

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

Public Notice

Notice is hereby given that the Hillside Review Board of the City of St. George, Washington County, Utah, will hold meetings at the referenced site on **Wednesday, August 26, 2020** commencing on-site at 8:30 a.m.

The estimated site times are in bold.

The agenda for the meetings are as follows:

1. Consider a request for a Hillside Development Permit to allow development of a multi-family housing subdivision to be called “**The Cove.**” The property is generally located west of Bluff Street at approximately 300 West and 900 South. The property is currently zoned C-2 (Highway Commercial). The owner is Cove Towers LLC, the applicant is Brent Holdaway, and the representative is Bush & Gudgell, Inc. Case No. 2020-HS-007. The estimated time to meet is **9:30 am** (*See ‘Meeting Place’ exhibit below*).
2. Consider approval of the meeting minutes from July 15, 2020

Dan Boles, AICP
Senior Planner
Development Services

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

Meeting Place for #1 “The Cove”



HILLSIDE REVIEW BOARD AGENDA REPORT: **07/15/2020**

HILLSIDE DEVELOPMENT PERMIT

The Cove

Case No. 2020-HS-007

- Request:** This is a request for a Hillside Development Permit for “The Cove”
- Location:** The property is generally located west of Bluff Street at approximately 300 West and 900 South.
- APN:** SG-6-2-36-110
- Proposed:** The property is proposed to be developed into a multi-family residential project.
- Background:** On March 5, 2020 the City Council approved a general plan amendment to change a portion of OS (Open Space) and COM (Commercial) land use designations to HDR (High Density Residential) and areas of OS (Open Space) to COM (Commercial). This was Case No. 2020-GPA-006. The applicant next intends to submit a zone change application after the hillside permit process. The applicant will need to submit all requirements for the zone change prior to being put on an agenda.
- Owner:** Cove Towers LLC
- Applicant:** Brent Holdaway
- Engineer:** Bush & Gudgell, Inc.
- Geological Hazards:** AGECEC has provided a letter dated January 6, 2020 titled “Geological Hazard Assessment” and it was submitted with the hillside application. The hazards discussed in the letter include: 1) Rockfall Evaluation, 2) Landslide Evaluation, 3) Debris Flow, and 4) Fault Rupture
- Geotech:** Produced by AGECEC, July 1, 2020 is attached to this report.
- Drainage:** A preliminary drainage study prepared by Bush & Gudgell and dated April 29, 2020 Job # 191258 was submitted with the hillside application.

Current Zoning: The current zoning on the property is primarily C-2. There is a small sliver of OS (Open Space) designated at the top of the bluff as well. Now that the General Plan amendment was approved by council, zoning will have to be changed in the future to conform to how the applicant would like to develop the property.

General Plan: The General Plan Land Use Map was changed on 3/5/2020 by the City Council (*reference 'Background' section above*).

Area: The area is just approximately 16 acres.

Surrounding: The surrounding properties to the south and east are commercial businesses. Properties to the north and west are currently undeveloped hillside.

Staff Comments: If the HSRB recommends approval of the hillside permit, then the permit request advances forward to the Planning Commission (PC) for review and recommendation and then on to the City Council (CC) for approval or denial.

1. Hillside Permit - A hillside permit is required per ordinance and the HSRB will make recommendations to the PC & CC.
2. Zoning – Currently the zoning is C-2 and OS, but the applicant will have to approach the city council with a zone change request in order to proceed with the development.
3. Development – It's proposed to grade the area as presented.
4. Geotechnical Investigation – All earthworks shall comply with the recommendations and mitigations presented in Geotech Report.
5. Drainage – Drainage shall comply with the Drainage Study by Bush & Gudgeon dated April 29, 2020.
6. Grading Permit - If approved, the applicant will work with staff for submittal of a Grading Permit with the required accompanying civil engineering plan set (for plan review).

HSRB Motion: The HSRB recommends approval of “The Cove” and the following are recommended conditions and comments:

1. Grading Permit – The applicant shall work with staff for submittal of a Grading Permit for “The Cove” with the required accompanying civil engineering plan set (for plan review).
2. Non-contiguous Areas – The non-contiguous, insignificant areas, and man-made spoils over 40% may be removed.

3. Geotechnical Investigation – All earthworks shall comply with the recommendations and mitigations presented in the AGECE Report Project No. 2192092 dated July 1, 2020.
4. Drainage – Drainage shall comply with the recommended mitigations presented in the ‘Preliminary Drainage Study” by Bush & Gudgell dated April 29, 2020.



Bush and Gudgell, Inc.

Engineers • Planners • Surveyors

St. George, Utah

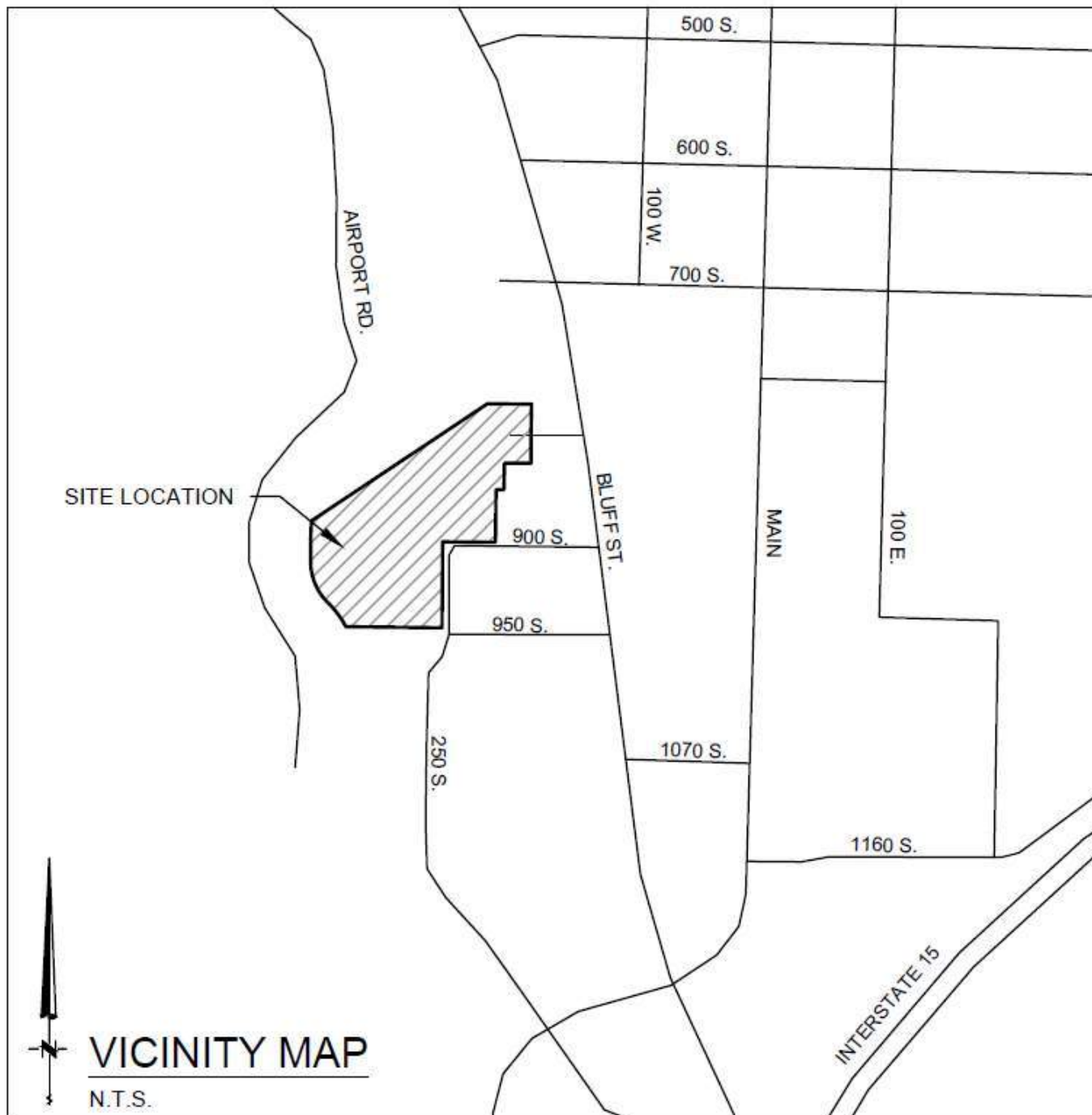
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The Cove **Hillside Review Narrative**

The purpose for this hillside review to allow multifamily development in the area approximately located West of 900 S. and 250 W. St George, Utah. The Cove is a proposed 16-acre multifamily residential project. The property is noted on the General Plan as Multifamily or Commercial. The proposed use is multifamily consisting of 5 buildings for approximately 138 units.

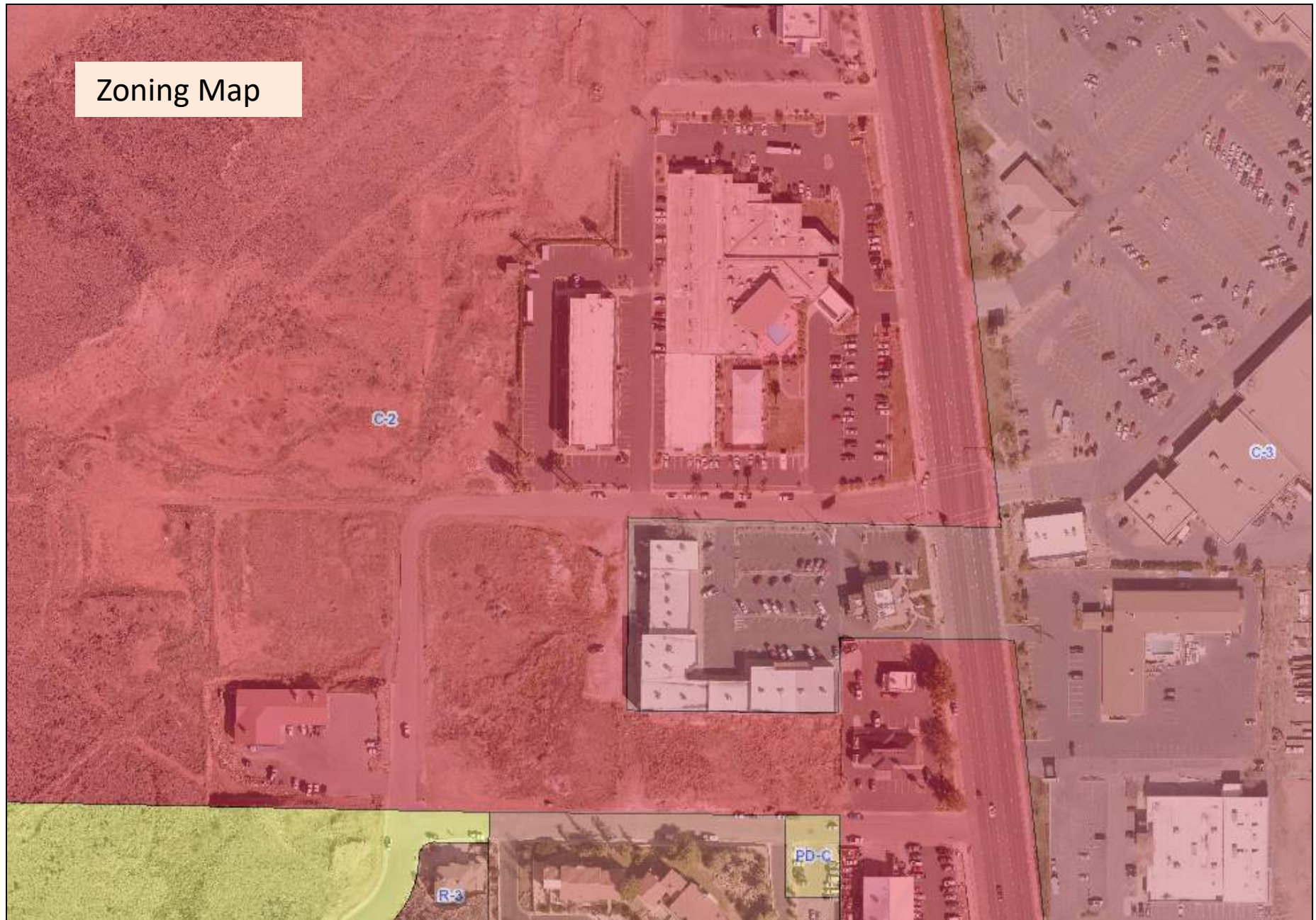
The surrounding properties currently to the South and East are commercial business, properties North and West are currently undeveloped hillside but where possible have commercial business.

Powerpoint Presentation

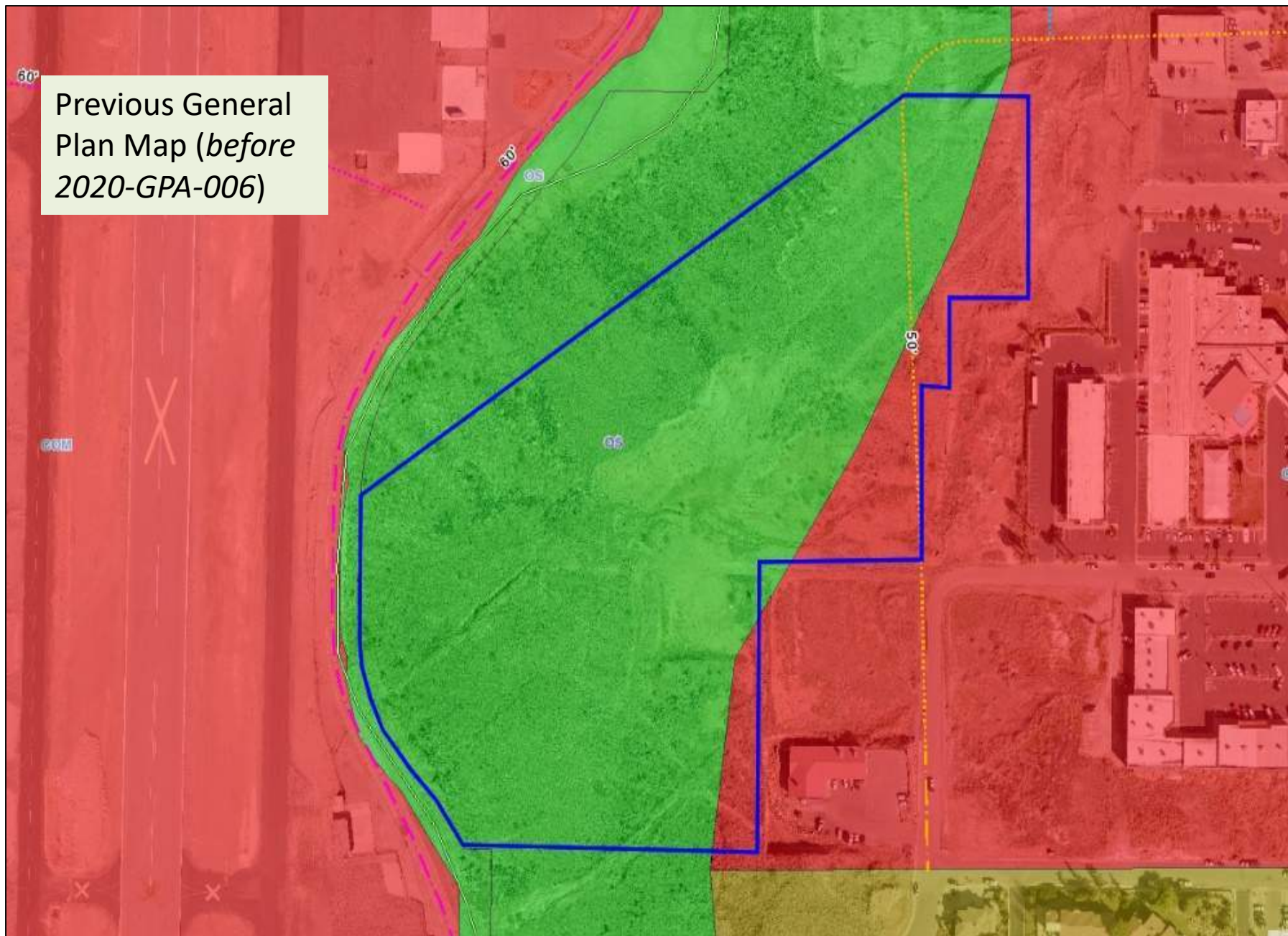




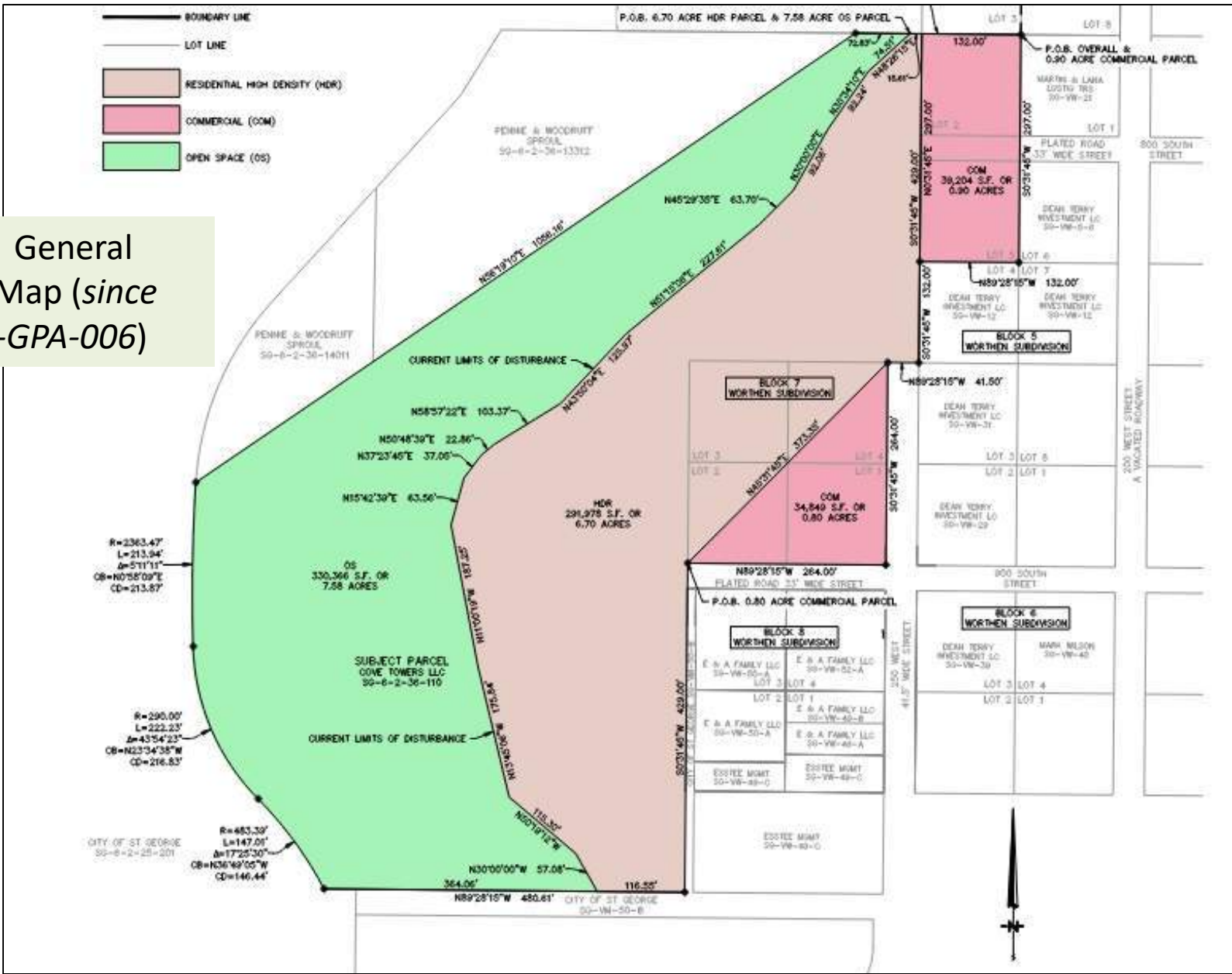
Zoning Map

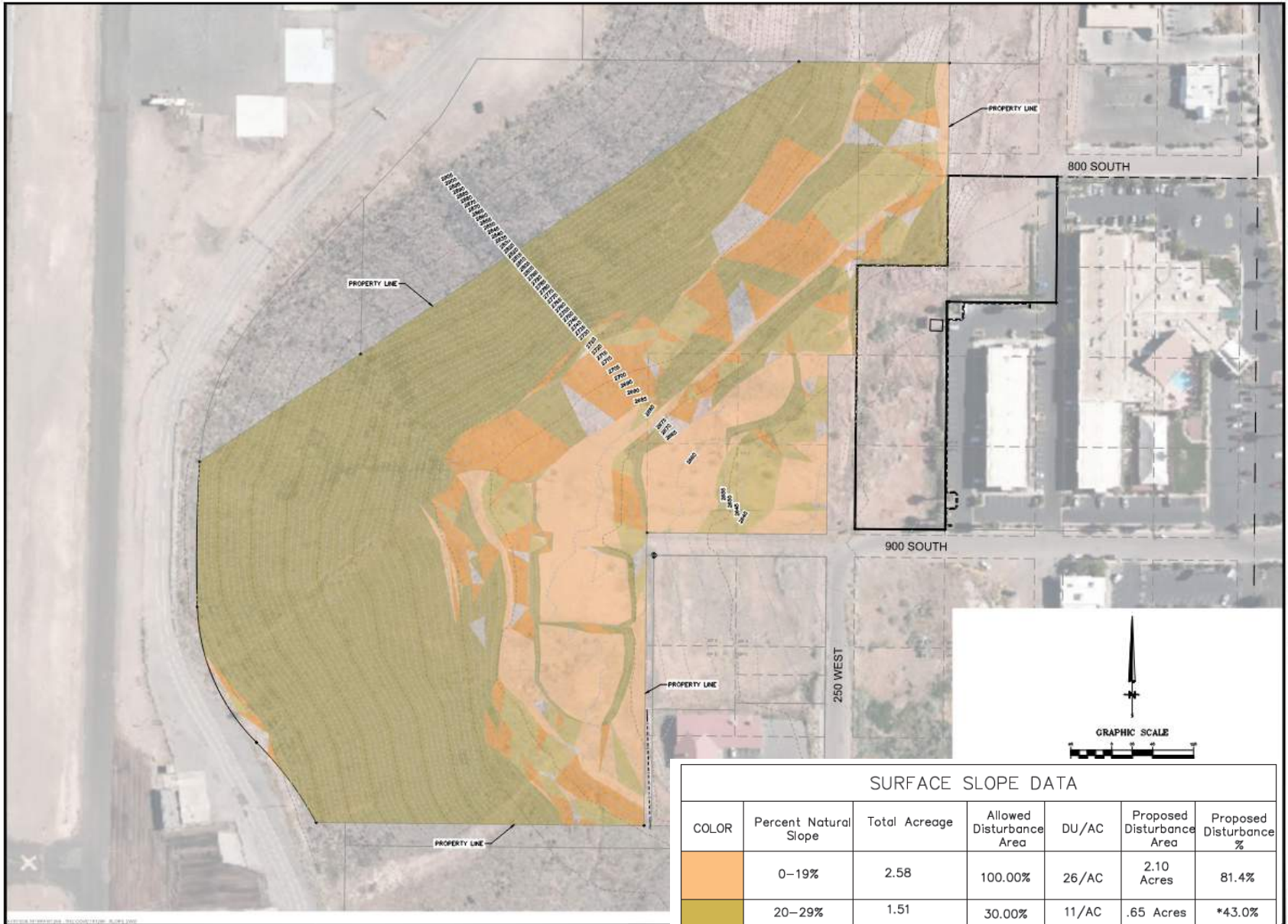


Previous General
Plan Map (*before*
2020-GPA-006)



New General
Plan Map (*since
2020-GPA-006*)





SURFACE SLOPE DATA

COLOR	Percent Natural Slope	Total Acreage	Allowed Disturbance Area	DU/AC	Proposed Disturbance Area	Proposed Disturbance %
	0-19%	2.58	100.00%	26/AC	2.10 Acres	81.4%
	20-29%	1.51	30.00%	11/AC	.65 Acres	*43.0%
	30-39%	1.93	10.00%	9.6/AC	.41 Acres	*21.2%
	40+%	9.52	0.00%	3.5/AC	.61 Acres	*6.4%

*Area contains previously distributed or man made dirt piles.



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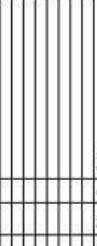
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DRAWN BY: JMG
APPROVED: JMG
CHECKED: JMG
DATE: 08/11/2011

SLOPE ANALYSIS
THE COVE
ST GEORGE, UTAH

SHEET 4 OF 10
DATE: 08/11/2011

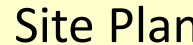


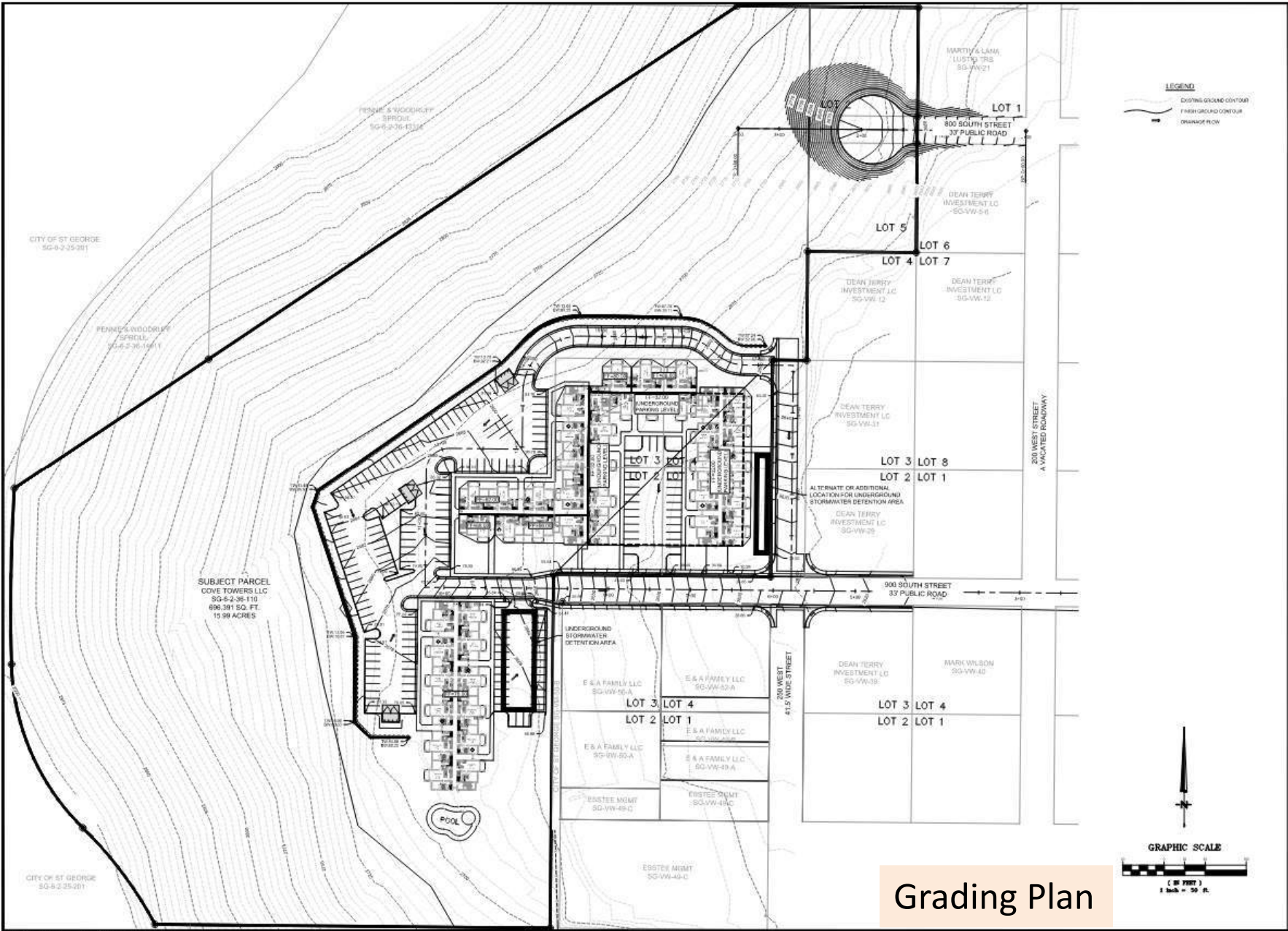




SITE PLAN
THE COVE
ST. GEORGE, UTAH

2 10







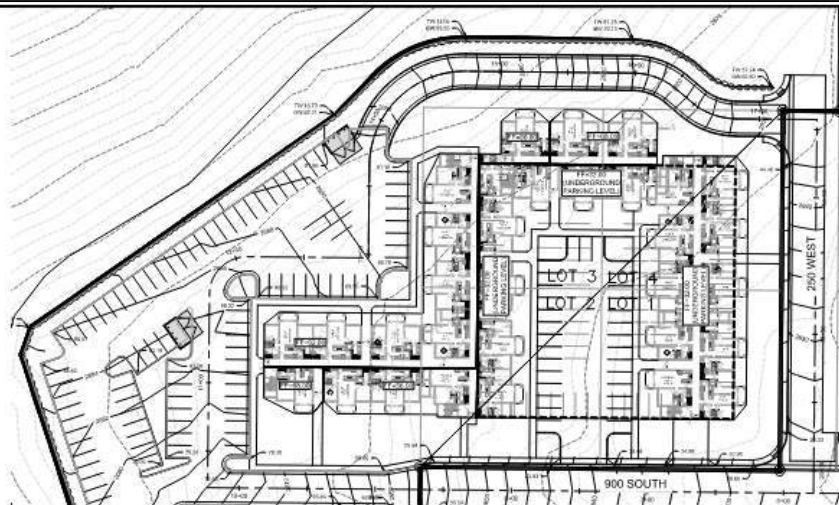
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209 East Talmadge Suite #4
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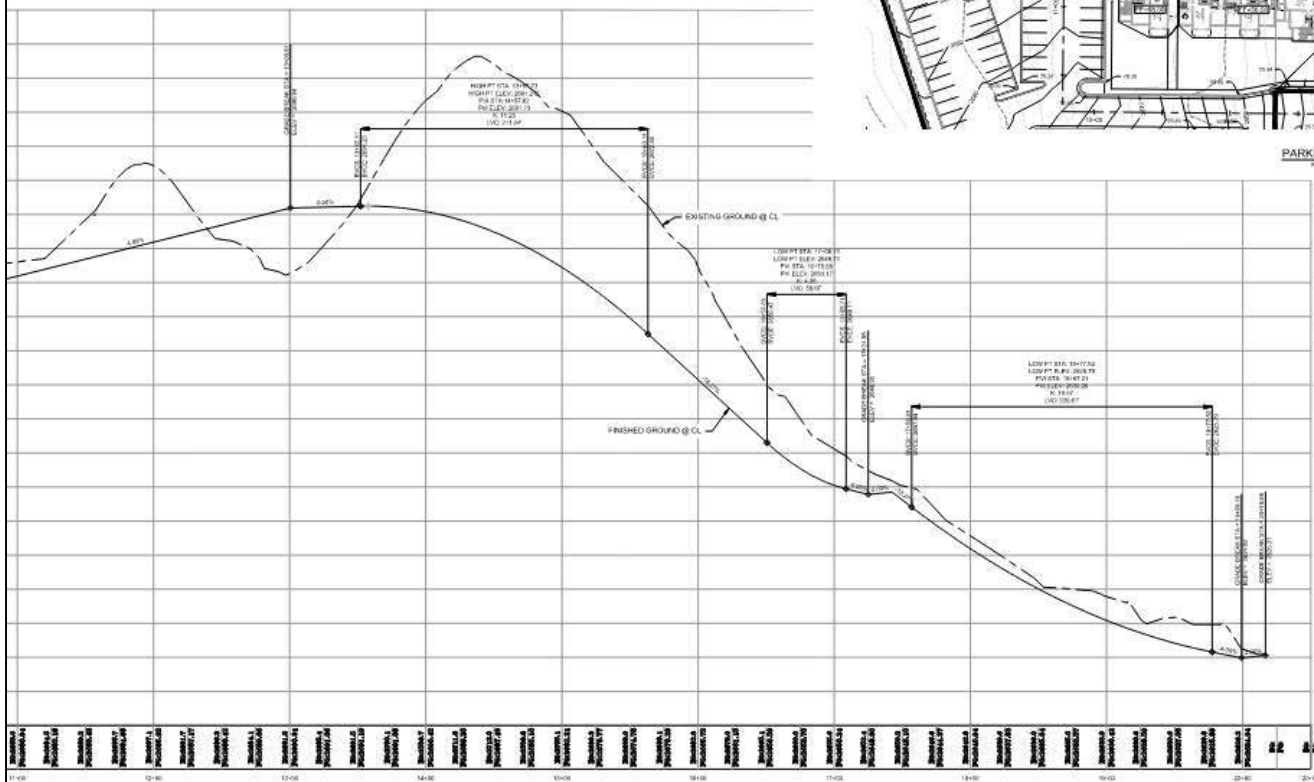
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GRADING PLAN
THE COVE
ST. GEORGE, UTAH

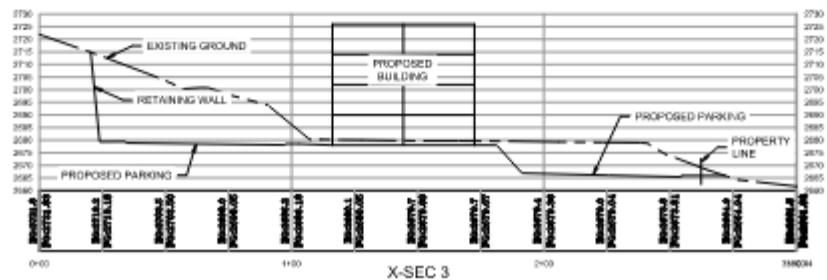
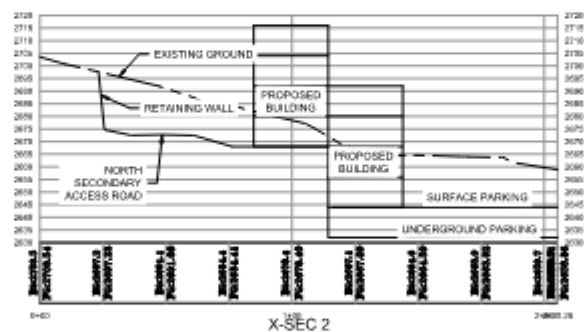
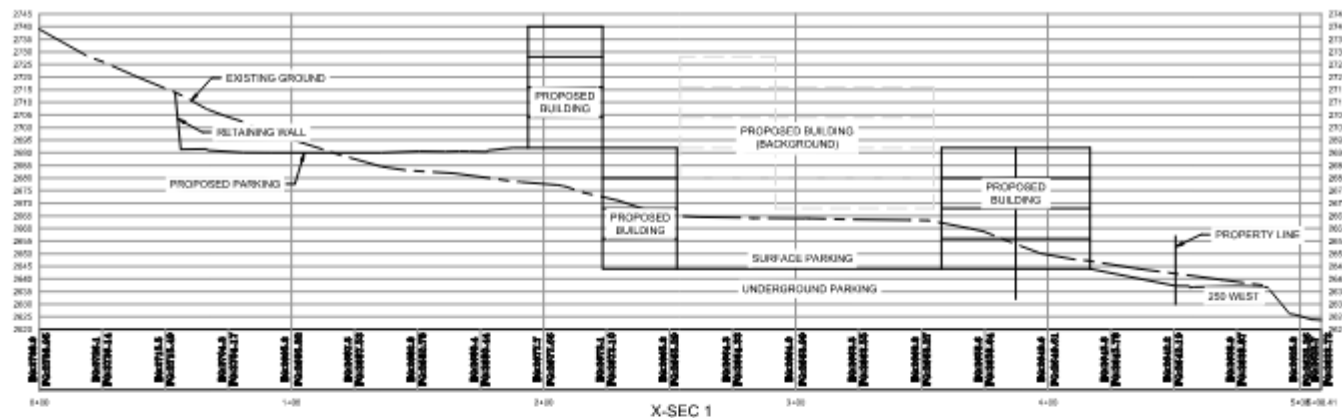
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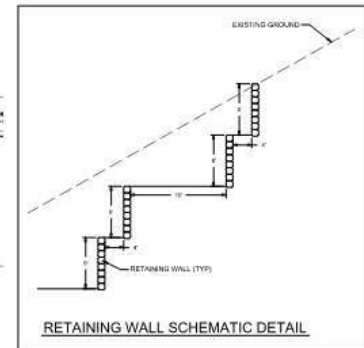
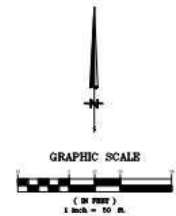
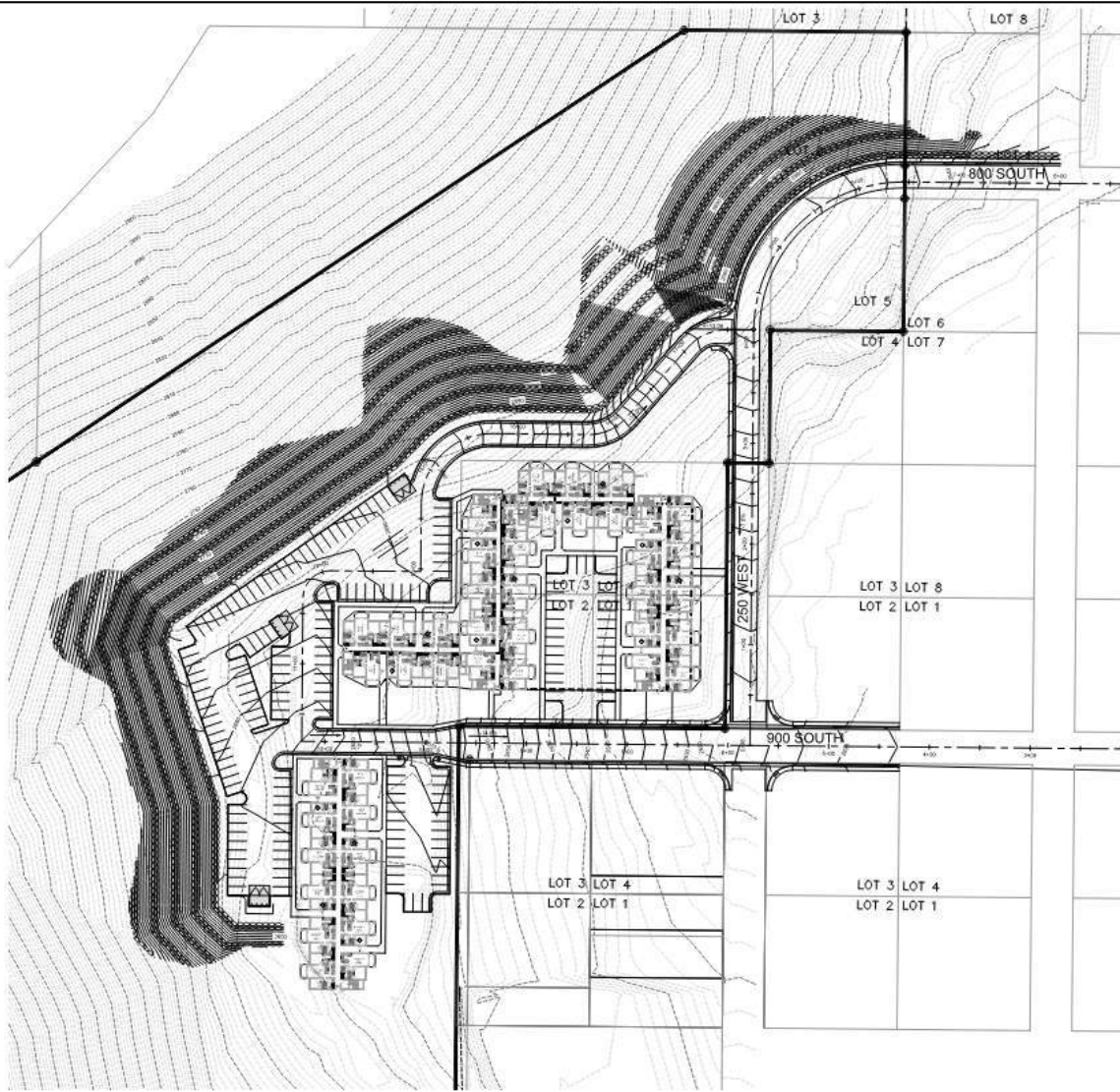


PARKING LOT & 250 WEST
SURVEY TO THE 2002



MAIN 5-22-20
H: 1"=50'
V: 1"=10'





Hillside Submittal Plans

B&G PROJECT NUMBER 191258

THE COVE

HILLSIDE SUBMITTAL LOCATED IN ST. GEORGE, UTAH

SECTION 36, T 42 S, R 16 W, SLB&M

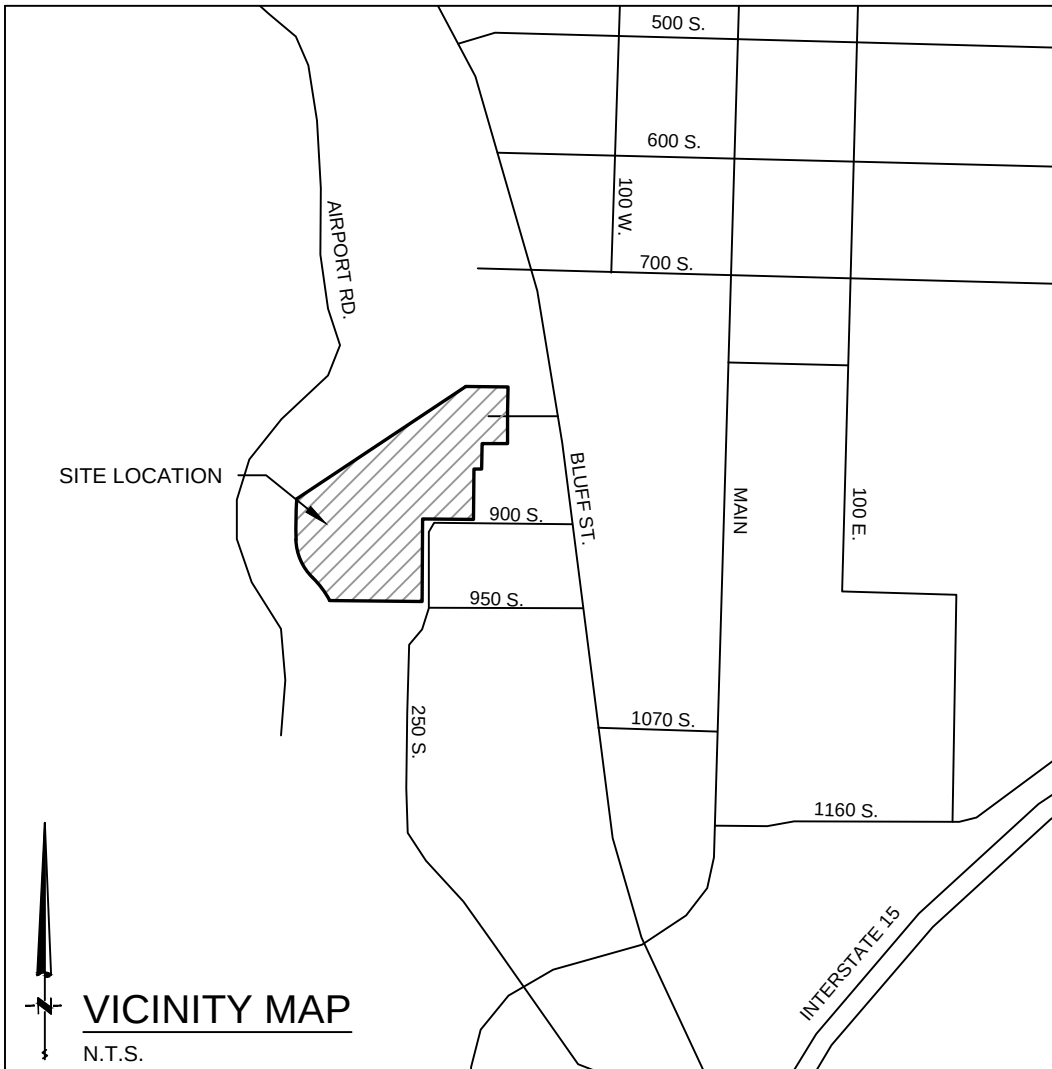
AVOID CUTTING UNDERGROUND
UTILITY LINES. IT'S COSTLY

Call
before you
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1-800-662-4111

BLUE STAKES LOCATION CENTER (UTAH)

SHEET NO.	DESCRIPTION
1	COVER SHEET
2	SITE PLAN
3	GRADING & DRAINAGE PLAN
4	SLOPE PLAN
5	PLAN & PROFILE - 900 SOUTH
6	PLAN & PROFILE - PARKING LOT & 250 WEST
7	PLAN & PROFILE - 800 SOUTH
8	CROSS SECTIONS
9	OPTION 2 PLAN VIEW
10	OPTION 2 PROFILES



OWNER / DEVELOPER
COVE TOWERS LLC
1347 HARBOR DR.
MESQUITE, NEVADA 89027

BRENT HOLDAWAY
(435) 467-3744

ENGINEERING CONTACT

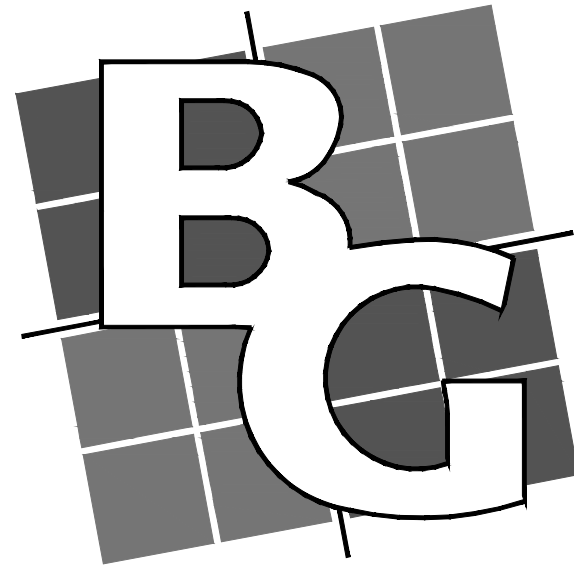
BUSH AND GUDGELL, INC.
205 EAST TABERNACLE #4
ST GEORGE, UT 84770

ADAM ALLEN - PROJECT MANAGER
(435)-673-2337

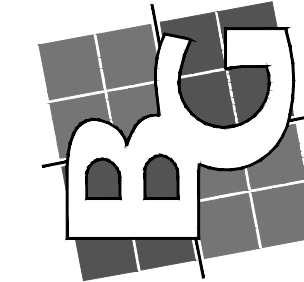
MAY 2020

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Phone (435) 673-2337



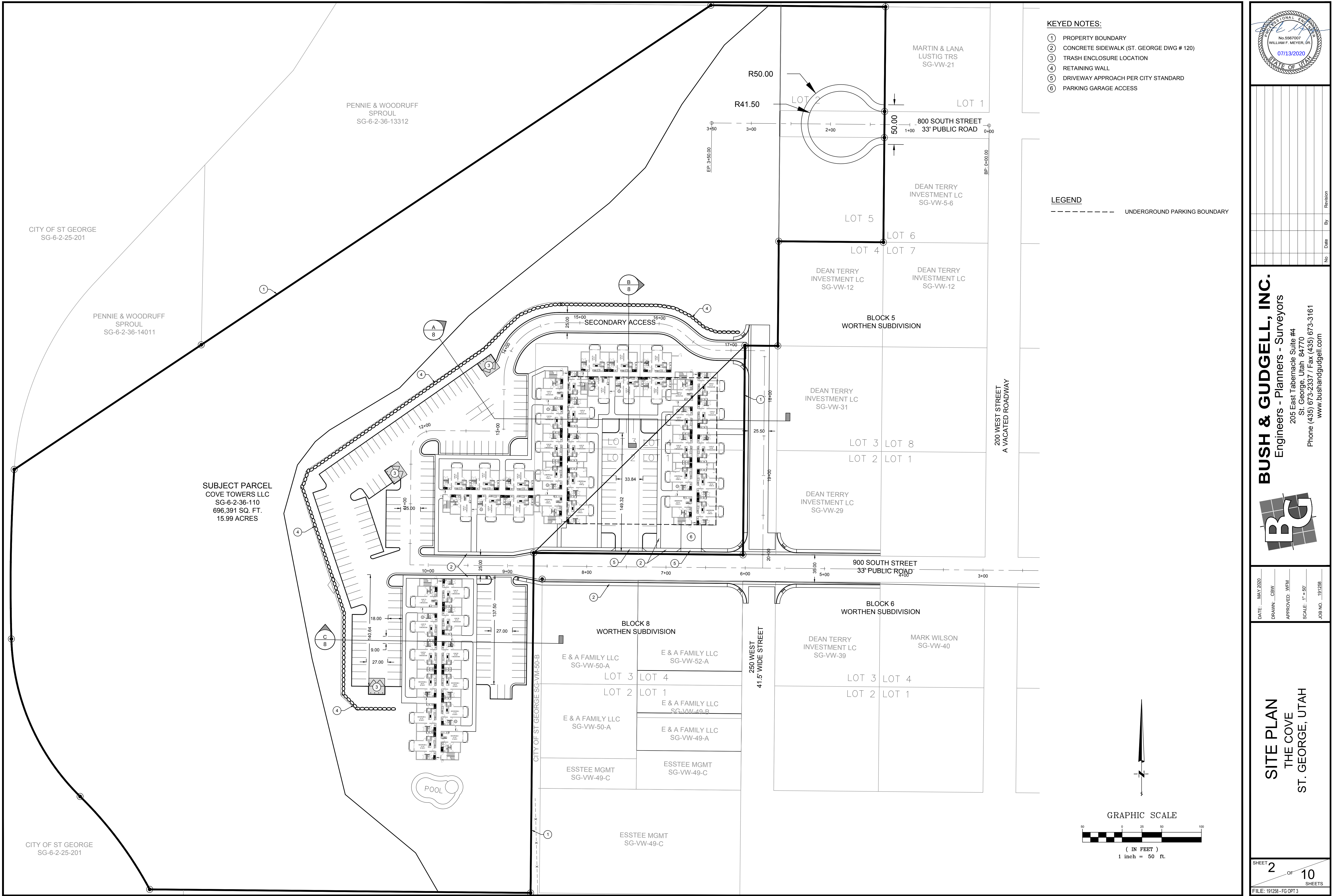
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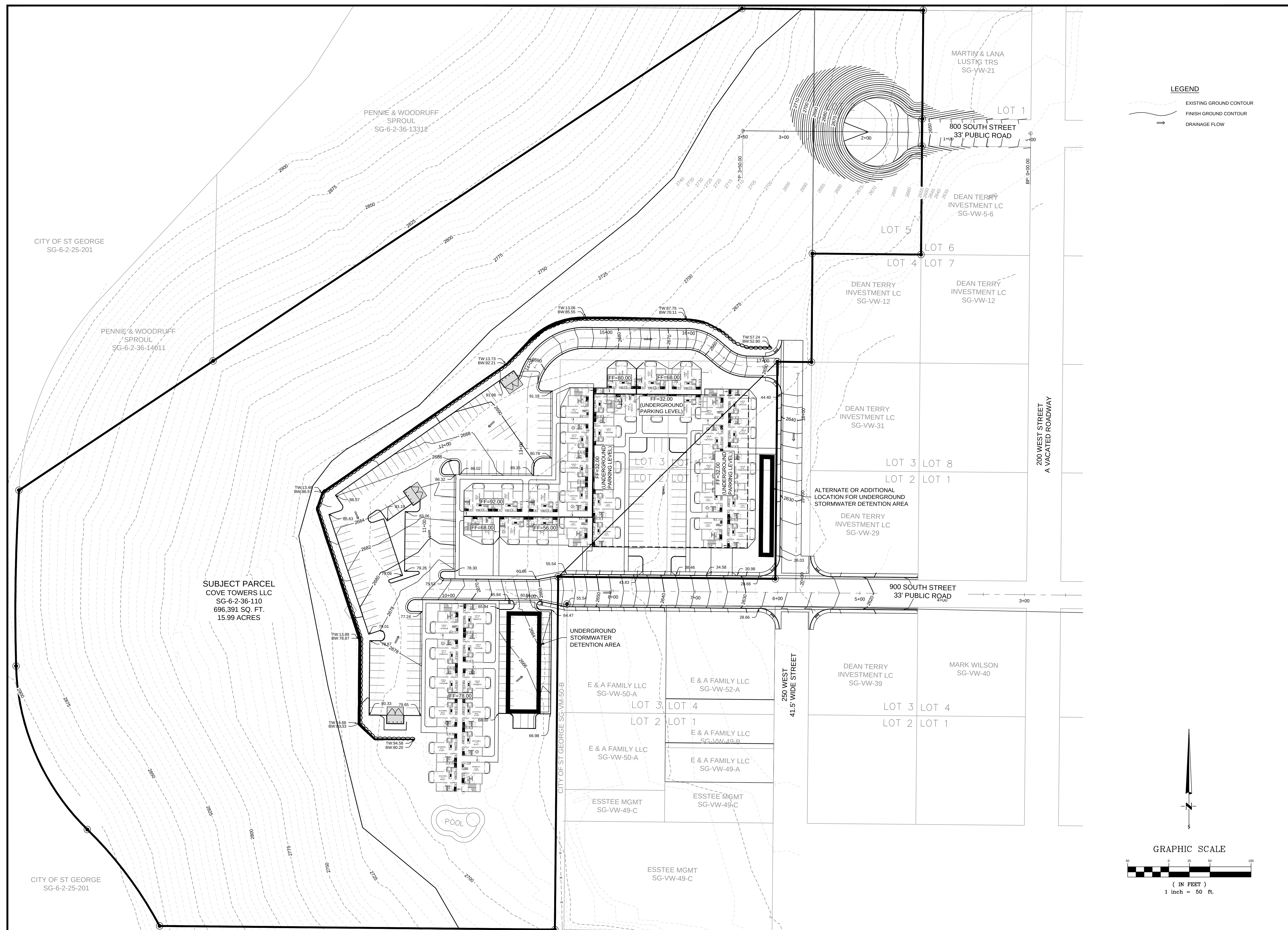


DATE: MAY 2020
DRAWN: CBW
APPROVED: WFM
SCALE: NOTED
JOB NO. 191258

COVER SHEET
THE COVE, HILLSIDE SUBMITTAL
ST. GEORGE, UTAH

SHEET 1 OF 10
SHEETS
FILE: 191258-HILLSIDE





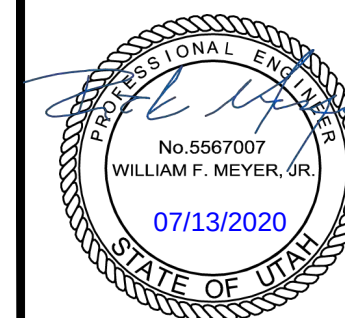
LEGEND

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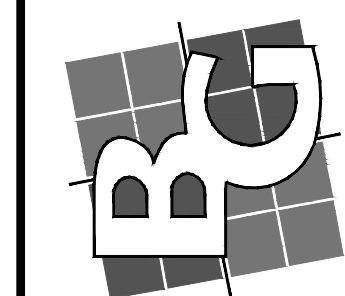
FINISH GROUND CONTOUR

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DRAINAGE FLOW



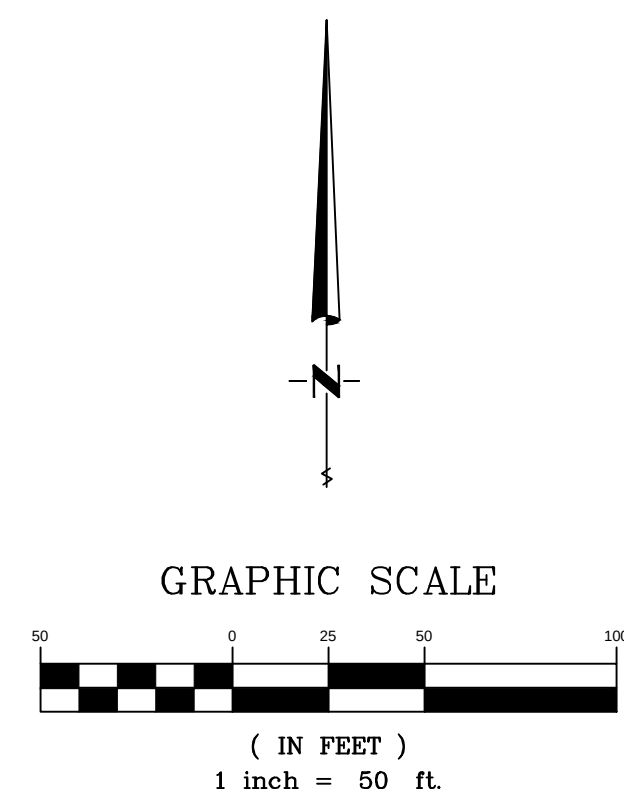
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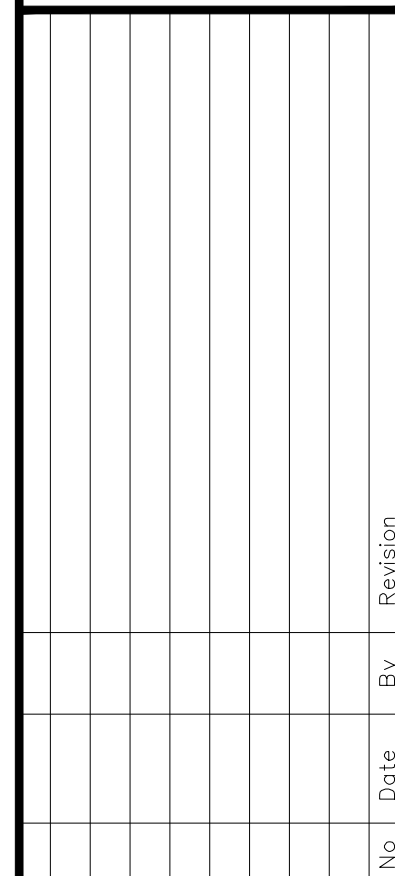


DATE: MAY 2020
DRAWN: CBW
APPROVED: WFM
SCALE: 1" = 50'

GRADING PLAN
THE COVE
ST. GEORGE, UTAH

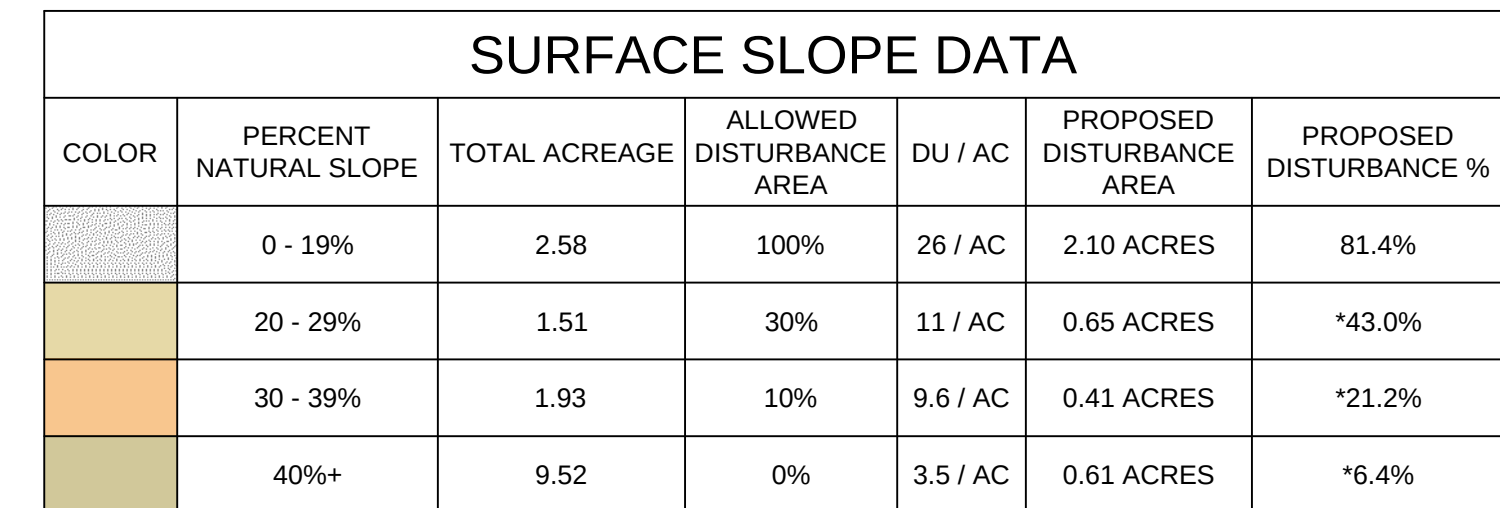
SHEET 3 OF 10
FILE: 191258 - FG OPT 3



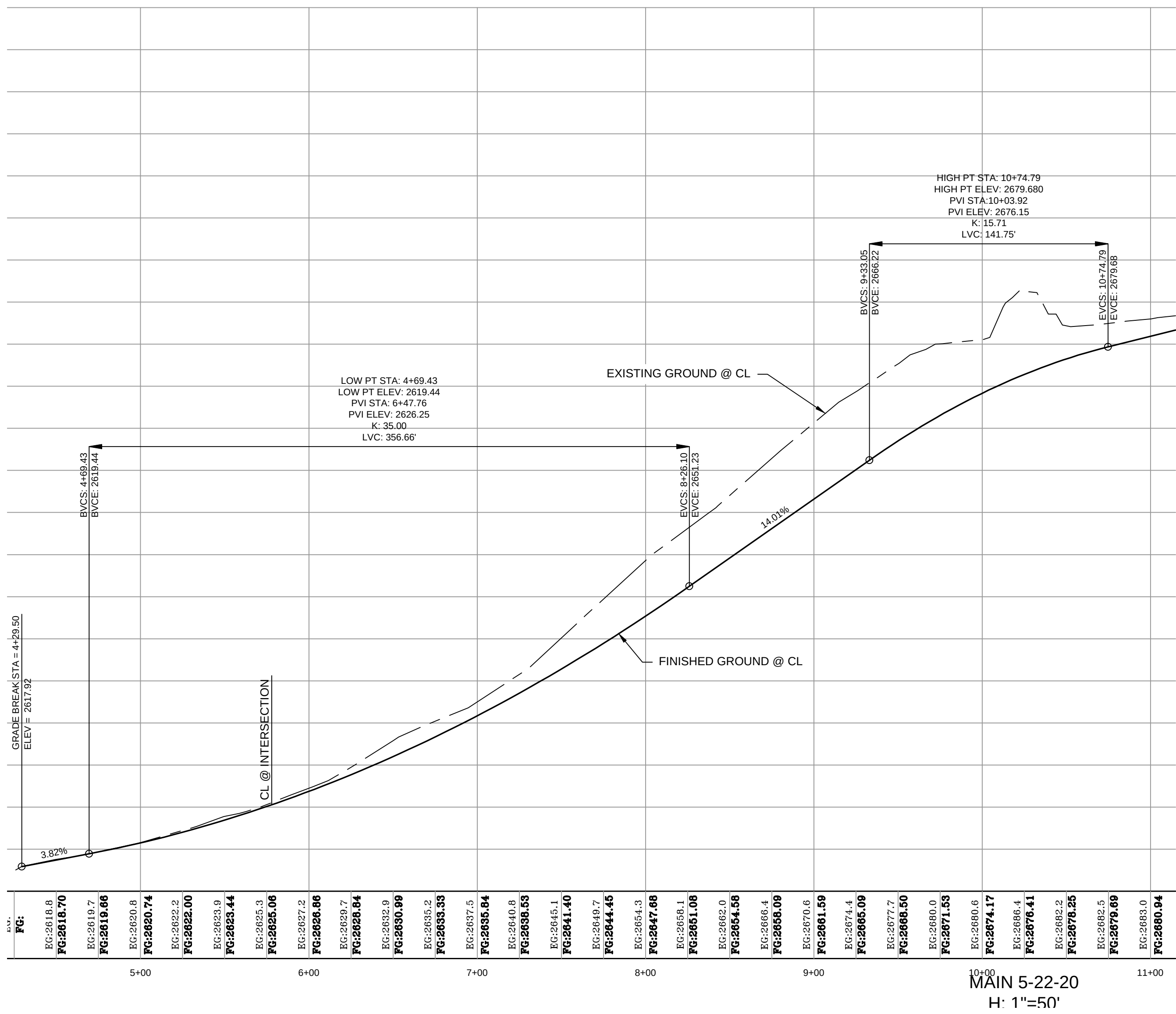
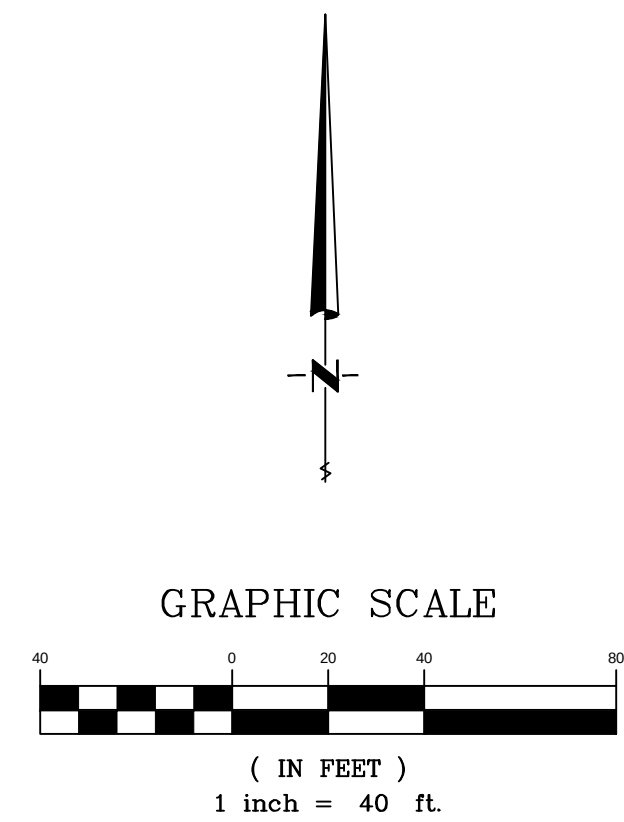
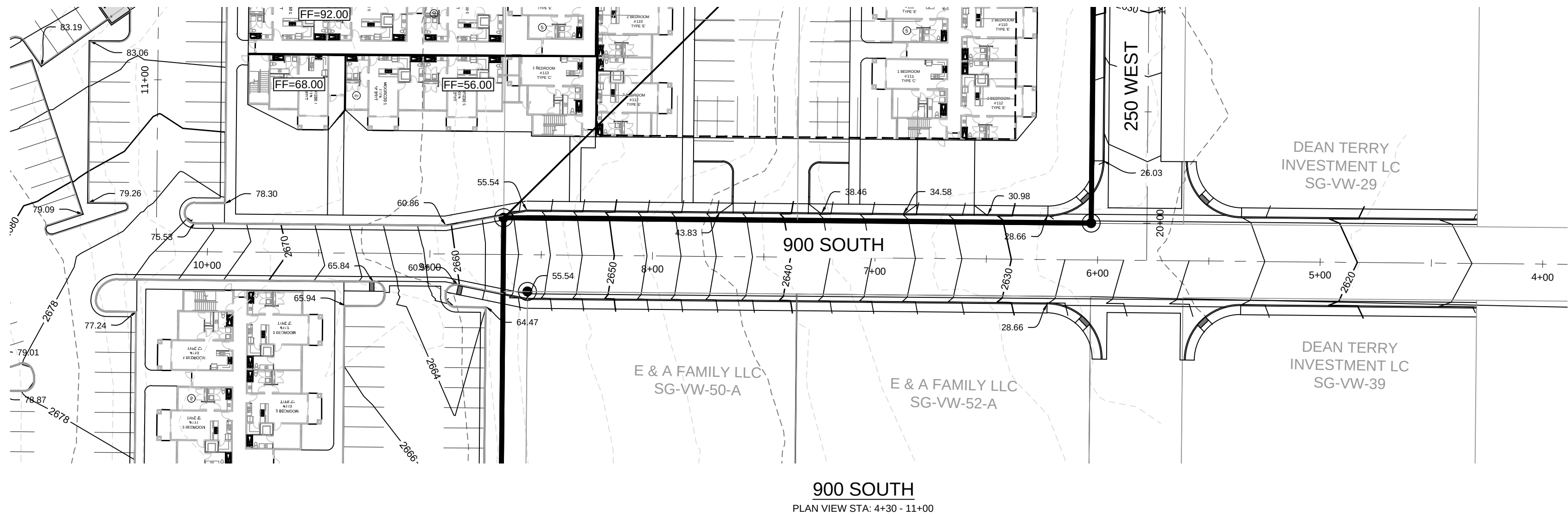


SLOPE ANALYSIS
THE COVE
ST GEORGE, UTAH

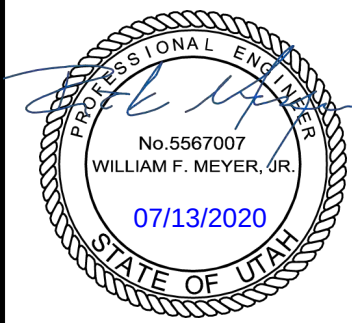
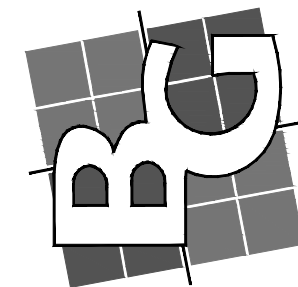
SHEET 4 OF 10 SHEETS
FILE:191258 SLOPE

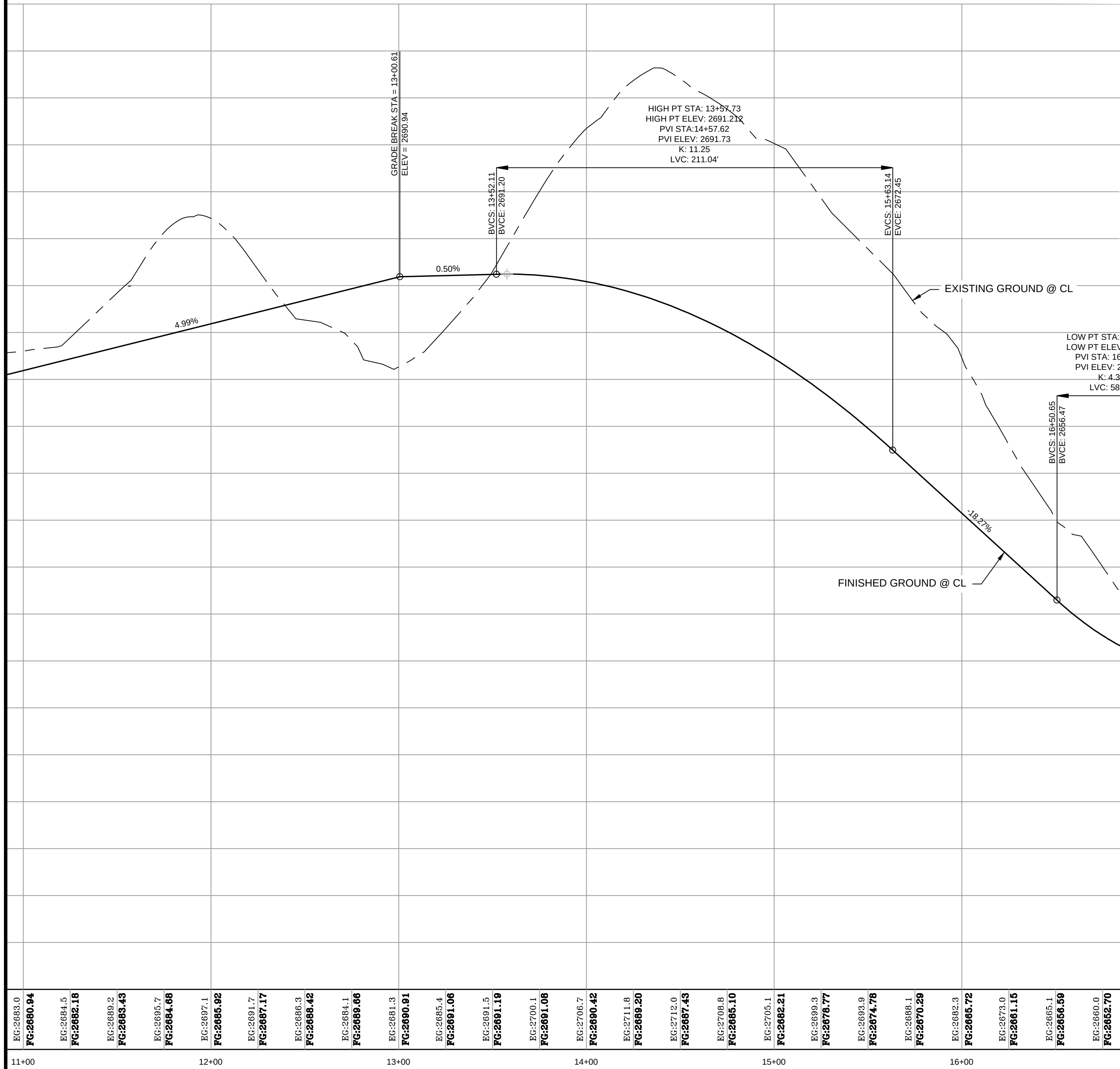


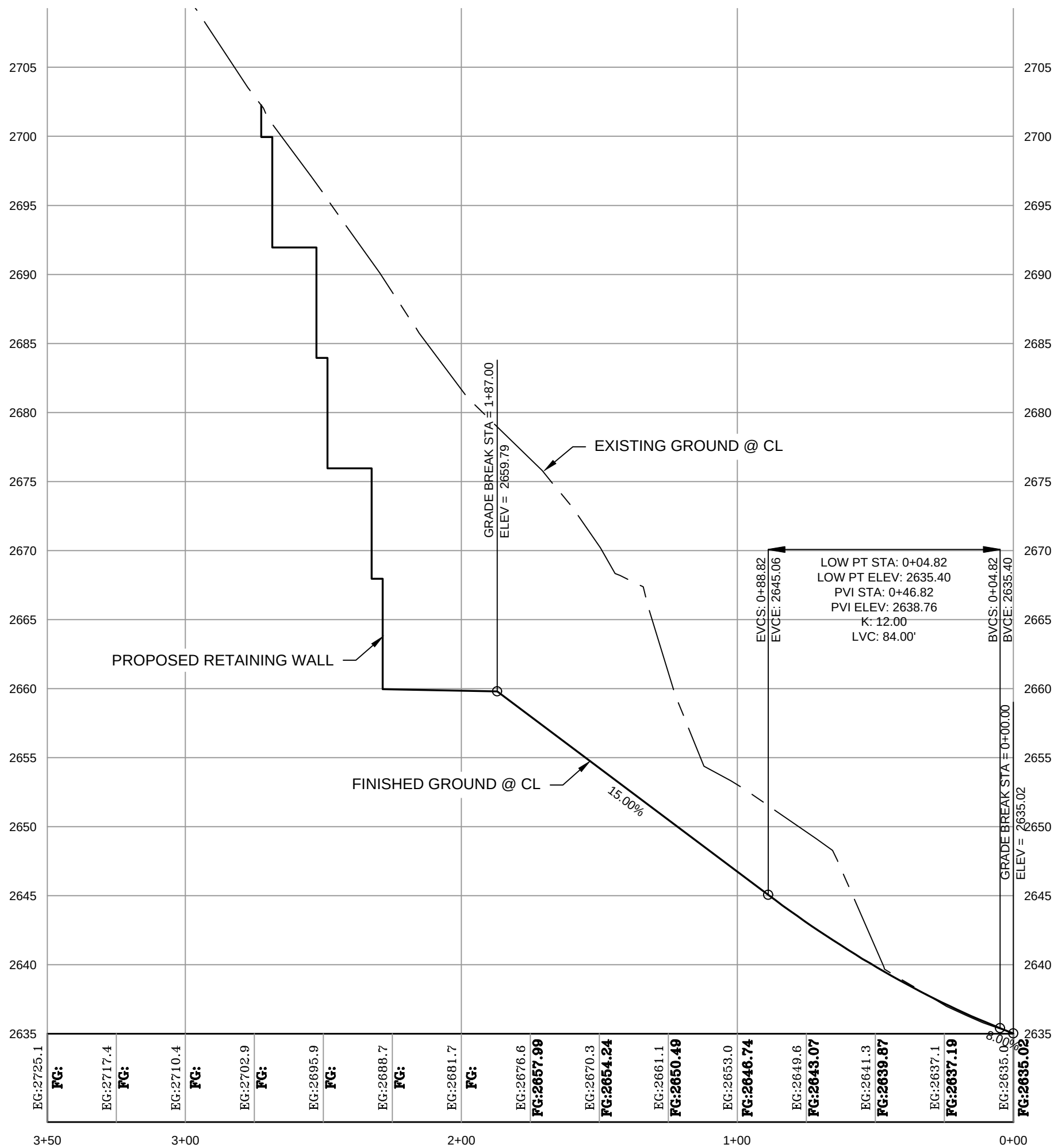
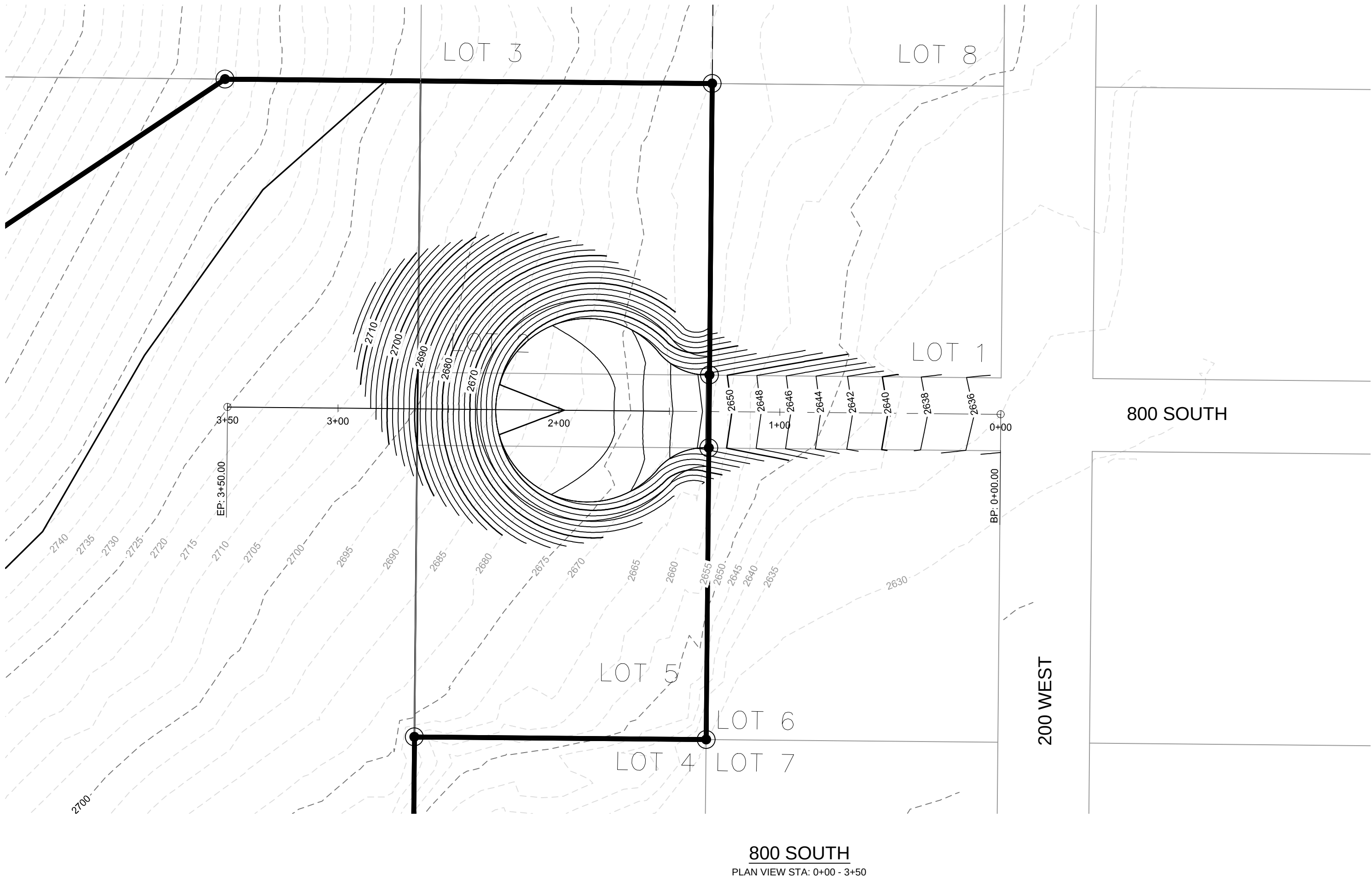
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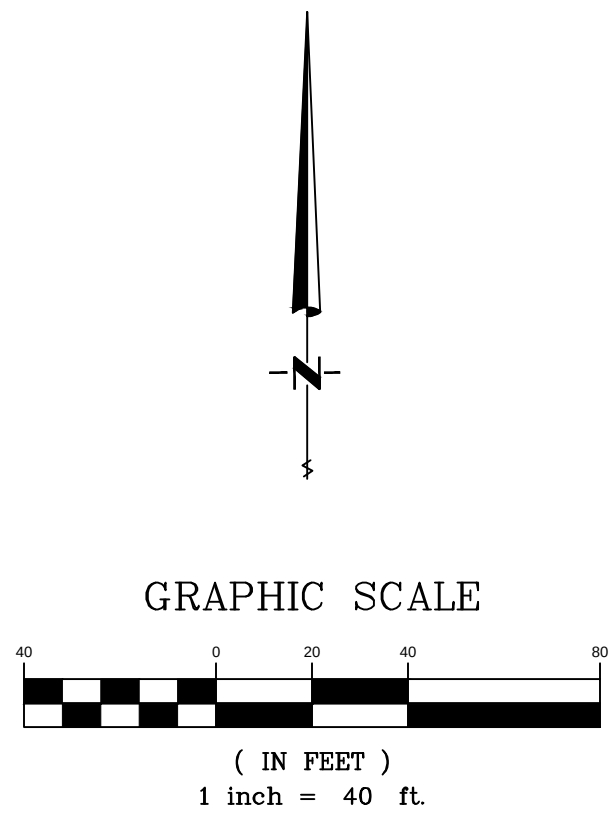
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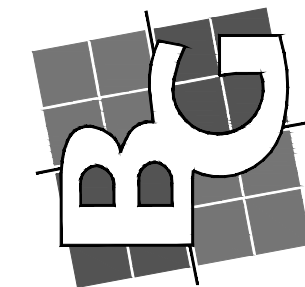
800 SOUTH 7-13-20
H: 1"=50'
V: 1"=10'



LEGEND

--- 2650 --- EXISTING GROUND CONTOUR
--- 2660 --- FINISH GROUND CONTOUR

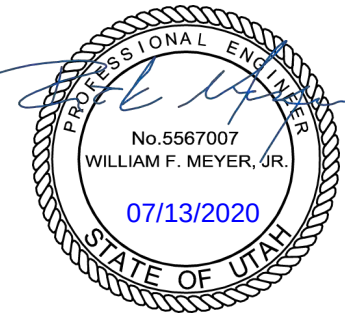
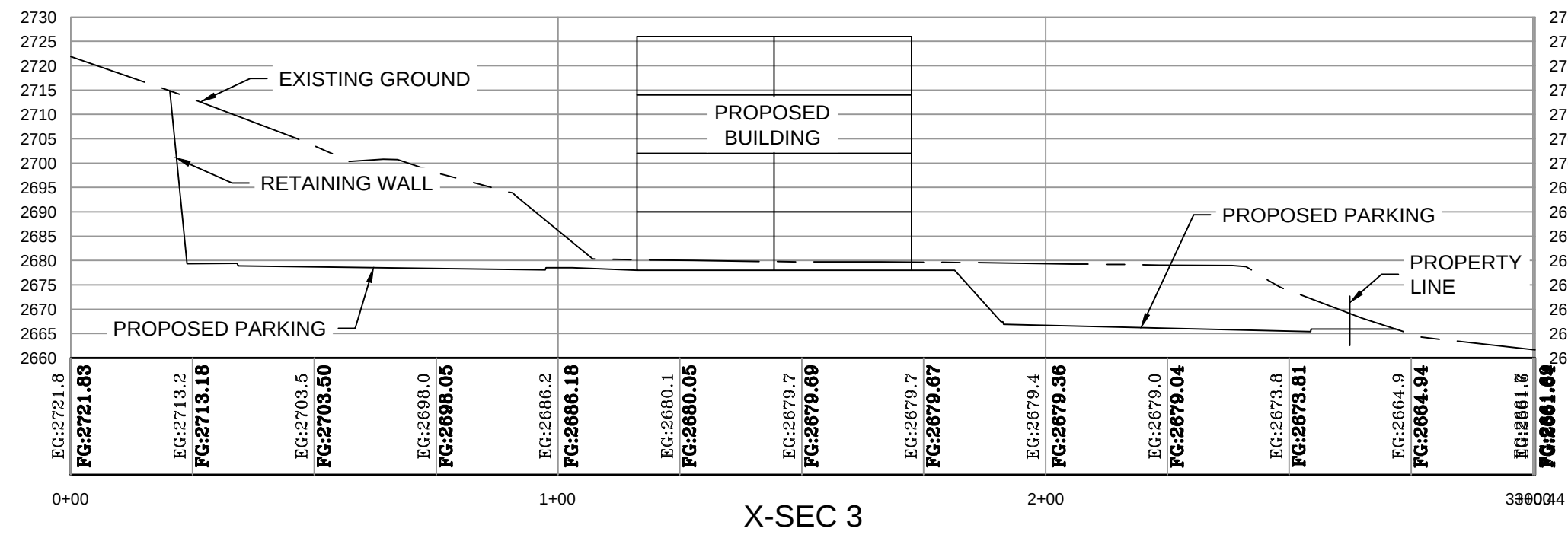
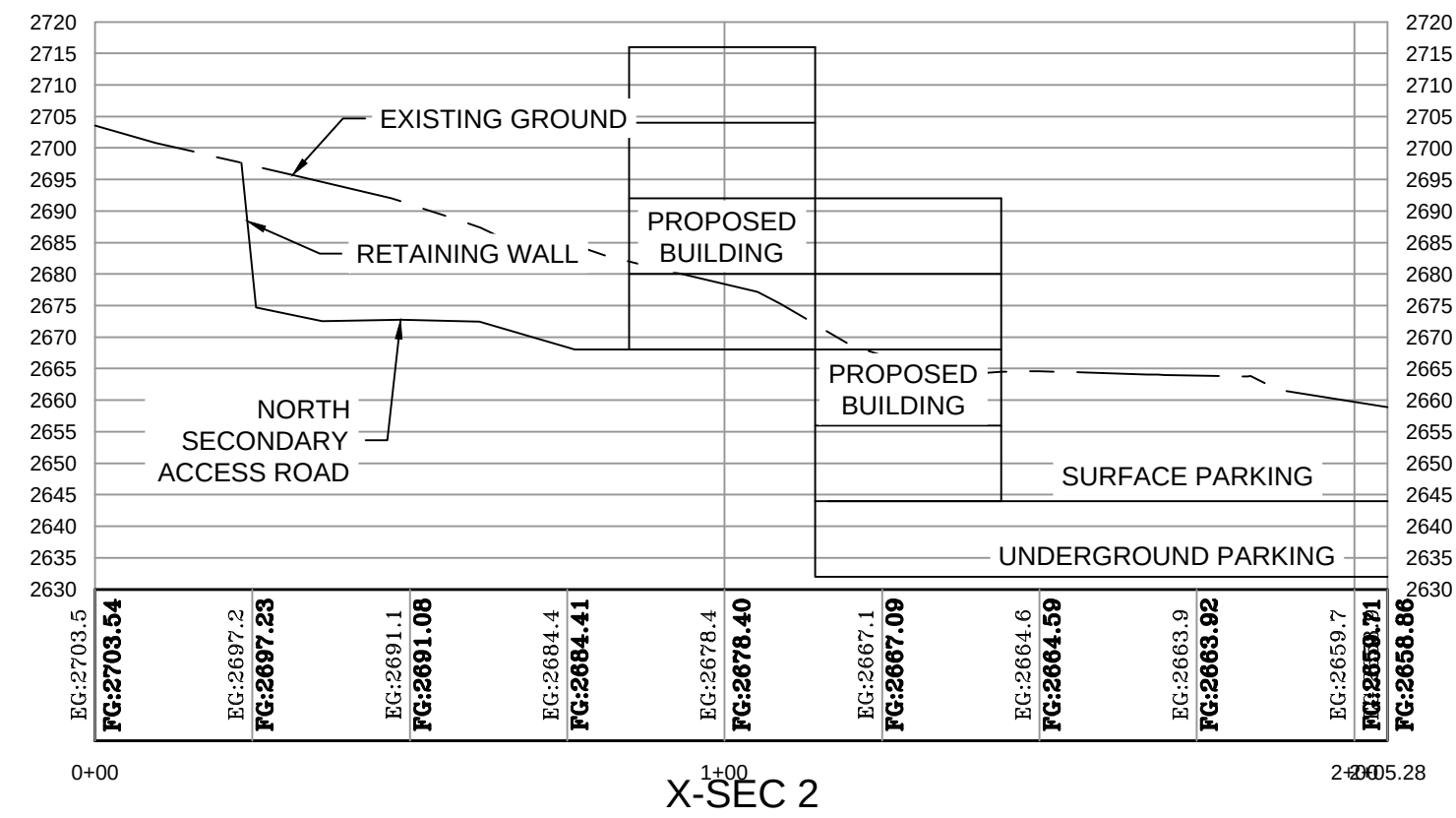
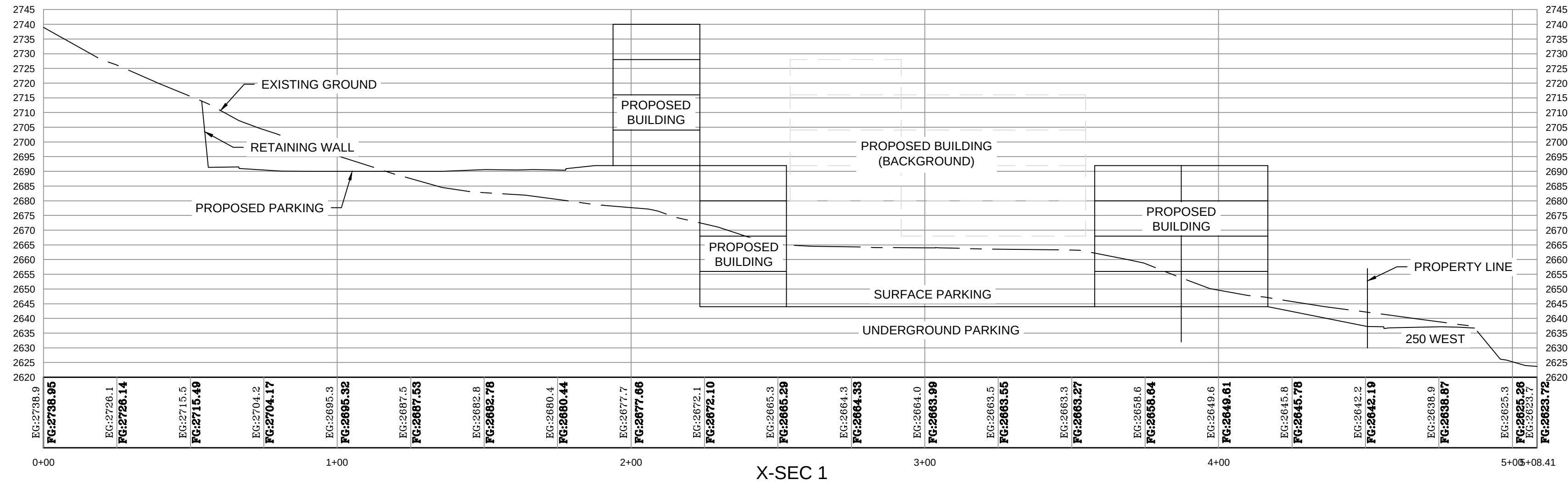
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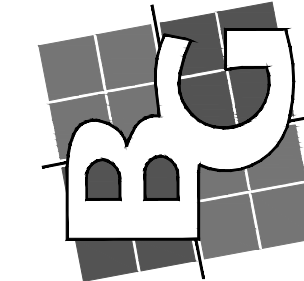
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APPROVED: WFM
SCALE: 1" = 40'
JOB NO.: 191258

800 SOUTH PLAN & PROFILE
THE COVE
ST. GEORGE, UTAH

SHEET 7 OF 10 SHEETS
FILE: 191258 - FG OPT 3

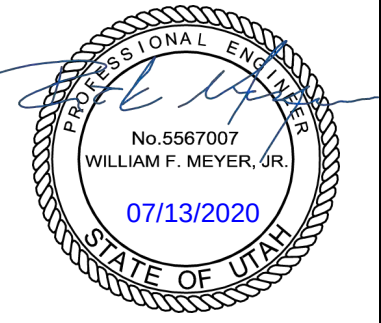
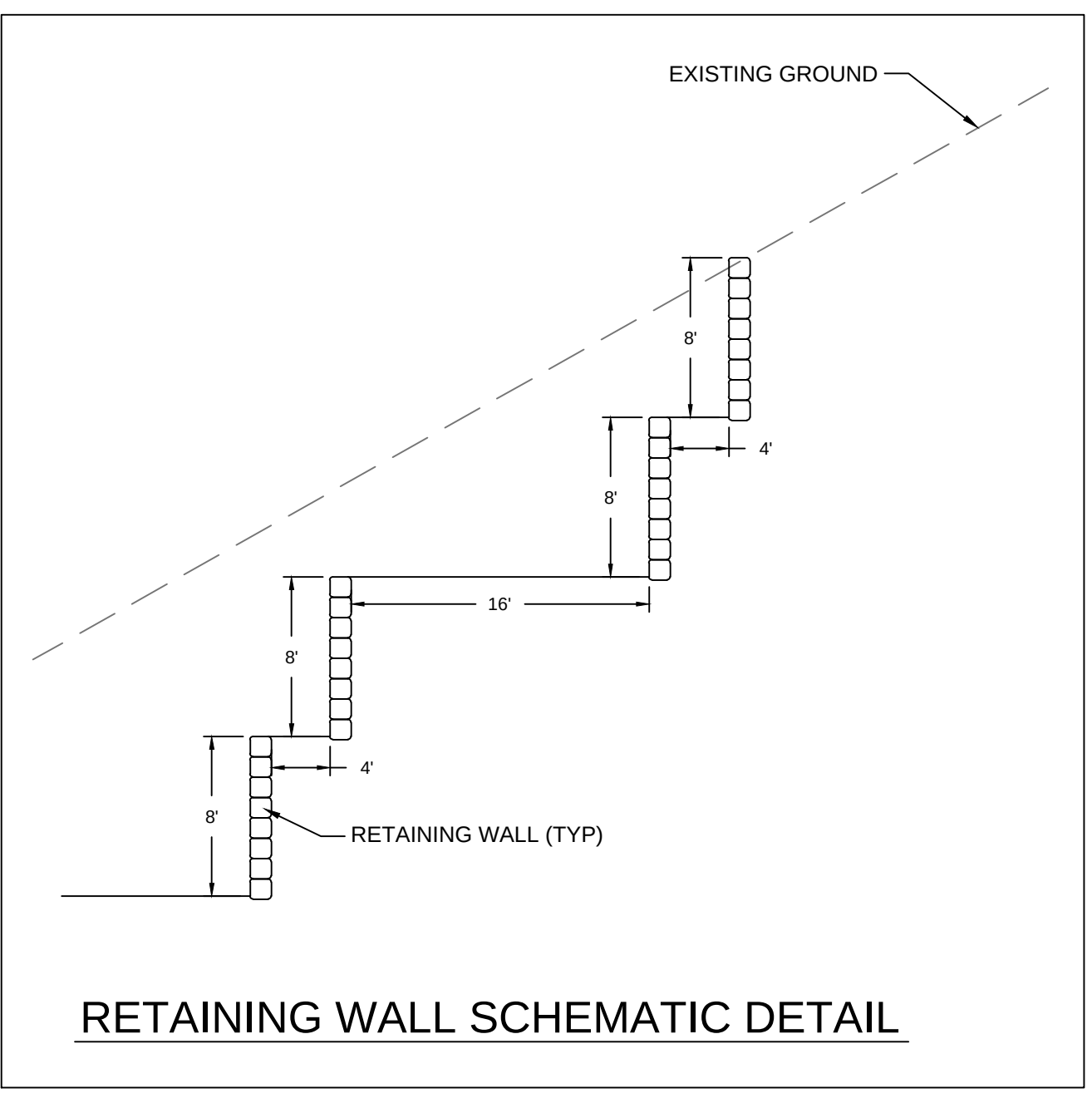
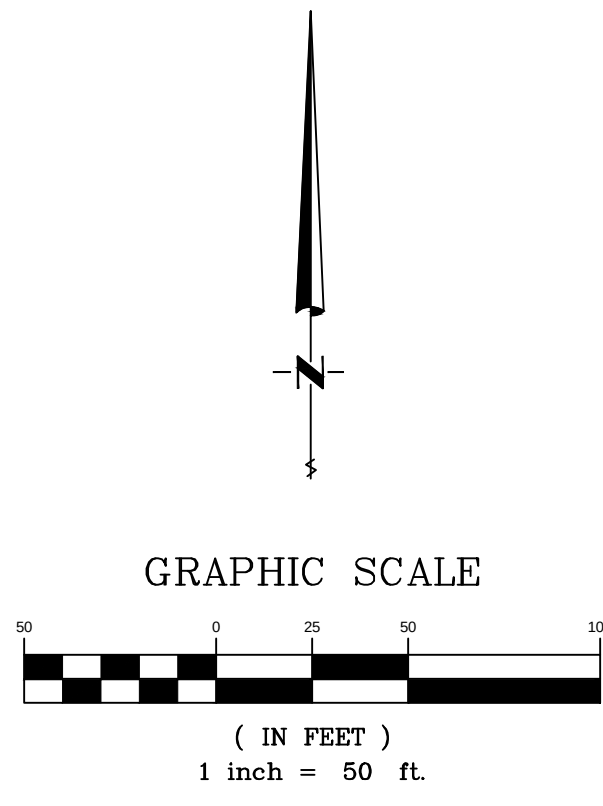
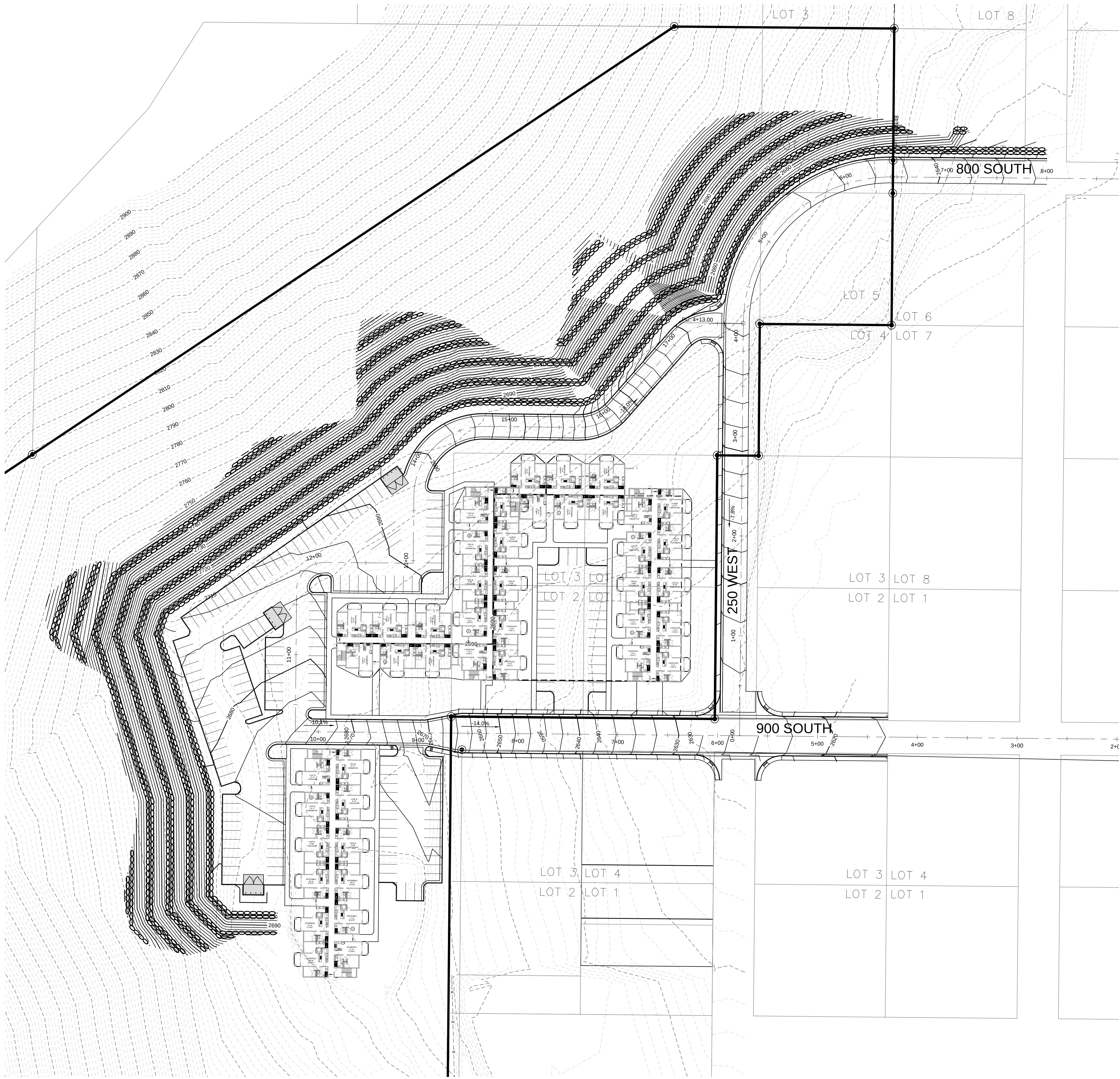


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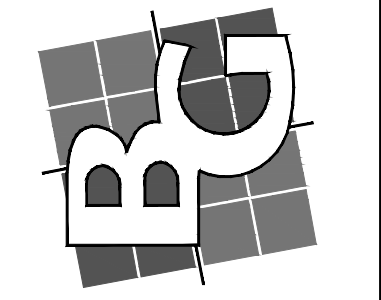
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APPROVED: WFM
SCALE: 1" = 40'
JOB NO.: 191258

CROSS SECTIONS
THE COVE
ST. GEORGE, UTAH



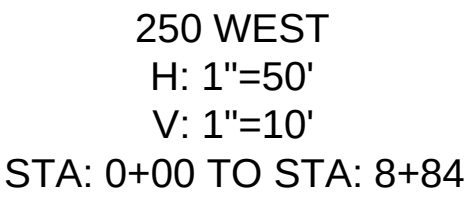
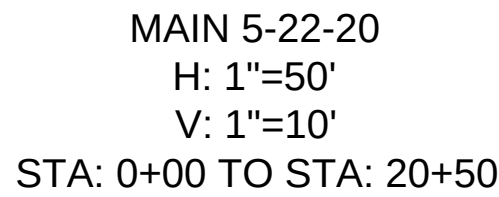
No.	Date	By	Revision

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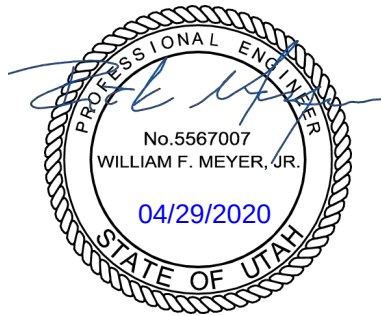
DATE: MAY 2020	DRAWN: _____	APPROVED: _____	SCALE: NOTED	JOB NO. _____
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OPTION 2 PLAN VIEW
THE COVE
ST GEORGE



Drainage Report

PRELIMINARY DRAINAGE STUDY
FOR
THE COVE
A Residential Subdivision located in
St. George, Utah



PREPARED BY:



Bush & Gudgell Engineering

205 East Tabernacle Suite #4

St. George, Utah 84770

Phone: (435) 673-2337

Fax: (435) 673-3161

www.bushandgudgell.com

Project Engineer

Date

Job Number

Rick Meyer, P.E.

April 29, 2020

B&G #191258

Introduction

The Cove is a proposed 16-acre multi-family residential project. The project is located in St George at the end of 900 South, just west of Bluff Street. It is pushed against the hillside below the old airport. It is located in the northeast quarter of section 36, township 42 south, range 16 west SLB&M. Approximate latitude and longitude coordinates are 37°05'33" N and 113°35'24" W (from Google Earth). The project will include multiple apartment buildings and parking lots.

The site generally slopes from west to east. The site is located within the hillside overlay zone. About 8 acres of the site is not developable due to slopes being greater than 40%. The land is currently undeveloped except for some grading that was done several years ago.

Drainage calculations were performed for this site. Pre-development and post-development runoff was calculated and the required detention volume was estimated. The purpose of this study is to discuss how these calculations were performed and discuss the data that backs them up.

Site Runoff

Autodesk Storm and Sanitary Analysis is the software that was used for calculating stormwater runoff for the site. The software takes area, curve number, time of concentration, and rainfall information and uses the TR-55 method to estimate runoff. Pre-development and post-development models were generated for these calculations. The table below shows the calculated runoff for each model. Also, see hydrographs in appendix.

Site Runoff	
Pre-Development	12.43 cfs
Post-Development	14.25 cfs

Area

The area used in calculating stormwater runoff for the site was the same in both pre-development and post-development models. It is the area of offsite runoff and the on-site area that will be developed. All developed area will be collected by the storm drain system. The area used for these models is 15.5 acres. The two models were broken up into smaller subbasins. The areas for each of these subbasins is shown in the table below.

Subbasin Area, acres		
Model	Subbasin	Area
Pre-Development	BAS-EX A	12.33
	BAS-EX B	3.20
Post-Development	BAS-A	2.18
	BAS-B	0.45
	BAS-C	1.34
	BAS-D	4.56
	BAS-E	0.63
	BAS-F	1.49
	BAS-G	1.80
	BAS-H	3.06

Curve Number

Curve number is a variable that relates soil conditions to stormwater runoff. The curve number is a function of land use and hydrologic soil group. A web soil survey was done on USDA.com (see

appendix). This survey helps to determine hydrologic soil group. The table below shows the curve numbers that were used for the two models.

Curve Numbers			
Model	Curve Number	Land Use	Hydrologic Soil Group
Pre-Development	85	Natural Western Desert	C
	63	Natural Western Desert	A
Post-Development	85	Natural Western Desert	C
	98	Paved Areas	A

Time of Concentration

The time of concentration (Tc) is defined as the time required for runoff to travel from the hydraulically most distant point of the sub-basin to where the runoff leaves the sub-basin (concentration point or spill point). Runoff moves through the sub-basin as sheet flow, shallow concentrated flow, open channel flow, or some combination of these. The type of runoff that occurs is a function of the sub-basin conveyance system and is best determined by field inspection. The time of concentration is determined by summing together all of the individual runoff travel times within the sub-basin. The table below shows the time of concentration used for each subbasin.

Time of Concentration, min		
Model	Subbasin	Tc
Pre-Development	BAS-EX A	7.69
	BAS-EX B	20.51
Post-Development	BAS-A	7.81
	BAS-B	7.54
	BAS-C	7.34
	BAS-D	8.71
	BAS-E	7.64
	BAS-F	7.34
	BAS-G	7.52
	BAS-H	47.96

Rainfall

The 100-year 3-hour storm (Farmer Fletcher distribution) storm was used to analyze the site. Information for this storm event was taken from the *City of St George Drainage Manual*. Total rainfall for this storm is 1.64 inches.

Detention

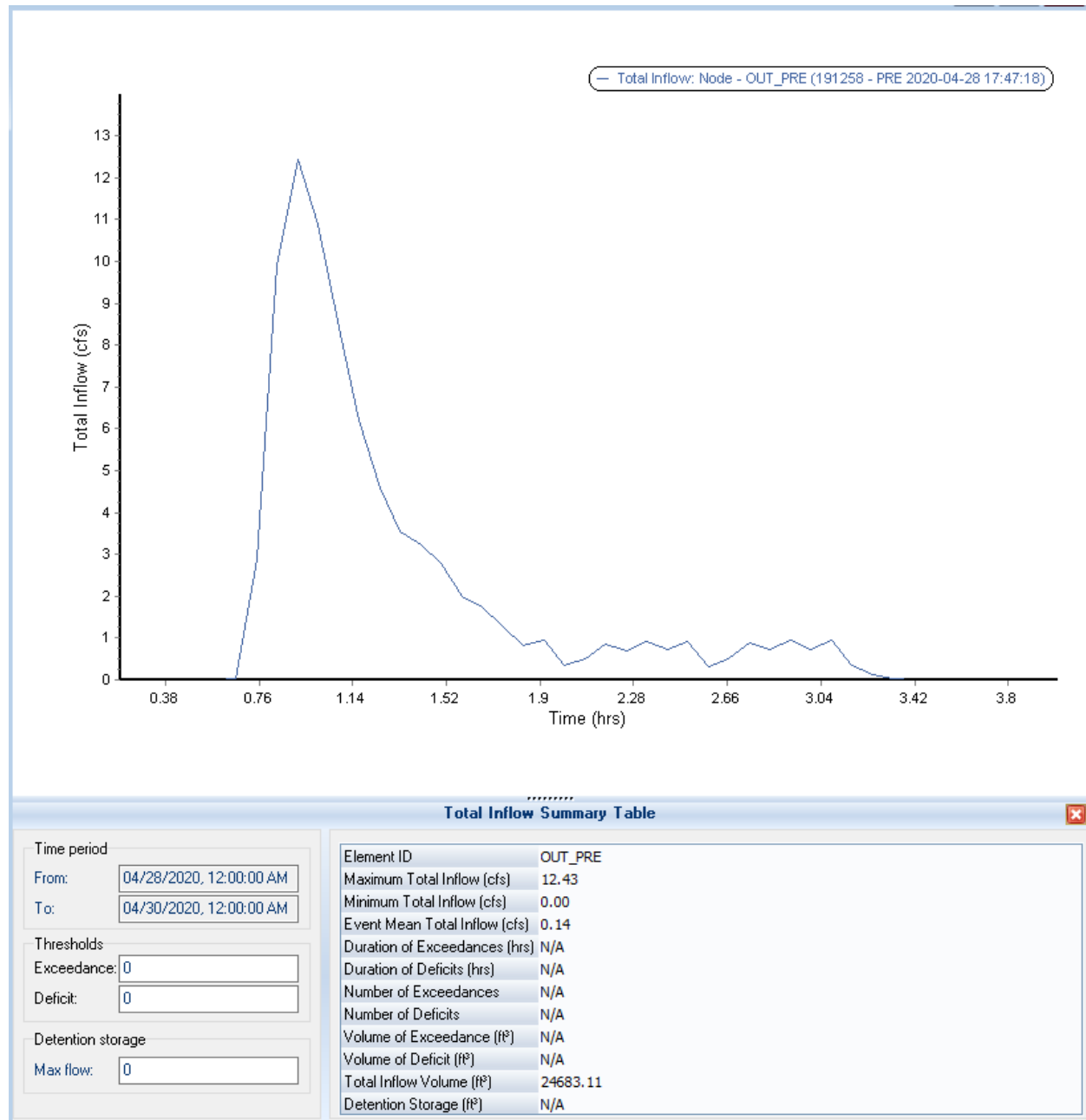
As the site develops, stormwater runoff will increase. A detention system will be used to reduce the peak runoff to pre-development levels. The allowable discharge for the post-development model is the peak runoff for the pre-development model. The allowable discharge was input into the post-development model and Storm and Sanitary Analysis returned the required detention volume (see appendix). This volume is 3733 cubic feet. This detention volume will take place in an underground system.

Conclusion

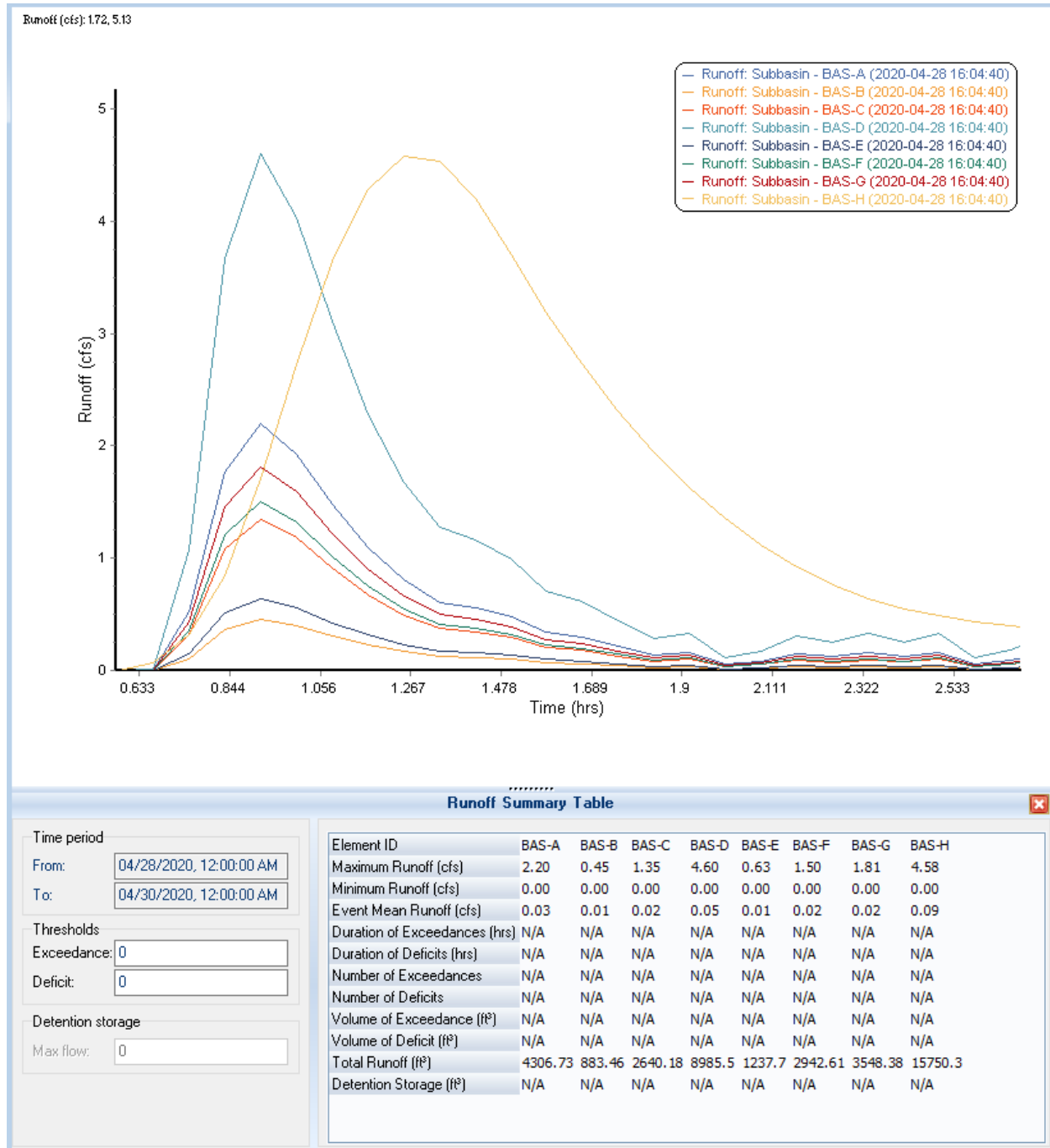
This preliminary drainage study for The Cove has addressed calculations for site runoff and stormwater detention storage. This study has shown that drainage requirements for the site are feasible. The final drainage study will provide more details for the stormwater system (inlet capture rates, pipe sizing, orifice size, detention system details, drainage swales, etc).

Appendix

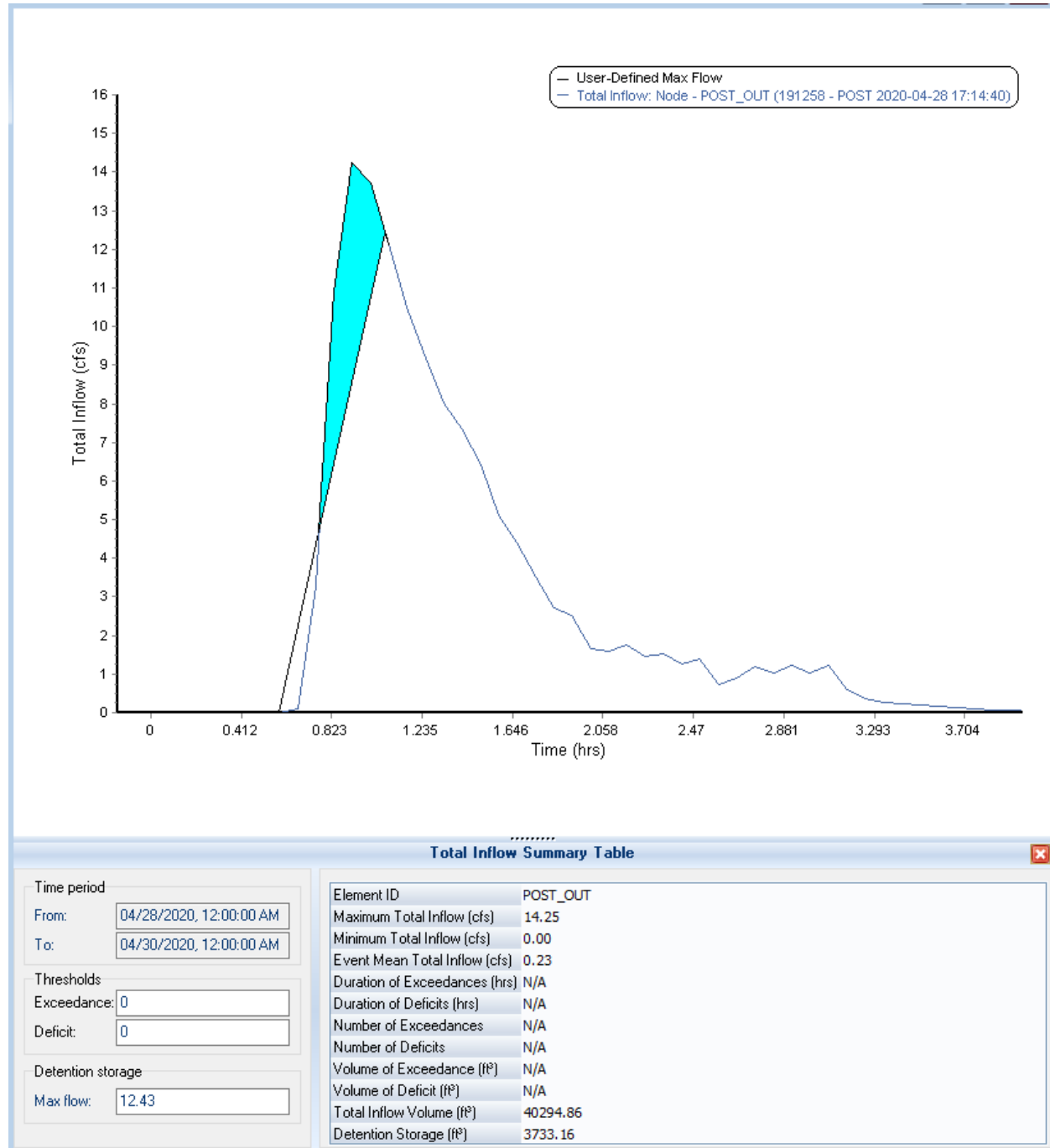
Pre-Development Runoff Hydrograph



Post-Development Runoff Hydrographs



Required Detention



Geotechnical Report



**GEOTECHNICAL INVESTIGATION
& HILLSIDE EVALUATION**

THE COVE

ST. GEORGE, UTAH

PREPARED FOR:

**HOLDAWAY CONSTRUCTION
38 E. 590 N.
HURRICANE, UTAH 84737**

ATTN:

BRENT HOLDAWAY

PROJECT NO. 2192092

JULY 1, 2020

TABLE OF CONTENTS

SUMMARY.....	Page 1
SCOPE.....	Page 3
SITE CONDITIONS.	Page 3
FIELD STUDY.....	Page 4
SUBSURFACE SOIL CONDITIONS.....	Page 4
GEOLOGY.	Page 4
A. Geomorphology of the Area.....	Page 5
B. Stratigraphy of the Area.....	Page 5
GEOLOGIC HAZARDS.....	Page 6
A. Liquefaction.....	Page 6
B. Flooding.....	Page 6
C. Expansive Soil/Bedrock.....	Page 6
D. Landslides.....	Page 6
E. Rock Fall.....	Page 6
F. Faults.....	Page 6
PROPOSED CONSTRUCTION.....	Page 7
RECOMMENDATIONS.....	Page 7
A. Site Grading.....	Page 8
B. Foundation Recommendations.....	Page 12
C. Concrete Slab-on-Grade.....	Page 13
D. Lateral Earth Pressures.....	Page 14
E. Seismicity.....	Page 15
F. Soil Corrosion.....	Page 16
G. Pavement.....	Page 17
H. Construction Testing and Observations.....	Page 18
I. Geotechnical Recommendations Review.....	Page 19
LIMITATIONS.....	Page 19
REFERENCES.....	Page 20
Vicinity Map.....	Figure 1
Site Plan.....	Figure 2 and 2a
Logs, Legend and Notes of Exploratory Borings and Test Pits.....	Figures 3-6

SUMMARY

1. This report is a preliminary geotechnical study and also a part of the hillside submittal for St. George City Hillside Ordinance. A final report with details for design and construction will be provided up completion of the laboratory testing and evaluation of the proposed construction.
2. The site was evaluated by drilling 8 borings and observing the excavation of 4 test pits at the approximate locations shown on Figure 2 and 2a. The subsurface profile observed within the borings and test pits consisted of varied thicknesses of sand and gravel and clay overlying various types of bedrock. The bedrock varies from siltstone to shale to claystone.

The bedrock is mapped as Dinosaur Canyon member of the Moenave Formation. Portions of the bedrock appear to be expansive. Laboratory testing is currently in progress to identify the layers and magnitude of the expansive characteristics.

3. Groundwater was encountered at various depths from 14 to 50 feet below the surface. Fluctuations in groundwater may occur over time. An evaluation of such fluctuations was beyond the scope of this report. Springs or seepages were not observed on the site. The affect of the groundwater will be evaluated and recommendations provided in the final report.
4. The topography of the site consists of a moderately steep to more gentle hillside sloping down to the east and south. The site is a cove or bowl type shape. The site is proposed to be graded by small cuts on the west and north and filling to the east and south. There will be significant cuts for the lower parking levels and building levels.
5. Based on the proposed grading, we anticipate that the majority of the cuts will be in the sands and gravels and will expose the various bedrock layers. We anticipate that the cuts for buildings will be shored temporarily and retained permanently. The upper cut on the parking area will be retained using stacked rock slopes.
6. AGECH has previously provided a Geologic hazard Assessment dated January 6, 2020. This report is attached. The geologic hazard of potentially expansive bedrock layers has not been addressed in the previous report. This hazard is discussed in this report.
7. The proposed structures may be supported on conventional spread footings bearing on a properly prepared subgrade. As an alternative, micropiles or deep foundations may be utilized. Following completion of the laboratory testing and final details of construction, detailed foundation recommendations will be provided.
8. The on-site sand and gravel soils, free of organics and debris, are suitable for use as structural fill, site grading fill, and utility trench backfill. There are occasional surface cobbles and boulders along with limited subsurface materials that are oversized for use as fill materials. The oversized material will require processing to remove the larger particles such that the maximum particle size is 6 inches and at least 50 percent of the material

passes the No. 4 sieve. Larger materials may be used on slopes for erosion protection or placed in deeper fills, provided they are properly nested. The on-site claystone bedrock is not suitable for use as structural fill, but may be used as fill in non-structural areas or as trench backfill, wall backfill, or at least 4 feet below pavement areas.

9. Positive drainage of the surface soils within the development is critical and should be maintained throughout the development. We recommend the piping of surface drainage and in no case should be ponding of water be allowed adjacent to or up-gradient of structures.

SCOPE

This report presents the results of a preliminary geotechnical investigation and hillside evaluation for the proposed Cove Development to be located in St. George, Utah, as shown in Figure 1. This report presents the subsurface conditions encountered, laboratory test results, and recommendations for the project. AGECH has previously completed a Geologic-hazard Assessment for the project dated January 6, 2020.

A field exploration of 8 borings and 4 test pits were conducted to obtain information on the subsurface conditions and to obtain samples for laboratory testing. Information obtained from the field and laboratory was used to define conditions at the site and to develop recommendations for the proposed development. AGECH has also utilized the proposed grading plans and conceptual plans to develop our recommendations. Additional details will be provided in a final report following completion of the laboratory testing.

This report has been prepared to summarize the data obtained during the study and to present our conclusions and recommendations based on the proposed construction and the subsurface conditions encountered. The report is intended to meet the requirements for evaluation for St. George City Hillside developments. The findings, conclusions and recommendations for design and construction are included in this report.

SITE CONDITIONS

The subject site consists of the parcel shown on Figure 1. The property is located west of the proposed 250 West at approximately 900 South and encompasses the hillside area or “bowl” type area as shown on the attached Figures 1, 2 and 2a. The property is moderately steep with a flatter area at the base of the hillside. Portions of the property have been previously graded with pad areas along the north and western portions of the planned construction area. The property is sparsely covered with vegetation consisting of small brush and grasses.

FIELD STUDY

On June 4-10, 2020, an engineer from AGECH visited the site for a subsurface investigation. Eight borings were drilled using a truck mounted rig using hollow stem augers. Portions of the bedrock were cored using mud rotary or air to removed cuttings from a 2.5 inch HQ core barrel for continuous sampling. The 4 test pits were excavated with a track excavator. The locations are shown on Figure 2 and 2a.

SUBSURFACE SOIL CONDITIONS

The subsurface profile observed within the borings and test pits consisted of varied thicknesses of sand and gravel and clay overlying various types of bedrock. The bedrock varies from siltstone to shale to claystone.

The bedrock is mapped as Dinosaur Canyon member of the Moenave Formation. Portions of the bedrock appear to be expansive. Laboratory testing is currently in progress to identify the layers and magnitude of the expansive characteristics.

The preliminary boring and test pit logs are shown on Figures 3 to 6 with the legend and notes on Figure 7. These logs will be updated following the classification data provided from laboratory testing in a final report.

GEOLOGY

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

A. Geomorphology of the Area

The site is located along the east slope of the West Black Ridge or Cedar Bench Lava Flow in St. George, Utah as shown on Figure 1. The site is also located on the north side of the Virgin River Anticline. This area is part of the St. George Basin which is bound on the north by the Pine Valley Mountains, on the east by the Hurricane Cliffs, on the west by the Beaver Dam Mountains, and on the south by the Mount Trumbull area.

Bedrock in the St. George basin mainly consists of Upper Permian and Lower Jurassic sandstone, shale, siltstone, limestone, gypsum, and conglomerate. These beds are folded to the southeast into the northeast trending Virgin anticline. Several north-trending faults are present within the St. George Basin, the most prominent of which is the Washington Fault (Christensen and Deen, 1983).

The St. George Basin is characterized by basalt capped buttes and cuestas that were once stream channels along which lava flowed. Erosion of the surrounding softer sedimentary rocks over time has resulted in an inverted topography of old stream channel becoming resistant basalt ridges such as the Middleton Black Ridge and the West Black Ridge (Christenson and Deen, 1983).

The geologic structure within the basin is dominated by the Virgin anticline which trends northwest to southeast and is located south of the site. The Virgin anticline is a broad, generally symmetrical fold with maximum flank dips of 25 to 30 degrees to the northwest and southeast (Christenson and Deen, 1983).

The geologic conditions at the site were evaluated based on a review of geologic literature, boring and test pit exploration and a reconnaissance of the site.

B. Stratigraphy of the Area

The stratigraphy of the area consists of Upper Triassic to Lower Jurassic- aged bedrock of the Moenave Formation. There is alluvium (Holocene to lower Pleistocene aged) deposits over the Chinle that cover the majority of the site. The top of the ridge is capped by the Lava Ridge lava flow, which consists of Basalt of the lower Pleistocene aged deposit.

GEOLOGIC HAZARDS

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

A. Liquefaction

Relatively shallow bedrock was encountered across the site. Thus, based upon subsurface conditions encountered our experience in the area, the subsurface soils below the developed areas are considered to be a non-liquefiable during a severe seismic event to the depths investigated.

B. Expansive Soil/Bedrock

The presence of potentially expansive layers of bedrock is identified by the geologic mapping hazard by Lund and others, 2008. The expansive bedrock is mapped as the Dinosaur Canyon member of the Moenave Formation. Our laboratory testing is currently in progress. Our experience in the area also indicate that claystone bedrock on the project site is moderately expansive.

An evaluation and analysis along with detailed recommendations to address this concern for expansive layers will be provided in a final report.

D. Landslides

See attached document.

E. Rock Fall

See attached document.

F. Faults

Based on previous work by Christenson and Deen (1983), Willis and Higgins (1995) Lund and others (2008), the inferred location of the St. George Fault is located further east near River Road.

PROPOSED CONSTRUCTION

The Cove Development will consist of developing the property with two 2 apartment/townhome type buildings. The buildings will be multiple levels with underground parking. The buildings are to be constructed with reinforced concrete on the garage level and wood framing on the above grade levels. We anticipate wall loads on the order of 8 to 10 kips per lineal foot and column loads up to 300 kips.

There will be access to the site from 900 South and 250 West which will be further improved as a part of the site development. There is an existing sewer up the 900 South roadway alignment. The anticipated traffic for the different areas consists of a Traffic Index of 7 for the Public Roads and a 5 for the parking and access areas.

The proposed grading consists of significant temporary cuts for construction. The cuts will be retained or shored during construction. The hill side cuts above the parking area are proposed to be retained by rockery faced slopes. The fills will be located in walkout areas and in the lower area on the west side of the project.

The proposed construction, or building loads are estimated and should be verified to refine our recommendations in the final report.

RECOMMENDATIONS

Based on our experience in the area, the subsurface conditions encountered, our engineering analysis, and the proposed construction, the following recommendations are provided. A final report will be provided that defines the expansive bedrock characteristics following completion of the lab testing. The final report will include overexcavation depths for buildings, foundation alternatives such as micropiles and shoring recommendations.

A. Site Grading

Based on the subsurface conditions and proposed grading provided by Bush & Gudgell Engineering, the following is provided:

1. Subgrade Preparation

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

Expansive Bedrock Removal - Buildings and Structures: We recommend that a separation be provided between the expansive claystone and the building pad grades. The thickness of removal will be defined and provided in a final report as the laboratory testing is completed. The claystone should be removed below structures, entry areas and canopies, extending at least 5 feet beyond the perimeter of the structure. The limits of removal should be determined by survey and documented following removal.

Expansive Bedrock Removal - Roadways and Flatwork: We recommend providing at least a separation of 4 feet below the proposed subgrade elevation and the surface of the expansive mudstone. The material should be removed a distance of at least 2 feet beyond the edge of roadway/flatwork improvements .

2. Excavation/Slopes

Based on the proposed grading, we anticipate that the majority of the cuts will be in bedrock. The cuts are significant and will require shoring or permanent retaining. Details will be provided in a final report.

The upper cuts will be in the sands and gravels with portions of the parking cuts extending into the bedrock. In order to maintain stable slopes, they should be retained or slopes should be graded no steeper than 2:1 Horizontal to Vertical (H:V). Fill slopes should be graded no steeper than 2:1 (H:V).

To control erosion and weathering, the bedrock cut slopes should be protected by erosion protection. This would be particularly critical where softer bedrock is exposed. Benches may also be cut into the slopes to assist in controlling drainage and erosion. Benches should be at least 5 feet in width and should be constructed at intervals in accordance with the 2018 IBC. In lieu of facing bedrock cuts, they could be flattened to a 3:1 (H:V) slope.

Fill slopes should be constructed by overbuilding the slope and then cutting back the slope face to the desired grade to provide a properly compacted slope face. Fill placed on existing slopes steeper than 3:1 (H:V) should be keyed into the existing slope using a benching procedure. Benches should be of sufficient width to allow for operation of compaction equipment.

Utility trenches excavated in the on-site soils should be excavated in accordance with OSHA requirements using a OSHA Soil Class C (1½:1 H:V) for overburden soils and Soil Class A (½:1 H:V) for trenches excavated into the bedrock. Steeper trenches may require the use of shoring or a trench box to provide as safe work environment. Safe trench excavation is the responsibility of the contractor.

3. Materials

Import materials should be non-expansive, non-gypsiferous, granular soil. Listed below are the materials recommended for imported fill.

Area	Fill Type	Recommendations
Foundations/slabs	Site grading/ structural fill	-200 <35%, LL <30% Maximum size: 4 inches Solubility < 1%
Roadways	Base course	CBR >50%, 200 <12% Maximum size: ¾ inch
Underslab	Base course	-200 <12% Maximum size: 1 inch

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

The on-site silt, sand and gravel soils and fill soils, free of organics and debris, are suitable for use as structural fill, site grading fill, and utility trench backfill. The on-site claystone is not suitable for use as structural fill or site grading fill, but may be used as fill in non structural areas, trench backfill, wall backfill, or at least 4 feet below pavement areas. An AGECE engineer should observe the bedrock removal to determine suitability for its intended use.

4. Compaction

Compaction of fill materials placed at the site should equal or exceed the following percentages when compared to the maximum dry density as determined by ASTM D-698 or ASTM D-1557:

Area	Percent Compaction ASTM D-698*	Percent Compaction ASTM D-1557**
Subgrade	90	90
Footings/foundations	NA	95
Slabs/Pad Fill (over excavation)	100	95
Utility trench backfill (Structural Areas)	100	95
Wall Backfill (Structural Areas)	100	95

* Fine-grained or processed mudstone/clay.

** Granular site grading/structural fill

Fill should be placed in lifts which do not exceed the capability of the equipment used. Generally 6 to 8 inch lifts are adequate for heavy rubber tire equipment. Lift thicknesses should be reduced to 4 inches for hand compaction equipment. Fill placed at the site should be properly moisture conditioned prior to placement and should be tested to verify proper compaction.

Fill materials should be properly moisture conditioned prior to placement. Fine-grained should be moisture conditioned to 0 to 4 percentage points over the optimum moisture content as determined by ASTM D-698. Granular soil should be

moisture conditioned to within 2 percentage points of the optimum moisture content as determined by ASTM D-1557.

5. Drainage

The following drainage recommendations should be implemented:

- Positive site drainage should be maintained during the course of construction. In no case should water be allowed to pond adjacent to buildings/foundations.
- After construction has been completed, positive drainage of surface water away from the structures should be maintained throughout the life of the structures. We recommend a minimum slope of 6 inches in the first 10 feet from the perimeter of the structures. Hard or impermeable surfaces may be used to direct water away from buildings.
- Roof gutters should also be utilized with downspouts which extend out away and down slope from buildings. Preferably, downspouts should discharge off-site.
- Landscaping that requires water (grass) should be limited to reduce the potential for wetting of foundation support soils and to reduce the potential future accumulation of perched water on top of the bedrock.
- We also recommend that desert landscaping, which requires little to no water, be used adjacent to concrete or masonry walls which will be backfilled to reduce salt migration of soluble salts and the subsequent salt weathering on cement containing elements. The below grade portions of walls/fences which are backfilled with soil should be protected with an impermeable membrane and a subsurface drain. A gravel covered, perforated PVC pipe should also be placed at the base of the wall to carry water to a discharge point. This is intended to reduce the potential for salt weathering and sulfate attack on concrete/masonry.

6. Subsurface Drainage Protection

A perimeter subsurface drain should be provided around the basement of each structure.

The drain system should consist of 1 foot of gravel adjacent the perimeter foundation supporting the building. A 4 inch perforated PVC pipe should be placed in the bottom of the gravel zone sloped at a 1% grade (minimum) to drain by gravity. Prior to backfilling, Mirafi 140N filter fabric should be placed over the gravel.

B. **Foundation Recommendations**

Based on the subsurface conditions, the proposed grading provided by Bush & Gudgeon Engineering and that the proper separation from expansive soils has been provided, the following foundation recommendations are provided for support of slab on grade foundations. If the expansive soils are not removed to provide the proper separation, the use of micropiles or a deep foundation system should be used. Recommendations for deep foundation systems are not included in this report. If requested, those recommendations can be provided.

1. Foundations

The proposed structures may be supported on conventional spread footings with slab-on-grade floors supported on a properly prepared subgrade as indicated in the Subgrade Preparation section of this report.

2. Bearing Material

Footings should bear on properly compacted structural fill underlain by a properly prepared subgrade as recommended in the Subgrade Preparation section of this report.

3. Bearing Pressure

Spread footings bearing on properly compacted structural fill may be designed for a net allowable bearing pressure of 2,500 pounds per square foot (psf). Spot footings supporting columns or footings with a width of greater than 3 feet may be

designed for a net allowable bearing pressure of 3,000 psf. If larger footings are anticipated, the bearing pressures may be increased with further evaluation.

4. Temporary Loading Conditions

The bearing pressure indicated above may be increased by one-half for temporary wind and seismic loads.

5. Footing Width and Embedment

Spread footings should have a minimum width of 18 inches and exterior or unheated footings should be embedded at least 12 inches below the lowest adjacent grade.

6. Settlement/Heave

Based on the subsoil conditions encountered and the anticipated building loads, we estimate a total settlement/heave for the foundation designed as indicated above to be up to approximately 1 inch. Differential settlement is estimated to be approximately ½ inch.

C. Concrete Slab-on-Grade

1. Slab Support

Concrete slabs may be supported on a properly compacted subgrade as recommended in the Subgrade Preparation section of this report. Fill placed in slab areas should be tested to verify compaction meets the recommendations provided within this report.

2. Underslab Base Course

A 4-inch layer of properly compacted base course should be placed below slabs to provide a firm and consistent subgrade and promote even curing of the concrete.

D. Lateral Earth Pressures

1. Lateral Resistance for Footings

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

2. Retaining Structures

The following equivalent fluid weights are given for design of subgrade walls and retaining structures. The active condition is where the wall moves away from the soil. The passive condition is where the wall moves into the soil and the at-rest condition is where the wall does not move. We recommend the basement walls be designed in an at-rest condition.

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

Description	Active	At-Rest	Passive
Granular Backfill (Sand or Gravel)	35 pcf	55 pcf	350 pcf
Granular Backfill - Earth Pressure Coefficient	0.28	0.44	-
On-site Clay Soil/Processed claystone	50 pcf	65pcf	190 pcf
On-site Clay Soil/Processed claystone - Earth Pressure Coefficient	0.45	0.59	-

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

Lateral loading should be increased to account for surcharge loading using the appropriate earth pressure coefficient and a rectangular distribution if structures are placed above the wall and are within a horizontal distance equal to the height of the

wall. If the ground surface slopes up away from the wall, the equivalent fluid weights should also be increased.

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

3. Seismic Conditions

Under seismic conditions, the equivalent fluid weights should be modified as follows according to the Mononobe-Okabe method assuming a level backfill condition:

Lateral Earth Pressure Condition	Seismic Modification (2% PE in 50 yrs)
	Granular Backfill
Active	7 pcf increase
At-rest	no increase
Passive	18 pcf decrease

The resultant of the seismic increase should be placed up $\frac{1}{3}$ from the base of the wall.

4. Safety Factors

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

E. **Seismicity**

Listed below is a summary of the site parameters as required by the 2018 International Building Code and ASCE 7, Chapter 20:

Description	Seismic Event - 2% PE in 50 Yrs
	Value
2018 IBC Site Class	C
PGA	0.22g
S_s (0.2 second period)	0.505g
S_1 (1 second period)	0.164g
F_{PGA}	1.2
F_a	1.298
F_v	1.5

The values provided above were generated using the ASCE 7-16 Seismic Hazard tool.

Based on the observed subsurface conditions, a ground motion hazard analysis (GMHA) as per ASCE 7-16 is not required by the 2018 International Building Code. A 10-percent decrease in design seismic load might be achieved if shear wave velocities are measured on site. If this is requested, we propose to perform a Refraction Microtremor (ReMi) survey to measure subsurface shear wave velocity.

F. Soil Corrosion

Our experience has shown that portions of the on-site soil/bedrock and many imported soils may contain sulfates in sufficient concentration to be corrosive to concrete. Therefore, we recommend concrete elements that will be exposed to the on-site soils be designed in accordance with provisions provided in the American Concrete Institute Manual of Concrete Practice (ACI) 318-14. Tables 19.3.1.1 and 19.3.2.1 of ACI 318-14 should be referenced for design of concrete elements utilizing a Sulfate Exposure Class of S2.

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

G. Pavement

Based on the subsoil conditions encountered and the laboratory test results, the following recommendations are given:

1. Analysis

Asphaltic Concrete: The flexible pavement analysis is based on UDOT and AASHTO design methods and a 20 year design life. The following parameters were considered for our analysis:

- Base course that meets specifications which would correspond to a Structural Coefficient (a_2) of at least 0.12. Asphalt that provides a Structural Coefficient (a_1) of at least 0.40.
- Drainage Coefficient = 1.0.
- The subgrade support soils consists generally of silty sand to gravel. Based on the on-site soils, a M_R value of 15,000 psi was used for the subgrade based upon an estimated California Bearing Ratio (CBR) value of 10 percent and the relationship between CBR and Resilient Modulus (M_R).
- Serviceability Index: $P_o=4.2$, $P_t=2.5$.
- Reliability of 90 percent.
- Standard Deviation (S_o) = 0.45.

2. Subgrade Support

We anticipate the subgrade materials will consist of compacted on-site silty sand to gravel. Our design assumes a properly compacted subgrade. Prior to placing base course or pavement area grading fill, the subgrade should be prepared as recommended in the Subgrade Preparation section of this report.

3. Pavement Thickness

Based on the anticipated traffic, a 20 year design life, PCC and AASHTO design methods, the following pavement sections are recommended.

Area	Flexible Pavement	
	Asphaltic concrete (inches)	Base Course (inches)
300 West, 900 South	3	8
Acces/Entrance Road	2.5	8
Parking areas	2.5	6

4. Pavement Materials

The pavement materials should meet AASHTO and City of St. George Specifications for gradation and quality. The pavement thicknesses indicated above assume that the base course is high quality material with a CBR of at least 60 percent. Asphalt material should have a Marshall stability of at least 1,800 pounds.

5. Drainage

The collection and diversion of drainage away from the pavement surface is extremely important to the satisfactory performance of the pavement section. Proper drainage should be provided. We further recommend a yearly maintenance program including crack sealing and a surface treatment such as a “slurry seal” to extend the pavement life and reduce water infiltration into the subsurface soils.

H. **Construction Testing and Observations**

We recommend testing fill, concrete, and asphalt materials at a frequency which meets or exceeds St. George City minimum testing frequency requirements for city improvements.

We also recommend the following:

1. Verify the subgrade is properly prepared/compacted in accordance with the recommendations provided in the Subgrade Preparation section of this report.
2. Verify that foundation subgrade is properly compacted prior to placement of concrete.
3. Conduct compaction testing on fill placed below foundations, in building pads, and paved areas. We recommend testing each foot of fill placed.
4. Conduct construction materials testing of soils, concrete and asphalt materials and special inspections as required for the proposed construction by St. George City and the structural engineer.
5. Conduct special inspections on the proposed building as required by the 2018 International Building Code and the structural engineer.

I. Geotechnical Recommendation Review

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

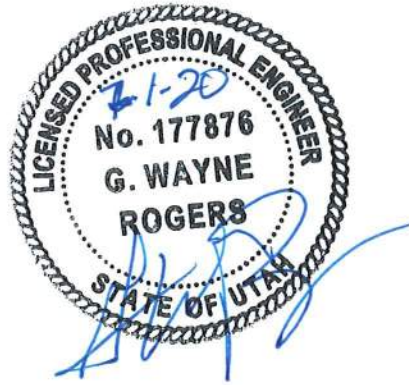
LIMITATIONS

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

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

G. Wayne Rogers, P.E.

P:\2019 Project Files\2192000\2192092 - GT The Cove\Report.wpd



REFERENCES:

Christenson, G.E. and Deen, R.D., 1983, Engineering Geology of the St. George area Washington County, Utah: Utah Geological and Mineral Survey Special Studies 58, 32 p., scale 1:24,000.

Lund, W.R., Knudsen, T.R., Vice, G.S., and Shaw, L.M., 2008, Geologic hazards and adverse construction conditions, St. George-Hurricane Metropolitan Area, Washington County, Utah, Utah Geological Survey Special Study 127, 14 plates, scale 1:24,000.

Hayden, Janice, M and Willis, Grant C. UGS Map 251DM. 2011, Geologic Map of the St. George Quadrangle, Washington County, Utah, Utah Geological Survey.



Approximate site location

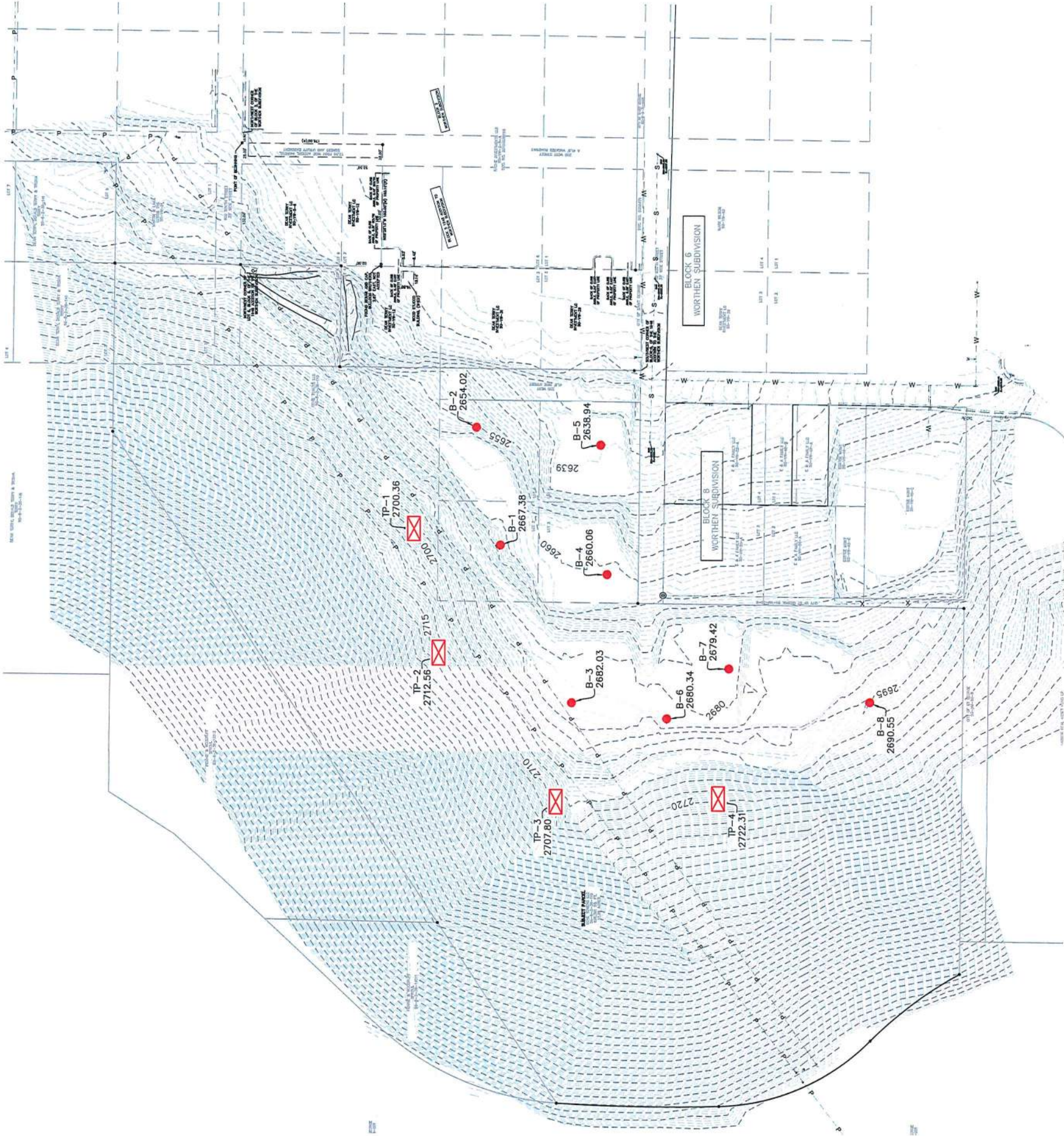
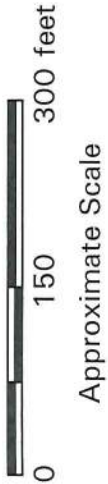


Not to Scale

THE COVE
ST. GEORGE, UTAH

THE COVE
ST. GEORGE, UTAH

- Approximate boring location
- ⊠ Approximate test pit location

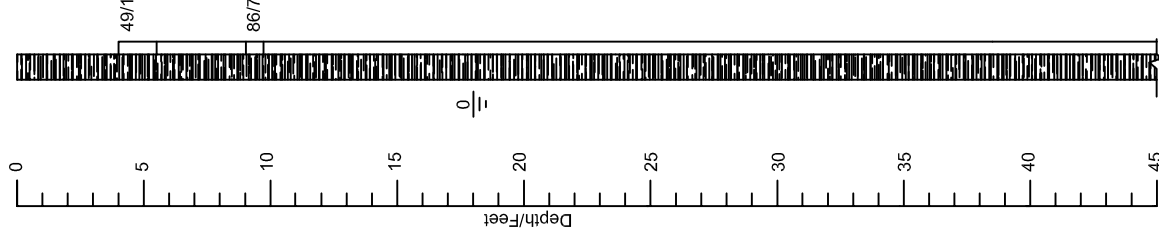


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ST. GEORGE, UTAH

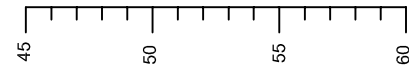
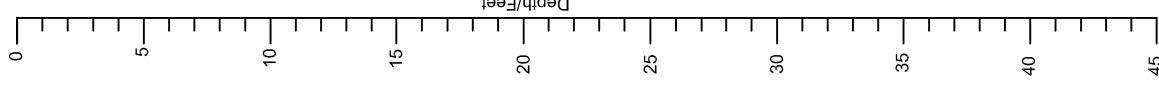


0 200 400 feet
Approximate Scale

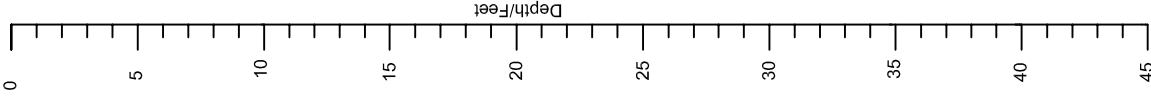
B-1
Elev. 2667.4'



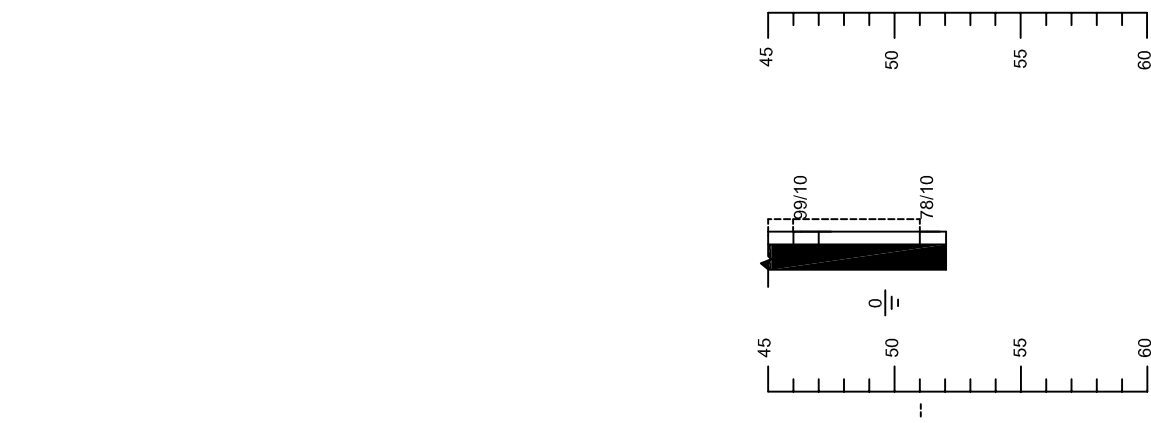
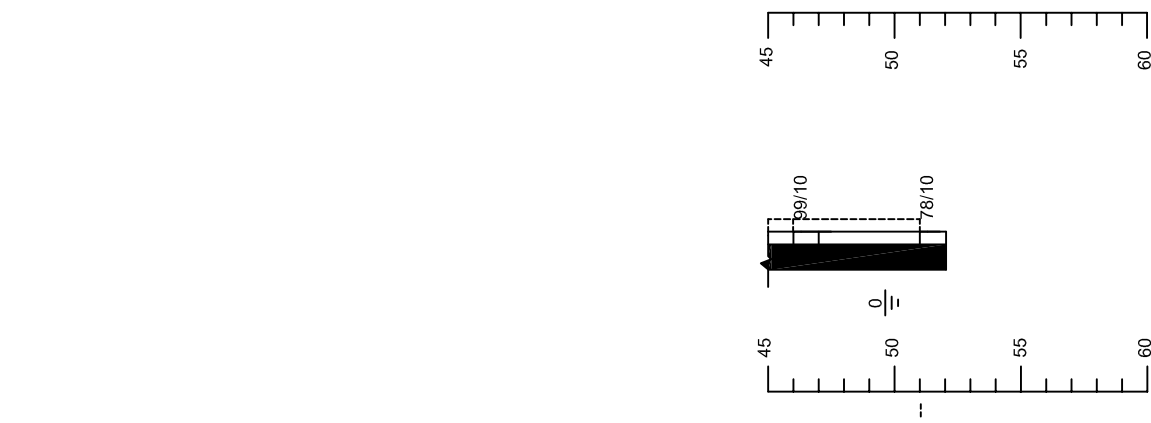
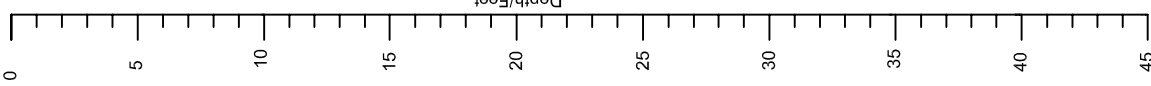
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Elev. 2654.0'

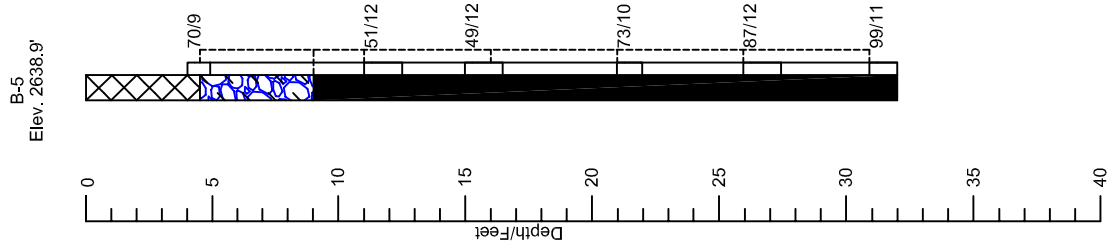


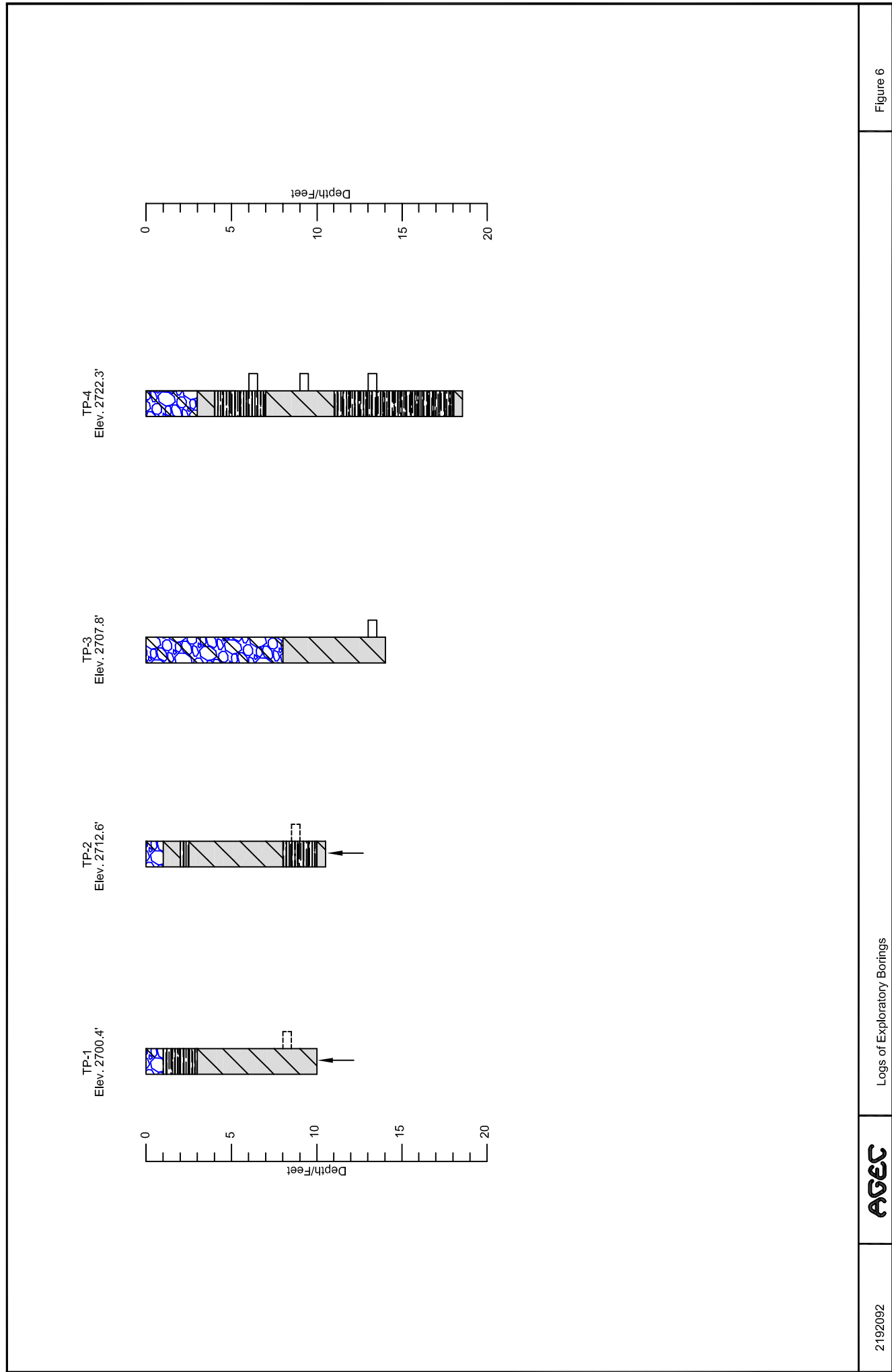
B-3
Elev. 2682.0'



B-4
Elev. 2660.1'







LEGEND:



Fill, Silty to Clayey Sand with Gravel, poorly compacted, slightly moist, and reddish brown in color.



Fat Clay (CH); medium stiff, moist, and reddish brown in color.



Clayey Sand (SC); medium dense, slightly moist, and reddish brown in color.



Silty Sand (SM); medium dense, moist, and reddish brown in color.



Clayey Gravel (GC); dense, moist, basalt cobbles and boulders, and black to red in color.



Silty Gravel with Sand (GM); dense, moist, basalt cobbles and boulders, and black to red in color.



Shale Bedrock; moderately hard, slightly moist, low to medium plastic, layered, gypsum, and red in color.



Claystone Bedrock; soft to moderately hard, moist, medium to high plastic, gypsum streaks, and red with white in color.



Siltstone Bedrock; moderately hard, slightly moist, non to low plastic, sandstone lenses/layers, and red-brown in color.



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



Indicates core sample taken.



Indicates relatively undisturbed block sample taken.



Indicates disturbed sample taken.



Indicates the depth to free water and the number days after excavation the measurement was taken.



Indicates practical trackhoe refusal on boulders, sandstone bedrock, or limestone bedrock.

NOTES:

1. The borings were drilled on June 4, 5, 8, 9, and 10 with a truck mounted drill rig equipped with 8-inch hollow-stem augers. The test pits were excavated on June 9 and 10, 2020 with a trackhoe. Portions of the bedrock were cored using a 2 1/2 inch diameter HQ bit using either air or mud rotary.
2. The locations and elevations of the borings and test pits were measured by survey by Bush and Gudgeon, Inc.
3. The boring and test pit locations and elevations should be considered accurate only to the degree implied by the method used.
4. The lines between the materials shown on the logs represent the approximate boundaries between material types and the transitions may be gradual.
5. Water level readings shown on the logs were made at the time and under the conditions indicated. Fluctuations in the water level may occur with time.



B-1 @ 5-15 ft.



B-1 @ 15-24 ft



B-1 @ 24-32 ft.



B-1 @ 32-41 ft.



B-1 @ 41-50 ft.



B-1 @ 50-58 ft.



B-1 @ 58-60 ft.



B-2 @ 9-23 ft.



B-2 @ 23-32 ft.



B-2 @ 32-42 ft.



B-2 @ 42-44 ft.



B-3 @ 4-19 ft.



B-3 @ 19-29 ft.



B-3 @ 29-39 ft.



B-3 @ 39-49 ft.



B-6 @ 4-14 ft.



B-6 @ 14-26 ft.



B-6 @ 26-34 ft.



B-6 @ 34-39 ft.



B-7 @ 4-17 ft.



B-7 @ 17-26 ft.



B-7 @ 26-36 ft.



B-7 @ 36-39 ft.



B-8 @ 9-22 ft.



B-8 @ 22-29 ft.



B-8 @ 29-34 ft.



B-8 @ 34-39 ft.



January 6, 2020

Holdaway Construction
38 East 590 North
Hurricane, Utah 84737

Attention: Brent Holdaway
EMAIL: bholdaway@live.com

Subject: Geologic-hazard Assessment
Proposed Cove Development
300 West 900 South
St George, Utah
Project No. 2192092

Gentlemen:

Applied Geotechnical Engineering Consultants, Inc. (AGEC) was requested to evaluate geologic hazards for the proposed Cove development to be constructed at approximately 300 West 900 South in St George, Utah.

PROPOSED CONSTRUCTION

We understand a mixed-use development consisting of retail, restaurant and residential facilities is planned for the east portion of the property. The west side of the developed area will be cut into the slope of the hillside.

GEOLOGY

The geology of the site is mapped by Hayden and Willis (2011) to consist of talus and landslide deposits on the hillside and bedrock near the base of the slope. The relatively flat east side of the property is mapped as mixed eolian and alluvial deposits. The bedrock is the Springdale Sandstone Member of the Kayenta Formation overlying the Whitmore Point Member of the Moenave Formation overlying the Dinosaur Canyon Member of the Moenave Formation. The bedrock dips gently down in a north/east direction.

Low-sun-angle aerial photographs from 1981, color aerial photographs from 2000, black and white aerial photographs from 1960 and lidar data from 2017 were reviewed to evaluate geologic hazards in the area. The resolution of the photographs along is not sufficient to allow evaluation of rockfall. In addition, the area planned for development had been disturbed

by the time of the photographs. Landslide deposits can be identified on the aerial photographs south of the site. The landslide mapped on the northwest slope above the proposed development area is not apparent from the aerial photographs or lidar. The area mapped as landslide is terraced suggesting there may be creep or shallow-depth movement of the ground in this area. The affected soil does not appear to extend more than about 2 or 3 feet deep.

ROCKFALL EVALUATION

There are outcrops of basalt above the property with some areas of rock that could potentially become dislodged, particularly during a major earthquake, and result in rockfall hazard for the proposed development. The rocks are generally less than 5 feet in size. The approximate extent of the rockfall hazard is presented on Figure 2. This is based on field observation and experience with similar sites in the area. The extent of the potential rockfall hazard cannot be well defined due to land disturbance and likely removal of rocks in the runout zone.

The area planned for buildings could be protected from rockfall hazards by constructing a barrier along the uphill side of the development or removal of the source rocks.

The rockfall-protection berm, assumed to be constructed just up slope of the west and northwest cut slopes for the development, should have a height of at least 8 feet, a top width of at least 6 feet and an upslope face of $\frac{1}{2}$ horizontal to 1 vertical or steeper. It is important to have a steep upslope face for the berm so rocks are not directed over the berm. The berm should be reinforced using geogrid to maintain a steep upslope face. The reinforcement spacing and slope construction will depend on the type of fill used and reinforcement selected. Internal design of the berm reinforcement could be provided upon request.

LANDSLIDE EVALUATION

The landslide on the northwest side of the property appears to be less than 2 or 3 feet deep and is not expected to be a hazard for the proposed development if slopes are adequately reinforced. This should be evaluated in the geotechnical study for the site.

OTHER GEOLOGIC HAZARDS

Other geologic hazards considered for this study are debris flow and fault rupture. Based on geologic mapping for the area, our site reconnaissance, and review of aerial photographs and lidar data, these are not considered hazards at the site.

LIMITATIONS

This letter has been prepared in accordance with generally geologic engineering practices in the area for the use of the client. The conclusions and recommendations included in the letter are based on conditions observed during our field study, topographic information provided and

Holdaway Construction
January 6, 2020
Page 3

our experience with similar type projects. If conditions are significantly different from those described in this letter, we should be notified to reevaluate the recommendations given.

If you have questions or if we can be of further service, please call.

Sincerely,

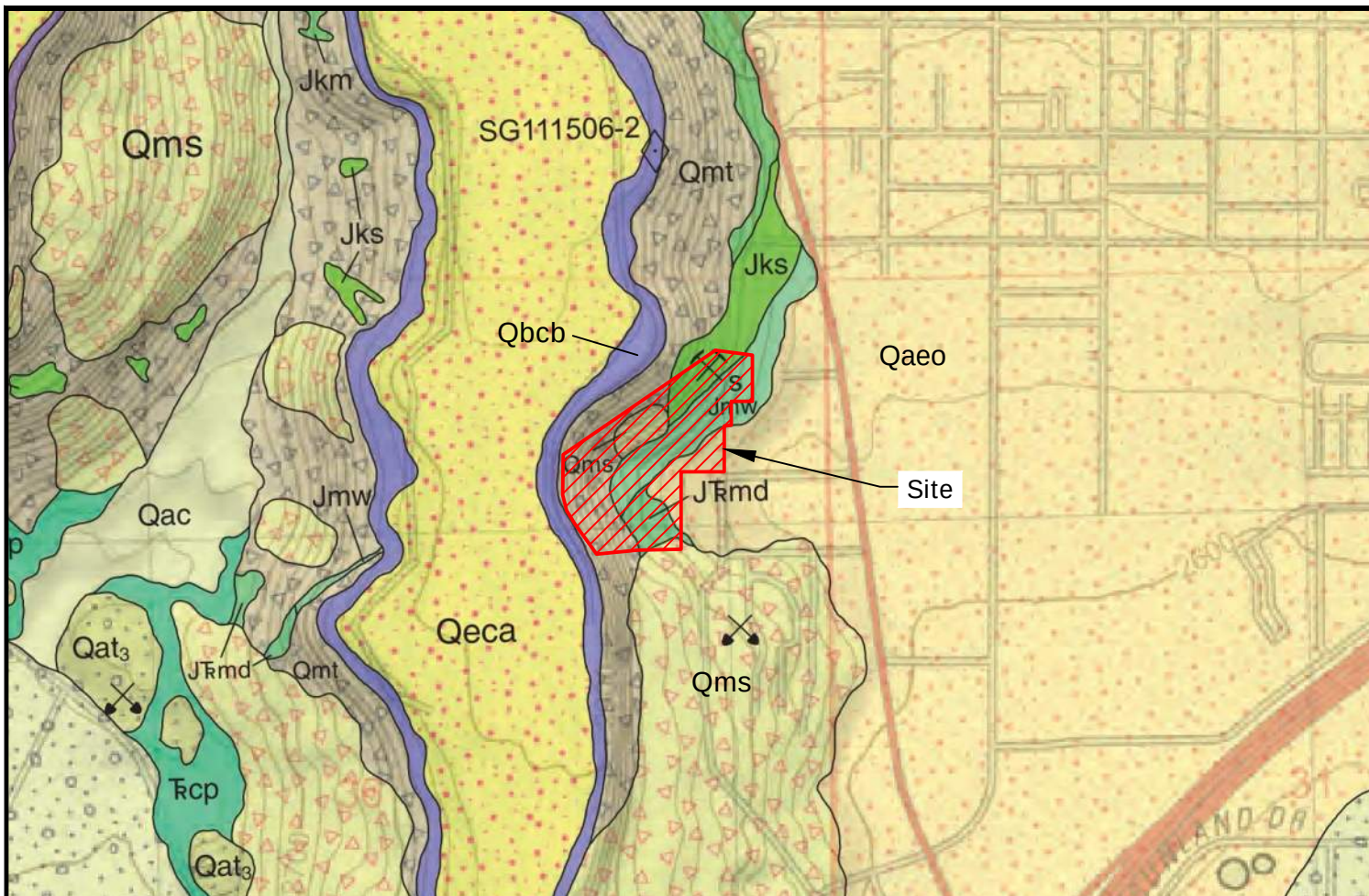
APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.


Douglas R. Hawkes, P.E., P.G.

Reviewed by JEN, P.E.
DRH/rs
Enclosures

Reference:

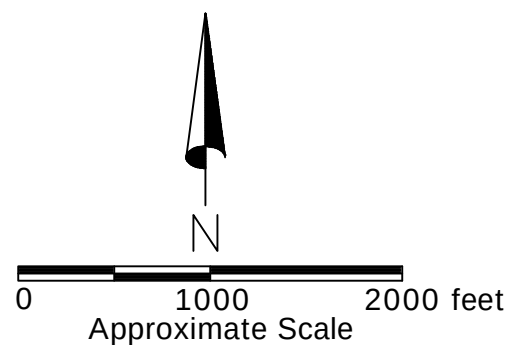
Hayden, J.M. and Willis, G.C., 2011; Geologic map of the St George 7.5' quadrangle, Washington County, Utah, Utah Geological Survey Map 251DM.



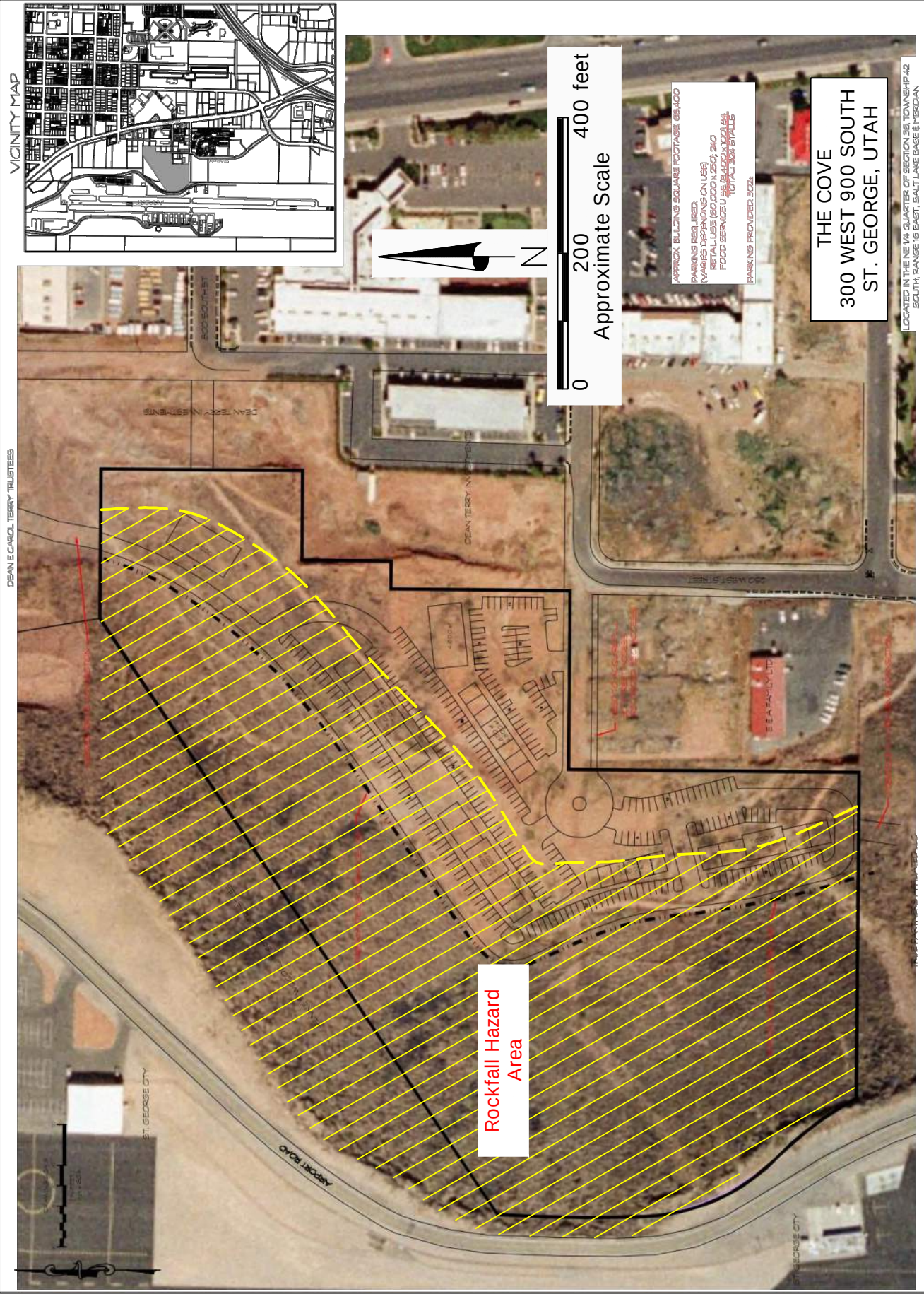
From Hayden and Willis (2011)

EXPLANATION OF SYMBOLS AND GEOLOGIC UNITS IN AREA OF PROPOSED DEVELOPMENT

- Qmt - Talus deposits (Holocene to upper Pleistocene)
- Qms - Landslide deposits (Holocene to middle Pleistocene).
- Qeca - Eolian and alluvial deposits with thick calcic soil on lava flows (Holocene to lower Pleistocene).
- Qaao - Mixed alluvial and eolian deposits (Holocene to middle Pleistocene).
- Qbcb - Cedar Bench lava flow (lower Pleistocene)
- Jks - Springdale Sandstone Member of the Kayenta Formation (Lower Jurassic)
- Jmw - Whitmore Point Member of the Moenave Formation (Lower Jurassic)
- JTrmd - Dinosaur Canyon Member of the Moenave Formation (Lower Jurassic to Upper Triassic).
- — — Geologic contact between units, dashed where approximate.
- — — — — Normal fault, bar and ball on down thrown side, dashed where approximate, dotted where concealed.



THE COVE
300 WEST 900 SOUTH
ST. GEORGE, UTAH



Geologic Hazards Assessment

AGEC

Applied GeoTech

January 6, 2020

Holdaway Construction
38 East 590 North
Hurricane, Utah 84737

Attention: Brent Holdaway
EMAIL: bholdaway@live.com

Subject: Geologic-hazard Assessment
Proposed Cove Development
300 West 900 South
St George, Utah
Project No. 2192092

Gentlemen:

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PROPOSED CONSTRUCTION

We understand a mixed-use development consisting of retail, restaurant and residential facilities is planned for the east portion of the property. The west side of the developed area will be cut into the slope of the hillside.

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Holdaway Construction
January 6, 2020
Page 3

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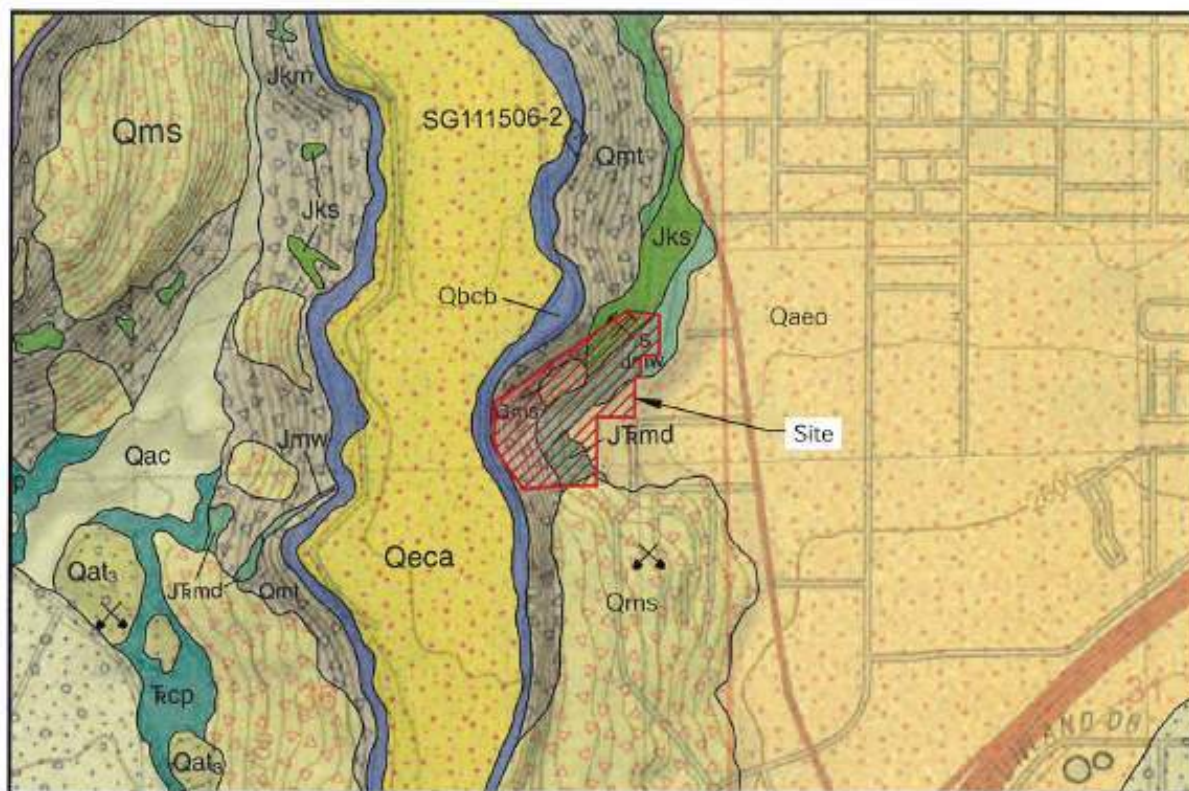
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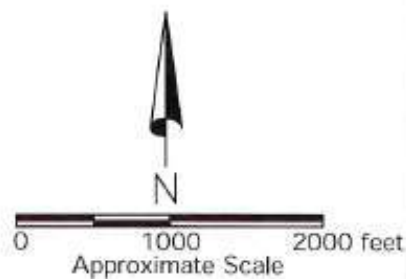
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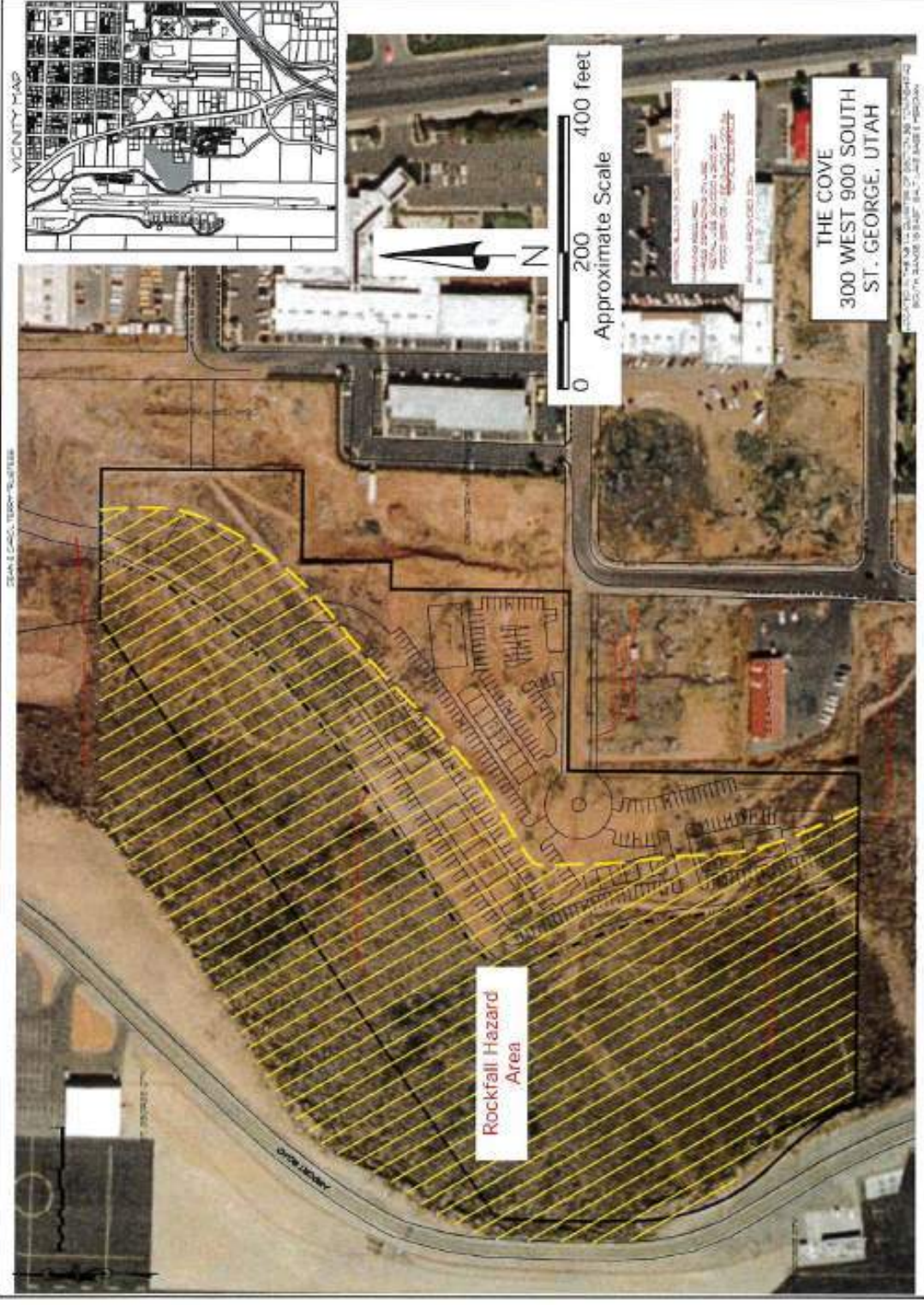
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- ⊥-... Normal fault, bar and ball on down thrown side, dashed where approximate, dotted where concealed.



THE COVE
300 WEST 900 SOUTH
ST. GEORGE, UTAH



2192092	AGEC	Rockfall Hazard Area	Figure 2
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HILLSIDE REVIEW BOARD
CITY OF ST GEORGE
WASHINGTON COUNTY, UTAH
JULY 15, 2020

PRESENT: Chairman Dave Black
Shawn Patten (items 1 & 2 only)
James Dotson
James Sullivan
Tyler Hoskins

CITY STAFF:

Assistant Public Works Director Wes Jenkins
Planner III Dan Boles
Deputy Director Parks Planning Jeff Peay (item 1 only)
Landscape Architect Mark Goble (item 1 only)
Parks Planner Joseph Nielson (item 1 only)
Development Office Supervisor Brenda Hatch

EXCUSED: Shawn Patten (item 3)

1. Consider a request for a Hillside Development Permit to allow development of a community park to be called “**Desert Canyons East Park.**” The property is located on the south-east corner of Broken Rock Way and Desert Canyons Parkway. This area is a part of the Desert Canyons Master Plan. The property is zoned PD-R (Planned Development Residential). The applicant is Desert Canyon Lands, LLC and the representative is Curt Gordon. Case No. 2020-HS-008). The time to meet is **8:30 am** (See ‘Meeting Place’ exhibit below).

Item Representatives Present: Curt Gordon, Cody Service

Curt Gordon – Desert Canyons has a development agreement with the City to set aside land for parks and to contribute funding toward them. As you can see this area is fairly built up now, it’s time that we build the park that is designated. It’s basically 4 acres, there is roadway frontage, parking and utility services that front the property. Mark has done a great job coming up with some conceptual designs for the park. We like the natural park design with the bike skills portion. We’ve had a rock fall study done, it basically comes down to these boulders here and down the other side. These boulders here have petroglyphs on them that will be preserved.

Dave Black – Do any of the other boulders remain?

Curt Gordon – I guess it depends on which scenario we go with. Mark would you mind taking them through the scenarios. Our concept would be to leave the ridge in place.

HILLSIDE REVIEW BOARD
CITY OF ST GEORGE
WASHINGTON COUNTY, UTAH
JULY 15, 2020

Mark Goble – We did two different concepts for this site; one was more traditional and this one is more natural. Areas of the park were described. There will be a turf area in the saddle. Where there is existing cut slope on the north side of the hill, we plan on dressing that up with some landscape and some terracing. I need to give credit to Joe; Joe is actually the one who drew this up.

Wes Jenkins – So that plan leaves that hillside right there?

Discussion on where features of the park are located and that all of the features are located outside of the rock fall hazard area.

Mark Goble – On the natural style park we would not create a berm, we would like to keep it as natural as we can. Keeping the hill in acts as that natural rock fall barrier. This is the more traditional park, we put the core of the facilities right in the middle and this concept does include a berm.

Curt Gordon – This concept would remove the hill entirely and remove all of the boulders except for archeological protected ones.

Dave Black – Typically the guidelines for the rock fall hazard is to protect habitable structures. So, it begs the question do we need it? We are creating a gathering place so your pavilions, restrooms and pickleball courts so the city would want the berm if those items were in the rock fall hazard. From a hillside viewpoint I like the natural park without the berm.

James Dotson – Mark do you think you could incorporate and keep more of those boulders instead of going so far up with the turf?

Discussion on keeping the boulders and meandering the grass between them.

Curt Gordon – From the developer's point of view, the natural plan is the one we would want to move forward with and apply for.

Wes Jenkins – Aren't you going to take this to the community?

Jeff Peay – Yes we will take this to the community.

Tyler Hoskins – So the more traditional park would require hillside approval, but the natural park would not?

Curt Gordon – I think we would need hillside approval on both just because we are in the hillside zone. We would need a grading permit and have a vote to move forward with that.

MOTION: James Dotson made a motion to recommend approval of the natural park
--

HILLSIDE REVIEW BOARD
CITY OF ST GEORGE
WASHINGTON COUNTY, UTAH
JULY 15, 2020

concept plan that is proposed noting to incorporate as many of the large existing boulders as possible esthetically.

SECOND: Shawn Patten

VOTE:

AYES (5)

Dave Black

James Dotson

James Sullivan

Shawn Patten

Tyler Hoskins

NAYS (0)

Motion Carries unanimous recommend approval

8:50 AM left site to reconvene at the site of item 2.

2. Consider a request for a Hillside Development Permit to allow development of two (2) professional office buildings to be called “**Hillside Professional Offices**” The property is generally located north of the intersection of Riverside and Riverbend Drives. The property is zoned PD-AP (Planned Development – Administrative Professional). The applicant is Cole Fowler & Sorensen and the representative is Vaun Beal. Case No. 2020-HS-010. The **estimated** time to meet is **9:00 am** (*See meeting Place’ exhibit below*).

Item Representatives Present: Jeff Mathis, Wayne Rodgers, Brandee Walker, Vaughn Beal, Colby Beal

Vaughn Beal – I have three sons that are doctors that want to be in St. George so we want to build a building here and call it Hillside Professional.

Jeff Mathis – Described the lot layout, where the buildings are. Both buildings have underground parking, it graded out really nice we have really minimal walls. We will fill in a little here. The building foot print is 6,000 square feet. The retaining walls retain some of the parking on the north side.

Shawn Patten – Is there retaining besides the back side of the parking?

Jeff Mathis – In spots, it’s not continuous.

Brandee Walker – Our highest wall is at this corner and I think it is 8. At the other corner we are at 4.

James Dotson – Am I reading the plans right, that parking lot sits about 12 ft higher than the road?

HILLSIDE REVIEW BOARD
CITY OF ST GEORGE
WASHINGTON COUNTY, UTAH
JULY 15, 2020

Brandee Walker – Yes, about 12 feet.

Jeff Mathis – That nub on the corner is going to come down for site distance.

James Dotson – What is your slope on that landscape area Brandee?

Brandee Walker – We are probably 4 to 1. We have a lot of space to spread it out.

Dave Black – So what drives an acceleration lane?

Wes Jenkins – We usually don't do those.

Tyler Hoskins – Actually it is based on the number of cars.

Dave Black – They drive kind of fast along here.

James Dotson – There is not even a turning lane here, I know it might not be in our purvey but I live in this neighborhood right here. You can't pull out onto this road right here.

Dave Black – When does something like this trigger a traffic study, or a suicide lane?

Tyler Hoskins – Is this developable on the other side?

Wes Jenkins – It is slated to be a park.

Tyler Hoskins – Well the point is if the City does decide to develop that then there probably will need to be a suicide lane there for those left turns.

Wes Jenkins – You know where McArthur had that property? They are going to fill that in and develop that then we are going to extend 1450 East down to Riverside and that is a possible location for another traffic signal, it will slow things down and create gaps. We will have to look at this as we go through the process.

Dave Black – That's not a hillside issue.

Jeff Mathis – That will be resolved in engineering.

Dave Black – Getting back to the hillside stuff, you have 3 items in the Geotech. You have expansive soils, rockfall and the high classification for slope instability.

Wayne Rogers – We've done a rockfall evaluation and basically you can see that the runoff zones just barely miss the development. The other positive thing is that you have parking in between it.

HILLSIDE REVIEW BOARD
CITY OF ST GEORGE
WASHINGTON COUNTY, UTAH
JULY 15, 2020

Dave Black – I think the City would want some type of letter stating that the mitigation for rockfall is the parking area. The report mentioned scaling off some questionable boulders. Can you point out anything that might be a concern?

Wayne Rogers – If you see the boulders right up there, they are probably not going to roll. It would need to be one that was perched up higher, that is fractured behind it. There are probably a couple up there but they are down past the zone of concern. There are no really perched ones up there.

Dave Black – So if you feel that the parking mitigates the hazard give us something that says that.

Wayne Rogers – The expansion soils, we know they are there. It's obvious. We will over-ex below each building. We will cut that out and have a little bit of import export. Some of the clay we will hide in the landscape areas around the building. It should be taken care of with expansive soils during the excavation.

Dave Black – I noticed you had a 4 ft over-ex for pavements. Does that apply for any of these buildings?

Wayne Rogers – We actually did this road; this part here won't have much. There might be some in the de-cell lane here. As long as you get good drainage away from a road like this, drainage is the key.

Tyler Hoskins – The problem is you can see that water is ponded in here, so you probably have water back underneath.

Wayne Rogers – The last issue was the slope stability issue. For all you trained geologists you can see that the mapped landslide ends right outside of the development. The landslide follows around the corner a ways. We are in a slope with clay but there is no water here, until you get down closer to the river level. These homes have been up there for about 20 years now and we haven't seen any issues with that. The only place is right back there in the corner where the parking cuts into the slope a little bit, that's probably the deepest cut, about 8 foot. We didn't run a stability analysis but because we are filling up so much and berming the toe of the slope. If we did run one right now I can tell you it's going to be well above the factor of safety limits that we need.

Dave Black – I looked at the 3 cross sections that you did and I and I would agree with you on two of them for sure because you are filling and increasing the stability. The third cross section is up there where you do have the cut, you have a house and a nice back yard and then a fairly steep slope. Personally I don't think it would be unreasonable to ask that a stability analysis be done that profile and make the profile extend to the top of the back yard. More than likely it's going to come out just fine, but

HILLSIDE REVIEW BOARD
CITY OF ST GEORGE
WASHINGTON COUNTY, UTAH
JULY 15, 2020

I think that in a high hazard slope area I think that would be prudent. It sets a precedence for what goes on in other areas.

Wayne Rogers – So is that something Wes, that we could submit after the fact? After this meeting, can we still get the approval?

Dave Black – It can just be considered a condition of the motion; we wouldn't have to meet again. It protects the City, the developer and the homeowner.

Wayne Rogers – Yeah, I think you're right, I think it will come out fine. If I had been really worried, we would have run it up front. For documentation reasons I think its fine.

Dave Black – It makes sense to have a stability analysis if you are going to cut into a high hazard area.

Wes Jenkins – I have a question for Brandee. On your slope analysis, you exceeded the 40%, right? On disturbance? I guess you just need to point that out to them. You're not following the ordinance so there will need to be a recommendation as to why you're doing that.

Brandee – It's the front slope right there.

Wayne Rodgers – The sewer road and Riverside Drive are the areas that are 40%.

Jeff Mathis – There is a little piece where this basin is. The anomaly type thing.

James Dotson – My question is what are you doing to mitigate where you cut back into the slope, it always looks like a big scar. If you are not doing rock walls what are you doing to mitigate here?

Wayne Rogers – Rock wall stacking most likely.

James Dotson – That needs to be a part of the motion too, that we don't leave any scarring.

Jeff Mathis – Anything that is disturbed is going to be landscaped or covered with rock walls.

Tyler Hoskins – So other than those couple of areas that we talked about do we fall within the hillside? I noticed there was some.

Brandee Walker – We are actually far under.

HILLSIDE REVIEW BOARD
CITY OF ST GEORGE
WASHINGTON COUNTY, UTAH
JULY 15, 2020

Jeff Mathis – We have 8 acres, and we are doing a little acre and a half development. So the percentages are way, way under.

James Dotson – Are we in agreement that this cut slope doesn't pose a problem?

Brandee Walker – Yes, it's a safety thing.

Dave Black – That's man made. The motion probably ought to say that the local minor slopes over that certain percentage are non-essential, noncontiguous.

MOTION: James Sullivan made a motion to recommend approval based upon the fact that the 40% grades that are disturbed are non-essential, noncontiguous and not an issue. Also based upon approval of staff on the stability slope analysis that will be done and that a letter addressing the rock fall mitigation is provided to be approved by staff.

SECOND: Tyler Hoskins

VOTE:

AYES (5)

Dave Black

James Dotson

James Sullivan

Shawn Patten

Tyler Hoskins

NAYS (0)

Motion Carries unanimous recommend approval

9:36 AM Shawn Patten left the meeting, the rest of the board and City staff continued to the site for Item 3.

3. Consider a request for a Hillside Development Permit to allow development of a multi-family housing subdivision to be called "**The Cove.**" The property is generally located west of Bluff Street at approximately 300 West and 900 South. The property is currently zoned C-2 (Highway Commercial). The owner is Cove Towers LLC, the applicant is Brent Holdaway, and the representative is Bush & Gudgell, Inc. Case No. 2020-HS-007. The estimated time to meet is **9:30 am** (See '*Meeting Place*' exhibit below).

Item Representatives Present: Bob Hermandson, Rick Meyer, Wayne Rogers, Reed Scow, Brett Holdaway

Dan Boles – We are looking at multi family at this site, I will turn it over to them to describe their proposal.

Rick Meyer – It is multi family, apartments, we don't know exactly the unit count, but it will be between 130 and 160 range. It will be separated into two buildings. One is going to be on the bench up there and the other will be set back over here. The one on the north side will be an odd shape, a U shaped building with a spur on the west side.

HILLSIDE REVIEW BOARD
CITY OF ST GEORGE
WASHINGTON COUNTY, UTAH
JULY 15, 2020

James Sullivan – Rick, just to be clear does the property start at the fence line?

Bob Hermandson – The property starts at the fence line. Originally the master plan the City had this road punching through but in talking with Wes he wanted us to show two different scenarios of how to put that road through. When we drew it up it became apparent that it would be extremely difficult because of the steepness of the slope. Our thought was to not have anything just leave it like it is. We drew up the cul-de-sac and the punch through scenarios so that Wes could see that it would be difficult to accomplish.

Wes Jenkins – I needed someone to lay it out and show what it would take to actually build the road.

Bob Hermandson – Our opinion would be to just leave it as it stands, that's probably the best option. That's up for discussion.

Rick Meyer – The other option was to punch that through and tie it into 250 W. A pretty significant amount of retaining walls would have to be put in there to do that. One of the questions that Wes had was regarding the adjacent properties to the east, all of those properties are owned by the same person. I think they have access from 800 S and 900 S. I don't know that it is a real concern for them to have access from 250 W. Some of the odd things we need to talk about on this project are the retaining nature of the building itself. On one side of the building it is significantly higher than the other side of the building. I think it is a 60 ft retaining structure in the building itself. I think Wayne didn't really have any major concerns with that, right. We could come up with some design that would work.

Dave Black – What do you envision for temporary?

Wayne Rogers – Maybe tiebacks.

Bob Hermandson – The parking lot would be buffering the hillside. The cut line on the left is kind of where that parking lot would wrap around then stop right there so you could get another access around the backside. Going up and over that hump, in my opinion none of that is developable over there.

James Dotson – The city code for walls you can only go 8 and 8 right?

Rick Meyer – Yes this shows that if we went 8 foot walls then 4 foot step.

Dave Black – Typically with a hillside meeting we ask that everything is staked so that we can see where it is. I think there is probably some tweaking, you still don't have the recommendations, the final recommendations from AGEC on the stable slope. I'd like to see this get developed, I think if a geotechnical engineer gets into it for about a month

HILLSIDE REVIEW BOARD
CITY OF ST GEORGE
WASHINGTON COUNTY, UTAH
JULY 15, 2020

and they look at optimizing cuts and retaining and stuff that you can make something work. Then we could come out here and see it staked to see where it's going. My personal opinion would be is if we could not have any disturbance above what is already disturbed. So, we are looking where the scar lines are. If we could stay up to or below the existing scarring that would be sweet.

Wayne Rogers – How would you guys feel about a couple options on the slope up there? Rather than doing so many steps up the hillside, because with every step you are going up the hill further. If you could take the bottom and lay it back at a one to one and cover it with rip rap or stacked rock on a portion of it and then rip rap, would you guys be ok with that provided the stability comes out?

Dave Black – Yes that makes sense. We are in a cove, that's why it's called The Cove. When you are driving down there you can't see anything until you get above that line, so if we can stay below that scar line you probably won't see any disturbance at all. Plus, you are going to hide it with some of your buildings and such. But we're going to try to keep that natural slope. If you could do that and come out and stake where the top of your disturbance line is I think you're on the right track.

James Dotson – Is there another avenue to take, a variance or something because the ordinance is the 8 foot step.

Wes Jenkins – You can do concrete, although it becomes quite expensive, you can go 8, 4, 8, 4. It's only the rock wall that requires the 16 foot setback after you get to the maximum of 16 feet high. You could propose something different like a slope face, something like that and we wouldn't call it a wall. You would have to make the argument that it's not a wall, it's just more of a cut slope.

Dave Black – Is the big block considered a rock wall?

Wes Jenkins – No.

Dave Black - Then you can stain it or paint it to match. The result of that is some pretty big scarring.

Wayne Rogers – How much do you need to know now on the big cut for the building? We don't know all the details of construction it's not even been designed yet. Do you just need to know that it will be dealt with and that it will have a stable system put in place or do you need to know what type of system or will you rely on the City to do that? Will it need to come back to you to be reviewed once that is designed? We are still down the road a little bit.

Dave Black – I don't see that having to come back.

HILLSIDE REVIEW BOARD
CITY OF ST GEORGE
WASHINGTON COUNTY, UTAH
JULY 15, 2020

Tyler Hoskins – We didn't have to do that on Blackstone Hotel, it went to hillside a year ago and it's being built now.

Dave Black – We will need to review scarring, visual aspects, geologic hazards, but structural designs can go through building review.

Wes Jenkins – Are there any geological hazards like landslide like Blackstone Hotel?

Dave Black – There is a landslide, it's mapped.

Wayne Rogers – It's surficial, and it's just shallow. Once we get the cuts right there, the final grading right there we need to look at that and see if we are cutting out the toe of that surficial part. That would be the only issue.

Dave Black – With the surficial landslide, I agree that it is surficial. The risk would be if that decides to come down in a big heavy rainstorm it's going to be more like a rock fall issue, the mass itself will be 3 feet thick and will cover the parking lot. There is the rock fall issue as well. There is a parking lot between that and the building which is great, and I think we need a letter stating that the rock fall issue and potentially that shallow landslide is being mitigated by the parking lot.

Wes Jenkins – Do any of the buildings lie within the rock fall hazard area?

Wayne Roger – No, they don't, this one does go into the parking area. We will need to update our run out zone with the grading plan that we have now. That was done just for a natural slope, when you come and flatten that out it may shorten it a bit.

Wes Jenkins – You will have to provide that kind of detail so when you go to Planning Commission and Council you have to lay that out: this is the mitigation, the rock fall line is in the parking area but this is what we're going to do to mitigate it. We are outside of all the building areas. That needs to be included.

Dave Black – I'd suggest to the City, when you have drainage studies done, they always include calcs, we're not seeing the input or the output on the rock fall or stability. I would suggest those reports have the calcs with them. I can't require it, but it would be good.

Discussion on programs used to obtain calculations.

James Sullivan – Are those reports you want to see before we make any recommendations?

Dave Black – Yes, we should come out and see where the disturbance lines are, have him stake them. I think today we would want to table it.

HILLSIDE REVIEW BOARD
CITY OF ST GEORGE
WASHINGTON COUNTY, UTAH
JULY 15, 2020

Wes Jenkins – You would want it staked based on Wayne’s maybe changing going up.

Dave Black – Yes, after Wayne has gone through it and you guys have maybe worked out your slopes. I think you are on the right path, but I think it’s a little early to make a recommendation for approval. At the next meeting we should be able to do it.

James Sullivan – Is it a general feeling that as a committee we would like to see options other than the rock wall. Even though they could meet it with the rock wall, if there is something else that they can do.

Wayne Rogers – Yes, if the rip rapped slope is not considered a rock wall I think that meets the intent of what we are all trying to do here.

Dave Black – Maybe you can check it and see how far you are going up the slope and if you can stay under the already disturbed line.

Wayne Rogers – Maybe if we show the different scenarios, how we could mitigate going so far up the slope.

Discussion on different ways to go up the slope.

Dave Black – Do we have any other comments or recommendations that would help them move forward, so we don’t surprise them when we come back?

Wayne Rogers – I would like a list of what needs to be done.

Dave Black - We need to have something that addresses the rock fall mitigation, the landslide mitigation for the existing landslide, and cross sections and detailed design for how you are going to retain and design the slopes as you go up the hill and that we would like the top of the disturbance staked so we can come back and see that. We highly recommend that we eliminate the cul-de-sac and the road option due to the amount of disturbance required to do that.

MOTION: James Dotson made a motion to table this and come back to hillside when the list has been addressed and we can stake out the extent of the redesign.

SECOND: Tyler Hoskins

VOTE:

AYES (4)

Dave Black

James Dotson

James Sullivan

Tyler Hoskins

NAYS (0)

Motion Carries unanimous recommend

HILLSIDE REVIEW BOARD
CITY OF ST GEORGE
WASHINGTON COUNTY, UTAH
JULY 15, 2020