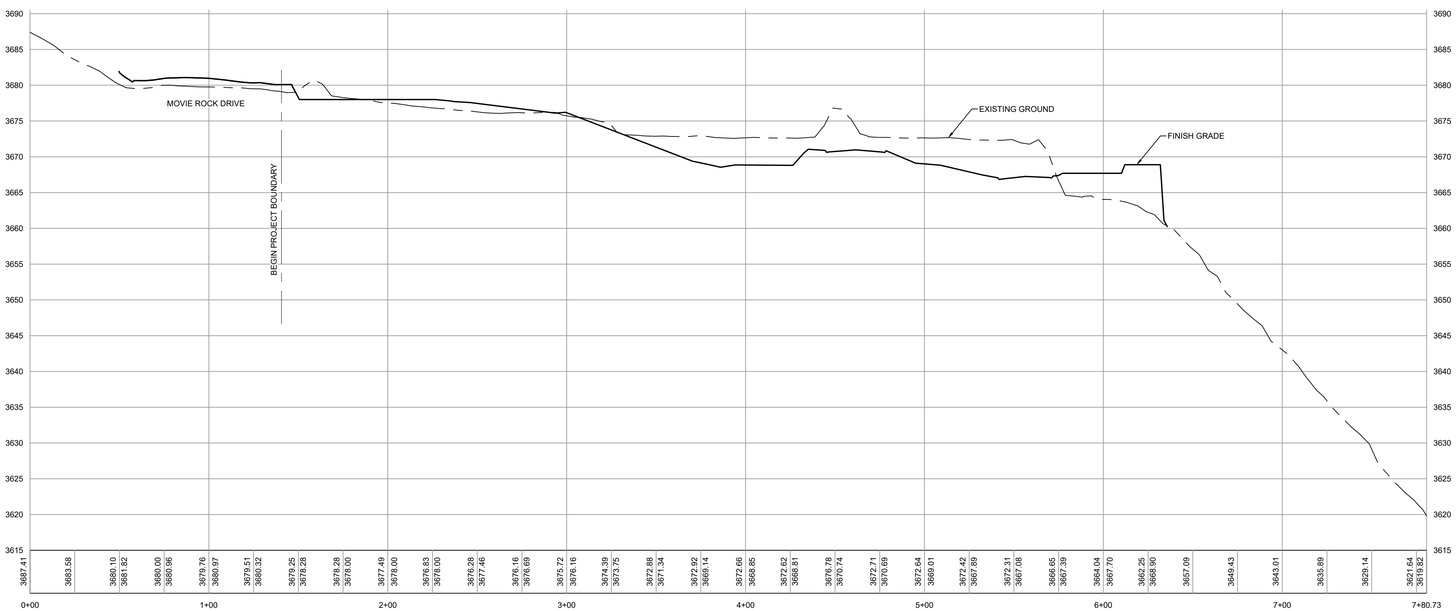
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SECTION 1

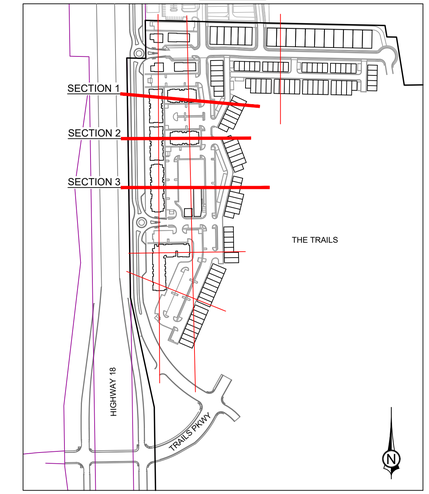


SECTION 2



SECTION 3

KEY MAP



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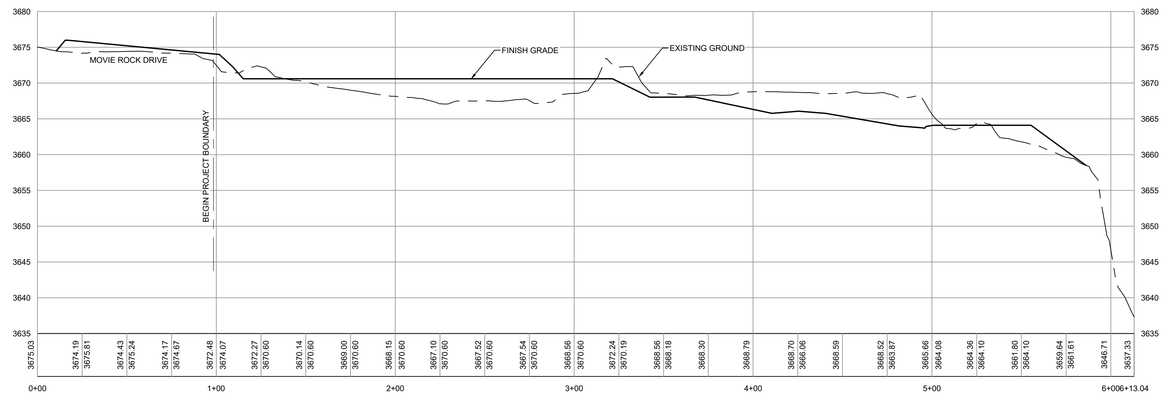
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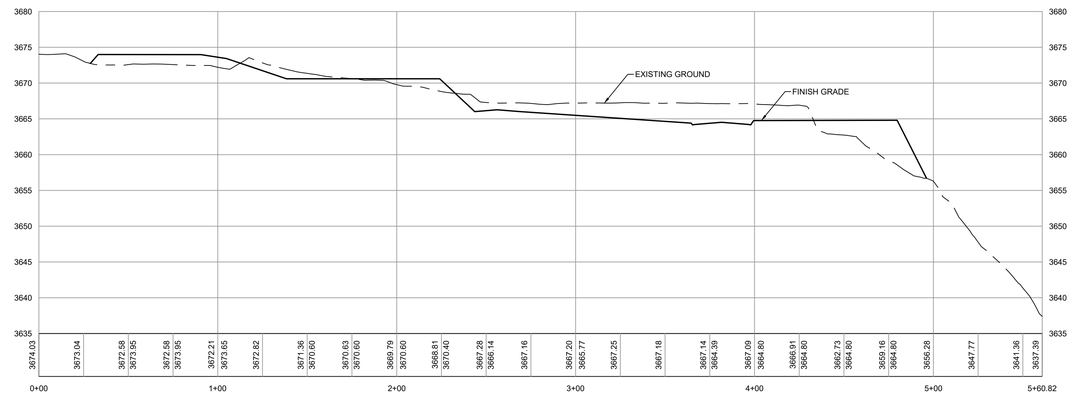
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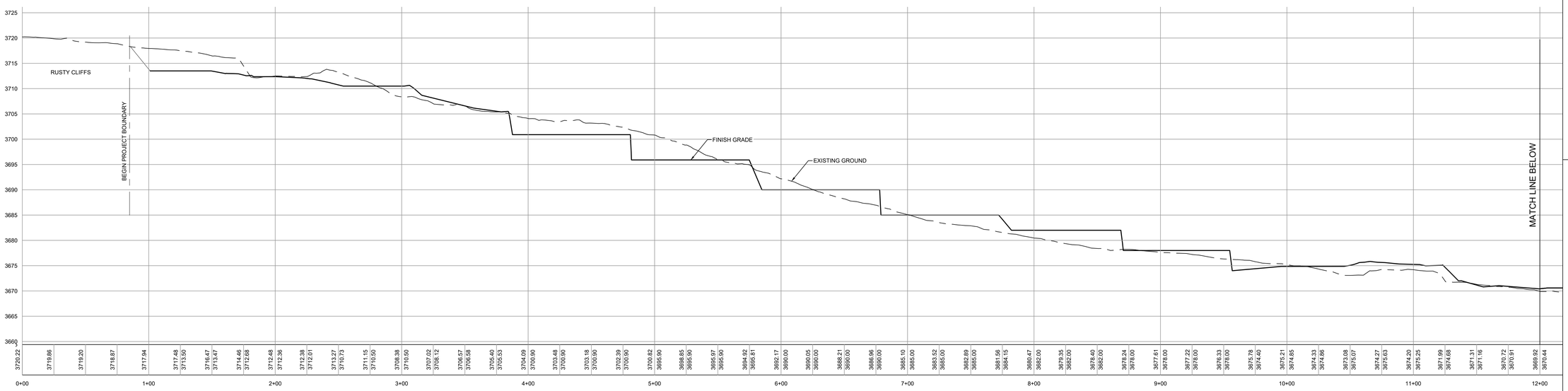
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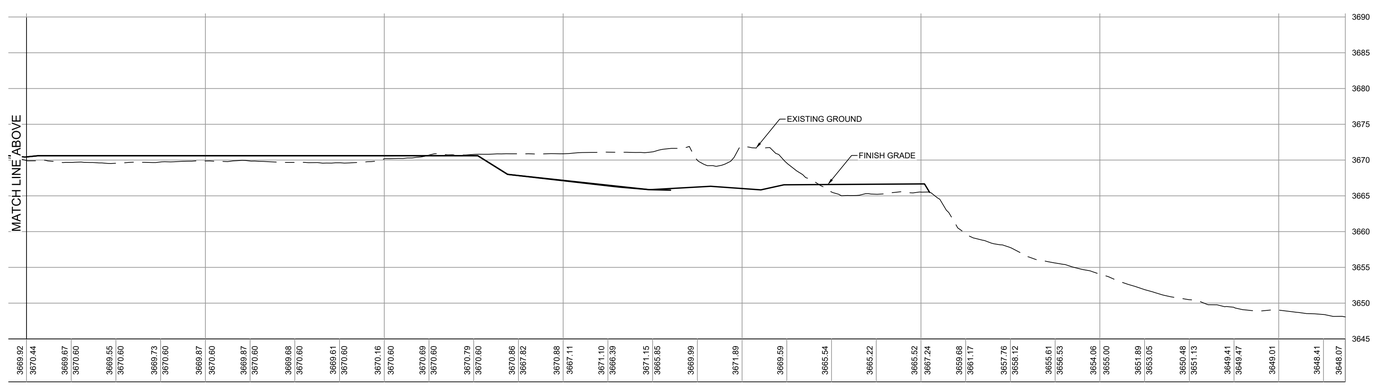
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SECTION 5

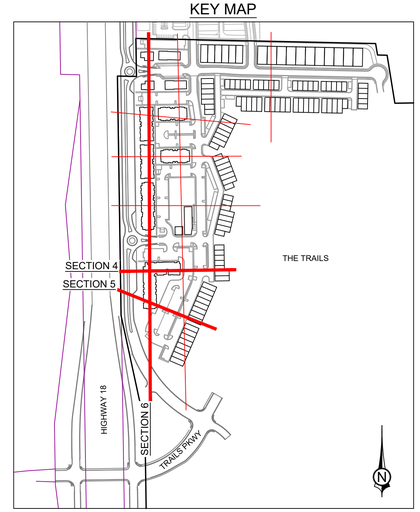


SECTION 6



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KEY MAP



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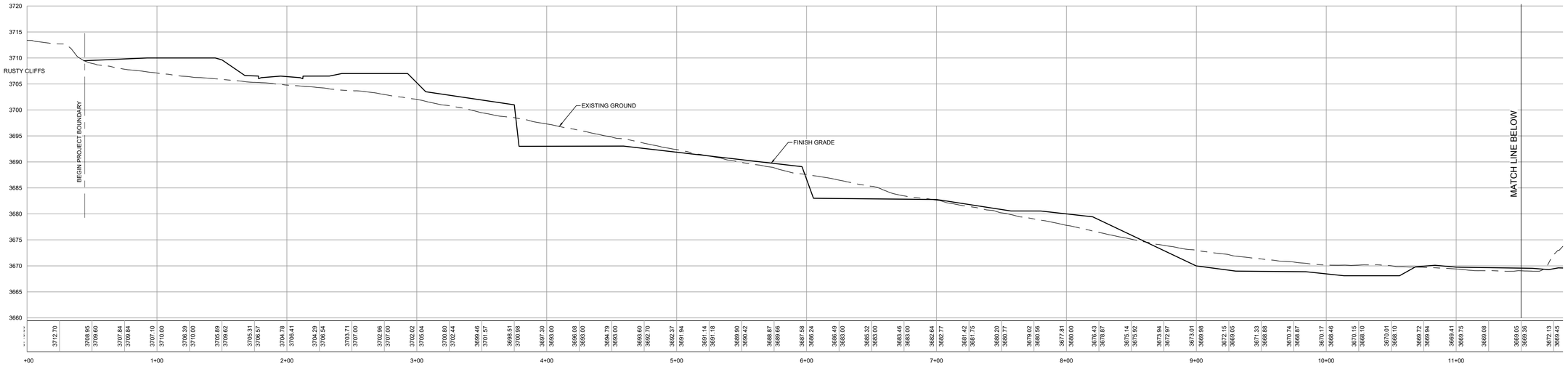
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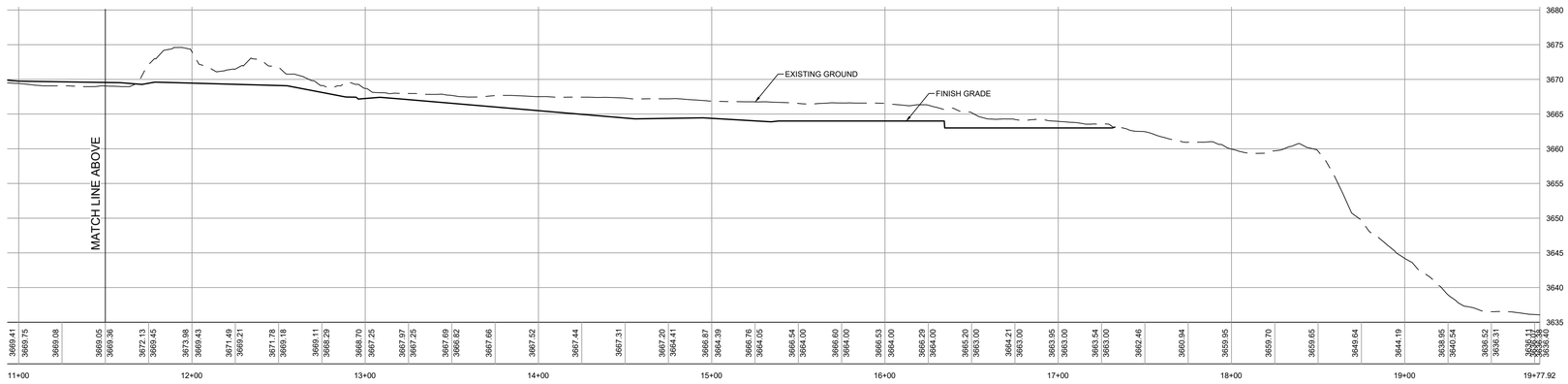
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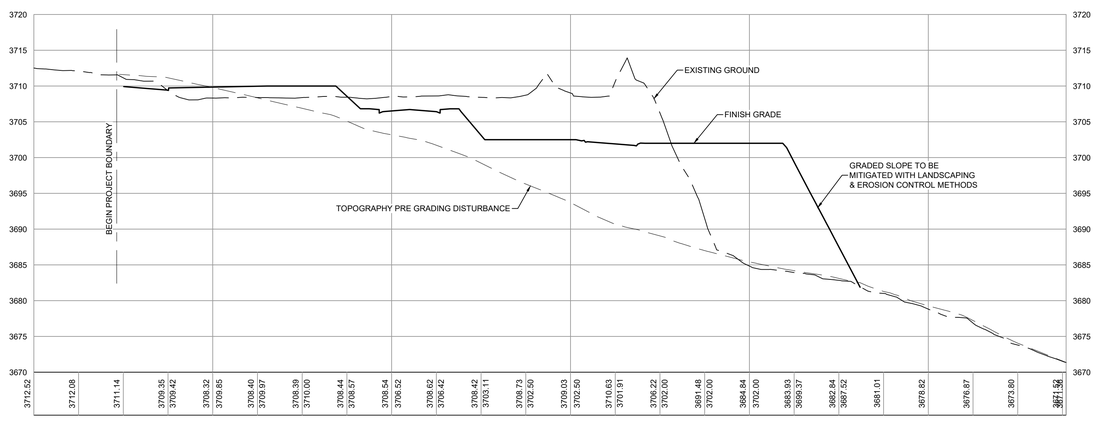
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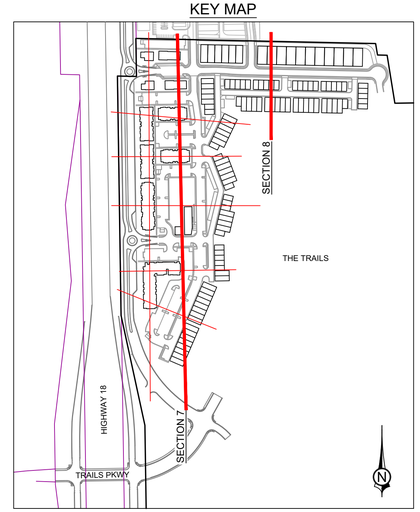


SECTION 7 CONTINUED



SECTION 8

KEY MAP



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EXHIBIT C

Illustrative Plan



Medium Tree

Cercidium x 'Desert Museum' / Desert Museum Palo Verde
Koelreuteria chinensis / Chinese Flame Tree
Pistacia chinensis / Chinese Pistache
Prosopis chilensis 'Thornless' / Thornless Chilean Mesquite
Salix matsudana 'Navajo' / Navajo Globe Willow

Small Tree

Pistacia lentiscus / Mastic Tree
Prunus cerasifera 'Krauter Vesuvuis' / Krauter Vesuvius Purple-leaf Plum
Sophora secundiflora / Texas Mountain Laurel
Vitex agnus-castus / Chaste Tree

Palm Tree

Phoenix dactylifera / Date Palm
Washingtonia filifera / California Fan Palm
Washingtonia robusta / Mexican Fan Palm

Evergreen Tree

Cupressus sempervirens 'Glauca' / Blue Italian Cypress
Cupressus x leylandii / Leyland Cypress

Shrub Plantings

Agapanthus x 'Galaxy White' / Galaxy White African Lily
Agave geminiflora / Twin Flowered Agave
Cereus peruvianus / Peruvian Apple Cactus
Echinocactus grusonii / Golden Barrel Cactus
Eremophila maculata 'Valentine' / Valentine Spotted Emu Bush
Ferocactus wislizenii / Fish Hook Barrel Cactus
Fouquiera splendens / Ocotillo
Hesperaloe parviflora 'Perpa' TM / Brakelights Red Yucca
Juniperus squamata 'Blue Star' / Blue Star Juniper
Muhlenbergia rigens / Deer Grass
Myrtus communis / Common Myrtle
Nassella tenuissima / Mexican Feather Grass
Opuntia santa-rita / Santa Rita Pricklypear
Pedilanthus macrocarpus / Slipper
Pittosporum tobira 'Wheeler's Dwarf' / Wheeler's Dwarf Pittosporum
Rosmarinus officinalis / Rosemary
Yucca filamentosa 'Color Guard' / Color Guard Adam's Needle

0' 10' 20' 40'

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FFKR | LANDSCAPE & PLANNING

TRAILS EAST - PHASE 1A - APTS, CLUBHOUSE & RETAIL
SR-18 MILE POST 7, ST. GEORGE UT 84771
HELOS GROUP
100% DESIGN DEVELOPMENT - FEB. 06, 2026

△ DATE REVISION

PROJECT NUMBER 25073

ILLUSTRATIVE SITE PLAN

LA002

THE TRAILS EAST - RESORT MASTER PLAN

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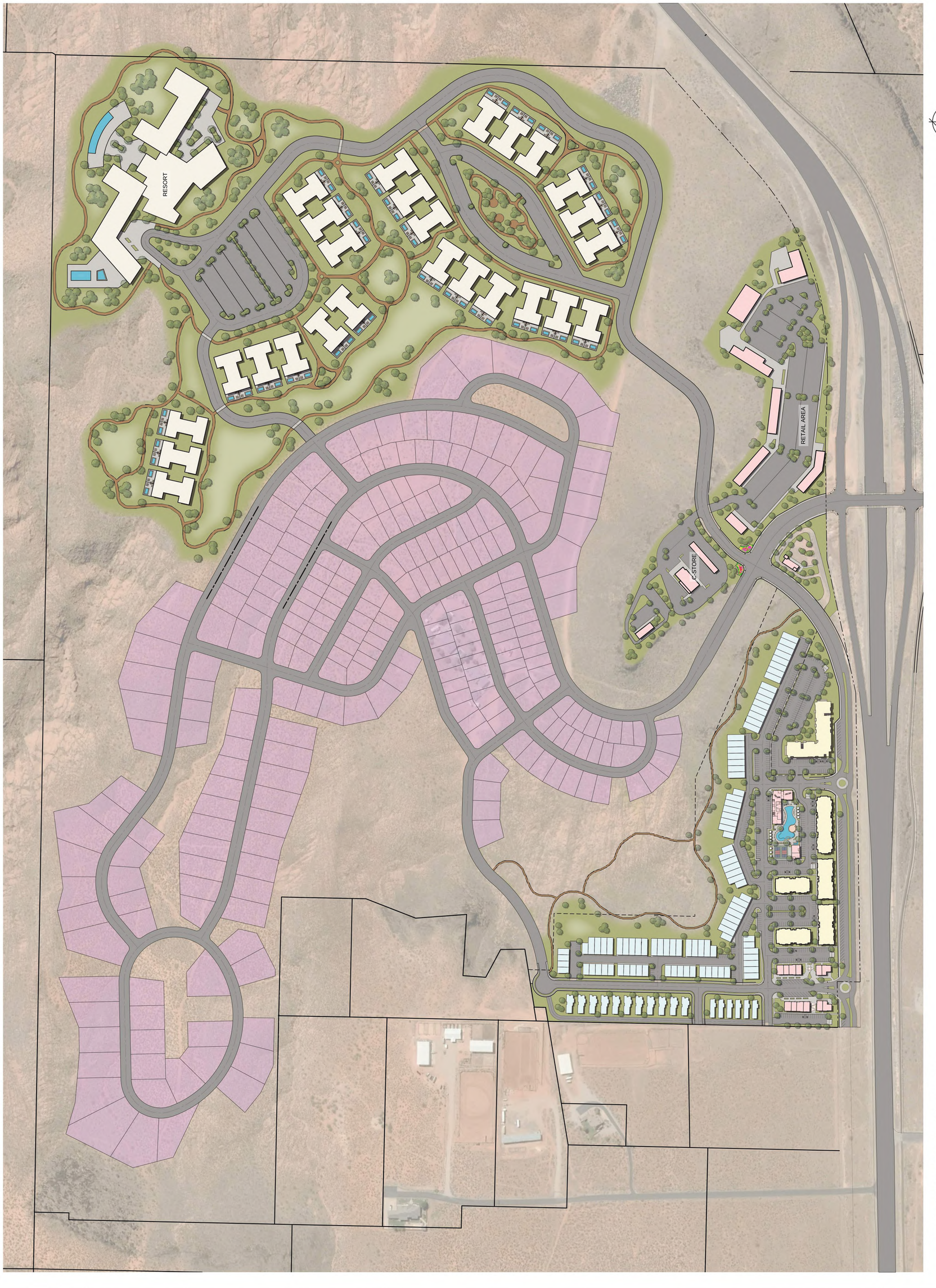
Helos Group

SITE PLAN - FEB. 23, 2026

△	DATE	REVISION

PROJECT NUMBER 25111

FFKR ARCHITECTS | LANDSCAPE & PLANNING



A1 SITE ILLUSTRATIVE PLAN

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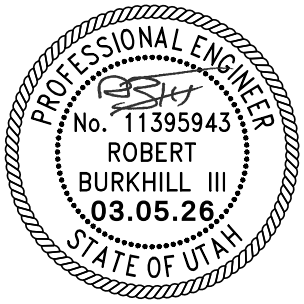
EXHIBIT D

Phases 1 & 2
Drainage Study

TECHNICAL DRAINAGE STUDY

THE TRAILS PHASES 1-2

Located in St. George, Utah



Prepared for:

Trails Development QOZB LLC
3940 North Traverse Mtn. Blvd. Ste. 200
Lehi, UT 84043

Prepared by:

Civil Science Infrastructure, Inc.
Robert Burkhill, P.E.
Utah PE # 11395943-2202
1453 S. Dixie Drive, Suite 150
St. George, UT 84770
(435) 986-0100

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Appendices

Preliminary Site plan
Rusty Cliffs Preliminary Drainage (DSG Engineering)
Hydraulic Calculations
Soil Type Documentation
Fema Firmette

1. INTRODUCTION

This drainage study has been prepared to analyze the existing drainage patterns on a portion of the parcel SG-7284-B-1-A which will be the site for The Trails Phases 1-2 development. This study will propose a drainage plan and the required storm water infrastructure to support the continued development of The Trails project while meeting all city standards and requirements. The Trails Phase 1 will route existing on-site and off-site flows to a storm drain system that will discharge flows to the east. This phase of development will increase development flows which will be detained in future phases of development. All increases of flows from the development of The Trails Phases 1-2 to be detained in later phases will be highlighted in this report.

2. EXISTING CONDITIONS

- **Description of property, area, existing site conditions, including all existing drainage facilities such as ditches, canals, washes, structures, etc.**

The Trails Phases 1-2 will be constructed on a portion of parcel SG-7284-B-1-A, the entirety of this parcel is shown below in Figure 2-1. Parcel SG-7284-B-1-A has a total area of 332.65 acres, Phases 1 and 2 will have an area of disturbance of approximately 26.58 acres. The site is largely undisturbed desert landscape

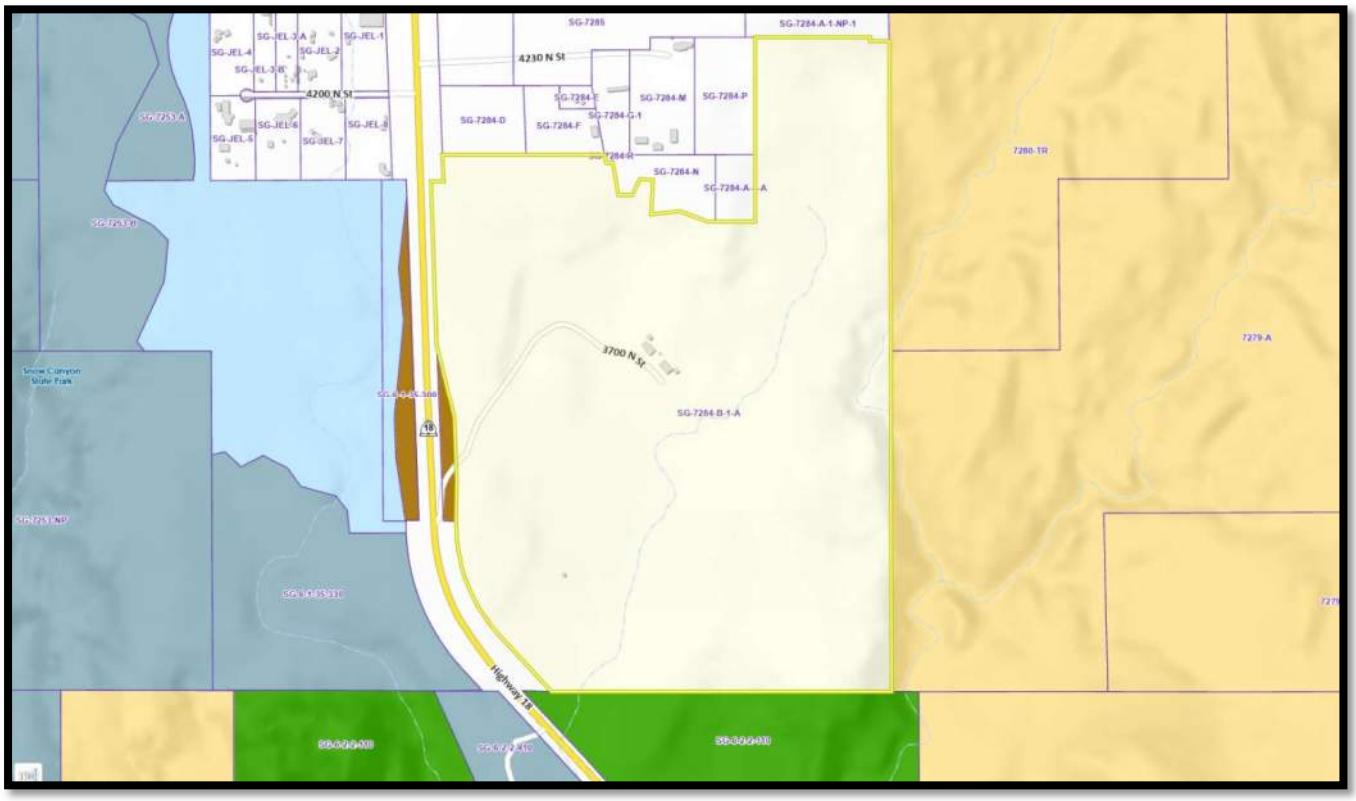


Figure 2-1: Site Map (Washington County Assessor)

with grading and development taking place adjacent to the site location see Figure 2-2. There are no current drainage facilities located on the site, all onsite and offsite runoff overland flows into a series of washes. There is currently an existing residence located on the site.

- **Description of off-site drainage upstream and downstream.**

This site currently receives offsite flows from the undeveloped land to the north which overland flows into an existing wash that runs central through the property toward State Route 18. The future Rusty Cliffs development will re-route offsite flows into the development through a system of storm drain and curb and gutter at two locations. A preliminary subbasin analysis and proposed flow prepared by DSG Engineering is provided in the appendix.



Figure 2-2: Existing Site Conditions (Google Earth, accessed: 02/27/2026, imagery date: 08/2025)

- **Description of on-site drainage**

All onsite drainage will overland flow into the existing drainage wash located onsite.

3. PROPOSED CONDITIONS

- **Description of master planned drainage and how improvements conform.**

No new master planned facilities are expected to be installed with the proposed phases.

- **Description of FEMA floodplain if applicable.**

The site is located within the FEMA Flood Insurance Rate Map number 49053C0786G. The map shows the project is located in Zone “X”, “Areas determined to be outside the 0.2% annual chance floodplain “, effective date April 2. 2009.

- **Description of other drainage studies that affect the site.**

Currently, a drainage study is being prepared by DSG Engineering for the Rusty Cliff development that will discharge into The Trails development at two locations, as well as provide storm drain infrastructure that will provide connection points for this subdivision’s storm drain. These locations and preliminary drainage calculations are provided in the appendix

- **Description of proposed drainage facilities.**

This development will convey onsite and offsite drainage through curbs and gutters and storm drain infrastructure to low points that will then be allowed to flow into the existing wash. These flows will be later

rerouted into a series of storm water basins at the bottom of the mesa that will be designed with later phases of The Trails development. See Figure 3-1 for a preliminary site layout of The Trails development.

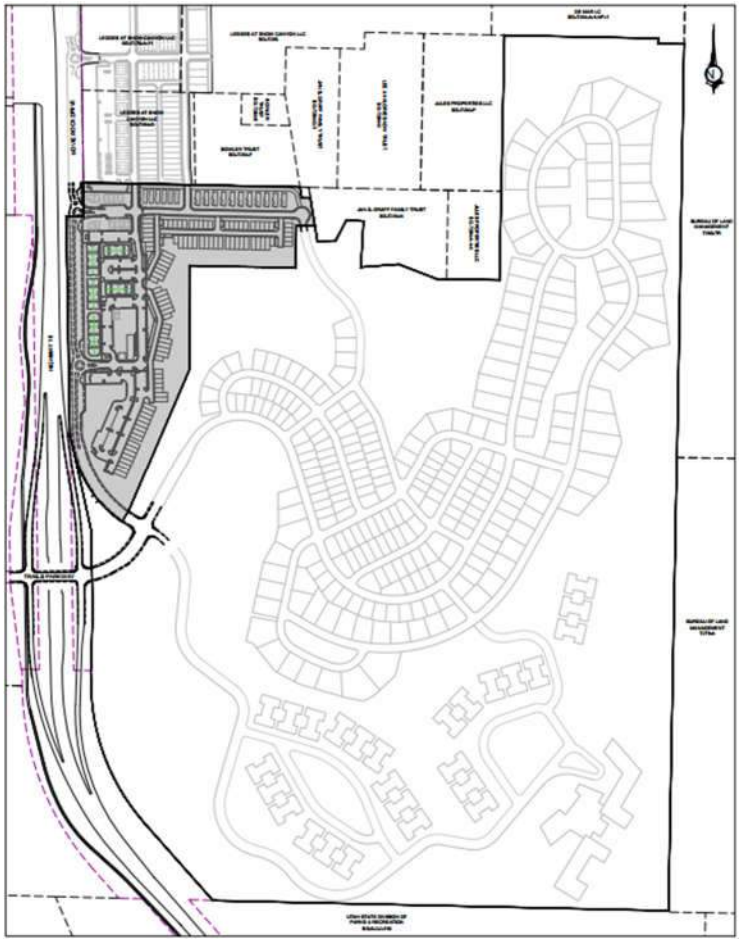


Figure 3-1: Preliminary Site plan of The Trails development. Phases 1-2 highlighted in grey

4. MODELING & ANALYSIS

- **Hydrological criteria.**

The 100-year 24-hour, 100-year 3-hour, 10-year 24-hour, 10-year 3-hour storm events were used to analyze the site hydrology. The 100-year, 24-hour rainfall depth used was 2.51 inches based on NOAA Atlas 14 precipitation frequency estimates and uses the SCS Type II rainfall distribution for the meteorological model. The 100-year, 3-hour rainfall totals depth used was 1.66 inches and the 3-hour storm was modeled using the Farmer Fletcher distribution.

The NRCS Urban Hydrology for Small Watersheds TR-55 and SCS Curve Number method were used to model all runoff. Autodesk Storm and Sanitary Analysis 2021 was used as the computer modeling software for this study. A minimum time of concentration of 10 minutes was used for modeling and calculations. Table 1 below shows basin areas, curve numbers and time of concentration values. Sub basins were chosen

to group similar lot sizes and similar areas of permeability. *Figure 4-1* shows the *Autodesk Storm & Sanitary Analysis* (SSA) Layout.

This development will receive offsite runoff from the Rusty Cliffs development to the north at two locations (Jun-OFFSITE 1, and JUN-OFFSITE2), to model these flows each junction was assigned a corresponding external inflow to measure the effect of this development on the proposed Improvements of The Trails Phases 1-2.

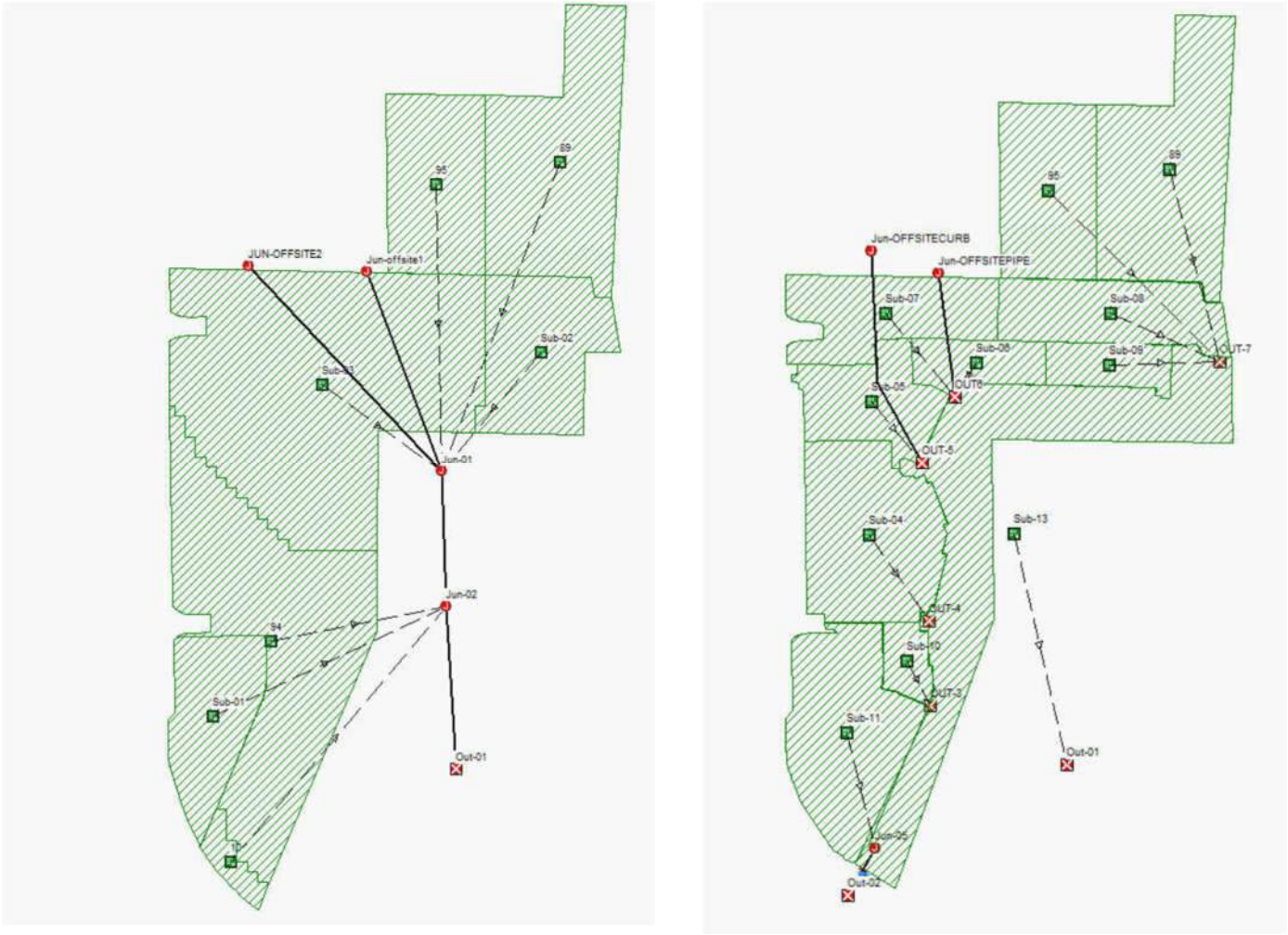


Figure 4-1:Pre and Post Development SSA model overview

- **Description of design runoff computations.**

Runoff will be discharged into the wash at six locations in the post development condition with OUT-02 being discharged into the existing storm drain stub in Movie Rock Drive. Each storm condition was run adding the flows from the neighboring development (see appendix for total flows). A curve number of 95 was assigned to each subbasin assuming 85% impervious and using a hydraulic soil group D. A summary of predevelopment and post development subbasins can be found in flows can be found below in Table 2, and a summary of all design storms and results can be seen in Table 1.

Table 1: Design Storm Results

	Pre-Developed Storm Event				Post-Developed Storm Event			
Storm Type	10yr-3hr	10yr-24hr	100yr-3hr	100yr-24hr	10yr-3hr	10yr-24hr	100yr-3hr	100yr-24hr
OUT-01	-	-	-	-	3.99	8.04	10.80	14.98
OUT-02	-	-	-	-	5.31	7.35	11.46	11.90
OUT-03	-	-	-	-	0.85	1.19	1.85	1.91
OUT-04	-	-	-	-	5.45	7.58	11.78	12.17
OUT-05	-	-	-	-	7.25	8.36	15.65	15.86
OUT-06	-	-	-	-	21.38	23.37	37.78	38.14
OUT-07	-	-	-	-	8.82	15.49	21.67	27.53
Total Peak [cfs]	39.58	58.01	87.86	106.59	53.05	71.38	110.99	122.49

Table 2: Pre and Post Development subbasin summary

Composite Curve Number Calculations

Pre-development

Basin ID	Land Use	Area [ac]	CN	Soil Group	Tc [min]
10	Natural Desert	0.52	89	D	13.50
89	Natural Desert	6.03	89	D	15.17
94	Natural Desert	8.92	89	D	14.60
95	Natural Desert	3.58	89	D	14.32
Sub-01	Natural Desert	2.80	89	D	13.67
Sub-02	Natural Desert	3.63	89	D	13.33
Sub-03	Natural Desert	13.51	89	D	12.36
	Total	**38.99**	**89**	-	-

Post-development

Basin ID	Land Use	Area [ac]	CN	Soil Group	Tc [min]
89	Natural Desert	6.03	89	D	15.17
95	Natural Desert	3.58	89	D	14.32
Sub-04	Commercial	4.73	95	D	10.00
Sub-05	Commercial	2.47	95	D	10.00
Sub-06	Commercial	1.27	95	D	10.00
Sub-07	Commercial	3.14	95	D	10.00
Sub-08	Commercial	2.99	95	D	10.00
Sub-09	Commercial	1.17	95	D	10.00
Sub-10	Commercial	0.74	95	D	10.00
Sub-11	Commercial	4.65	95	D	10.00
Sub-13	Natural Desert	8.22	89	D	10.00
	Total	**38.99**	**92**	-	-

*10.0 minute minimum Tc per City Standard

- **Description of drainage facility design computations**

All proposed storm water basins will be designed to detain the 100 – year storm event, and all storm drain infrastructure will be designed to accommodate the 10 - year storm event. This phase of development will not provide stormwater basins as several basins will be provided in subsequent phases that will provide stormwater detention for this development.

- **Description of compliance with applicable flood control requirements and FEMA requirements.**

No flood control or FEMA requirement are required for these phases of development.

- **Description of all easements and rights-of-way required.**

No public easements are required. As all easements will be provided within public or private streets.

5. CONCLUSIONS

- **Stating compliance with drainage requirements and opinion of effectiveness of proposed drainage facilities and accuracy of calculations.**

The proposed subdivision will comply with all applicable City of St. George Standards. Calculations for the post-development conditions show an increase in the runoff due to this phase of improvements. As this is phases 1 and 2 of a larger multi-phase subdivision and the design for the future phases has not been completed at the time of this report, all flow increases, and LID requirements will be reduced and satisfied in the future phases to meet St. George City Standards. A 24" HDPE pipe will be installed to accommodate the flows from the Rusty Cliffs development to the north (JUN-OFFSITE 1), all other storm drainpipe to be installed in this phase will be 18" HDPE.

It is critical to the performance of the storm drain system that inlets be kept clear of debris that could restrict the functionality of the storm drain design. Without the regular maintenance described above, the effectiveness of the overall storm drain infrastructure will decrease over time and will eventually fail.

6. APPENDICES

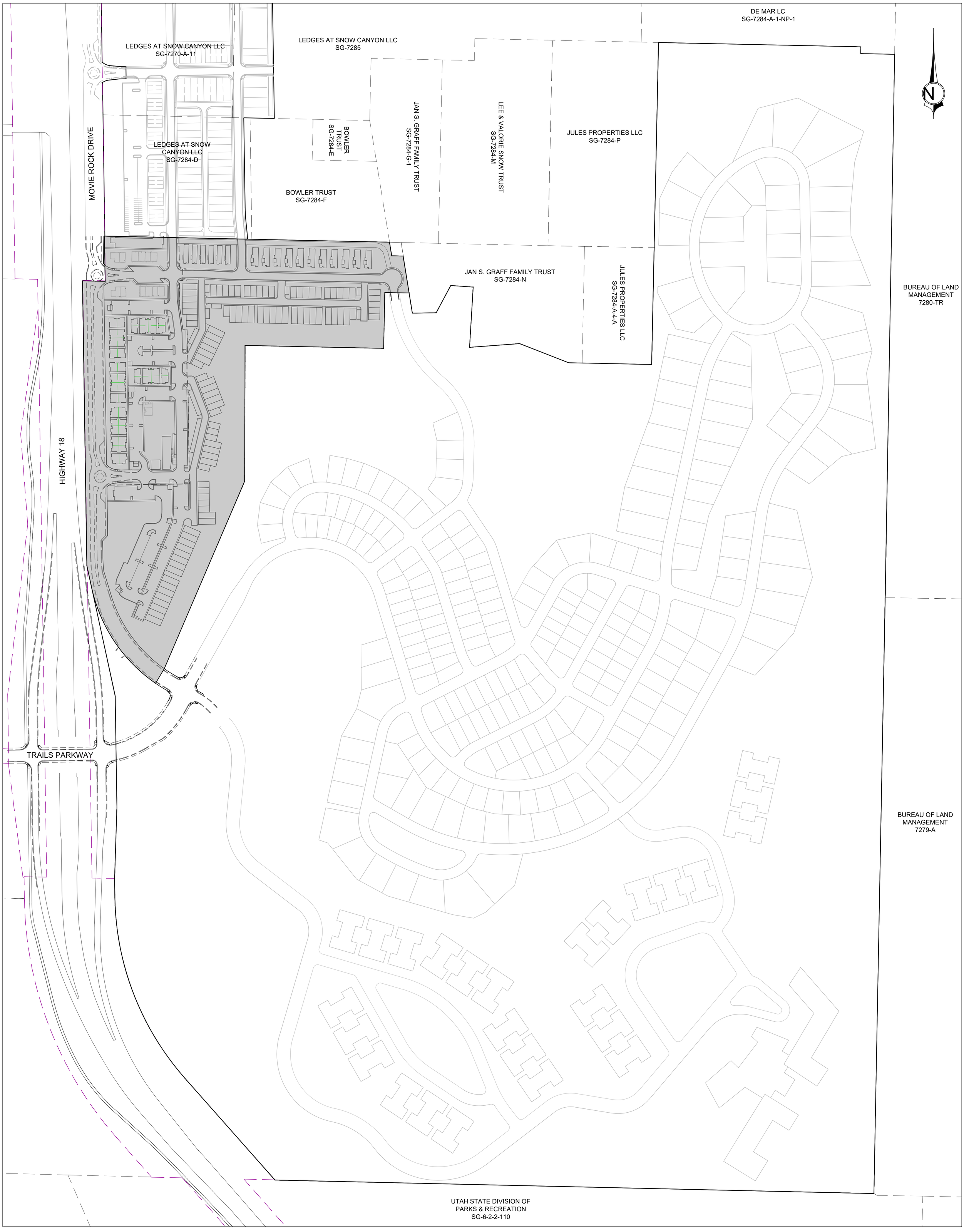
- **Appendices showing all applicable reference information**

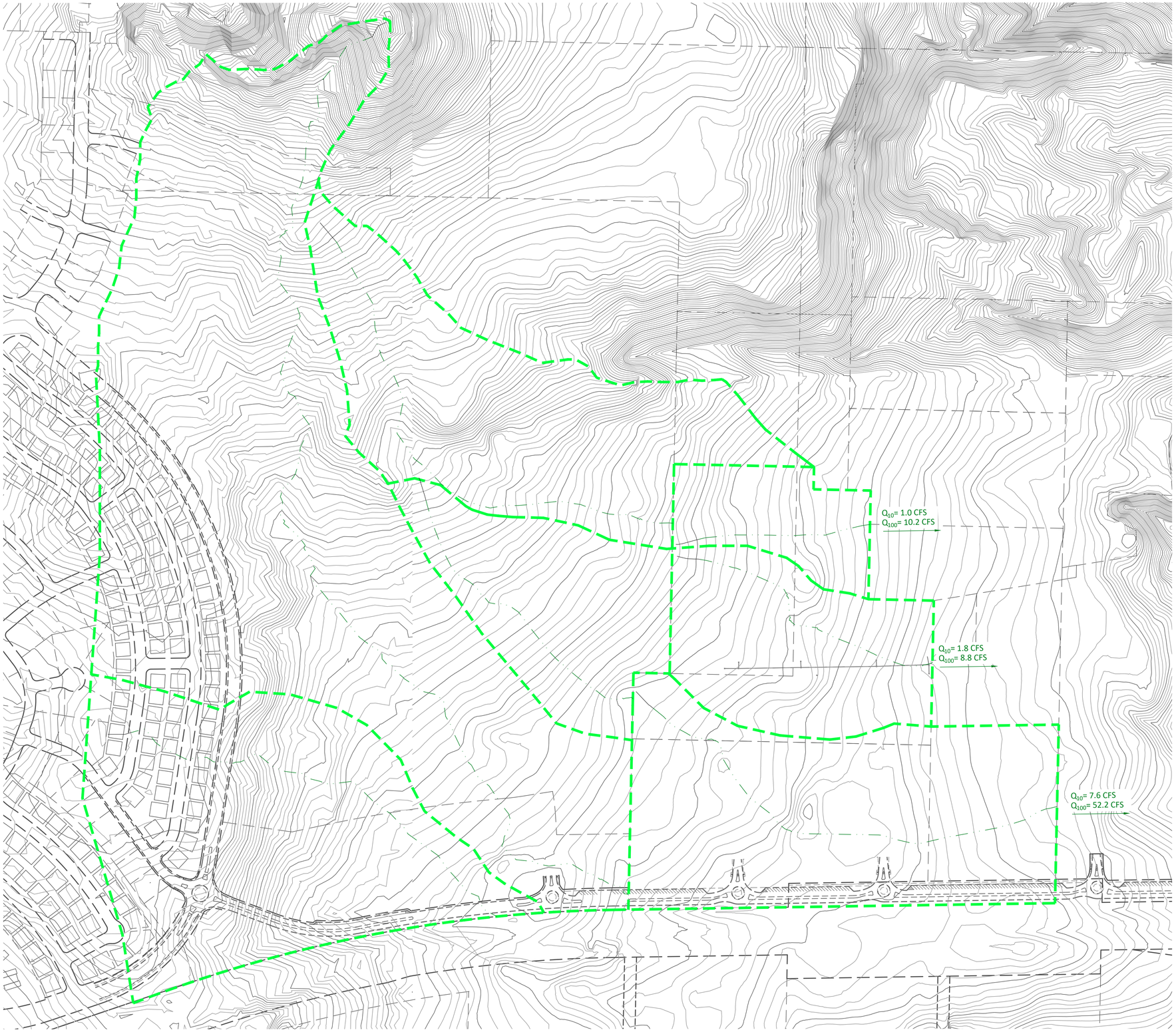
Preliminary Site Plan
Rusty Cliffs Preliminary Drainage (DSG Engineering)
Hydraulic Calculations
Soil Type Documentation
Fema Firmette

7. REFERENCES

1. NRCS Soil Surveyohttps://websoilsurvey.nrcs.usda.gov/app/
2. FEMA Flood Service mapohttps://msc.fema.gov/portal/home
3. Google Earth

THE TRAILS PRELIMINARY SITE PLAN





LEGEND:

EB-OFF	DRAINAGE SUBBASIN
	DRAINAGE SUBBASIN BOUNDARY
	DRAINAGE FLOW PATH
	EXISTING CONTOUR LINE
Q_{10} = 2 CFS	10 YEAR FLOW
Q_{100} = 12 CFS	100 YEAR FLOW

N

400 0 400 800

SCALE IN FEET

FIGURE 2

PRELIMINARY

NO.	DESCRIPTION	DATE	APP'D

PROJECT NAME : RUSTY CLIFF SOUTH OFFSITE
LOCATED IN ST. GEORGE, UTAH

SHEET NAME : CURRENT CONDITIONS

DSG ENGINEERING, INC.
LAND PLANNERS, LAND SURVEYORS, CIVIL ENGINEERS
113 East 200 North Suite #2
St. George, UT 84770
Office (435) 628-2121

DATE :	FEBRUARY 2025
PM :	LB
DRAWN BY :	LB
DESIGNED BY :	LB
CHECKED BY :	JRT
PROJECT NO. :	25-005
SCALE :	1" = 200'

SHEET NUMBER :

CC-1

1 OF 1 TOTAL

LEGEND:

CB-OFF	DRAINAGE SUBBASIN
	DRAINAGE SUBBASIN BOUNDARY
	PROPOSED CONTOUR LINE
	EXISTING CONTOUR LINE
	PROPOSED STORM DRAIN
	EXISTING STORM DRAIN
	STREET FLOW
Q_{100} = 12 CFS Q_{10} = 2 CFS	100 YEAR FLOW 10 YEAR FLOW

N

200 0 200 400

SCALE IN FEET

Q_{10}= 16.3 CFS
Q_{100}= 26.8 CFS

Q_{10}= 4.4 CFS
Q_{100}= 9.5 CFS

Q_{10}= 7.2 CFS
Q_{100}= 26.6 CFS

FIGURE 3

PRELIMINARY

NO.	DESCRIPTION	DATE	APP'D

PROJECT NAME : RUSTY CLIFFS SOUTH

LOCATED IN ST. GEORGE, UTAH

SHEET NAME : DEVELOPED CONDITIONS

DSG ENGINEERING, INC.
LAND PLANNERS, LAND SURVEYORS, CIVIL ENGINEERS
113 East 200 North Suite #2
St. George, UT 84770
Office (435) 628-2121

DATE :	FEBRUARY 2025
PM :	SY
DRAWN BY :	LB
DESIGNED BY :	LB
CHECKED BY :	JRT
PROJECT NO. :	25-005
SCALE :	1" = 200'

SHEET NUMBER :

DC-1

1 OF 1 TOTAL

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.3.206 (Build 0)

****
Project Description
****
File Name ..... POST DEV.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. SCS TR-20
Time of Concentration..... SCS TR-55
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. Horton, wetted area
Starting Date FEB-27-2026 00:00:00
Ending Date FEB-28-2026 00:00:00
Report Time Step 00:05:00

****
Element Count
****
Number of rain gages 1
Number of subbasins 11
Number of nodes 10
Number of links 3

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	10 Year 3 Hour	CUMULATIVE	5.00

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Peak Rate Factor
89	6.03	484.00
95	3.58	484.00
Sub-04	4.73	484.00
Sub-05	2.47	484.00
Sub-06	1.27	484.00
Sub-07	3.14	484.00
Sub-08	2.99	484.00
Sub-09	1.17	484.00
Sub-10	0.74	484.00
Sub-11	4.65	484.00
Sub-13	7.42	484.00

****
Node Summary
****

Node ID	Element Type	Invert Elevation	Maximum Elev.	Ponded Area	External Inflow

			ft	ft	ft²	
Jun-05	JUNCTION	3664.00	3670.00	1000.00		
Jun-OFFSITECURB	JUNCTION	3708.82	3709.32	10000.00	Yes	
Jun-OFFSITEPIPE	JUNCTION	3706.26	3730.00	1000.00	Yes	
Out-01	OUTFALL	3530.00	3530.00	0.00		
Out-02	OUTFALL	3640.00	3642.00	0.00		
OUT-3	OUTFALL	3654.00	3654.00	0.00		
OUT-4	OUTFALL	3660.00	3660.00	0.00		
OUT-5	OUTFALL	3680.00	3680.50	0.00		
OUT6	OUTFALL	3685.00	3687.00	0.00		
OUT-7	OUTFALL	3682.00	3682.00	0.00		

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Link-11	Jun-OFFSITEPIPE	OUT6	CONDUIT	380.5	5.5874	0.0150
Link-12	Jun-OFFSITECURB	OUT-5	CHANNEL	626.8	4.5977	0.0320
Orifice-01	Jun-05	Out-02	ORIFICE			

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Link-11	CIRCULAR	2.00	2.00	1	3.14	0.50	46.34
Link-12	RECT_OPEN	0.50	10.00	1	5.00	0.45	29.43

********** Runoff Quantity Continuity **********	Volume acre-ft	Depth inches
Total Precipitation	3.246	1.020
Surface Runoff	0.144	0.045
Continuity Error (%)	-0.008	

********** Flow Routing Continuity **********	Volume acre-ft	Volume Mgallons
External Inflow	40.914	13.332
External Outflow	42.349	13.800
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.011	0.003
Continuity Error (%)	-0.000	

****
Composite Curve Number Computations Report
****

Subbasin 89

Soil/Surface Description	Area (acres)	Soil Group	CN
-	6.03	-	89.00
Composite Area & Weighted CN	6.03		89.00

Subbasin 95

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.58	-	89.00
Composite Area & Weighted CN	3.58		89.00

Subbasin Sub-04

Soil/Surface Description	Area (acres)	Soil Group	CN
-	4.73	-	95.00
Composite Area & Weighted CN	4.73		95.00

Subbasin Sub-05

Soil/Surface Description	Area (acres)	Soil Group	CN
-	2.47	-	95.00
Composite Area & Weighted CN	2.47		95.00

Subbasin Sub-06

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.27	-	95.00
Composite Area & Weighted CN	1.27		95.00

Subbasin Sub-07

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.14	-	95.00
Composite Area & Weighted CN	3.14		95.00

Subbasin Sub-08

Soil/Surface Description	Area (acres)	Soil Group	CN
-	2.99	-	95.00
Composite Area & Weighted CN	2.99		95.00

Subbasin Sub-09

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.17	-	95.00
Composite Area & Weighted CN	1.17		95.00

Subbasin Sub-10

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.74	-	95.00
Composite Area & Weighted CN	0.74		95.00

Subbasin Sub-11

Soil/Surface Description	Area (acres)	Soil Group	CN
-	4.65	-	95.00
Composite Area & Weighted CN	4.65		95.00

Subbasin Sub-13

Soil/Surface Description	Area (acres)	Soil Group	CN
-	7.42	-	89.00
Composite Area & Weighted CN	7.42		89.00

****
SCS TR-55 Time of Concentration Computations Report
****

Sheet Flow Equation

```
        Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))
        Where:

        Tc = Time of Concentration (hrs)
        n  = Manning's Roughness
        Lf = Flow Length (ft)
        P  = 2 yr, 24 hr Rainfall (inches)
        Sf = Slope (ft/ft)
```

Shallow Concentrated Flow Equation

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

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)
```

Channel Flow Equation

```
        V  = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
        R  = Aq / Wp
```

Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's Roughness

Subbasin 89

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1202.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	2.77	0.00	0.00
Total TOC (minutes):	15.17		

Subbasin 95

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	833.32	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	1.92	0.00	0.00
Total TOC (minutes):	14.32		

```
------------------
Subbasin Sub-04
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-05
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-06
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-07
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-08
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-09
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-10
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-11
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-13
------------------

        User-Defined TOC override (minutes):     10.00

**********************
Subbasin Runoff Summary
**********************

-------------------------------------------------------------------------------
Subbasin             Total      Total      Peak  Weighted           Time of
ID                  Precip     Runoff    Runoff     Curve      Concentration
                        in         in       cfs    Number     days  hh:mm:ss
-------------------------------------------------------------------------------
89                    1.02       0.30      2.89    89.000        0  00:15:10
95                    1.02       0.30      1.75    89.000        0  00:14:19
Sub-04                1.02       0.58      5.67    95.000        0  00:10:00
Sub-05                1.02       0.58      2.96    95.000        0  00:10:00
```

Sub-06	1.02	0.58	1.52	95.000	0	00:10:00
Sub-07	1.02	0.58	3.77	95.000	0	00:10:00
Sub-08	1.02	0.58	3.58	95.000	0	00:10:00
Sub-09	1.02	0.58	1.40	95.000	0	00:10:00
Sub-10	1.02	0.58	0.89	95.000	0	00:10:00
Sub-11	1.02	0.58	5.58	95.000	0	00:10:00
Sub-13	1.02	0.30	4.00	89.000	0	00:10:00

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Flooded Time minutes	Retention Time hh:mm:ss
Jun-05	0.03	0.98	3664.98	0	00:52	0	0	0:00:00
Jun-OFFSITECURB	0.16	0.16	3708.98	0	01:11	0	0	0:00:00
Jun-OFFSITEPIPE	0.85	0.86	3707.12	0	00:05	0	0	0:00:00
Out-01	0.00	0.00	3530.00	0	00:00	0	0	0:00:00
Out-02	0.00	0.00	3640.00	0	00:00	0	0	0:00:00
OUT-3	0.00	0.00	3654.00	0	00:00	0	0	0:00:00
OUT-4	0.00	0.00	3660.00	0	00:00	0	0	0:00:00
OUT-5	0.16	0.16	3680.16	0	00:35	0	0	0:00:00
OUT6	0.82	0.82	3685.82	0	00:05	0	0	0:00:00
OUT-7	0.00	0.00	3682.00	0	00:00	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
Jun-05	JUNCTION	5.37	5.37	0	00:50	0.00		
Jun-OFFSITECURB	JUNCTION	4.40	4.40	0	00:05	0.00		
Jun-OFFSITEPIPE	JUNCTION	16.30	16.30	0	00:05	0.00		
Out-01	OUTFALL	3.99	3.99	0	00:55	0.00		
Out-02	OUTFALL	0.00	5.31	0	00:52	0.00		
OUT-3	OUTFALL	0.85	0.85	0	00:50	0.00		
OUT-4	OUTFALL	5.45	5.45	0	00:50	0.00		
OUT-5	OUTFALL	2.85	7.25	0	00:50	0.00		
OUT6	OUTFALL	5.08	21.38	0	00:50	0.00		
OUT-7	OUTFALL	8.82	8.82	0	00:55	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
Out-01	11.85	0.78	3.99
Out-02	12.03	0.94	5.31
OUT-3	11.45	0.16	0.85
OUT-4	12.00	0.96	5.45

OUT-5	99.98	4.45	7.25
OUT6	99.98	16.36	21.38
OUT-7	12.69	1.74	8.82
System	37.14	25.39	52.72

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged minutes	Reported Condition
Link-11	CONDUIT	0 00:05	13.07	1.00	16.35	46.34	0.35	0.42	0	Calculated
Link-12	CHANNEL	0 00:35	2.82	1.00	4.40	29.43	0.15	0.31	0	Calculated
Orifice-01	ORIFICE	0 00:52			5.31			0.49		

****
Highest Flow Instability Indexes
****
All links are stable.

Analysis began on: Mon Mar 2 09:37:34 2026
Analysis ended on: Mon Mar 2 09:37:38 2026
Total elapsed time: 00:00:04

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.3.206 (Build 0)

****
Project Description
****
File Name ..... POST DEV.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. SCS TR-20
Time of Concentration..... SCS TR-55
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. Horton, wetted area
Starting Date FEB-27-2026 00:00:00
Ending Date FEB-28-2026 00:00:00
Report Time Step 00:05:00

****
Element Count
****
Number of rain gages 1
Number of subbasins 11
Number of nodes 12
Number of links 10

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	10 Year 24 Hour	CUMULATIVE	6.00

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Peak Rate Factor
89	6.03	484.00
95	3.58	484.00
Sub-04	4.73	484.00
Sub-05	2.47	484.00
Sub-06	1.27	484.00
Sub-07	3.14	484.00
Sub-08	2.99	484.00
Sub-09	1.17	484.00
Sub-10	0.74	484.00
Sub-11	4.65	484.00
Sub-13	7.42	484.00

****
Node Summary
****

Node ID	Element Type	Invert Elevation	Maximum Elev.	Ponded Area	External Inflow

			ft	ft	ft²	
Jun-01	JUNCTION	3625.00	3635.00	100.00		
Jun-02	JUNCTION	3560.00	3570.00	1000.00		
Jun-05	JUNCTION	3664.00	3670.00	1000.00		
Jun-06	JUNCTION	3654.00	3664.00	1000.00		
Jun-07	JUNCTION	3660.00	3670.00	1000.00		
Jun-08	JUNCTION	3680.00	3690.00	1000.00		
Jun-09	JUNCTION	3682.00	3700.00	1000.00		
Jun-10	JUNCTION	3685.00	3700.00	1000.00		
Jun-OFFSITECURB	JUNCTION	3708.82	3709.32	10000.00	Yes	
Jun-OFFSITEPIPE	JUNCTION	3706.26	3730.00	1000.00	Yes	
Out-01	OUTFALL	3530.00	3540.00	0.00		
Out-02	OUTFALL	3640.00	3642.00	0.00		

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Link-01	Jun-01	Jun-02	CHANNEL	403.5	16.1086	0.0320
Link-02	Jun-02	Out-01	CHANNEL	484.2	6.1957	0.0320
Link-05	Jun-09	Jun-01	CHANNEL	792.8	7.1897	0.0320
Link-06	Jun-10	Jun-01	CHANNEL	377.0	15.9143	0.0320
Link-07	Jun-08	Jun-02	CHANNEL	599.8	20.0080	0.0320
Link-08	Jun-07	Jun-02	CHANNEL	393.0	25.4434	0.0320
Link-09	Jun-06	Jun-02	CHANNEL	452.1	20.7909	0.0320
Link-11	Jun-OFFSITEPIPE	Jun-10	CONDUIT	380.5	5.5874	0.0150
Link-12	Jun-OFFSITECURB	Jun-08	CHANNEL	626.8	4.5977	0.0320
Orifice-01	Jun-05	Out-02	ORIFICE			

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Link-01	RECT_OPEN	10.00	30.00	1	300.00	6.00	18462.36
Link-02	RECT_OPEN	10.00	30.00	1	300.00	6.00	11449.89
Link-05	RECT_OPEN	10.00	30.00	1	300.00	6.00	12334.26
Link-06	RECT_OPEN	10.00	30.00	1	300.00	6.00	18350.63
Link-07	RECT_OPEN	10.00	30.00	1	300.00	6.00	20575.93
Link-08	RECT_OPEN	10.00	30.00	1	300.00	6.00	23203.03
Link-09	RECT_OPEN	10.00	30.00	1	300.00	6.00	20974.65
Link-11	CIRCULAR	1.50	1.50	1	1.77	0.38	21.52
Link-12	RECT_OPEN	0.50	2.50	1	1.25	0.36	6.27

********** Runoff Quantity Continuity	Volume acre-ft	Depth inches
Total Precipitation	5.477	1.721
Surface Runoff	0.322	0.101
Continuity Error (%)	-0.001	

********** Flow Routing Continuity	Volume acre-ft	Volume Mgallons
External Inflow	40.914	13.332
External Outflow	43.971	14.329
Initial Stored Volume	0.000	0.000

Final Stored Volume 0.225 0.073
Continuity Error (%) ..... -0.001

****
Composite Curve Number Computations Report
****

Subbasin 89

Soil/Surface Description	Area (acres)	Soil Group	CN
-	6.03	-	89.00
Composite Area & Weighted CN	6.03		89.00

Subbasin 95

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.58	-	89.00
Composite Area & Weighted CN	3.58		89.00

Subbasin Sub-04

Soil/Surface Description	Area (acres)	Soil Group	CN
-	4.73	-	95.00
Composite Area & Weighted CN	4.73		95.00

Subbasin Sub-05

Soil/Surface Description	Area (acres)	Soil Group	CN
-	2.47	-	95.00
Composite Area & Weighted CN	2.47		95.00

Subbasin Sub-06

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.27	-	95.00
Composite Area & Weighted CN	1.27		95.00

Subbasin Sub-07

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.14	-	95.00
Composite Area & Weighted CN	3.14		95.00

Subbasin Sub-08

Soil/Surface Description	Area (acres)	Soil Group	CN

Soil/Surface Description	Area (acres)	Soil Group	CN
-	2.99	-	95.00
Composite Area & Weighted CN	2.99		95.00

Subbasin Sub-09

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.17	-	95.00
Composite Area & Weighted CN	1.17		95.00

Subbasin Sub-10

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.74	-	95.00
Composite Area & Weighted CN	0.74		95.00

Subbasin Sub-11

Soil/Surface Description	Area (acres)	Soil Group	CN
-	4.65	-	95.00
Composite Area & Weighted CN	4.65		95.00

Subbasin Sub-13

Soil/Surface Description	Area (acres)	Soil Group	CN
-	7.42	-	89.00
Composite Area & Weighted CN	7.42		89.00

****
SCS TR-55 Time of Concentration Computations Report
****

Sheet Flow Equation

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where:

Tc = Time of Concentration (hrs)
n = Manning's Roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)

V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's Roughness

Subbasin 89

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1202.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	2.77	0.00	0.00

Total TOC (minutes):	15.17

Subbasin 95

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17

Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	833.32	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	1.92	0.00	0.00
Total TOC (minutes):	14.32		

Subbasin Sub-04

User-Defined TOC override (minutes): 10.00

Subbasin Sub-05

User-Defined TOC override (minutes): 10.00

Subbasin Sub-06

User-Defined TOC override (minutes): 10.00

Subbasin Sub-07

User-Defined TOC override (minutes): 10.00

Subbasin Sub-08

User-Defined TOC override (minutes): 10.00

Subbasin Sub-09

User-Defined TOC override (minutes): 10.00

Subbasin Sub-10

User-Defined TOC override (minutes): 10.00

Subbasin Sub-11

User-Defined TOC override (minutes): 10.00

Subbasin Sub-13

User-Defined TOC override (minutes): 10.00

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	Time of Concentration hh:mm:ss
89	1.70	0.79	5.85	89.000	0	00:15:10
95	1.70	0.79	3.54	89.000	0	00:14:19
Sub-04	1.70	1.20	7.69	95.000	0	00:10:00
Sub-05	1.70	1.20	4.02	95.000	0	00:10:00
Sub-06	1.70	1.20	2.06	95.000	0	00:10:00
Sub-07	1.70	1.20	5.11	95.000	0	00:10:00
Sub-08	1.70	1.20	4.86	95.000	0	00:10:00
Sub-09	1.70	1.20	1.90	95.000	0	00:10:00
Sub-10	1.70	1.20	1.21	95.000	0	00:10:00
Sub-11	1.70	1.20	7.56	95.000	0	00:10:00
Sub-13	1.70	0.79	8.06	89.000	0	00:10:00

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-01	0.12	0.22	3625.22	0	12:06	0	0	0:00:00
Jun-02	0.19	0.36	3560.36	0	12:08	0	0	0:00:00
Jun-05	0.09	1.22	3665.22	0	12:05	0	0	0:00:00
Jun-06	0.00	0.02	3654.02	0	12:05	0	0	0:00:00
Jun-07	0.01	0.07	3660.07	0	12:05	0	0	0:00:00
Jun-08	0.05	0.08	3680.08	0	12:05	0	0	0:00:00
Jun-09	0.01	0.15	3682.15	0	12:06	0	0	0:00:00
Jun-10	0.12	0.15	3685.15	0	12:05	0	0	0:00:00
Jun-OFFSITECURB	0.48	0.48	3709.30	0	00:10	0	0	0:00:00
Jun-OFFSITEPIPE	18.82	19.07	3725.33	0	02:41	0	0	0:00:00
Out-01	0.19	0.35	3530.35	0	12:08	0	0	0:00:00
Out-02	0.00	0.00	3640.00	0	00:00	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
Jun-01	JUNCTION	8.06	46.12	0	12:05	0.00		
Jun-02	JUNCTION	0.00	62.23	0	12:06	0.00		
Jun-05	JUNCTION	7.47	7.47	0	12:05	0.00		
Jun-06	JUNCTION	1.19	1.19	0	12:05	0.00		
Jun-07	JUNCTION	7.59	7.59	0	12:05	0.00		
Jun-08	JUNCTION	3.97	8.37	0	12:05	0.00		
Jun-09	JUNCTION	15.51	15.51	0	12:05	0.00		

Jun-10	JUNCTION	7.09	23.39	0	12:05	0.00
Jun-OFFSITECURB	JUNCTION	4.40	4.40	0	00:05	0.00
Jun-OFFSITEPIPE	JUNCTION	16.30	16.30	0	00:05	0.00
Out-01	OUTFALL	0.00	60.59	0	12:08	0.00
Out-02	OUTFALL	0.00	7.34	0	12:05	0.00

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
Out-01	99.99	21.96	60.59
Out-02	78.19	0.30	7.34
System	89.09	22.26	67.28

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged minutes	Reported Condition
Link-01	CHANNEL	0 12:06	5.28	1.00	45.59	18462.36	0.00	0.03	0	Calculated
Link-02	CHANNEL	0 12:08	5.68	1.00	60.59	11449.89	0.01	0.04	0	Calculated
Link-05	CHANNEL	0 12:06	2.72	1.00	15.10	12334.26	0.00	0.02	0	Calculated
Link-06	CHANNEL	0 12:05	5.48	1.00	23.34	18350.63	0.00	0.02	0	Calculated
Link-07	CHANNEL	0 12:05	2.18	1.00	8.31	20575.93	0.00	0.02	0	Calculated
Link-08	CHANNEL	0 12:05	1.22	1.00	7.53	23203.03	0.00	0.02	0	Calculated
Link-09	CHANNEL	0 12:05	0.21	1.00	1.16	20974.65	0.00	0.02	0	Calculated
Link-11	CONDUIT	0 00:05	16.73	1.00	16.30	21.52	0.76	0.55	0	Calculated
Link-12	CHANNEL	0 11:59	6.57	1.00	4.41	6.27	0.70	0.55	0	Calculated
Orifice-01	ORIFICE	0 12:05			7.34			0.61		

****
Highest Flow Instability Indexes
****
All links are stable.

Analysis began on: Mon Mar 2 08:43:49 2026
Analysis ended on: Mon Mar 2 08:43:53 2026
Total elapsed time: 00:00:04

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.3.206 (Build 0)

****
Project Description
****
File Name ..... POST DEV.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. SCS TR-20
Time of Concentration..... SCS TR-55
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. Horton, wetted area
Starting Date FEB-27-2026 00:00:00
Ending Date FEB-28-2026 00:00:00
Report Time Step 00:05:00

****
Element Count
****
Number of rain gages 1
Number of subbasins 11
Number of nodes 10
Number of links 3

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	100 Year 3 Hour	CUMULATIVE	5.00

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Peak Rate Factor
89	6.03	484.00
95	3.58	484.00
Sub-04	4.73	484.00
Sub-05	2.47	484.00
Sub-06	1.27	484.00
Sub-07	3.14	484.00
Sub-08	2.99	484.00
Sub-09	1.17	484.00
Sub-10	0.74	484.00
Sub-11	4.65	484.00
Sub-13	7.42	484.00

****
Node Summary
****

Node ID	Element Type	Invert Elevation	Maximum Elev.	Ponded Area	External Inflow

			ft	ft	ft²	
Jun-05	JUNCTION	3664.00	3670.00	1000.00		
Jun-OFFSITECURB	JUNCTION	3708.82	3709.32	10000.00	Yes	
Jun-OFFSITEPIPE	JUNCTION	3706.26	3730.00	1000.00	Yes	
Out-01	OUTFALL	3530.00	3530.00	0.00		
Out-02	OUTFALL	3640.00	3642.00	0.00		
OUT-3	OUTFALL	3654.00	3654.00	0.00		
OUT-4	OUTFALL	3660.00	3660.00	0.00		
OUT-5	OUTFALL	3680.00	3680.50	0.00		
OUT6	OUTFALL	3685.00	3687.00	0.00		
OUT-7	OUTFALL	3682.00	3682.00	0.00		

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Link-11	Jun-OFFSITEPIPE	OUT6	CONDUIT	380.5	5.5874	0.0150
Link-12	Jun-OFFSITECURB	OUT-5	CHANNEL	626.8	4.5977	0.0320
Orifice-01	Jun-05	Out-02	ORIFICE			

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Link-11	CIRCULAR	2.00	2.00	1	3.14	0.50	46.34
Link-12	RECT_OPEN	0.50	10.00	1	5.00	0.45	29.43

********** Runoff Quantity Continuity **********	Volume acre-ft	Depth inches
Total Precipitation	5.282	1.660
Surface Runoff	0.311	0.098
Continuity Error (%)	-0.008	

********** Flow Routing Continuity **********	Volume acre-ft	Volume Mgallons
External Inflow	71.747	23.380
External Outflow	74.852	24.392
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.015	0.005
Continuity Error (%)	-0.000	

****
Composite Curve Number Computations Report
****

Subbasin 89

Soil/Surface Description	Area (acres)	Soil Group	CN
-	6.03	-	89.00
Composite Area & Weighted CN	6.03		89.00

Subbasin 95

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.58	-	89.00
Composite Area & Weighted CN	3.58		89.00

Subbasin Sub-04

Soil/Surface Description	Area (acres)	Soil Group	CN
-	4.73	-	95.00
Composite Area & Weighted CN	4.73		95.00

Subbasin Sub-05

Soil/Surface Description	Area (acres)	Soil Group	CN
-	2.47	-	95.00
Composite Area & Weighted CN	2.47		95.00

Subbasin Sub-06

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.27	-	95.00
Composite Area & Weighted CN	1.27		95.00

Subbasin Sub-07

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.14	-	95.00
Composite Area & Weighted CN	3.14		95.00

Subbasin Sub-08

Soil/Surface Description	Area (acres)	Soil Group	CN
-	2.99	-	95.00
Composite Area & Weighted CN	2.99		95.00

Subbasin Sub-09

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.17	-	95.00
Composite Area & Weighted CN	1.17		95.00

Subbasin Sub-10

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.74	-	95.00
Composite Area & Weighted CN	0.74		95.00

Subbasin Sub-11

Soil/Surface Description	Area (acres)	Soil Group	CN
-	4.65	-	95.00
Composite Area & Weighted CN	4.65		95.00

Subbasin Sub-13

Soil/Surface Description	Area (acres)	Soil Group	CN
-	7.42	-	89.00
Composite Area & Weighted CN	7.42		89.00

****
SCS TR-55 Time of Concentration Computations Report
****

Sheet Flow Equation

```
        Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))
        Where:

        Tc = Time of Concentration (hrs)
        n  = Manning's Roughness
        Lf = Flow Length (ft)
        P  = 2 yr, 24 hr Rainfall (inches)
        Sf = Slope (ft/ft)
```

Shallow Concentrated Flow Equation

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

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)
```

Channel Flow Equation

```
        V  = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
        R  = Aq / Wp
```

Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's Roughness

Subbasin 89

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1202.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	2.77	0.00	0.00
Total TOC (minutes):	15.17		

Subbasin 95

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	833.32	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	1.92	0.00	0.00
Total TOC (minutes):	14.32		

```
------------------
Subbasin Sub-04
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-05
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-06
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-07
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-08
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-09
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-10
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-11
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-13
------------------

        User-Defined TOC override (minutes):     10.00

**********************
Subbasin Runoff Summary
**********************

-------------------------------------------------------------------------------
Subbasin             Total      Total      Peak  Weighted           Time of
ID                  Precip     Runoff    Runoff     Curve      Concentration
                        in         in       cfs    Number     days  hh:mm:ss
-------------------------------------------------------------------------------
89                    1.66       0.75      7.92    89.000        0  00:15:10
95                    1.66       0.75      4.80    89.000        0  00:14:19
Sub-04                1.66       1.16     11.85    95.000        0  00:10:00
Sub-05                1.66       1.16      6.19    95.000        0  00:10:00
```

Sub-06	1.66	1.16	3.18	95.000	0	00:10:00
Sub-07	1.66	1.16	7.88	95.000	0	00:10:00
Sub-08	1.66	1.16	7.49	95.000	0	00:10:00
Sub-09	1.66	1.16	2.94	95.000	0	00:10:00
Sub-10	1.66	1.16	1.86	95.000	0	00:10:00
Sub-11	1.66	1.16	11.66	95.000	0	00:10:00
Sub-13	1.66	0.75	11.06	89.000	0	00:10:00

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Flooded Time minutes	Retention Time hh:mm:ss
Jun-05	0.05	1.64	3665.64	0	00:50	0	0	0:00:00
Jun-OFFSITECURB	0.25	0.25	3709.07	0	00:35	0	0	0:00:00
Jun-OFFSITEPIPE	1.16	1.17	3707.43	0	00:05	0	0	0:00:00
Out-01	0.00	0.00	3530.00	0	00:00	0	0	0:00:00
Out-02	0.00	0.00	3640.00	0	00:00	0	0	0:00:00
OUT-3	0.00	0.00	3654.00	0	00:00	0	0	0:00:00
OUT-4	0.00	0.00	3660.00	0	00:00	0	0	0:00:00
OUT-5	0.25	0.25	3680.25	0	00:25	0	0	0:00:00
OUT6	1.09	1.09	3686.09	0	00:05	0	0	0:00:00
OUT-7	0.00	0.00	3682.00	0	00:00	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
Jun-05	JUNCTION	11.59	11.59	0	00:49	0.00		
Jun-OFFSITECURB	JUNCTION	9.50	9.50	0	00:05	0.00		
Jun-OFFSITEPIPE	JUNCTION	26.80	26.80	0	00:05	0.00		
Out-01	OUTFALL	10.80	10.80	0	00:54	0.00		
Out-02	OUTFALL	0.00	11.46	0	00:50	0.00		
OUT-3	OUTFALL	1.85	1.85	0	00:49	0.00		
OUT-4	OUTFALL	11.78	11.78	0	00:49	0.00		
OUT-5	OUTFALL	6.15	15.65	0	00:49	0.00		
OUT6	OUTFALL	10.98	37.78	0	00:49	0.00		
OUT-7	OUTFALL	21.67	21.67	0	00:54	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
Out-01	12.08	1.94	10.80
Out-02	12.12	1.87	11.46
OUT-3	11.64	0.31	1.85
OUT-4	12.05	1.91	11.78

OUT-5	99.98	9.59	15.65
OUT6	99.98	26.95	37.78
OUT-7	13.04	3.89	21.67
System	37.27	46.47	107.57

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged minutes	Reported Condition
Link-11	CONDUIT	0 00:05	14.70	1.00	26.89	46.34	0.58	0.57	0	Calculated
Link-12	CHANNEL	0 00:25	3.81	1.00	9.50	29.43	0.32	0.50	0	Calculated
Orifice-01	ORIFICE	0 00:50			11.46			0.82		

****
Highest Flow Instability Indexes
****
All links are stable.

Analysis began on: Mon Mar 2 09:28:58 2026
Analysis ended on: Mon Mar 2 09:29:02 2026
Total elapsed time: 00:00:04

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.3.206 (Build 0)

****
Project Description
****
File Name ..... POST DEV.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. SCS TR-20
Time of Concentration..... SCS TR-55
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. Horton, wetted area
Starting Date FEB-27-2026 00:00:00
Ending Date FEB-28-2026 00:00:00
Report Time Step 00:05:00

****
Element Count
****
Number of rain gages 1
Number of subbasins 11
Number of nodes 10
Number of links 3

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	100 Year 24 Hour	CUMULATIVE	6.00

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Peak Rate Factor
89	6.03	484.00
95	3.58	484.00
Sub-04	4.73	484.00
Sub-05	2.47	484.00
Sub-06	1.27	484.00
Sub-07	3.14	484.00
Sub-08	2.99	484.00
Sub-09	1.17	484.00
Sub-10	0.74	484.00
Sub-11	4.65	484.00
Sub-13	7.42	484.00

****
Node Summary
****

Node ID	Element Type	Invert Elevation	Maximum Elev.	Ponded Area	External Inflow

			ft	ft	ft²	
Jun-05	JUNCTION	3664.00	3670.00	1000.00		
Jun-OFFSITECURB	JUNCTION	3708.82	3709.32	10000.00	Yes	
Jun-OFFSITEPIPE	JUNCTION	3706.26	3730.00	1000.00	Yes	
Out-01	OUTFALL	3530.00	3530.00	0.00		
Out-02	OUTFALL	3640.00	3642.00	0.00		
OUT-3	OUTFALL	3654.00	3654.00	0.00		
OUT-4	OUTFALL	3660.00	3660.00	0.00		
OUT-5	OUTFALL	3680.00	3680.50	0.00		
OUT6	OUTFALL	3685.00	3687.00	0.00		
OUT-7	OUTFALL	3682.00	3682.00	0.00		

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Link-11	Jun-OFFSITEPIPE	OUT6	CONDUIT	380.5	5.5874	0.0150
Link-12	Jun-OFFSITECURB	OUT-5	CHANNEL	626.8	4.5977	0.0320
Orifice-01	Jun-05	Out-02	ORIFICE			

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Link-11	CIRCULAR	2.00	2.00	1	3.14	0.50	46.34
Link-12	RECT_OPEN	0.50	10.00	1	5.00	0.45	29.43

********** Runoff Quantity Continuity **********	Volume acre-ft	Depth inches
Total Precipitation	8.118	2.551
Surface Runoff	0.557	0.175
Continuity Error (%)	-0.002	

********** Flow Routing Continuity **********	Volume acre-ft	Volume Mgallons
External Inflow	71.747	23.380
External Outflow	77.306	25.191
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.015	0.005
Continuity Error (%)	-0.000	

****
Composite Curve Number Computations Report
****

Subbasin 89

Soil/Surface Description	Area (acres)	Soil Group	CN
-	6.03	-	89.00
Composite Area & Weighted CN	6.03		89.00

Subbasin 95

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.58	-	89.00
Composite Area & Weighted CN	3.58		89.00

Subbasin Sub-04

Soil/Surface Description	Area (acres)	Soil Group	CN
-	4.73	-	95.00
Composite Area & Weighted CN	4.73		95.00

Subbasin Sub-05

Soil/Surface Description	Area (acres)	Soil Group	CN
-	2.47	-	95.00
Composite Area & Weighted CN	2.47		95.00

Subbasin Sub-06

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.27	-	95.00
Composite Area & Weighted CN	1.27		95.00

Subbasin Sub-07

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.14	-	95.00
Composite Area & Weighted CN	3.14		95.00

Subbasin Sub-08

Soil/Surface Description	Area (acres)	Soil Group	CN
-	2.99	-	95.00
Composite Area & Weighted CN	2.99		95.00

Subbasin Sub-09

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.17	-	95.00
Composite Area & Weighted CN	1.17		95.00

Subbasin Sub-10

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.74	-	95.00
Composite Area & Weighted CN	0.74		95.00

Subbasin Sub-11

Soil/Surface Description	Area (acres)	Soil Group	CN
-	4.65	-	95.00
Composite Area & Weighted CN	4.65		95.00

Subbasin Sub-13

Soil/Surface Description	Area (acres)	Soil Group	CN
-	7.42	-	89.00
Composite Area & Weighted CN	7.42		89.00

****
SCS TR-55 Time of Concentration Computations Report
****

Sheet Flow Equation

```
        Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))
        Where:

        Tc = Time of Concentration (hrs)
        n  = Manning's Roughness
        Lf = Flow Length (ft)
        P  = 2 yr, 24 hr Rainfall (inches)
        Sf = Slope (ft/ft)
```

Shallow Concentrated Flow Equation

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

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)
```

Channel Flow Equation

```
        V  = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
        R  = Aq / Wp
```

Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's Roughness

Subbasin 89

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1202.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	2.77	0.00	0.00
Total TOC (minutes):	15.17		

Subbasin 95

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	833.32	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	1.92	0.00	0.00
Total TOC (minutes):	14.32		

```
------------------
Subbasin Sub-04
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-05
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-06
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-07
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-08
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-09
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-10
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-11
------------------

        User-Defined TOC override (minutes):     10.00

------------------
Subbasin Sub-13
------------------

        User-Defined TOC override (minutes):     10.00

**********************
Subbasin Runoff Summary
**********************

-------------------------------------------------------------------------------
Subbasin             Total      Total      Peak  Weighted           Time of
ID                  Precip     Runoff    Runoff     Curve      Concentration
                        in         in       cfs    Number     days  hh:mm:ss
-------------------------------------------------------------------------------
89                    2.52       1.47     10.96    89.000        0  00:15:10
95                    2.52       1.47      6.63    89.000        0  00:14:19
Sub-04                2.52       1.98     12.41    95.000        0  00:10:00
Sub-05                2.52       1.98      6.48    95.000        0  00:10:00
```

Sub-06	2.52	1.98	3.32	95.000	0	00:10:00
Sub-07	2.52	1.98	8.24	95.000	0	00:10:00
Sub-08	2.52	1.98	7.84	95.000	0	00:10:00
Sub-09	2.52	1.98	3.07	95.000	0	00:10:00
Sub-10	2.52	1.98	1.95	95.000	0	00:10:00
Sub-11	2.52	1.98	12.20	95.000	0	00:10:00
Sub-13	2.52	1.47	15.09	89.000	0	00:10:00

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Flooded Time minutes	Retention Time hh:mm:ss
Jun-05	0.13	1.68	3665.68	0	12:05	0	0	0:00:00
Jun-OFFSITECURB	0.25	0.25	3709.07	0	00:35	0	0	0:00:00
Jun-OFFSITEPIPE	1.16	1.17	3707.43	0	00:05	0	0	0:00:00
Out-01	0.00	0.00	3530.00	0	00:00	0	0	0:00:00
Out-02	0.00	0.00	3640.00	0	00:00	0	0	0:00:00
OUT-3	0.00	0.00	3654.00	0	00:00	0	0	0:00:00
OUT-4	0.00	0.00	3660.00	0	00:00	0	0	0:00:00
OUT-5	0.25	0.25	3680.25	0	00:25	0	0	0:00:00
OUT6	1.09	1.09	3686.09	0	00:05	0	0	0:00:00
OUT-7	0.00	0.00	3682.00	0	00:00	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
Jun-05	JUNCTION	11.97	11.97	0	12:05	0.00		
Jun-OFFSITECURB	JUNCTION	9.50	9.50	0	00:05	0.00		
Jun-OFFSITEPIPE	JUNCTION	26.80	26.80	0	00:05	0.00		
Out-01	OUTFALL	14.98	14.98	0	12:05	0.00		
Out-02	OUTFALL	0.00	11.90	0	12:05	0.00		
OUT-3	OUTFALL	1.91	1.91	0	12:05	0.00		
OUT-4	OUTFALL	12.17	12.17	0	12:05	0.00		
OUT-5	OUTFALL	6.36	15.86	0	12:05	0.00		
OUT6	OUTFALL	11.34	38.14	0	12:05	0.00		
OUT-7	OUTFALL	27.53	27.53	0	12:05	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
Out-01	70.07	0.65	14.98
Out-02	84.21	0.46	11.90
OUT-3	83.06	0.07	1.91
OUT-4	84.27	0.47	12.17

OUT-5	99.98	9.68	15.86
OUT6	99.98	27.10	38.14
OUT-7	84.09	1.11	27.53
System	86.52	39.54	122.47

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged minutes	Reported Condition
Link-11	CONDUIT	0 00:05	14.70	1.00	26.89	46.34	0.58	0.57	0	Calculated
Link-12	CHANNEL	0 00:25	3.81	1.00	9.50	29.43	0.32	0.50	0	Calculated
Orifice-01	ORIFICE	0 12:05			11.90			0.84		

****
Highest Flow Instability Indexes
****
All links are stable.

Analysis began on: Mon Mar 2 09:35:06 2026
Analysis ended on: Mon Mar 2 09:35:09 2026
Total elapsed time: 00:00:03

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.3.206 (Build 0)

****
Project Description
****
File Name ..... PRE DEV.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. SCS TR-20
Time of Concentration..... SCS TR-55
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. Horton, wetted area
Starting Date FEB-27-2026 00:00:00
Ending Date FEB-28-2026 00:00:00
Report Time Step 00:05:00

****
Element Count
****
Number of rain gages 1
Number of subbasins 7
Number of nodes 5
Number of links 4

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	10 Year 3 Hour	CUMULATIVE	5.00

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Peak Rate Factor
10	0.52	484.00
89	6.03	484.00
94	8.92	484.00
95	3.58	484.00
Sub-01	2.80	484.00
Sub-02	3.63	484.00
Sub-03	13.51	484.00

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Elev. ft	Ponded Area ft²	External Inflow
Jun-01	JUNCTION	3625.00	3635.00	100.00	
Jun-02	JUNCTION	3560.00	3570.00	1000.00	

Jun-offsite1	JUNCTION	3695.00	3710.00	10000.00	Yes
JUN-OFFSITE2	JUNCTION	3695.00	3715.00	0.00	Yes
Out-01	OUTFALL	3530.00	3540.00	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Link-01	Jun-01	Jun-02	CHANNEL	403.5	16.1086	0.0320
Link-02	Jun-02	Out-01	CHANNEL	484.2	6.1957	0.0320
Link-03	Jun-offsite1	Jun-01	CONDUIT	636.4	10.9989	0.0150
Link-04	JUN-OFFSITE2	Jun-01	CHANNEL	840.3	8.3306	0.0320

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Link-01	RECT_OPEN	10.00	30.00	1	300.00	6.00	18462.36
Link-02	RECT_OPEN	10.00	30.00	1	300.00	6.00	11449.89
Link-03	CIRCULAR	1.50	1.50	1	1.77	0.38	30.19
Link-04	RECT_OPEN	1.00	1.00	1	1.00	0.33	6.44

********** Runoff Quantity Continuity	Volume acre-ft	Depth inches
Total Precipitation	3.314	1.020
Surface Runoff	0.097	0.030
Continuity Error (%)	-0.006	

********** Flow Routing Continuity	Volume acre-ft	Volume Mgallons
External Inflow	4.990	1.626
External Outflow	5.956	1.941
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

****
Composite Curve Number Computations Report
****

Subbasin 10

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.52	-	89.00
Composite Area & Weighted CN	0.52		89.00

Subbasin 89

Soil/Surface Description	Area (acres)	Soil Group	CN

Soil/Surface Description	Area (acres)	Soil Group	CN
-	6.03	-	89.00
Composite Area & Weighted CN	6.03		89.00

Subbasin 94

Soil/Surface Description	Area (acres)	Soil Group	CN
-	8.92	-	89.00
Composite Area & Weighted CN	8.92		89.00

Subbasin 95

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.58	-	89.00
Composite Area & Weighted CN	3.58		89.00

Subbasin Sub-01

Soil/Surface Description	Area (acres)	Soil Group	CN
-	2.80	-	89.00
Composite Area & Weighted CN	2.80		89.00

Subbasin Sub-02

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.63	-	89.00
Composite Area & Weighted CN	3.63		89.00

Subbasin Sub-03

Soil/Surface Description	Area (acres)	Soil Group	CN
-	13.51	-	89.00
Composite Area & Weighted CN	13.51		89.00

****
SCS TR-55 Time of Concentration Computations Report
****

Sheet Flow Equation

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where:

Tc = Time of Concentration (hrs)
n = Manning's Roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation

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

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's Roughness

Subbasin 10

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	476.78	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	1.10	0.00	0.00
Total TOC (minutes):	13.50		

Subbasin 89

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1202.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	2.77	0.00	0.00
Total TOC (minutes):	15.17		

Subbasin 94

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	824.16	0.00	0.00
Slope (%):	15.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	6.25	0.00	0.00
Computed Flow Time (minutes):	2.20	0.00	0.00
Total TOC (minutes):	14.60		

Subbasin 95

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	833.32	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	1.92	0.00	0.00
Total TOC (minutes):	14.32		

Subbasin Sub-01

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	477.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	6.25	0.00	0.00
Computed Flow Time (minutes):	1.27	0.00	0.00
Total TOC (minutes):	13.67		

Subbasin Sub-02

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	404.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.93	0.00	0.00
Total TOC (minutes):	13.33		

Subbasin Sub-03

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.47	0.00	0.00
Computed Flow Time (minutes):	10.54	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	683.41	0.00	0.00
Slope (%):	15.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	6.25	0.00	0.00
Computed Flow Time (minutes):	1.82	0.00	0.00
Total TOC (minutes):	12.36		

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	Time of Concentration hh:mm:ss
10	1.02	0.30	0.26	89.000	0	00:13:30
89	1.02	0.30	2.89	89.000	0	00:15:10
94	1.02	0.30	4.33	89.000	0	00:14:36
95	1.02	0.30	1.75	89.000	0	00:14:19
Sub-01	1.02	0.30	1.39	89.000	0	00:13:40
Sub-02	1.02	0.30	1.81	89.000	0	00:13:19
Sub-03	1.02	0.30	6.90	89.000	0	00:12:21

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Flooded Time minutes	Retention Time hh:mm:ss
Jun-01	0.03	0.19	3625.19	0	01:00	0	0	0:00:00
Jun-02	0.04	0.28	3560.28	0	01:00	0	0	0:00:00
Jun-offsite1	0.20	1.11	3696.11	0	00:06	0	0	0:00:00
JUN-OFFSITE2	0.17	0.92	3695.92	0	00:39	0	0	0:00:00
Out-01	0.04	0.27	3530.27	0	01:00	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	hh:mm
Jun-01	JUNCTION	13.07	33.78	0	01:00	0.00		
Jun-02	JUNCTION	5.94	39.70	0	01:00	0.00		
Jun-offsite1	JUNCTION	16.30	16.30	0	00:05	0.00		
JUN-OFFSITE2	JUNCTION	4.40	4.40	0	00:05	0.00		
Out-01	OUTFALL	0.00	39.58	0	01:00	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
Out-01	30.54	14.78	39.58
System	30.54	14.78	39.58

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Depth	Total Time Surcharged minutes	Reported Condition
Link-01	CHANNEL	0	01:00	5.03	1.00	33.75	18462.36	0.00	0.02	0	Calculated
Link-02	CHANNEL	0	01:00	4.81	1.00	39.58	11449.89	0.00	0.03	0	Calculated
Link-03	CONDUIT	0	00:46	23.94	1.00	16.36	30.19	0.54	0.41	0	Calculated
Link-04	CHANNEL	0	00:49	8.30	1.00	4.41	6.44	0.68	0.54	0	Calculated

****
Highest Flow Instability Indexes
****
All links are stable.

Analysis began on: Fri Feb 27 15:45:32 2026
Analysis ended on: Fri Feb 27 15:45:35 2026
Total elapsed time: 00:00:03

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.3.206 (Build 0)

****
Project Description
****
File Name ..... PRE DEV.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. SCS TR-20
Time of Concentration..... SCS TR-55
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. Horton, wetted area
Starting Date FEB-27-2026 00:00:00
Ending Date FEB-28-2026 00:00:00
Report Time Step 00:05:00

****
Element Count
****
Number of rain gages 1
Number of subbasins 7
Number of nodes 5
Number of links 4

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	10 Year 24 Hour	CUMULATIVE	6.00

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Peak Rate Factor
10	0.52	484.00
89	6.03	484.00
94	8.92	484.00
95	3.58	484.00
Sub-01	2.80	484.00
Sub-02	3.63	484.00
Sub-03	13.51	484.00

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Elev. ft	Ponded Area ft²	External Inflow
Jun-01	JUNCTION	3625.00	3635.00	100.00	
Jun-02	JUNCTION	3560.00	3570.00	1000.00	

Jun-offsite1	JUNCTION	3695.00	3710.00	10000.00	Yes
JUN-OFFSITE2	JUNCTION	3695.00	3715.00	0.00	Yes
Out-01	OUTFALL	3530.00	3540.00	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Link-01	Jun-01	Jun-02	CHANNEL	403.5	16.1086	0.0320
Link-02	Jun-02	Out-01	CHANNEL	484.2	6.1957	0.0320
Link-03	Jun-offsite1	Jun-01	CONDUIT	636.4	10.9989	0.0150
Link-04	JUN-OFFSITE2	Jun-01	CHANNEL	840.3	8.3306	0.0320

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Link-01	RECT_OPEN	10.00	30.00	1	300.00	6.00	18462.36
Link-02	RECT_OPEN	10.00	30.00	1	300.00	6.00	11449.89
Link-03	CIRCULAR	1.50	1.50	1	1.77	0.38	30.19
Link-04	RECT_OPEN	1.00	1.00	1	1.00	0.33	6.44

********** Runoff Quantity Continuity	Volume acre-ft	Depth inches
Total Precipitation	5.592	1.721
Surface Runoff	0.254	0.078
Continuity Error (%)	-0.001	

********** Flow Routing Continuity	Volume acre-ft	Volume Mgallons
External Inflow	40.914	13.332
External Outflow	43.404	14.144
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.069	0.023
Continuity Error (%)	-0.000	

****
Composite Curve Number Computations Report
****

Subbasin 10

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.52	-	89.00
Composite Area & Weighted CN	0.52		89.00

Subbasin 89

Soil/Surface Description	Area (acres)	Soil Group	CN

Soil/Surface Description	Area (acres)	Soil Group	CN
-	6.03	-	89.00
Composite Area & Weighted CN	6.03		89.00

Subbasin 94

Soil/Surface Description	Area (acres)	Soil Group	CN
-	8.92	-	89.00
Composite Area & Weighted CN	8.92		89.00

Subbasin 95

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.58	-	89.00
Composite Area & Weighted CN	3.58		89.00

Subbasin Sub-01

Soil/Surface Description	Area (acres)	Soil Group	CN
-	2.80	-	89.00
Composite Area & Weighted CN	2.80		89.00

Subbasin Sub-02

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.63	-	89.00
Composite Area & Weighted CN	3.63		89.00

Subbasin Sub-03

Soil/Surface Description	Area (acres)	Soil Group	CN
-	13.51	-	89.00
Composite Area & Weighted CN	13.51		89.00

****
SCS TR-55 Time of Concentration Computations Report
****

Sheet Flow Equation

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where:

Tc = Time of Concentration (hrs)
n = Manning's Roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation

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

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's Roughness

Subbasin 10

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	476.78	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	1.10	0.00	0.00
Total TOC (minutes):	13.50		

Subbasin 89

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1202.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	2.77	0.00	0.00
Total TOC (minutes):	15.17		

Subbasin 94

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	824.16	0.00	0.00
Slope (%):	15.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	6.25	0.00	0.00
Computed Flow Time (minutes):	2.20	0.00	0.00
Total TOC (minutes):	14.60		

Subbasin 95

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	833.32	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	1.92	0.00	0.00
Total TOC (minutes):	14.32		

Subbasin Sub-01

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	477.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	6.25	0.00	0.00
Computed Flow Time (minutes):	1.27	0.00	0.00
Total TOC (minutes):	13.67		

Subbasin Sub-02

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	404.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.93	0.00	0.00
Total TOC (minutes):	13.33		

Subbasin Sub-03

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.47	0.00	0.00
Computed Flow Time (minutes):	10.54	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	683.41	0.00	0.00
Slope (%):	15.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	6.25	0.00	0.00
Computed Flow Time (minutes):	1.82	0.00	0.00
Total TOC (minutes):	12.36		

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	Time of Concentration hh:mm:ss
10	1.70	0.78	0.52	89.000	0	00:13:30
89	1.70	0.79	5.85	89.000	0	00:15:10
94	1.70	0.79	8.76	89.000	0	00:14:36
95	1.70	0.79	3.54	89.000	0	00:14:19
Sub-01	1.70	0.79	2.82	89.000	0	00:13:40
Sub-02	1.70	0.79	3.67	89.000	0	00:13:19
Sub-03	1.70	0.79	13.99	89.000	0	00:12:21

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Flooded Time minutes	Retention Time hh:mm:ss
Jun-01	0.14	0.23	3625.23	0	12:05	0	0	0:00:00
Jun-02	0.19	0.35	3560.35	0	12:06	0	0	0:00:00
Jun-offsite1	1.10	1.11	3696.11	0	00:06	0	0	0:00:00
JUN-OFFSITE2	0.92	0.92	3695.92	0	02:46	0	0	0:00:00
Out-01	0.19	0.35	3530.35	0	12:06	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	hh:mm
Jun-01	JUNCTION	26.14	46.88	0	12:04	0.00		
Jun-02	JUNCTION	11.55	58.40	0	12:05	0.00		
Jun-offsite1	JUNCTION	16.30	16.30	0	00:05	0.00		
JUN-OFFSITE2	JUNCTION	4.40	4.40	0	00:05	0.00		
Out-01	OUTFALL	0.00	58.01	0	12:06	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
Out-01	99.96	21.92	58.01
System	99.96	21.92	58.01

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged minutes	Reported Condition
Link-01	CHANNEL	0	12:05	5.46	1.00	46.86	18462.36	0.00	0.03	0	Calculated
Link-02	CHANNEL	0	12:06	5.59	1.00	58.01	11449.89	0.01	0.03	0	Calculated
Link-03	CONDUIT	0	11:56	23.94	1.00	16.35	30.19	0.54	0.41	0	Calculated
Link-04	CHANNEL	0	11:58	8.30	1.00	4.41	6.44	0.69	0.56	0	Calculated

****
Highest Flow Instability Indexes
****
All links are stable.

Analysis began on: Fri Feb 27 15:47:09 2026
Analysis ended on: Fri Feb 27 15:47:12 2026
Total elapsed time: 00:00:03

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.3.206 (Build 0)

****
Project Description
****
File Name ..... PRE DEV.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. SCS TR-20
Time of Concentration..... SCS TR-55
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. Horton, wetted area
Starting Date FEB-27-2026 00:00:00
Ending Date FEB-28-2026 00:00:00
Report Time Step 00:05:00

****
Element Count
****
Number of rain gages 1
Number of subbasins 7
Number of nodes 5
Number of links 4

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	100 Year 3 Hour	CUMULATIVE	5.00

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Peak Rate Factor
10	0.52	484.00
89	6.03	484.00
94	8.92	484.00
95	3.58	484.00
Sub-01	2.80	484.00
Sub-02	3.63	484.00
Sub-03	13.51	484.00

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Elev. ft	Ponded Area ft²	External Inflow
Jun-01	JUNCTION	3625.00	3635.00	100.00	
Jun-02	JUNCTION	3560.00	3570.00	1000.00	

Jun-offsite1	JUNCTION	3695.00	3750.00	10000.00	Yes
JUN-OFFSITE2	JUNCTION	3695.00	3750.00	1000.00	Yes
Out-01	OUTFALL	3530.00	3540.00	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Link-01	Jun-01	Jun-02	CHANNEL	403.5	16.1086	0.0320
Link-02	Jun-02	Out-01	CHANNEL	484.2	6.1957	0.0320
Link-03	Jun-offsite1	Jun-01	CHANNEL	636.4	10.9989	0.0320
Link-04	JUN-OFFSITE2	Jun-01	CHANNEL	840.3	8.3306	0.0320

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Link-01	RECT_OPEN	10.00	30.00	1	300.00	6.00	18462.36
Link-02	RECT_OPEN	10.00	30.00	1	300.00	6.00	11449.89
Link-03	RECT_OPEN	10.00	30.00	1	300.00	6.00	15255.67
Link-04	RECT_OPEN	10.00	30.00	1	300.00	6.00	13276.84

Runoff Quantity Continuity	Volume acre-ft	Depth inches
Total Precipitation	5.394	1.660
Surface Runoff	0.245	0.075
Continuity Error (%)	-0.006	

Flow Routing Continuity	Volume acre-ft	Volume Mgallons
External Inflow	8.750	2.851
External Outflow	11.201	3.650
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-0.000	

****
Composite Curve Number Computations Report
****

Subbasin 10

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.52	-	89.00
Composite Area & Weighted CN	0.52		89.00

Subbasin 89

Soil/Surface Description	Area (acres)	Soil Group	CN

Soil/Surface Description	Area (acres)	Soil Group	CN
-	6.03	-	89.00
Composite Area & Weighted CN	6.03		89.00

Subbasin 94

Soil/Surface Description	Area (acres)	Soil Group	CN
-	8.92	-	89.00
Composite Area & Weighted CN	8.92		89.00

Subbasin 95

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.58	-	89.00
Composite Area & Weighted CN	3.58		89.00

Subbasin Sub-01

Soil/Surface Description	Area (acres)	Soil Group	CN
-	2.80	-	89.00
Composite Area & Weighted CN	2.80		89.00

Subbasin Sub-02

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.63	-	89.00
Composite Area & Weighted CN	3.63		89.00

Subbasin Sub-03

Soil/Surface Description	Area (acres)	Soil Group	CN
-	13.51	-	89.00
Composite Area & Weighted CN	13.51		89.00

****
SCS TR-55 Time of Concentration Computations Report
****

Sheet Flow Equation

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where:

Tc = Time of Concentration (hrs)
n = Manning's Roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation

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

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's Roughness

Subbasin 10

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	476.78	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	1.10	0.00	0.00
Total TOC (minutes):	13.50		

Subbasin 89

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1202.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	2.77	0.00	0.00
Total TOC (minutes):	15.17		

Subbasin 94

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	824.16	0.00	0.00
Slope (%):	15.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	6.25	0.00	0.00
Computed Flow Time (minutes):	2.20	0.00	0.00
Total TOC (minutes):	14.60		

Subbasin 95

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	833.32	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	1.92	0.00	0.00
Total TOC (minutes):	14.32		

Subbasin Sub-01

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	477.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	6.25	0.00	0.00
Computed Flow Time (minutes):	1.27	0.00	0.00
Total TOC (minutes):	13.67		

Subbasin Sub-02

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	404.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.93	0.00	0.00
Total TOC (minutes):	13.33		

Subbasin Sub-03

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.47	0.00	0.00
Computed Flow Time (minutes):	10.54	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	683.41	0.00	0.00
Slope (%):	15.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	6.25	0.00	0.00
Computed Flow Time (minutes):	1.82	0.00	0.00
Total TOC (minutes):	12.36		

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	Time of Concentration hh:mm:ss
10	1.66	0.75	0.71	89.000	0	00:13:30
89	1.66	0.75	7.92	89.000	0	00:15:10
94	1.66	0.75	11.88	89.000	0	00:14:36
95	1.66	0.75	4.80	89.000	0	00:14:19
Sub-01	1.66	0.75	3.81	89.000	0	00:13:40
Sub-02	1.66	0.75	4.98	89.000	0	00:13:19
Sub-03	1.66	0.75	18.97	89.000	0	00:12:21

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Flooded Time minutes	Retention Time hh:mm:ss
Jun-01	0.03	0.29	3625.29	0	00:56	0	0	0:00:00
Jun-02	0.04	0.45	3560.45	0	00:57	0	0	0:00:00
Jun-offsite1	0.02	0.19	3695.19	0	00:06	0	0	0:00:00
JUN-OFFSITE2	0.01	0.11	3695.11	0	02:30	0	0	0:00:00
Out-01	0.04	0.44	3530.44	0	00:57	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	hh:mm
Jun-01	JUNCTION	36.33	72.63	0	00:55	0.00		
Jun-02	JUNCTION	16.16	87.98	0	00:56	0.00		
Jun-offsite1	JUNCTION	26.80	26.80	0	00:05	0.00		
JUN-OFFSITE2	JUNCTION	9.50	9.50	0	00:05	0.00		
Out-01	OUTFALL	0.00	87.86	0	00:57	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
Out-01	38.15	14.80	87.86
System	38.15	14.80	87.86

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Depth	Total Time Surcharged minutes	Reported Condition
Link-01	CHANNEL	0	00:56	6.47	1.00	72.01	18462.36	0.00	0.04	0	Calculated
Link-02	CHANNEL	0	00:57	6.57	1.00	87.86	11449.89	0.01	0.04	0	Calculated
Link-03	CHANNEL	0	00:06	5.87	1.00	27.72	15255.67	0.00	0.02	0	Calculated
Link-04	CHANNEL	0	00:48	2.23	1.00	9.50	13276.84	0.00	0.02	0	Calculated

****
Highest Flow Instability Indexes
****
All links are stable.

Analysis began on: Fri Feb 27 15:51:59 2026
Analysis ended on: Fri Feb 27 15:52:02 2026
Total elapsed time: 00:00:03

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.3.206 (Build 0)

****
Project Description
****
File Name ..... PRE DEV.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. SCS TR-20
Time of Concentration..... SCS TR-55
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. Horton, wetted area
Starting Date FEB-27-2026 00:00:00
Ending Date FEB-28-2026 00:00:00
Report Time Step 00:05:00

****
Element Count
****
Number of rain gages 1
Number of subbasins 7
Number of nodes 5
Number of links 4

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	100 Year 24 Hour	CUMULATIVE	6.00

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Peak Rate Factor
10	0.52	484.00
89	6.03	484.00
94	8.92	484.00
95	3.58	484.00
Sub-01	2.80	484.00
Sub-02	3.63	484.00
Sub-03	13.51	484.00

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Elev. ft	Ponded Area ft²	External Inflow
Jun-01	JUNCTION	3625.00	3635.00	100.00	
Jun-02	JUNCTION	3560.00	3570.00	1000.00	

Jun-offsite1	JUNCTION	3695.00	3750.00	10000.00	Yes
JUN-OFFSITE2	JUNCTION	3695.00	3750.00	1000.00	Yes
Out-01	OUTFALL	3530.00	3540.00	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Link-01	Jun-01	Jun-02	CHANNEL	403.5	16.1086	0.0320
Link-02	Jun-02	Out-01	CHANNEL	484.2	6.1957	0.0320
Link-03	Jun-offsite1	Jun-01	CHANNEL	636.4	10.9989	0.0320
Link-04	JUN-OFFSITE2	Jun-01	CHANNEL	840.3	8.3306	0.0320

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Link-01	RECT_OPEN	10.00	30.00	1	300.00	6.00	18462.36
Link-02	RECT_OPEN	10.00	30.00	1	300.00	6.00	11449.89
Link-03	RECT_OPEN	10.00	30.00	1	300.00	6.00	15255.67
Link-04	RECT_OPEN	10.00	30.00	1	300.00	6.00	13276.84

Runoff Quantity Continuity	Volume acre-ft	Depth inches
Total Precipitation	8.289	2.551
Surface Runoff	0.477	0.147
Continuity Error (%)	-0.002	

Flow Routing Continuity	Volume acre-ft	Volume Mgallons
External Inflow	71.747	23.380
External Outflow	76.341	24.877
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.211	0.069
Continuity Error (%)	-0.000	

****
Composite Curve Number Computations Report
****

Subbasin 10

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.52	-	89.00
Composite Area & Weighted CN	0.52		89.00

Subbasin 89

Soil/Surface Description	Area (acres)	Soil Group	CN

Soil/Surface Description	Area (acres)	Soil Group	CN
-	6.03	-	89.00
Composite Area & Weighted CN	6.03		89.00

Subbasin 94

Soil/Surface Description	Area (acres)	Soil Group	CN
-	8.92	-	89.00
Composite Area & Weighted CN	8.92		89.00

Subbasin 95

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.58	-	89.00
Composite Area & Weighted CN	3.58		89.00

Subbasin Sub-01

Soil/Surface Description	Area (acres)	Soil Group	CN
-	2.80	-	89.00
Composite Area & Weighted CN	2.80		89.00

Subbasin Sub-02

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.63	-	89.00
Composite Area & Weighted CN	3.63		89.00

Subbasin Sub-03

Soil/Surface Description	Area (acres)	Soil Group	CN
-	13.51	-	89.00
Composite Area & Weighted CN	13.51		89.00

****
SCS TR-55 Time of Concentration Computations Report
****

Sheet Flow Equation

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where:

Tc = Time of Concentration (hrs)
n = Manning's Roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation

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

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's Roughness

Subbasin 10

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	476.78	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	1.10	0.00	0.00
Total TOC (minutes):	13.50		

Subbasin 89

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1202.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	2.77	0.00	0.00
Total TOC (minutes):	15.17		

Subbasin 94

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	824.16	0.00	0.00
Slope (%):	15.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	6.25	0.00	0.00
Computed Flow Time (minutes):	2.20	0.00	0.00
Total TOC (minutes):	14.60		

Subbasin 95

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	833.32	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	1.92	0.00	0.00
Total TOC (minutes):	14.32		

Subbasin Sub-01

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	477.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	6.25	0.00	0.00
Computed Flow Time (minutes):	1.27	0.00	0.00
Total TOC (minutes):	13.67		

Subbasin Sub-02

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.40	0.00	0.00
Computed Flow Time (minutes):	12.40	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	404.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.93	0.00	0.00
Total TOC (minutes):	13.33		

Subbasin Sub-03

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.08	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	1.17	1.17	1.17
Velocity (ft/sec):	0.47	0.00	0.00
Computed Flow Time (minutes):	10.54	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	683.41	0.00	0.00
Slope (%):	15.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	6.25	0.00	0.00
Computed Flow Time (minutes):	1.82	0.00	0.00
Total TOC (minutes):	12.36		

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	Time of Concentration hh:mm:ss
10	2.52	1.47	0.98	89.000	0	00:13:30
89	2.52	1.47	10.96	89.000	0	00:15:10
94	2.52	1.47	16.43	89.000	0	00:14:36
95	2.52	1.47	6.63	89.000	0	00:14:19
Sub-01	2.52	1.47	5.27	89.000	0	00:13:40
Sub-02	2.52	1.47	6.87	89.000	0	00:13:19
Sub-03	2.52	1.47	26.16	89.000	0	00:12:21

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Flooded Time minutes	Retention Time hh:mm:ss
Jun-01	0.20	0.33	3625.33	0	12:06	0	0	0:00:00
Jun-02	0.27	0.50	3560.50	0	12:07	0	0	0:00:00
Jun-offsite1	0.18	0.19	3695.19	0	00:06	0	0	0:00:00
JUN-OFFSITE2	0.11	0.11	3695.11	0	13:24	0	0	0:00:00
Out-01	0.27	0.50	3530.50	0	12:07	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	hh:mm
Jun-01	JUNCTION	49.58	85.88	0	12:05	0.00		
Jun-02	JUNCTION	21.93	106.72	0	12:06	0.00		
Jun-offsite1	JUNCTION	26.80	26.80	0	00:05	0.00		
JUN-OFFSITE2	JUNCTION	9.50	9.50	0	00:05	0.00		
Out-01	OUTFALL	0.00	106.59	0	12:07	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
Out-01	99.83	38.55	106.59
System	99.83	38.55	106.59

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Depth	Total Time Surcharged minutes	Reported Condition
Link-01	CHANNEL	0	12:06	6.84	1.00	85.03	18462.36	0.00	0.04	0	Calculated
Link-02	CHANNEL	0	12:07	7.09	1.00	106.59	11449.89	0.01	0.05	0	Calculated
Link-03	CHANNEL	0	00:06	5.87	1.00	27.72	15255.67	0.00	0.03	0	Calculated
Link-04	CHANNEL	0	00:48	2.23	1.00	9.50	13276.84	0.00	0.02	0	Calculated

****
Highest Flow Instability Indexes
****
All links are stable.

Analysis began on: Fri Feb 27 15:53:40 2026
Analysis ended on: Fri Feb 27 15:53:42 2026
Total elapsed time: 00:00:02

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Washington County Area, Utah



March 3, 2026

Preface

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

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

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

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

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

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

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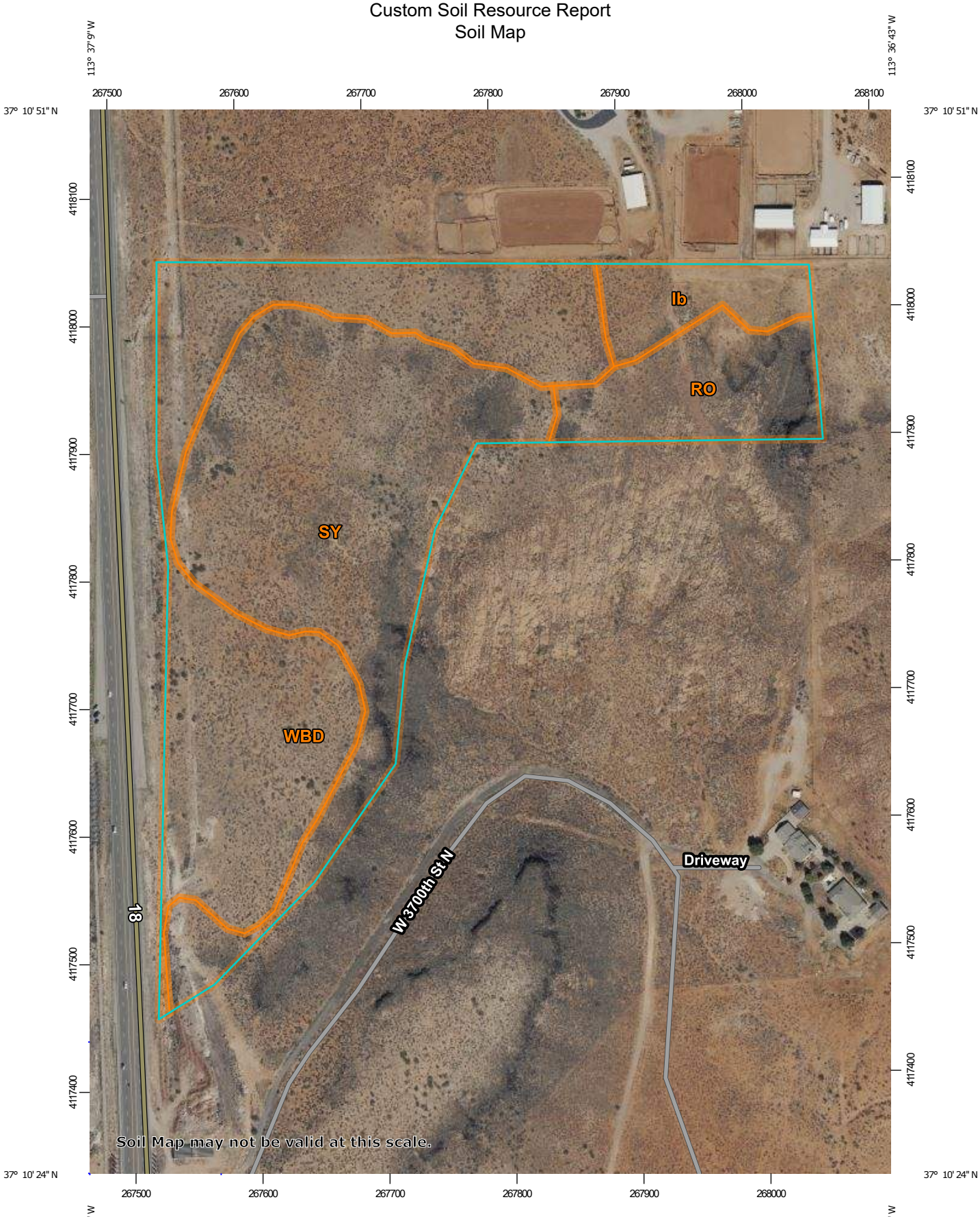
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Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:4,070 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: 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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ib	Ivins loamy fine sand	2.2	6.1%
RO	Rock land	4.0	11.0%
SY	Stony colluvial land	15.4	42.9%
WBD	Winkel gravelly fine sandy loam, 1 to 8 percent slopes	14.4	40.0%
Totals for Area of Interest		**36.0**	**100.0%**

Map Unit Descriptions

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

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

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

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The

delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

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

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

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

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

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

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

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

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

Washington County Area, Utah

Ib—Ivins loamy fine sand

Map Unit Setting

National map unit symbol: j8f1
Elevation: 2,800 to 3,800 feet
Mean annual precipitation: 8 to 11 inches
Mean annual air temperature: 57 to 67 degrees F
Frost-free period: 170 to 195 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Ivins and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ivins

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Eolian deposits derived from sandstone and shale

Typical profile

H1 - 0 to 4 inches: loamy fine sand
H2 - 4 to 24 inches: loamy fine sand
H3 - 24 to 30 inches: sandy clay loam
H4 - 30 to 39 inches: sandy clay
H5 - 39 to 60 inches: sandy clay loam

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: R030XY120UT - Desert Sand (Indian ricegrass)
Hydric soil rating: No

Minor Components

Tobler
Percent of map unit: 5 percent

Pintura
Percent of map unit: 5 percent

Ivins, hummocky
Percent of map unit: 5 percent

RO—Rock land

Map Unit Composition
Rock land: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Land

Setting
Landform: Mountain slopes
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex

Minor Components

Shallow soils
Percent of map unit: 20 percent

SY—Stony colluvial land

Map Unit Composition
Stony colluvial land: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

WBD—Winkel gravelly fine sandy loam, 1 to 8 percent slopes

Map Unit Setting
National map unit symbol: j8h9
Elevation: 2,800 to 4,000 feet
Mean annual precipitation: 8 to 11 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 190 to 195 days

Farmland classification: Not prime farmland

Map Unit Composition

Winkel and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Winkel

Setting

Landform: Mesas
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous material weathered from basalt, limestone, and wind-deposited sand.

Typical profile

H1 - 0 to 1 inches: gravelly fine sandy loam
H2 - 1 to 6 inches: gravelly fine sandy loam
H3 - 6 to 12 inches: very gravelly fine sandy loam
H4 - 12 to 16 inches: extremely cobbly fine sandy loam
H5 - 16 to 20 inches: indurated
H6 - 20 to 24 inches: unweathered bedrock

Properties and qualities

Slope: 1 to 8 percent
Depth to restrictive feature: 11 to 19 inches to petrocalcic; 14 to 24 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water supply, 0 to 60 inches: Very low (about 1.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R030XY134UT - Desert Shallow Loam (Creosotebush)
Hydric soil rating: No

Minor Components

Lava flows

Percent of map unit: 5 percent

Harrisburg

Percent of map unit: 5 percent

Bermesa

Percent of map unit: 5 percent

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National Flood Hazard Layer FIRMette

FEMA

113°37'9"W 37°10'47"N



113°36'32"W 37°10'19"N

Feet

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

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
- 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 2/27/2026 at 6:03 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.

EXHIBIT E

Geotechnical Study

REPORT
GEOTECHNICAL STUDY
PROPOSED TRAILS EAST – PHASE 1 MIXED-USE DEVELOPMENT
APPROXIMATELY 4101 NORTH HIGHWAY 18
ST. GEORGE, UTAH (37.1783°, -113.6176°)

Submitted To:

Trails Development QOZB, LCC
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Submitted By:

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December 2, 2025

Job No. 4209-001-25

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Mr. Josh Bush
Trails Development QOZB, LCC
3940 North Traverse Mountain Boulevard, Suite 200
Lehi, Utah 84043

Mr. Bush:

Re: Report
Geotechnical Study
Trails East – Phase 1 Mixed-Use Development
Approximately 4101 North Highway 18
St. George, Utah (37.1783°, -113.6176°)

1. INTRODUCTION

1.1 GENERAL

This report presents the results of our geotechnical study performed at the site of the proposed Trails East – Phase 1 Mixed-Use Development to be located at approximately 4101 North Highway 18 in St. George, Utah (37.1783°, -113.6176°). The general location of the site with respect to existing roadways, as of 2025, is presented on Figure 1, Vicinity Map. A more detailed layout of the site showing proposed facilities, existing roadways, and the test pits excavated in conjunction with this study is presented on Figure 2, Site Plan.

1.2 OBJECTIVES AND SCOPE

The objectives and scope of the study were planned in discussions between Mr. Josh Bush of Trails Development QOZB, LLC and Mr. Mike Huber, P.E., of GSH Geotechnical, Inc. (GSH).

In general, the objectives of this study were to:

1. Define and evaluate the subsurface soil and groundwater conditions across the site.

2. Provide appropriate foundation, earthwork, pavement, and geoseismic recommendations to be utilized in the design and construction of the proposed facilities.

In accomplishing these objectives, our scope has included the following:

1. A field program consisting of the excavating, logging, and sampling of 15 exploration test pits.

2. A laboratory testing program.

3. An office program consisting of the correlation of available data, engineering analysis, and the preparation of this summary report.

1.3 AUTHORIZATION

Authorization was provided by returning a signed copy of the Professional Services Agreement No. 25-1119 dated November 14, 2025.

1.4 PROFESSIONAL STATEMENTS

Supporting data upon which our recommendations are based are presented in subsequent sections of this report. Recommendations presented herein are governed by the physical properties of the soils encountered in the exploration test pits, projected groundwater conditions, and the layout and design data discussed in Section 2, Proposed Construction. If subsurface conditions other than those described in this report are encountered and/or if design and layout changes are implemented, GSH must be informed so that our recommendations can be reviewed and amended, if necessary.

Our professional services have been performed, our findings developed, and our recommendations prepared in accordance with generally accepted engineering principles and practices in this area at this time.

2. PROPOSED CONSTRUCTION

The project is to consist of the construction of five (5) 3-level multi-family apartment structures, 1 clubhouse structure, 4 retail pads, and associated pavements. The structures are anticipated to be constructed with wood-, light steel-framing, or CMU and be supported upon conventional spread and continuous wall footings.

Maximum real column and wall loads are anticipated to be on the order of up to 200 kips and up to 6 kips per lineal foot, respectively. Real loads are defined as the total of all dead plus frequently applied (reduced) live loads.

Paved parking areas and drive lanes are planned around the structures. Proposed traffic in these areas is anticipated to consist of a moderate volume of automobiles and light trucks, a light volume of medium-weight trucks, and occasional heavyweight trucks.

Site development will require some earthwork in the form of minor cutting and filling. At this time, we anticipate that maximum site grading cuts and fills, excluding utilities, will be on the order of 3 to 5 feet.

3. SITE INVESTIGATIONS

3.1 GENERAL

Subsurface conditions in unexplored locations or at other times may vary from those encountered at specific test pit locations. If such variations are noted during construction or if project development plans are changed, GSH must review the changes and amend our recommendations, if necessary.

Test pit locations were established by estimating distances and angles from site landmarks. If increased accuracy is desired by the client, we recommend that the test pit locations and elevations be surveyed.

3.2 FIELD PROGRAM

To define and evaluate the subsurface soil and groundwater conditions across the site, 15 test pits were excavated within the accessible areas. These test pits were completed to depths ranging from 1.5 to 10.0 feet with a moderate-sized rubber track-mounted excavator. Excavation refusal within bedrock terminated each test pit except Test Pit TP-2. The approximate locations of the test pits are presented on Figure 2.

The field portion of our study was under the direct control and continual supervision of an experienced member of our geotechnical staff. During the course of the excavation operations, a continuous log of the subsurface conditions encountered was maintained. In addition, samples of the typical soils encountered were obtained for subsequent laboratory testing and examination. The soils were classified in the field based upon visual and textural examination. These classifications were supplemented by subsequent inspection and testing in our laboratory. Graphical representation of the subsurface conditions encountered is presented on Figures 3A through 3O, Test Pit Logs. Soils were classified in accordance with the nomenclature described on Figure 4, Key to Test Pit Log (USCS).

A 2.42-inch inside diameter thin-wall drive sampler was utilized at select locations and depths within the test pit excavations to collect soil samples for further examination and laboratory testing.

Following completion of excavation operations, the test pits were then backfilled. Although an effort was made to compact the backfill with the excavator, backfill was not placed in uniform lifts and compacted to a specific density. Consequently, settlement of the backfill with time is likely to occur.

3.3 LABORATORY TESTING

3.3.1 General

To provide data necessary for our engineering analysis, a laboratory testing program was performed. This program included moisture, density, partial gradation, and chemical tests. The following paragraphs describe the tests and summarize the test data.

3.3.2 Moisture and Density Tests

To provide index parameters and to correlate other test data, moisture and density tests were performed on selected samples. The results of these tests are presented on the test pit logs, Figures 3A through 3O.

3.3.3 Partial Gradation Tests

To aid in classifying the granular soils, partial gradation tests were performed. Results of the tests are tabulated below and presented on the test pit logs, Figures 3A through 3O:

Test Pit No.	Depth (feet)	Percent Passing No. 200 Sieve	Moisture Content Percent	Soil Classification
TP-1	0.5	18.9	10.8	SM
TP-2	3.0	36.0	4.7	SM
TP-3	0.5	35.1	7.6	SM
TP-6	0.5	27.4	9.1	SM
TP-10	0.5	30.8	2.2	SM
TP-12	0.5	28.2	7.1	SM
TP-13	0.5	34.5	8.0	SM
TP-14	0.5	23.8	6.5	SM
TP-15	0.5	38.7	6.9	SM

3.3.4 Chemical Tests

A representative soil sample was collected and sent for laboratory analysis for pH and sulfate content. As of the date of this report, results are still pending and will be transmitted when available and with corresponding cement recommendations, if applicable.

4. SITE CONDITIONS

4.1 SURFACE

The site is located at approximately 4101 North Highway 18 in St. George, Utah (37.1783°, -113.6176°). The site is currently vacant/undeveloped brush/grass land. The topography of the site is somewhat sloped, grading down to the southeast with a total relief of approximately 55 to 60 feet. Site vegetation consists of various weeds, brush/grass, and shrubs. The east edge of the site has been rough graded as part of grading activities that extend further to the east as well as to the south.

The site is bounded to the north by similar vacant/undeveloped land along with 4230 North Street; to the east by similar vacant/undeveloped land; to the south by similar vacant/undeveloped land along with 3700 North Street; and to the west by State Highway 18 followed by similar vacant/undeveloped land along with single-family residential structures.

4.2 SUBSURFACE SOIL

The following paragraphs provide generalized descriptions of the subsurface profiles and soil conditions encountered within the test pits conducted during this study. As previously noted, soil conditions may vary in unexplored locations.

The test pits were excavated to depths ranging from 1.5 to 10.0 feet. The soil conditions encountered in each of the test pits, to the depths explored, were generally similar across the test pit locations.

- Approximately 6 inches of topsoil was encountered in Test Pits TP-2, TP-5, TP-9, TP-13, TP-14, and TP-15. Topsoil thickness is frequently erratic and thicker zones of topsoil should be anticipated.

- Non-engineered fill soils were encountered in Test Pits TP-1, TP-2, TP-6, TP-7, and TP-9, to depths ranging from 0.5 to 4.0 feet beneath the existing ground surface. The non-engineered fill soils primarily consisted of silty sand with varying gravel content.

- Natural soils were encountered below the non-engineered fill or ground surface in each test pit. The natural soils consisted primarily of granular silt and sand with varying gravel content overlying sandstone bedrock encountered at depths ranging from 0.5 to 6.0 feet beneath the existing ground surface, extending to the maximum depths explored.

- Materials causing excavation refusal were encountered within the bedrock in each test pit except Test Pit TP-2 at depths ranging from 1.5 to 7.0 feet below the existing ground surface.

The natural granular soils were loose to dense, slightly moist, and white, light brown, and red in color. The natural granular soils are anticipated to exhibit moderately high strength and moderately low compressibility characteristics under the anticipated load range.

The natural bedrock was fractured moderately weathered to massive, dense to very dense, slightly moist, and white/tan and red in color. The natural bedrock is anticipated to exhibit high strength and low compressibility characteristics under the anticipated load range.

For a more descriptive interpretation of subsurface conditions, please refer to Figures 3A through 3O, Test Pit Logs. The lines designating the interface between soil types on the test pit logs generally represent approximate boundaries. In situ, the transition between soil types may be gradual.

4.3 GROUNDWATER

Groundwater was not encountered at this site at the time of excavating. However, "perched" groundwater conditions typically occur in this area during the spring and summer months. Recommendations for groundwater will be presented in Section 5.3.1, Subdrains.

Groundwater levels vary with changes in season and rainfall, construction activity, irrigation, snow melt, surface water run-off, and other site-specific factors.

5. DISCUSSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF FINDINGS

The proposed structures may be supported upon conventional spread and continuous wall foundations supported upon suitable natural granular soils/bedrock and/or structural fill extending to suitable natural granular soils/bedrock.

The most significant geotechnical aspects at the site are:

1. The existing non-engineered fills across much of the site.

2. The potential for perched groundwater.

3. The shallow depth to excavation refusal in each test pit except Test Pit TP-2.

Prior to proceeding with construction, removal of any existing debris, surface vegetation, root systems, topsoil, non-engineered fill, and any deleterious materials from beneath an area extending out at least 5 feet from the perimeter of the proposed structure footprints and 3 feet beyond pavements and exterior flatwork areas will be required. All existing utility locations should be reviewed to assess their impact on the proposed construction and abandoned and/or relocated as appropriate.

Due to the developed nature of this site and the surrounding area, additional non-engineered fills may exist in unexplored areas of the site. Based on our experience, non-engineered fills are frequently erratic in composition and consistency. All surficial loose/disturbed soils and non-engineered fills must be removed below all footings, floor slabs, and pavements.

On-site granular soils may be re-utilized as structural site grading fill if they meet the criteria for such, as stated later in this report.

Due to the possibility of "perched" groundwater conditions, perimeter foundation/chimney subdrains will be required along the perimeters of any proposed habitable structures extending below the ground surface. Subdrains are discussed in Section 5.3.1, Subdrains.

The bedrock encountered at the refusal depths may require significant effort to excavate and should be considered in the design and bidding process. However, larger excavation equipment with rock chipping attachments may be utilized to reach required design depths.

Detailed discussions pertaining to earthwork, foundations, pavements, and the geoseismic setting of the site are presented in the following sections.

5.2 EARTHWORK

5.2.1 Site Preparation

Initial site preparation will consist of the removal of any existing debris, non-engineered fills, surface vegetation, root systems, topsoil, and any deleterious materials from beneath an area extending out at least 5 feet from the perimeter of the proposed structure footprint and 3 feet beyond pavements and exterior flatwork areas. All existing utility locations should be reviewed to assess their impact on the proposed construction and abandoned and/or relocated as appropriate.

Subsequent to stripping and prior to the placement of floor slabs, foundations, structural site grading fills, exterior flatwork, and pavements, the exposed subgrade must be proof rolled by passing moderate-weight rubber tire-mounted construction equipment over the surface at least twice. If excessively soft or otherwise unsuitable soils are encountered beneath footings, they must be completely removed. If removal depth required is greater than 2 feet below footings, GSH must be notified to provide further recommendations. In pavement, floor slab, and outside flatwork areas, unsuitable natural soils shall be removed to a maximum depth of 2 feet and replaced with compacted granular structural fill.

Subgrade preparation as described must be completed prior to placing overlying structural site grading fills.

GSH must be notified prior to the placement of structural site grading fills, floor slabs, footings, and pavements to verify that all loose/disturbed soils and non-engineered fills (if encountered) have been completely removed.

5.2.2 Temporary Excavations

Temporary excavations up to 8 feet deep in fine-grained cohesive soils (if encountered), above or below the water table, may be constructed with sideslopes no steeper than one-half horizontal to one vertical (0.5H:1.0V). Excavations deeper than 8 feet are not anticipated at the site.

For granular (cohesionless) soils, construction excavations above the water table, not exceeding 4 feet, shall be no steeper than one-half horizontal to one vertical (0.5H:1.0V). For excavations up to 8 feet, in granular soils and above the water table, the slopes shall be no steeper than one horizontal to one vertical (1H:1V). Excavations encountering saturated cohesionless soils will be very difficult and will require very flat sideslopes and/or shoring, bracing, and dewatering.

Excavations within the bedrock may be constructed with near-vertical sideslopes.

Due to the relatively shallow excavation refusal depths, difficult excavation should be anticipated within deeper excavations such as those for construction of utilities. However, larger excavation equipment with rock chipping attachments may be utilized to reach required design depths.

All excavations must be inspected periodically by qualified personnel. If any signs of instability or excessive sloughing are noted, immediate remedial action must be initiated.

5.2.3 Structural Fill

Structural fill is defined as all fill which will ultimately be subjected to structural loadings, such as imposed by footings, floor slabs, pavements, etc. Structural fill will be required as backfill over foundations and utilities, as site grading fill, and as replacement fill below footings. All structural fill must be free of surface vegetation, root systems, rubbish, topsoil, frozen soil, and other deleterious materials.

Structural site grading fill is defined as structural fill placed over relatively large open areas to raise the overall grade. For structural site grading fill, the maximum particle size shall not exceed 4 inches; although, occasional larger particles, not exceeding 8 inches in diameter, may be incorporated if placed randomly in a manner such that “honeycombing” does not occur, and the desired degree of compaction can be achieved. The maximum particle size within structural fill placed within confined areas shall be restricted to 2 inches.

On-site soils may be re-utilized as structural site grading fill if they do not contain construction debris or deleterious material and meet the requirements of structural fill. Fine-grained soils will require very close moisture control and may be very difficult, if not impossible, to properly place and compact during wet and cold periods of the year.

Imported structural fill below foundations and floor slabs shall consist of a well graded sand and gravel mixture with less than 30 percent retained on the three-quarter-inch sieve and less than 20 percent passing the No. 200 Sieve (clays and silts).

To stabilize soft subgrade conditions (if encountered) or where structural fill is required to be placed closer than 2.0 feet above the water table at the time of construction, a mixture of coarse angular gravels and cobbles and/or 1.5- to 2.0-inch gravel (stabilizing fill) shall be utilized. It may also help to utilize a stabilization geosynthetic, such as Mirafi RS380i/RS580i or Tensar NX750/NX850, placed on the natural ground if 1.5- to 2.0-inch gravel is used as stabilizing fill.

5.2.4 Fill Placement and Compaction

All structural fill shall be placed in lifts not exceeding 8 inches in loose thickness. Structural fills shall be compacted in accordance with the percent of the maximum dry density as determined by the AASHTO[1] T180 (ASTM[2] D1557) compaction criteria in accordance with the following table:

Location	Total Fill Thickness (feet)	Minimum Percentage of Maximum Dry Density
Beneath an area extending at least 5 feet beyond the perimeter of the structure	0 to 5	95
Site grading fills outside area defined above	0 to 5	90
Utility trenches within structural areas	--	96
Road base	--	96

Structural fills greater than 5 feet thick are not anticipated at the site.

Subsequent to stripping and prior to the placement of structural site grading fill, the subgrade shall be prepared as discussed in Section 5.2.1, Site Preparation, of this report. In confined areas, subgrade preparation shall consist of the removal of all loose or disturbed soils.

Coarse angular gravel and cobble mixtures (stabilizing fill), if utilized, shall be end dumped, spread to a maximum loose lift thickness of 15 inches, and compacted by dropping a backhoe bucket onto the surface continuously at least twice. As an alternative, the stabilizing fill may be compacted by passing moderately heavy construction equipment or large self-propelled compaction equipment at least twice. Subsequent fill material placed over the coarse gravels and cobbles shall be adequately compacted so that the "fines" are "worked into" the voids in the underlying coarser gravels and cobbles. Where soil fill materials are to be placed directly over more than about 18 inches of clean gravel, a separation geofabric, such as Mirafi 140N or equivalent, is recommended to be placed between the gravel and subsequent soil fills.

[1] American Association of State Highway and Transportation Officials
[2] American Society for Testing and Materials

Non-structural fill may be placed in lifts not exceeding 12 inches in loose thickness and compacted by passing construction, spreading, or hauling equipment over the surface at least twice.

5.2.5 Utility Trenches

All utility trench backfill material below structurally loaded facilities (footings, floor slabs, flatwork, pavements, etc.) shall be placed at the same density requirements established for structural fill. If the surface of the backfill becomes disturbed during the course of construction, the backfill shall be proof rolled and/or properly compacted prior to the construction of any exterior flatwork over a backfilled trench. Proof rolling shall be performed by passing moderately loaded rubber tire-mounted construction equipment uniformly over the surface at least twice. If excessively loose or soft areas are encountered during proof rolling, they shall be removed to a maximum depth of 2 feet below design finish grade and replaced with structural fill.

Many utility companies and City-County governments are now requiring that Type A-1a or A-1b (AASHTO Designation – granular soils with limited fines) soils be used as backfill over utilities. These organizations are also requiring that in public roadways, the backfill over major utilities be compacted over the full depth of fill to at least 96 percent of the maximum dry density as determined by the AASHTO T180 (ASTM D1557) method of compaction. GSH recommends that as the major utilities continue onto the site that these compaction specifications are followed.

Fine-grained soils, such as silts and clays, are not recommended for utility trench backfill in structural areas.

Due to the relatively shallow excavation refusal depths, difficult excavation should be anticipated within deeper excavations such as those for construction of utilities. However, larger excavation equipment with rock chipping attachments may be utilized to reach required design depths.

5.3 GROUNDWATER

Groundwater was not encountered at this site at the time of excavating. However, “perched” groundwater conditions typically occur in this area during the spring and summer months. Recommendations for groundwater will be presented in Section 5.3.1, Subdrains.

The groundwater measurements presented are conditions at the time of the field exploration and may not be representative of other times or locations. Groundwater levels may vary seasonally and with precipitation, as well as other factors including irrigation. Evaluation of these factors is beyond the scope of this study. Groundwater levels may, therefore, be at shallower or deeper depths than those measured during this study, including during construction and over the life of the structure.

The extent and nature of any dewatering required during construction will be dependent on the actual groundwater conditions prevalent at the time of construction and the effectiveness of construction drainage to prevent run-off into open excavations.

5.3.1 Stormwater Percolation Test

A stormwater percolation test was performed at a depth of approximately 5 feet in the representative sandy silt soils at Test Pit TP-2. The measured percolation rate was 30 minutes per inch. This design percolation rate should be considered typical for the soils at the site.

5.3.2 Subdrains

Due to the potential for "perched" groundwater levels, especially during the spring and early summer months, we recommend the installation of foundation subdrains around the perimeter wall footings for structures with habitable subgrade levels extending below surrounding grades.

Foundation subdrains shall consist of a 4-inch diameter perforated or slotted plastic or PVC pipe enclosed in clean gravel comprised of three-quarter to 1-inch minus gap-graded gravel and/or "pea" gravel. The invert of a subdrain shall be at least 18 inches below the top of the lowest adjacent habitable floor slab. The gravel portion of the drain shall extend 2 inches laterally and below the perforated pipe and at least 1 foot above the top of the lowest adjacent floor slab. The gravel zone must be installed immediately adjacent to the perimeter footings and the foundation walls. To reduce the possibility of plugging, the gravel must be wrapped with a geotextile, such as Mirafi 140N or equivalent.

Above the foundation subdrain, a minimum 4-inch-wide zone of "free-draining" sand or gravel (chimney) shall be placed adjacent to the foundation walls and extend to within 2 feet of final grade. The sand/gravel fill must be separated from adjacent native or backfill soils with geotextile fabric (Mirafi 140N or equivalent). The upper 2 feet of soils shall consist of a compacted clayey soil cap to reduce surface water infiltration into the drain. As an alternative to the zone of permeable sand and gravel, a prefabricated "drainage board," such as Miradrain or equivalent, may be placed against the exterior below-grade walls. Prior to the installation of the footing subdrain, the below-grade walls shall be waterproofed if adjacent to habitable areas and dampproofed if adjacent to parking or mechanical room areas. The slope of the subdrain shall be at least 0.3 percent. The foundation subdrains shall be discharged into area subdrains, storm drains, or other suitable down-gradient location (see attached Figure 5, Typical Foundation/Chimney Subdrain Detail 18").

5.4 SPREAD AND CONTINUOUS WALL FOUNDATIONS

5.4.1 Design Data

The results of our analysis indicate that the proposed structures may be supported upon conventional spread and continuous wall foundations established upon suitable natural granular soils/bedrock and/or structural fill extending to suitable natural granular soils/bedrock. Under no circumstances shall foundations be established over non-engineered fills, loose or disturbed soils,

topsoil, surface vegetation, root systems, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water. For design, the following parameters are provided:

Minimum Recommended Depth of Embedment for Frost Protection	- 30 inches
Minimum Recommended Depth of Embedment for Non-frost Conditions	- 15 inches
Recommended Minimum Width for Continuous Wall Footings	- 18 inches
Minimum Recommended Width for Isolated Spread Footings	- 24 inches
Bearing Capacity Increase for Seismic Loading	- 50 percent

Recommended Net Bearing Capacity for Real Load Conditions:

Suitable Natural Granular Soils or Structural Fills Extending To Suitable Natural Granular Soils	- 3,000 pounds per square foot
Decomposed/Weathered Bedrock and/or Structural Fill Extending to Bedrock	- 3,500 pounds per square foot
Massive Bedrock	- 4,500 pounds per square foot

Bearing Capacity Increase for Seismic Loading

Footing Established on Natural and/or Structural Fill Soil	- 50 percent
Footing Established on Bedrock	- 75 percent

* No specific minimum depth of embedment will be required for footings established directly upon massive bedrock; although, the footings must be appropriately "tied" to the underlying bedrock to provide appropriate lateral resistance.

The term "net bearing capacity" refers to the allowable pressure imposed by the portion of the structure located above lowest adjacent final grade. Therefore, the weight of the footing and backfill to lowest adjacent final grade need not be considered. Real loads are defined as the total

of all dead plus frequently applied live loads. Total load includes all dead and live loads, including seismic and wind.

5.4.2 Installation

Under no circumstances shall the footings be installed upon non-engineered fills (if encountered), loose or disturbed soils, topsoil, surface vegetation, root systems, rubbish, construction debris, or other deleterious materials. If unsuitable soils are encountered, they must be removed and replaced with compacted granular fill. If granular soils become loose or disturbed, they must be recompacted prior to pouring the concrete.

The width of structural replacement fill below footings shall be equal to the width of the footing plus one foot for each foot of fill thickness.

5.4.3 Settlements

Based on column loadings, soil bearing capacities, and the foundation recommendations as discussed above, we expect primary total settlement beneath individual foundations to be less than one inch.

The amount of differential settlement is difficult to predict because the subsurface and foundation loading conditions can vary considerably across the site. However, we anticipate differential settlement between adjacent foundations could vary from 0.5 to 0.75 inch. The final deflected shape of the structure will be dependent on actual foundation locations and loading.

5.5 LATERAL RESISTANCE

Lateral loads imposed upon foundations due to wind or seismic forces may be resisted by the development of passive earth pressures and friction between the base of the footings and the supporting soils. In determining frictional resistance, a coefficient of friction of 0.40 may be utilized for the footing interface with natural granular soils or granular structural fill. Passive resistance provided by properly placed and compacted granular structural fill above the water table may be considered equivalent to a fluid with a density of 300 pounds per cubic foot. Below the water table, this granular soil shall be considered equivalent to a fluid with a density of 150 pounds per cubic foot.

A combination of passive earth resistance and friction may be utilized provided that the friction component of the total is divided by 1.5.

5.6 LATERAL PRESSURES

Parameters, as presented within this section, are for backfills which will consist of drained soil placed and compacted in accordance with the recommendations presented herein.

The lateral pressures imposed upon subgrade facilities will, therefore, be basically dependent upon the relative rigidity and movement of the backfilled structure. For active walls, such as retaining walls which can move outward (away from the backfill), drained backfill may be considered equivalent to a fluid with a density of 40 pounds per cubic foot in computing lateral pressures. For more rigid subgrade walls that are not more than 10 inches thick, granular backfill may be considered equivalent to a fluid with a density of 50 pounds per cubic foot. For very rigid non-yielding walls, granular backfill shall be considered equivalent to a fluid with a density of at least 60 pounds per cubic foot. The above values assume that the surface of the soils slope behind the wall is horizontal and that the granular fill within 3 feet of the wall will be compacted with hand-operated compacting equipment.

For seismic loading of below-grade walls, the uniform lateral pressures below, in pounds per square foot (psf), shall be added based on wall depth and wall case:

Uniform Lateral Pressures			
Wall Height (Feet)	**Active Pressure Case (psf)**	**Moderately Yielding Case (psf)**	**At Rest/Non-Yielding Case (psf)**
4	12	32	53
6	19	49	79
8	25	65	105
10	31	81	131

5.7 FLOOR SLABS

Floor slabs may be established upon suitable natural subgrade soils or structural fill extending to suitable natural soils. Under no circumstances shall floor slabs be established directly over non-engineered fills, loose or disturbed soils, sod, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water.

To facilitate curing of the concrete and to provide a capillary moisture break, it is recommended that floor slabs be directly underlain by at least 4 inches of "free-draining" fill, such as "pea" gravel or three-quarters to one inch minus clean gap-graded gravel.

Settlement of lightly loaded floor slabs designed according to previous recommendations (average uniform pressure of 200 pounds per square foot or less) is anticipated to be less than one-quarter of an inch.

5.8 PAVEMENTS

The natural granular soils and bedrock will exhibit moderate pavement support characteristics when saturated. All pavement areas must be prepared as previously discussed (see Section 5.2.1,

Site Preparation). Under no circumstances shall pavements be established over non-engineered fills, loose or disturbed soils, topsoil, surface vegetation, root systems, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water. With the subgrade soils and the estimated projected traffic as discussed in Section 2, Proposed Construction, the following pavement sections are recommended:

Parking Areas

(Moderate Volume of Automobiles and Light Trucks,
Light Volume of Medium-Weight Trucks,
and No Heavyweight Trucks)
[10 equivalent 18-kip axle loads per day]

Flexible Pavements:
(Asphalt Concrete)

3.0 inches	Asphalt concrete
8.0 inches	Aggregate base (roadbase)
Over	Properly prepared natural subgrade soils/bedrock and/or structural site grading fill extending to properly prepared natural subgrade soils/bedrock

Rigid Pavements:
(Non-reinforced Concrete)

6.0 inches	Portland cement concrete (non-reinforced)
5.0 inches	Aggregate base (roadbase)
Over	Properly prepared natural subgrade soils/bedrock and/or structural site grading fill extending to properly prepared natural subgrade soils/bedrock

Primary Drive Lanes

(Moderate Volume of Automobiles and Light Trucks,
Light Volume of Medium-Weight Trucks,
and Occasional Heavyweight Trucks)
[10 equivalent 18-kip axle loads per day]

Flexible Pavements:
(Asphalt Concrete)

3.0 inches	Asphalt concrete
9.0 inches	Aggregate base (roadbase)
Over	Properly prepared natural subgrade soils/bedrock and/or structural site grading fill extending to properly prepared natural subgrade soils/bedrock

Rigid Pavements:
(Non-reinforced Concrete)

6.0 inches	Portland cement concrete (non-reinforced)
6.0 inches	Aggregate base (roadbase)
Over	Properly prepared natural subgrade soils/bedrock and/or structural site grading fill extending to properly prepared natural subgrade soils/bedrock

For dumpster pads, we recommend a pavement section consisting of 8 inches of Portland cement concrete, 12 inches of aggregate base (roadbase), over properly prepared natural subgrade or site grading structural fills. Dumpster pads shall not be constructed overlying non-engineered fills under any circumstances.

The above rigid pavement sections are for non-reinforced Portland cement concrete. Concrete shall be designed in accordance with the American Concrete Institute (ACI) and joint details shall conform to the Portland Cement Association (PCA) guidelines. The concrete shall have a minimum 28-day unconfined compressive strength of 4,000 pounds per square inch and contain 6 percent ±1 percent air-entrainment.

The roadbase must conform to applicable sections of the current Utah Department of Transportation (UDOT) Standard Specifications. All asphalt material and paving operations shall meet applicable specifications of the Asphalt Institute and UDOT. A GSH technician shall observe placement and perform density testing of the roadbase material and asphalt. Please note that the 3rd column of Table 2 of Section 02721 "Job Mix Gradation Tolerance" does not apply to roadbase utilized on this project and all roadbase must meet the requirements of the 2nd column of Table 2 of Section 02721 "Job Mix Gradation Target Blend" without any additional tolerances. The aggregate gradation limits presented on Table 2 of Section 02721, Untreated Base Course (UTBC) (roadbase) of UDOT 2025 Standard Specification for Road and Bridge Construction are tabulated below:

Gradation Limits	
Sieve Size	**Job Mix Gradation Target Blend**
1 1/2 inch	100
1 inch	90-100
3/4 inch	70-85
1/2 inch	65-80
3/8 inch	55-75
No. 4	40-65
No. 16	25-40
No. 200	7-11

Percent passing based on total aggregate (dry weight), and fine and coarse aggregate having approximately the same bulk specific gravities.

Please note that the recommended pavement section is based on estimated post-construction traffic loading. If the pavement is to be constructed and utilized by construction traffic, the above pavement section may prove insufficient for heavy truck traffic, such as concrete trucks or tractor-trailers used for construction delivery. Unexpected distress, reduced pavement life, and/or premature failure of the pavement section could result if subjected to heavy construction traffic and the owner should be made aware of this risk. If the estimated traffic loading stated herein is not correct, GSH must review actual pavement loading conditions to determine if revisions to these recommendations are warranted.

5.9 CEMENT TYPES

A representative soil sample was collected and sent for laboratory analysis for pH and sulfate content. As of the date of this report, results are still pending and will be transmitted when available and with corresponding cement recommendations, if applicable.

5.10 GEOSEISMIC SETTING

5.10.1 General

Utah municipalities have adopted the International Building Code (IBC) 2021. The IBC 2021 code refers to ASCE 7-16 Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE 7-16) determines the seismic hazard for a site based upon mapping of bedrock accelerations prepared by the United States Geologic Survey (USGS) and the soil site class. The USGS values are presented on maps incorporated into the IBC code and are also available based on latitude and longitude coordinates (grid points).

5.10.2 Faulting

Based on our review of available literature, no active faults pass through or immediately adjacent to the site. The nearest active mapped fault consists of the Northern Section of the Washinton Fault Zone, located about 6.1 miles to the southeast of the site.

5.10.3 Soil Class

For dynamic structural analysis, the Site Class C - Very Dense Soil and Soft Rock Soil Profile as defined in Chapter 20 of ASCE 7-16 (per Section 1613.3.2, Site Class Definitions, of IBC 2021) can be utilized.

5.10.4 Ground Motions

The IBC 2021 code is based on USGS mapping, which provides values of short and long period accelerations for average bedrock values for the Western United States and must be corrected for local soil conditions. The following table summarizes the peak ground and short and long period accelerations for the MCE event and incorporates the appropriate soil amplification factor for a Site Class C – Very Dense Soil and Soft Rock Soil Profile. Based on the site latitude and longitude (37.1783 degrees north and 113.6176 degrees west, respectively), the values for this site are tabulated on the following page.

Spectral Acceleration Value, T	Bedrock Boundary [mapped values] (% g)	Site Coefficient	Site Class C [adjusted for site class effects] (% g)	Design Values** (% g)
0.2 Seconds (Short Period Acceleration)	S_S = 49.4	F_a = 1.300	S_{MS} = 64.2	S_{DS} = 42.8
1.0 Second (Long Period Acceleration)	S_1 = 16.0	F_v = 1.500	S_{M1} = 24.0	S_{D1} = 16.0

* If a measured site class in accordance with IBC 2021/ASCE 7-16 is beneficial based on the project structural engineer's review, please contact GSH for additional options for obtaining this measured site class.

**IBC 2021/ASCE 7-16 may require a site-specific study based on the project structural engineer's evaluation and recommendations. If needed, GSH can provide additional information and analysis including a complete site-specific study.

5.10.5 Liquefaction

Liquefaction is defined as the condition when saturated, loose, granular soils lose their support capabilities because of excessive pore water pressure, which develops during a seismic event. Clayey soils, even if saturated, will generally not liquefy during a major seismic event.

Due to the density of the shallow bedrock and the lack of groundwater, liquefaction is not anticipated to occur within the soils encountered at this site.

5.11 SITE VISITS

GSH must verify that all topsoil/disturbed soils, non-engineered fill, and any other unsuitable soils have been removed, and that suitable soils have been encountered prior to placing site grading fills, footings, slabs, and pavements. Additionally, GSH must observe fill placement and verify in-place moisture content and density of fill materials placed at the site.

6. CLOSURE

If you have any questions or would like to discuss these items further, please feel free to contact us at (801) 685-9190.

Respectfully submitted,

GSH Geotechnical, Inc.



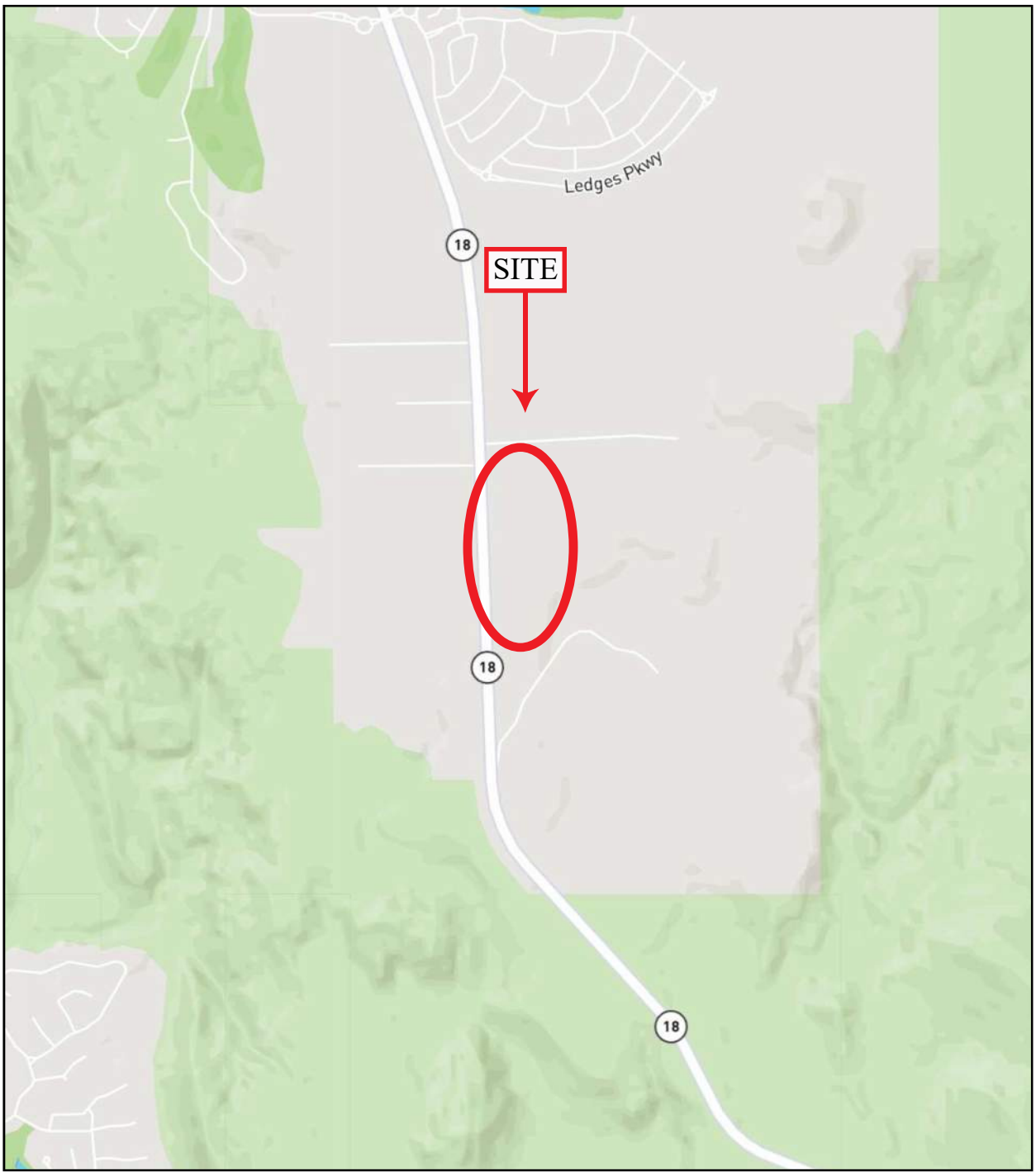
Michael S. Huber, P.E.
State of Utah No. 343650
Vice President/Senior Geotechnical Engineer

MSH:jmt

Encl. Figure 1, Vicinity Map
Figure 2, Site Plan
Figures 3A through 3O, Test Pit Logs
Figure 4, Key to Test Pit Log (USCS)
Figure 5, Typical Foundation/Chimney Subdrain Detail 18”

Addressee (email)

TRAILS DEVELOPMENT QOZB, LCC
JOB NO. 4209-001-25



0.2 0 0 0 0 0 0.2 0.4 MI 0.6

200 0 0 200 400 600 800 1000 M 1200

FIGURE 1
VICINITY MAP

REFERENCE:
ALL TRAILS - NATIONAL GEOGRAPHIC TERRAIN
DATED 2025

GSH

TRAILS DEVELOPMENT QOZB, LCC
JOB NO. 4209-001-25

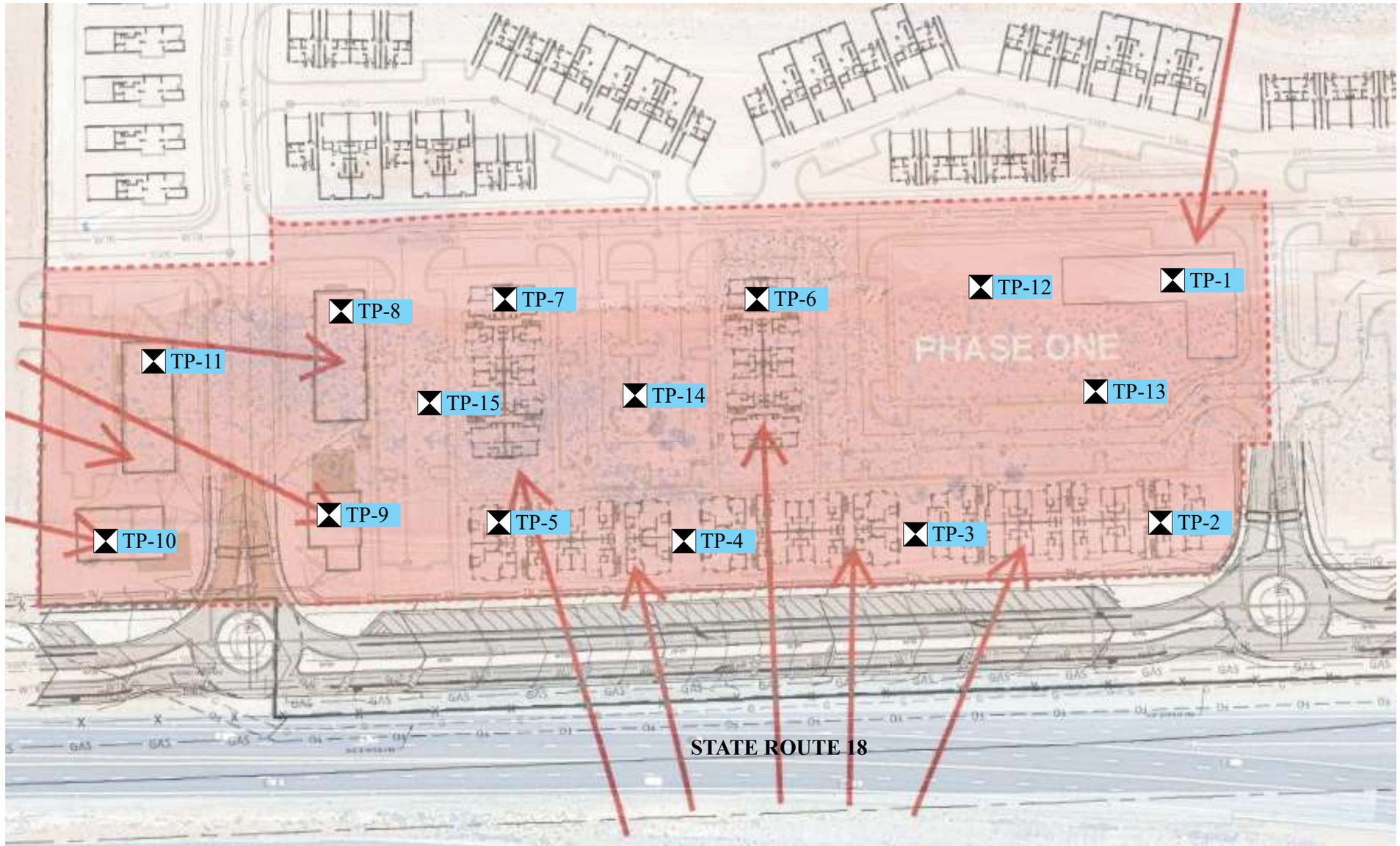


FIGURE 2
SITE PLAN

REFERENCE:
ADAPTED FROM AERIAL PHOTOGRAPH
DOWNLOADED FROM GOOGLE EARTH
IMAGERY DATED 2/2025

APPROXIMATE SCALE IN FEET
50 0 50 100

GSH

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-1

CLIENT: Trails Development QOZB, LLC | PROJECT NUMBER: 4209-001-25

PROJECT: Trails East - Phase 1 Mixed-Use Development | DATE STARTED: 11/24/25 | DATE FINISHED: 11/24/25

LOCATION: Approximately 4101 North Highway 18, St. George, Utah (37.1783°, -113.6176°) | GSH FIELD REP.: JA

EXCAVATING METHOD/EQUIPMENT: SANY 60 Mini Trackhoe

GROUNDWATER DEPTH: Not Encountered (11/24/25) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	SM FILL	SILTY FINE TO COARSE SAND, FILL red			10.8		18.9			slightly moist loose
	RX	SANDSTONE BEDROCK white								slightly moist very dense
		Refusal at 1.5' on sandstone bedrock. No significant sidewall caving. No groundwater encountered at time of excavation.								
			5							
			10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3A

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-2

CLIENT: Trails Development QOZB, LLC
PROJECT NUMBER: 4209-001-25

PROJECT: Trails East - Phase 1 Mixed-Use Development
DATE STARTED: 11/24/25 DATE FINISHED: 11/24/25

LOCATION: Approximately 4101 North Highway 18, St. George, Utah (37.1783°, -113.6176°)
GSH FIELD REP.: JA

EXCAVATING METHOD/EQUIPMENT: SANY 60 Mini Trackhoe

GROUNDWATER DEPTH: Not Encountered (11/24/25)
ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	SM FILL	SILTY FINE TO MEDIUM SAND, FILL with major roots (topsoil) to 6"; red/brown								slightly moist loose
					4.7		36.0			
	ML	FINE TO MEDIUM SANDY SILT light brown/white	5							slightly moist medium dense
	SM	SILTY FINE TO MEDIUM SAND with fractured sandstone bedrock; red								slightly moist medium dense
		End of Exploration at 10.0' No significant sidewall caving. No groundwater encountered at time of excavation.	10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3B

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-3

CLIENT: Trails Development QOZB, LLC | PROJECT NUMBER: 4209-001-25

PROJECT: Trails East - Phase 1 Mixed-Use Development | DATE STARTED: 11/24/25 | DATE FINISHED: 11/24/25

LOCATION: Approximately 4101 North Highway 18, St. George, Utah (37.1783°, -113.6176°) | GSH FIELD REP.: JA

EXCAVATING METHOD/EQUIPMENT: SANY 60 Mini Trackhoe

GROUNDWATER DEPTH: Not Encountered (11/24/25) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	SM	SILTY FINE TO MEDIUM SAND with trace fine gravel; red			7.6		35.1			slightly moist loose
	RX	SANDSTONE BEDROCK white/tan								slightly moist very dense
		Refusal at 3.0' on sandstone bedrock. No significant sidewall caving. No groundwater encountered at time of excavation.	5							
			10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3C

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-4

CLIENT: Trails Development QOZB, LLC | PROJECT NUMBER: 4209-001-25

PROJECT: Trails East - Phase 1 Mixed-Use Development | DATE STARTED: 11/24/25 | DATE FINISHED: 11/24/25

LOCATION: Approximately 4101 North Highway 18, St. George, Utah (37.1783°, -113.6176°) | GSH FIELD REP.: JA

EXCAVATING METHOD/EQUIPMENT: SANY 60 Mini Trackhoe

GROUNDWATER DEPTH: Not Encountered (11/24/25) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	SM	SILTY FINE SAND red								slightly moist loose
	RX	SANDSTONE BEDROCK white/tan								slightly moist very dense
		Refusal at 5.0' on sandstone bedrock. No significant sidewall caving. No groundwater encountered at time of excavation.	5							
			10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3D

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-5

CLIENT: Trails Development QOZB, LLC | PROJECT NUMBER: 4209-001-25

PROJECT: Trails East - Phase 1 Mixed-Use Development | DATE STARTED: 11/24/25 | DATE FINISHED: 11/24/25

LOCATION: Approximately 4101 North Highway 18, St. George, Utah (37.1783°, -113.6176°) | GSH FIELD REP.: JA

EXCAVATING METHOD/EQUIPMENT: SANY 60 Mini Trackhoe

GROUNDWATER DEPTH: Not Encountered (11/24/25) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	SM	SILTY FINE SAND with major roots (topsoil) to 6"; red								slightly moist loose
	RX	SANDSTONE BEDROCK white/tan								slightly moist very dense
		Refusal at 2.0' on sandstone bedrock. No significant sidewall caving. No groundwater encountered at time of excavation.	5							
			10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3E

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-6

CLIENT: Trails Development QOZB, LLC | PROJECT NUMBER: 4209-001-25

PROJECT: Trails East - Phase 1 Mixed-Use Development | DATE STARTED: 11/24/25 | DATE FINISHED: 11/24/25

LOCATION: Approximately 4101 North Highway 18, St. George, Utah (37.1783°, -113.6176°) | GSH FIELD REP.: JA

EXCAVATING METHOD/EQUIPMENT: SANY 60 Mini Trackhoe

GROUNDWATER DEPTH: Not Encountered (11/24/25) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	SM FILL	SILTY FINE TO MEDIUM SAND, FILL with coarse gravel; red			9.1		27.4			slightly moist loose
	RX	SANDSTONE BEDROCK white/tan								slightly moist very dense
		Refusal at 2.0' on sandstone bedrock. No significant sidewall caving. No groundwater encountered at time of excavation.								
			5							
			10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3F

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-7

CLIENT: Trails Development QOZB, LLC | PROJECT NUMBER: 4209-001-25

PROJECT: Trails East - Phase 1 Mixed-Use Development | DATE STARTED: 11/24/25 | DATE FINISHED: 11/24/25

LOCATION: Approximately 4101 North Highway 18, St. George, Utah (37.1783°, -113.6176°) | GSH FIELD REP.: JA

EXCAVATING METHOD/EQUIPMENT: SANY 60 Mini Trackhoe

GROUNDWATER DEPTH: Not Encountered (11/24/25) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	SM FILL	SILTY FINE TO MEDIUM SAND, FILL with trace fine and coarse gravel; white/red								slightly moist loose
	RX	SANDSTONE BEDROCK white/tan								slightly moist very dense
		Refusal at 3.0' on sandstone bedrock. No significant sidewall caving. No groundwater encountered at time of excavation.	5							
			10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3G

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-8

CLIENT: Trails Development QOZB, LLC | PROJECT NUMBER: 4209-001-25

PROJECT: Trails East - Phase 1 Mixed-Use Development | DATE STARTED: 11/24/25 | DATE FINISHED: 11/24/25

LOCATION: Approximately 4101 North Highway 18, St. George, Utah (37.1783°, -113.6176°) | GSH FIELD REP.: JA

EXCAVATING METHOD/EQUIPMENT: SANY 60 Mini Trackhoe

GROUNDWATER DEPTH: Not Encountered (11/24/25) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	SM	SILTY FINE TO MEDIUM SAND with trace fine and coarse gravel; red		■	8.6	92				slightly moist loose
	RX	SANDSTONE BEDROCK white/tan								slightly moist very dense
		Refusal at 3.0' on sandstone bedrock. No significant sidewall caving. No groundwater encountered at time of excavation.	5							
			10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3H

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-9

CLIENT: Trails Development QOZB, LLC | PROJECT NUMBER: 4209-001-25

PROJECT: Trails East - Phase 1 Mixed-Use Development | DATE STARTED: 11/24/25 | DATE FINISHED: 11/24/25

LOCATION: Approximately 4101 North Highway 18, St. George, Utah (37.1783°, -113.6176°) | GSH FIELD REP.: JA

EXCAVATING METHOD/EQUIPMENT: SANY 60 Mini Trackhoe

GROUNDWATER DEPTH: Not Encountered (11/24/25) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	SM FILL	SILTY FINE SAND, FILL with major roots (topsoil) to 6"; red		◢						slightly moist loose
	RX	SANDSTONE BEDROCK white/tan								slightly moist very dense
		Refusal at 2.0' on sandstone bedrock. No significant sidewall caving. No groundwater encountered at time of excavation.	5 10 15 20 25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3I

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-10

CLIENT: Trails Development QOZB, LLC | PROJECT NUMBER: 4209-001-25

PROJECT: Trails East - Phase 1 Mixed-Use Development | DATE STARTED: 11/24/25 | DATE FINISHED: 11/24/25

LOCATION: Approximately 4101 North Highway 18, St. George, Utah (37.1783°, -113.6176°) | GSH FIELD REP.: JA

EXCAVATING METHOD/EQUIPMENT: SANY 60 Mini Trackhoe

GROUNDWATER DEPTH: Not Encountered (11/24/25) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	SM	SILTY FINE TO MEDIUM SAND with trace fine gravel; red			2.2		30.8			slightly moist loose
	RX	SANDSTONE BEDROCK white/tan								slightly moist very dense
		Refusal at 2.0' on sandstone bedrock. No significant sidewall caving. No groundwater encountered at time of excavation.	5							
			10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3J

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-11

CLIENT: Trails Development QOZB, LLC | PROJECT NUMBER: 4209-001-25

PROJECT: Trails East - Phase 1 Mixed-Use Development | DATE STARTED: 11/24/25 | DATE FINISHED: 11/24/25

LOCATION: Approximately 4101 North Highway 18, St. George, Utah (37.1783°, -113.6176°) | GSH FIELD REP.: JA

EXCAVATING METHOD/EQUIPMENT: SANY 60 Mini Trackhoe

GROUNDWATER DEPTH: Not Encountered (11/24/25) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	SM	SILTY FINE TO MEDIUM SAND with trace fine and coarse gravel; red								slightly moist loose
	RX	SANDSTONE BEDROCK white/tan								slightly moist very dense
		Refusal at 1.5' on sandstone bedrock. No significant sidewall caving. No groundwater encountered at time of excavation.	5							
			10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3K

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-12

CLIENT: Trails Development QOZB, LLC | PROJECT NUMBER: 4209-001-25

PROJECT: Trails East - Phase 1 Mixed-Use Development | DATE STARTED: 11/24/25 | DATE FINISHED: 11/24/25

LOCATION: Approximately 4101 North Highway 18, St. George, Utah (37.1783°, -113.6176°) | GSH FIELD REP.: JA

EXCAVATING METHOD/EQUIPMENT: SANY 60 Mini Trackhoe

GROUNDWATER DEPTH: Not Encountered (11/24/25) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	SM	SILTY FINE TO MEDIUM SAND with trace fine and coarse gravel; red			7.1		28.2			slightly moist loose
	RX	SANDSTONE BEDROCK white/tan								slightly moist very dense
		Refusal at 3.0' on sandstone bedrock. No significant sidewall caving. No groundwater encountered at time of excavation.	5							
			10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3L

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-13

CLIENT: Trails Development QOZB, LLC | PROJECT NUMBER: 4209-001-25

PROJECT: Trails East - Phase 1 Mixed-Use Development | DATE STARTED: 11/24/25 | DATE FINISHED: 11/24/25

LOCATION: Approximately 4101 North Highway 18, St. George, Utah (37.1783°, -113.6176°) | GSH FIELD REP.: JA

EXCAVATING METHOD/EQUIPMENT: SANY 60 Mini Trackhoe

GROUNDWATER DEPTH: Not Encountered (11/24/25) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	SM	SILTY FINE TO MEDIUM SAND with major roots (topsoil) to 6"; red			8.0		34.5			slightly moist loose
	RX	SANDSTONE BEDROCK white/tan								slightly moist very dense
		Refusal at 1.5' on sandstone bedrock. No significant sidewall caving. No groundwater encountered at time of excavation.								
			5							
			10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3M

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-14

CLIENT: Trails Development QOZB, LLC | PROJECT NUMBER: 4209-001-25

PROJECT: Trails East - Phase 1 Mixed-Use Development | DATE STARTED: 11/24/25 | DATE FINISHED: 11/24/25

LOCATION: Approximately 4101 North Highway 18, St. George, Utah (37.1783°, -113.6176°) | GSH FIELD REP.: JA

EXCAVATING METHOD/EQUIPMENT: SANY 60 Mini Trackhoe

GROUNDWATER DEPTH: Not Encountered (11/24/25) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	SM	SILTY FINE SAND with trace fine gravel; major roots (topsoil) to 6"; red			6.5		23.8			slightly moist medium dense
		grades with fine and coarse gravel								
	RX	SANDSTONE BEDROCK white/tan								slightly moist medium dense
			5							
										very dense
		Refusal at 7.0' on sandstone bedrock. No significant sidewall caving. No groundwater encountered at time of excavation.								
			10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3N

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-15

CLIENT: Trails Development QOZB, LLC | PROJECT NUMBER: 4209-001-25

PROJECT: Trails East - Phase 1 Mixed-Use Development | DATE STARTED: 11/24/25 | DATE FINISHED: 11/24/25

LOCATION: Approximately 4101 North Highway 18, St. George, Utah (37.1783°, -113.6176°) | GSH FIELD REP.: JA

EXCAVATING METHOD/EQUIPMENT: SANY 60 Mini Trackhoe

GROUNDWATER DEPTH: Not Encountered (11/24/25) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	ML	FINE TO MEDIUM SANDY SILT with trace fine gravel; major roots (topsoil) to 6"; red			6.9		38.7			slightly moist loose
	RX	SANDSTONE BEDROCK white/tan								slightly moist very dense
		Refusal at 1.5' on sandstone bedrock. No significant sidewall caving. No groundwater encountered at time of excavation.	5							
			10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3O

CLIENT: Trails Development QOZB, LLC
PROJECT: Trails East - Phase 1 Mixed-Use Development
PROJECT NUMBER: 4209-001-25

KEY TO TEST PIT LOG

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪

COLUMN DESCRIPTIONS

① **Water Level:** Depth to measured groundwater table. See symbol below.

② **USCS:** (Unified Soil Classification System) Description of soils encountered; typical symbols are explained below.

③ **Description:** Description of material encountered; may include color, moisture, grain size, density/consistency,

④ **Depth (ft.):** Depth in feet below the ground surface.

⑤ **Sample Symbol:** Type of soil sample collected at depth interval shown; sampler symbols are explained below.

⑥ **Moisture (%):** Water content of soil sample measured in laboratory; expressed as percentage of dryweight of

⑦ **Dry Density (pcf):** The density of a soil measured in laboratory; expressed in pounds per cubic foot.

⑧ **% Passing 200:** Fines content of soils sample passing a No. 200 sieve; expressed as a percentage.

⑨ **Liquid Limit (%):** Water content at which a soil changes from plastic to liquid behavior.

⑩ **Plasticity Index (%):** Range of water content at which a soil exhibits plastic properties.

⑪ **Remarks:** Comments and observations regarding drilling or sampling made by driller or field personnel. May include other field and laboratory test results using the following abbreviations:

CEMENTATION:

Weakly: Crumbles or breaks with handling or slight finger pressure.

Moderately: Crumbles or breaks with considerable finger pressure.

Strongly: Will not crumble or break with finger pressure.

MODIFIERS:

Trace <5%

Some 5-12%

With > 12%

MOISTURE CONTENT (FIELD TEST):

Dry: Absence of moisture, dusty, dry to the touch.

Moist: Damp but no visible water.

Saturated: Visible water, usually soil below water table.

Descriptions and stratum lines are interpretive; field descriptions may have been modified to reflect lab test results. Descriptions on the logs apply only at the specific boring locations and at the time the borings were advanced; they are not warranted to be representative of subsurface conditions at other locations or times.

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISIONS			USCS SYMBOLS	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS More than 50% of material is larger than No. 200 sieve size.	**GRAVELS** More than 50% of coarse fraction retained on No. 4 sieve.	**CLEAN GRAVELS** (little or no fines)	GW	Well-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
			GP	Poorly-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
		GRAVELS WITH FINES (appreciable amount of fines)	GM	Silty Gravels, Gravel-Sand-Silt Mixtures
			GC	Clayey Gravels, Gravel-Sand-Clay Mixtures
	SANDS More than 50% of coarse fraction passing through No. 4 sieve.	**CLEAN SANDS** (little or no fines)	SW	Well-Graded Sands, Gravelly Sands, Little or No Fines
			SP	Poorly-Graded Sands, Gravelly Sands, Little or No Fines
		SANDS WITH FINES (appreciable amount of fines)	SM	Silty Sands, Sand-Silt Mixtures
			SC	Clayey Sands, Sand-Clay Mixtures
FINE-GRAINED SOILS More than 50% of material is smaller than No. 200 sieve size.	**SILTS AND CLAYS** Liquid Limit less than 50%		ML	Inorganic Silts and Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts with Slight Plasticity
			CL	Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays
			OL	Organic Silts and Organic Silty Clays o f Low Plasticity
	SILTS AND CLAYS Liquid Limit greater than 50%		MH	Inorganic Silts, Micacious or Diatomacious Fine Sand or Silty Soils
			CH	Inorganic Clays of High Plasticity, Fat Clays
			OH	Organic Silts and Organic Clays of Medium to High Plasticity
HIGHLY ORGANIC SOILS			PT	Peat, Humus, Swamp Soils with High Organic Contents

Note: Dual Symbols are used to indicate borderline soil classifications.

STRATIFICATION:

DESCRIPTION	THICKNESS
Seam	up to 1/8"
Layer	1/8" to 12"

Occasional: One or less per 6" of thickness

Numerous; More than one per 6" of thickness

TYPICAL SAMPLER GRAPHIC SYMBOLS

- Bulk/Bag Sample
- Standard Penetration Split Spoon Sampler
- Rock Core
- No Recovery
- 3.25" OD, 2.42" ID D&M Sampler
- 3.0" OD, 2.42" ID D&M Sampler
- California Sampler
- Thin Wall

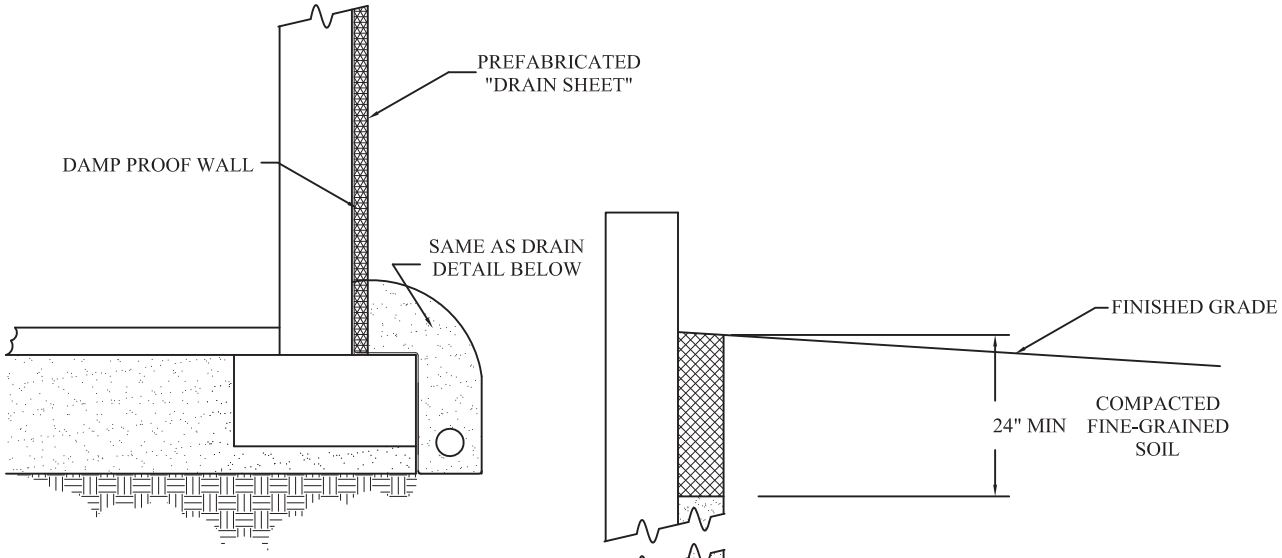
WATER SYMBOL

- Water Level

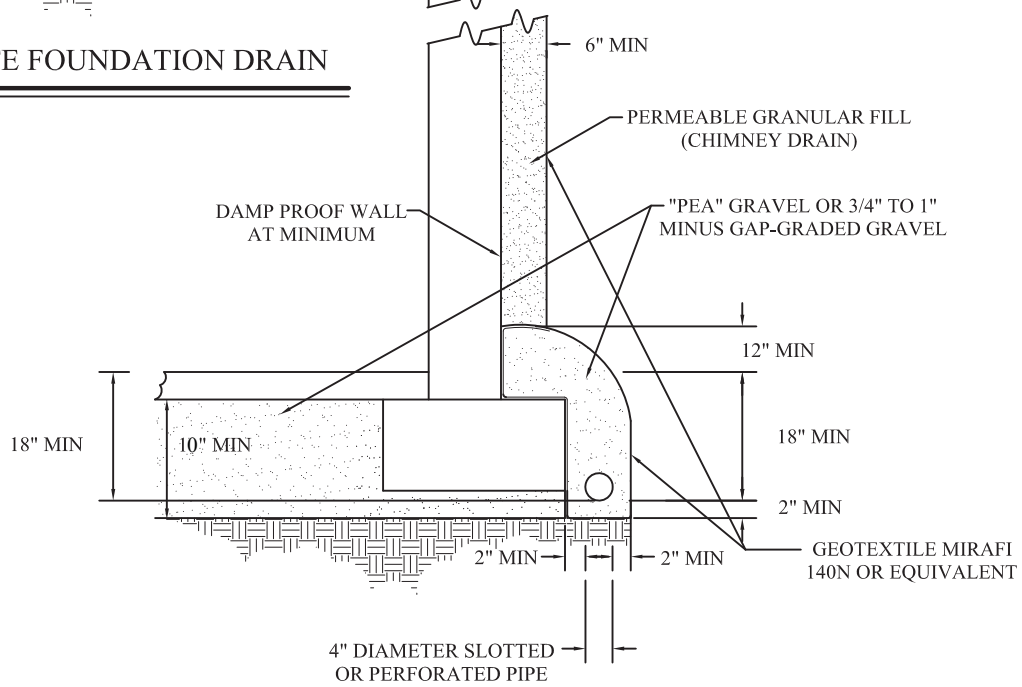
FIGURE 4

GSH

TYPICAL FOUNDATION/CHIMNEY SUBDRAIN DETAIL



ALTERNATE FOUNDATION DRAIN



TYPICAL FOUNDATION DRAIN

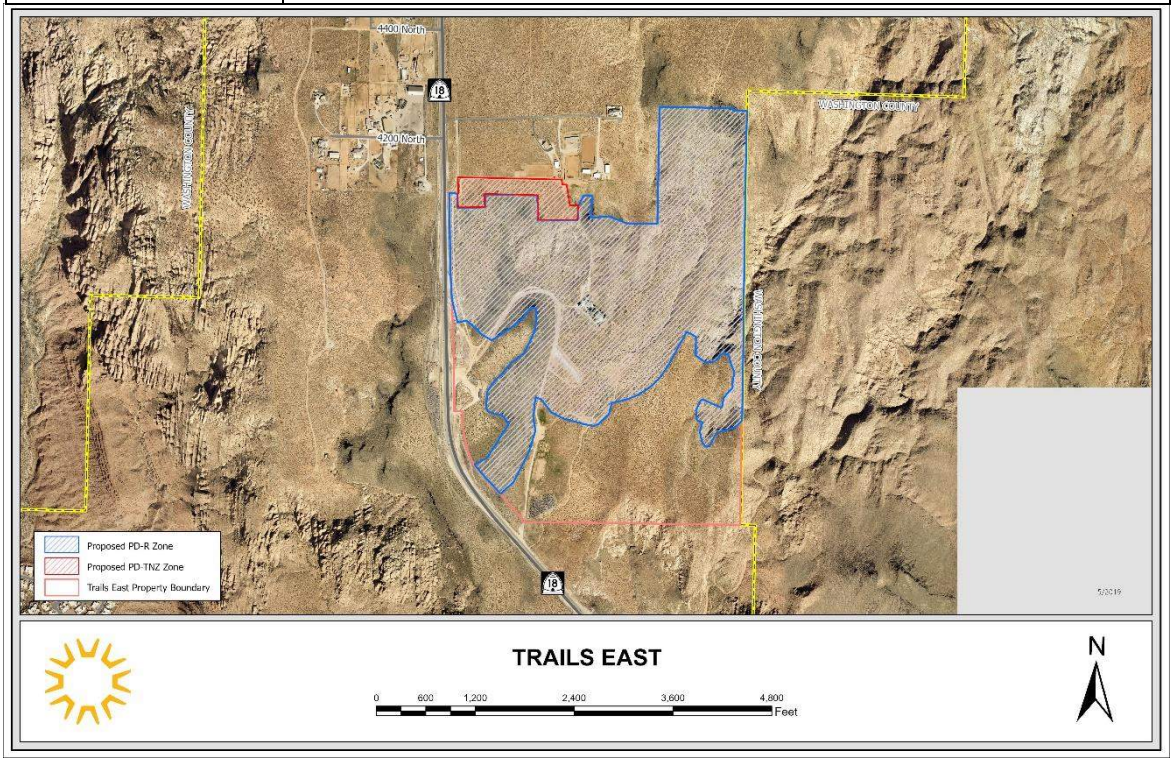
(NOT TO SCALE)

GSH

FIGURE 5

PLANNING COMMISSION AGENDA REPORT: 04/14/2026

Trails East Zone Changes Zone Changes (Case No's. 2026-ZC-003 & 2026-ZC-004)		
Request:	Consider changing the zone from G&G (Gravel and Grazing) to PD-TNZ (Planned Development Traditional Neighborhood Zone) on approximately 10.0 acres and from G&G (Gravel & Grazing) to PD-R (Planned Development Residential) on approximately 214 acres.	
Applicant:	Brandee Walker, Civil Science	
Location:	The property is generally located on the east side of Highway 18 between approximately 3400 North and 4200 North.	
General Plan:	LDR (Low Density Residential)	
Existing Zoning:	G&G (Gravel and Grazing)	
Surrounding Zoning:	North	PD-TNZ (Planned Development Traditional Neighborhood Zone) & G&G (Gravel and Grazing)
	South	R-1-10 (Single Family, 10,000 ft² minimum lot size)
	East	Washington County (Red Cliffs Conservation Area)
	West	Hwy 18 & G&G (Gravel and Grazing)
Land Area:	Approximately 224 acres	



BACKGROUND:
The subject property is approximately 224 acres in size and is located on the east side of Highway 18 between approximately 3400 and 4200 North. The property is currently zoned G&G (Gravel & Grazing) throughout. The property to the north, known as the Rusty Cliffs development, has recently been approved as a PD-TNZ and includes similar uses such as single-family residential, townhomes, apartments, live-work units and commercial elements.

The applicant is requesting to rezone 10 acres of the site to PD-TNZ (Planned Development Traditional Neighborhood Zone) to serve as a transition area adjacent to the recently approved Rusty Cliffs TNZ development to the north. The remaining 200+ acres are proposed to be rezoned to PD-R (Planned Development Residential).

The PD-TNZ portion includes a mix of smaller single-family lots, townhomes, and a limited commercial component. The PD-R portion is designed with a mix of townhomes, apartment buildings, and conventional single-family lots. Additional details regarding each proposal are provided throughout this staff report.

While this has been prepared as a single staff report, it is important to note that the request consists of two separate applications and will require two separate motions for consideration.

Along with the rezone, the applicant is also requesting approval of the first two phases of the project, including elevations and renderings, conceptual site layout, landscaping plans, signage, and the rest of the supporting details. The larger single-family portion of the PD-R, with its standard lots, will be developed as market demand dictates and will be platted in phases as those sections move forward.

Hillside and Density
This rezone request is accompanied by a hillside permit request (2026-HS-002), which requires review by the Hillside Review Board. As part of that process, the Board evaluates site slopes with consideration given to soil conditions, grading, and proposed development plans. Understanding the site's topography is important in evaluating how the property functions as a whole and why the project has been designed in its current layout.

It should also be noted that when the Hillside Review Board visited the site on March 31, 2026, they reviewed the entire property, including future commercial areas. As a result, some of the figures referenced in the hillside analysis may differ slightly from those included in this rezone request. Specifically, there are two areas on the far south side of the property totaling approximately seven acres that are not contiguous to the property proposed for rezoning and are therefore excluded from the rezone area. These areas were included in the initial hillside review, which accounts for the difference between the 224-acre hillside review area and the 217-acre rezone request.

The following is from the hillside permit request:

Regarding the [remaining] 224 acres to be used for residential development: the applicant has removed the non-buildable property from the equation. That leaves the following total buildable area:

0% - 20%	254.33		100%	254.33
21% - 30%	36.75		30%	11.02
31% - 40%	19.31		5%	0.97
41% +	22.29		0%	0
Total:	332.68			266.32

After removing the 107.6 acres of buildable commercial property, the total buildable residential acreage is 158.72 acres. The site will have two primary areas of residential development. The first area is next to the highway and will consist of small single-family homes, townhomes and stacked apartments. The larger, second area will consist of all single-family homes. Each will require a zone change. Overall, the density is restricted to 4.0 units per acre. At a total of 607 units over 158.72 buildable acres, the project would yield an overall density of 3.82 units per acre.

Overall, the residential development is limited to a maximum density of 4.0 units per acre. Based on the proposed 607 units over 158.72 buildable acres, the project yields an overall density of 3.82 units per acre.

When the additional seven acres discussed above are removed from the calculation, the project yields an overall density of exactly 4.0 units per acre. This complies with the overall LDR maximum density of four units per acre. This is consistent with other projects calculated in this way.

PD-TNZ (Planned Development Traditional Neighborhood Zone) – 2026-ZC-003

The PD-TNZ zone can be found in two parts. Part one is section 10-7H of the St. George municipal code. This section deals with the standards for rezoning a property to the TNZ zone and some of the goals and objectives of the zone. It also deals with the administrative aspects of the zone. The second portion of the zone can be found in the "Planned Development – Traditional Neighborhood Zone Design Manual & Form Based Code". This manual is not found in Title 10 but as section 10-7H-2(A) states, "*The design manual and form-based code are hereby incorporated into this chapter and shall have the same regulatory force and effect hereof, and hereinafter it is referred to as the "design manual*."

The PD-TNZ zone attempts to create a method by which a more traditional development pattern may flourish. A typical traditional neighborhood can be categorized by such things as reduced setbacks, alleyways, smaller and more compact development, a more walkable pattern, more detail to architectural styles, commercial, higher density and medium density residential integrated together, etc. To accomplish these goals, The PD-TNZ zone can be divided into two sub-categories or neighborhood types, NE (Neighborhood Edge) and NG (Neighborhood General). In general, the NE is *"the less dense form of traditional neighborhood development consisting principally of detached*

single-family homes. NE may also include a limited number of duplexes and courtyard bungalows. Buildings are situated on larger lots with setbacks on all sides. The permitted building frontage includes porches and front yards." [1] In contrast, the NG neighborhood is "*a primarily residential development pattern; however, it is denser than neighborhood edge and may consist of both attached and detached residence types. Multiple-family residential and nonresidential uses are permitted but shall blend into the neighborhood by occupying buildings that are of a scale and appearance compatible with single-family detached residences. Single-family homes are situated on smaller, narrower lots with shallow setbacks. The narrow lots generally require that off-street parking be accessed from the rear by alleys*." [2] A NG designation may have limited commercial uses as well as outlined in Chapter 10-7H.

Though a single PD-TNZ zone may include areas of both NE and NG areas (think Desert Color), the applicant is proposing that the entirety of The Trails TNZ be designated Neighborhood General (NG) giving the entirety of the project a more compact and walkable feel which will also integrate into Rusty Cliffs which is all designated TNZ-NG as well.

One other aspect of the PD-TNZ zone that is different than any other zone is that it is compatible with all General Plan land use designations. St. George code states that, "*The NE and NG shall be deemed consistent with the city's general plan if located in an area designated for low, medium, medium high, or high density residential use; no general plan amendment shall be required in such circumstances*."[3] The property is found entirely within the LDR (Low Density Residential) general plan land use category making the proposed PD-TNZ zone compliant with the general plan.

Please see the zoning requirements below for site details:

Zoning Requirements			
Regulation	**Section Number**	**Proposal**	**Staff Comments**
Land Area	10-7H-2(D)(1)	10.0 Acres	This complies with the 10 contiguous acre minimum size requirement.
Mix of Forms	10-7H-2(D)(2)	They are proposing: 1. Single-Family 2. Townhomes 3. Commercial	The proposal meets the requirements for a minimum of three forms. 53% of homes will be single-family meeting the requirement of 50% single-family units.

[1] St. George City Code section 10-7H-1(A)(1) – Neighborhood Edge (NE)
[2] St. George City Code section 10-7H-1(A)(2) – Neighborhood General (NG)
[3] St. George City Code section 10-7H-2(B) – General Plan

NE Civic Space	10-7H-2(D)(4)	No Neighborhood Edge is proposed with the development.	N/A
NG Civic Space	10-7H-2(D)(5)	Between a village green and square, paseo space and a pocket park, approximately 22,000 ft² (5%) is proposed as civic space.	5% of the project shall be usable civic space and be within 350' of the geographic center of the project (unless otherwise approved).
TNZ Integration	10-7H-2(D)(6)	Where a proposed TNZ development is adjacent to an existing single-family subdivision, the TNZ must locate single-family detached homes adjacent to existing single-family units.	Single Family is adjacent to the property to the north. The commercial element is adjacent to Rusty Cliffs commercial/multi-family to the north.

The applicant has produced a narrative which will serve as the guiding document for development of the project (see attached). This document gives a full narrative of the project, details items such as allowed uses, setbacks, mix of architectural types, layout of the project, etc. It should be noted that while this booklet lays out the future development and shows examples of architecture, etc., it should not be misunderstood to be an exact design of what will be constructed. These give a flavor of future development, not an exact diagram of the exact details of development. The site will be expected to develop as shown here (layout, number of units, and so forth), but the architecture may vary according to demand, timing, and as design moves forward.

Some of the "Planned Development – Traditional Neighborhood Zone Design Manual & Form Based Code" (hereinafter referred to as "Design Manual") has been integrated into the proposed booklet by way of cut and paste. This was done to ensure that there was continuity between the two documents. These include diagrams of traditional frontage types, street cross sections and yard dispositions. They also address the guidelines outlined in the design manual. See the following table for details:

Design Manual Requirements			
Guideline	**Letter**	**Proposal**	**Staff Comments**
Architectural Coherence	Guideline A	Buildings over one story will show distinct floors and use high-quality exterior materials.	This is consistent with Guideline A, which requires high quality architecture.

Compatibility of Scale	Guideline B	Commercial or mixed-use buildings must match neighborhood scale and place form transitions at rear edges.	This is consistent with Guideline B which requires buildings to be compatible with each other in the immediate vicinity.
Architectural Variety	Guideline C	Homes may not be the same design as an adjacent neighbor or across the street.	This is self-imposed and not included in the design manual but a good practice to avoid monotony and repetition.
Human Scale	Guideline D	Entrances must face public spaces, feature pedestrian-scale detailing, provide street visibility, and avoid long blank walls.	Guideline C requires specific architectural requirements which will be reviewed at the time the applicant is ready for a PD Amendment.
Streetscape	Guideline E	Signs and lighting must follow city standards; allow small, well-designed signs and require regularly spaced street trees.	This is consistent with Guideline D. The code will be followed for signage and street trees.
Walls/Fencing	Guideline F	Rear/side privacy walls allowed with limits; front fences must be low, decorative, and non-solid unless retaining.	This guideline is consistent with the Design manual though staff is recommending that city ordinances will also need to be followed.
Accessory Structures	Guideline G	Accessory structures follow setbacks, size, height, and design limits, matching the home and protecting utilities.	Much of this proposed guideline follows the allowance under current St. George code. It also details guidelines for carriage houses as outlined in the Design Manual. Because the single-family homes are proposed to be pads, this will likely not apply. Should they decide to go with traditional lots, this would be in place.

Zero Lot SF Homes	Guideline H	Zero-lot homes allow one side setback at the property line with required easements, limits, and drainage rules.	This is another self-imposed standard which would allow a zero setback on one side of the lot. Again may not be applicable.
Landscaping	Guideline I	Landscaping standards must comply with Chapter 25 of the St. George City Code.	This is consistent with the Design Manual.

The Design Manual has requirements for parking and access. The development is designed to be a compact neighborhood where all homes are within a 5-minute walk of the civic and commercial center, with mid-block pedestrian shortcuts provided. The neighborhood is bound by natural features and public land, limiting external traffic and visitation from outside the immediate area. On street parking in the PD-TNZ zone is encouraged, which is not typical of standard development throughout the city. Diagonal parking is provided along the Movie Rock Drive frontage to serve the multifamily units and commercial promenade though these are not credited towards the site to count for required parking.

Parking Requirements			
Guideline	**Letter**	**Proposal**	**Staff Comments**
Parking Placement	Guideline A	On-street parking (including diagonal) permitted; parking lots generally not allowed on frontages except corner lots with screening.	This is generally consistent with the Design manual and with City Code which states, "*On-street parking is encouraged in all traditional neighborhood forms in order to create a buffer between car traffic and pedestrians, and to introduce traffic calming friction to thoroughfares.*[4]"
Access	Guideline B	Off-street parking accessed via lane/alley (preferred) or driveway; tandem parking allowed in garages per unit.	This is consistent with city code and the design manual.

[4] St. George City Code Section 10-7H-1(B)(1) – Access Design

Garages	Guideline C	Alley garages: 5' setback from alley. Uncovered spaces: min 9'×18' to count as parking.	This is allowed per code and the design manual.
Alleyways	Guideline D	No front or side-loaded garages are being proposed.	N/A
Spaces Required	Guideline E	1 bedroom – 1 space 2 bedroom – 1.5 spaces 3+ bedroom – 2 spaces SF – 2 spaces/home Commercial – 2 per 1,000 ft² gross floor area.	Under the Design Manual, commercial requires two spaces per 1,000 ft² floor area. All else is consistent.

Miscellaneous Information – There are other aspects of the development that haven't been covered.

1. The number of proposed units is 32 total units
2. Single Family is proposed to be 17 units or 53% of the total number of units
3. 15 total townhomes (in the TNZ)
4. Commercial will comprise 15,000 ft² of the site
5. Approval of a PD-TNZ will allow the site to flow from Rusty Cliffs into the proposed PD-R without requiring obtrusive fencing that would otherwise block off flow between the two.

There will be more about the overall site in the section that follows regarding the PD-R proposal.

PD-R (Planned Development Residential) - 2026-ZC-004

The PD-R portion of the project consists of two primary components: a larger single-family residential area located within the lower-lying portions of the property and a multi-family area situated closer to the highway. If approved, the application would establish the maximum number of permitted units and overall development framework while maintaining flexibility for future refinement to ensure compliance with applicable codes and ordinances.

Single-Family

Much of the detailed design for the single-family area will occur at a later stage of development. Currently, the applicant has designed the layout to accommodate a maximum of 269 future single-family homes. As discussed in the hillside permit, the subdivision has been laid out in a manner intended to preserve as much of the natural hillside and open space as possible, particularly within the more sensitive hillside areas. Preliminary and final plats will be required prior to future development.

Multi-Family

The second component of the PD-R is the multi-family portion of the project. This area is integrated with the adjacent PD-TNZ and is intended to function as part of a cohesive, unified development. Amenities associated with the project will be shared between residents of both the PD-R and PD-TNZ areas.

The applicant has designed the multi-family area with several townhome buildings located along the northern and eastern edges of Phases 1 and 2. These buildings are intended to transition seamlessly into the adjoining TNZ area and further reinforce the appearance of a single, coordinated development. The townhomes are proposed at approximately 28 feet in height to the highest point. The building elevations are designed with interchangeable unit arrangements so that individual buildings will vary in appearance while maintaining consistent architectural elements throughout the project. A total of 13 townhome buildings are proposed within the PD-R, containing 82 units. An additional three townhome buildings with 15 units are proposed within the TNZ, bringing the total number of townhome units across the development to 97. The next product type are stacked apartments. There are six stacked buildings proposed with a total of 224 units.

Building Height

Five of the six buildings are three stories and fall into the allowed 40-foot maximum height. The larger five story building is proposed to be 48’ from grade to the very top of the tallest architectural feature. To the coping of the tallest parapet, this building is proposed to be 43’ tall which still exceeds the 40’ maximum height limit for the PD-R zone. The PD-R regulations allow for the applicant to request additional height. The Planning Commission may recommend that the City Council grant additional height. The following is from the St. George city code[5]:

> *Height Regulations:* No residential dwelling shall be erected to a height less than ten feet (10') and no structure shall be greater than forty feet (40'). The city council, after recommendation from the planning commission, may approve increased building height upon making a finding, as part of a zone change approval, that the increase in height will fit harmoniously into the neighborhood, minimizing any negative impacts, after considering the following:
>
> 1. Proposed setbacks provide an appropriate buffer to neighboring properties;
> 2. Increased landscaping enhances the project and reduces any negative impacts;
> 3. Site layout and design enhance the project and reduce any negative impacts;
> 4. The massing and building scale is appropriate for the location;
> 5. The proposed height increase is appropriate for the area; and
> 6. The increase in height is consistent with any applicable master plan.

The following is from the applicant regarding the request for an additional eight feet.

[5] St. George City Code, Section 10-7F-5(C)

Phase 2 Apartment Building is designed as a 4 story building.

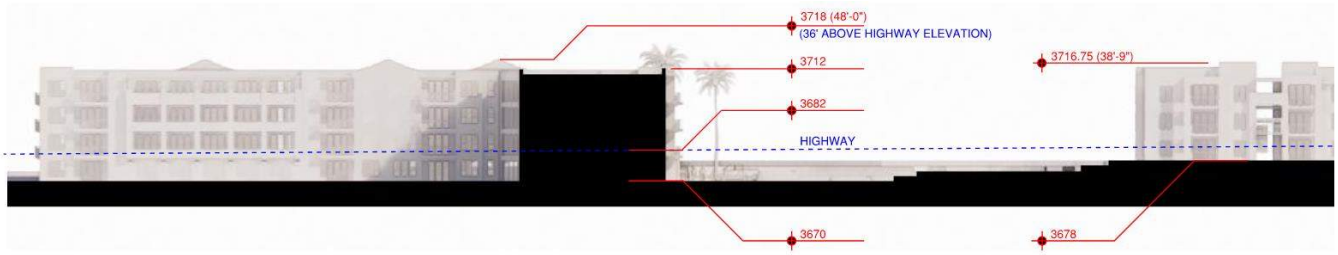
Trails East is requesting a variance in the 40'-0" height limit for our Phase 2 Apartment Building. We are requesting an additional 8'-0" of height for the following reasons:

1 - The elevation of the highway being higher than the building's base, the height of the building is only 36'-0" above the height of the highway, or 3 stories above the highway.

2 - Due to the drop in grade across the site, the 3-Story apartment sits 8 foot higher than the base of the Phase 2 apartment building.

3 - The 3-Story apartment is 4.75 foot taller than the majority of the phase two apartment building. Only the 5 Espedana's on the phase 2 building are 1.25 foot taller than the 3-story apartment buildings.

4 - The phase 2 apartment project is 36 feet below the Rusty Cliffs project, which means only the top floor of the building will be visible to the Rusty Cliffs, and any other adjacent owner, so it will not negatively impact adjacent properties.



Parking

Each townhome is required to have two parking stalls, which may be the garage if one is provided. Each townhome will have a two-car garage. They will also provide one stall for three units for guest parking. The stacked units require the same parking ratios as the townhomes. It appears that the project has been adequately parked per code. The following breakdown of parking was provided by the applicant.

PARKING:
TOWNHOMES
UNITS = 164 REQUIRED (82*2), 164 PROVIDED (82 GARAGES)
GUEST = 27 REQUIRED (82/3), 27 PROVIDED
TOTAL = 191 REQUIRED/ PROVIDED

APARTMENTS
UNITS = 448 REQUIRED (224*2), 448 PROVIDED
GUEST = 75 REQUIRED (224/3), 75 PROVIDED
TOTAL = 523 REQUIRED/ PROVIDED

TNZ Parking

PARKING:
COMMERCIAL = 30 REQUIRED (15,000/2:1000), 36 PROVIDED
SINGLE FAMILY = 17 GARAGES (34 STALLS)
TOWNHOMES = 30 REQUIRED, 30 PROVIDED (15 GARAGES)
GUEST = 5 REQUIRED (15/3), 5 PROVIDED

Zoning Requirements			
Regulation	**Section Number**	**Proposal**	**Staff Comments**
Setbacks	10-7F-5	Front – 20’ driveways Rear – 5’ to alleyways 20’ to Movie Rock Drive	The required setbacks are: Front/ Street Side: 15’ Side/ Rear: 10’ and 20’ Alley – 5’

Uses	10-7F-1	Townhomes/Apartments	With approval of the zone change request to PD-R, the use and proposed density is permitted.
Height and Elevation	10-7F-5	See section above	The code allows up to 40’ in height, therefore, the proposed townhomes comply. The one stacked apartment building is requesting an eight-foot deviation for additional height as allowed by code.
Signs	10-7F-2	See proposed signage attached.	Any signs will need to meet the sign regulations found in Title 9-13.
Landscape Plan	10-7F-6	See proposed landscape plan.	The code requires 30% of the lot area to be landscaped and at least 50% of the front setback area to be landscaped. A minimum of 7 amenities are required with a minimum of 200 ft² per unit of usable recreation or playground areas.
Utilities	10-7F-2	Conceptual Utility Plan has been included.	All utilities will be determined and designed during the JUC process. Staff will ensure this is completed during the site plan approval process. Preliminary utility discussion has already occurred at a pre-application meeting.
Lighting	10-7F-2	A photometric plan has not been provided.	Staff will ensure a photometric plan that meets the current city code is submitted.
Solid Waste	10-7F-2	The plans show the solid waste locations.	The solid waste locations are proposed to be screened with walls and gates.
Parking	10-19-5	See breakdown above	Required: 2/unit and 1 per every 3 units for guests
Amenities	10-7F-6	They are offering amenity space with a pool, hot tubs, fitness center, children’s play area, sport courts, clubhouse, Vinyl Lounge,	Meets requirements of the code

		etc. They are also proposing a park (civic space) connected with the TNZ and 111 acres of open space. A trail network is proposed throughout as well.	

RECOMMENDATION FOR TNZ:
Staff recommends approval of the application for Trails East PD-TNZ zone change from G&G (Gravel and Grazing) to PD-TNZ with the following conditions:

1. That the number of units associated with the project is limited to 32 as shown on the conceptual plan.
2. That a preliminary plat is submitted for review and approval by the Planning Commission.
3. That a site plan that meets the requirements of city code and development standards is applied for and approved prior to construction.
4. That city ordinances are adhered to pertaining to construction of retaining walls.

ALTERNATIVES:

1. Recommend approval as presented.
2. Recommend approval with additional conditions.
3. Recommend denial of the request.
4. Continue the proposed zone change to a later date.

POSSIBLE MOTION:
"I move that we forward a positive recommendation to the City Council for the Trails East PD-TNZ zone change as presented, Case No. 2026-ZC-003, based on the findings and subject to the conditions listed in the staff report (and as modified by the following…)."

FINDINGS FOR APPROVAL:

1. The proposed PD-TNZ zoning is consistent with the intent and purpose of the Traditional Neighborhood Zone as outlined in Section 10-7H of the St. George City Code and the adopted Design Manual.
2. The proposed development provides the required mix of housing types, civic space, and integrated design elements necessary to support a traditional neighborhood development pattern.
3. The PD-TNZ portion of the project is designed to transition appropriately with the adjoining Rusty Cliffs development and promotes a cohesive and unified neighborhood layout.
4. The proposed PD-TNZ development is consistent with the Low Density Residential General Plan designation and complies with applicable density limitations.
5. The property will be served by approved sources and facilities: culinary and secondary irrigation water, power, sewer, and access to a dedicated public street.

6. A Hillside permit accompanies the rezone request, ensuring compliance with hillside requirements and regulations.

RECOMMENDATION FOR PD-R:

Staff recommends approval of the application for Trails East PD-R zone change request from G&G (Gravel and Grazing) to PD-R with the following conditions:

1. That the number of units associated with the project is limited to 575 as shown on the conceptual plan.
2. That the general layout of the project is adhered to with room for small changes as necessary to meet the requirements of the code and potentially hillside requirements.
3. That a preliminary plat is submitted for review and approval by the Planning Commission.
4. That a site plan that meets the requirements of city code and development standards is applied for and approved prior to construction.
5. That city ordinances are adhered to pertaining to construction of retaining walls.
6. That a deviation for height is granted as outlined previously in this staff report.

ALTERNATIVES:

1. Recommend approval as presented.
2. Recommend approval with additional conditions.
3. Recommend denial of the request.
4. Continue the proposed zone change to a later date.

POSSIBLE MOTION:

“I move that we forward a positive recommendation to the City Council for the Trails East PD-R zone change as presented, Case No. 2026-ZC-004, based on the findings and subject to the conditions listed in the staff report (and as modified by the following…).”

FINDINGS FOR APPROVAL:

1. The proposed PD-R zoning is consistent with the intent and purpose of the Planned Development Residential district as established in the St. George City Code.
2. The proposed residential density and development pattern complies with the Low Density Residential General Plan designation and applicable hillside density limitations.
3. The layout of the PD-R portion has been designed in a manner that clusters development in the more buildable portions of the site while preserving sensitive hillside and open space areas.
4. The proposed PD-R development will provide a compatible transition between the higher-intensity residential uses near Highway 18 and the larger-lot single-family areas located further east on the site.

5. The property will be served by approved sources and facilities: culinary and secondary irrigation water, power, sewer, and access to a dedicated public street.
6. A Hillside permit accompanies the rezone request, ensuring compliance with hillside requirements and regulations.

Exhibit A
Applicant's PD-TNZ Narrative (Booklet)

HELOS GROUP LLC
3940 N Traverse Mountain Blvd
Ste 200
Lehi, UT 84043
Attention: Josh Bush
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Trails East Traditional Neighborhood

Master Zoning & Development Plan
March 2026



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1. Development Overview

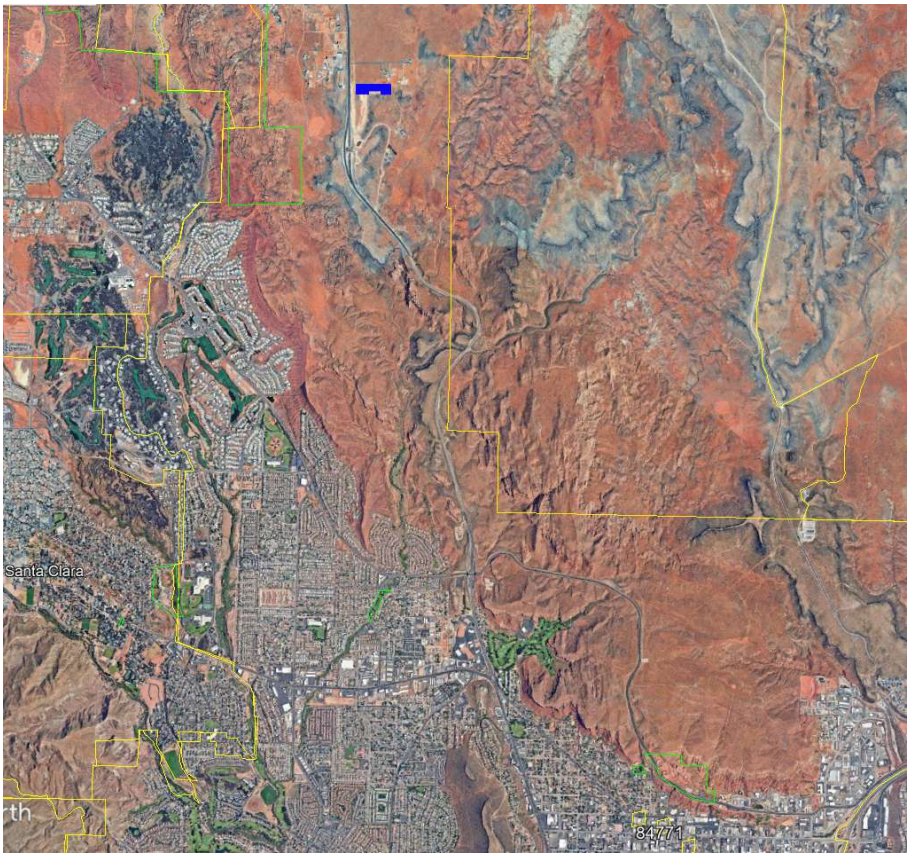
1.1 Vision

Trails East is a 10 Acre traditional neighborhood,a part of the larger 332.65 acre Trails East master-planned development, that will create an immersive living experience that is part of an active lifestyle community. Residents will share in community parks, trails, and a variety of housing types, all within walking distance to a central neighborhood retail center. Resident's of the traditional neighborhood will also have access to The Post, a highly ammenitized resort clubhouse, pool, and physical fitness center.

1.2 Strategies

- We will utilize St. George's Planned Development Traditional Neighborhood Zone (PD_TNZ) to deliver a variety of housing types and complementary land uses that meet the diverse needs and preferences of households of different incomes and life stages.
- The residential homes will be complimented by a vibrant, experiential, mixed-use retail promenade, reducing the number of necessary car trips to other parts of the city. All homes in the neighborhood will be within a 5-minute walk of the commercial center. Our retail center will also serve to aid in the reduction of vehicular trips of the remainder of our Trails development, as well as those of the Rusty Cliffs, Winchester Hills, & Red Ledges developments.
- The programming of our proposed retail center is aimed at delivering both food and beverage options and traditional retail, which will provide a destination experience for Trails East, Rusty Cliffs, Winchester Hills, & the Red Ledges communities.
- A well-connected street grid will enhance the pedestrian experience, improve the current vehicular access for adjacent properties, and provide for the reliable, cost-effective delivery of utilities and other public services. Thus improving the lives of our residents, as well as, those of the surrounding properties.
- As the name implies, Trails East, will be an immersive outdoor recreation experience. Nestled between the Desert Tortoise sanctuary and the retail core, outdoor trails will connect the community effectively creating a living experience for all ages and incomes.

1.3 Project Location and Physical Characteristics.



Location: Utah Highway SR-18 at Milepost 7
Total Area: 332.65 acres
Physical Description: The site of the neighborhood is along the east side of Utah's Highway 18 (SR-18) just North of Mile-post 7. Other adjacent property includes the Red Cliffs Desert Reserve, The Rusty Cliffs Development, and the Ledge's planned community. The terrain is a gently sloping sagebrush field adjacent to the highway. Access to the property will be by way of Movie Rock Drive, a frontage collector road linking the Ledges and (under construction) Trails interchanges. The elevation is about 1000' higher than downtown St. George.

1.4 Land Use Designation



General Plan

Low Density Residential (LDR, <4 Dwelling Units per Acre)

Zoning

Existing.

- Mining & Grazing (M&G): 10 Acres

Development Parameters.

-32 Units (3.5 Dwelling Units per acre)

*17 Single Family, 15 Townhomes

- Neighborhood-Scale Mixed-Use/Retail Center

- 4 Commercial Retail buildings totaling 15,000 sf (2 @ ~3500 sf and 2 @ ~4000sf) configured for pedestrian-oriented patronage. Storefronts to face along internal roadway.

- No Drive-thrus will be utilized in this commercial area.

2. Traditional Neighborhood Plan

2.1 Overview

Overview of uses. This Traditional Neighborhood Plan includes a wide range of residence types: Single Family detached dwellings- Paseos (for rent) and single story and 2 story Single family attached dwellings- Townhomes (for rent). Accessory commercial retail building forms will consist of single story retail buildings that will frame the development as guests enter from Movie Rock Drive.





Essential Characteristics. A mixed-use neighborhood center; diverse residence types including modest multifamily and small-scale retail; a harmonious union of public and private spaces; fully encompassing pedestrian experience that utilizes experiential storytelling to create engaging retail storefronts and homes that inspire imagination and emotion. Utilization of thoughtful and carefully curated landscaping and a welcoming and exciting community.

Yard Dispositions. Edge Yards; Side Yards; Rear Yards. Generally shallow front and side setbacks or zero-lot line configurations. Yards will be utilized to create a sense of privacy, while encouraging a more connected community. See Yard Dispositions section for detail.

Frontage Types. Common Yard; Porch Yard; Terrace or Lightwell; forecourt; stoop; shopfront. See Private Frontages section for detail.

Building Height. 1-2 stories, excluding attics or raised basements. Up to 4 stories permitted along Movie Rock Drive. Stories may not exceed 10 feet from finished floor to ceiling, except where the first floor is a commercial function.

Civic Spaces & Other Defined Open Space. To be owned and maintained by private developer as part of overall planned development, unless accepted as public facilities by the city. City ordinance requires 5% of the project to be qualifying Civic Space. Trails East will provide % Civic Space (Acres), as follows; Pocket Park and greenspace (w/pet sanitation support and walking trails) This civic space will be adjacent to a larger civic space provided by adjacent portion of development, which will have a playground.



2.2 BUILDING FORMS AND STANDARDS SUMMARY TABLE		
1	**BUILDING FORMS**	
	Single Family House (For Rent)	
	Accessory Dwelling Unit (Internal, Detached, or Attached)	
	Townhomes/Rowhouses	
	Paseos (attached or detached)	
	Neighborhood Commercial (Retail)	No Drive-Thrus, no buildings>10,000 sf
		Limited to designated site and 20,000 sf
2	**PERMITTED USES ^1**	
	See: St. George Code 10-7H-6 (as amended) Neighborhood General (NG) Allowed Use Table.	
3	**MAX. BUILDING HEIGHT^2**	
	Main Building	3 Stories/35'
	Accessory Structures	2 Stories/25'
	Building's Fronting Movie Rock Dr.	3 Stories/35'
4	**SETBACKS ETC.**	See table below
5	**YARD DISPOSITIONS**	Edge Yard, Side Yard, Rear Yard
6	**PRIVATE FRONTAGES**	Common Yard, Porch Yard, Dooryard, Forecourt, Stoop, Shopfront
7	**CIVIC SPACES**	Square, Green, Dog Park, & Trails. (Civic space will adjoin adjacent civic space which will house a large playground)
^1 Where they differ, the modifications to standard City use regulations made by this masterplan document control.		
^2 Stories may not exceed 10' from finished floor to finished ceiling, except where the first floor is a commercial function.		

Setbacks, Widths, & Typical Size for "Trails East" Residential Lots

	Paseos	2-Story Townhomes	Single-Story Townhomes	Retail
Front Setbacks	5' Minimum	10' Minimum	10' Minimum	15' Minimum
Alley Setbacks	5' Minimum	5' Minimum	5' Minimum	5' Minimum
Side Setbacks	5' Minimum	15' Minimum	15' Minimum	10' Minimum
Minimum Pad/Lot Width	36' (NA^1)	(NA^1)	(NA^1)	50' Minimum
Typical Pad/Lot Size	3,400 sq. ft.	(NA^1)	(NA^1)	45,000 sq. ft.

^1 Paseos & Townhomes are for rent, not for sale, so they will not be individually platted.

2.3 Architecture

2.3.1 Design/Precedent Images.



Single Family Detached House- Paseo (For Rent)



Single Family Attached House- Townhomes (For Rent)



Single Story Retail



Neighborhood Center- Mixed-Use Promenade and Outdoor Dining



Neighborhood-Scale Commercial Corner



Frontage Cross-Section, Movie Rock Drive & in front of proposed retail.

2.3.2 *Architectural Guidelines*

Review Process. Architecture shall consist of southwestern vernacular colors and styles. All construction shall comply with the Architectural Guidelines enumerated below and shall encourage a cohesive design to both the Rusty Cliffs development and the future Trails East Development. The design of the retail storefronts shall be of the same desert architecture and shall be designed to be compliant with the Cities Architectural Design Guidelines enumerated below.

Guideline A: Architectural Coherence. A building greater than one story should clearly express each floor of the structure through belt courses, cornice lines, or similar architectural detailing. All building materials shall be high quality, as brick, stone, stucco, cement clapboard siding or comparable materials.

Guideline B: Compatibility of Scale. A commercial or mixed-use building must be integrated into its residential setting through scale and appearance. Generally, similar building forms should face across street with transitions to dissimilar building forms made at rear lot or across alleys.

Guideline C: Architectural Variety. To promote visual interest, the design guidelines adopted by the community's Architectural Review Committee shall require that no two identical single family detached homes (Paseos) be constructed side by side or directly across the street from one another. Architect shall design Paseos and Townhomes in such a way as to provide multiple color and design options to deliver a cohesive variety of styles, roof forms, materials and color palettes.

Guideline D: Human Oriented Scale & Design. A building's main entrance shall face a public street or common green or plaza and be clearly identified through use of architectural detailing. Windows and Doors on the front façade of a building should create lines of sight between the building and the street. Doorways, windows, and other openings in the façade should be proportioned to reflect pedestrian scale and movement, and to encourage interest at the street level. Buildings should incorporate the façade indicated by their private frontage type. Long, uninterrupted walls or roof plans are prohibited.

Guideline E: Streetscape Elements. Street lighting and permanent signage shall comply with St. George City Code and Standards, unless otherwise approved. Wall, awning and hanging signs are encouraged in commercial contexts. Small-scale mixed use/retail may have one permanent wall and/or one hanging sign. Such a sign may not exceed six square feet and must be consistent with the design of the main structure. Illuminated

signs are permitted only for buildings fronting Movie Rock Drive, or at the Retail portion of the TNZ development. Street Trees are required, and shall generally be placed in planter strips at intervals of no more than thirty feet (30') unless utility placement or other conditions dictate alternative spacing.

Guideline F: Walls and Fencing. Block privacy walls no taller than six feet four inches (6'-4") are permitted in the rear and side yard areas of buildings. Side yard privacy walls should terminate at least twenty feet (20') behind the main building façade. A low decorative fence or retaining wall/planter may be placed at or within the frontage line to set a spatial boundary with the street and/or create an elevated porch (see figure 1 below). Such a fence or wall shall not exceed thirty six inches (36") in height and masonry blocks or other solid material permitted in this context only where serving as a retaining wall.



Figure 1. A low retaining wall in the frontage may be used to create an elevated entry and a spatial boundary with the public right-of-way.

Guideline G: Accessory structures, including Detached Garages and Carraige Houses (Accessory dwelling unit atop garage).

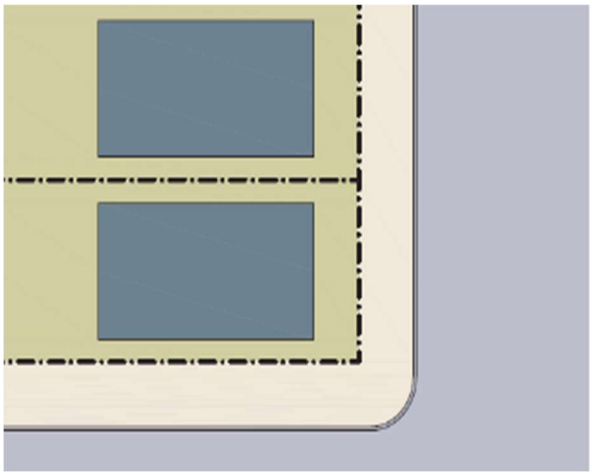
1. Accessory structures fully contained within the rear yard may have zero (0") setbacks from the side and rear property line. No roof shall project beyond the property line and stormwater runoff from the building shall not run onto adjacent property.
2. Main dwelling and accessory buildings must be separated by a maximum of six feet (6').

3. Accessory structures larger than 200 square feet must be of the same design, material, color, and quality as the main dwelling.
4. Accessory structures other than carriage houses and detached garages are limited to twenty five percent (25%) rear yard coverage. Carraige houses are limited to the square footage of the garage over which they are built.
5. Accessory structures, including detached accessory dwelling units other than carriage houses, are limited to one (1) story and an overall height of fifteen feet (15'). Carriage houses are limited to one (1) story above the garage (two stories total) and overall height of twenty five feet (25')

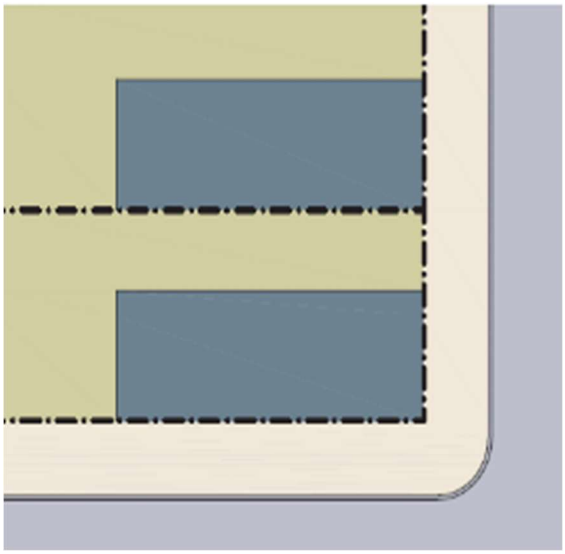
A perpetual maintenance, eave overhang, and drainage easement at least eight feet (8') wide shall be provided on the lot adjacent to the zero lot-line property line. The easement shall be shown on the plat and recorded on the properties. The residential wall abutting the zero lot-line shall be maintained in its original color and treatment unless the adjacent property owner expressly consents otherwise. Eaves, but no other part of any structure, may protrude across a zero lot-line, and such eave protrusion shall not exceed eighteen inches (18"). Notwithstanding the required drainage easement, rain gutters must direct runoff from the dwelling away from the adjacent lot.

Guideline I: Landscape Standards. All landscaping must comply with St. Geroge City Code Title 10 Chapter 25, and commercial forms must comply with section 10-25-4, as amended, unless otherwise approved.

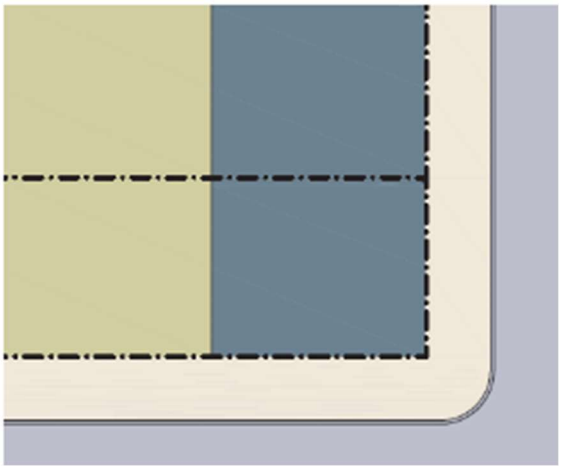
2.4 Yard Dispositions



Specific housing types: single-family house, cottage.
Description: building occupies the interior of its lot with setbacks on all sides. This is the least urban yard type as the front yard sets it back from the frontage, while the side yards weaken the spatial definition of the public thoroughfare space. The front yard is intended to be visually continuous with the yards of adjacent buildings. The rear yard can be secured for privacy by walls/fences and/or a garage/outbuilding.

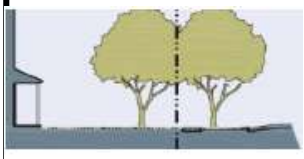
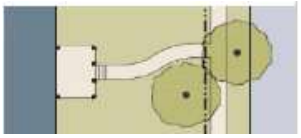
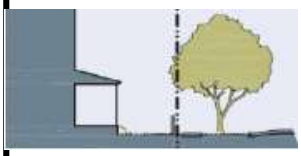
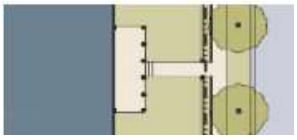
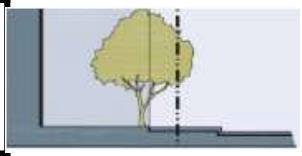
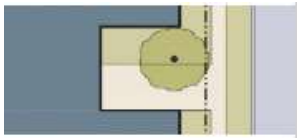
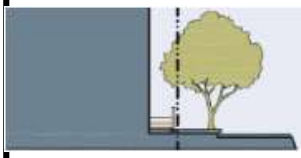
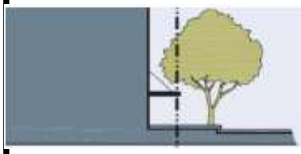


Specific housing types: cottage, zero-lot-line house, duplex, twin.
Description: Building occupies one side of the lot with the setback to the opposite side. A zero or shallow front setback defines a more urban condition. If the adjacent building is similar with a blank side wall, the side yard can be quite private. A side yard house may abut a neighboring side yard house to create a duplex or twin house. Energy costs, and sometimes noise, are reduced by sharing a party wall in this disposition.



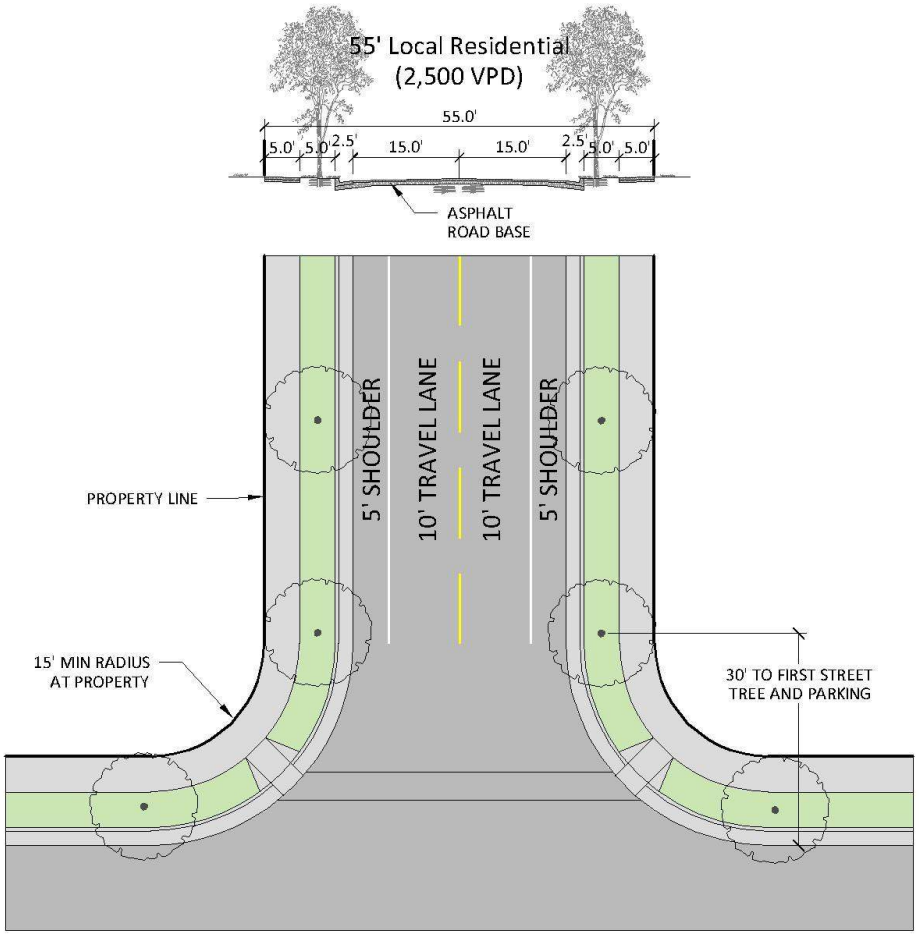
Specific building types: townhouse, rowhouse, flats (apartment or condo).
Description: Building occupies the full frontage, leaving the rear of the lot as the sole yard. This is a more urban type, as the continuous façade steadily defines the public streetscape. The rear elevations may be articulated for functional purposes. In its residential form, this type is the rowhouse. In a commercial context, the rear yard can accommodate substantial parking.

2.5 PRIVATE FRONTAGES

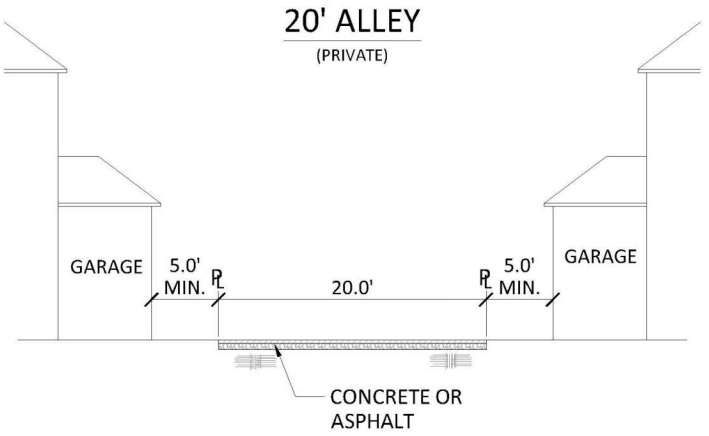
	SECTION		PLAN	
	LOT > PRIVATE > FRONTAGE	< R.O.W. < PUBLIC FRONTAGE	LOT > PRIVATE > FRONTAGE	< R.O.W. < PUBLIC FRONTAGE
a. Front Yard. A planted frontage wherein the building façade is set back from the lot line. The setback will be shallower in a traditional neighborhood, unlike in a suburban context.				
b. Porchyard. A planted frontage wherein the façade has a shallow setback from the lot line. A low, decorative fence at the frontage line may be used to set a spatial boundary with the street. An elevated porch will be permitted.				
c. Dooryard. A frontage wherein the façade is set back from the lot line only by an elevated terrace or sunken light well. This buffers residential use inside the building from busier sidewalks. A deeper, wider landing is encouraged for use as a terraced patio or outdoor cafe.				
d. Forecourt. A frontage wherein a portion of the façade is close to the lot line and the central portion is set back. A variation of this type may also be used to create a bungalow court or paseo. Large trees within the forecourts may overhang the sidewalks.				
e. Stoop. A frontage wherein the façade is aligned close to the lot line with the first story elevated from the sidewalk sufficiently to ensure privacy. The entrance is usually an exterior stair and landing. This frontage type is recommended for first-floor residential use adjacent to a commercial form.				
f. Shopfront. A frontage wherein the façade is aligned close to the lot line with the building entrance at sidewalk grade. This type is conventional for commercial uses with substantial glazing at sidewalk level. An awning may overhang the sidewalk, and outdoor dining is permissable.				

2.6 Street Designs

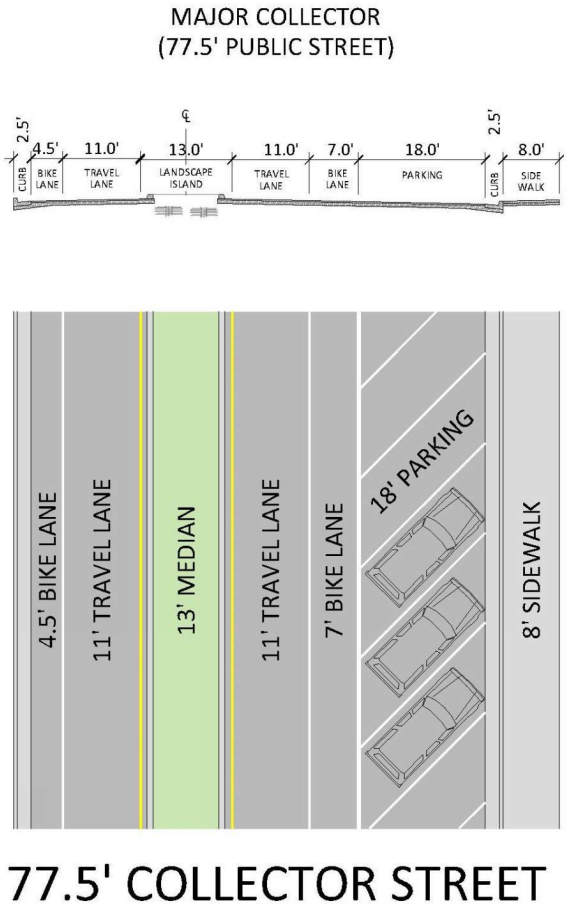
Typical Residential Cross-Sections.



55' LOCAL RESIDENTIAL STREET



Collector Street Cross-Section (Movie Rock Drive).



2.7 *Parking Standards*

Discussion. The Trails East Development traditional neighborhood has several unique characteristics worth noting for their effects on car use in general and parking in particular.

1. The compact, highly walkable nature of the neighborhood means that almost no local trips to the neighborhood's civic and retail centers will be made by car. All neighborhood homes will be within a pleasant 5-minute walk of the retail core, the civic center, and the adjoining civic center and clubhouse/pool. In addition to excellent walkability at the street, midblock pedestrian shortcuts, and trails connecting the entirety of the 332 acre property will also be provided.
2. This part of St. George is relatively disconnected from the rest of the city by significant natural features and public land ownership, which will reduce the volume of visitation to the neighborhood from beyond the Ledges-Trails-Rusty Cliffs vicinity.
3. Access to substantially all off-street parking will be via alley, which eliminates driveway cuts in front of homes. This improves the pedestrian experience and opens up much more space for curbside parking. On-street spaces will provide a plentiful, convenient buffer for any parking overflow from off-street spaces. Indeed, though we have programmed ample off-street parking, cars parked curbside will be welcomed as a traffic calming element and barrier between sidewalk and street.
4. The diagonal parking programmed along the Movie Rock Dr. frontage will provide particularly convenient parking for guests and patrons visiting the multifamily flats and commercial/retail promenade. Also, additional retail parking is being provided behind the retail to encourage pedestrian access, but allow sufficient parking ratios to meet city requirements.

Standard A: Placement. On-street parking is expressly permitted, including diagonal parking on Movie Rock Drive (see 77.5' Collector Street Cross-Section above), and in front of all commercial retail perpendicular to Movie Rock Drive. Parking lots may be set back behind commercial retail. Such a parking lot must be set back at least fifteen feet (15') from the back of sidewalk and screened from the street by at least a three and a half feet (3' 1/2) high landscaped berm or a solid masonry fence setback at least ten feet (10') from back of sidewalk. Parking standards in city ordinance, Title 10 Chapter 19, apply unless provided otherwise herein.

Standard B: Access. Off-street parking shall be accessed by lane, alley, or driveway. Lane or alley access to off-street parking is strongly preferred. If covered parking is provided within a garage, each dwelling unit may tandem park, if the garage and tandem parking spaces are associated with the same unit.

Standard C: Alley garages and uncovered parking spaces. Garages accessed from an alley must be set back a minimum of five feet (5') from the edge of the alley. Uncovered parking spaces in parking lots or driveways must be a minimum of nine by eighteen feet (9'X18') in order to count toward the satisfaction of off-street parking requirements.

Standard D: Front- or side-loading garages. No front- or side-loading garages are programmed in Trails Neighborhood zone.

Standard E: Minimum required spaces.

1. Paseos- 2 spaces per home, at least one of which must be covered.
2. Townhomes- 2 spaces per home, at least one of which must be covered.
3. Retail: minimum of 2.0 stalls per 1,000 SF. The stalls along Movie Rock Drive shall be permitted to count toward the required retail parking.
4. Guest Parking: For the Residential portion of Trails East one (1) guest parking space shall be provided per six (6) dwelling units. On street parking and off street stalls shall be allowed to count toward the required guest parking. These stalls shall be located within two hundred feet (200') of the dwelling units.

3. PROJECT-WIDE-SIGNAGE, LIGHTING, AND LANDSCAPING

3.1 *Overview of signage*. Specific plans shall be provided for any signage, lighting or landscaping elements that deviate from typical City specifications. (See code sections for signage, lighting, and landscaping.)

3.2 *Overview of Lighting*. All Lighting within the Trails East Development will preserve the dark skies initiatives/requirements of the City. All path lighting will be designed to meet City requirements, and to develop a consistent experiential design to match the adjacent PD-R development.

3.3 Landscaping will be sensitive to native desert ecology through plant choice and irrigation design. Trails East will coordinate with Rusty Cliffs to continue to develop a plan to implement the ultra water efficient standards of the Washington County Water Conservancy District. See Exhibit 4.7 for the proposed landscaping and street tree plan.

Exhibit B
Applicant's PD-TNZ Narrative (Booklet)

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c. (505)715-2677

TRAILS EAST



PD-R Zone Change Request

Written Text
April 2026

Trails East

Zone Change PD-R - Written Narrative

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    - 2.3. Parking Standards

3. Project Wide Signage, Lighting, & Landscape Architecture

4. Exhibits
    - 4.1. Max Building Height (Height Variance Request)

1. Development Overview

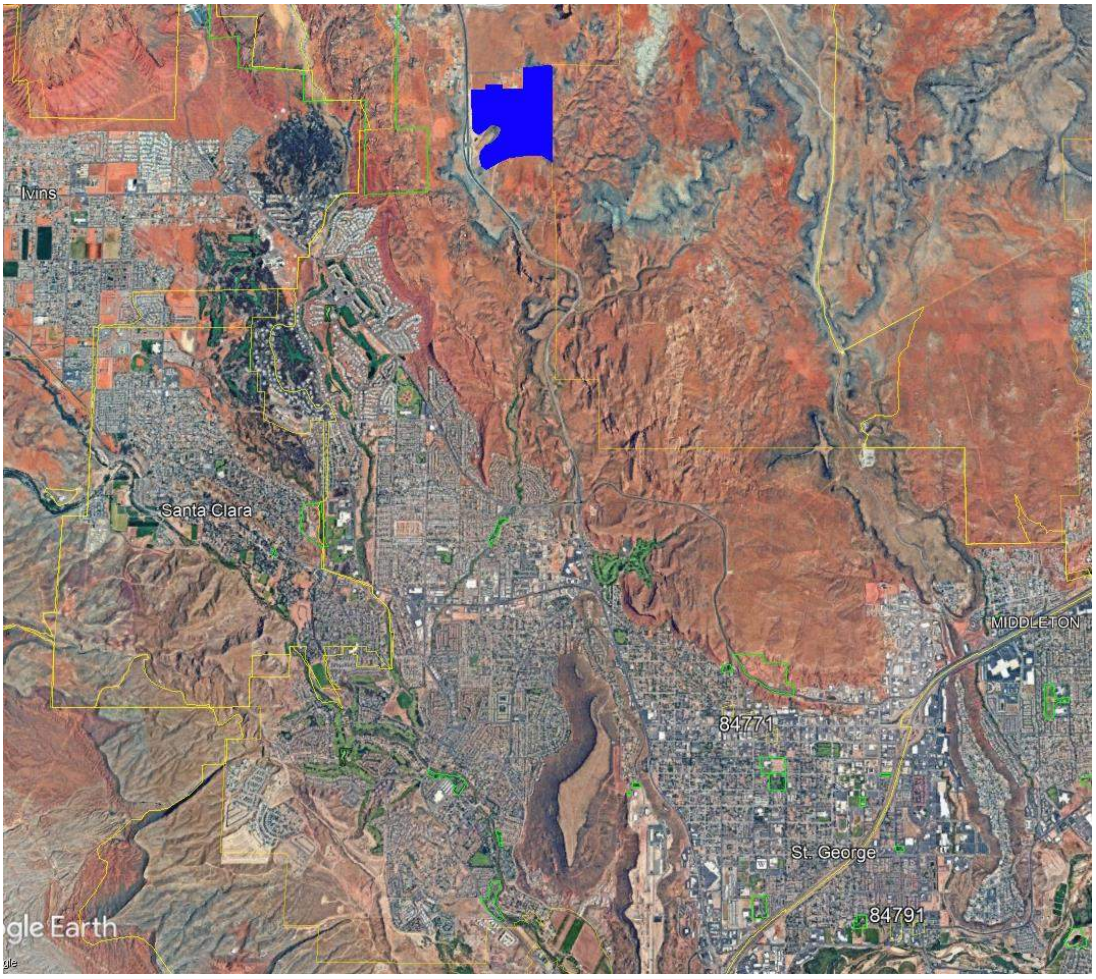
1.1 Vision

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1.2 Strategies

- We will utilize St. George's Planned Development Residential Zone (PD-R) to deliver a variety of housing types and complementary land uses that meet the diverse needs and preferences of households of different incomes and life stages.
- The residential homes will be complimented by a vibrant, experiential, mixed-use retail promenade, as part of the adjacent PD-TNZ zone, reducing the number of necessary car trips to other parts of the city. All homes in the neighborhood will be within a 5-minute walk of the commercial center. Our retail center will also serve to aid in the reduction of vehicular trips of the remainder of our Trails East development, as well as those of the Rusty Cliffs, Winchester Hills, & Red Ledges developments.
- A well-connected street grid will enhance the pedestrian experience, improve the current vehicular access for adjacent properties, and provide for the reliable, cost-effective delivery of utilities and other public services. Thus improving the lives of our residents, as well as, those of the surrounding properties.
- As the name implies, Trails East, will be an immersive outdoor recreation experience. Nestled between the Desert Tortoise sanctuary and the retail core, outdoor trails will connect the community effectively creating a living experience for all ages and incomes. These trails will encourage all residents of the PD-R to traverse the site on foot.

1.3 Project Location and Physical Characteristics.



Location: Utah Highway SR-18 at Milepost 7
Total Area: 332.65 acres
Physical Description: The site of the PD-R is along the east side of Utah's Highway 18 (SR-18) just North of Mile-post 7. Other adjacent property includes the Red Cliffs Desert Reserve, The Rusty Cliffs development, and the Ledge's planned community. The terrain is a gently sloping sagebrush field adjacent to the highway. Access to the property will be by way of Movie Rock Drive, a frontage collector road linking the Ledges and (under construction) Trails Parkway interchanges. The elevation is about 1000' higher than downtown St. George.

1.4 General Requirements



General Plan

Low Density Residential (LDR, <4 Dwelling Units per Acre)

Zoning

Existing: Mining & Grazing (M&G): 214.35 Acres

Development Parameters:

573 Total Units

A- Multifamily Apartment Units- 224 Units

B- Townhomes- 82 Units

C- Single Family Residential- 269 Homes

Density

PD-R area = 214.35 Acres

Developable area = 148.92 acres (Hillside Protection removed 65.43 acres)

Net Density = **3.85** DU/acre (573 DU/214.35 acres)

Open Spaces

Developed Amenities = 1.9 acres
Developed Landscape = 3.5 acres
Natural Open Space = 106.1 acres
Total Open Space = 111.5 acres **(48%)**

Phasing Plan

The development will be constructed in multiple phases. Phase 1, located on the mesa adjacent to Movie Rock Drive, includes the multifamily units and clubhouse (Lot 2 of the preliminary plat). Subsequent phases will proceed based on market conditions. A phasing plan is included with this application.

Topography

The project area is characterized by red rock formations, lava outcroppings, and sandy washes that define the site's natural landscape. The terrain generally slopes from north to south, with existing drainage patterns meandering through the property and converging at a low point along the southern boundary. A Hillside Development application has been prepared to identify and map protected and undisturbed areas, guiding site design and development constraints. The Trails East project is thoughtfully planned to respond to the natural topography by preserving significant landforms and integrating development with the site's existing features. A detailed topography exhibit is included with this application.

Landscape Plan

A general landscape plan is included, illustrating a schematic desert design that emphasizes water conservation as a primary objective. Detailed landscape plans will be submitted with the construction documents.

Utilities

Utilities will be designed and constructed in accordance with city standards and specifications. The proposed unit count and land uses have been coordinated with

the wastewater, water, and power departments, confirming that adequate infrastructure capacity is available to serve the development.

Buildout of the lower residential areas will require installation of a sewer lift station to serve single-family lots located within the lower valley; this facility will also support future commercial development. In addition, a power substation is planned north of Trails East to accommodate the project's needs and anticipated growth in the surrounding area.

2. Planned Residential Development

2.1 Overview

Overview of uses. This Residential Neighborhood includes a wide range of residence types: single story and 2 story attached dwellings- ownhomes (for rent), 3-Story Breezeway style apartments, and 4-Story Elevator Served Apartments.





Essential Characteristics. Diverse residence types including modest multifamily, high end for sale single family residences, and various townhome options; a harmonious union of public and private spaces; fully encompassing pedestrian experience that utilizes experiential storytelling to create an engaging community that will inspire imagination and emotion. The central focus of the for rent product will be a highly amenitized clubhouse and resort pool. Utilization of thoughtful and carefully curated landscaping and a welcoming and exciting community.

Building Height. 1-2 stories, excluding attics or raised basements. Up to 4 stories permitted along Movie Rock Drive. 40 feet is the maximum height allowed by code, however developer is requesting an increase to 48 feet, see exhibit 4.1 for details.

Open Space Amenities. To be owned and maintained by private developer as part of overall planned development, unless accepted as public facilities by the city. Trails East will provide 5% Civic Space (16.6325 Acres), as follows; Pocket Park and greenspace (w/pet sanitation support and walking trails), and playgrounds.



2.2 Architecture

2.2.1 Design/Precedent Images.



Attached House- Townhomes (For Rent) (Single Story)



Attached House- Townhomes (For Rent) (2-Story)



Multifamily Apartments



Multifamily Apartments

2.2.2 *Architectural Guidelines*

Review Process. Architecture shall consist of southwestern vernacular colors and styles. All construction shall comply with the Architectural Guidelines enumerated below and shall encourage a cohesive design to both the Rusty Cliffs development and the future Trails East TNZ Development.

Guideline A: Architectural Coherence. A building greater than one story should clearly express each floor of the structure through belt courses, cornice lines, or similar architectural detailing. All building materials shall be high quality, as brick, stone, stucco, cement clapboard siding or comparable materials.

Guideline B: Compatibility of Scale. Generally, similar building forms should face across street with transitions to dissimilar building forms made at rear lot or across alleys. The 3 and 4 story apartment buildings will be required to maintain a similar architectural scale. Due to the grade of the site, the 4-story building will look very similar in scale to the 3-story buildings.

Guideline C: Architectural Variety. To promote visual interest, architect shall design Townhomes in such a way as to provide multiple color and design options to deliver a cohesive variety of styles, roof forms, materials and color palettes.

Guideline D: Human Oriented Scale & Design. A building's main entrance shall face a public street or common green or plaza and be clearly identified through use of architectural detailing. Windows and doors on the front façade of a building should create lines of sight between the building and the street. Buildings should incorporate the façade indicated by their private frontage type. Long, uninterrupted walls or roof plans are prohibited.

Guideline E: Streetscape Elements. Street lighting and permanent signage shall comply with St. George City Code and Standards, unless otherwise approved. Street Trees are required and shall generally be placed in planter strips at intervals of no more than thirty feet (30') unless utility placement or other conditions dictate alternative spacing along Movie Rock Drive.

Guideline F: Walls and Fencing. A low decorative fence or retaining wall/planter may be placed at or within the frontage line to set a spatial boundary with the street and/or create an elevated porch. Such a fence or wall shall not exceed thirty six inches (36") in height and masonry blocks or other solid material permitted in this context only where serving as a retaining wall.

Guideline I: Landscape Standards. All landscaping must comply with St. Geroge City Code Title 10 Chapter 25, and commercial forms must comply with section 10-25-4, as amended, unless otherwise approved.

2.3 Parking Standards

Parking calculations are provided below as Trails East meets City parking requirements within the PD-R zone.

Parking Requirements

Townhomes

Units = 164 Required (82*2), 164 Provided (82 Garages)
Guest = 27 Required (82/3), 27 Provided
Total = **191** Required/ Provided

Apartments

Units = 448 Required (224*2), 448 Provided
Guest = 75 Required (224/3), 75 Provided
Total = **523** Required/ Provided

The above calculations do not account for nor include the additional on-street parking that is constructed along Movie Rock Drive being an additional 61 stalls along the PD-R frontage.

3. PROJECT-WIDE-SIGNAGE, LIGHTING, AND LANDSCAPING

3.1 *Overview of signage*. Specific plans shall be provided for any signage, lighting or landscaping elements that deviate from typical City specifications. (See code sections for signage, lighting, and landscaping.)

3.2 *Overview of Lighting*. All Lighting within the Trails East development will preserve the dark skies initiatives/requirements of the City. All path lighting will be designed to meet City requirements, and to develop a consistent experiential design to match the adjacent PD-TNZ phase of development.

3.3 Landscaping will be sensitive to native desert ecology through plant choice and irrigation design.

3.4 Landscape area and amenity requirements:

3.4.1 Developments with five (5) or more units shall provide one thousand (1,000) square feet of recreation space for the first five (5) units. An additional Two hundred (200) square feet shall be provided for each unit over 5 units.

3.4.2 The average width and length of each useable recreation space shall be no less than twenty feet (20').

3.4.3 All required common space shall be useable to the entire development.

3.4.4 Trails East totals 315 Multifamily units (including the PD-TNZ) requiring to provide 4 amenities, however the projects central clubhouse will exceed that. The following amenities will be provided:

- Pool- must be at least 400 square feet
- Fitness Center
- Children's Play Area
- Hot Tubs
- Sport Courts
- Community Clubhouse
- Community Vinyl Lounge
- Co-Working Lab
- Video Game Lounge

3.4.5 All required amenities shall be constructed prior to construction of fifty percent (50%) of the total project units.

PD-R Rezone request, height

Phase 2 Apartment Building is designed as a 4 story building.

Trails East is requesting a variance in the 40'-0" height limit for our Phase 2 Apartment Building. We are requesting an additional 8'-0" of height for the following reasons:

1- The elevation of the freeway being higher than the building's base, the height of the building is only 36'-0" above the height of the highway, or 3 stories above the highway.
2- Due to the drop in grade across the site, the 3-Story apartment sits 8 foot higher than the base of the Phase 2 apartment building
3- The 3-Story apartment is 4.75 foot taller than the majority of the phase 2 apartment building. Only the 5 espedana's on the phase 2 building are 1.25 foot taller than the 3-story apartment buildings.
4- The phase 2 apartment project is 36 feet below the Rusty Cliffs project, which means only the top floor of the building will be visible to the Rusty Cliffs, and any other adjacent owner. So it will not negatively impact adjacent properties.

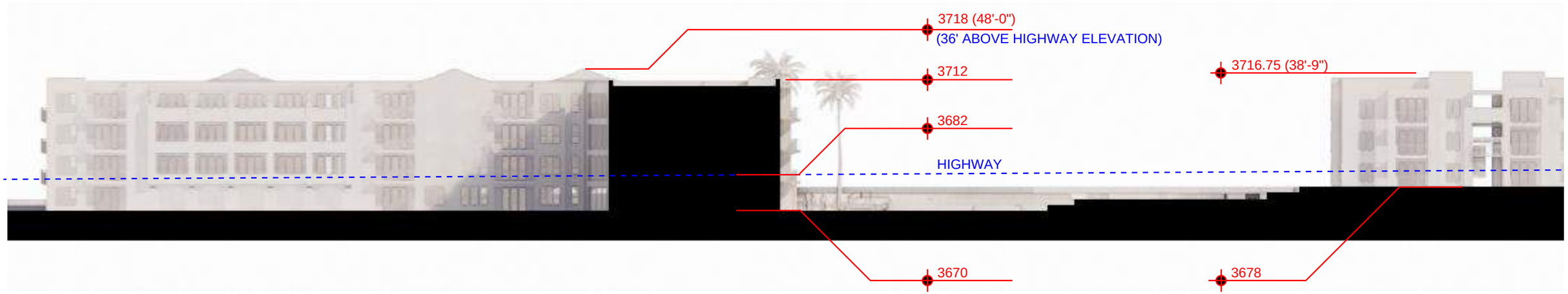
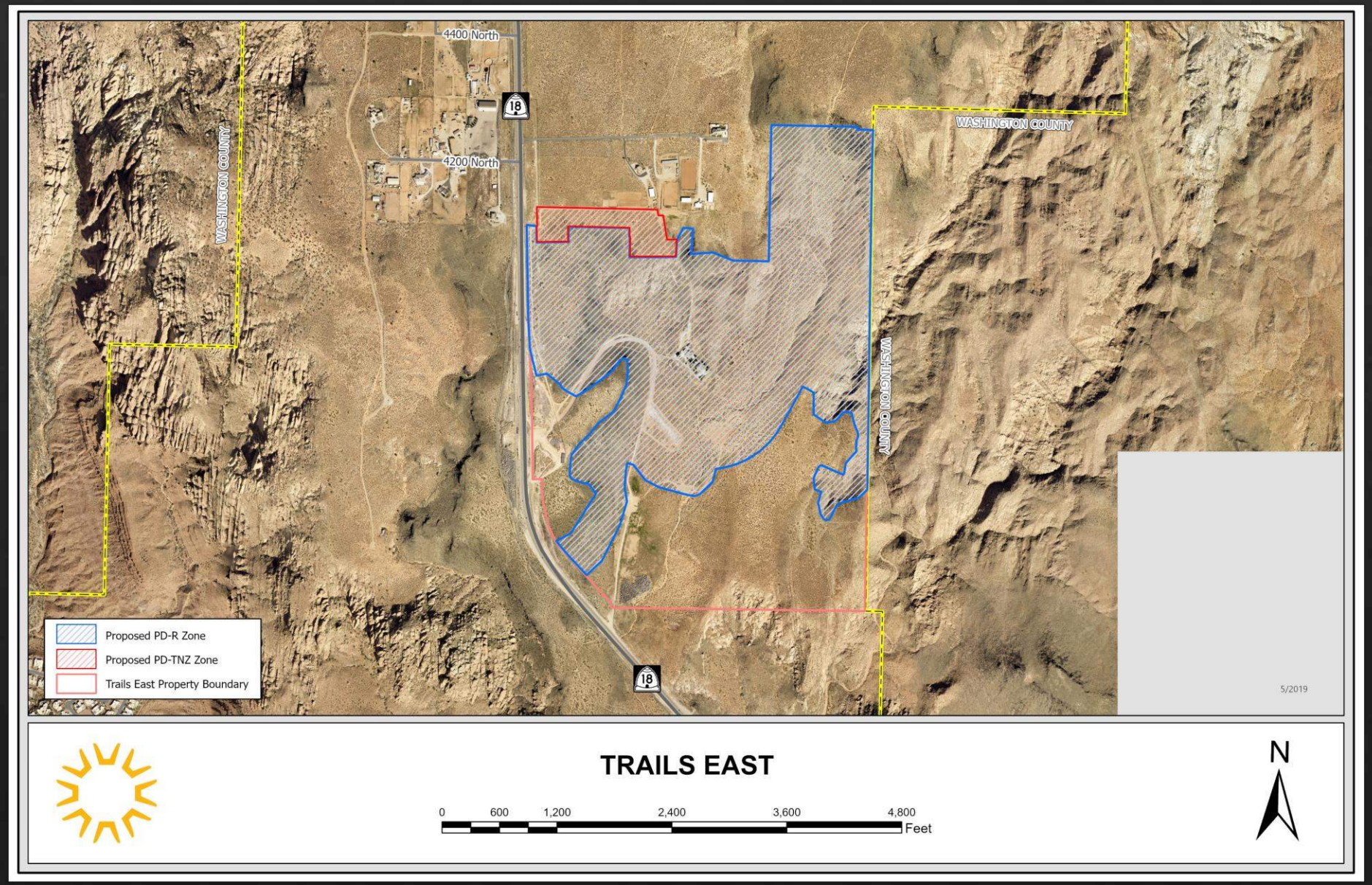


EXHIBIT 4.1- MAX BUILDING HEIGHT

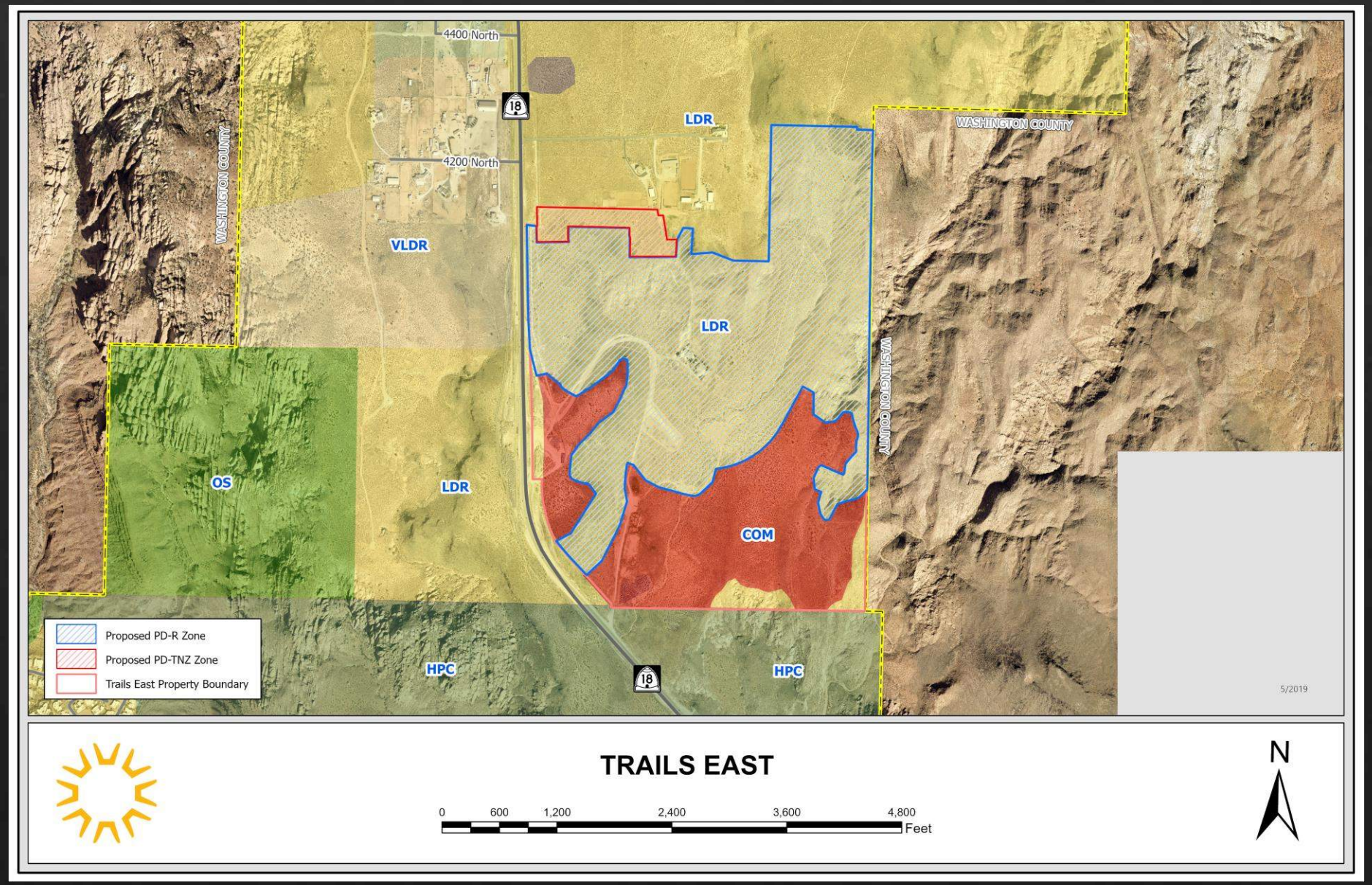
Exhibit C
PowerPoint Presentation


The Trails East
Rezone
PD-TNZ & PD-R
2026-ZC-003 & 2026-ZC-004

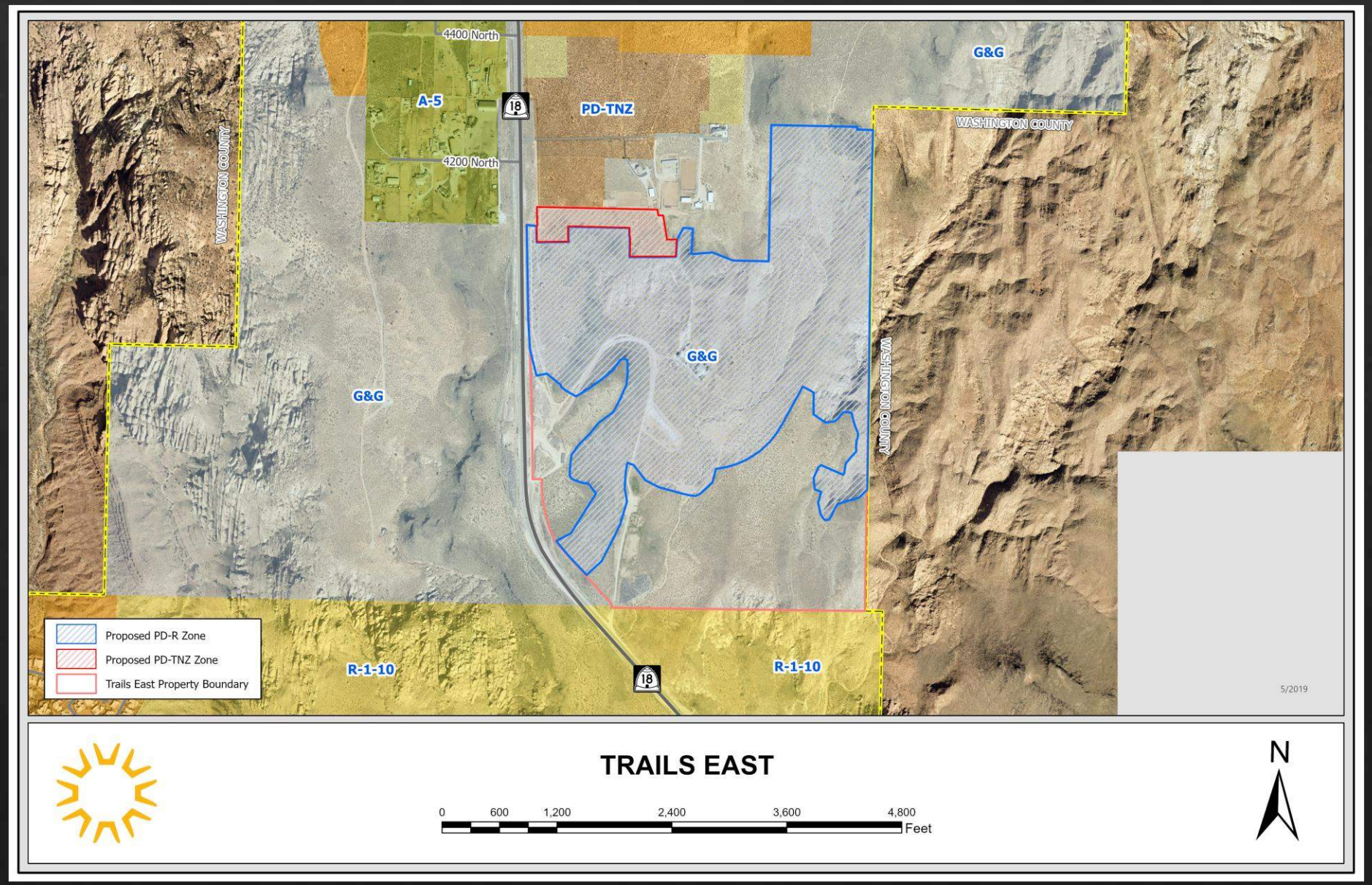
Aerial Map


4400 North
4200 North
18
WASHINGTON COUNTY
WASHINGTON COUNTY
WASHINGTON COUNTY
Proposed PD-R Zone
Proposed PD-TNZ Zone
Trails East Property Boundary
5/2019
TRAILS EAST
0
600
1,200
2,400
3,600
4,800
Feet
N

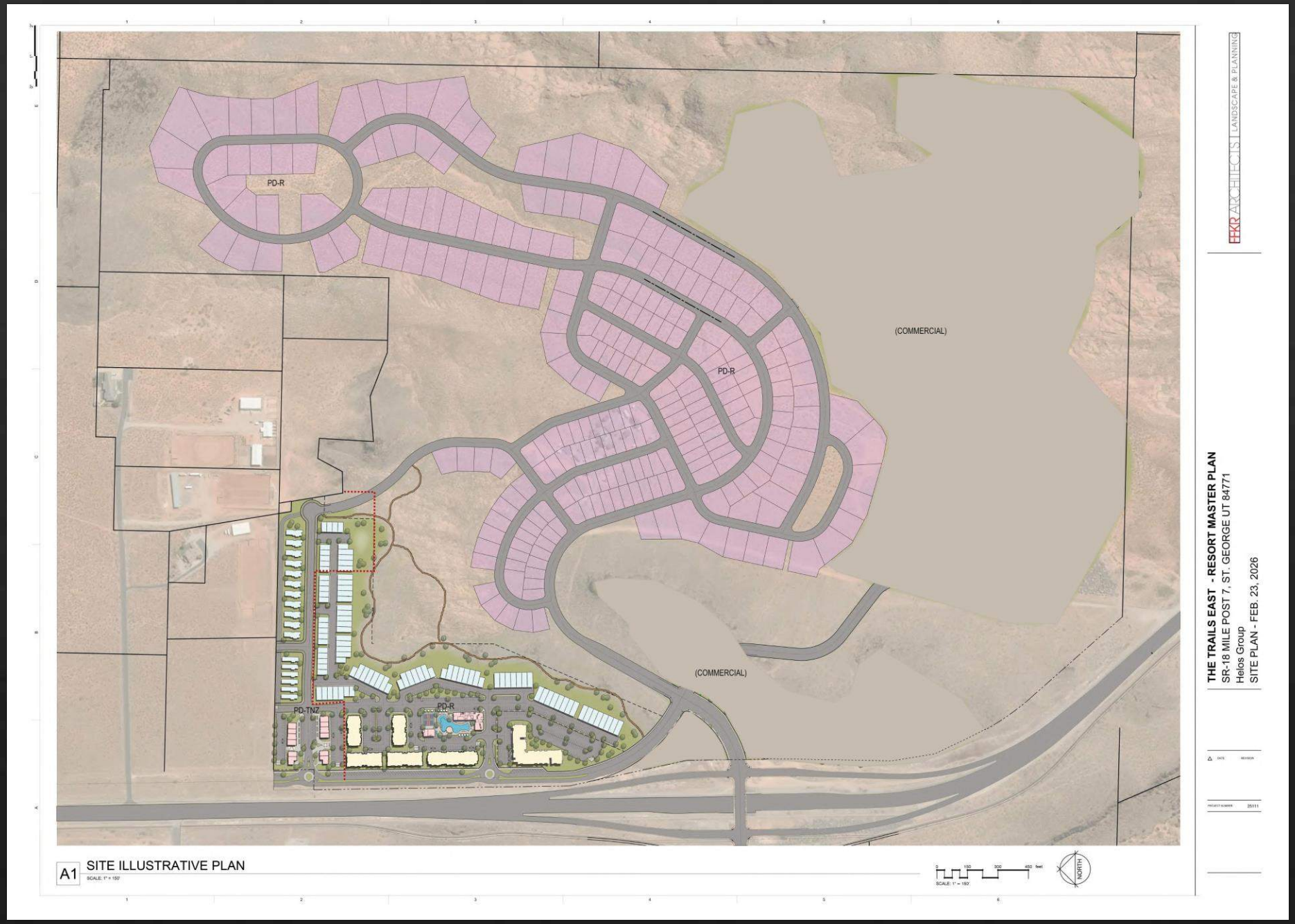
Land Use Map


4400 North
4200 North
18
WASHINGTON COUNTY
WASHINGTON COUNTY
WASHINGTON COUNTY
LDR
LDR
VLDR
LDR
OS
COM
HPC
HPC
Proposed PD-R Zone
Proposed PD-TNZ Zone
Trails East Property Boundary
5/2019
TRAILS EAST
0
600
1,200
2,400
3,600
4,800
Feet
N

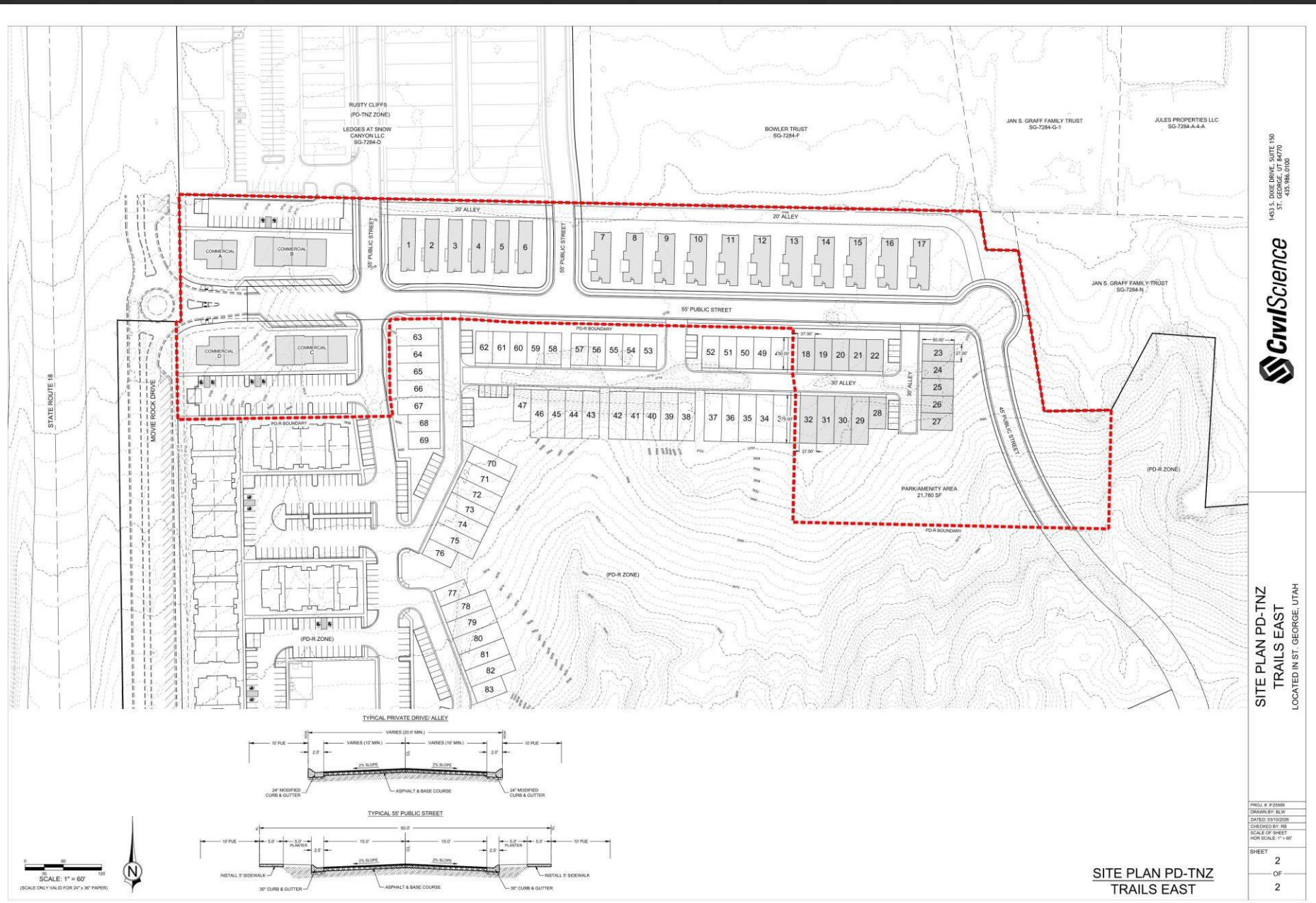
Zoning Map


4400 North
4200 North
A-5
PD-TNZ
G&G
WASHINGTON COUNTY
G&G
G&G
WASHINGTON COUNTY
WASHINGTON COUNTY
R-1-10
R-1-10
Proposed PD-R Zone
Proposed PD-TNZ Zone
Trails East Property Boundary
5/2019
TRAILS EAST
0
600
1,200
2,400
3,600
4,800
Feet
N

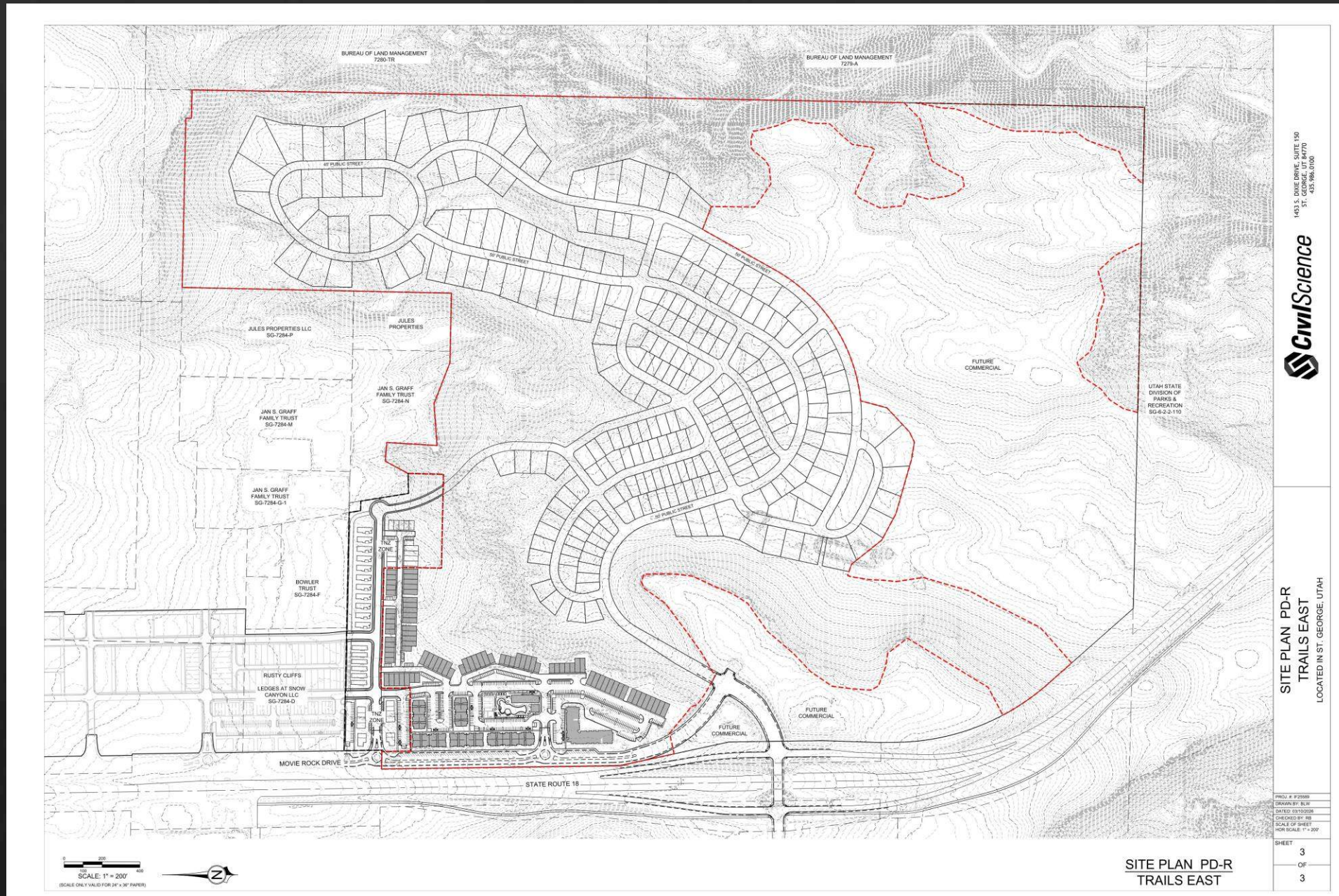
Illustrative Plan



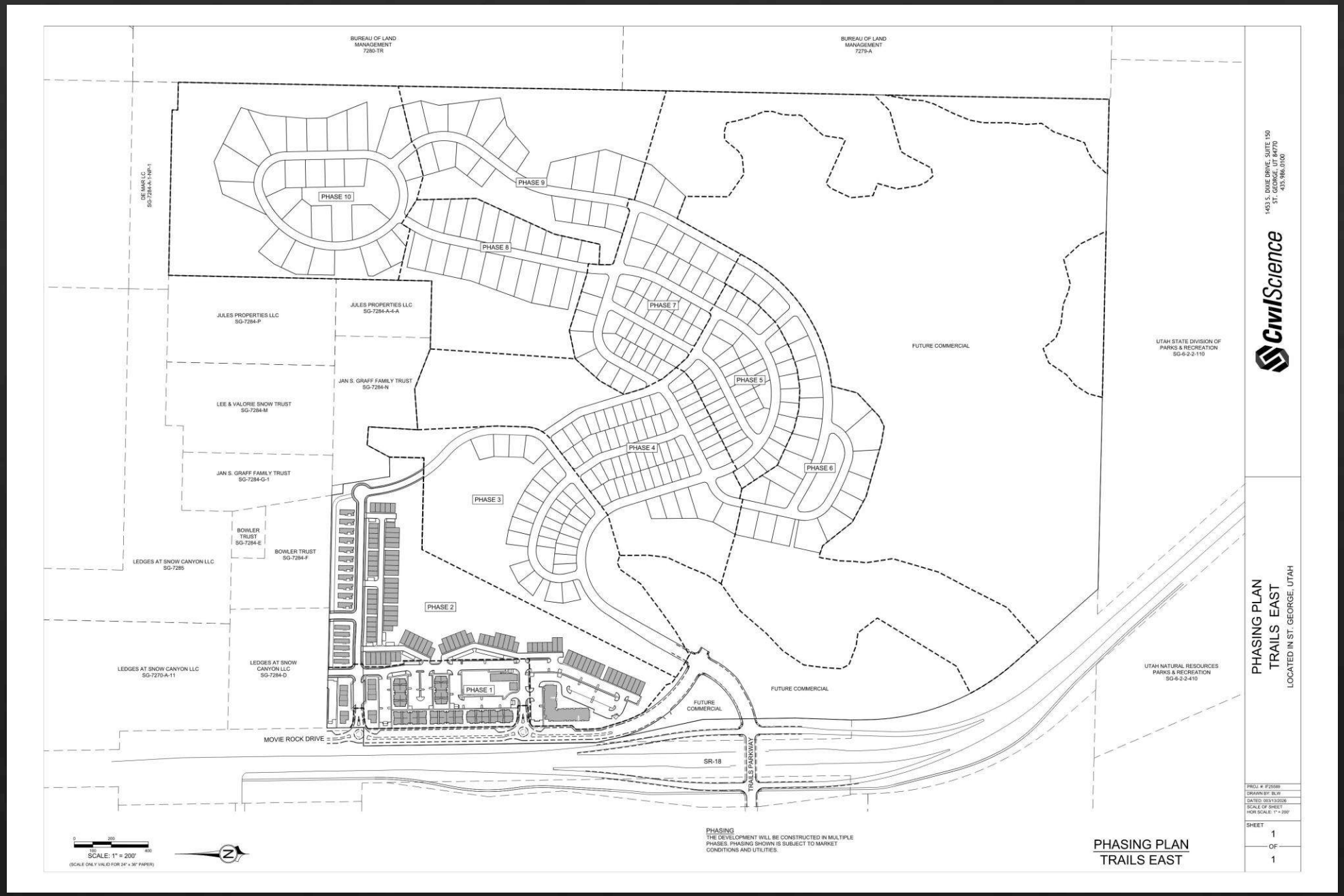
PD-TNZ Location



PD-R Location



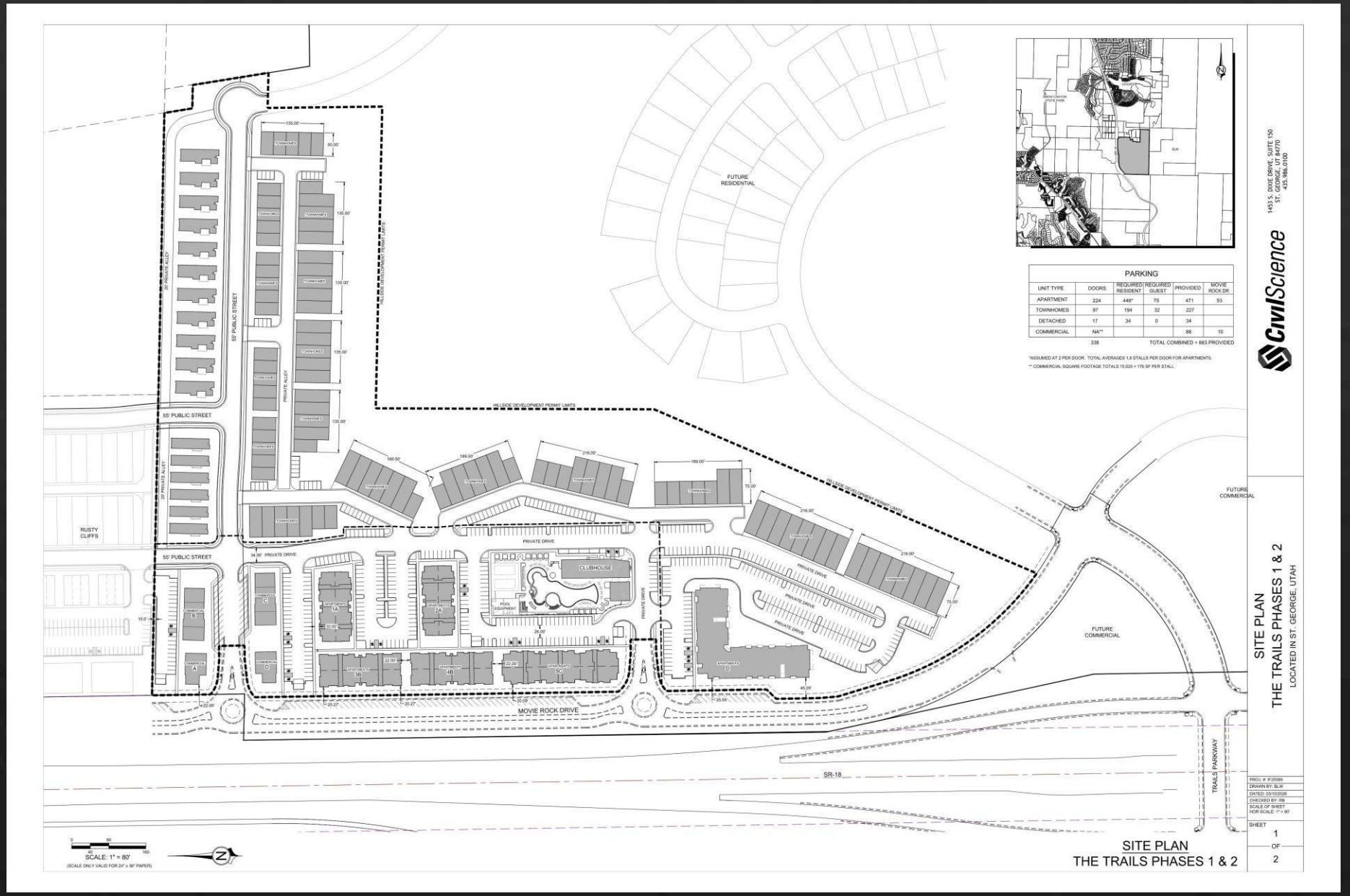
Phasing Plan



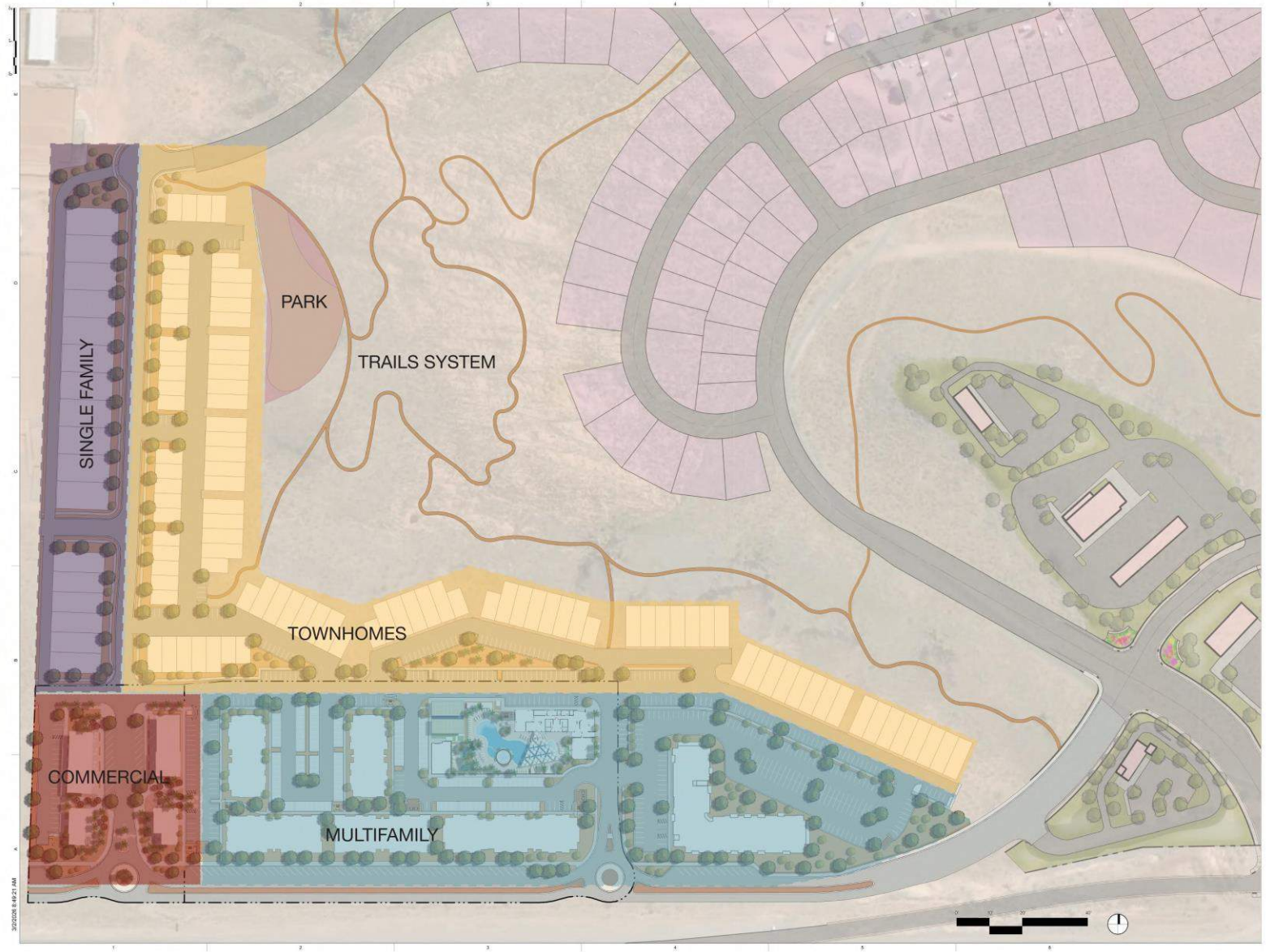
Phases 1&2 Layout



Phases 1&2 Layout



Unit Type Locations



FFKR ARCHITECTS

HELOS GROUP

TRAILS EAST - PHASE 1A - APTS & CLUBHOUSE
SR-18 MILE POST 7, ST. GEORGE UT 84771
HELOS GROUP
RE-ZONE SUBMITTAL - MARCH. 13, 2026

PHASE 1 LABELED AREAS

LA002

Paseos
Plans (TNZ only)



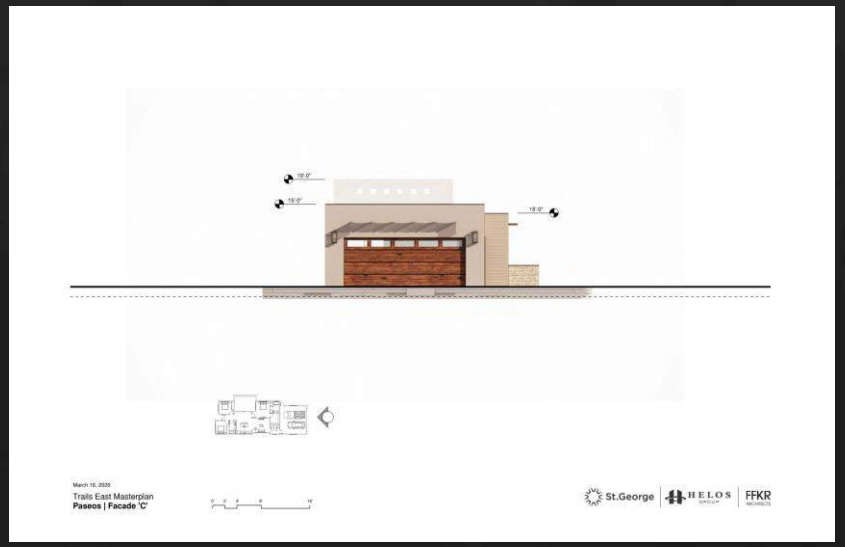
March 16, 2026

Trails East Masterplan

Paseos | Conceptual Rendering

St.George | HELOS GROUP | FFKR ARCHITECTS





Townhomes (TNZ & PD-R)









Townhomes (TNZ & PD-R)



April 7, 2026
Trails East Masterplan
Townhomes Grouping | Conceptual Rendering



April 7, 2026
Trails East Masterplan
Townhomes Grouping | Conceptual Rendering



April 7, 2026
Trails East Masterplan
Townhomes Grouping | Grouping Options

Three Story
Stacked “A” (PD-R Only)



March 16, 2026

Trails East Masterplan

3-Story Apts | Bldg A South Facade

0' 4' 8' 16' 32'

St.George | HELOS GROUP | FFKR ARCHITECTS

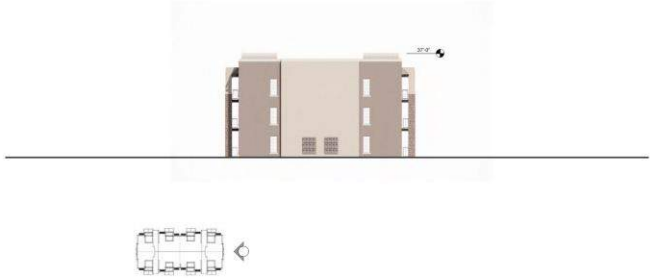


March 16, 2026

Trails East Masterplan

3-Story Apts | Bldg A North Facade

St.George | HELOS GROUP | FFKR ARCHITECTS



March 16, 2026

Trails East Masterplan

3-Story Apts | Bldg A Side Facade

St.George | HELOS GROUP | FFKR ARCHITECTS

Three Story
Stacked “B” (PD-R Only)



March 16, 2026

Trails East Masterplan

3-Story Apts | Bldg B East Facade

0' 4' 8' 16' 32'

St.George | HELOS GROUP | FFKR ARCHITECTS



March 16, 2026

Trails East Masterplan

3-Story Apts | Bldg B West Facade

St.George | HELOS GROUP | FFKR ARCHITECTS



March 16, 2026

Trails East Masterplan

3-Story Apts | Bldg B N/S Facade

St.George | HELOS GROUP | FFKR ARCHITECTS

Three Story
Stacked “C” (PD-R Only)







Three Story Stacked (PD-R Only)



March 16, 2026

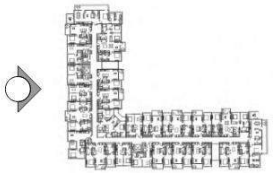
Trails East Masterplan

3-Story Apts | Conceptual Rendering

St.George | HELOS GROUP | FFKR ARCHITECTS

Four Story Stacked





March 16, 2026

Trails East Masterplan

4-Story Apts | North Facade

0' 5' 10' 20' 40'

St.George | HELOS GROUP | FFKR ARCHITECTS

Four Story Stacked







Four Story Stacked



March 16, 2026

Trails East Masterplan

4-Story Apts | Conceptual Rendering

St.George | HELOS GROUP | FFKR ARCHITECTS

Elevations Relative to Highway

PD-R Rezone request, height

Phase 2 Apartment Building is designed as a 4 story building.

Trails East is requesting a variance in the 40'-0" height limit for our Phase 2 Apartment Building. We are requesting an additional 8'-0" of height for the following reasons:

1- The elevation of the freeway being higher than the building's base, the height of the building is only 36'-0" above the height of the highway, or 3 stories above the highway.
2- Due to the drop in grade across the site, the 3-Story apartment sits 8 foot higher than the base of the Phase 2 apartment building
3- The 3-Story apartment is 4.75 foot taller than the majority of the phase 2 apartment building. Only the 5 espedana's on the phase 2 building are 1.25 foot taller than the 3-story apartment buildings.
4- The phase 2 apartment project is 36 feet below the Rusty Cliffs project, which means only the top floor of the building will be visible to the Rusty Cliffs, and any other adjacent owner. So it will not negatively impact adjacent properties.

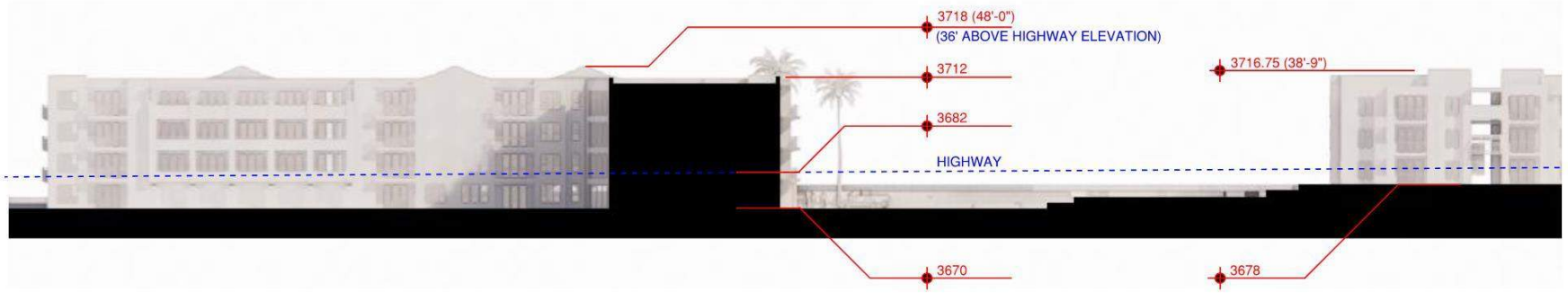


EXHIBIT 4.1- MAX BUILDING HEIGHT

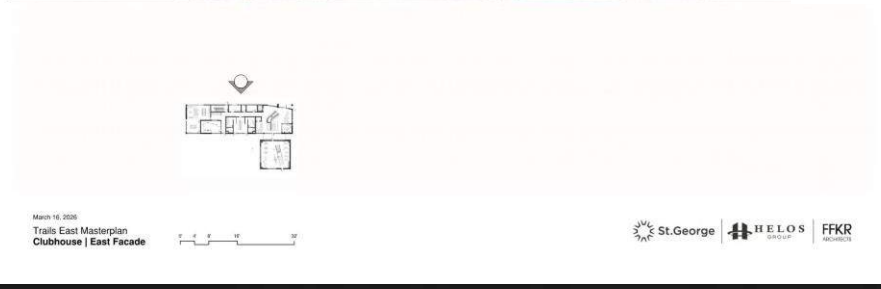
Amenity Area



Clubhouse









March 16, 2026

Trails East Masterplan

Clubhouse | Conceptual Rendering

St.George | HELOS GROUP | FFKR ARCHITECTS

Landscape Plan



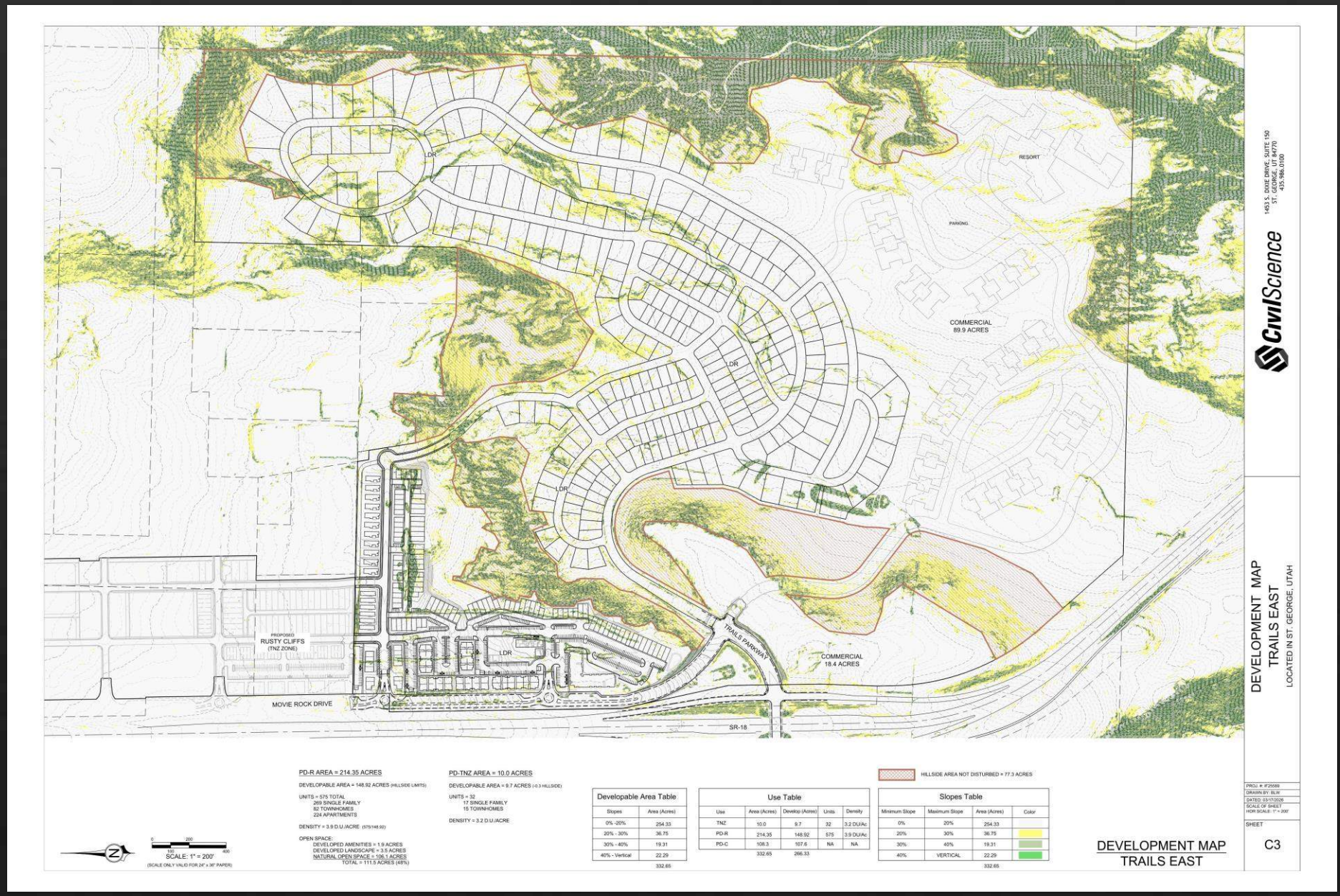
Proposed Signage







Slope Map


LDR
RESORT
PARKING
COMMERCIAL
89.9 ACRES
LDR
LDR
PROPOSED
RUSTY CLIFFS
(TNZ ZONE)
LDR
TRAILS PARKWAY
COMMERCIAL
18.4 ACRES
MOVIE ROCK DRIVE
SR-18
PD-R AREA = 214.35 ACRES
DEVELOPABLE AREA = 148.92 ACRES (HILLSIDE LIMITS)
UNITS = 575 TOTAL
269 SINGLE FAMILY
82 TOWNHOMES
224 APARTMENTS
DENSITY = 3.9 D.U./ACRE (575/148.92)
OPEN SPACE:
DEVELOPED AMENITIES = 1.9 ACRES
DEVELOPED LANDSCAPE = 3.5 ACRES
NATURAL OPEN SPACE = 106.1 ACRES
TOTAL = 111.5 ACRES (48%)
PD-TNZ AREA = 10.0 ACRES
DEVELOPABLE AREA = 9.7 ACRES (-0.3 HILLSIDE)
UNITS = 32
17 SINGLE FAMILY
15 TOWNHOMES
DENSITY = 3.2 D.U./ACRE
HILLSIDE AREA NOT DISTURBED = 77.3 ACRES
SCALE: 1" = 200'
(SCALE ONLY VALID FOR 24" x 36" PAPER)
Developable Area Table
Slopes | Area (Acres)
0% -20% | 254.33
20% - 30% | 36.75
30% - 40% | 19.31
40% - Vertical | 22.29
332.65
Use Table
Use | Area (Acres) | Develop (Acres) | Units | Density
TNZ | 10.0 | 9.7 | 32 | 3.2 DU/Ac
PD-R | 214.35 | 148.92 | 575 | 3.9 DU/Ac
PD-C | 108.3 | 107.6 | NA | NA
332.65 | 266.33
Slopes Table
Minimum Slope | Maximum Slope | Area (Acres) | Color
0% | 20% | 254.33
20% | 30% | 36.75
30% | 40% | 19.31
40% | VERTICAL | 22.29
332.65
DEVELOPMENT MAP
TRAILS EAST
1453 S. DIXIE DRIVE, SUITE 150
ST. GEORGE, UT 84770
435.986.0100
CivilScience
DEVELOPMENT MAP
TRAILS EAST
LOCATED IN ST. GEORGE, UTAH
PROJ. #: IF25089
DRAWN BY: BLW
DATED: 03/17/2026
SCALE OF SHEET
HOR SCALE: 1" = 200'
SHEET
C3
DEVELOPMENT MAP
TRAILS EAST

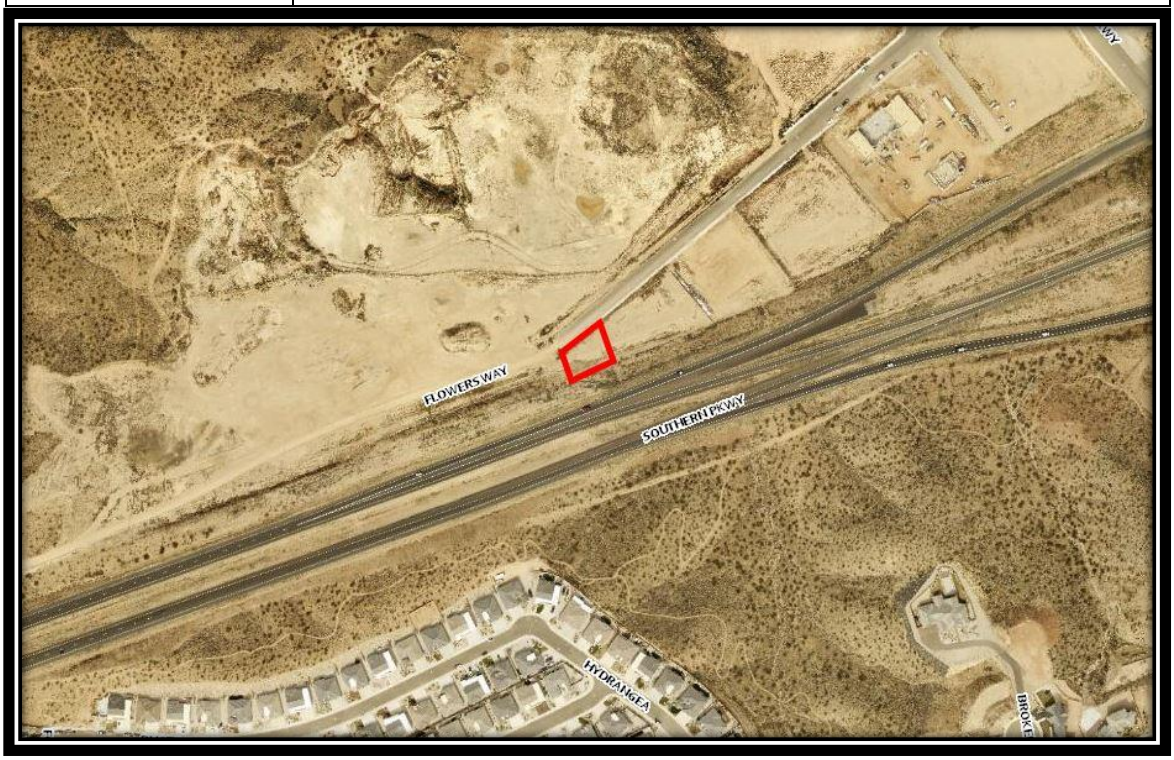
St.George
Community Development

Item 4

Zone Change

PLANNING COMMISSION AGENDA REPORT: 04/14/2026

Zion Bible Church Zone Change (Case No. 2026-ZC-005)		
Request:	Consider a request to change the City Zoning Map from ASBP (Airport Supporting Business Park) to C-2 (Commercial).	
Applicant:	Civil Science	
Representative:	Brandee Walker	
Location:	generally located south of Flowers Way and North of the Southern Parkway	
General Plan:	COM (Commercial)	
Existing Zoning:	None	
Surrounding Zoning:	North	C-2 (Highway Commercial)
	South	Southern Parkway
	East	ASBP (Airport Supporting Business Park)
	West	C-2 (Highway Commercial)
Land Area:	Approximately .23	



BACKGROUND:
The subject property was originally zoned as part of the Desert Canyon master plan. During that process, zones were assigned by general areas rather than exact legal descriptions.

When the plat was recorded, the western .23 acres of the property fell within the ASBP (Airport Supporting Business Park) designation. This proposed zone change is intended to clean up the zoning and ensure the entire parcel matches the zoning of the larger portion of the property.

The General Plan designation for this property is COM (Commercial). The entire property is 1.07 acres, or 46,609.2 square feet. The minimum square footage required for a lot with the C-2 Highway Commercial designation is 10,000 square feet.

RECOMMENDATION ZONE CHANGE:
Staff recommends approval of this Zone Change with the following conditions:

1. The applicant will need to submit a fully designed site plan and comply with all the requirements of the C-2 (Commercial) zoning code at the time of development.

ALTERNATIVES:
1. Recommend approval as presented.
2. Recommend approval with conditions.
3. Recommend denial.
4. Continue the proposed zone change to a later date.

POSSIBLE MOTION:
"I move that we forward a positive recommendation to the City Council of the Zion Bible Church Change, case no. 2026-ZC-005, with the condition and based on the findings listed in the staff report."

FINDINGS FOR APPROVAL:
1. The proposed zoning is consistent with the general plan designations on the property.
2. That approval of the zoning map amendment is in the best interest of the health, safety and welfare of the citizens of St. George.

Exhibit A
PowerPoint Presentation

Zion Bible Church
2026-ZC-005



Location

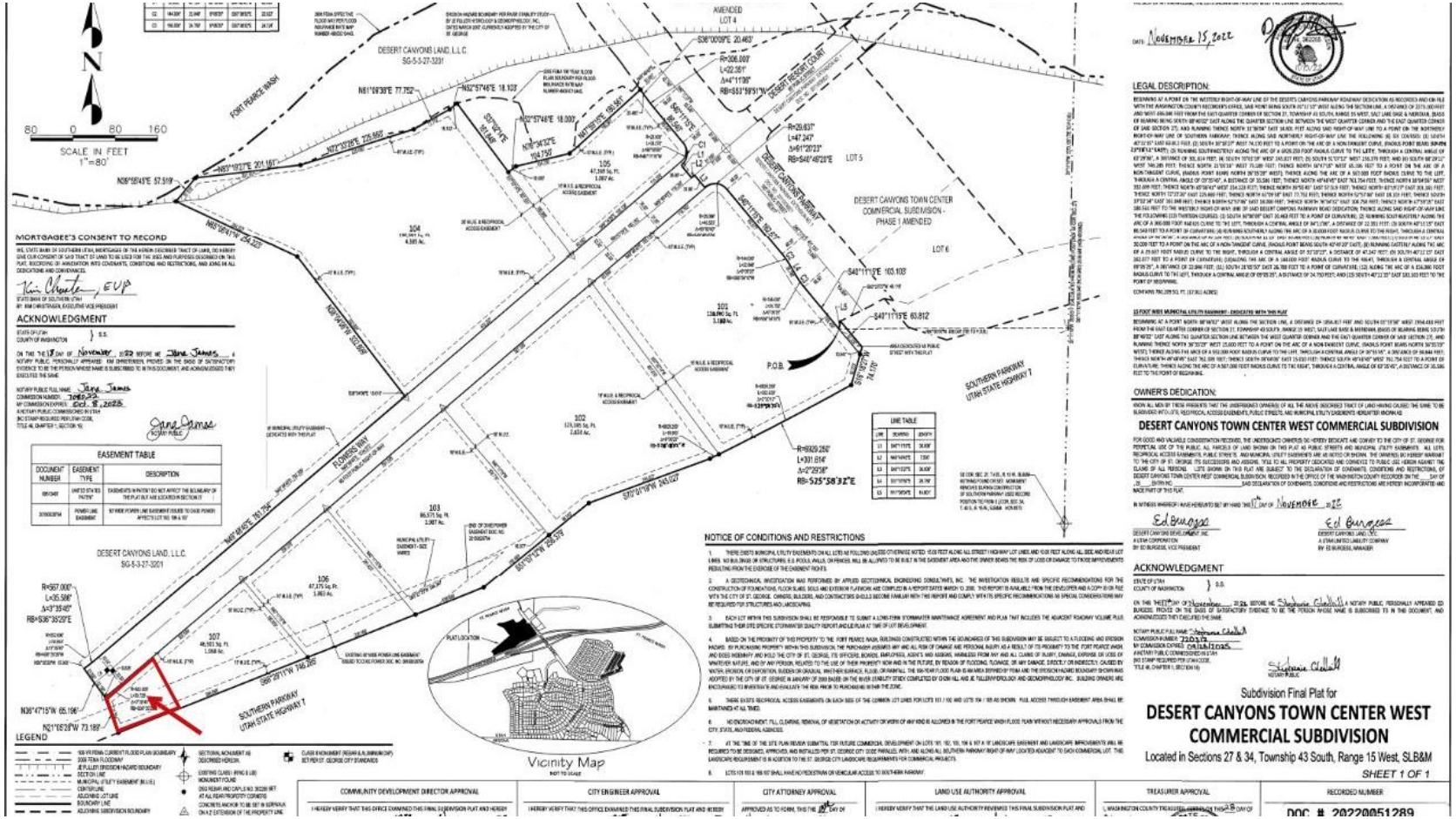


General Plan



Zoning

Area of Zone Change



Possible Motion

“I move that we forward a positive recommendation to the City Council of the Zion Bible Church Change, case no. 2026-ZC-005, with the condition and based on the findings listed in the staff report.”

St.George
Community Development

ITEM 5

Zone Change

PLANNING COMMISSION AGENDA REPORT: 04/14/2026

Woodhaven Estates Amended and Extended Zone Change (Case No. 2026-ZC-006)		
Request:	Consider a request to amend the City Zoning Map by amending the zone from A-1 (Agricultural, 40,000 square foot minimum lot size) to RE-37.5 (Residential Estates, 37,500 square foot minimum lot size) on approximately 2.87 acres generally located on 3430 East at approximately 2300 South.	
Applicant:	Civil Science, Brandee Walker	
Location:	Generally located on 3430 East at approximately 2300 South	
General Plan:	AE (Agricultural Estates)	
Existing Zoning:	A-1 (Agricultural, 40,000 square foot minimum lot size)	
Surrounding Zoning:	North	A-1 (Agricultural, 40,000 square foot minimum lot size)
	South	RE-37.5 (Residential Estates, 37,500- square foot minimum lot size)
	East	Washington City
	West	A-1 (Agricultural, 40,000 square foot minimum lot size)
Land Area:	Approximately 7.46 acres	



BACKGROUND:
The applicant is seeking to change the zone from A-1 (Agricultural, 40,000 square foot minimum lot size) to RE-37.5 (Residential Estates, 37,500 square feet minimum lot size) in order to subdivide the property.

The applicant, in deciding what zoning would be most appropriate for this area, took into consideration how the surrounding area has been developed. The land directly south of the property has been developed as RE-37.5 (Residential Estates, 37,500 square foot minimum lot size). To the north and west of the property has been developed as A-1 (Agricultural, 40,000 square foot minimum lot size). The RE zones allow for limited animal rights in keeping with the agricultural zones but allowing for a smaller, more manageable lot size. The RE zone is also consistent with the underlying General Plan on this property, which is AE (Agricultural Esates).

NOTICING:
Notice letters were sent to property owners within a 500 ft. radius of the rezone and notices were posted in four (3) public places on the City website, State website, and on the bulletin board in the City.

RECOMMENDATION:
Staff recommends approval of this zone change for Woodhaven Estates Amended and Extended.

ALTERNATIVES:
1. Recommend approval as presented.
2. Recommend denial.
3. Continue the proposed zone change amendment to a specific date.

POSSIBLE MOTION:
“I move that we forward a positive recommendation to the City Council for the zone change for Woodhaven Estates Amended and Extended, case number 2026-ZC-006, based on the findings listed in the staff report.”

FINDINGS FOR APPROVAL:
1. The proposed zone change is consistent with the general plan.
2. There is consistent zoning in the surrounding area to the proposed zone change.
3. The zone change will be followed by a plat to subdivide the property.

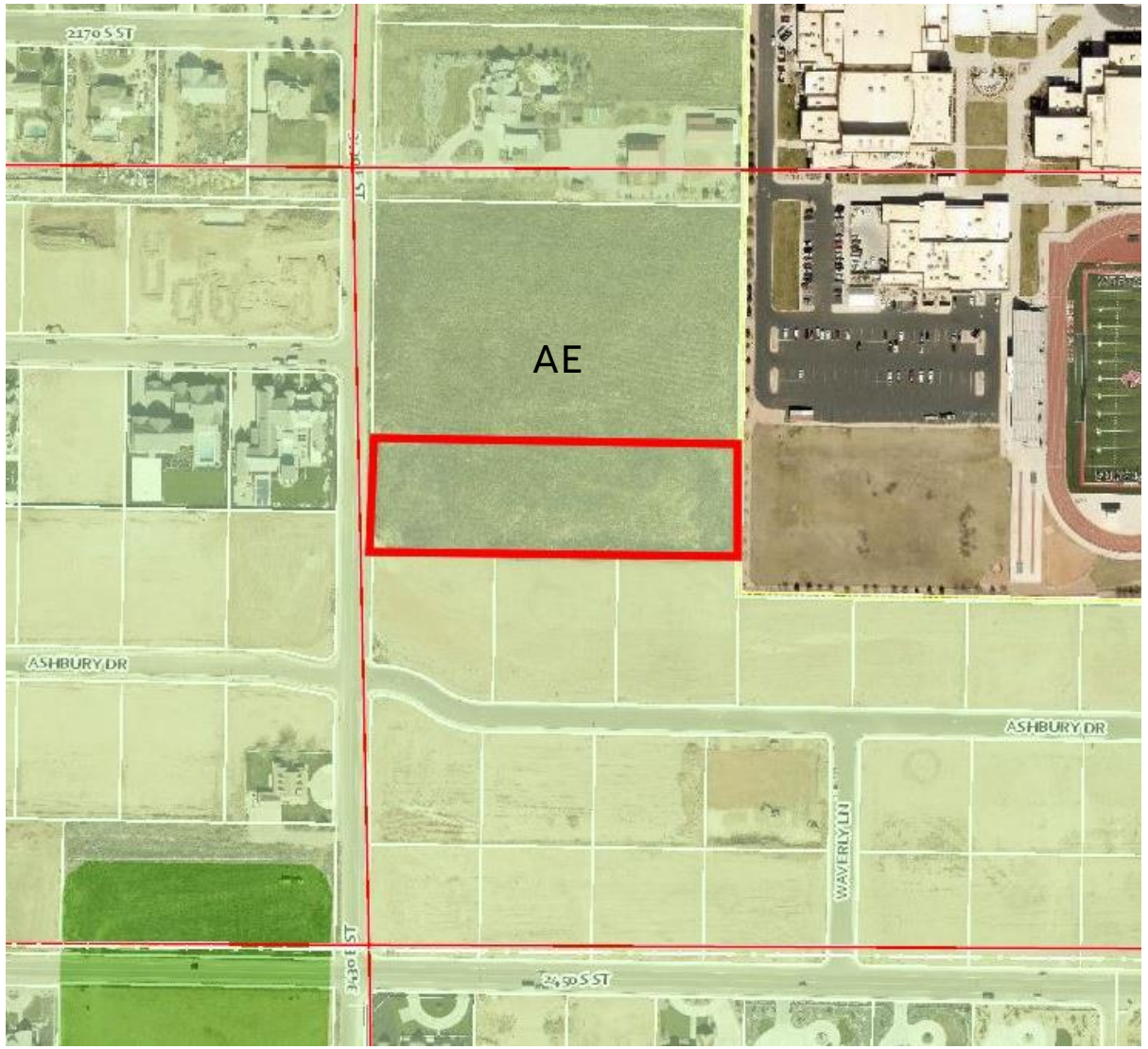
Exhibit A
PowerPoint Presentation


WOODHAVEN ESTATES
AMENDED AND
EXTENDED 2026-ZC-006

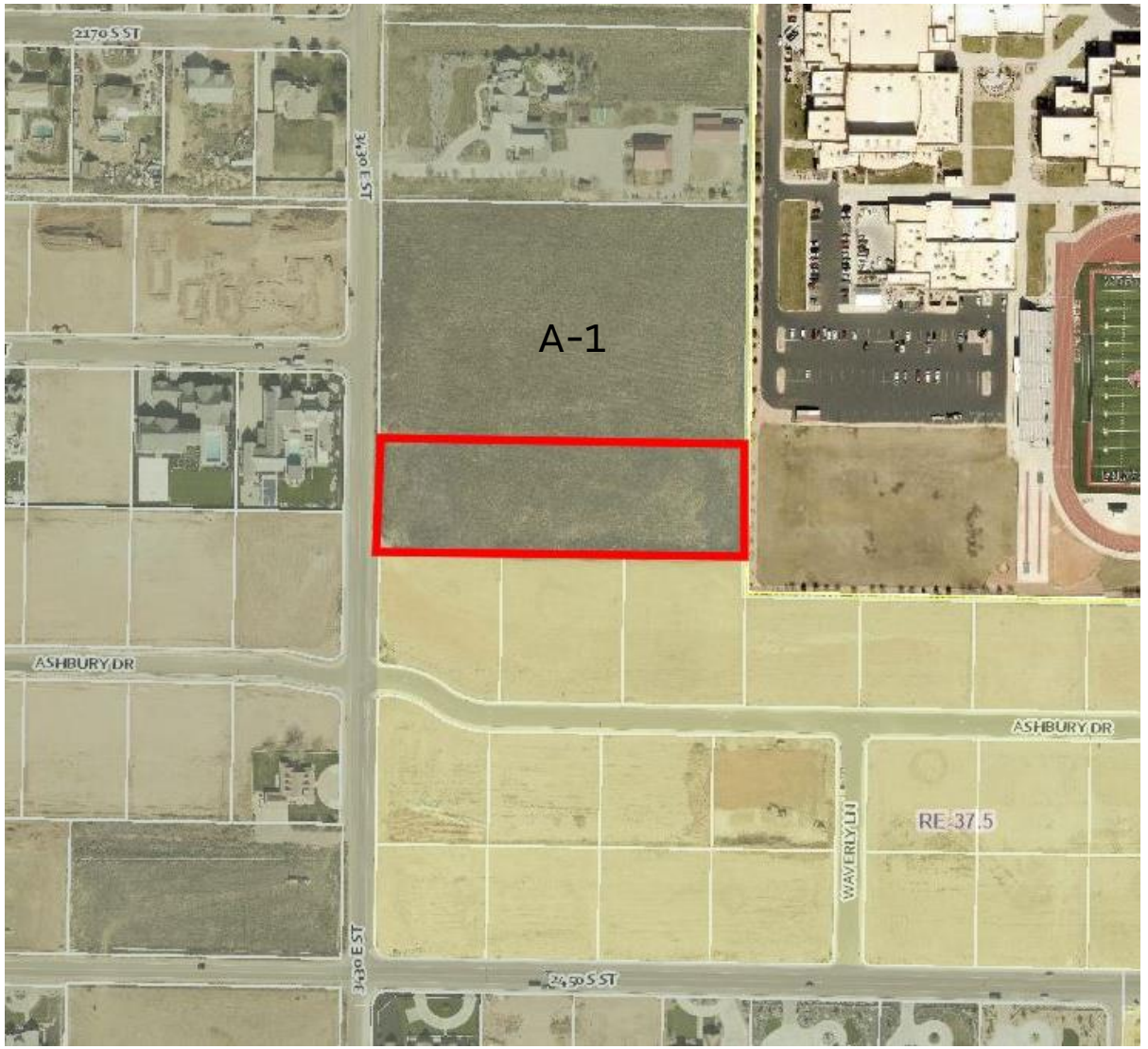
LOCATION


2170 S ST
3430 E ST
ASHBURY DR
ASHBURY DR
WAVERLY LN
3430 E ST
2450 S ST

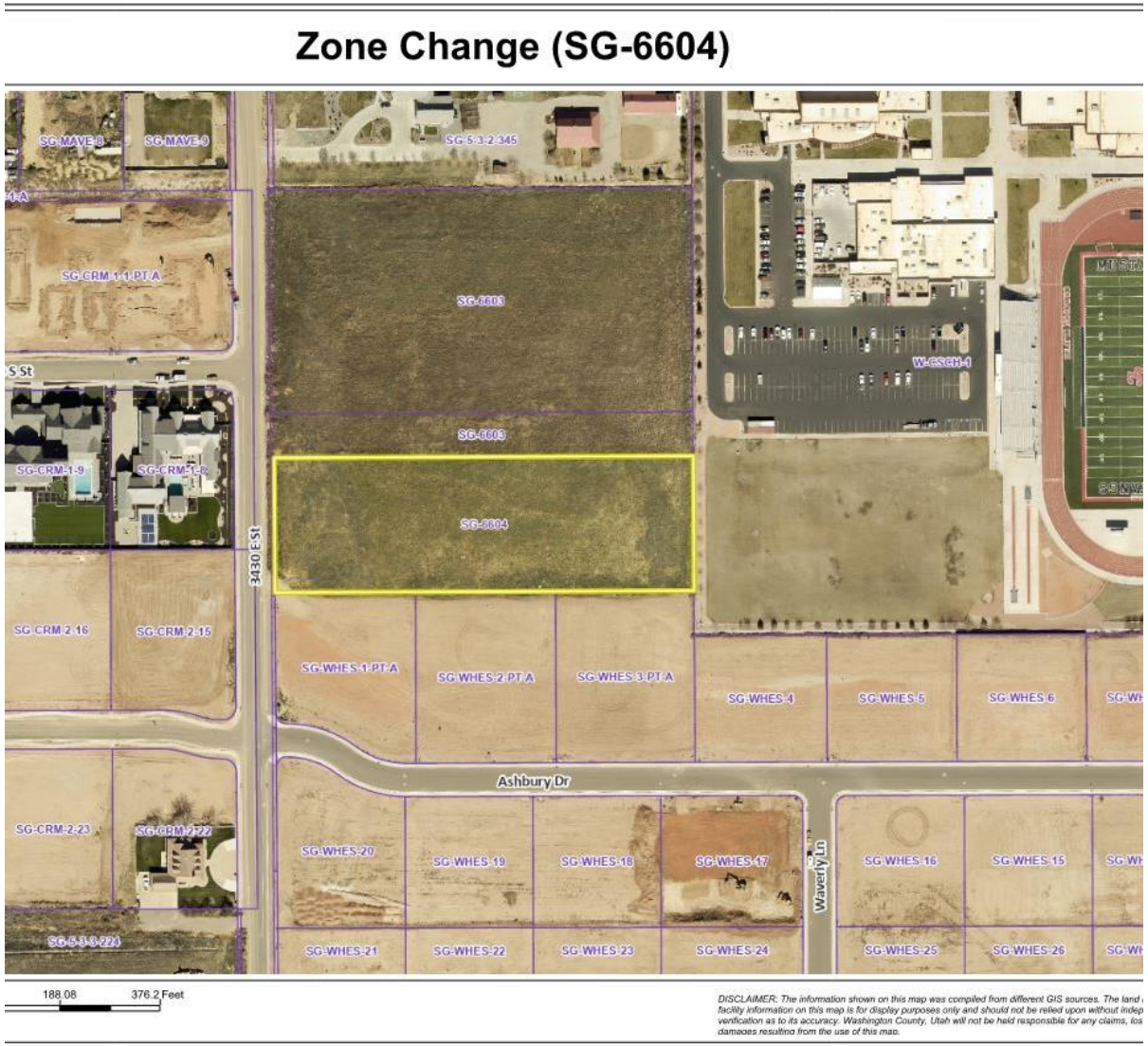
GENERAL PLAN



ZONING

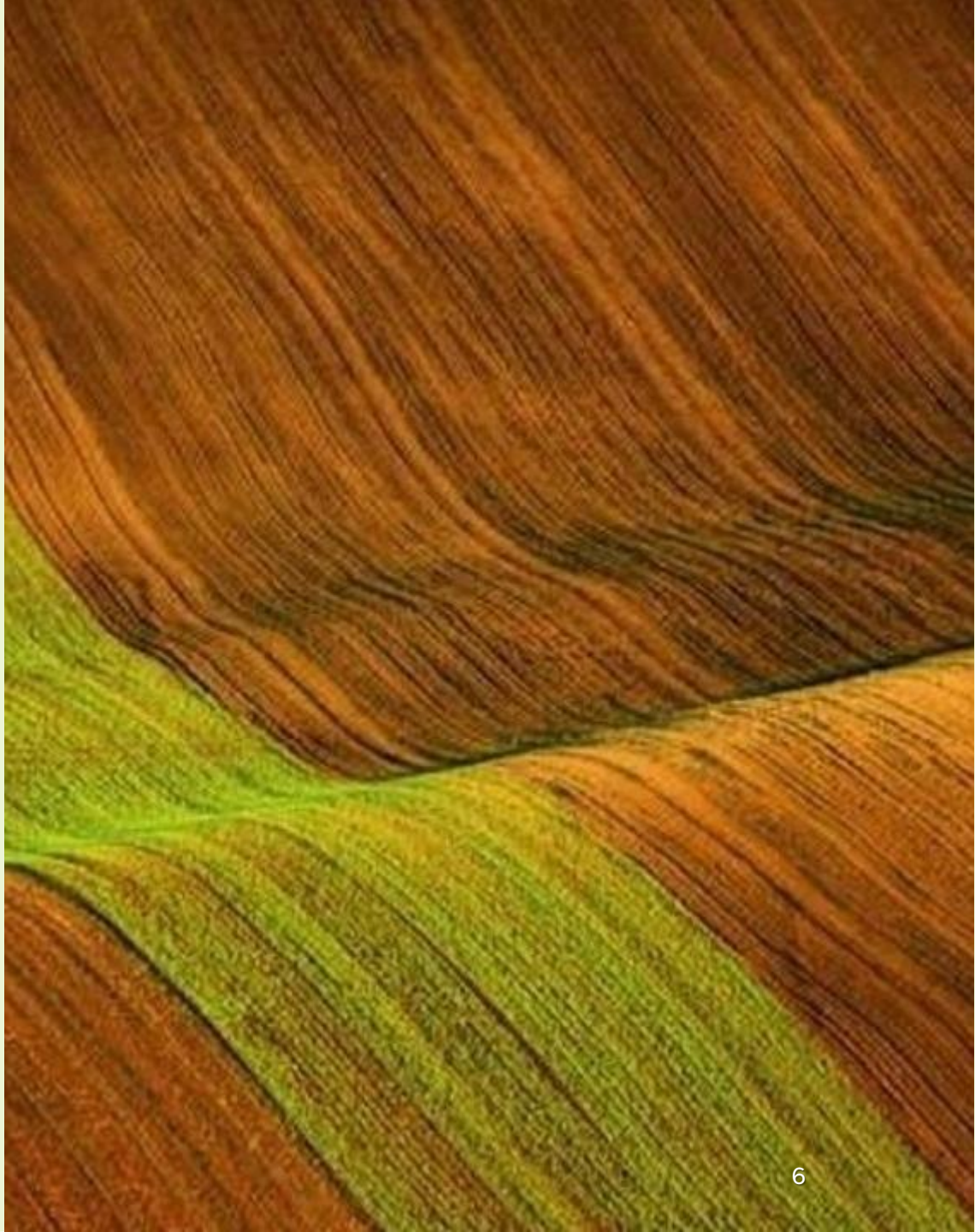

2170 S ST
3430 E ST
A-1
ASHBURY DR
ASHBURY DR
WAVERLY LN
RE-37.5
3430 E ST
2450 S ST

ZONE CHANGE AREA



POSSIBLE MOTION

"I MOVE THAT WE FORWARD A POSITIVE RECOMMENDATION TO THE CITY COUNCIL FOR THE ZONE CHANGE FOR WOODHAVEN ESTATES AMENDED AND EXTENDED, CASE NUMBER 2026-ZC-006, BASED ON THE FINDINGS LISTED IN THE STAFF REPORT."



St.George

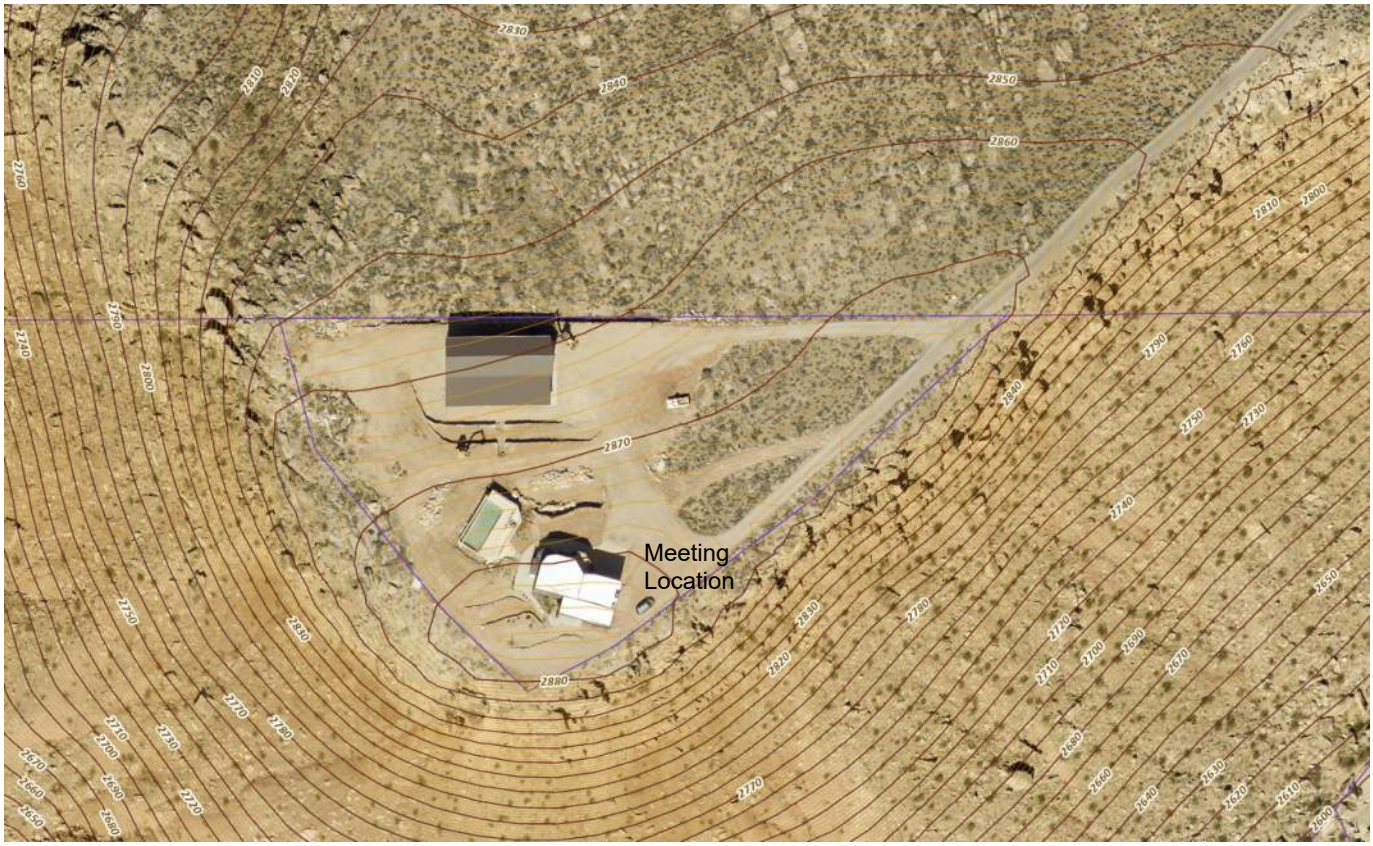
Community Development

ITEM 6

Hillside Permit

HILLSIDE REVIEW BOARD AGENDA REPORT: **03/24/2026**
PLANNING COMMISSION AGENDA REPORT: **04/14/2026**

Greg Rath Property – 785 W. Sir Monte Drive (SG-6-3-12-4311) Hillside Development Permit (Case No. 2026-HS-001)		
Request:	A Hillside Development Permit to adjust the designation of the ridgeline setback on parcel SG-6-3-12-4311 from "Cuesta" to "Ridgeline" to reduce the ridgeline setback from 100' to 30' for a residential ADU.	
Applicant:	Greg Rath	
Location:	785 W. Sir Monte Drive	
General Plan:	Low Density Residential (LDR)	
Existing Zoning:	Single Family Residential	
Surrounding Zoning:	North	Open Space
	South	Open Space
	East	Open Space
	West	Open Space
Land Area:	Approximately 2.24 acres	



BACKGROUND

This is a request is to change the ridgeline designation for the property located at 785 W. Sir Monte Drive (SG-6-3-12-4311) from "Cuesta" to a "Ridge line". (See Exhibit A, Ridge Line Map) This location is surrounded by open space, and the applicant would like to build an ADU Accessory Dwelling Unit on this lot. The approved city Ridge Line Map identifies the applicant's property as "Cuesta" with a 100' setback from the existing ridge line.

The applicant is requesting to change the ridgeline designation as shown on the Ridge Line Map from a "Cuesta" to a "Ridge Line" and propose a new ridgeline designation which the owner feels is more indicative of the actual ridge line.

APPLICABLE ORDINANCE(S) *(Selected portions)*

10-13A-6: Building Setbacks and Additional Design Standards:

A. *Front Setback along Streets:* Along streets where the slope of the adjacent property to the street is over fifteen percent (15%), the minimum setback is twenty feet (20').

B. *Setbacks:* All setbacks shall conform to the underlying zone criteria except as provided herein. No structure or accessory structure shall be constructed within the setback area as defined below. However, a see-through wrought iron fence with at least fifty percent (50%) of the fence open, landscaping, and a nonvertical swimming pool are permitted in the setback area.

    1. *Ridgelines:* All ridgelines as shown on the ridgeline map shall be subject to the setback provisions contained herein. Setbacks from ridgelines not identified on the ridgeline map shall be a minimum of thirty feet (30'), or greater if recommended in the geotechnical reports.

    2. *Plateaus:* On plateaus, the setback from the ridgeline shall be a minimum of fifty feet (50') unless a greater setback is recommended in the geotechnical reports.

C. *Cuesta:* Where a ridgeline occurs on a cuesta, the minimum setback shall be one hundred feet (100') measured normal (perpendicular) to the closest point of the ridge, unless a greater setback is recommended in the geotechnical report.

EXHIBITS PROVIDED

1. Exhibit A – Ridge Line Map
   "Exhibit A" in the packet shows the Ridge Line Map.

2. Exhibit B – Ridge Line Map - Site Location
   "Exhibit B" is the Ridge Line Map zoomed into the location of the site reduction request.

3. Exhibit C – Images
   "Exhibit C" are images showing the location of the proposed ADU.

RECOMMENDATION

The Hillside Review Board conducted a site visit on March 24, 2026. A motion was made to recommend approval of the hillside permit for the application passing with a unanimous 4-0 vote with the following condition:

1. That the ridgeline on the south of the property extending to the east remain "Cuesta", passing with a unanimous 4-0 vote

General Plan – LDR (Low Density Residential)



Zoning - R-1-10



EXHIBIT A
Ridge Line Map

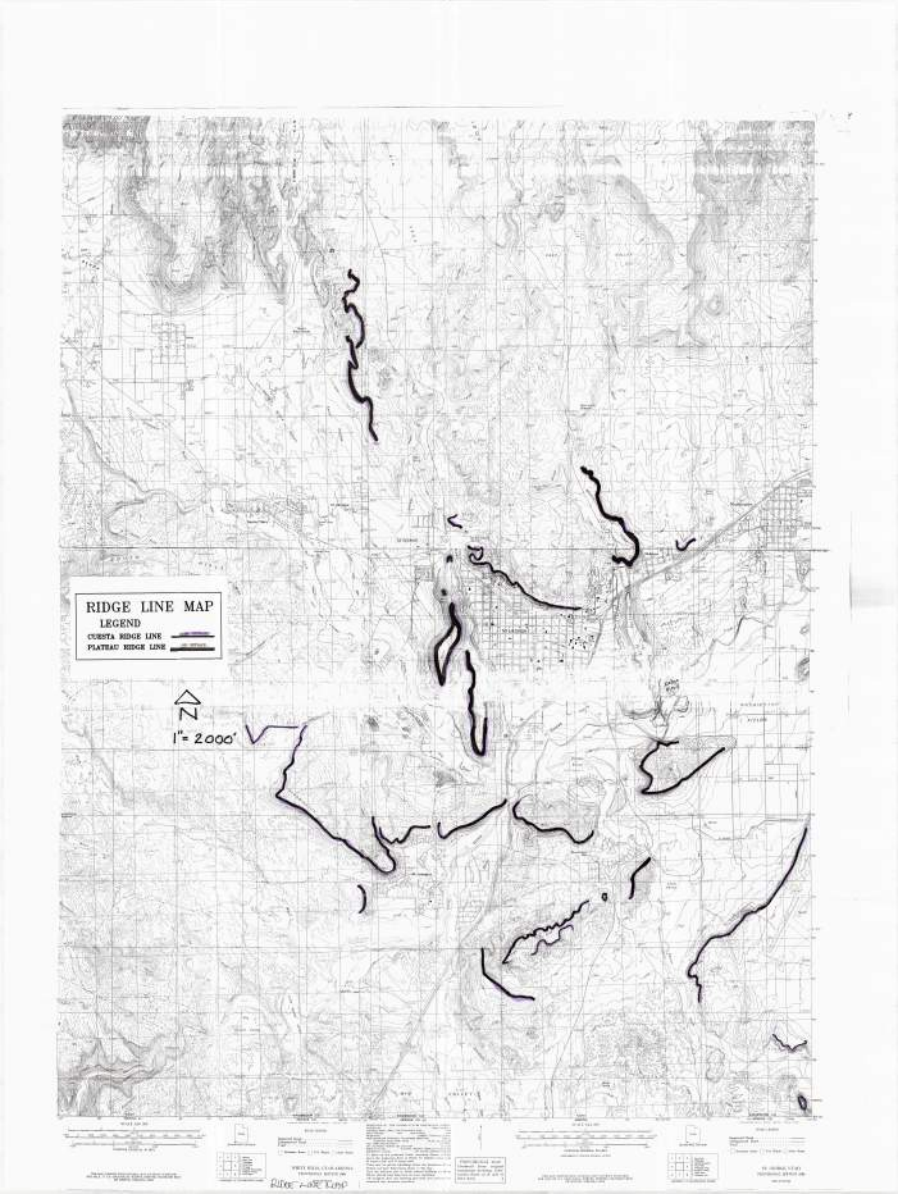


EXHIBIT B
Ridge Line Map
Ridgeline reduction location

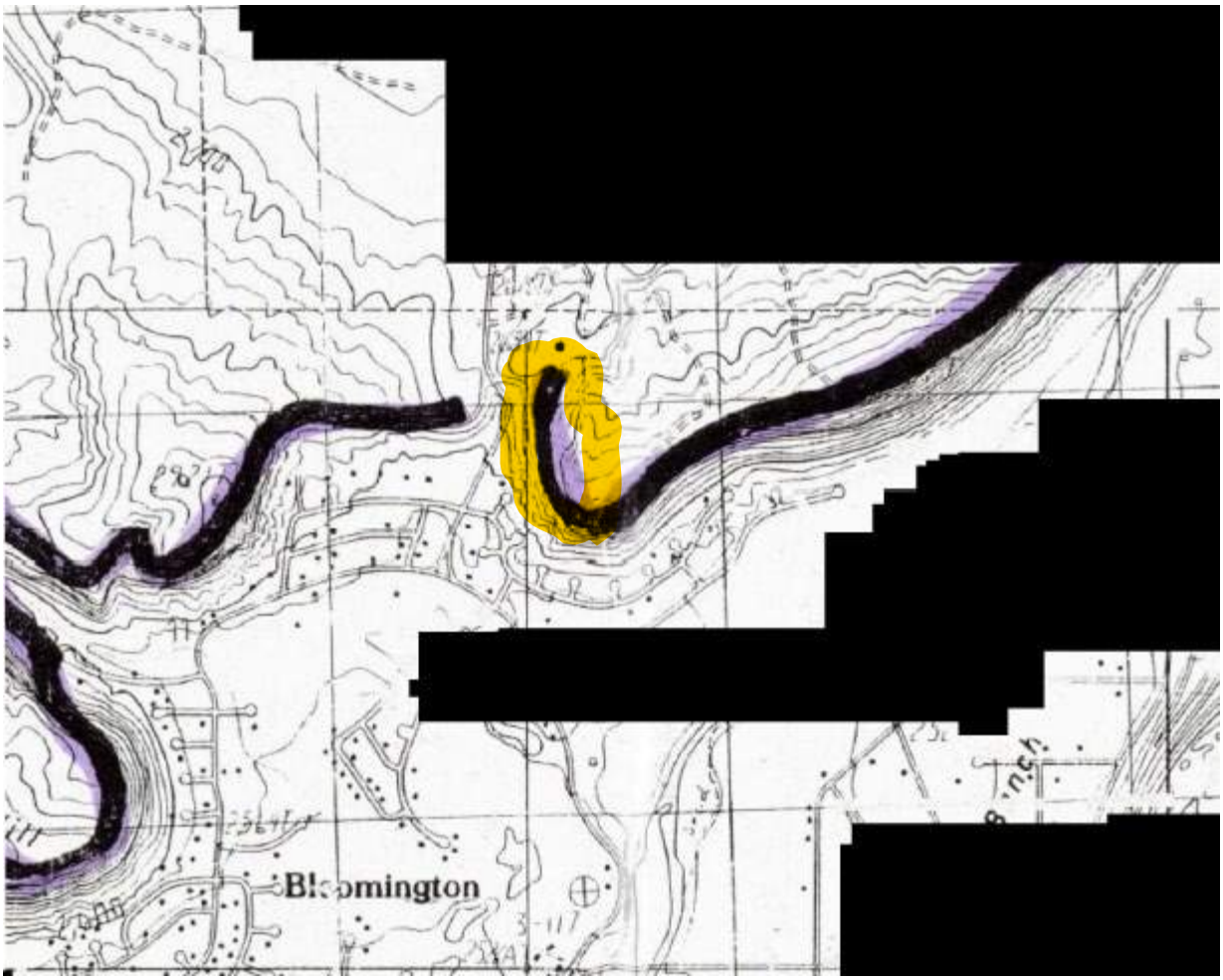


EXHIBIT C
IMAGES 785 W. Sir Monte Drive













St.George
Community Development

ITEM 7
Preliminary Plat

PLANNING COMMISSION AGENDA REPORT: **04/14/2025**

Desert Corner Commercial Subdivision Preliminary Plat (Case No. 2026-PP-008)		
Request:	Consider a request for a preliminary plat for a 9 building commercial subdivision totaling approximately 6.62 Acres	
Applicant:	DSG Engineering Inc.	
Representative:	Ken Miller	
Location:	The property is generally located south of Southern Parkway and west of Desert Canyons Parkway.	
General Plan:	PD (Planned Development)	
Existing Zoning:	C-2 (Commercial)	
Surrounding Zoning:	North	C-2 (Commercial)
	South	C-2 (Commercial) and PD-R (Planned Development Residential)
	East	C-2 (Commercial)
	West	PD-R (Planned Development Residential)
Land Area:	Approximately 6.62 Acres	



BACKGROUND:
The site consists of approximately 6.62 acres. The subject property is currently zoned C-2 (Commercial) and designated PD (Planned Development) on the General Plan. This parcel is located in the Desert Canyons Zone and Land Use Plan, originally approved in 2009, and was designated commercial at that time.

The proposal is for a 9 building commercial plat, with 2 of the 9 buildings completed. Accesses will come from the already existing accesses on Desert Canyon Parkway and Desert Edge Drive. The project will consist of three phases starting in the east corner where the two completed buildings are located. As part of the plat, the required open space designation has been met.

RECOMMENDATION:
Staff recommends approval with the following condition:

1. That the rockery retaining walls shall adhere to the standards found in 10-18 of City Code.

ALTERNATIVES:

1. Approve as presented.
2. Approve with conditions.
3. Deny the application.
4. Continue the proposed preliminary plat to a later date.

POSSIBLE MOTION:
"I move that we approve the Desert Corner Commercial Subdivision preliminary plat, case number 2026-PP-008, based on the findings in the staff report."

FINDINGS FOR APPROVAL:

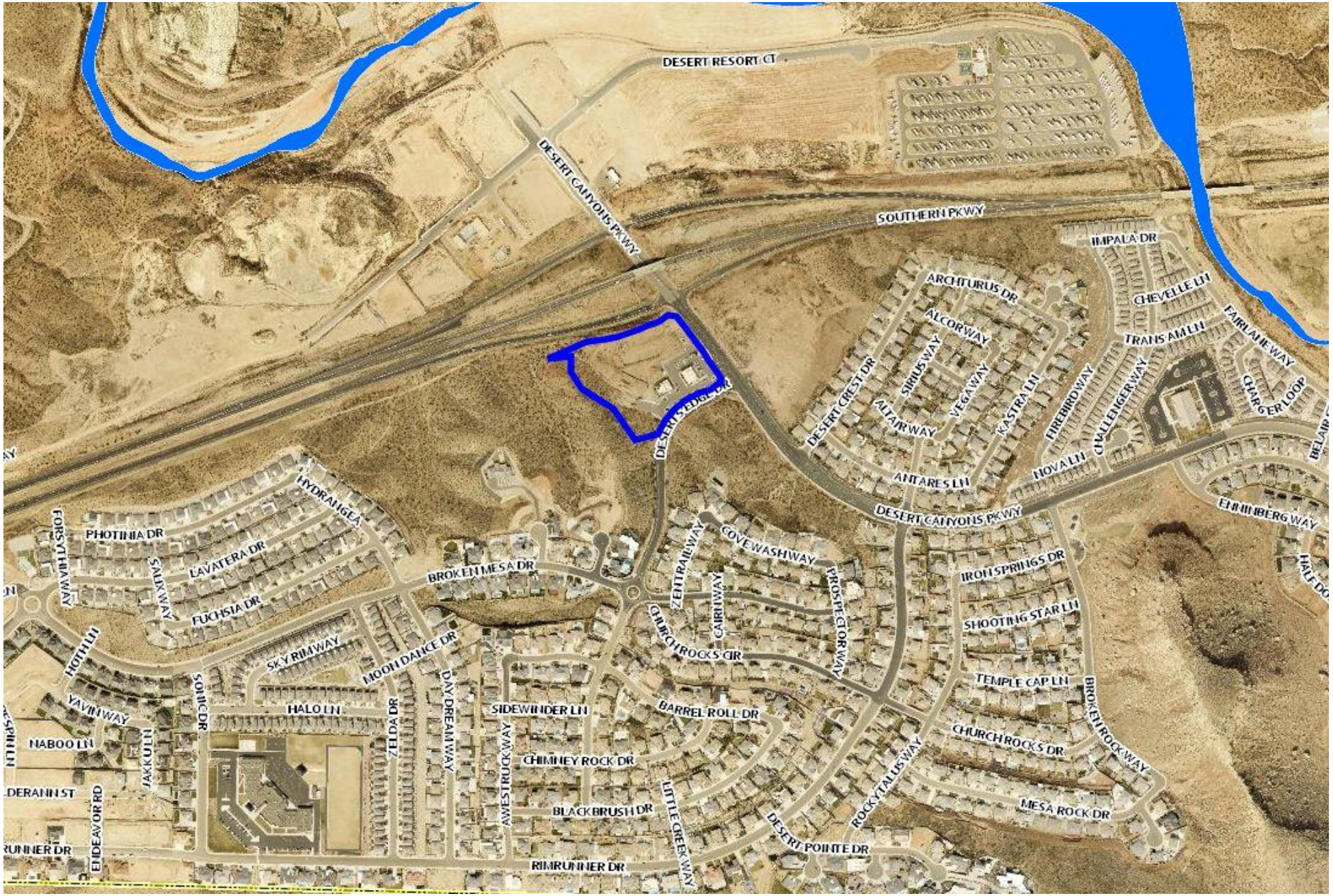
1. The proposed Preliminary Plat meets the requirements found in Section 10-25C-3 of the Subdivision Regulations.
2. The proposed project meets the lot size and frontage requirements found in Section 10-8B.
3. Approval of the preliminary plat is in the best interest of the health, safety, and welfare of the community.

EXHIBIT A
PowerPoint Presentation

Desert Corner Commercial Preliminary Plat

2026-PP-008

Vicinity Map



Aerial Map



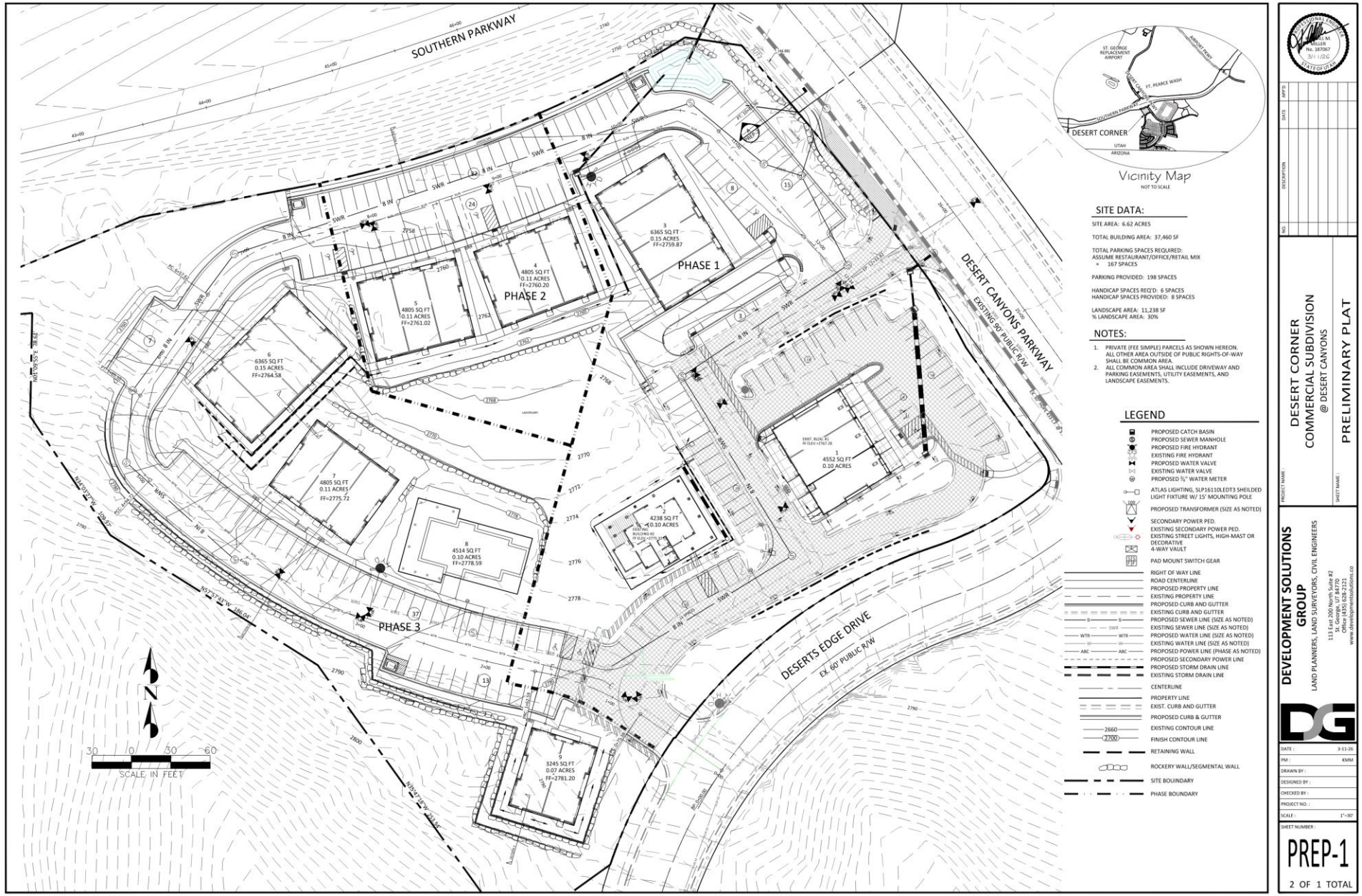
Land Use Map



Zoning Map



Proposed Preliminary Plat



DESERT CORNER COMMERCIAL SUBDIVISION @ DESERT CANYONS

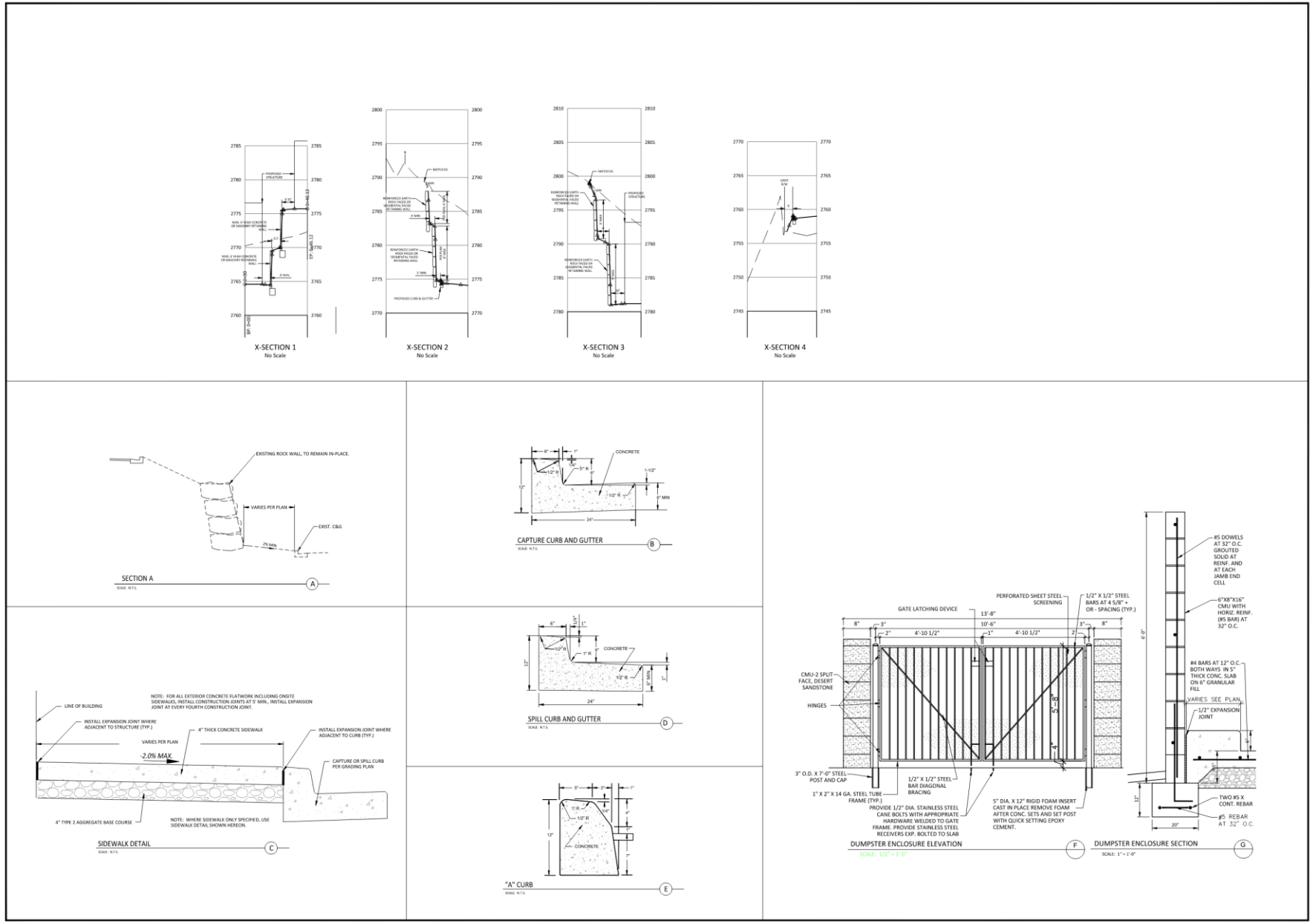
PRELIMINARY PLAT

DEVELOPMENT SOLUTIONS GROUP
LAND PLANNERS, LAND SURVEYORS, CIVIL ENGINEERS
113 East 200 North Suite #2
St. George, UT 84770
Office (435) 628-2121
www.developmentsolutionsgroup.com

DATE : 3-11-26
PM : KMM
DRAWN BY :
DESIGNED BY :
CHECKED BY :
PROJECT NO. :
SCALE : 1"=30'

SHEET NUMBER :
PREP-1
2 OF 1 TOTAL

Proposed Preliminary Plat



KEVIN M. MILLER
No. 187067
3/ 1 /26
STATE OF UTAH

NO.	DESCRIPTION	DATE	APP'D

PROJECT NAME:
DESERT CORNER
COMMERCIAL SUBDIVISION
@ DESERT CANYONS

SHEET NAME:
PRELIMINARY PLAT SECTIONS & DETAILS

DEVELOPMENT SOLUTIONS GROUP
LAND PLANNERS, LAND SURVEYORS, CIVIL ENGINEERS
113 East 200 North Suite #2
St. George, UT 84770
Office (435) 628-2121
www.developmentsolutions.co

DATE :	2-4-26
PM :	KMM
DRAWN BY :	
DESIGNED BY :	
CHECKED BY :	
PROJECT NO. :	
SCALE :	1"=30'

SHEET NUMBER :
PREP-2
2 OF 2 TOTAL

Recommendation

Staff recommends approval with the following condition:

1. That the rockery retaining walls shall adhere to the standards found in 10-18 of City Code.

Possible Motion

“I move that we approve the Desert Corner Commercial Preliminary Plat request, Case No. 2026-PP-008, based on the findings and condition noted in the staff report.”

PLANNING COMMISSION AGENDA REPORT: 04/14/2026

Desert Color Commercial Phase 5 Preliminary Plat (Case No. 2026-PP-009)		
Request:	This is a request for Preliminary Plat for a two lot, commercial subdivision in the Desert Color Development.	
Applicant:	Bush & Gudgell, Inc.	
Representative:	Bob Hermandson	
Location:	Located east of Desert Color Pkwy and between Southern Parkway and Black Mountain Drive	
General Plan:	PD (Planned Development)	
Existing Zoning:	PD-C (Planned Development Commercial)	
Surrounding Zoning:	North	PD-C (Planned Development Commercial)
	South	PD-C (Planned Development Commercial)
	East	PD-C (Planned Development Commercial)
	West	PD-C (Planned Development Commercial)
Land Area:	Approximately 2.03 acres	



BACKGROUND:
The subject property is currently zoned PD-C (Planned Development Commercial). There are two lots included in this preliminary plat: Lot one is 55,786 square feet and Lot 2 is 32,639 square feet. The lots are accessed via private drive aisles that are part of the Desert Color PD-C development.

Access to these drive aisles will be provided from the Desert Color Parkway public right-of-way. The access points and drive aisles will be improved throughout the development as construction progresses.

RECOMMENDATION:
Staff recommends approval of this Preliminary Plat with the following conditions:

1) Access and utilities from Desert Color Parkway to these two lots will need to be constructed with the Desert Color Commercial (DCC North Access Roadway Construction Drawings) prior to plan approval for each lot.
2) Shared and cross access between Lots 1 & 2 and Lot 2 and Dutch Bros. will need to be provided and shown on the construction drawings and final plats for all proposed projects.
3) The Desert Color Commercial Phase 1 subdivision plat will need to be amended to remove the pie shaped area that was broken off by deed.

ALTERNATIVES:

1. Recommend approval as presented.
2. Recommend approval with modified conditions.
3. Recommend denial of the request.
4. Continue the proposed PD amendment to a later date.

FINDINGS FOR APPROVAL:

1. That the preliminary plat creates commercial lots that match the approved Desert Color Planned Development and allows the properties to be legally developed.
2. That the proposed lot sizes, layouts, and accesses are appropriate for commercial uses and are consistent with surrounding PD-C zoning in the Desert Color area.
3. That approving the preliminary plat allows orderly development of the property while ensuring that a final plat is reviewed and approved prior to construction, consistent with City subdivision requirements.

POSSIBLE MOTION:
“I move that we approve the Preliminary Plat for Desert Color Commercial Phase 5, Case No. 2026-PP-009, based on the findings in the staff report with the following conditions:
1) Access and utilities from Desert Color Parkway to these two lots will need to be constructed with the Desert Color Commercial (DCC North Access Roadway Construction Drawings) prior to plan approval for each lot.
2) Shared and cross access between Lots 1 & 2 and Lot 2 and Dutch Bros. will need to be provided and shown on the construction drawings and final plats for all proposed projects.
3) The Desert Color Commercial Phase 1 subdivision plat will need to be amended to remove the pie shaped area that was broken off by deed.”

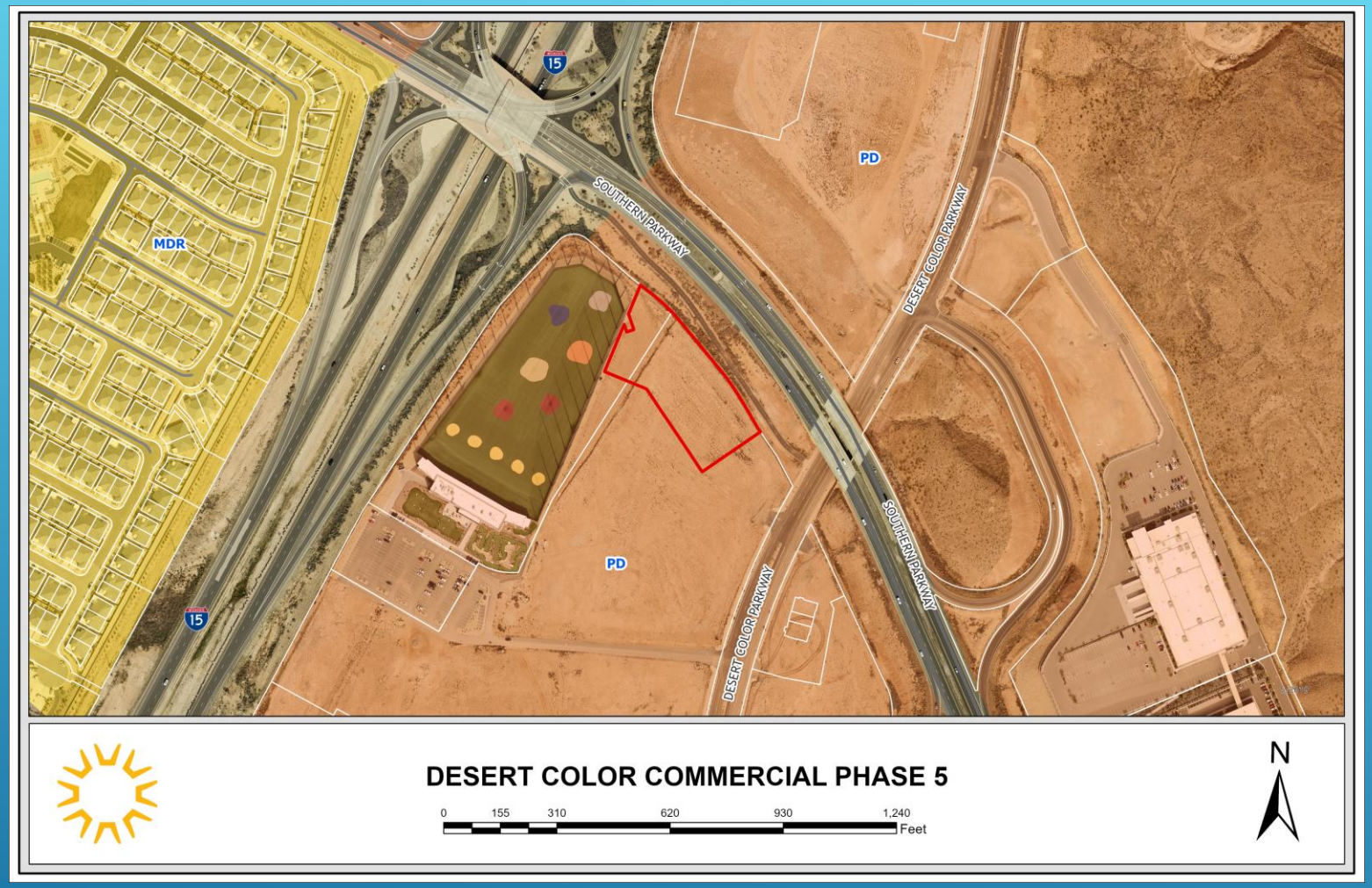
Exhibit A
PowerPoint Presentation

DESERT COLOR COMMERCIAL PHASE 5

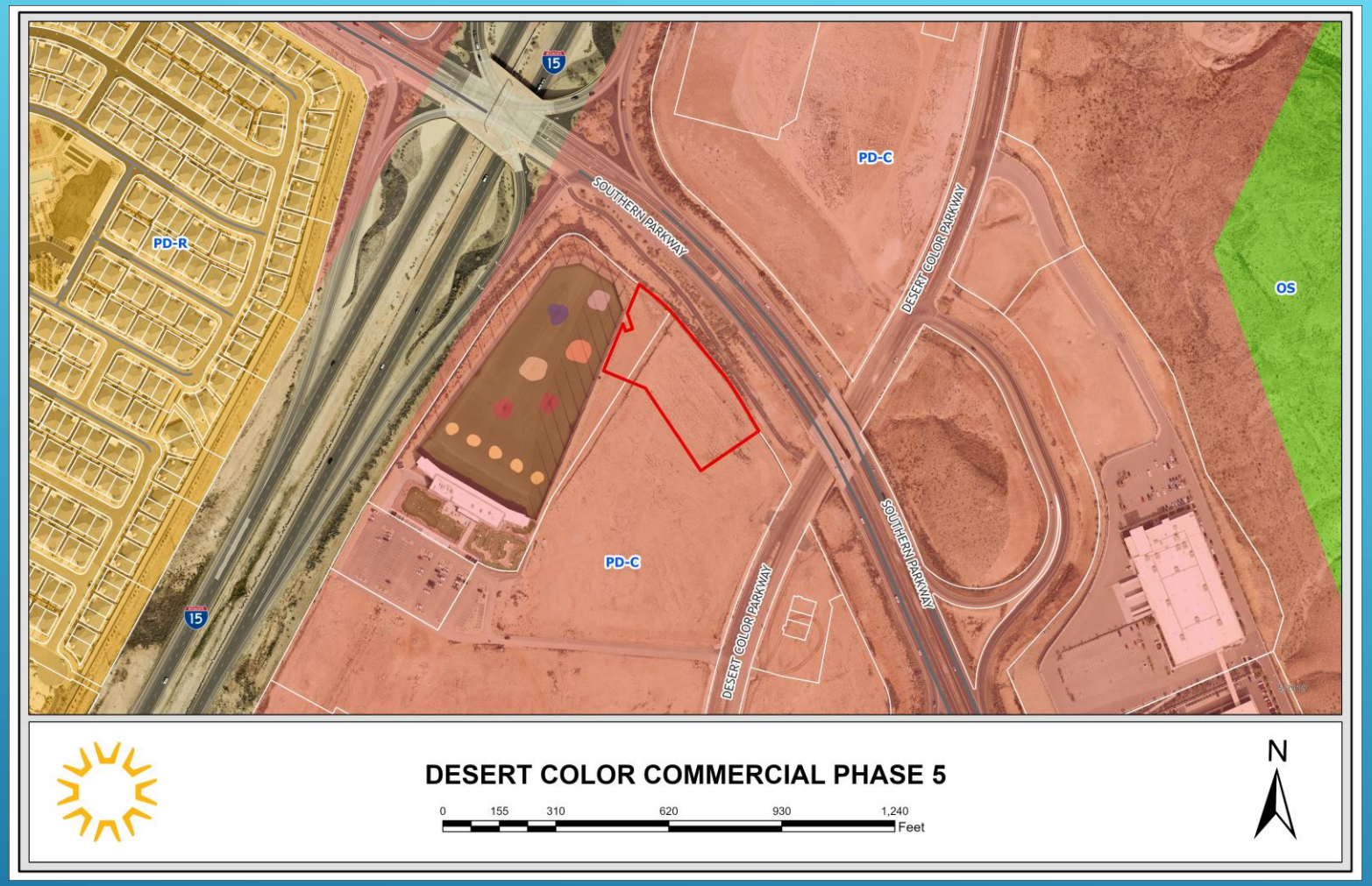
2026-PP-009


15
SOUTHERN PARKWAY
DESERT COLOR PARKWAY
DESERT COLOR PARKWAY
SOUTHERN PARKWAY
15
DESERT COLOR COMMERCIAL PHASE 5
0
155
310
620
930
1,240
Feet
N

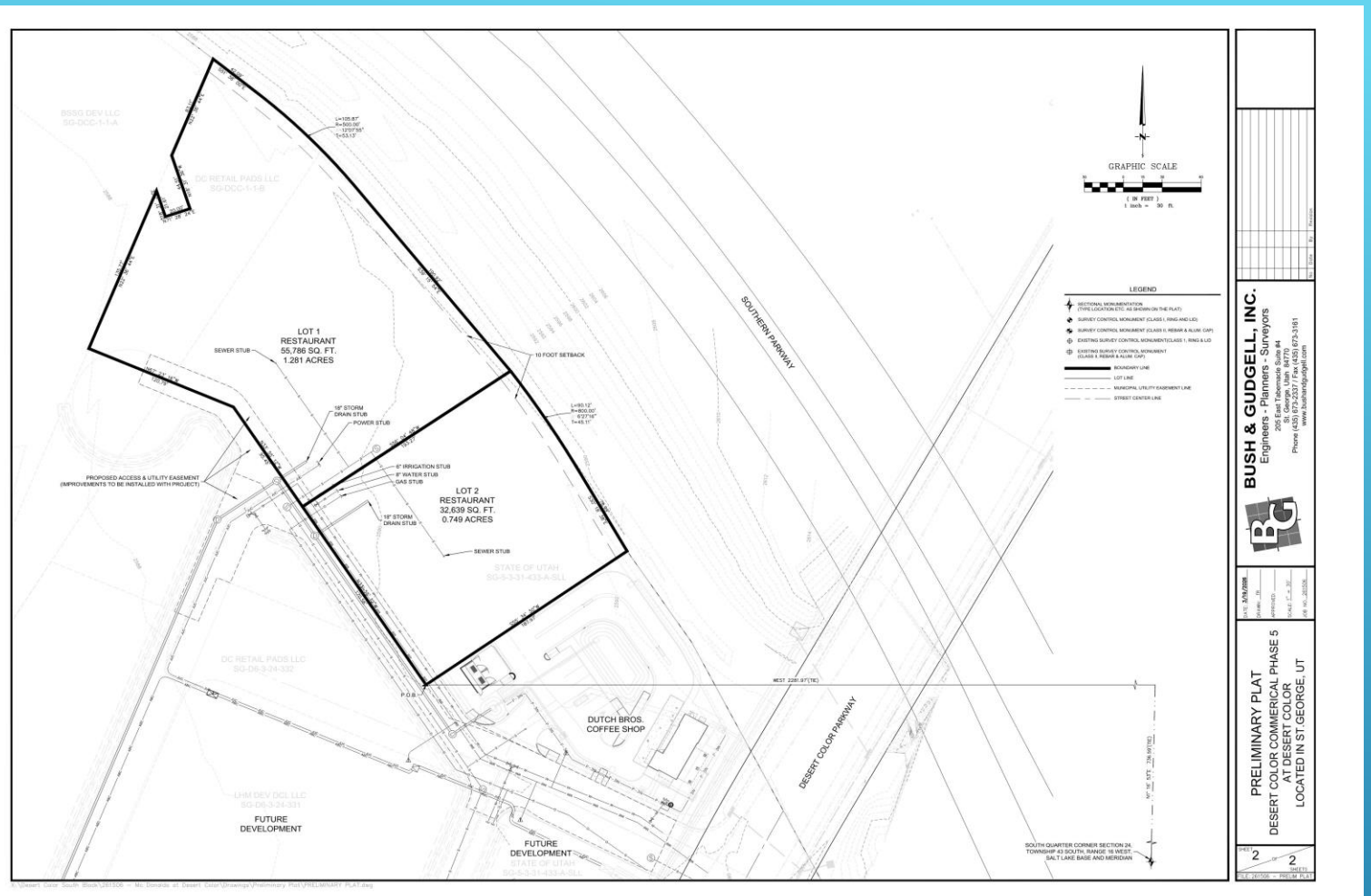
LOCATION


MDR
PD
PD
SOUTHERN PARKWAY
SOUTHERN PARKWAY
DESERT COLOR PARKWAY
DESERT COLOR PARKWAY
15
15
DESERT COLOR COMMERCIAL PHASE 5
0 155 310 620 930 1,240
Feet
N

LAND USE


PD-R
PD-C
PD-C
OS
SOUTHERN PARKWAY
DESERT COLOR PARKWAY
DESERT COLOR PARKWAY
SOUTHERN PARKWAY
15
15
DESERT COLOR COMMERCIAL PHASE 5
0 155 310 620 930 1,240
Feet
N

ZONING



PRELIMINARY PLAT

POSSIBLE MOTION

"I MOVE THAT WE APPROVE THE PRELIMINARY PLAT FOR DESERT COLOR COMMERCIAL PHASE 5, CASE NO. 2026-PP-009, BASED ON THE FINDINGS IN THE STAFF REPORT WITH THE FOLLOWING CONDITIONS:

1. ACCESS AND UTILITIES FROM DESERT COLOR PARKWAY TO THESE TWO LOTS WILL NEED TO BE CONSTRUCTED WITH THE DESERT COLOR COMMERCIAL (DCC NORTH ACCESS ROADWAY CONSTRUCTION DRAWINGS) PRIOR TO PLAN APPROVAL FOR EACH LOT.

2. SHARED AND CROSS ACCESS BETWEEN LOTS 1 & 2 AND LOT 2 AND DUTCH BROS. WILL NEED TO BE PROVIDED AND SHOWN ON THE CONSTRUCTION DRAWINGS AND FINAL PLATS FOR ALL PROPOSED PROJECTS.

3. THE DESERT COLOR COMMERCIAL PHASE 1 SUBDIVISION PLAT WILL NEED TO BE AMENDED TO REMOVE THE PIE SHAPED AREA THAT WAS BROKEN OFF BY DEED.

ST. GEORGE PLANNING COMMISSION MINUTES
March 24, 2026, 5:00 P.M.
CITY COUNCIL CHAMBERS

PRESENT:

Planning Commission Vice Chair Lori Chapman
Planning Commission Member Kelly Taysom
Planning Commission Member Nathan Fisher
Planning Commission Member Kelly Casey
Planning Commission Member Brandon Anderson
Planning Commission Member Terri Draper

EXCUSED:

Planning Commission Chair Ben Rogers

STAFF MEMBERS PRESENT:

Deputy City Attorney Jami Bracken
Assistant City Attorney Alicia Carlton
Community Development Director Carol Winner
Assistant Public Works Director Wes Jenkins
Planner Dan Boles
Planner Brenda Hatch
Planner Brian Dean
Development Office Supervisor Angie Jessop

OTHERS PRESENT:

Applicant Curt Gordon
Applicant Rob Reid
Applicant Ryan Ruud
Applicant Tucker Nipko
Applicant Colby Anderson
Applicant Ashley Phillips

CALL TO ORDER:

Planning Commission Vice Chair Chapman called the meeting to order and welcomed all in attendance. The Pledge of Allegiance to the Flag was led by Commission Member xxx.

Link to call to order and flag salute 00:00:20

Link to call for disclosures 00:01:00

Commission Member Anderson recused himself on items #3 & #4

ITEM 1

PRELIMINARY PLAT -Avenidas at Hidden Valley Ph 3 & 4

Consider a request for a 45-lot preliminary plat located south of Hidden Valley Drive and west of Rio Road on approximately 11.69 acres. The applicant is Bush & Gudgell and the representative is Bob Hermandson.
Case No. 2026-PP-004 (Staff – Brian Dean)

Agenda Packet [Page 3]

DRAFT

Link to Presentation by Brian Dean 00:02:22

Link to discussion by Commission Members 00:05:19

Link to motion 00:06:45

MOTION:

A motion was made by Planning Commission Member Draper approve this item for Avenidas extension of phase 3 and phase 4 preliminary plat request, subject to the seven conditions that are outlined and the findings in the report.

SECOND:

The motion was seconded by Planning Commission Member Fisher.

VOTE:

Commission Vice Chair Chapman called for a vote, as follows:

Planning Commission Chair Rogers – absent
Planning Commission Member Anderson –aye
Planning Commission Member Fisher – aye
Planning Commission Member Casey – aye
Planning Commission Member Chapman – aye
Planning Commission Member Taysom –aye
Planning Commission Member Draper –aye

The vote was unanimous. Motion carries.

ITEM 2

ZONE CHANGE- Desert Canyons Business Park– PUBLIC HEARING

Consider a request to change the zoning from C-2 (General Commercial) to PD-C (Planned Development Commercial) on approximately 53.2 acres. The property is generally located south-west of Airport Parkway and north-west of Southern Parkway. The proposal is an initial zone change to a PD zone with the proposed uses only and not the site plan or building elevations. The applicant is Desert Canyons Development, Inc. and the representative is Curt Gordon.
Case No. 2026-ZC-002 (Staff – Dan Boles)

Agenda Packet [Page 15]

Link to Presentation by Dan Boles 00:08:05

Link to discussion with Commission Members and Mr. Boles 00:13:45

Link to comments by applicant Curt Gordon 00:15:43

Link to public hearing 00:16:55

Public Hearing Closed

Link to discussion by Commission Members 00:17:40

DRAFT

Link to comments by Community Development Director 00:18:16

Link to comments and discussion by Mr. Boles and Commission Members 00:19:13

Link to comment by applicant Curt Gordon 00:23:15

Link to comment by Mr. Boles 00:23:55

Link to comment by applicant Curt Gordon 00:26:55

Link to discussion with Mr. Boles and Commission Members 00:27:32

Link to motion 00:30:55

MOTION:

A motion was made by Planning Commission Member Fisher recommend to City Council approval of the zone change from C-2 to PD-C on the Desert Canyons Business Park. And with regards to adopting the use list, simply a condition that as each use comes through as a PD Amendment, that the City reserves the right to be able to review proposed outside storage to make sure that they are screened from view sufficiently from the street.

SECOND:

The motion was seconded by Planning Commission Member Draper.

Link to comment by Commission Member Casey.

VOTE:

Commission Vice Chair Chapman called for a vote, as follows:

Planning Commission Chair Rogers – absent
Planning Commission Member Anderson –aye
Planning Commission Member Fisher – aye
Planning Commission Member Casey – aye
Planning Commission Member Chapman – aye
Planning Commission Member Taysom –aye
Planning Commission Member Draper –aye

The vote was unanimous. Motion carries.

ITEM 3

ZONE CHANGE- Crimson Heights Behavioral Health – PUBLIC HEARING

Consider a request to change the zoning from R-3 (Multiple-Family Residential) to PD-C (Planned Development Commercial) on approximately 0.83 acres, located at 691 South 300 East. The applicant is Rosenberg Associates, and the representative is Rob Reid.
Case No. 2025-ZC-022 (Staff – Brenda Hatch)

Agenda Packet [Page 36]

Link to Presentation by Brenda Hatch 00:32:52

DRAFT

Link to discussion by Commission Member Chapman and Ms. Hatch 00:40:35

Link to comments by applicant Ryan Ruud and discussion with Commission Members 00:42:08

Link to public hearing 00:54:40

Public Hearing Closed

Link to discussion by Commission Members 00:55:05

Link to motion 00:57:09

MOTION:

A motion was made by Planning Commission Member Draper forward a positive recommendation for the zone change for Crimson Heights Behavioral Health to the City Council, subject to the conditions and findings in the report. Amendment added to specify that Condition 3, where it talks about one-way access, that is should exit on 300 South.

SECOND:

The motion was seconded by Planning Commission Member Casey.

Link to comment on motion by Commission Member Fisher.

Commission Member Draper agreed to amendment of motion to specify that Condition 3, where it talks about one-way access, that it should exit on 300 South.

VOTE:

Commission Vice Chair Chapman called for a vote, as follows:

Planning Commission Chair Rogers – absent
Planning Commission Member Anderson –recused
Planning Commission Member Fisher – aye
Planning Commission Member Casey – aye
Planning Commission Member Chapman – aye
Planning Commission Member Taysom –aye
Planning Commission Member Draper –aye

The vote was unanimous. Motion carries.

ITEM 4

DEVELOPMENT AGREEMENT Crimson Heights Behavioral Health–PUBLIC HEARING

Consider a request for a development agreement for Crimson Heights Behavioral Health, located at 691 South 300 East, for the purpose of addressing the total number of parking spaces needed for the behavioral health clinic to operate. The applicant is Rosenberg Associates, and the representative is Rob Reid.
Case No. 2025-DA-005 (Staff – Brenda Hatch)

Agenda Packet [Page 61]

DRAFT

Link to Presentation by Brenda Hatch 00:32:52

Link to public hearing 00:58:30

Public Hearing Closed

Link to motion 00:59:35

MOTION:

A motion was made by Planning Commission Member Casey forward a positive recommendation to the City Council for Item 4, Crimson Heights Behavioral Health Development Agreement.

SECOND:

The motion was seconded by Planning Commission Member Taysom.

VOTE:

Commission Vice Chair Chapman called for a vote, as follows:

Planning Commission Chair Rogers – absent
Planning Commission Member Anderson –recused
Planning Commission Member Fisher – aye
Planning Commission Member Casey – aye
Planning Commission Member Chapman – aye
Planning Commission Member Taysom –aye
Planning Commission Member Draper –aye

The vote was unanimous. Motion carries.

ITEM 5

PLANNED DEVELOPMENT AMENDMENT Tuscan Valley at Tuscan Ridge– PUBLIC HEARING *This item will not be heard at this meeting and will be re-noticed for a later date.*

Consider a request to amend the Tuscan Hills Planned Development (PD). The applicant is proposing to develop the Western Area of the Planned Development, identified as Tuscan Valley at Tuscan Ridge. The 37.5-acre site is located south of what will be Gap Canyon Parkway and west of Dixie Drive and is planned to include 159 townhomes in 42 buildings. The applicant is Bush & Gudgell, Inc. and the representative is Bob Hermandson.

Case No. 2026-PDA-005 (Staff – Brian Dean)

ITEM 6

PLANNED DEVELOPMENT AMENDMENT Pelican Hills– PUBLIC HEARING

This item will not be heard at this meeting and will be re-noticed for a later date.

Consider a request to amend the Pelican Hills Planned Development (PD). The applicant is proposing to develop the northwest portion of the development. This 4.82-acre site is located east of Ostler Way and south-west of Dixie Drive and is planned to include 46 detached units. The applicant is Bush & Gudgell, Inc. and the representative is Bob Hermandson.

Case No. 2026-PDA-006 (Staff – Brian Dean)

DRAFT

ITEM 7

PLANNED DEVELOPMENT AMENDMENT Mohave Crossing– PUBLIC HEARING

Consider a request to amend the Atkinville Interchange Area Planned Development Commercial (PD-C) zone. The request specifically relates to the hotel portion of the Mojave Crossing project approved in 2025. The applicant is proposing adjustments to the southeastern portion of the hotel and the amenity area. Minor parking adjustments are also proposed to accommodate these changes. No other changes to the site or the other approved buildings are proposed. The property is located at the intersection of Pioneer Road and Nighthawk Drive. The applicant is TJN Development, represented by Tucker Nipko.
Case No. 2026-PDA-007 (Staff – Dan Boles)

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Link to Presentation by Dan Boles 01:00:37

Link to comment by Commission Member Fisher 01:10:40

Link to public hearing 01:12:35

Link to comment by John Carr 01:12:55

Link to comment by Brent Erickson 01:14:43

Public Hearing Closed

Link to comment by applicant Colby Anderson 01:16:49

Link to discussion by Commission Members and Community Development Director Carol Winner 01:22:49

Link to discussion by Commission Members 01:24:30

Link to motion 01:26:00

MOTION:

A motion was made by Planning Commission Member Anderson to forward a positive recommendation to the City Council for the Mohave Crossing Plan Development Amendment, as proposed, with the conditions listed in the Staff Report.

SECOND:

The motion was seconded by Planning Commission Member Fisher.

VOTE:

Commission Vice Chair Chapman called for a vote, as follows:

Planning Commission Chair Rogers – absent
Planning Commission Member Anderson –aye
Planning Commission Member Fisher – aye
Planning Commission Member Casey – aye
Planning Commission Member Chapman – aye

DRAFT

Planning Commission Member Taysom –aye
Planning Commission Member Draper –aye

The vote was unanimous. Motion carries.

ITEM 8

ZONE REGULATION AMENDMENT Bare Foot Montessori Private Micro-School – PUBLIC HEARING Consider a request to amend portions of the city zoning ordinance, Title 10, in order to amend Conditional Uses for Landmark Sites as well as other sections of Title 10 pertaining to those uses. The applicant is Bare Foot Montessori, and the representative is Ashley Phillips.
Case No. 2025-ZRA-017 (Staff – Brenda Hatch)

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Link to Presentation by Brenda Hatch 01:27:45

Link to comment by Commission Member Anderson 01:30:45

Link to comment by Commission Member Casey 01:31:00

Link to comment by Commission Vice Chair Chapman 01:31:55

Link to comment by Commission Member Casey 01:33:25

Link to comment by Community Development Director Carol Winner 01:34:04

Link to comment by Deputy City Attorney Jami Bracken 01:34:55

Link to continued presentation by Ms. Hatch 01:35:20

Link to question by Commission Vice Chair Chapman 01:42:46

Link question by Commission Member Draper 01:44:28

Link to comment by Ashley Phillips 01:45:13

Link to public hearing 01:45:55

Public Hearing Closed

Link to discussion by Commission Members and Deputy City Attorney Bracken 01:46:15

Link to motion 01:47:30

MOTION:

A motion was made by Planning Commission Member Draper forward a positive recommendation to City Council to approve this zone regulation amendment for Bare Foot Montessori, subject to the conditions and findings in the staff report.

SECOND:

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The motion was seconded by Planning Commission Member Fisher.

VOTE:

Commission Vice Chair Chapman called for a vote, as follows:

Planning Commission Chair Rogers – absent
Planning Commission Member Anderson –aye
Planning Commission Member Fisher – aye
Planning Commission Member Casey – aye
Planning Commission Member Chapman – aye
Planning Commission Member Taysom –aye
Planning Commission Member Draper –aye

The vote was unanimous. Motion carries.

APPROVAL OF MINUTES:

Consider a request to approve the meeting minutes from the March 10, 2026 meeting.

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Link to motion 01:48:16

MOTION:

A motion was made by Planning Commission Member Taysom to approve minutes of March 10, 2026 meeting.

SECOND:

The motion was seconded by Planning Commission Member Fisher.

VOTE:

Commission Vice Chair Chapman called for a vote, as follows:

Planning Commission Chair Rogers – absent
Planning Commission Member Anderson -aye
Planning Commission Member Fisher – aye
Planning Commission Member Casey – aye
Planning Commission Vice Chair Chapman –aye
Planning Commission Member Taysom – aye
Planning Commission Member Draper- aye

The vote was unanimous and the motion carried.

CITY COUNCIL ITEMS:

There has not been a City Council meeting held since last Planning Commission meeting

ADJOURN:

Link to motion: 01:50:22

MOTION:

A motion was made by Planning Commission Member Casey to adjourn.

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SECOND:

The motion was seconded by Planning Commission Member Fisher.

VOTE:

Commission Vice Chair Chapman called for a vote, as follows:

Planning Commission Chair Rogers – absent
Planning Commission Member Anderson –aye
Planning Commission Member Fisher – aye
Planning Commission Member Casey –aye
Planning Commission Member Chapman –aye
Planning Commission Member Taysom –aye
Planning Commission Member Draper – aye

The vote was unanimous, and the motion carries.

/s/
Angie Jessop, Development Services

DRAFT