



PLANNING COMMISSION AGENDA

NOTICE IS HEREBY GIVEN THAT THE CENTERVILLE PLANNING COMMISSION WILL HOLD A REGULAR MEETING AT 7:00 PM ON OCTOBER 11, 2023 AT CENTERVILLE CITY HALL, 250 NORTH MAIN STREET, CENTERVILLE, UTAH.

Centerville City Planning Commission meetings are open to the public, unless otherwise closed for reasons allowed by law. Centerville City Planning Commission meetings may be conducted via electronic means pursuant to Utah Code § 52-4-207. In compliance with the Americans with Disabilities Act, individuals needing special accommodations due to a disability may contact the City Recorder at (801) 295-3477, at least 24 hours in advance of the meeting. The Commission reserves the right to modify the sequence of agenda items in order to facilitate special needs or provide greater efficiency.

The full agenda packet and backup materials can be found on the Centerville City website at:

<https://centervilleutah.gov/129/Agendas-Minutes>

A. CALL TO ORDER

1. ROLL CALL
2. LEGISLATIVE PRAYER OR THOUGHT
3. PLEDGE OF ALLEGIANCE

B. BUSINESS ITEMS

Business action or discussion items to be considered by the Planning Commission.

1. PUBLIC HEARING - PLANNED DEVELOPMENT OVERLAY (A-L/PD), WITH CONCEPTUAL SUBDIVISION PLAN ACCEPTANCE - FOR A MASTER PLANNED SINGLE FAMILY LOT SUBDIVISION - APPROXIMATELY 350 EAST ROLLING HILLS DR, LEONG -APPLICANT - LEGISLATIVE DECISION

C. COMMUNITY DEVELOPMENT DIRECTORS REPORT

1. Community Development Director's Report
Next Planning Commission Meeting - **October 25, 2023**
Tentative Items:

- Preliminary Subdivision - Chase Creek Estates
- Conditional Use Permit - S & S Auto Sales

D. MINUTES

Minutes of prior meetings may be reviewed and accepted. Minutes review and approval shall comply with the Centerville City Minutes Approval Policy.

1. Minutes Review and Approval

E. ADJOURNMENT

CERTIFICATE OF POSTING

I hereby certify that this notice and agenda was posted at Centerville City Hall, published on the Utah Public Notice Website, and provided to a newspaper or media correspondent in accordance with the requirements of the Utah Open and Public Meetings Act, including, but not limited to, provisions of Utah Code § 52-4-202.

**Jennifer Robison
Centerville City Recorder**

**PLANNING
COMMISSION**

Staff Report
10/11/2023

Item No. 1.

Title: PUBLIC HEARING - PLANNED DEVELOPMENT OVERLAY (A-L/PD), WITH CONCEPTUAL SUBDIVISION PLAN ACCEPTANCE - FOR A MASTER PLANNED SINGLE FAMILY LOT SUBDIVISION - APPROXIMATELY 350 EAST ROLLING HILLS DR, LEONG -APPLICANT - **LEGISLATIVE DECISION**

Initiated By: Applicant

Staff Representative: Cory Snyder, Community Development Director

SUBJECT:

RECOMMENDATION:

BACKGROUND:

ATTACHMENTS:

1. 10-11-2023 PC Staff Report Jensen Family Subdivision Rezone and PDO Development
2. Jensen Family Plans - Updated 10-3-2023
3. Betterments - FINAL
4. 1159-002 2017 Geologic Hazards Assessment - Jensen Development_Updated
5. R1159-001 2017 Geotechnical Investigation - Jensen Development

**CENTERVILLE CITY
COMMUNITY DEVELOPMENT DEPARTMENT
655 North 1250 West, Centerville, Utah 84014
801-292-8232**

STAFF REPORT AGENDA: ITEM 1

PROPERTY OWNER: DANA LEONG
PO BOX 4009
KAILUA-KONA, HI 96745

APPLICANT: ENTELLUS
c/o SCOTT ARGYLE
1470 SOUTH 600 WEST
WOODS CROSS, UT 84010
(sargyle@entellus.com)

PROPERTY LOCATION: APPROXIMATELY 350 EAST ROLLING HILLS
DRIVE

PARCEL SIZE: 22.44 ACRES (*several parcels*)

ZONING DISTRICT: AGRICULTURE-LOW (A-L)

APPLICATIONS: PLANNED DEVELOPMENT OVERLAY (A-L/PD),
WITH CONCEPTUAL SUBDIVISION PLAN
ACCEPTANCE - FOR A MASTER PLANNED
SINGLE FAMILY LOT SUBDIVISION

BACKGROUND & GENERAL INTRODUCTION OF THE PROJECT

On behalf of the property owner, the applicant has applied for a Planned Development Overlay (PDO) Zone to develop a single-family subdivision. Currently, the property is Zone Agricultural Low (A-L). A PDO rezone request also requires a Conceptual Plan to be approved in conjunction with obtaining a PDO approval. Additionally, the land is located in the Hillside Overlay Zone, which adds additional development requirements for any development request.

**ZONE MAP AMENDMENT & CONCEPTUAL PLAN APPROVAL
PROCEDURE**

Pursuant to the City's Zoning Ordinance, the "*decision to amend the...zoning map is a matter of within the legislative discretion of the City Council as described in CZC 12.21.060.a.*" Nevertheless, the Zoning Ordinance provides the owner of this site the

ability to make also request for a PDO designation. The purpose of a PDO designation is to allow design flexibility, integration, clustering, optimum land planning than what is possible under conventional zoning regulations. Thus, without a guarantee, a project meeting the PDO development standards is eligible to be considered for a PDO designation.

GENERAL PROJECT REVIEW AND ANALYSIS SUMMARY

With this PDO project proposal, the Planning Commission will be considering the following:

- ✓ **CZC 12.21.080 & 12.41, Consider a PDO ZONE Map Amendment request from A-L to A-L/PD** - According to the PDO provisions, a PDO is to be used for achieving optimum land planning above and beyond conventional development standards.
- ✓ **CMC 15. 02 & CZC Conceptual Subdivision (Conceptual Plan) Application** - In conjunction with the PDO request, the Commission will also be reviewing the overall concept subdivision plan and making a recommendation to the Council that ties the overall conceptual plan to it associated PDO zone, if approved by the City.
- ✓ **CZC 12.42, Hillside Overlay Compliance Review** – The Commission will evaluate the Hillside development provisions to determine compliance with overlay standards.
- ✓ **CZC 12.41.070 – Zoning and Subdivision Ordinance Variation Requests**– As part of the PDO request, the overlay allows for variations to both the Zoning and Subdivision regulations, provided that expectations of the PDO are met.

STAFF REVIEW AND EVALUATION SUMMARY OF SUBMITTED PLANS:

- ❖ CZC 12.41.010 - Staff is NOT YET convinced that the proposed request for the PDO meets the real purpose and intent of the PDO provisions. Whether there are human-made engineering or natural problems that constrain developing the property, the PDO provisions are not intended to just waive zoning and subdivision ordinance requirements. Any waivers are to be used to create a superior development layout, which could include allowing a greater density to achieve the desired outcome.
 - *Staff Suggestions: using the PDO objectives, the plan should look to cluster the homes together in prudent areas that can be developed along with minimizing cuts and fills, addressing revegetation of the slopes or disturbed areas (including overall slope stabilization, where needed), enhance the use of appropriate residential landscaping, and consider the use of shared driveways and parking courts to minimize how the property would be further disturbed and compromised.*
- ❖ CMC 12.420.2, CMC 12.480.4(1.A & 1.B) - Staff believes that the Concept Plan is

consistent with the goals and policies of the Neighborhood Plan. The proposed development consists of a low-density development with an integrated mixture of lot sizes, with a focus on developing the land as one entire subdivision for the purposes of infrastructure completion

- ❖ CZC 12.50.040 - The conceptual plan that has been provided addresses the exiting conditions of the site. Such inventory outlines the topography, easements, existing roads, existing utility lines, geologic hazards, geotechnical investigation. From staff review of the plan submitted, it appears the plans are missing the following inventories:
 - Streams & Floodplains or note to that effect
 - Steep Slopes categories, as defined/listed
 - Wetlands or note to that effect
 - Shrubs and Trees, delineated as described
 - Special Protection Areas or note to that effect
 - Cultural & Historic Resources or note to that effect
- ❖ CZC 12.41.090(b) - A yield plan is yet to be prepared and submitted as a conceptual plan based on Centerville Municipal Code requirements that pertain to a conventional subdivision and shall reflect the dimensional (lot area, frontage, width, setbacks, etc.) and other standards of the underlying zone in which the proposed planned development will be located. The purpose of the yield plan is to establish the number of lots that can be conventionally developed before deciding the final density to be allowed for the PDO.
- ❖ CZC 12.42.040 - A Slope Analysis needs to be provided, as defined in the Hillside Ordinance.
- ❖ CZC 12.42.050 - The submittal needs to further address the cut and fill slope protection measures. Provided an overall revegetation strategy, which should be deemed acceptable/compliant by the City Engineer.
- ❖ CMC 15.05.020(g) - The submittal needs to further address CZC 15.05.020(g) regarding allowance of remnant property within the subdivision and its purpose.
- ❖ CZC 12.42.050(c) and (d) - Both a geotechnical investigation and a geologic hazard assessment have been submitted, which need to be deemed compliant and acceptable by the City Engineer.
- ❖ CMC 15.05.060 - The land is located in the foothills where there are potential constraints regarding adequacy of culinary water pressure, stormwater management, and even risk of wildland fires. Planning staff desires greater clarity with understanding these matters and suggests seeking further information from the applicant and other professional opinions from the experts involved with providing and maintaining needed infrastructure and services for the proposed lots.
- ❖ CZC 12.41.070 – During the application process, the applicant has indicated a likely desire to alter the following:
 - Allow some development on slopes above 30%

- Allow retaining up to 10-feet in height
- Eliminate sidewalk(s), at least on one side of the street
- Reduce setbacks for the Front Yard

From staff's review of the plans, there is some evidence of these above-listed items. However, it is not very clear as to exactly what is being requested and also to what extent the variations are being altered or waived. Staff believes that the submitted plans need to be refined and should clearly identify what is being asked with the PDO request.

PLANNING STAFF RECOMMENDATION

Suggested Staff Motion – “I hereby make a motion for the Planning Commission to TABLE the request for a Rezone to A-L/PD to a later date not to exceed more than three months (*which will also be publicly re-noticed*). Failure to submit a revised plan in this time frame the application will be considered withdrawn by the applicant. In the meantime, the applicant is to further modify the submittal to address the following and along with the two (2) options, as listed:

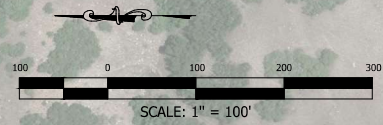
OPTION #1 – Continue to pursue the request for PDO Designation with respect the following:

- a) *Review CZC 12.42.010 Purpose and Objectives and modify the plans and provide narrative, maps, illustrations, etc. describing how the proposed development would meet these objectives.*
- b) *Amend the submittal and further address the Existing Conditions Inventory as described by CZC 12.50.040 and more particularly the following:*
 - i. *Streams & Floodplains or note to that effect*
 - ii. *Steep Slopes categories, as defined/listed*
 - iii. *Wetlands or note to that effect*
 - iv. *Shrubs and Trees, delineated as described*
 - v. *Special Protection Areas or note to that effect*
 - vi. *Cultural & Historic Resources or note to that effect*
- c) *A Slope Analysis shall be prepared and provided, as defined in the Hillside Ordinance of CZC 12.42.040.*
- d) *Address the slope area on the west side (i.e., downhill side of roadway), which needs to provide erosion protection measures to ensure that the dedicated roadway is not compromised with the future development of homes, causing the roadway to collapse.*
- e) *The submittal needs to further address the cut and fill slope protection measures to reduce or minimize such use and provide an overall revegetation strategy for the entire development.*
- f) *The submittal needs to further address CZC 15.05.020(g) regarding allowance of remnant property*
- g) *The Plan submittal needs to better identify the zoning and subdivision variations being requested with the PDO and the reasons supporting such variations.*
- h) *The applicant contact and meet with and obtain a written response from the City Engineer regarding both the geotechnical investigation and a geologic hazard assessment have been submitted, as to the adequacy and acceptability of the conclusions of these reports.*

- i) *The applicant shall review the ordinance required along with the staff highlights and comments and further address or clarify matters raised in this report.*

OPTION #2 – Change Direction and Pursue a Conventional Development within the A-L Zone and consider the following:

- a) *Amend the submittal and further address the Existing Conditions Inventory as described by CZC 12.50.040 and more particularly the following:*
 - i. *Streams & Floodplains or note to that effect*
 - ii. *Steep Slopes categories, as defined/listed*
 - iii. *Wetlands or note to that effect*
 - iv. *Shrubs and Trees, delineated as described*
 - v. *Special Protection Areas or note to that effect*
 - vi. *Cultural & Historic Resources or note to that effect*
- b) *A Slope Analysis shall be prepared and provided, as defined in the Hillside Ordinance of CZC 12.42.040.*
- c) *Address the slope area on the west side (i.e., downhill side of roadway), which needs to provide erosion protection measures to ensure that the dedicated roadway is not compromised with the future development of homes, causing the roadway to collapse.*
- d) *The submittal needs to further address the cut and fill slope protection measures to reduce or minimize such use and provide an overall revegetation strategy for the entire development, as outlined in CZC 12.42.050(c).*
- e) *The submittal needs to further address CZC 15.05.020(g) regarding allowance of remnant property*
- f) *The applicant contact and meet with and obtain a written response from the City Engineer regarding both the geotechnical investigation and a geologic hazard assessment have been submitted, as to the adequacy and acceptability of the conclusions of these reports.*
- g) *Reconfigure the lots in a manner that meets all of the conventional zoning and subdivision standards for development. Then, based on the past history of disturbance to the property consider making the narrative and arguments using the following regulations of the Hillside Overlay Ordinance:*
 - i. *12.42.040(a) Requirements for All Lots*
 - ii. *12.42.050(f) - Street & Ways*
 - iii. *12.42.050(g) – Architectural Design, and*
 - iv. *Review and provide any other applicable regulations of the Hillside Overlay Zone that are not addressed in this staff report.*

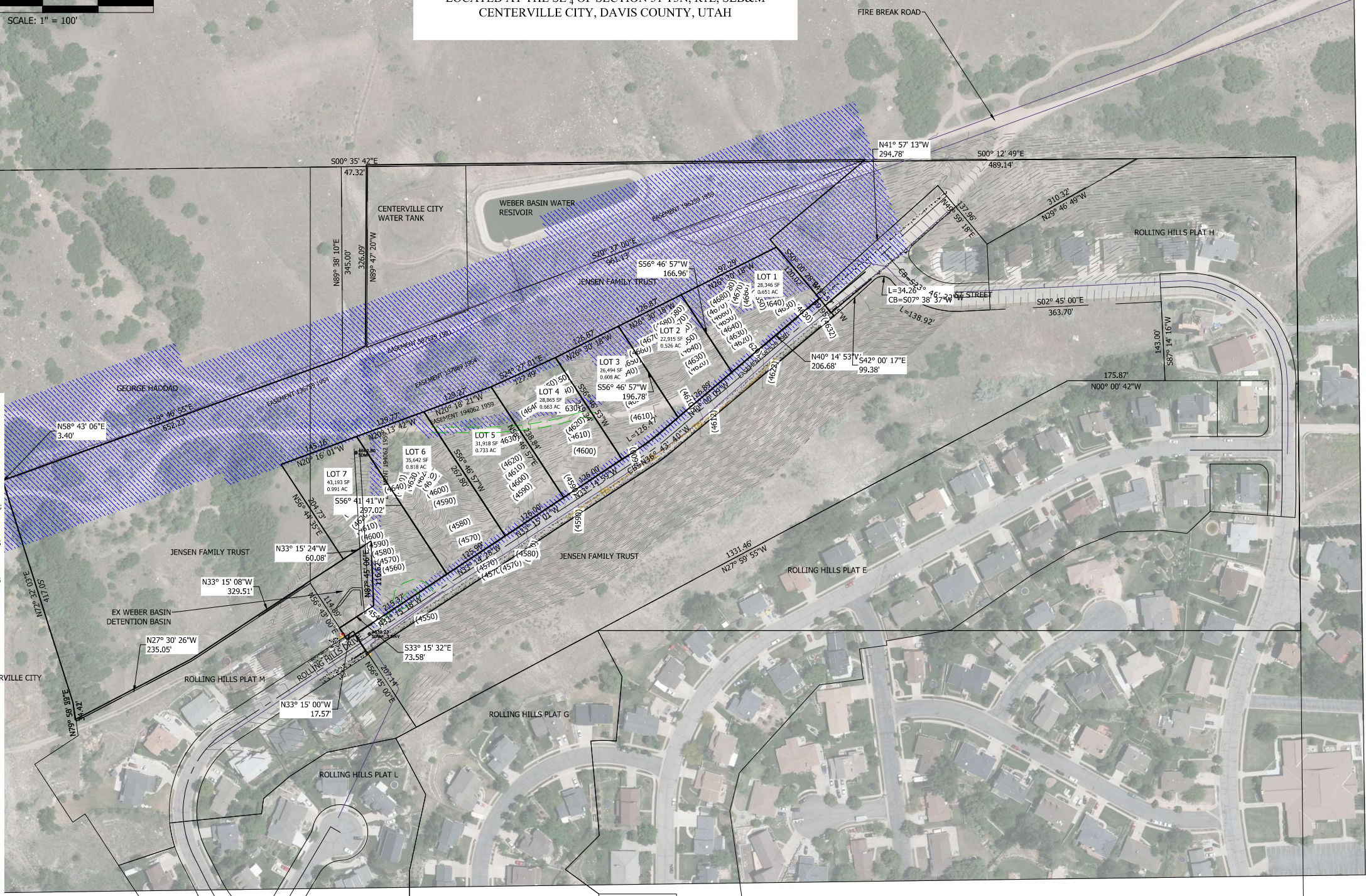


**CONCEPT PLAN FOR
JENSEN SUBDIVISION**
1975 ROLLING HILLS DRIVE
LOCATED AT THE SE 1/4 OF SECTION 31 T3N, R1E, SLB&M
CENTERVILLE CITY, DAVIS COUNTY, UTAH

PARCEL #: 07-073-0118
PARCEL A: A TRACT OF LAND SIT IN THE SE 1/4 OF SEC 31-T3N-R1E, SLB&M, BEING MORE PARTLY DESC AS FOLLOWS: COM AT THE SE COR OF SD SEC 31; TH N 00°15'07" W 607.77 FT ALG THE E LINE OF THE SE 1/4 OF SD SEC 31; TH N 90°00'00" W 272.29 FT TO A PT ON THE W LINE OF 350 EAST STR AS MONUMENTED & SHOWN ON THE OFFICIAL PLAT OF AMD ROLLING HILLS ESTATES SUB PLAT H, THE TRUE POB; TH S 87°35'50" W 120.79 FT; TH N 09°48'35" W 282.45 FT; TH N 48°20'33" E 90.06 FT; TH NWLY 22.39 FT ALG A CURVE TO THE LEFT, HAVING A RADIUS OF 25.00 FT & A CHORD BEARING N 67°18'59" W 21.65 FT; TH 161.61 FT ALG A CURVE TO THE RIGHT, HAVING A RADIUS OF 55.00 FT & A CHORD BEARING N 08°47'55" W 109.43 FT; TH N 41°39'27" W 111.73 FT; TH N 32°29'58" W 218.70 FT; TH N 29°48'40" W 88.48 FT; TH N 32°54'27" W 49.91 FT; TH N 57°05'33" E 260.78 FT; TH S 19°55'20" E 349.33 FT; TH S 70°04'40" W 25.00 FT; TH S 19°55'20" E 392.59 FT; TH S 50°20'33" W 20.35 FT TO THE NE'LY LINE OF ROLLING HILLS DRIVE AS MONUMENTED & SHOWN ON THE OFFICIAL PLAT OF AMD ROLLING HILLS ESTATES SUB PLAT H; TH S 50°20'33" W 50.03 FT TO THE SW'LY LINE OF SD ROLLING HILLS DRIVE; TH S 41°39'27" E 99.40 FT ALG SD ROLLING HILLS DRIVE; TH 32.52 FT ALG SD DRIVE, A CURVE TO THE RIGHT HAVING A RADIUS OF 20.00 FT & A CHORD BEARING S 04°56'02" W 29.05 FT; TH 141.17 FT ALG SD DRIVE, A CURVE TO THE LEFT HAVING A RADIUS OF 150.00 FT & A CHORD BEARING S 24°33'14" W 136.02 FT TO THE POB. (THE BASIS OF BEARING IS THE E LINE OF THE SE 1/4 OF SEC 31 CALLED N 00°15'07" W, NAD 83, UTAH STATE PLANE (NORTH ZONE) GRID BEARING.) CONT. 4.01 ACRES

PARCEL #: 07-073-0119
PARCEL B: A TRACT OF LAND SIT IN THE SE 1/4 OF SEC 31-T3N-R1E, SLB&M, BEING MORE PARTLY DESC AS FOLLOWS: COM AT THE SE COR OF SD SEC 31; TH N 00°15'07" W 607.77 FT ALG THE E LINE OF THE SE 1/4 OF SD SEC 31; TH N 90°00'00" W 272.29 FT TO A PT ON THE W LINE OF 350 EAST STR AS MONUMENTED & SHOWN ON THE OFFICIAL PLAT OF AMD ROLLING HILLS ESTATES SUB PLAT H, THE TRUE POB; TH S 02°24'10" E 363.66 FT ALG THE W LINE OF SD 350 EAST STR TO THE N LINE OF ROLLING HILLS ESTATES SUB PLAT E; TH S 87°35'33" W 143.00 FT ALG SD N LINE; TH N 00°20'33" E 175.79 FT ALG THE E LINE OF SD ROLLING HILLS ESTATES SUB PLAT E; TH N 27°39'27" W 1214.67 FT ALG SD E LINE & THE E LINE OF ROLLING HILLS ESTATES SUB PLAT G TO THE SW'LY COR OF ADJUSTED LOT 20-M, ROLLING HILLS ESTATES SUB PLAT M; TH N 57°05'33" E 167.83 FT ALG THE S LINE OF SD ADJUSTED LOT; TH N 32°54'27" W 116.32 FT ALG THE E LINE OF SD ADJUSTED LOT TO THE TERMINUS OF THE W LINE OF ROLLING HILLS DRIVE; TH N 57°05'33" E 50.00 FT TO THE TERMINUS OF THE E LINE OF SD ROLLING HILLS DRIVE; TH N 32°54'27" W 17.57 FT TO THE S LINE OF LOT 19-M, ROLLING HILLS ESTATES SUB PLAT M; TH N 57°05'33" E 14.98 FT ALG THE S LINE OF SD LOT 19-M TO THE W LINE OF WEBER BASIN WATER CO. PARCEL NO. 0040 OF DAVIS COUNTY RECORDS; TH S 32°54'27" E 73.71 FT ALG SD PARCEL; TH N 88°06'08" E 116.68 FT ALG SD PARCEL; TH N 32°54'27" W 389.82 FT ALG SD PARCEL & THE E'LY LINE OF ROLLING HILLS ESTATES SUB PLAT M; TH N 27°09'53" W 235.05 FT ALG SD SUB; TH N 82°36'07" E 31.12 FT; TH N 72°46'05" E 298.27 FT; TH S 19°55'20" E 387.88 FT; TH S 70°04'40" W 25.00 FT; TH S 19°55'20" E 362.57 FT; TH S 57°05'33" W 260.78 FT; TH S 32°54'27" E 49.91 FT; TH S 29°48'40" E 88.48 FT; TH S 32°29'58" E 218.70 FT; TH S 41°39'27" E 111.73 FT; TH 161.61 FT ALG A CURVE TO THE LEFT, HAVING A RADIUS OF 55.00 FT & A CHORD BEARING S 08°47'55" E 109.43 FT; TH 22.39 FT ALG A CURVE TO THE RIGHT, HAVING A RADIUS OF 25.00 FT & A CHORD BEARING S 67°18'59" E 21.65 FT; TH S 48°20'33" W 90.06 FT; TH S 09°48'35" E 282.45 FT; TH N 87°35'50" E 120.79 FT TO THE POB. (THE BASIS OF BEARING IS THE E LINE OF THE SE 1/4 OF SEC 31 CALLED N 00°15'07" W, NAD 83, UTAH STATE PLANE (NORTH ZONE) GRID BEARING.) (CONT. 11.67 ACRES

PARCEL #: 07-073-0120
PARCEL C: A TRACT OF LAND SIT IN THE SE 1/4 OF SEC 31-T3N-R1E, SLB&M, BEING MORE PARTLY DESC AS FOLLOWS: COM AT THE SE COR OF SD SEC 31; TH N 00°15'07" W 284.31 FT ALG THE E LINE OF THE SE 1/4 OF SD SEC 31 TO THE TRUE POB; TH N 29°09'27" W 313.55 FT ALG THE E'LY LINE OF ROLLING HILLS ESTATES SUB PLAT H; TH N 50°20'33" E 138.29 FT ALG THE E'LY LINE OF AMD ROLLING HILLS ESTATES SUB PLAT H TO THE NE'LY LINE OF ROLLING HILLS DRIVE AS MONUMENTED & SHOWN ON THE OFFICIAL PLAT OF AMD ROLLING HILLS ESTATES SUB PLAT H; TH N 41°39'27" W 294.79 FT ALG SD NE'LY LINE; TH N 50°20'33" E 20.35 FT; TH N 19°55'20" W 392.59 FT; TH N 70°04'40" E 25.00 FT; TH N 19°55'20" W 711.90 FT; TH N 70°04'40" E 25.00 FT; TH N 19°55'20" W 387.88 FT; TH N 72°46'05" E 122.31 FT; TH S 19°28'07" E 660.00 FT; TH S 89°56'27" E 345.00 FT TO THE E LINE OF THE SE 1/4 OF SEC 31; TH S 00°15'07" E 37.88 FT ALG SD E LINE; TH N 89°22'22" W 326.87 FT; TH S 19°37'27" E 930.21 FT ALG THE W'LY LINE OF PPTY CONV TO WEBER BASIN WATER CO. (ROSEDALE WATER CO IN PREVIOUS LEGAL DESCRIPTIONS) & CENTERVILLE CITY; TH S 39°39'27" E 28.80 FT TO THE E LINE OF THE SE 1/4 OF SEC 31; TH S 00°15'07" E 496.37 FT ALG SD E LINE TO THE POB. (BASIS OF BEARING IS THE E LINE OF THE SE 1/4 OF SEC 31 CALLED N 00°15'07" W, NAD 83, UTAH STATE PLANE (NORTH ZONE) GRID BEARING.) CONT. 6.76 ACRES



- NOTES:
1. EXISTING 10" PVC WATER LINE AND EXISTING 6" PVC IRRIGATION LINE TO BE USED TO TIE INTO NEW LOTS WITH 1" POLY WATER LATERALS AND METERS
 2. A NEW 8" PVC SANITARY SEWER LINE TO BE USED TO CONNECT INTO NEW LOTS. LOTS WILL TIE INTO THE NEW LINE WITH 4" PVC LATERALS, NEW SEWER WILL CONNECT TO EX MANHOLE LOCATED AT THE NORTH WEST PORTION OF THE PROPERTY.
 3. A NEW 15" RCP STORM DRAIN LINE WILL BE IMPLEMENTED IN THE ROAD AS REQUIRED.
 4. ALL PROPERTIES ARE OUTSIDE OF ANY KNOWN FEMA FLOOD ZONE AREA
 5. THE TOTAL ACREAGE TO BE DEVELOPED IS 5.98 ACRES. TOTAL PROPERTY AREA IS 22.4 ACRES
 6. THE EXISTING ZONING DISTRICT TO BE CHANGED FROM AL TO AL/PDO

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ROLLING HILLS DRIVE

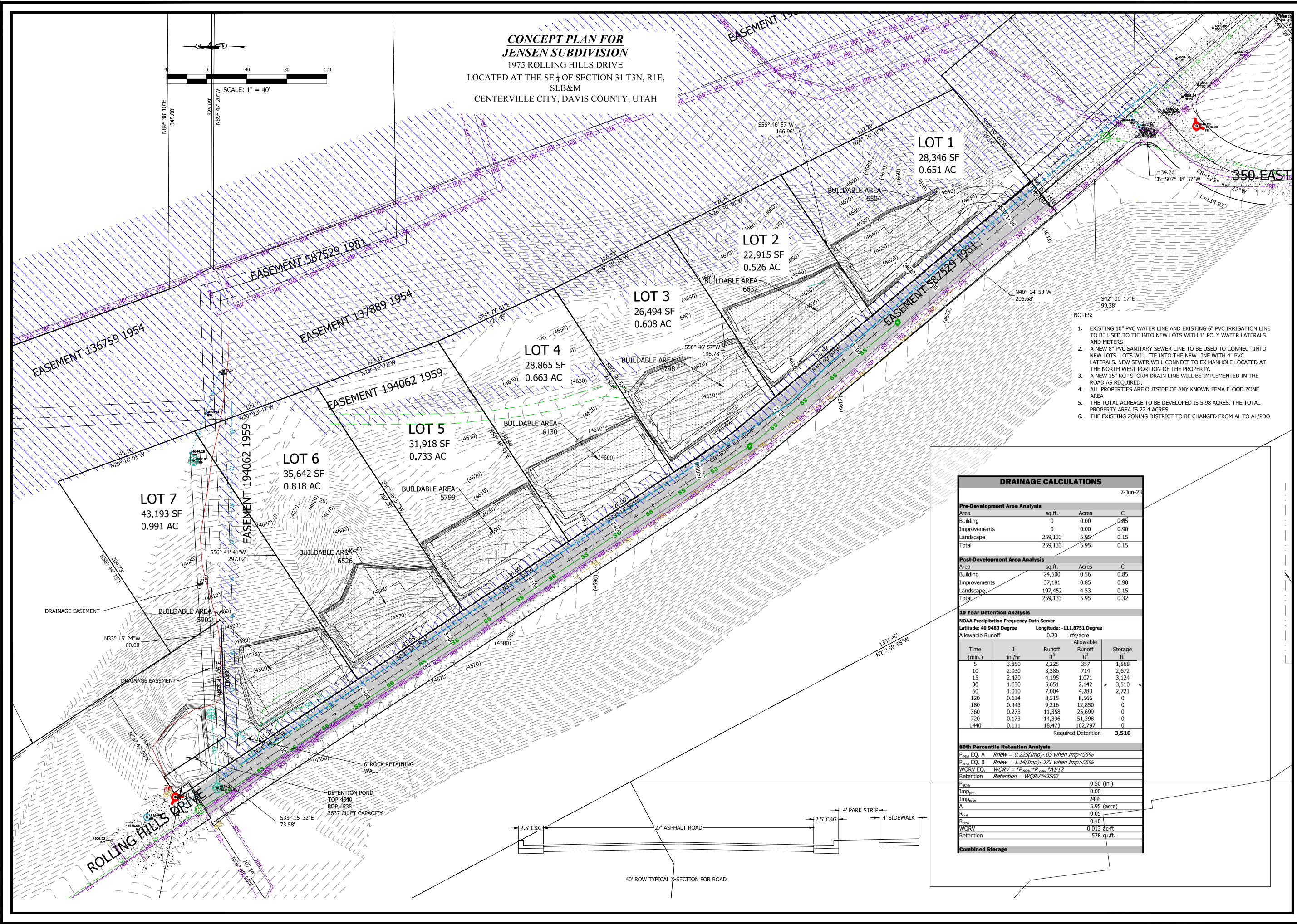
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SURVEY	XXX	7/5/2022
ENGINEER	XXX	7/5/2022

PRELIMINARY
CONSTRUCTION

1470 South 600 West
Woods Cross, UT 84010
Phone 801.298.2236
www.Entellus.com

C101
VICINITY



Entellus®
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C400
 SITE GRADING

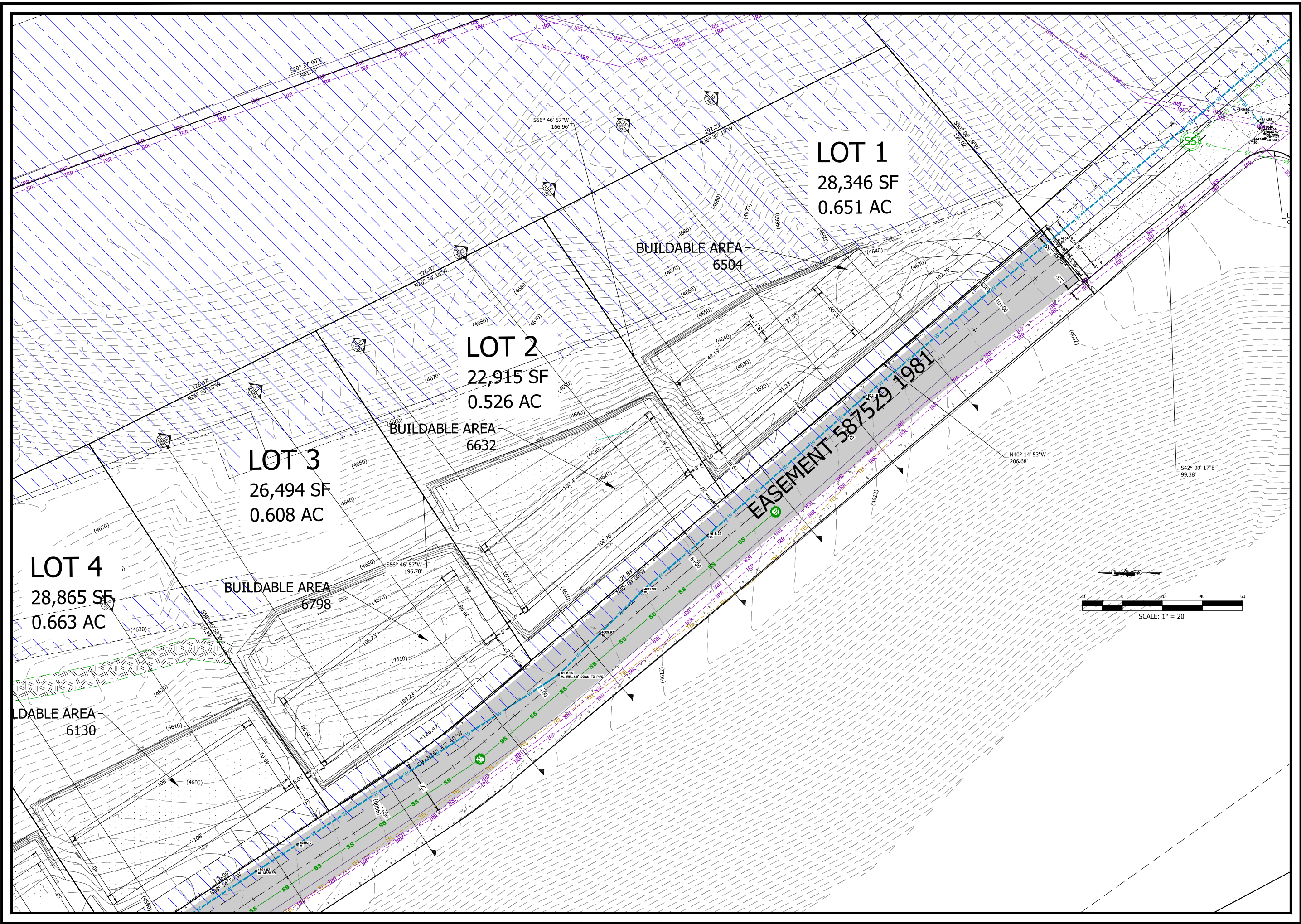
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CIVIL	XXX	7/5/2022
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PRELIMINARY

CONSTRUCTION

1470 South 600 West

Woods Cross, UT 84010

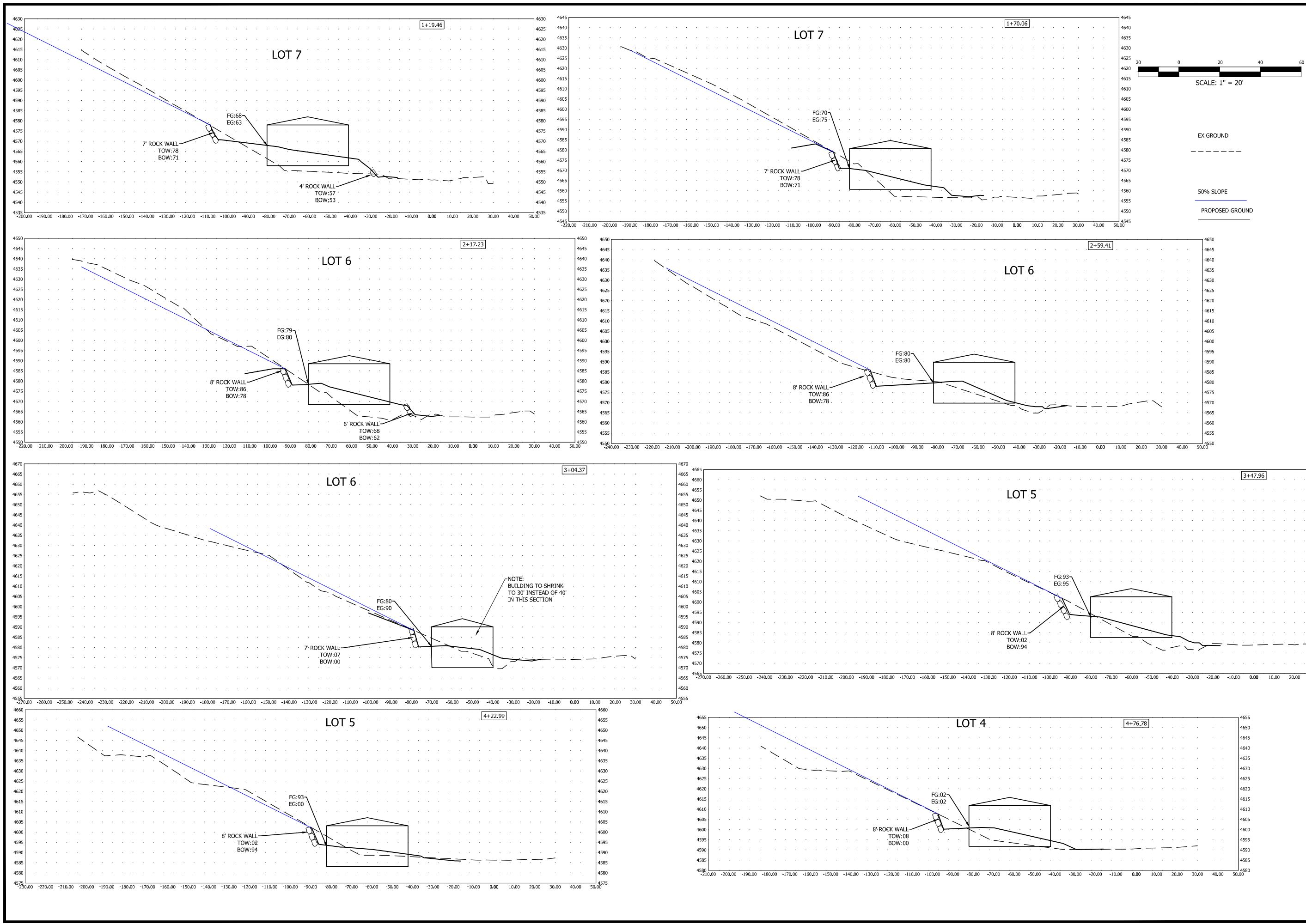
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GRADING



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CIVIL

7/5/2022

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ROLLING HILLS DRIVE

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PRELIMINARY

CONSULTATION

1470 South 600 West

Woods Cross, UT 84010

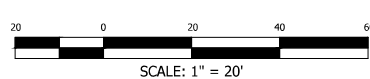
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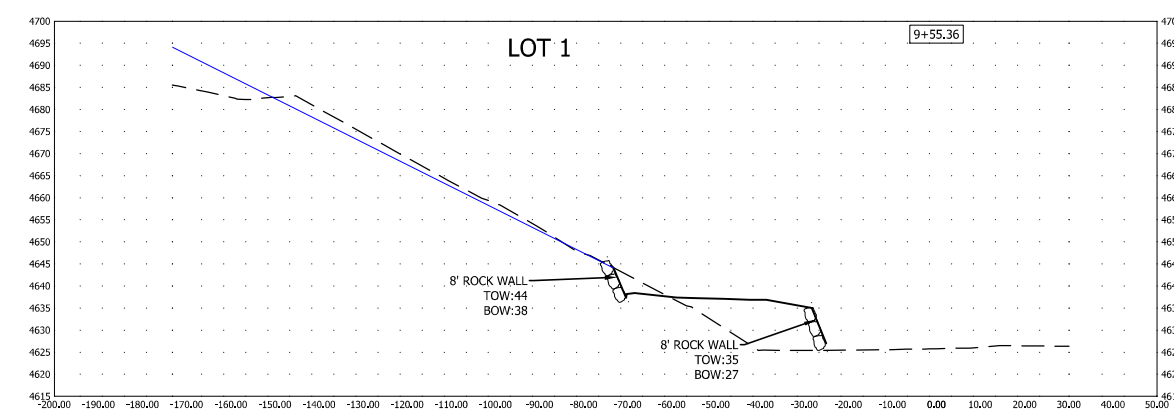
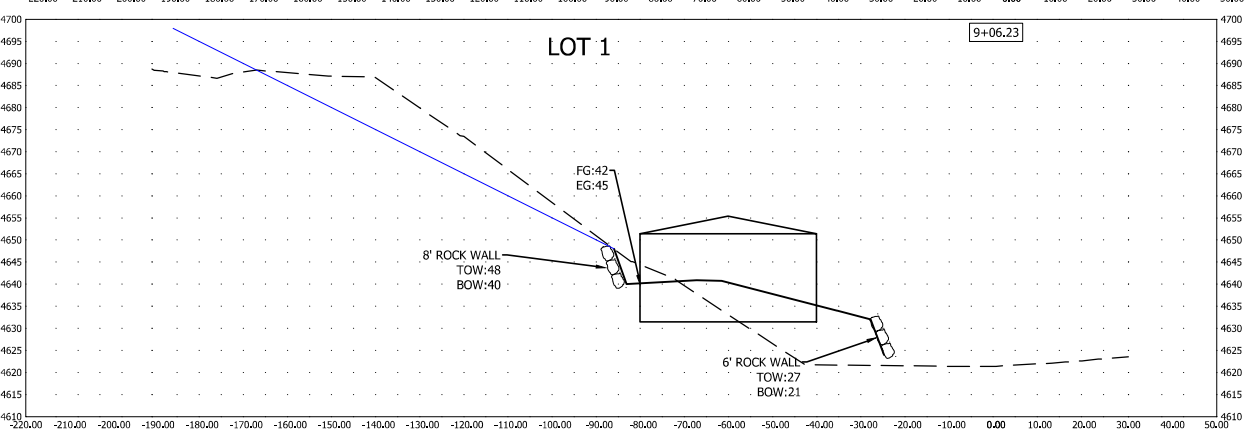
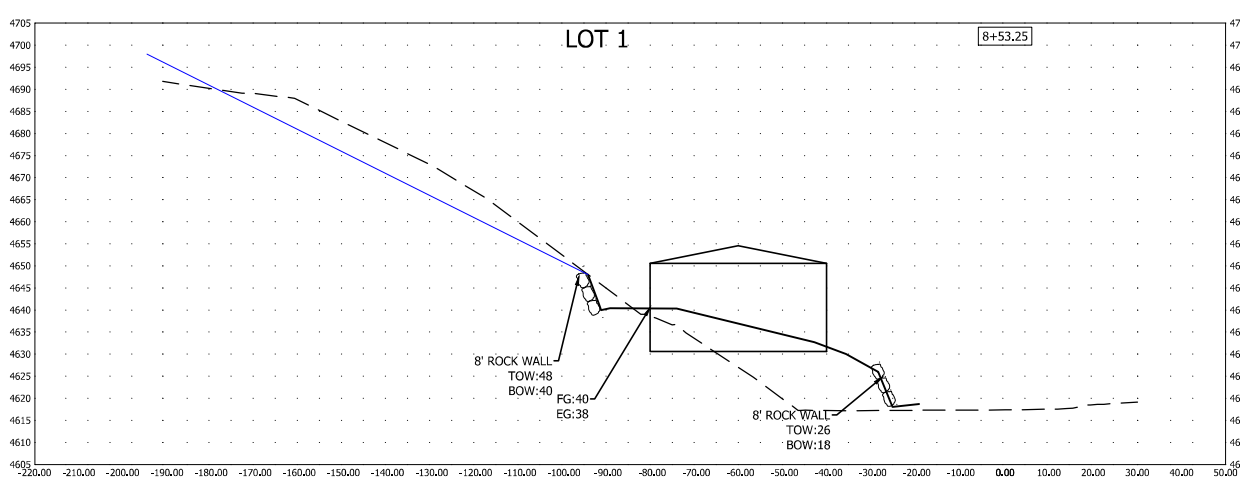
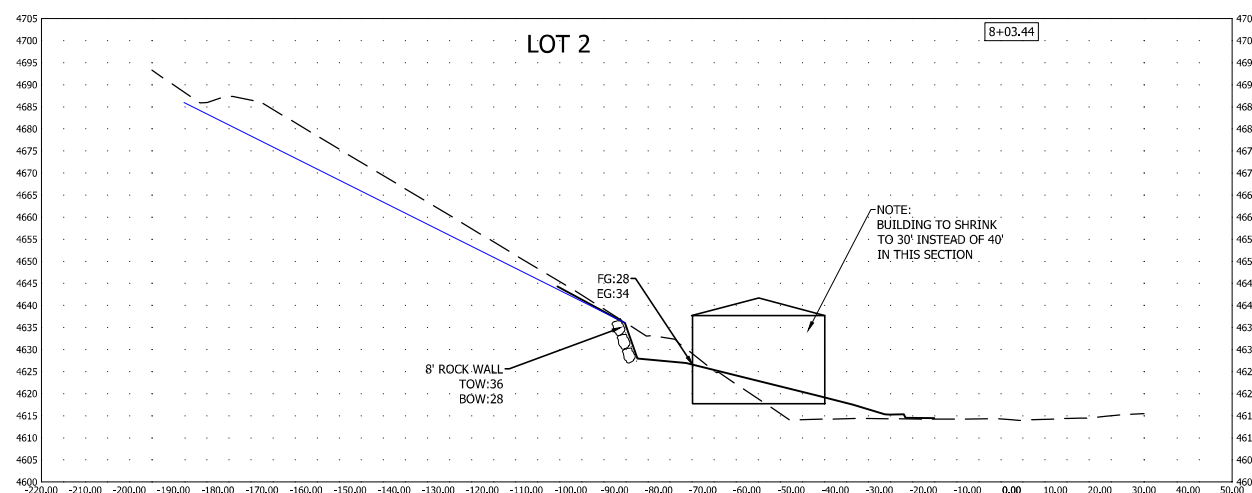
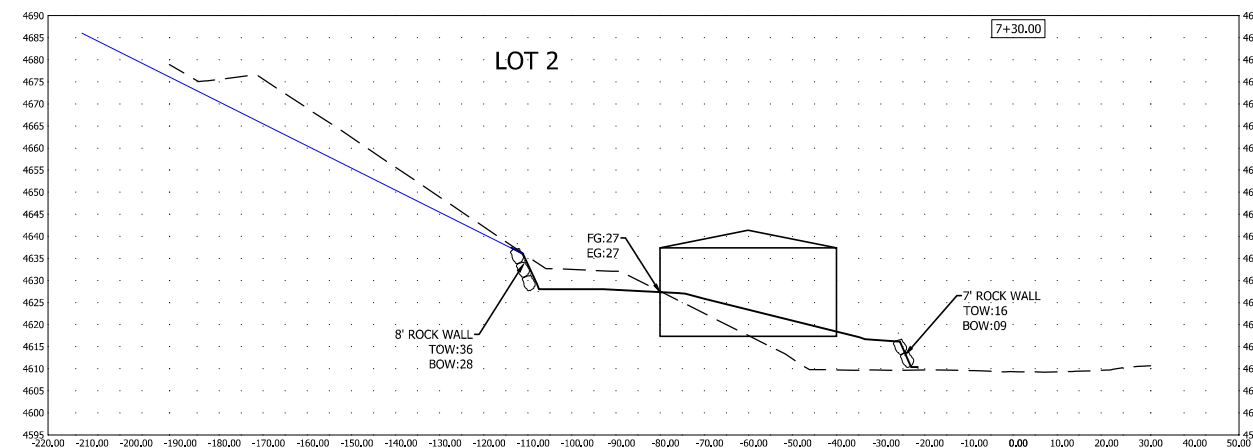
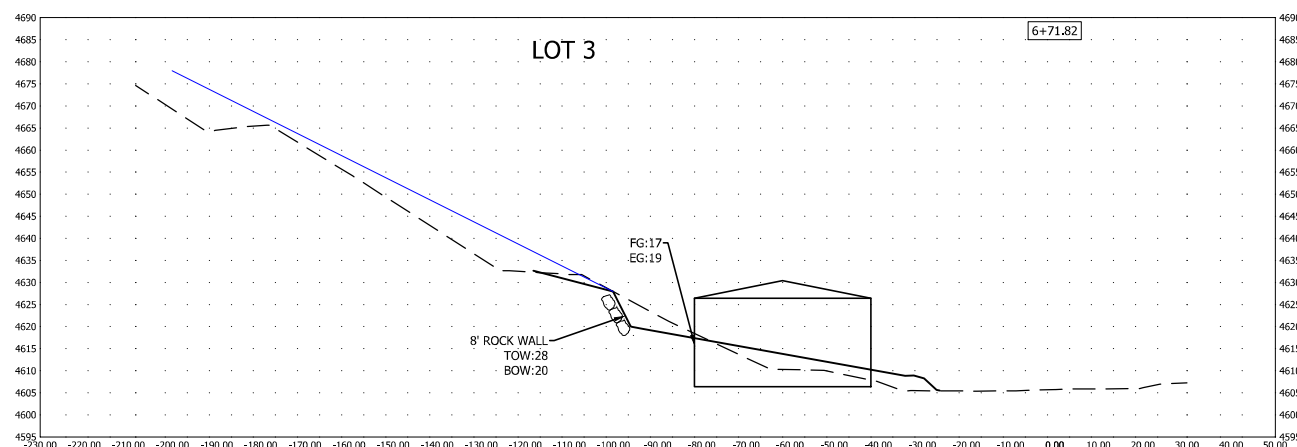
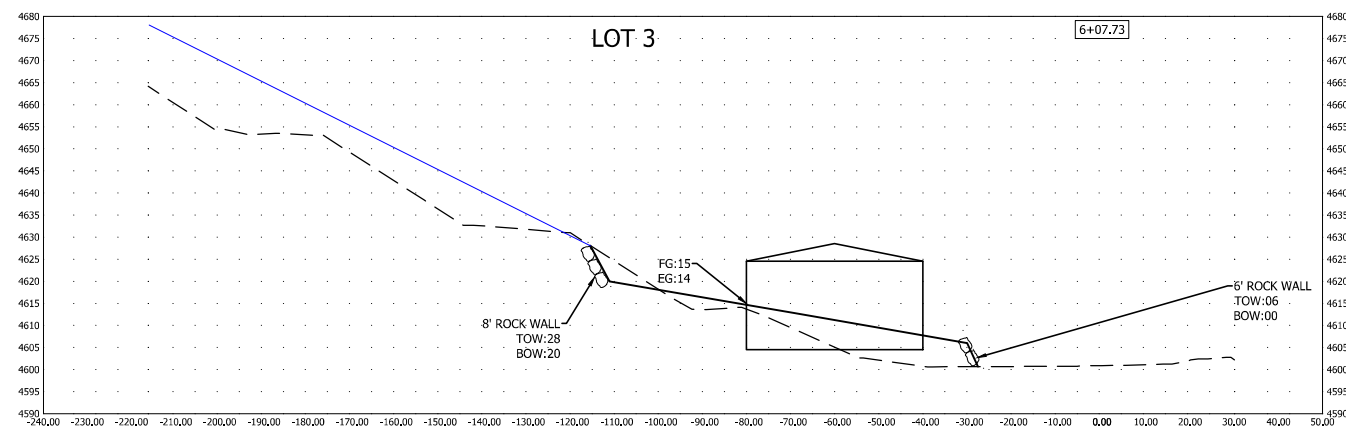
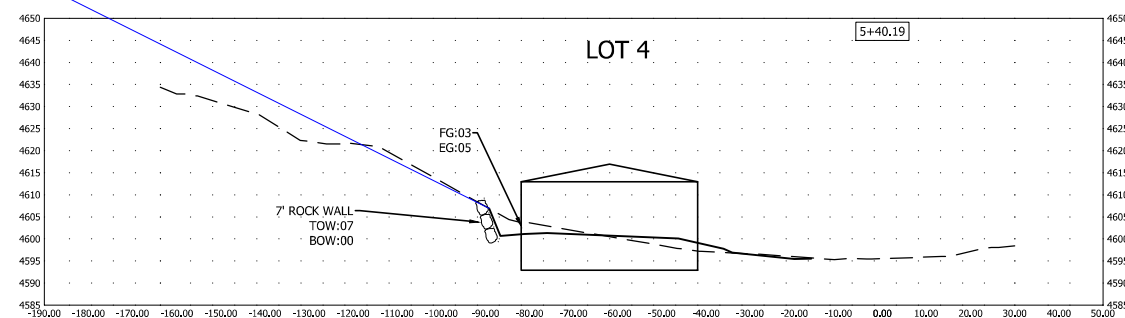
X-SECTIONS 1



EX GROUND

50% SLOPE

PROPOSED GROUND



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ROLLING HILLS DRIVE

2098001

CIVIL	XXX	7/5/2022
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Betterments

- 1) Create road connection.
 - i) Providing access for EMV, snowplows and other city services.
 - ii) Providing turnaround at the top of Rolling Hills Drive
- 2) Provide Public parking at trailhead.
- 3) Designate access to trail – Plaque donated from Gray Jensen
- 4) Donation of land to Centerville City
- 5) Weber Basin and Centerville City to implement emergency shutoff valves.
- 6) Create legal easements for existing utilities.
- 7) Eliminate public nuisance.
 - a) Parties, underage drinking
 - b) Squatters
 - c) Fires
 - d) Hazards, trash dumping, etc.
- 8) Manage water runoff.
 - a) Utilize detention basin.
 - b) Tie into existing storm drain
 - c) Eliminate debris on roadway, i.e., silt,
- 9) Prevent debris on Rolling Hills Drive
 - a) Uncontrolled runoff
 - b) Silt
- 10) Provide erosion control.
 - a) Water deterrent
- 11) Reduce water seepage above steep slope west of road grade
 - a) Impervious road pavement to reduce water infiltration.
 - b) Gutters and storm drains to remove surface water.
- 12) Low density, small Family subdivision
 - a) Provide landscape.



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**Geologic Hazards Assessment
Lake View Vista Development
Approximately 1950 North and Rolling Hills Road
Centerville, Utah**

GeoStrata Job No. 1159-002

October 25, 2017

Prepared for:

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Learn More

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Lake View Vista Development
Approximately 1950 North and Rolling Hills Road
Centerville, Utah**

GeoStrata Job No. 1159-002

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October 25, 2017

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1.0 EXECUTIVE SUMMARY

The purpose of this investigation and report is to evaluate the proposed Lake View Vista development located at approximately 1950 North and Rolling Hills Drive in Centerville, Utah for the presence of geologic hazards that may impact the planned development of the site. The subject site will consist of two multi-level single family residences. The geologic hazards considered for this site are presented in Table 2 of this report.

Earthquake ground shaking hazard that would potentially impact the site was assessed as part of our study. It is the opinion of GeoStrata that the earthquake ground shaking hazard within the subject site is considered high and recommendations for mitigation of the earthquake ground shaking hazard within the subject site are out of the scope of this geological study. GeoStrata recommends that a licensed structural engineer provide proper structural designs for the proposed residential structure which account for and mitigate this hazard. It is the opinion of GeoStrata that earthquake ground shaking hazard should not preclude development at the subject site.

Surface Fault rupture hazard that would potentially impact the subject site was assessed as part of our study. It is the opinion of GeoStrata that no surface fault ruptures associated with the Weber Segment of the WFZ were observed in any of the trenches excavated as a part of this investigation. The recommended setback of 15 feet was extended past the end of each trench and where the end of the trench is within the Surface Rupture Special Study Zone. No structures or any portions of any structures intended for human occupancy should be located within the setback areas. It is generally accepted practice to allow roadways, landscaping, driveways, and non-habitable structures such as detached garages and sheds to be located within the setback areas. Given the observations made during the fieldwork conducted for this investigation, surface fault rupture hazards should not preclude development within the subject lot.

Tectonic deformation hazard that would potentially impact the site was assessed as part of our study. It is the opinion of GeoStrata that the tectonic deformation hazard within the subject site is considered high. Assessment of the magnitude of and mitigation for this hazard is out of the scope of this study. The project structural engineer should be consulted for mitigation of this potential structural damage. It is the opinion of GeoStrata that the tectonic deformation hazard should not preclude development at the subject site.

Liquefaction hazard that would potentially impact the site was assessed as part of our study. Based on our review of the *Liquefaction Special Study Areas, Wasatch Front and Nearby Areas*

Utah, the site is located in an area currently designated as having a “Very Low” liquefaction potential. A liquefaction analysis was beyond the scope of this geologic hazards assessment; however, if the owner wishes to have greater understanding of the liquefaction potential of the soils at greater depths, a liquefaction analysis could be completed at the site as a part of a geotechnical assessment. It is the opinion of GeoStrata that liquefaction hazard should not preclude development at the subject site.

Rock fall hazards within the subject site were assessed as part of our study. No rock fall or talus deposits are located within or immediately adjacent to the subject site. Our field investigation revealed no indications that the subject site has been subjected to previous rock fall. Therefore, the rock fall hazard within the subject site is considered low and it is considered unlikely that rock fall will impact the proposed development. It is the opinion of GeoStrata that rock fall hazard should not preclude development at the subject site.

Landslide, slump and creep hazards that would potentially impact the site were assessed as part of this study. No landslide, slump or creep deposits are mapped within the subject site. It is the opinion of GeoStrata that landslide, slump, and creep hazards within the subject site are considered low and it is considered unlikely that these hazards will impact the proposed development. It is the opinion of GeoStrata that landslide, slump and creep hazards should not preclude development at the subject site.

Slope stability of the subject site was not assessed as part of this geological hazard assessment. Slopes within the subject site were observed to be steeply sloping above and below the pre-graded area along the road and east of the road. A site specific geotechnical investigation will be compiled by GeoStrata and include a detailed slope stability assessment of the site as part of the geotechnical investigation prior to development and the recommendations contained in the geotechnical report should be followed as a part of the grading design for the site.

Snow avalanche hazard that would potentially impact the site was assessed as part of this study. No evidence of prior snow avalanche was observed within the subject site. It is the opinion of GeoStrata that the snow avalanche hazard within the subject site is considered low and it is considered unlikely that this hazard will impact the proposed development. It is the opinion of GeoStrata that snow avalanche hazard should not preclude development at the subject site.

Alluvial-fan flooding hazard that would potentially impact the site was assessed as part of this study. No Holocene-aged alluvial fan deposits are mapped as underlying the subject site.

Sheetflooding deposits were observed within the near surface soils exposed in Trench 1 and Trench 2. During our field investigation, erosion of the road and deposition of eroded material at the north end of the dirt road was observed. Rills were also observed along the hillside to the east, upslope, and to the west, downslope, during our field investigation and review of aerial imagery. It is the opinion of GeoStrata that the alluvial fan flooding hazard is considered moderate and it is considered unlikely that alluvial fan flooding will impact the proposed development as long as proper site grading and drainage plans are developed by a civil engineer as part of the development of the subject site that are designed to redirect water and material away from the subject site while not impacting surrounding developments. GeoStrata also recommends that the calculated volume of expected debris is included in the design parameters of the detention basin. It is the opinion of GeoStrata that alluvial fan flooding hazards should not preclude development at the subject site.

Shallow groundwater assessment is out of the scope of this study. Seasonal fluctuations in precipitation, surface runoff from adjacent properties, or other on or offsite sources may increase moisture conditions; groundwater conditions can be expected to rise several feet seasonally depending on the time of year. Since shallow groundwater was not assessed as part of this study, a separate geotechnical study including subsurface exploration would be needed to assess this hazard.

Stream flooding hazard that would potentially impact the site was assessed as part of this study. No streams were observed or are mapped within or adjacent to the subject site. Given our field and office investigations, the stream flooding hazard within the subject site is considered low and it is considered unlikely that stream flooding will impact the proposed development. It is the opinion of GeoStrata that stream flooding hazard should not preclude development at the subject site. Proper site grading and drainage plans should be developed for the subject site as a part of the civil engineering design for the site.

Canal flooding hazard that would potentially impact the site was assessed as part of this study. No canals were observed or are mapped within or adjacent to the subject site. Given our field and office investigations, the canal flooding hazard within the subject lot is considered low and it is considered unlikely that canal flooding will impact the proposed development. It is the opinion of GeoStrata that canal flooding hazard should not preclude development at the subject lot.

Dam failure hazard that would potentially impact the site was assessed as part of this study. No dam is located near the subject site. An approximately 0.35 square acre reservoir owned and

operated by the City of Centerville is located east and uphill of the subject site. Given the size of the reservoir, a breach of this reservoir could cause minor flooding and erosion within the subject site. Given our field and office investigations, the dam failure hazard within the subject site is considered low and it is considered unlikely that dam failure will impact the proposed development. It is the opinion of GeoStrata that dam failure hazard should not preclude development at the subject site.

Problem soils hazard is out of the scope of this study. Based on our subsurface investigation and review of published geologic maps, the subject site is underlain by a sand and gravel. No laboratory testing was performed on these soils as part of this study and therefore this hazard was not assessed as part of this study. In order to understand soil properties for use in the design of footing and foundation elements, a site specific geotechnical study would need to be conducted for the project.

Radon gas hazard potential is out of the scope of this study. No published information on radon gas potential that covers the area of the subject site currently exists. Indoor testing following construction is recommended for determining radon gas levels and mitigation methods needed.

Karst and sink holes hazards that would impact the site were assessed as part of this study. The karst and sink holes hazards within the subject site are considered low and it is unlikely that karst and sink holes hazards will impact the proposed development. It is the opinion of GeoStrata that karst and sink hole hazards should not preclude development at the subject lot.

NOTICE: The scope of services provided within this report are limited to the assessment of the subsurface conditions for the proposed development. This executive summary is not intended to replace the report of which it is part and should not be used separately from the report. The executive summary is provided solely for purposes of overview. The executive summary omits a number of details, any one of which could be crucial to the proper application of this report.

2.0 INTRODUCTION

2.1 PURPOSE AND SCOPE OF WORK

The purpose of this investigation and report is to evaluate the proposed Lake View Vista development located at approximately 1950 North and Rolling Hills Drive in Centerville, Utah for the presence of geologic hazards that may impact the planned development of the site. The subject site will consist of two multi-level single family residences. The geologic hazards considered for this site are presented in Table 2 of this report. The work performed for this report was performed in accordance with our Master Service Agreement and proposal, dated June 20, 2017 and signed June 22, 2017. Our scope of services included the following:

- Review of available references and maps of the area.
- Stereographic aerial photograph interpretation of aerial photographs covering the site area.
- Review of the sub-meter Wasatch Front LiDAR elevation data (2013 to 2014) obtained from the State of Utah AGRC.
- Geologic reconnaissance of the site by an engineering geologist to observe and document pertinent surface features indicative of possible surface rupture fault hazards, landslide hazards, debris flow hazards or other geologic hazards
- Subsurface investigation consisting of trenching across portions of the site exposing the soil stratigraphy and observing the exposed soil for evidence of surface fault rupture or other geologic hazards
- Preparation of hand drawn logs to document any fault structures, debris flow deposits or evidence of geologic hazards encountered during our subsurface investigation; and
- Evaluation of our observations combined with existing information and preparation of this written report with conclusions and recommendations regarding possible surface rupture hazards or any other geologic hazards observed to affect the site.

The recommendations contained in this report are subject to the limitations presented in the Limitations section of this report.

2.2 PROJECT DESCRIPTION

The project site is located along within the foothills of the Wasatch front and north of Ricks Creek Canyon at approximately 1950 North and Rolling Hills Drive in Centerville, Utah.

Proposed development, as currently planned, will consist of two multi-level single family residential structures as well as associated roadways and landscape areas. The subject property currently exists as an undeveloped property within an existing neighborhood. A dirt road trends north-south through the subject site connecting the established neighborhoods north and south of the subject site. Grading surrounding the dirt road has also been conducted prior to this study. The subject site is steeply sloping to the west toward the valley. The project site is shown on the Site Vicinity Map and Topographic Map included in the Appendix of this report (Plate A-1 Site Vicinity Map; Plate A-2 Topographic Map).

3.0 METHODS OF STUDY

3.1 OFFICE INVESTIGATION

To prepare for the investigation, GeoStrata reviewed pertinent literature and maps listed in the references section of this report, which provided background information on the local geologic history of the area and the locations of suspected or known geologic hazards (Nelson and Personius, 1993; Bryant, 1990; Elliot and Harty, 2010; Christenson and others, 2008; U.S. Geological Survey, 2006). The presence of specific stratigraphic units is also very useful in determining the presence and severity of other geologic hazards that may be present on the subject property. A stereographic aerial photograph interpretation was also performed for the subject site using two sets of stereo aerial photographs obtained from the UGS as shown in Table 1.

Source	Photo Number	Date	Scale
ASCS	AAK_4K-190	September 1, 1952	1:20,000
ASCS	AAK_4K-191	September 1, 1952	1:20,000

Table 1: Aerial Stereosets.

GeoStrata also conducted a review of the sub-meter Wasatch Front LiDAR elevation data (2013 to 2014) obtained from the State of Utah AGRC to assess the subject site for visible lineations or other surface fault rupture related geomorphology. The LiDAR elevation data was used to create hillshade imagery that could be reviewed for assessment of geomorphic features related to geologic hazards (Plate A-3 Hillshade Map). We used this hillshade imagery and the stereographic aerial photographs to map the location of the Weber segment of the Wasatch fault zone within the subject site.

The subject site falls within the Surface Fault Rupture Special Study Zone (Plate A-4 Special Study Map) and needed to be assessed by means of trenching to observe the near surface geologic units for the presence or absence of active surface fault rupture hazards. A Surface Fault Rupture Special Study Zone Map provided by the Utah Geological Survey was used during our assessment. Nelson and Personius (1993) map the Weber Segment of the Wasatch fault zone (WFZ) in the area of the subject site as a two splays trending generally north to south (Plate A-5 Site Vicinity Geologic Map). Bryant (1990) and the U.S. Geological Survey and Utah Geological Survey Quaternary fault and fold database (2006) report this section of the Weber segment of the Wasatch fault zone as being comprised of one splay trending generally north to south in the

western portion and eastern portion of the subject site, respectively (Plate A-6 Site Vicinity 30x60 Geologic Map; Plate A-7 Quaternary Fault Map).

3.2 FIELD INVESTIGATION

An engineering geologist investigated the geologic conditions within the general site area. A field geologic reconnaissance was conducted to observe existing geologic conditions and to assess existing surficial evidence of geologic hazards. Based on the results of our office research and field observations, the surface fault rupture hazard at the site should be assessed prior to development of the site.

4.0 GEOLOGIC CONDITIONS

4.1 GEOLOGIC SETTING

The site is located in Centerville, Utah along the foothills of the Wasatch Front and within Salt Lake Valley at an elevation ranging from 4710 to 4460 feet above mean sea level. The Salt Lake Valley is a deep, sediment-filled structural basin of Cenozoic age flanked by two uplifted blocks, the Wasatch Range on the east and the Oquirrh Mountains to the west (Hintze, 1980). The northern portion of the Salt Lake Valley extends beyond the northern limits of the Oquirrh mountain range and is bordered on the west by the southeast shore of the Great Salt Lake. The Wasatch Range is the easternmost expression of pronounced Basin and Range extension in north-central Utah (Stokes, 1986).

The near-surface geology of the Salt Lake Valley is dominated by sediments, which were deposited within the last 30,000 years by Lake Bonneville (Scott and others, 1983; Hintze, 1993). As the lake receded, streams began to incise large deltas that had formed at the mouths of major canyons along the Wasatch Range, and the eroded material was deposited in shallow lakes and marshes in the basin and in a series of recessional deltas and alluvial fans. Sediments toward the center of the valley are predominately deep-water deposits of clay, silt and fine sand. However, these deep-water deposits are in places covered by a thin post-Bonneville alluvial cover.

Surface sediments within the subject site are mapped as uppermost Pleistocene lacustrine sand (lbs) comprised of sand, silty sand, gravelly sand, and minor silt mapped downslope from Provo shoreline and gravel deposits (Nelson and Personius, 1993) as illustrated on Plate A-6 Site Vicinity Map. Nelson and Personius (1993) map the surface sediments in the western portion of the subject site as Holocene to uppermost Pleistocene younger fan alluvium (afy) which is described as deposits that postdate the regression of Lake Bonneville from the Provo level. Bryant (1990) delineates the subject site as Pleistocene sand and gravel deposits (Qug) related to the high stand and regressive phase of Lake Bonneville and sand and gravel deposits (Qpg) that include regressive phase Lake Bonneville deposits and deposits related to Stansbury Lake high stand (Plate A-6 Site Vicinity 30x60 Geologic Map). Archean schist and gneiss bedrock (Afs) of the Farmington Complex is mapped east and uphill of the subject site (Nelson and Personius, 1993; Bryant, 1999).

4.2 TECTONIC SETTING

Review of the Quaternary Fault and Fold Database as well as published geologic maps indicate that the Weber segment of the WFZ trends through the subject site (Plate A-5 Site Vicinity Geologic Map; Plate A-6 Site Vicinity 30x60 Geologic Map; Plate A-7 Quaternary Fault Map). The Weber segment is the second largest segment of the WFZ and extends north to south 56 km from the Salt Lake Salient, a ridge of Paleozoic and Tertiary bedrock that extends west of the Wasatch Front, to the Pleasant View Salient which marks the boundary between the Weber segment and the Brigham City segment (DuRoss and others, 2009). The geometry of linkage between the main rupture zones in the Weber segment and faults in the interior of the Salt Lake salient is not clear. Surface scarps at the southern margin of the salient are discontinuous but apparently extend into the large normal fault along the eastern boundary of the segment. There is no reported evidence for Quaternary movement on this fault in the interior of the salient, so presumably the Quaternary ruptures have not reactivated most of this fault. Prior paleoseismic studies report that the Weber segment of the WFZ is thought to have experienced four surface faulting seismic events since the middle Holocene. Nelson and others (2006) report four surface faulting seismic events since the middle Holocene with the most recent event being a partial segment rupture which occurred approximately 500 years ago resulting in a 1.6 feet surface rupture displacement. DuRoss and others (2009) report evidence from the 2007 Rice Creek trench site of as many as six surface faulting seismic events during the Holocene with four surface faulting events in approximately the past 5,400 years. This data from DuRoss and others (2009) supports the partial segment surface rupture timing reported by Nelson and others (2006). A location near Kaysville, Utah indicated that the Weber Segment has a measureable offset of 1.4 to 3.4 meters per event (McCalpin and others, 1994). The Weber Segment may be capable of producing earthquakes as large as magnitude 7.5 (Ms). The consensus preferred recurrence interval for the Weber segment, determined by the Utah Quaternary Fault Working Group, is approximately 1,400 years for the past four surface fault rupture earthquakes (Lund, 2005).

Analysis of the ground shaking hazard along the Wasatch Front suggests that the Wasatch Fault Zone is the single greatest contributor to the seismic hazard in the Salt Lake City region. The Weber segment of the WFZ shows evidence of Holocene-aged movement, and is therefore considered active.

5.0 GENERALIZED SITE CONDITIONS

5.1 SURFACE CONDITIONS

As stated previously, the project site is located within the foothills of the Wasatch Front at approximately 1950 North and Rolling Hills Drive in Centerville, Utah, and is underlain by sand and gravel deposits. The subject site has been altered by human activity, a roadway and grading have been performed on the site. Vegetation within the subject site was observed to consist primarily of grasses, weed and sagebrush with few trees in the northeast region of the site. The properties west of the subject site are occupied by establish single family and multifamily residences. The property to the east of the subject site is an undeveloped hillside.

5.2 SUBSURFACE CONDITIONS

The subsurface soil conditions were explored for the purpose of evaluating the presence or absence of active faults as well as any other geologic hazards at the subject property by excavating three trenches across the subject site oriented generally east to west and perpendicular to the mapped splay of the Weber segment of the WFZ (Plate A-8 Exploration Location Map). Subsurface soil conditions and soil stratigraphy were logged at the time of trenching (Plates B-1 through B-4). The following is a description of the trench excavation as observed during our field investigation.

5.2.1 Trench 1 Description

The trench was approximately 45 feet long and oriented approximately N65°E. The trench was excavated with a trackhoe to depths ranging from approximately 5 to 5½ feet below the existing site grade as it existed at the time of our investigation. Trench 1 was located approximately perpendicular to the Weber segment of the WFZ that is mapped trending generally north-south through the subject site. A hand log of the trench can be found on Plate B-1.

The soils exposed in Trench 1 have been separated into three stratigraphic units and labeled from oldest to youngest as Unit 1 through Unit 3 on the log of Trench 1. The oldest sediment observed at the bottom of Trench 1 was designated as Unit 1 and the youngest sediment observed at the top of the trench was designated as Unit 3.

Unit 1 was observed to be comprised of sediments similar in description to uppermost Pleistocene Lake Bonneville lacustrine sand and sand and gravel deposits (lbps, Qug) mapped

downslope from the Provo shoreline deposits and that cannot be directly correlated with transgressive and regressive phases of the Lake Bonneville cycle (Nelson and Personius, 1993; Bryant, 1990). Unit lbps is described by Nelson and Personius (1993) as sand, silty sand and gravelly sand and minor silt. Unit Qug is described by Bryant (1990) as high-stand and regressive-phase Lake Bonneville sand and gravel deposits. Unit 1 was observed to be a clast supported deposit consisting of grey-brown coarse sand with gravel. Unit 2 was observed to consist of a weakly developed A Soil Horizon overlying Unit 1. Unit 2 was observed to be approximately ½ foot thick and to comprise of sand and gravel with moderate organics. Unit 3 was observed to consist of locally derived fill comprised of fine to coarse grained sand and gravel. The uppermost Pleistocene lacustrine deposits were observed to be continuous throughout the entire length of Trench 1 with no observed fault offset. A detailed hand log and descriptions of each unit can be found on Plate B-1.

5.2.2 Trench 2 Description

The trench was approximately 73 feet long and oriented approximately N65°E. The trench was excavated with a trackhoe to depths ranging from approximately 5 to 5½ feet below the existing site grade as it existed at the time of our investigation. Trench 2 was located approximately perpendicular to the Weber segment of the WFZ that is mapped trending through the subject site. A hand log of the trench can be found on Plate B-2 and Plate B-3.

The soils exposed in Trench 2 have been separated into five stratigraphic units and labeled from oldest to youngest as Unit 1 through Unit 5 on the log of Trench 2. The oldest sediment observed at the bottom of Trench 2 was designated as Unit 1 and the youngest sediment observed at the top of the trench was designated as Unit 5.

Unit 1 was observed to be consistent with Unit 1 in Trench 1. Unit 2 was observed between approximately 51 and 64 feet down trench. Unit 2 was observed to comprise of a clast supported deposit consisting of well-rounded cobbles and boulders with fine to coarse grained sand. It is the opinion of GeoStrata that this deposit is the result of material transported downslope during the regressive phase of Lake Bonneville. Intact blocks of bedded silty sand within large well-rounded cobbles and boulders, similar to Unit 2, were observed across the trench from Unit 2. Bedding observed within the blocks of silty sand were oriented near vertical, suggesting these blocks originated upslope. Unit 3 was observed to be similar to Unit 1, however, it was observed to be light brown in color and to contain greater amounts of fine-grained sand. Unit 4 was observed to comprise of a weakly developed A Soil Horizon approximately ½ feet thick and to consist of sand and gravel. Unit 5 was observed between 0 and 18 feet down trench and to consist of locally

derived fill. The uppermost Pleistocene lacustrine deposits were observed to be continuous throughout the entire length of Trench 2 with no observed fault offset. A detailed hand log and description of each unit can be found in the Trench 2 legend found on Plate B-2 and Plate B-3.

5.2.2 Trench 2 Extension Description

The trench was approximately 15 feet long and oriented approximately N65°E. The trench was excavated with a trackhoe to depths ranging from approximately 4 to 4½ feet below the existing site grade as it existed at the time of our investigation. Trench 2 Extension was located approximately perpendicular to the Weber segment of the WFZ that is mapped trending through the subject site. A hand log of the trench can be found on Plate B-4.

The soils exposed in Trench 2 Extension have been separated into four stratigraphic units and labeled from oldest to youngest as Unit 1 through Unit 4 on the log of Trench 2 Extension. The oldest sediment observed at the bottom of Trench 2 Extension was designated as Unit 1 and the youngest sediment observed at the top of the trench was designated as Unit 5.

Unit 1 was observed to be consistent with Unit 1 in Trench 1 and Trench 2. Unit 1 was observed to consist of grey-brown coarse grained sand with gravel. Unit 2 was observed between approximately 5 and 10 feet down trench. Unit 2 was observed to be similar to Unit 2 in Trench 2 consisting of well-rounded cobbles and boulders with fine to coarse grained sand. Unit 3 was observed to be similar to Unit 1, however, it was observed to be light brown in color and to contain greater amounts of fine-grained sand. Unit 4 was observed to comprise of a weakly developed A Soil Horizon approximately ½ feet thick and to consist of sand and gravel. The uppermost Pleistocene lacustrine deposits were observed to be continuous throughout the entire length of Trench 2 Extension with no observed fault offset. A detailed hand log and description of each unit can be found in the Trench 2 Extension legend found on Plate B-2 and Plate B-3.

A Site Specific Geologic Map (Plate A-9) illustrates the surficial deposits underlying the subject site as determined through our subsurface investigation and reference of published geologic maps. The deposit mapped in the western portion of the site is likely a younger alluvial fan (afy) as indicated by Nelson and Personius (1993), however, no subsurface evaluation was compiled within this area of the subject site during this investigation. Soils exposed in Trench 1, Trench 2 and Trench 2 Extension appeared to be consistent with descriptions of surficial deposits compiled by Nelson and Personius (1993) and Bryant (1990) and therefore Plate A-9 Site Vicinity Geologic Map closely resembles the geologic maps compiled by Nelson and Personius (1993) and Bryant (1990).

6.0 GEOLOGIC HAZARDS

Geologic hazards can be defined as naturally occurring geologic conditions or processes that could present a danger to human life and property. These hazards must be considered before development of the site. There are several hazards that if present at the site should be considered in the design of habitable structures and other critical infrastructure. The hazards considered for this site are presented on Table 2 and discussed in the following sections of this report.

Hazard	Hazard Rating*					Further Study Recommended
	Not Applicable	Not Assessed	Low	Moderate	High	
Ground Shaking					X	E
Surface Fault Rupture				X		
Tectonic Deformation				X		
Liquefaction			X			
Rock Fall and Topple			X			
Landslide			X			
Slump			X			
Creep			X			
Avalanche	X					
Debris Flow			X			
Hyperconcentrated Flow			X			
Stream Flow				X		
Shallow Groundwater		X				E
Stream Flooding	X					
Canal Flooding	X					
Dam Failure			X			
Problem Soils		X				E
Radon		X				
Karst and Sink Hole	X					

Table 2: Summary of Geologic Hazards.

Table 2 shows the summary of the geologic hazards assessed and not assessed at the subject site. A hazard rating of “Not Assessed” are hazards this report does not consider and no inference is made as to the presence or absence of the hazard at the site. A hazard rating of “Low” indicates

that no evidence was found to indicate that the hazard is present, hazard not known or suspect to be present. A hazard rating of “Moderate” indicates that the hazard may exist, but the evidence is equivocal, based only on theoretical studies, or was not observed and further study is necessary as noted. A hazard rating of “High” indicates that that evidence is strong that the hazard exists and mitigation measures should be taken. If a hazard is assessed to potentially impact the site then further studies may be recommended. The following are the recommended studies and the letter designation associated with those studies: “E” – geotechnical/engineering, “H” – hydrologic, “A” – avalanche, “G” – additional detailed geologic hazard study out of the scope of this study.

6.1 EARTHQUAKE GROUND SHAKING HAZARD

During the event of an earthquake seismic waves radiate outward from the initial point of rupture and dissipate with distance. The ground shakes as the seismic waves displace the ground both vertically and horizontally. Ground shaking can cause significant damage to and potentially collapse structures and can also trigger landslide, avalanche and liquefaction. The type of soil a seismic wave travels through can amplify or dampen the effects of ground shaking.

Seismic hazard maps depicting probabilistic ground motions and spectral response have been developed for the United States by the U.S. Geological Survey as part of NEHRP/NSHMP (Frankel et al, 1996). These maps have been incorporated into both *NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures* (FEMA, 1997) and the *International Building Code* (IBC) (International Code Council, 2015). Spectral responses for the Maximum Considered Earthquake (MCE_R) are shown in the table below. These values generally correspond to a two percent probability of exceedance in 50 years (2PE50) for a “firm rock” site. To account for site effects, site coefficients which vary with the magnitude of spectral acceleration are used. Based on our field exploration, it is our opinion that this location is best described as a Site Class D which represents a “Stiff Soil” profile. The spectral accelerations are shown in the table below. The spectral accelerations are calculated based on the site’s approximate latitude and longitude of 40.947° and -111.874° respectively and the United States Geological Survey U.S. Seismic Design Maps web based application. Based on the IBC, the site coefficients are $F_a = 1.00$ and $F_v = 1.54$. From this procedure the peak ground acceleration (PGA) is estimated to be 0.50g.

Site Location: Latitude = 40.9473 N Longitude = -111.874 W	Site Class D Site Coefficients: F_a = 1.00 F_v = 1.54
Spectral Period (sec)	Response Spectrum Spectral Acceleration (g)
0.2	$S_{MS}=(F_a*S_s=1.00*1.253) = 1.25$
1.0	$S_{M1}=(F_v*S_1=1.54*0.469) = 0.72$
^a IBC 1613.3.4 recommends scaling the MCE _R values by 2/3 to obtain the design spectral response acceleration values; values reported in the table above have not been reduced.	

Table 3: MCE_R Seismic Response Spectrum Spectral Acceleration Values for IBC Site Class D^a.

Based on the above information, it is the opinion of GeoStrata that the earthquake ground shaking hazard within the subject site is considered high and recommendations for mitigation of the earthquake ground shaking hazard within the subject site are out of the scope of this geological study. GeoStrata recommends that a licensed structural engineer provide proper structural designs for the proposed residential structure which account for and mitigate this hazard. It is the opinion of GeoStrata that earthquake ground shaking hazard should not preclude development at the subject site.

6.2 SURFACE FAULT RUPTURE HAZARD

Based on the close proximity of the subject site to the Weber Segment of the Wasatch Fault Zone, GeoStrata reviewed conducted a surface fault rupture hazard assessment of the subject site. The following plate illustrates the mapped locations of the Weber Segment of the Wasatch Fault Zone: Plate A-5 as reported by Nelson and Personius (1993), Plate A-6 as reported by Bryant (1990) and Plate A-7 as reported by the U.S. Geological Survey and Utah Geological Survey Quaternary fault and fold database (2017).

No surface fault ruptures associated with the Weber Segment of the WFZ were observed in any of the trenches excavated as a part of this investigation (Plates B-1 through B-4). The trenches excavated as part of this investigation were advanced to the depth necessary to observe sediment of pre-Holocene age to assess the site for the presence or absence of active faults. It should be noted that while it is our opinion that the sediments observed within the trenches are of proper age to preserve evidence of active seismic surface fault ruptures, no age testing was completed as part of this investigation.

It is the opinion of GeoStrata that trenches excavated as part of this investigation were adequately located to intercept any active faults that would trend through the subject site. It is also the opinion of GeoStrata that no active faults are located within the limits of the area trenched within the subject site. The recommended setback of 15 feet was extended past the end of each trench and where the end of the trench is within the Surface Rupture Special Study Zone. No structures or any portions of any structures intended for human occupancy should be located within the setback areas shown on Plate A-10 Setback Map. It is generally accepted practice to allow roadways, landscaping, driveways, and non-habitable structures such as detached garages and sheds to be located within the setback areas.

6.3 TECTONIC DEFORMATION

Subsidence is a hazard associated with warping, lowering and tilting of a valley floor accompanying surface ruptures on normal faults (Robinson, 1993). Inundation along the shores of lakes and reservoirs and the rise of groundwater levels are the main hazards associated with subsidence. Structures that require gentle gradients or horizontal floors such as waste water treatment plants and sewer lines may be adversely affected by tectonic subsidence. Because subsidence may occur over very large areas, it is not generally practical to avoid the use of potentially affected land except in narrow areas of hazard due to lakeshore inundation (Keaton, 1987; Robison, 1993). According to Gary Christenson (UGS, personal communication 2001), tectonic subsidence is not typically assessed for subdivision development unless the development is located within an area of potential lake flooding.

Based on the close proximity of the subject site to the Weber segment of the WFZ, it is the opinion of GeoStrata that the tectonic deformation hazard within the subject site is considered high. Assessment of the magnitude of and mitigation for this hazard is out of the scope of this study. The subject site could experience a few degrees of tilting during a large magnitude earthquake event along the Weber segment of the WFZ. Tectonic deformation is typically not a life threatening event and is generally not required for low and medium density residential structures, however, structural damage could result. The project structural engineer should be consulted for mitigation of this potential structural damage. It is the opinion of GeoStrata that the tectonic deformation hazard should not preclude development at the subject site.

6.4 LIQUEFACTION

Certain areas within the intermountain region possess a potential for liquefaction during seismic events. Liquefaction is a phenomenon whereby loose, saturated, granular soil deposits lose a

significant portion of their shear strength due to excess pore water pressure buildup resulting from dynamic loading, such as that caused by an earthquake. Among other effects, liquefaction can result in densification of such deposits causing settlements of overlying layers after an earthquake as excess pore water pressures are dissipated. The primary factors affecting liquefaction potential of a soil deposit are: (1) level and duration of seismic ground motions; (2) soil type and consistency; and (3) depth to groundwater.

Based on our review of the *Liquefaction Special Study Areas, Wasatch Front and Nearby Areas Utah*, the site is located in an area currently designated as having a “Very Low” liquefaction potential. A “Very Low” liquefaction potential indicates that there is a less than 5 percent probability of having an earthquake within a 100-year period that will be strong enough to cause liquefaction. Groundwater was not encountered in the trench excavated as part of our investigation. The near-surface soils are considered to be susceptible to liquefaction. A liquefaction analysis was beyond the scope of this geologic hazards assessment; however, if the owner wishes to have greater understanding of the liquefaction potential of the soils at greater depths, a liquefaction analysis could be completed at the site as a part of a geotechnical assessment. It is the opinion of GeoStrata that liquefaction hazard should not preclude development at the subject site.

6.5 ROCK FALL AND TOPPLE

Rock falls are the fastest moving mass movement that predominantly occur in mountains where a rock source exists along steep slopes and cliffs greater than 35 degrees. Rock falls are a result of a loss of support from beneath the rock mass that can be caused by freeze/thaw action, rainfall, weathering and erosion, and/or strong ground shaking resulting from seismic activity. Rock falls result in the collection of rock fall material, referred to as talus, at the base of the slope. The presence of talus indicates that a rock fall hazard has occurred and may still be present at the site.

Based on review of our stereographic aerial photograph interpretation and our field observations, no rock fall or talus deposits are located within or immediately adjacent to the subject site. Our field investigation revealed no indications that the subject site has been subjected to previous rock fall. Therefore, the rock fall hazard within the subject site is considered low and it is considered unlikely that rock fall will impact the proposed development. It is the opinion of GeoStrata that rock fall hazard should not preclude development at the subject site.

6.6 LANDSLIDE, SLUMP, CREEP

There are several types of landslides that should be considered when evaluating geologic hazards at a site with moderately to steeply sloping terrain. These include shallow debris slides, deep-seated earth or rock slumps and earth flows. Landslides, slumps, creep and other mass movements can develop on moderate to steep slopes where the slope has been altered or disturbed. Movement can occur at the top of a slope that has been loaded by fill placement, at the base of a slope that has been undercut, or where local groundwater rises resulting in increased pore pressures within the slope. Slopes that exhibit prior failures and large landslide deposits are particularly susceptible to instability and reactivation.

Based on review of published geologic maps, our stereographic aerial photograph interpretation, our review of the hillshades derived from the 0.5 meter LiDAR elevation data (2013-2014) and our field observations, no landslide, slump or creep deposits are mapped within the subject site (Plate A-5 Site Vicinity Geologic Map; Plate A-6 Site Vicinity 30x60 Geologic Map; Plate A-11 Landslide Hazard Map). It is the opinion of GeoStrata that landslide, slump, and creep hazards within the subject site are considered low and it is considered unlikely that these hazards will impact the proposed development. It is the opinion of GeoStrata that landslide, slump and creep hazards should not preclude development at the subject site.

Slope stability of the subject site was not assessed as part of this geological hazard assessment. Slopes within the subject site were observed to be steeply sloping above and below the pre-graded area along the road and east of the road. A site specific geotechnical investigation will be compiled by GeoStrata and include a detailed slope stability assessment of the site as part of the geotechnical investigation prior to development and the recommendations contained in the geotechnical report should be followed as a part of the grading design for the site.

6.7 AVALANCHE

An avalanche is a rapid flow of snow down a hill or mountainside. A snow avalanche can be a hazard in high alpine settings with slopes generally between 35° and 45° that accumulate appreciable amounts of snow. There are three types of avalanches: slough, dry slab and wet slab. Sloughs typically occur right after a heavy snowfall event. This type of slide occurs from a single point and accumulates snow as it moves downslope. Dry slabs are the most common type of avalanche and are the result of a fracture that occurs along a weak layer within the snowpack. Dry slabs can travel upwards of 80 mph removing trees and structures in its path. Wet slabs are triggered when percolating water dissolves bonds and decreases the strength of the weak snow

layer. This type of slab can travel up to 20 mph. Several factors that influence a snow avalanche include weather, temperature, slope steepness, slope orientation, wind direction and wind loading, terrain, vegetation, and snowpack conditions. Snow avalanche hazard could affect access and snow removal on roads as well as the safety of habitable structures and critical facilities.

Based on review of our stereographic aerial photograph interpretation and our field observations, no avalanche prone slopes were observed within or adjacent to the subject site. The avalanche hazard within the subject site is considered low and it is considered unlikely that avalanches will impact the proposed development. It is the opinion of GeoStrata that avalanche hazard should not preclude development at the subject site.

6.8 ALLUVIAL FAN FLOODING

Alluvial fan flooding is a potential hazard that may exist in areas containing Holocene alluvial fan deposits. This type of flooding typically occurs as a stream flows, hyperconcentrated flows and debris flows consisting of a mixture of water, soil, organic material, and rock debris with variations in sediment-water concentrations transported by fast-moving water flows. Stream flows contains approximately less than 20% sediment by volume and involves sediment transport by entrained and suspended sediment load (Bowman and Lund, 2016). Unconfined stream flows are referred to as sheetfloods which are spread over and occur in the distal areas of the alluvial fan. Hyperconcentrated flows are alluvial fan flows with 20 to 60% sediment by volume whereas debris flows contain greater than 60% sediment by volume.

Alluvial fan flooding can be a hazard on or below alluvial fans or in stream channels above alluvial fans. Precipitation (rainfall and snowmelt) is generally viewed as an alluvial fan flood “trigger”, but this represents only one of the many factors that contribute to alluvial fan flooding hazard. Vegetation, root depth, soil gradation, antecedent moisture conditions and long term climatic cycles all contribute to the generation of debris and initiation of alluvial fan flooding. Events of relatively short duration, such as a fire, can significantly alter a basin’s absorption of storm water and snowmelt runoff and natural resistance to sediment mobilization for an extended period of time. These factors are difficult to quantify or predict and vary not only between different watersheds, but also within each sub-area of a drainage basin. In general, there are two methods by which alluvial fan flooding can be mobilized: 1) when shallow landslides from channel side-slopes are conveyed in existing channels when mixed with water and 2) channel scour where debris is initially mobilized by moving water in a channel and then the mobilized debris continues to assemble and transport downstream sediments.

Based on review of published geologic maps, our stereographic aerial photograph interpretation, our review of the hillshades derived from the 0.5 meter LiDAR elevation data (2013-2014) and our field observations, no Holocene-aged alluvial fan deposits are mapped as underlying the subject site (Plate A-5 Site Vicinity Geologic Map; Plate A-6 Site Vicinity 30x60 Geologic Map). Sheetflooding deposits were observed within the near surface soils exposed in Trench 1 and Trench 2. During our field investigation, erosion of the road and deposition of eroded material at the north end of the dirt road was observed. Rills were also observed along the hillside to the east, upslope, and to the west, downslope, during our field investigation and review of aerial imagery. Based on our understanding of the site, slope erosion occurs during periods of high runoff. During our field investigation, GeoStrata also observed the construction of a detention basin on the east side and at the north end of the dirt road. It is the opinion of GeoStrata that the alluvial fan flooding hazard is considered moderate and it is considered unlikely that alluvial fan flooding will impact the proposed development as long as proper site grading and drainage plans are developed by a civil engineer as part of the development of the subject site that are designed to redirect water and material away from the subject site while not impacting surrounding developments. GeoStrata also recommends that the calculated volume of expected debris is included in the design parameters of the detention basin. It is the opinion of GeoStrata that alluvial fan flooding hazards should not preclude development at the subject site.

6.9 SHALLOW GROUNDWATER

Shallow groundwater flooding is a hazard that can cause the flooding of excavated areas where the depth of excavation exceeds the depth of the local water table. Shallow groundwater flooding should be considered when designing habitable structures that require excavation that may exceed the depth to the shallow groundwater.

Shallow groundwater assessment is out of the scope of this study. Seasonal fluctuations in precipitation, surface runoff from adjacent properties, or other on or offsite sources may increase moisture conditions; groundwater conditions can be expected to rise several feet seasonally depending on the time of year. Since shallow groundwater was not assessed as part of this study, a separate geotechnical study including subsurface exploration would be needed to assess this hazard.

6.10 STREAM FLOODING HAZARD

Stream flooding can be caused by precipitation, snowmelt or a combination of both. Throughout most of Utah floods are most common in spring during the snowmelt. High flows in drainages can last for a few hours to several weeks. Factors that affect the potential for flooding at a site include surface water drainage patterns and hydrology, site grading and drainage design, and seasonal runoff.

Based on review of published topographic maps, our stereographic aerial photograph interpretation, our review of the hillshades derived from the 0.5 meter LiDAR elevation data (2013-2014) and our field observations, no streams were observed or are mapped within or adjacent to the subject site (Plate A-2 Topographic Map; Plate 12 Drainage Map). Given our field and office investigations, the stream flooding hazard within the subject site is considered low and it is considered unlikely that stream flooding will impact the proposed development. It is the opinion of GeoStrata that stream flooding hazard should not preclude development at the subject site. Proper site grading and drainage plans should be developed for the subject site as a part of the civil engineering design for the site.

6.11 CANAL FLOODING

High runoff in a short period of time can lead to canal water breaching their banks and flooding the surrounding area. Failure of the canal embankments or a blockage in the canal could also lead to flooding surrounding the canal.

Based on review of published topographic maps, our stereographic aerial photograph interpretation, our review of the hillshades derived from the 0.5 meter LiDAR elevation data (2013-2014) and our field observations, no canals were observed or are mapped within the subject site. Given our field and office investigations, the canal flooding hazard within the subject site is considered low and it is considered unlikely that canal flooding will impact the proposed development. It is the opinion of GeoStrata that canal flooding hazard should not preclude development at the subject site.

6.12 DAM FAILURE

Dams are structures that store water and diverge and impound water upstream. Most dams have a spillway where water flow from the reservoir is controlled and hydroelectric power is produced.

Failure in dams can occur from a collapse or a breach in the structure most commonly due to extended periods of high runoff.

Based on our review of the Centerville and Bountiful Peak topographic quadrangles and our field investigation, no dam is located near the subject site. An approximately 0.35 square acre reservoir owned and operated by the City of Centerville is located east and uphill of the subject site as shown on Plate 12 Drainage Map. Given the size of the reservoir, a breach of this reservoir could cause minor flooding and erosion within the subject site. Given our field and office investigations, the dam failure hazard within the subject site is considered low and it is considered unlikely that dam failure will impact the proposed development. It is the opinion of GeoStrata that dam failure hazard should not preclude development at the subject site.

6.13 PROBLEM SOILS

Problem soils include collapsible soils and expansive soils. Collapsible soils are low density and typically dry soils that decrease in volume when exposed to water. This type of problem soil typically occurs in alluvial fan flooding deposits, dry loess or eolian deposits or unconsolidated colluvium deposits (Owens and Rollins, 1990). Expansive soils are soils that undergo an increase in volume upon wetting and typically include fine grained soils such as clay.

The problem soils hazard is out of the scope of this study. Based on our subsurface investigation and review of published geologic maps, the subject site is underlain by a sand and gravel. No laboratory testing was performed on these soils as part of this study and therefore this hazard was not assessed as part of this study. In order to understand soil properties for use in the design of footing and foundation elements, a site specific geotechnical study would need to be conducted for the project.

6.14 RADON

Radon is a naturally occurring odorless, tasteless and colorless gas that is released during the breakdown of uranium in well drained permeable soils and uranium rich rocks which include granite, metamorphic rocks, black shales, and some volcanic rocks (Sprinkel and Solomon, 1990). Radon gas moves freely in the air and can also dissolve in water which can potentially migrate through cracks and open spaces in rock, soils, and foundations as well as utility pipes.

The radon gas potential is out of the scope of this study. No published information on radon gas potential that covers the area of the subject site currently exists. Indoor testing following construction is recommended for determining radon gas levels and mitigation methods needed.

6.15 KARST AND SINK HOLES

A karst is a type of underground drainage terrain that is the result of dissolution of soluble bedrock such as limestone, carbonate rock, salt beds or other types of rocks that are easily dissolved by groundwater circulating through them. The most common type of hazard that forms within a karst terrain is subsidence or collapse of soils, these are referred to as sink holes. Sink holes can be a few feet to hundreds of acres wide and 1 to 100 feet deep and can form slowly or collapse suddenly.

Based on our review of published geologic maps, the karst and sink holes hazards within the subject site are considered low and it is unlikely that karst and sink holes hazards will impact the proposed development. It is the opinion of GeoStrata that karst and sink hole hazards should not preclude development at the subject site.

7.0 GEOLOGIC HAZARDS SUMMARY AND CONCLUSIONS

It is the opinion of GeoStrata that the geologic hazards that we assessed in this study that could impact the subject site or that have not been assessed as a part of this study but which could impact the subject site include: earthquake ground shaking, surface fault rupture, tectonic deformation, liquefaction, slope stability, shallow groundwater, problem soils, and radon gas. Below is a summary of each geologic hazard and GeoStrata's recommendation for mitigation:

- Earthquake ground shaking hazard within the subject site is considered high and recommendations for mitigation of the earthquake ground shaking hazard within the subject site are out of the scope of this geological study. GeoStrata recommends that a licensed structural engineer provide proper structural designs for the proposed residential structure which account for and mitigate this hazard. It is the opinion of GeoStrata that earthquake ground shaking hazard should not preclude development at the subject site.
- Surface fault rupture hazard within the subject site is considered moderate. No surface fault ruptures associated with the Weber Segment of the WFZ were observed in any of the trenches excavated as a part of this investigation. The recommended setback of 15 feet was extended past the end of each trench and where the end of the trench is within the Surface Rupture Special Study Zone. No structures or any portions of any structures intended for human occupancy should be located within the setback areas shown on Plate A-10 Setback Map. It is generally accepted practice to allow roadways, landscaping, driveways, and non-habitable structures such as detached garages and sheds to be located within the setback areas.
- Tectonic deformation hazard within the subject site is considered moderate. Assessment of the magnitude of and mitigation for this hazard is out of the scope of this study. The subject site could experience a few degrees of tilting during a large magnitude earthquake event along the Weber segment. Tectonic deformation is typically not a life threatening event and mitigation of tectonic deformation hazards is typically not required for low and medium density residential structures, however, structural damage could result from tectonic deformation. The project structural engineer should be consulted for mitigation of this potential structural damage. It is the opinion of GeoStrata that the tectonic deformation hazard should not preclude development at the subject site.

- Liquefaction potential hazard within the subject site is considered “Very Low” based on the UGS published liquefaction potential hazard maps and is out of the scope of this study. A liquefaction analysis was beyond the scope of this geologic hazards assessment and mitigation of liquefaction hazards is typically not required for single family residential structures; however, if the owner wishes to have greater understanding of the liquefaction potential of the soils, a liquefaction analysis could be completed at the site as a part of a geotechnical assessment. It is the opinion of GeoStrata that liquefaction hazard should not preclude development at the subject site.
- Slope stability of the subject site was not assessed as part of this geological hazard assessment. Slopes within the subject site were observed to be steeply sloping above and below the pre-graded area along the road and east of the road. A site specific geotechnical investigation will be compiled by GeoStrata and include a detailed slope stability assessment of the site as part of the geotechnical investigation prior to development and the recommendations contained in the geotechnical report should be followed as a part of the grading design for the site.
- An assessment of the groundwater hazard within the subject site is out of the scope of this study. Seasonal fluctuations in precipitation, surface runoff from adjacent properties, or other on or offsite sources may increase moisture conditions; groundwater conditions can be expected to rise several feet seasonally depending on the time of year. Since shallow groundwater was not assessed as part of this study, a separate geotechnical study including subsurface exploration would be needed to assess this hazard.
- An assessment of the problem soils hazard within the subject site is out of the scope of this study. No laboratory testing was performed on these soils as part of this study and therefore this hazard was not assessed as part of this study. In order to understand soil properties for use in the design of footing and foundation elements, a site specific geotechnical study would need to be conducted for the project.
- An assessment of the radon gas hazard within the subject site is out of the scope of this study. No published information on radon gas potential that covers the area of the subject site currently exists. Indoor testing following construction is recommended for determining radon gas levels and mitigation methods needed.

It is the opinion of GeoStrata that these hazards should not preclude the development of the subject site, assuming that these recommendations given above will be followed.

7.0 CLOSURE

7.1 LIMITATIONS

The conclusions and recommendations contained in this report, which include professional opinions and judgments, are based on the information available to us at the time of our evaluation, the results of our field observations and our understanding of the proposed site development. If any conditions are encountered at this site that are different from those described in this report, our firm should be immediately notified so that we may make any necessary revisions to recommendations contained in this report. In addition, if the scope of the proposed development changes from that described in this report, our firm should also be notified.

All services were completed in accordance with the current standard of care and generally accepted standard of practice at the time and in the place our services were completed. No other warranty, expressed or implied, is made. Development of property in the immediate vicinity of geologic hazards involves a certain level of inherent risk. It is impossible to predict where geologic hazards will occur. New geologic hazards may develop and existing geologic hazards may expand beyond their current limits.

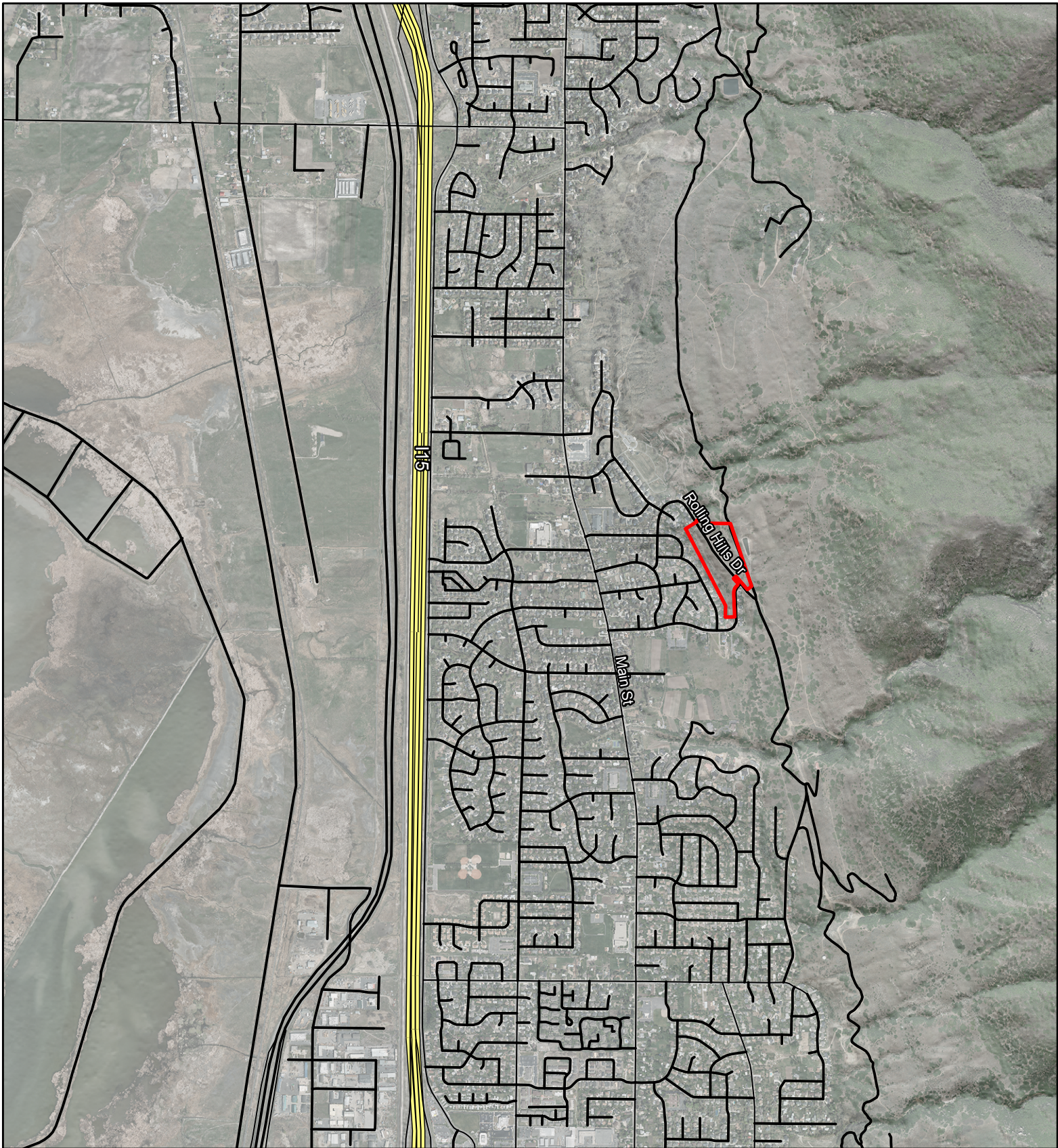
All services were performed for the exclusive use and benefit of the above addressee. No other person is entitled to rely on GeoStrata's services or use the information contained in this letter without the express written consent of GeoStrata. We are not responsible for the technical interpretations by others of the information described or documented in this report. The use of information contained in this report for bidding purposes should be done at the Contractor's option and risk.

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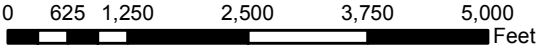
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Appendix A

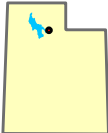


Legend

 Approximate Site Boundary



1 inch = 2,000 feet
Base Map:
2012 12.5cm HRO aerial imagery and hillshades derived from 2006
5 meter DEMs provided by the State of Utah AGRC.





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Geologic Hazards Investigation
Lake View Vista Development
Centerville, UT
Project Number: 1159-002

Site Vicinity Map

**Plate
A-1**

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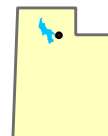
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Approximate Site Boundary

0 625 1,250 2,500 3,750 5,000
Feet

1 inch = 2,000 feet

Base Map:
Centerville and Bountiful Peak Quadrangles, Utah, 7.5-Minute
Series (Topographic), USGS 1998 and hillshades derived from
2103-2014 0.5 meter LIDAR provided by the State of Utah AGRC.



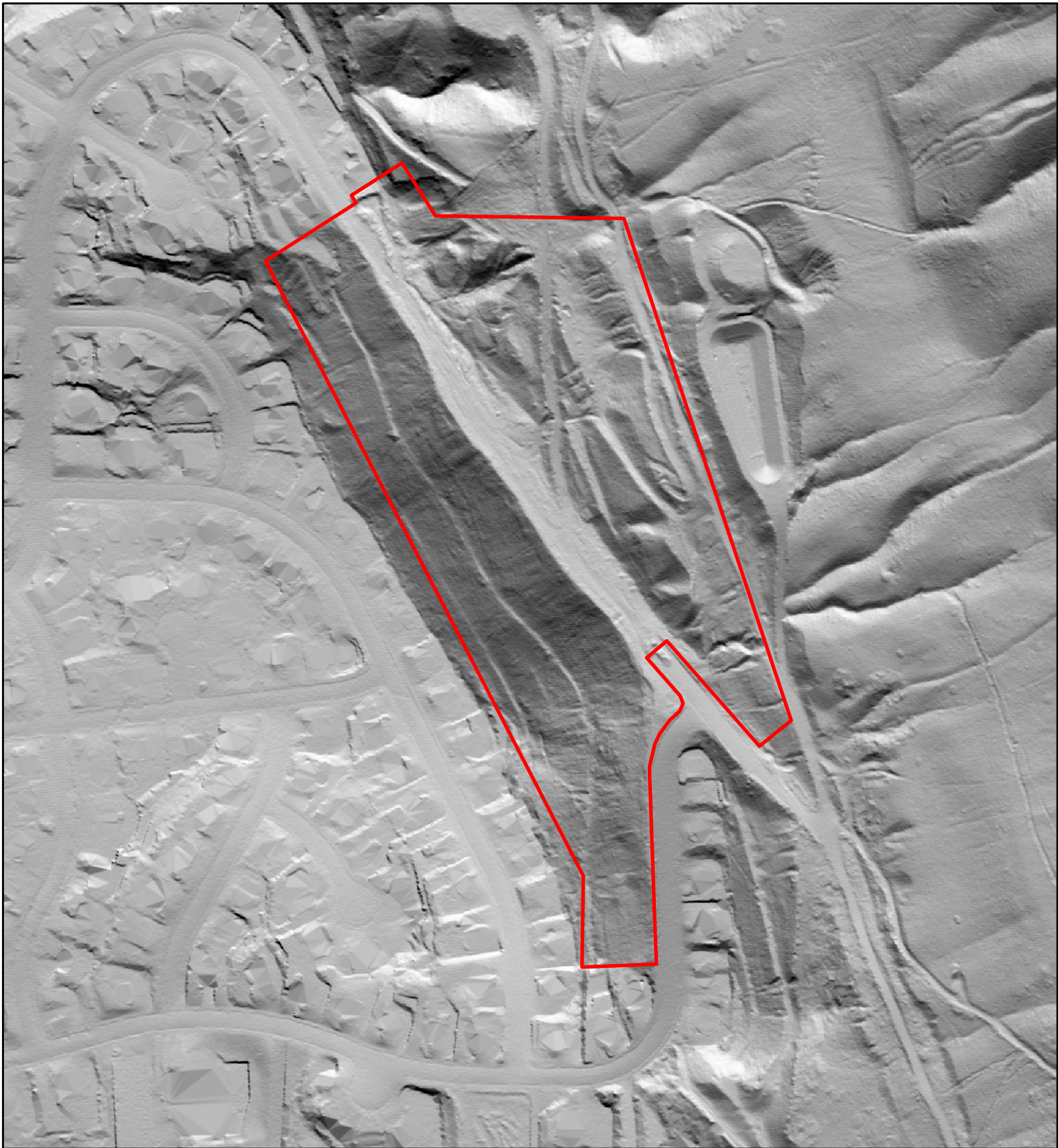
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Geologic Hazards Investigation
Lake View Vista Development
Centerville, UT
Project Number: 1159-002

**Plate
A-2**

Topographic Map Page 51 of 110



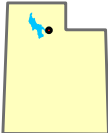
Legend

 Approximate Site Boundary

0 75 150 300 450 600 Feet

1 inch = 250 feet

Base Map:
Hillshades derived from 2103-2014 0.5 meter LiDAR provided by
the State of Utah AGRC.





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Geologic Hazards Investigation
Lake View Vista Development
Centerville, UT
Project Number: 1159-002

**Plate
A-3**



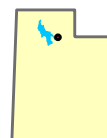
Legend

- Approximate Site Boundary
- Surface Fault Rupture Special Study Area

0 625 1,250 2,500 3,750 5,000
Feet

1 inch = 2,000 feet

Base Map:
Surface Fault Rupture Special Study Areas, Wasatch Front and
Nearby Areas, Utah, Christensen and Show, 2008 and hillshades
derived from 2103-2014 0.5 meter LIDAR provided by the
State of Utah AGRC.



GeoStrata

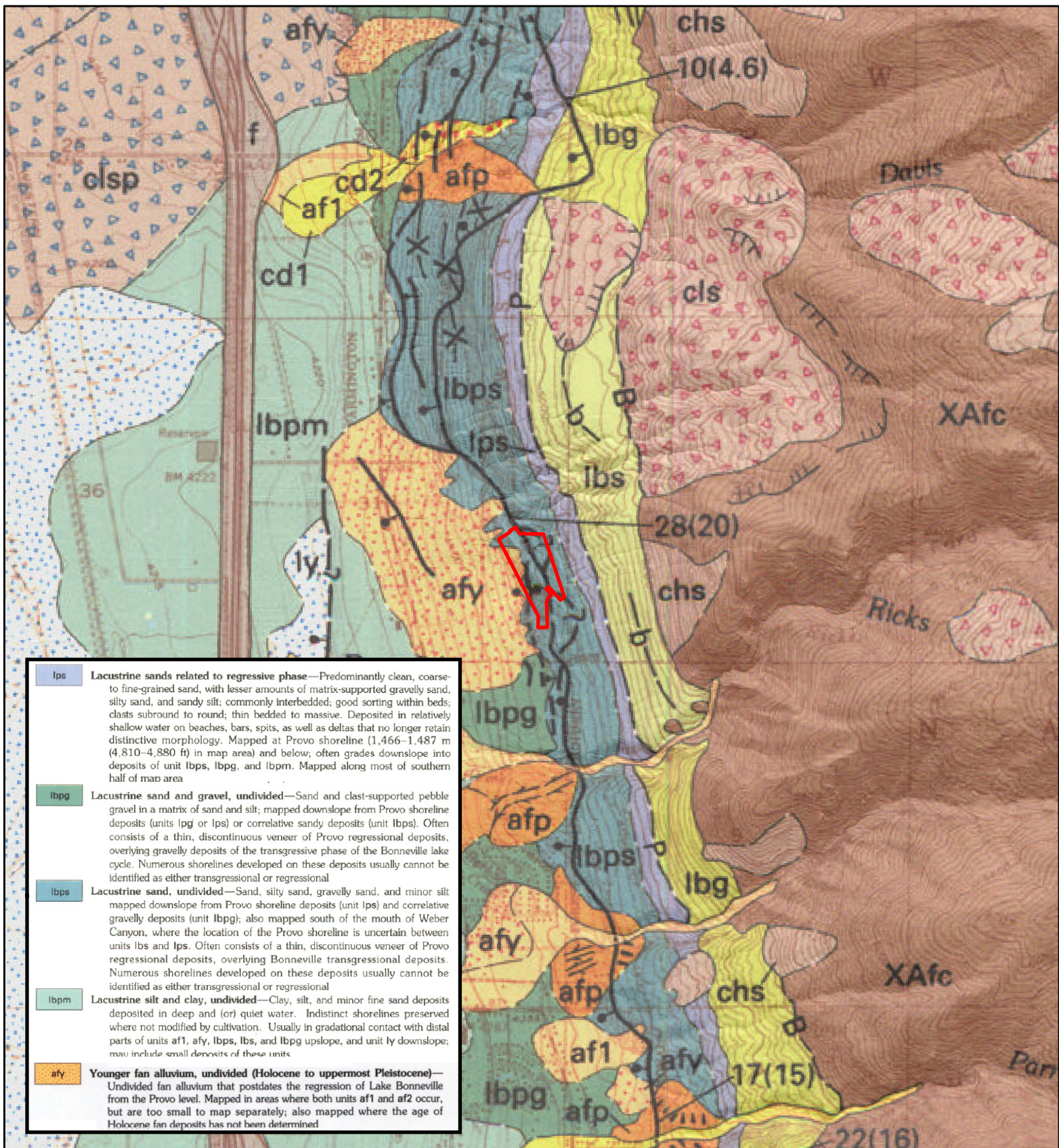
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Geologic Hazards Investigation
Lake View Vista Development
Centerville, UT
Project Number: 1159-002

**Surface Fault Rupture
Special Study Map**

**Plate
A-4**

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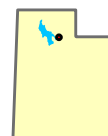
Legend

 Approximate Site Boundary

0 625 1,250 2,500 3,750 5,000 Feet

1 inch = 2,000 feet

Base Map:
1:50,000 Scale Surficial Geologic Map of the Weber Segment of the Wasatch Fault Zone, Weber and Davis Counties, Utah, Nelson and Personius, 1993. This geologic map has been modified from its original scale. Hillshades derived from 2013–2014 0.5 meter LiDAR provided by the State of Utah AGRC.



GeoStrata

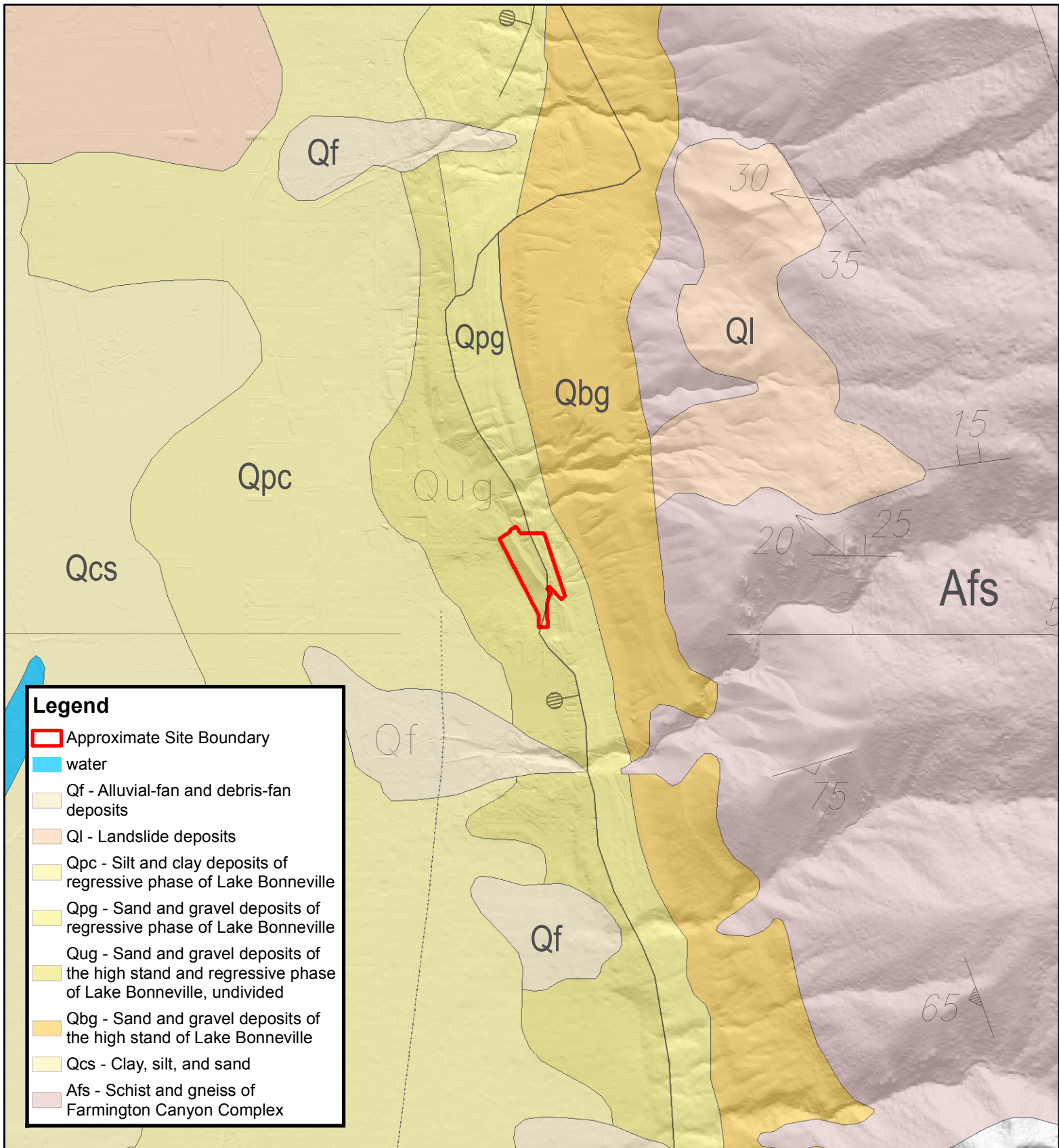
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Geologic Hazards Investigation
Lake View Vista Development
Centerville, UT
Project Number: 1159-002

Plate A-5

Site Vicinity Geologic Map

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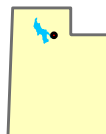


0 625 1,250 2,500 3,750 5,000
Feet

1 inch = 2,000 feet

Base Map:

Geologic Map of the Salt Lake City 30' X 60' Quadrangle, North-Central Utah, and Uinta County, Wyoming, Bryant, 1990. This geologic map has been modified from its original scale. Hillshades derived from 2013-2014 0.5 meter LiDAR provided by the State of Utah AGRC.



GeoStrata

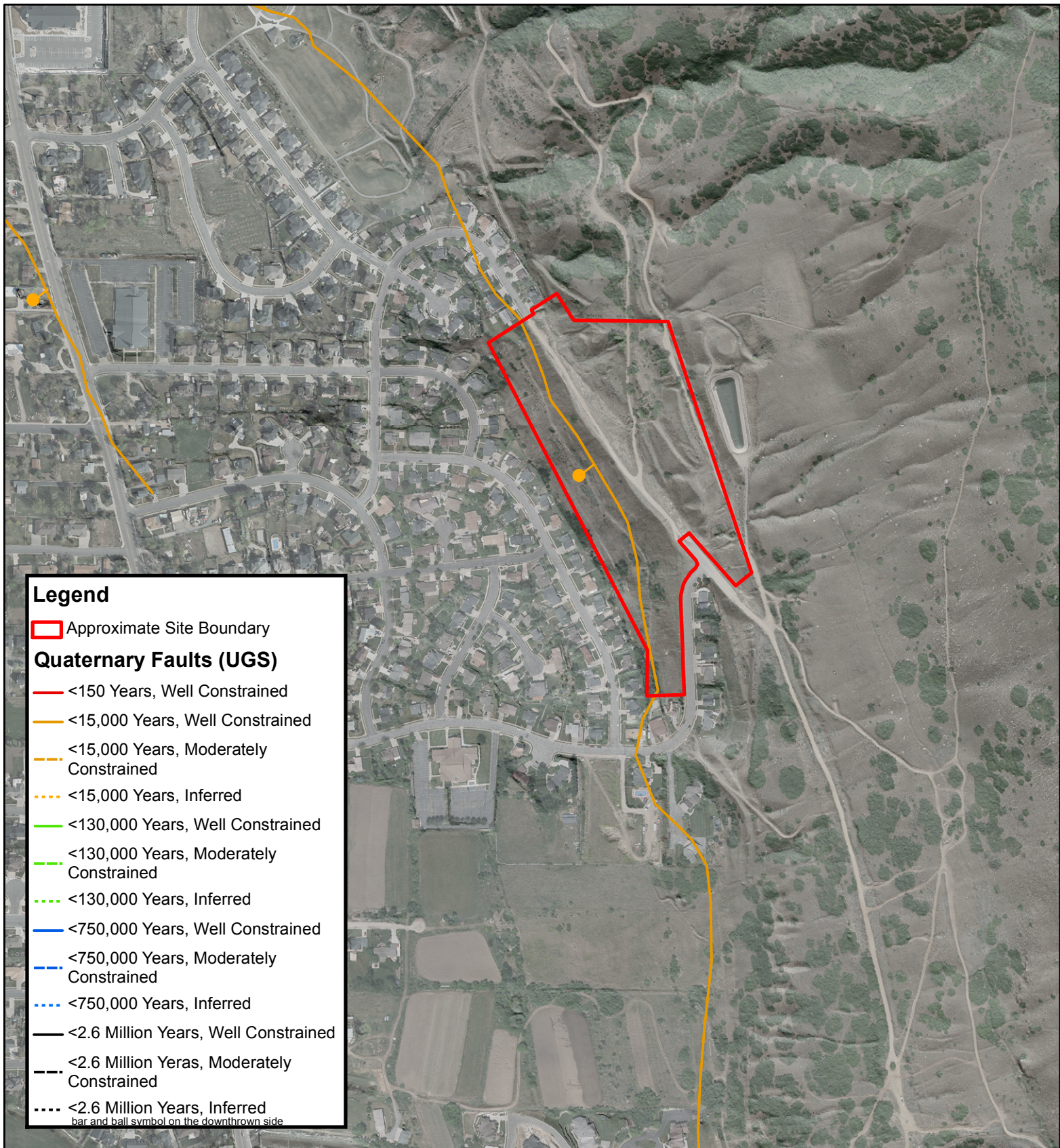
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Geologic Hazards Investigation
Lake View Vista Development
Centerville, UT
Project Number: 1159-002

**Site Vicinity 30x60
Geologic Map**

**Plate
A-6**

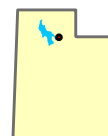
Page 55 of 110



0 160 320 640 960 1,280 Feet

1 inch = 500 feet

Base Map:
Quaternary fold and fault database, 2012 12.5cm HRO aerial
imagery and hillshades derived from 2013-2014 0.5 meter LIDAR
provided by the State of Utah AGRC.



Geologic Hazards Investigation
Lake View Vista Development
Centerville, UT
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Quaternary Fault Map Page 56 of 110

**Plate
A-7**



Legend

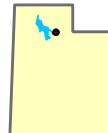
- Approximate Site Boundary
- Approximate Trench Location

0 62.5 125 250 375 500 Feet

1 inch = 200 feet

Base Map:

2012 12.5cm HRO aerial imagery and hillshades derived from
2013-2014 0.5 meter LiDAR provided by the State of Utah AGRC.



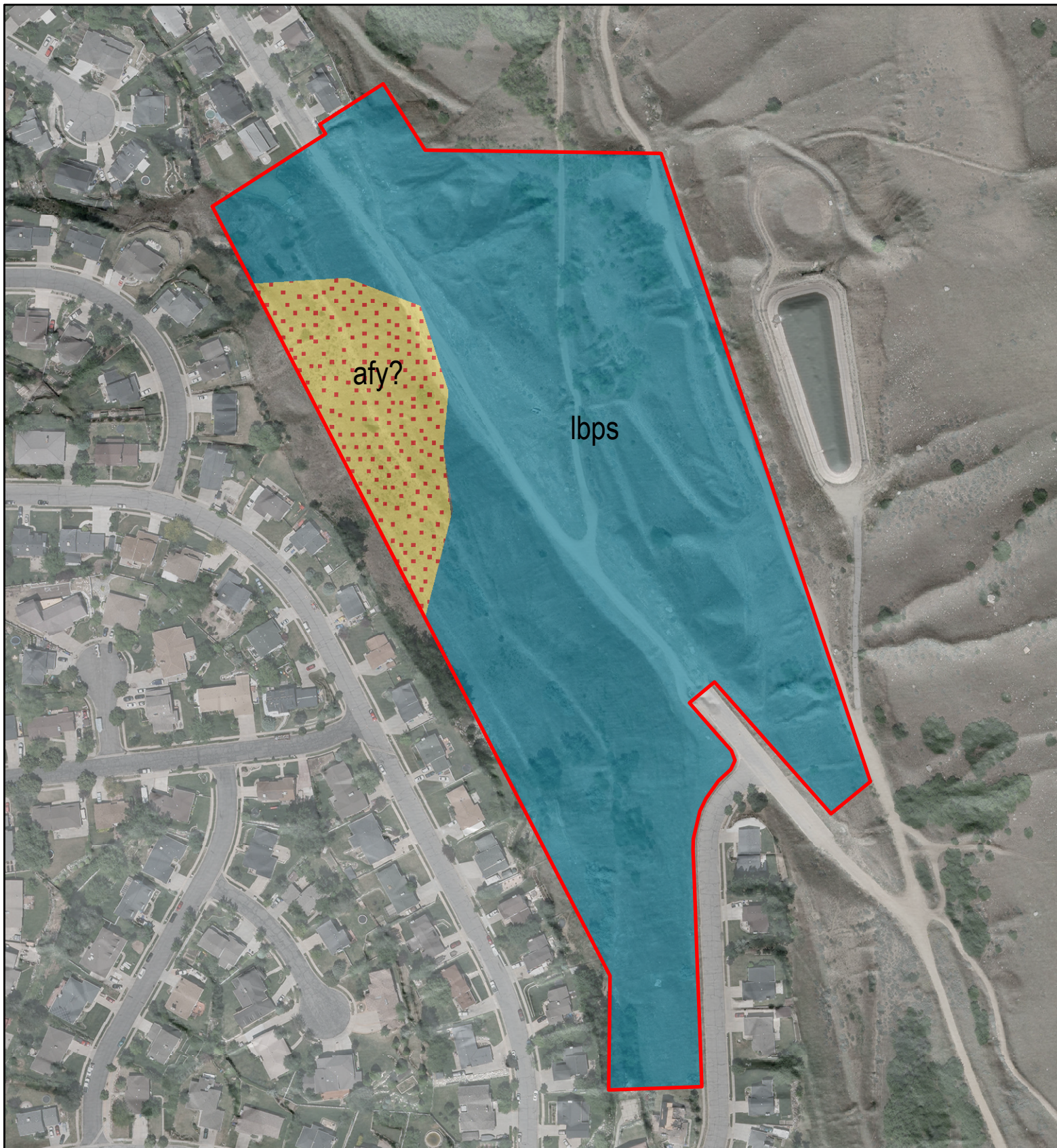
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Geologic Hazards Investigation
Lake View Vista Development
Centerville, UT
Project Number: 1159-002

**Plate
A-8**

Exploration Location Map Page 57 of 110



Legend

Approximate Site Boundary

Geology (GeoStrata)

lbps - Uppermost Pleistocene lacustrine sand, undivided

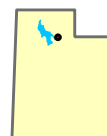
afy? - Holocene to uppermost Pleistocene younger fan alluvium

0 62.5 125 250 375 500 Feet

1 inch = 200 feet

Base Map:

2012 12.5cm HRO aerial imagery and hillshades derived from 2013-2014 0.5 meter LiDAR provided by the State of Utah AGRC.



GeoStrata

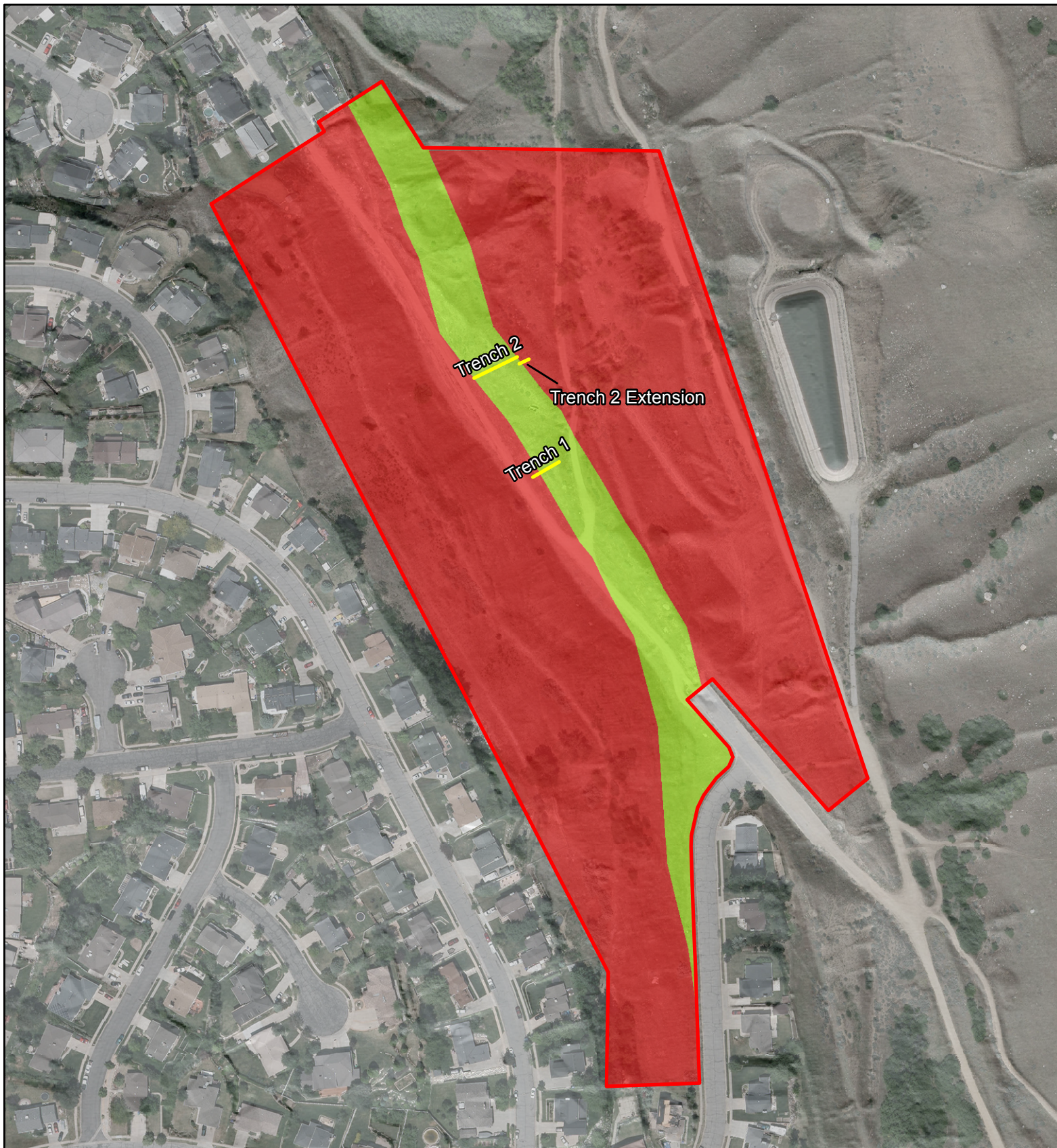
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Geologic Hazards Investigation
Lake View Vista Development
Centerville, UT
Project Number: 1159-002

Site Specific Geologic Map

**Plate
A-9**

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Legend

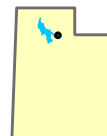
- Approximate Site Boundary
- Approximate Trench Location
- Area Cleared by Study
- Outside of Study Area

0 62.5 125 250 375 500 Feet

1 inch = 200 feet

Base Map:

2012 12.5cm HRO aerial imagery and hillshades derived from
2013-2014 0.5 meter LiDAR provided by the State of Utah AGRC.



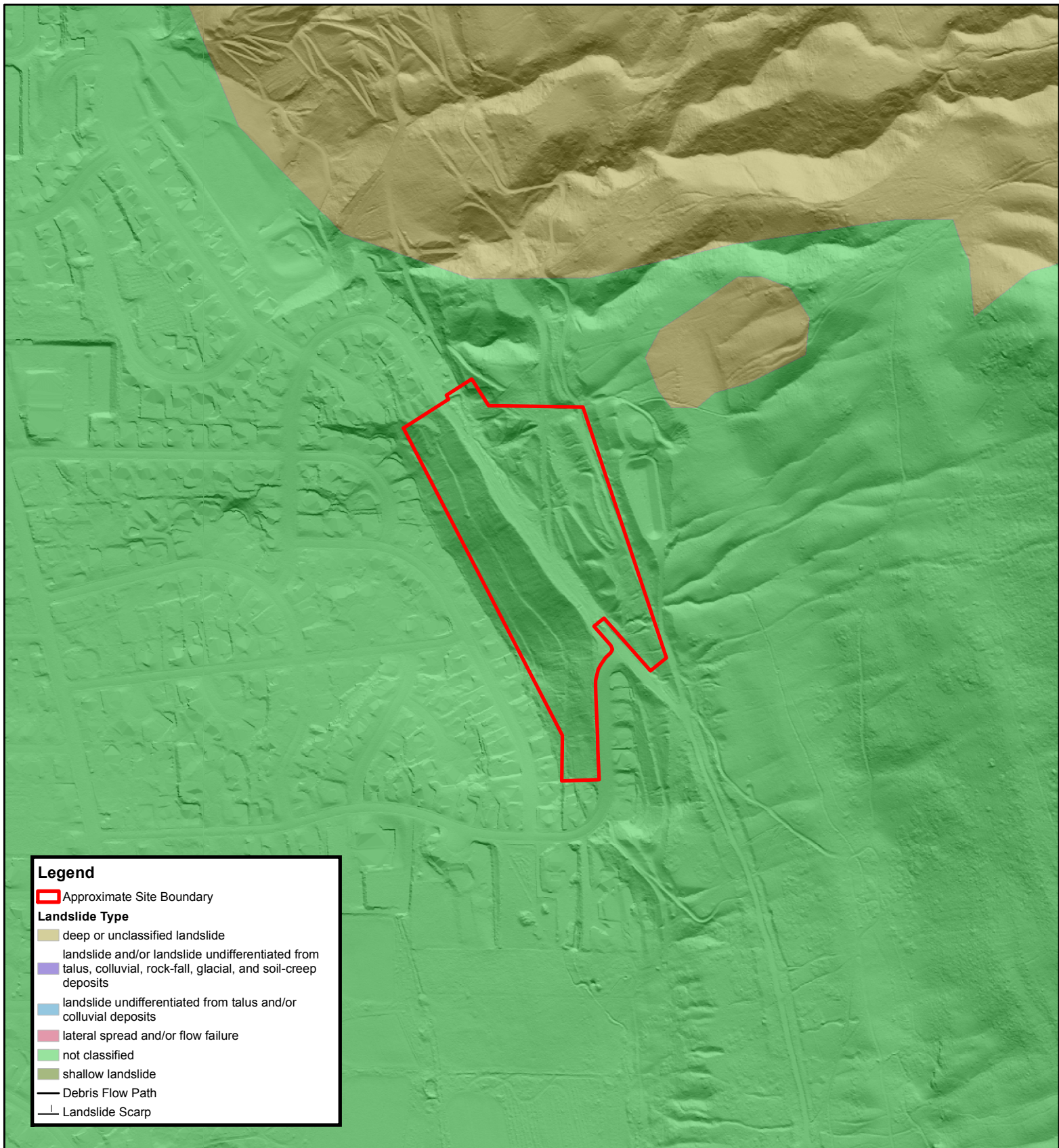
GeoStrata

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Geologic Hazards Investigation
Lake View Vista Development
Centerville, UT
Project Number: 1159-002

**Plate
A-10**

Setback Map Page 59 of 110



Legend

Approximate Site Boundary

Landslide Type

deep or unclassified landslide

landslide and/or landslide undifferentiated from talus, colluvial, rock-fall, glacial, and soil-creep deposits

landslide undifferentiated from talus and/or colluvial deposits

lateral spread and/or flow failure

not classified

shallow landslide

Debris Flow Path

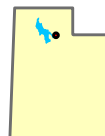
Landslide Scarp

0 160 320 640 960 1,280
Feet

1 inch = 500 feet

Base Map:

Landslide Maps of Utah, Utah Geological Survey Map 246D,
1:100,000 scale, Elliot and Harty, 2010 (scale has been modified
from its original version) and hillshades derived from 2013-2014 0.5
meter LiDAR provided by the State of Utah AGRC.



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Geologic Hazards Investigation
Lake View Vista Development
Centerville, UT
Project Number: 1159-002

Landslide Hazard Map

**Plate
A-11**

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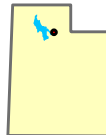
- Legend**
- Approximate Site Boundary
 - Stream (National Hydrology Dataset)
 - Reservoir (GeoStrata)

0 160 320 640 960 1,280 Feet

1 inch = 500 feet

Base Map:

National Hydrology Dataset, 2012 12.5cm HRO aerial imagery and hillshades derived from 2013-2014 0.5 meter LiDAR provided by the State of Utah AGRC.



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Lake View Vista Development
Centerville, UT
Project Number: 1159-002

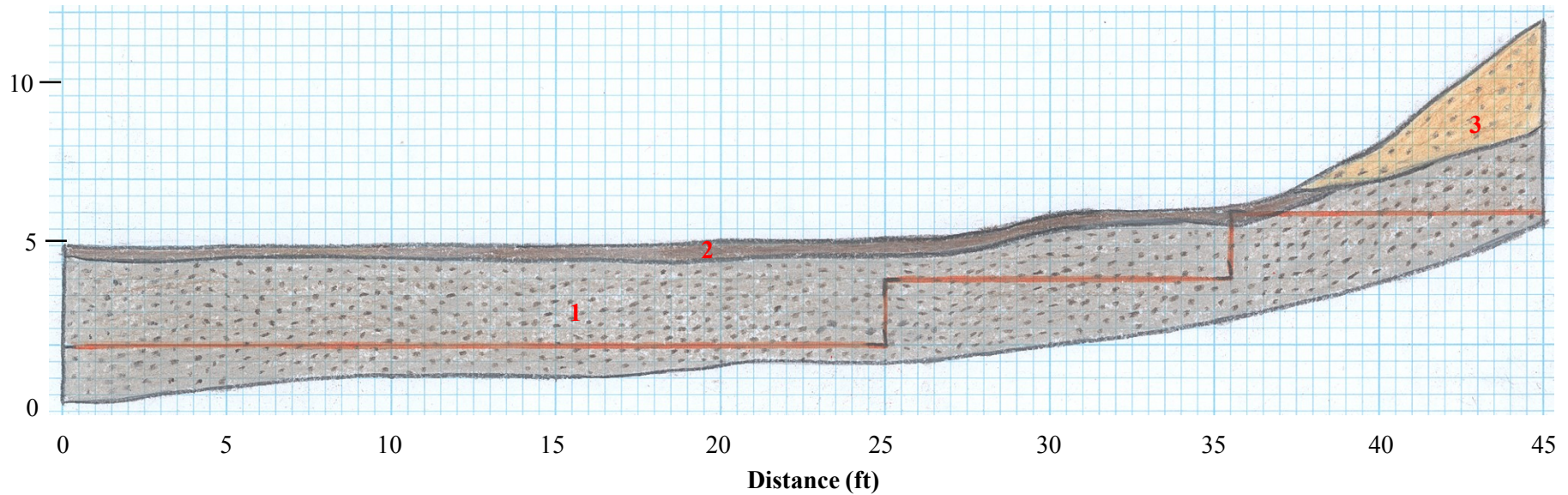
**Plate
A-12**

Appendix B

TRENCH 1 NORTH WALL

West

East



Trench 1 Legend

- 1** – *Uppermost Pleistocene Lacustrine Sand (lbps)*: grey-brown, clast supported, massive, sand and gravel, rounded clasts ½ inch in nominal size. Contained lenses of bedded sand and gravel related to sheetflow.
- 2** – A Soil Horizon: moderate organics, brown, sand and gravel.
- 3** – FILL: red-brown fine to coarse sand with gravel.

Trench Orientation: N65E

Scale

1 inch = 5 feet

Horizontal Scale = Vertical Scale

logged by S. Agopian

Plate
B-1

Geologic Hazards Investigation
Lake View Vista Subdivision
Centerville, Utah
Project Number – 1159-002

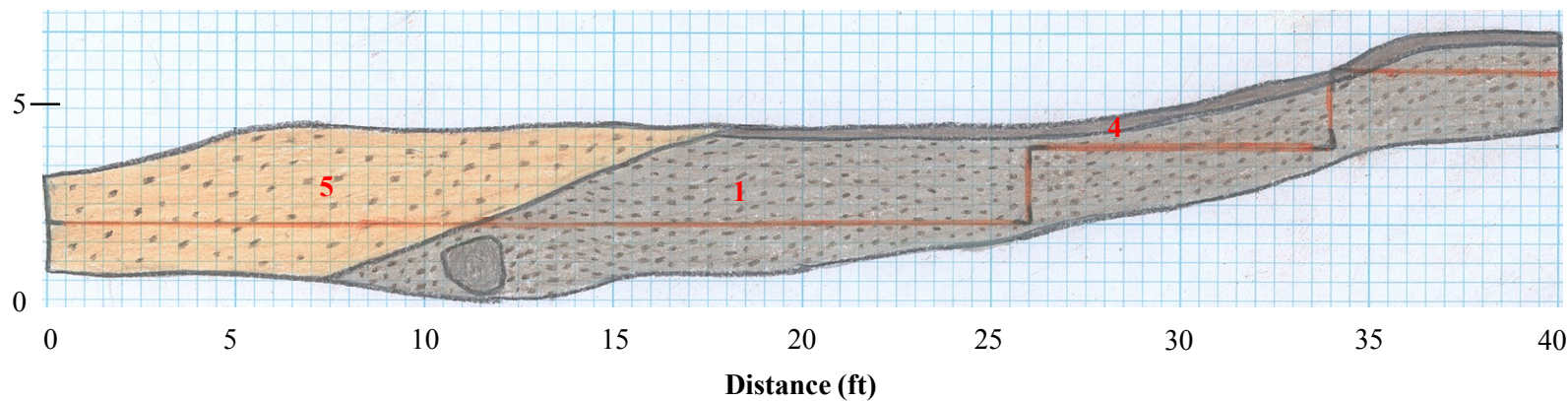
Trench 1 Log
0 to 45 feet

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TRENCH 2 NORTH WALL

West

East



Trench 2 Legend

- 1** – *Uppermost Pleistocene Lacustrine Sand (lbs)*: grey-brown, clast supported, massive, fine to coarse sand and gravel, rounded clasts ½ inch in nominal size. Contained lenses of bedded sand and gravel related to sheetflow.
- 4** – A Soil Horizon: moderate organics, brown, sand and gravel.
- 5** – FILL: light brown fine to coarse sand with gravel.

Trench Orientation: N65E

Scale

1 inch = 5 feet

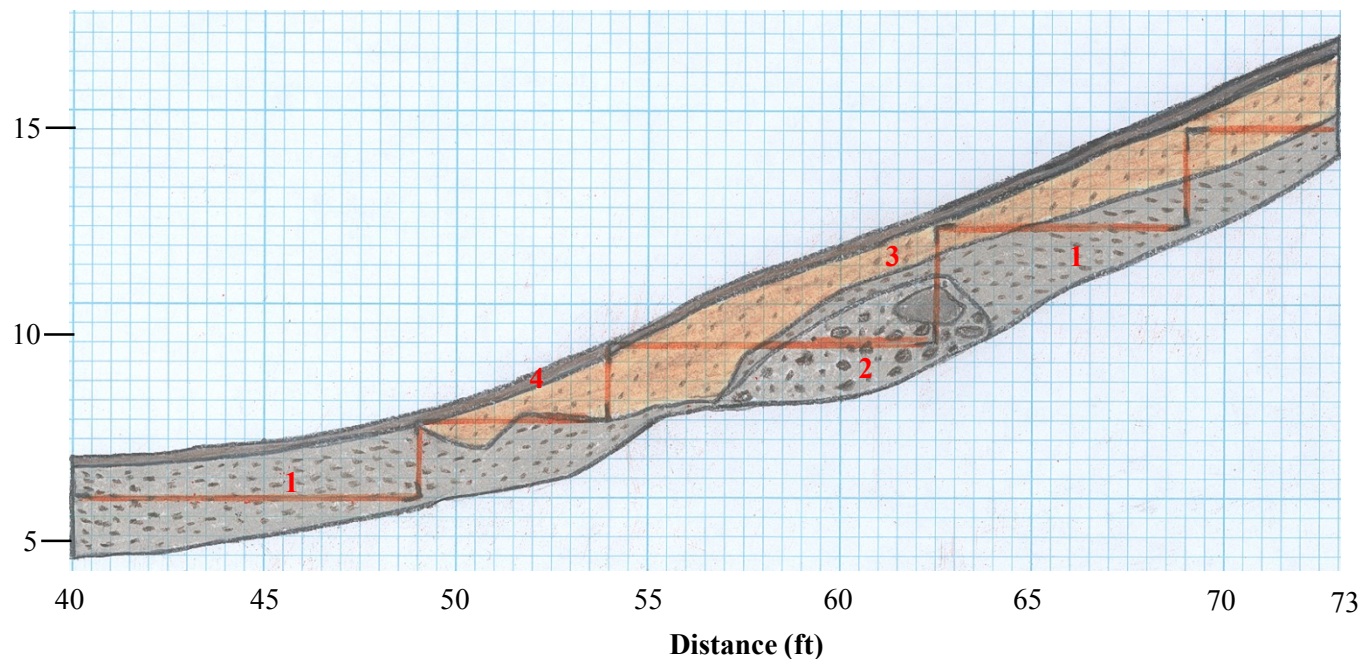
Horizontal Scale = Vertical Scale

logged by S. Agopian

TRENCH 2 NORTH WALL

West

East



Trench 2 Legend

- 1** – *Uppermost Pleistocene Lacustrine Sand (lbps)*: grey-brown, clast supported, massive, fine to coarse sand and gravel, rounded clasts ½ inch in nominal size. Contained lenses of bedded sand and gravel related to sheetflow.
- 2** – *Bonneville age alluvial fan related to regressive phase of Lake Bonneville*: grey-brown, clast supported, sand and gravel with boulders and cobbles, well rounded clasts up to 1½ feet in diameter.
- 3** – *Uppermost Pleistocene Lacustrine Sand (lbps)*: similar to unit 1 with more fines, light brown, clast supported, massive, fine to coarse sand and gravel, rounded clasts ½ inch in nominal size.
- 4** – A Soil Horizon: moderate organics, brown, sand and gravel.

Trench Orientation: N65E

Scale

1 inch = 5 feet

Horizontal Scale = Vertical Scale

logged by S. Agopian

Plate
B-3

Geologic Hazards Investigation
Taylor Ridge Subdivision
Farmington, Utah
Project Number – 1039-011

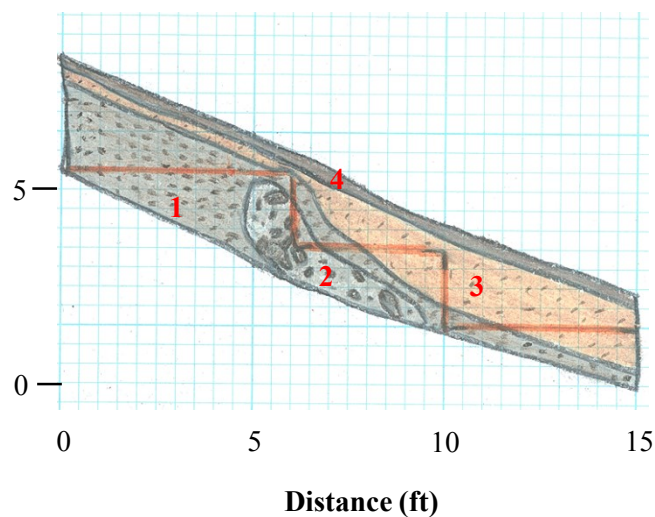
Trench 2 Log
40 to 73 feet

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East

TRENCH 1 EXTENSION SOUTH WALL

West



Trench 2 Extension Legend

- 1** – *Uppermost Pleistocene Lacustrine Sand (lbps)*: grey-brown, clast supported, massive, fine to coarse sand and gravel, rounded clasts ½ inch in nominal size. Contained lenses of bedded sand and gravel related to sheetflow.
- 2** – *Bonneville age alluvial fan related to regressive phase of Lake Bonneville*: grey-brown, clast supported, sand and gravel with boulders and cobbles, well rounded clasts up to 1½ feet in diameter.
- 3** – *Uppermost Pleistocene Lacustrine Sand (lbps)*: similar to unit 1 with more fines, light brown, clast supported, massive, fine to coarse sand and gravel, rounded clasts ½ inch in nominal size.
- 4** – A Soil Horizon: moderate organics, brown, sand and gravel.

Trench Orientation: N65E

Scale

1 inch = 5 feet

Horizontal Scale = Vertical Scale

logged by S. Agopian

Plate
B-4

Geologic Hazards Investigation
Lake View Vista Subdivision
Centerville, Utah
Project Number – 1159-002

Trench 2 Extension Log
0 to 15 feet

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14425 South Center Point Way Bluffdale, Utah 84065
Phone (801) 501-0583 | Fax (801) 501-0584

**Geotechnical Investigation
Lake View Vista Development
Approximately 1950 North and Rolling Hills Road
Centerville, Utah**

GeoStrata Job No. 1159-001

November 7, 2017

Prepared for:

**Gray Jensen
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jensenexcavating@yahoo.com**



Learn More

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**Geotechnical Investigation
Lake View Vista Development
Approximately 1950 North and Rolling Hills Road
Centerville, Utah**

GeoStrata Job No. 1159-001

Prepared by:

Reviewed by:

J. Scott Seal, P.E.
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November 7, 2017

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Appendix C	Plate C-1.....	Lab Summary Report
	Plate C-2.....	Grain Size Distribution Test Results
	Plate C-3.....	Direct Shear Test Results
Appendix D	Plates D-1 to D-5	Slope Stability Results

1.0 EXECUTIVE SUMMARY

This report presents the results of a geotechnical investigation conducted for the proposed Lake View Vista residential development located at approximately 1950 North Rolling Hills Drive in Centerville, Utah. The purposes of this investigation were to assess the nature and engineering properties of the subsurface soils at the proposed site and to provide recommendations for general site grading and the design and construction of foundations and slabs-on-grade, and exterior concrete flatwork.

Based on the subsurface conditions encountered at the site, it is our opinion that the subject site is suitable for the proposed construction provided that the recommendations contained in this report are complied with. Potentially thick layers of undocumented fill soils found along the western boundary of the lot, and over-excavation of these materials in areas underlying footings may be required to minimize the potential for differential settlement.

As part of the surface fault rupture hazard study for the subject property concurrently being completed by GeoStrata, two fault investigation trenches were excavated across the proposed building pads. For this geotechnical investigation, representative locations within the trench were logged and sampled as test pits. The fault trenches were excavated to a depth of 6 feet below the site grade as it existed at the time of our investigation. Based on our observations and geologic literature review, the subject property is overlain by 0 to over 6 feet of undocumented fill composed of silt, sand, gravel, and cobbles. The soils underlying the undocumented fill were observed to consist of approximately Pleistocene-aged lacustrine sand and gravel deposits associated with both the transgressive and regressive phases of the Bonneville lake cycle. These soils persisted to the full depth of our explorations and consisted of Poorly Graded SAND (SP) with varying amounts of silt, gravels, and cobbles.

The foundations for the proposed structure may consist of conventional strip and/or spread footings founded on undisturbed native soil. Based on our field observations, the site is overlain by approximately 0 to more than 6 feet of undocumented fill soils. It is possible that thicker sections of undocumented fill soils may be present depending on the original topography of the site. These undocumented fill soils will need to be over-excavated in all areas underlying footing elements. In order to eliminate the potential for premature distress to slabs on grade, the undocumented fill soils would likewise need to be over-excavated in all areas underlying the proposed flatwork. GeoStrata understands that it may not be economical to completely remove the fill soils from these areas, and as a minimum it is recommended that at least 12 inches of properly placed and compacted structural fill soils be placed in all areas underling flatwork. The Owner should be aware that by leaving any undocumented fill soils in place, the potential for premature distress in the slabs is increased. Under Foundation elements founded in such a manner may be proportioned for a maximum net allowable bearing capacity of 2,000 psf. We recommend that GeoStrata observe all foundation soils in footing excavations prior to placing reinforcing steel or concrete.

Based on the results of our slope stability modeling, the site is anticipated to remain relatively stable under static conditions. However, the site is not anticipated to maintain adequate factors of safety

under pseudo-static conditions. As a result, GeoStrata completed a deformation analysis for the subject site. Results of our deformation analysis indicate that the site could experience up to 2.6 cm of deformation in the western 1.5H:1V slope. It is recommended that this potential deformation be incorporated into the design of the foundations. It is also recommended that all setback distances and other requirements listed in the Geologic Hazards report be incorporated into the design of the project.

NOTE: This executive summary is not intended to replace the report of which it is part and should not be used separately from the report. The executive summary omits a number of details, any one of which could be crucial to the proper application of this report.

2.0 INTRODUCTION

2.1 PURPOSE AND SCOPE OF WORK

This report presents the results of a geotechnical investigation conducted for the proposed Lake View Vista development located at approximately 1950 North Rolling Hills Drive in Centerville, Utah. The purposes of this investigation were to assess the nature and engineering properties of the subsurface soils at the proposed site and to provide recommendations for general site grading and the design and construction of foundations and slabs-on-grade, and exterior concrete flatwork.

The scope of work completed for this study included a site reconnaissance, subsurface exploration, soil sampling, laboratory testing, engineering analyses, and preparation of this report. Our services were performed in accordance with our proposal and signed authorization, dated February 22, 2016. GeoStrata is concurrently completing a geologic hazards assessment for the subject lot, the results of which may be found in a separate report.

The recommendations contained in this report are subject to the limitations presented in the "Limitations" section of this report.

2.2 PROJECT DESCRIPTION

The roughly rectangle -shaped property is located at 1950 North Rolling Hills Drive in Centerville, Utah (see Plate A-1, *Site Vicinity Map*). The subject site has an area of approximately 16½ acres. Based on our conversations with you, we understand that the proposed development will consist of two multi-story, single family residential structures as well as associated landscape and roadway areas. Construction plans were not available at the time our report was prepared, however, we anticipate that the proposed residential structure will consist of wood-framed buildings with basements founded on conventional strip or spread footings.

3.0 METHOD OF STUDY

3.1 SUBSURFACE INVESTIGATION

As part of the geologic hazard assessment concurrently being completed for the subject property by GeoStrata, subsurface soil conditions were explored by excavating two exploratory trenches oriented in a southwest to northeastern direction across the central portion of the property. For this geotechnical investigation, the trenches were logged at representative locations as test pits. The test pits were excavated to a depth of 6 feet below the site grade as it existed at the time of our investigation. The approximate locations of the explorations are shown on the *Exploration Location Map*, Plate A-2 in Appendix A. Exploration points were selected to provide a representative cross section of the subsurface soil conditions in the anticipated vicinity of the proposed structures. Subsurface soil conditions as encountered in the explorations were logged at the time of our investigation by a qualified geotechnical engineer and are presented on the enclosed Trench Logs, Plates B-1 to B-4 in Appendix B.

The trenches were advanced using a CAT 320C trackhoe. Both relatively undisturbed and bulk soil samples were obtained in each of the test pit explorations. Due to the relatively granular nature of the exposed subsurface soils, it was not feasible to collect relatively “undisturbed” samples. As such, bulk soil samples were obtained in each of the explorations and placed in bags and buckets. All samples were transported to our laboratory for testing to evaluate engineering properties of the various earth materials observed. Classifications for the individual soil units are shown on the attached Trench Logs.

3.2 LABORATORY TESTING

Geotechnical laboratory tests were conducted on samples obtained during our field investigation. The laboratory testing program was designed to evaluate the engineering characteristics of onsite earth materials. Laboratory tests conducted during this investigation include:

- Atterberg Limits (ASTM D4318)
- Grain Size Distribution Test (ASTM D422)
- Direct Shear Test (ASTM D3080)

The results of laboratory tests are presented on the Trench Logs in Appendix B (Plates B-1 to B-4), the Laboratory Summary Table and the test result plates presented in Appendix C (Plates C-1 to C-3).

3.3 ENGINEERING ANALYSIS

Engineering analyses were performed using soil data obtained from the laboratory test results and empirical correlations from material density, depositional characteristics and classification. Appropriate factors of safety were applied to the results consistent with industry standards and the accepted standard of care.

4.0 GENERALIZED SITE CONDITIONS

4.1 SURFACE CONDITIONS

The subject site is located within the foothills of the Wasatch Front at approximately 1950 North Rolling Hills Drive in Centerville, Utah. A significant portion of the topography of the subject site has been altered by previously completed grading activities, and as such the original topography of the site has been lost. Improvements observed at the site at the time of our investigation include an unpaved portion of North Rolling Hills Drive that crosses the site in an approximate northwest-southeast orientation. Vegetation at the subject property was observed to consist primarily of native grasses, weeds, and sagebrush, with occasional larger mature trees, particularly near the northeastern region of the site. The topography of the site slopes downwards steeply to the west (towards the valley) at an approximate 1.5H:1V grade, and slopes steeply upwards to the east (towards the Wasatch Mountains) at an approximate 2.9H:1V grade, with the developable portion of the site existing as a relatively flat section of property between these slopes (containing Rolling Hills Drive). The properties to the north, west, and south of the subject site consist of established residential communities, whereas the property to the east consists of undeveloped hillside property as well as a concrete-lined reservoir. Topographic relief of the subject site is approximately 320 feet.

4.2 SUBSURFACE CONDITIONS

As mentioned previously, GeoStrata is concurrently completing a fault rupture potential study for the subject site. As part of that study, two fault trenches were advanced across the buildable portions of the site. The soil conditions were explored from a geotechnical perspective at that time by logging the ends of the trenches as individual test pits. The trenches extended to a depth of 6 feet below the existing site grade. Subsurface soil conditions were logged during our field investigation and are included on the Trench Logs in Appendix B (Plates B-1 to B-4). The soil and moisture conditions encountered during our investigation are discussed below.

4.2.1 Soils

Based on our observations and geologic literature review, the subject property is overlain by 0 to over 6 feet of undocumented fill soils composed of fine-grained to coarse-grained Poorly Graded SAND (SP) with gravel. It is possible that thicker sections of undocumented fill may be present at the subject site depending on the original topography of the area. In areas where undocumented

fill soils were not encountered, the site was overlain by 6-inches of sandy topsoil. Underlying the fill/topsoil, we encountered sediments that are mapped by Nelson and Personius (1993) as consisting of Pleistocene-aged lacustrine sand and gravel deposits with the exception of the westernmost portion of the site, which is mapped as being overlain by Holocene- to Pleistocene-aged alluvial fan deposits. These deposits extended to the maximum depths explored as part of this investigation. Descriptions of the soil units encountered are described below:

Undocumented Fill Soils: These soils were observed along the alignment of both trenches completed as part of this investigation, and where observed consisted of moist, light brown Poorly Graded SAND (SP) with varying amounts of gravel. This unit was observed to exceed the depth of the trench (6 feet) in Trench 1, and as such the total thickness of this material could not be delineated. The source of the fill soils is unknown, but is likely associated with the grading of Rolling Hills Drive as well as the unnamed access roadway leading to the reservoir to the east of the property. It is possible that thicker sections of undocumented fill soils may be present depending on the original topography of the site.

Topsoil: These soils were also observed along the alignment of both trenches, and had a maximum thickness of approximately 6 inches. Where observed these soils consisted of moist, dark brown Poorly Graded SAND (SP-SM) with silt and gravel. This unit also contained pinhole structures throughout. This topsoil unit was observed to thicken and pinch-out laterally along the length of the trench, however, it is considered likely that topsoil will be encountered across the majority of the site underlying the undocumented fill except in areas where grading has removed this deposit.

Pleistocene-aged Lacustrine Sand and Gravel deposits: Where observed, these soils consisted of dense, moist, light brown Poorly Graded SAND (SP) with varying amounts of silt and gravel. The sand was fine- to coarse-grained, and contained occasional light iron staining. The silt was non-plastic, and the gravels were subrounded to rounded quartzite clasts. Considering the rounded nature of the gravel as well as the presence of iron staining, it is indeed considered likely that these sediments represent a lacustrine shoreline environment. Mapping completed by Nelson and Personius (1993) indicates that these deposits are typically on the order of 2 to 20 meters in thickness, and are typically thickest adjacent to the mountain front on the downthrown side of the Wasatch fault zone.

The stratification lines shown on the enclosed logs represent the approximate boundary between soil types. The actual in-situ transition may be gradual. Due to the nature and depositional

characteristics of the native soils, care should be taken in interpolating subsurface conditions between and beyond the exploration locations.

4.2.3 Groundwater Conditions

Groundwater was not encountered in any of the test pits excavated as part of our investigation, and is anticipated to be relatively deep; however, due to the location of the subject property in the Wasatch Mountain foothills, localized perched groundwater may occur during the spring months. Fluctuations in the groundwater level should be expected over time.

5.0 GEOLOGIC CONDITIONS

5.1 GEOLOGIC SETTING

As mentioned previously, GeoStrata is concurrently completing a geologic hazards potential assessment of the subject property. Information concerning the geologic nature of the subject property may be found in that report dated October 25, 2017 (GeoStrata Project No. 1159-002). In order to make this a stand-alone document, we have copied text that is pertinent to our geotechnical analysis from our geologic report into this report.

5.2 EARTHQUAKE GROUND SHAKING HAZARD

During the event of an earthquake seismic waves radiate outward from the initial point of rupture and dissipate with distance. The ground shakes as the seismic waves displace the ground both vertically and horizontally. Ground shaking can cause significant damage to and potentially collapse structures and can also trigger landslide, avalanche and liquefaction. The type of soil a seismic wave travels through can amplify or dampen the effects of ground shaking.

Seismic hazard maps depicting probabilistic ground motions and spectral response have been developed for the United States by the U.S. Geological Survey as part of NEHRP/NSHMP (Frankel et al, 1996). These maps have been incorporated into both *NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures* (FEMA, 1997) and the *International Building Code* (IBC) (International Code Council, 2015). Spectral responses for the Maximum Considered Earthquake (MCE_R) are shown in the table below. These values generally correspond to a two percent probability of exceedance in 50 years (2PE50) for a “firm rock” site. To account for site effects, site coefficients which vary with the magnitude of spectral acceleration are used. Based on our field exploration, it is our opinion that this location is best described as a Site Class D which represents a “Stiff Soil” profile. The spectral accelerations are shown in the table below. The spectral accelerations are calculated based on the site’s approximate latitude and longitude of 40.9470° and -111.8741° respectively and the United States Geological Survey U.S. Seismic Design Maps web based application. Based on the IBC, the site coefficients are $F_a = 1.00$ and $F_v = 1.54$. From this procedure the peak ground acceleration (PGA) is estimated to be 0.50g.

Site Location: Latitude = 40.9470 N Longitude = -111.8741 W	Site Class D Site Coefficients: F_a = 1.00 F_v = 1.54
Spectral Period (sec)	Response Spectrum Spectral Acceleration (g)
0.2	$S_{MS}=(F_a*S_s=1.00*1.253) = 1.25$
1.0	$S_{M1}=(F_v*S_1=1.54*0.469) = 0.72$
^a IBC 1613.3.4 recommends scaling the MCE_R values by 2/3 to obtain the design spectral response acceleration values; values reported in the table above have not been reduced.	

Table 3: MCE_R Seismic Response Spectrum Spectral Acceleration Values for IBC Site Class D^a.

Based on the above information, it is the opinion of GeoStrata that the earthquake ground shaking hazard within the subject site is considered high and recommendations for mitigation of the earthquake ground shaking hazard within the subject site are out of the scope of this geological study. GeoStrata recommends that a licensed structural engineer provide proper structural designs for the proposed residential structure which account for and mitigate this hazard. It is the opinion of GeoStrata that earthquake ground shaking hazard should not preclude development at the subject site.

6.0 ENGINEERING ANALYSIS AND RECOMMENDATIONS

6.1 GENERAL CONCLUSIONS

Supporting data upon which the following recommendations are based have been presented in the previous sections of this report. The recommendations presented herein are governed by the physical properties of the earth materials encountered and tested as part of our subsurface exploration and the anticipated design data discussed in the **PROJECT DESCRIPTION** section. If subsurface conditions other than those described herein are encountered in conjunction with construction, and/or if design and layout changes are initiated, GeoStrata must be informed so that our recommendations can be reviewed and revised as changes or conditions may require.

Based on the subsurface conditions encountered at the site, it is our opinion that the subject site is suitable for the proposed development provided that the recommendations contained in this report are incorporated into the design and construction of the project.

Based on our field observations, the site is overlain by approximately 0 to more than 6 feet of undocumented fill soils. It is possible that thicker sections of undocumented fill soils may be present depending on the original topography of the site. These undocumented fill soils will need to be over-excavated in all areas underlying footing elements. In order to eliminate the potential for premature distress to slabs on grade, the undocumented fill soils would likewise need to be over-excavated in all areas underlying the proposed flatwork. GeoStrata understands that it may not be economical to completely remove the fill soils from these areas, and as a minimum it is recommended that at least 12 inches of properly placed and compacted structural fill soils be placed in all areas underling flatwork. The Owner should be aware that by leaving any undocumented fill soils in place, the potential for premature distress in the slabs is increased.

Based on the results of our slope stability modeling, the site is anticipated to remain relatively stable under static and pseudo-static conditions. It is recommended that all setback distances and other requirements listed in the Geologic Hazards report be incorporated into the design of the project.

The following sub-sections present our recommendations for general site grading, design of foundations, slabs-on-grade, and lateral earth pressures.

6.2 EARTHWORK

Prior to the placement of foundations, general site grading is recommended to provide proper support for foundations, exterior concrete flatwork, and concrete slabs-on-grade. Site grading is also recommended to provide proper drainage and moisture control on the subject property and to aid in preventing differential settlement of foundations as a result of variations in subgrade moisture conditions.

6.2.1 General Site Preparation and Grading

Within areas to be graded (below proposed structures, fill sections, or concrete flatwork), any existing vegetation, topsoil, undocumented fill, debris, or otherwise unsuitable soils should be removed. Any soft, loose, or disturbed soils should also be removed. If over-excavation is required, the excavation should extend a minimum of one foot laterally for every foot of depth of over-excavation. Excavations should extend laterally at least two feet beyond flatwork, pavements, and slabs-on-grade. Following the removal of vegetation, topsoil, undocumented fill, unsuitable soils, and loose or disturbed soils, as described above, site grading may be conducted to bring the site to design elevations.

Based on our observations in the test pits completed for our investigation, there is approximately 0 to over 6 feet of undocumented fill currently overlaying the subject site. It is possible that thicker sections of undocumented fill soils not observed in our explorations will be discovered during construction. This material should be removed prior to placement of structural fill, concrete, flatwork, and roadways if the owner wishes to eliminate the potential for these soils to impact the proposed development. At a minimum, it is recommended that the upper 12-inches of the undocumented fill be scarified and recompact as structural fill in areas underlying flatwork and pavements. The Owner should be aware that by leaving any undocumented fill soils in place, the potential remains for these soils to impact the proposed development. If undocumented fill soils are left in place, consideration should be given to using drip irrigation or desert landscape to minimize the potential of saturating the undocumented fill soils. Grading should be designed to minimize the potential of overloading the slopes through thick soils piles or fill sections.

A GeoStrata representative should observe the site preparation and grading operations to assess that the recommendations presented in this report are complied with.

6.2.2 Excavation Stability

Based on Occupational Safety and Health Administration (OSHA) guidelines for excavation safety, trenches with vertical walls up to 5 feet in depth may be occupied, however, the presence of fill soils, loose soils, or wet soils may require that the walls be flattened to maintain safe working conditions. When the trench is deeper than 5 feet, we recommend a trench-shield or shoring be used as a protective system to workers in the trench. Based on our soil observations, laboratory testing, and OSHA guidelines, subgrade soils at the site classify as Type C soils. Deeper excavations, if required, should be constructed with side slopes no steeper than one and one-half horizontal to one vertical ($1\frac{1}{2}H:1V$). If wet conditions are encountered, side slopes should be further flattened to maintain slope stability. Alternatively shoring or trench boxes may be used to improve safe work conditions in trenches. The contractor is ultimately responsible for trench and site safety. Pertinent OSHA requirements should be met to provide a safe work environment. If site specific conditions arise that require engineering analysis in accordance with OSHA regulations, GeoStrata can respond and provide recommendations as needed.

We recommend that a GeoStrata representative be on-site during all excavations to assess the exposed foundation soils. We also recommend that the Geotechnical Engineer be allowed to review the grading plans when they are prepared in order to evaluate their compatibility with these recommendations.

6.2.3 Structural Fill and Compaction

All fill placed for the support of structures, concrete flatwork or pavements should consist of structural fill. Structural fill may consist of the native sand, silt, and gravel soils provided that it is first screened for debris and material exceeding 4-inches in nominal diameter. Structural fill may also consist of onsite undocumented fill soils provided it is also screened for debris, vegetation, frozen material, and material exceeding 4-inches in nominal diameter. Alternatively, an imported structural fill meeting the specifications below may be used. If soil is imported for use as structural fill, we recommend that it be a relatively well graded granular soil with a maximum of 50 percent passing the No. 4 mesh sieve and a maximum fines content (minus No. 200 mesh sieve) of 25 percent. All structural fill soils should be approved by the Geotechnical Engineer prior to placement. Clay and silt particles in imported structural fill should have a liquid limit less than 35 and a plasticity index less than 15 based on the Atterberg Limit's test (ASTM D-4318). The contractor should anticipate testing all soils used as structural fill frequently to assess the maximum dry density, fines content, and moisture content, etc.

All structural fill should be placed in maximum 6-inch loose lifts if compacted by small hand-operated compaction equipment, maximum 8-inch loose lifts if compacted by light-duty rollers, and maximum 10-inch loose lifts if compacted by heavy duty compaction equipment that is capable of efficiently compacting the entire thickness of the lift. We recommend that all structural fill be compacted on a horizontal plane, unless otherwise approved by the geotechnical engineer. Structural fill should be compacted to at least 95% of the MDD (maximum dry density) as determined by ASTM D-1557 where total structural fill thickness is less than 5 feet. In areas exceeding 5 feet in total structural fill thickness, structural fill should be compacted to at least 98% of the MDD as determined by ASTM D-1557. The moisture content should be at or slightly above the OMC (optimum moisture content) at the time of placement and compaction. Also, prior to placing any fill, the excavations should be observed by the geotechnical engineer to observe that any unsuitable materials or loose soils have been removed. In addition, proper grading should precede placement of fill, as described in the **General Site Preparation and Grading** subsection of this report (Section 6.2.1).

Fill soils placed for subgrade below exterior flat work and pavements, should be within 3% of the OMC when placed and compacted to at least 95% of the MDD as determined by ASTM D-1557. All utility trenches backfilled below the proposed structure, pavements, and flatwork concrete, should be backfilled with structural fill that is within 3% of the OMC when placed and compacted to at least 95% of the MDD as determined by ASTM D-1557. All other trenches, in landscape areas, should be backfilled and compacted to at least 90% of the MDD (ASTM D-1557).

The gradation, placement, moisture, and compaction recommendations contained in this section meet our minimum requirements, but may not meet the requirements of other governing agencies such as city, county, or state entities. If their requirements exceed our recommendations, their specifications should override those presented in this report.

6.3 STABILITY OF SLOPES

As mentioned previously, a relatively steep (approximately 1.5H:1V grade) slope is located on the western portion of the site. In addition, a shallower but still relatively steep (approximately 2.9H:1V grade) slope is located on the eastern portion of the site. These slopes have been identified as the fault scarp associate with the main splay of the Weber segment of the Wasatch Fault Zone. The remainder of the site has been heavily modified by grading activities, with over 6 feet of

undocumented fill having been placed in areas while other areas have experienced cuts of an unknown thickness. We used this scenario along with an assumed 2,000 psf footing load to model the potential buildings using Slide, a computer program incorporating (among others) Bishop's Simplified Method of analysis. Calculations for stability were developed by searching for the minimum factor of safety for a circular-type failure. Homogeneous earth materials (lacustrine sands and gravels, bedrock, and fill soils) and arcuate failure surfaces were assumed.

Strength parameters used in our analyses were developed based on observations within the test pits, experience, as well as the results of our laboratory testing. A direct shear test (ASTM D3080) was completed on a disturbed sample obtained from Trench 2 at a depth of 1 foot below the site grade as it existed at the time of our investigation. This soil classifies as a Poorly Graded SAND (SP) with gravel. Results of our testing indicate that the native lacustrine sand and gravel soils have strength parameters consisting of an angle of internal friction (ϕ) of 41 degrees and cohesion of 75 psf.

Soil Type	Friction Angle (ϕ)	Cohesion (psf)
Poorly Graded SAND (SP-SM) with silt and gravel	41	75

Groundwater was not encountered in any portion of the exploratory trench excavated as part of this investigation. In addition, no evidence of near-surface water, such as springs or seeps was observed during our field investigation. As such, groundwater was not incorporated into the slope stability modeling completed for this project.

The modeled geometry of the slope as well as the anticipated structure locations were based on information obtained from the client as well as from our field investigations. Based on this information, we modeled the critical state (maximum slope height of approximately 178 feet to the west and 120 feet to the east). Results of our stability analysis for the slopes on the subject site are included in Appendix D.

As per industry standard, seismic screening was completed using one-half of the deterministic median (50th percentile) peak ground acceleration (PGA) for the area resulting from a characteristic earthquake of 7.1 Mw on the Weber segment of the Wasatch fault, which is estimated using the procedure described in Section 5.2 of this report.

Based on the results of our slope stability modeling, the 1.5H:1V slope located on the western portion of the property has a factor of safety of 1.51 under static conditions. However, the site has a factor of safety of 0.863 under seismic conditions and as such does not meet the industry standard factor of safety of 1.0 for seismic conditions. This indicates that the slope may experience deformation during a MCE event. As such, a deformation analysis was completed following the methodology outlined by Bray and Travasarou. Shear wave velocities utilized in this methodology were obtained from the 2015 IBC for site class “D” soils. Based on the results of our deformation analysis, it is anticipated that the referenced slope may experience up to 2.6 cm of deformation during a seismic event. This potential deformation should be accounted for during the design of the footings through the use of additional reinforcement within the footing elements.

Based on the results of our slope stability modeling, the 2.9H:1V slope located on the eastern portion of the property had factors of safety of 2.51 and 1.38 for static and pseudo-static conditions, respectively. These factors of safety meet the industry standard factors of safety of 1.5 and 1.0 for static and pseudo-static conditions, respectively.

6.4 FOUNDATIONS

The foundations for the proposed structure may consist of conventional strip and/or spread footings founded entirely on suitable native soils, or on properly placed structural fill that extends to undisturbed, native soils. Under no conditions should foundation elements be established on topsoil, organic soils, undocumented fill, or otherwise deleterious soils. If these soils are encountered in the areas underlying the proposed footings, it is recommended that they be over-excavated until undisturbed native soils are encountered. The site may then be brought back up to design grade using properly placed and compacted structural fill as described in Section 6.2.3 of this report.

Strip and spread footings should be a minimum of 20 and 36 inches wide, respectively, and exterior shallow footings should be embedded at least 30-inches below final grade for frost protection and confinement. Interior footings not subject to frost should be embedded at least 18 inches below final grade to provide confinement. In addition, all setback requirements made in the Geologic Hazards report concurrently being completed by GeoStrata should be incorporated into the design of the project.

Conventional strip and spread footings founded entirely on suitable native soils or on properly placed structural fill which in turn are established on undisturbed, native soils may be proportioned for a maximum net allowable bearing capacity of **2,000 psf**. The net allowable bearing capacity may be increased (typically by one-third) for temporary loading conditions such as transient wind and seismic loads. All footing excavations should be observed by the Geotechnical Engineer prior to footing placement.

6.5 SETTLEMENT

Settlements of properly designed and constructed conventional footings, founded as described above, are anticipated to be less than 1 inch. Differential settlements should be on the order of half the total settlement over 30 feet.

6.6 EARTH PRESSURES AND LATERAL RESISTANCE

Lateral forces imposed upon conventional foundations due to wind or seismic forces may be resisted by the development of passive earth pressures and friction between the base of the footing and the supporting subgrade. In determining the frictional resistance, a coefficient of friction of 0.61 should be used for granular native soils against concrete.

Ultimate lateral earth pressures from fine-grained backfill acting against buried walls and structures may be computed from the lateral pressure coefficients or equivalent fluid densities presented in the following table:

Condition	Lateral Pressure Coefficient	Equivalent Fluid Density (pounds per cubic foot)
Active*	0.21	25
At-rest**	0.34	41
Passive*	4.81	578
Seismic Active***	0.14	17
Seismic Passive***	-0.45	-54

* Based on Coulomb's equation

** Based on Jaky

*** Based on Mononobe-Okabe Equation

These coefficients and densities assume level, granular backfill with no buildup of hydrostatic pressures. The force of the water should be added to the presented values if hydrostatic pressures

are anticipated. If sloping backfill is present, we recommend the geotechnical engineer be consulted to provide more accurate lateral pressure parameters once the design geometry is established.

Walls and structures allowed to rotate slightly should use the active condition. If the element is constrained against rotation, the at-rest condition should be used. These values should be used with an appropriate factor of safety against overturning and sliding. A value of 1.5 is typically used. Additionally, if passive resistance is calculated in conjunction with frictional resistance, the passive resistance should be reduced by $\frac{1}{2}$.

For seismic analyses, the *active* and *passive* earth pressure coefficient provided in the table is based on the Mononobe-Okabe pseudo-static approach and only accounts for the dynamic horizontal thrust produced by ground motion. Hence, the resulting dynamic thrust pressure *should be added* to the static pressure to determine the total pressure on the wall. The pressure distribution of the dynamic horizontal thrust may be closely approximated as an inverted triangle with stress decreasing with depth and the resultant acting at a distance approximately 0.6 times the loaded height of the structure, measured upward from the bottom of the structure.

The coefficients shown assume a vertical wall face. Hydrostatic and surcharge loadings, if any, should be added. Over-compaction behind walls should be avoided. Resisting passive earth pressure from soils subject to frost or heave, or otherwise above prescribed minimum depths of embedment, should usually be neglected in design.

6.7 CONCRETE SLAB-ON-GRADE CONSTRUCTION

Concrete slabs-on-grade should be constructed over at least 4 inches of compacted gravel overlying native soils or a zone of structural fill that is at least 12 inches thick. It should be noted that if only 12 inches of structural fill are provided, several feet of undocumented soils will be left in place. The Owner/Contractor should be willing to accept the risk of excessive settlement if these soils become saturated at some future date. If the Owner/Contractor is unwilling to accept these risks, all of the undocumented fill beneath pavements and other flatwork should be completely removed and replaced with appropriately moisture conditioned and compacted structural fill. Disturbed native soils should be compacted to at least 95% of the MDD as determined by ASTM D-1557 (modified proctor) prior to placement of gravel. The gravel should consist of road base or clean drain rock with a $\frac{3}{4}$ -inch maximum particle size and no more than 12 percent fines passing the No. 200 mesh sieve. The gravel layer should be compacted to at least

95 percent of the MDD of modified proctor or until tight and relatively unyielding if the material is non-proctorable. All concrete slabs should be designed to minimize cracking as a result of shrinkage. Consideration should be given to reinforcing the slab with welded wire, re-bar, or fiber mesh.

6.8 MOISTURE PROTECTION AND SURFACE DRAINAGE

Precautions should be taken during and after construction to eliminate saturation of foundation soils. Overwetting the soils prior to or during construction may result in increased softening and pumping, causing equipment mobility problems and difficulty in achieving compaction.

Moisture should not be allowed to infiltrate the soils in the vicinity of, or upslope from, the structures. We recommend that roof runoff devices be installed to direct all runoff a minimum of 10 feet away from structures. The grade within 10 feet of the structures should be sloped a minimum of 5% away from the structure.

7.0 CLOSURE

7.1 LIMITATIONS

The recommendations contained in this report are based on our limited field exploration, laboratory testing, and understanding of the proposed construction. The subsurface data used in the preparation of this report were obtained from the explorations made for this investigation. It is possible that variations in the soil and groundwater conditions could exist between and beyond the points explored. The nature and extent of variations may not be evident until construction occurs. If any conditions are encountered at this site that are different from those described in this report, GeoStrata should be immediately notified so that we may make any necessary revisions to recommendations contained in this report. In addition, if the scope of the proposed construction changes from that described in this report, GeoStrata should be notified.

This report was prepared in accordance with the generally accepted standard of practice at the time the report was written. No warranty, expressed or implied, is made.

It is the Client's responsibility to see that all parties to the project including the Designer, Contractor, Subcontractors, etc. are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the Contractor's option and risk.

7.2 ADDITIONAL SERVICES

The recommendations made in this report are based on the assumption that an adequate program of tests and observations will be made during construction. GeoStrata staff should be on site to verify compliance with these recommendations. These tests and observations should include, but not necessarily be limited to, the following:

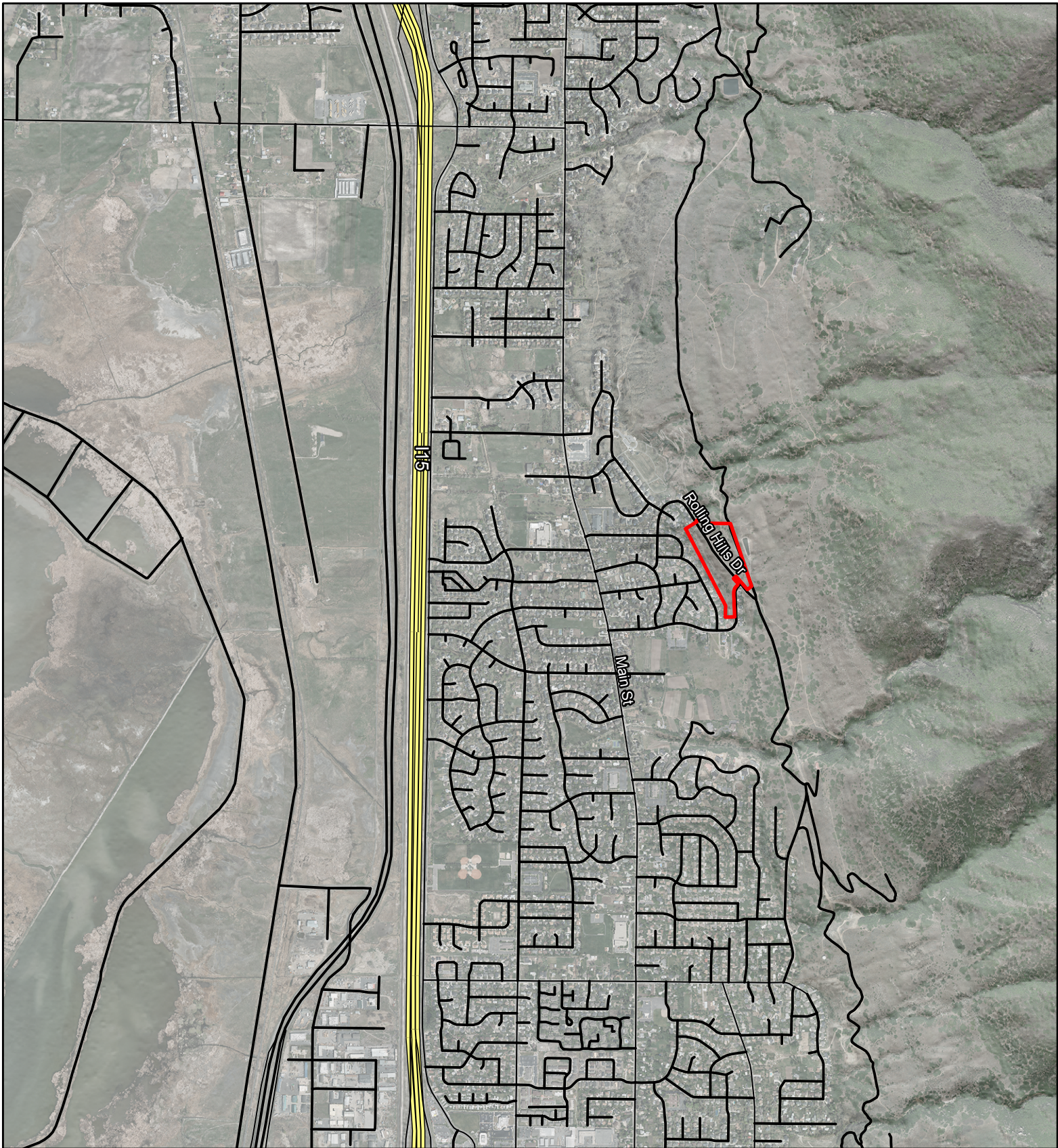
- Observations and testing during site preparation, earthwork and structural fill placement.
- Observation of foundation soils to assess their suitability for footing placement.
- Observation of soft/loose soils over-excavation.
- Observation of temporary excavations and shoring.
- Consultation as may be required during construction.
- Quality control and observation of concrete placement.

We also recommend that project plans and specifications be reviewed by GeoStrata to verify compatibility with our conclusions and recommendations. Additional information concerning the scope and cost of these services can be obtained from our office.

We appreciate the opportunity to be of service on this project. Should you have any questions regarding the report or wish to discuss additional services, please do not hesitate to contact us at your convenience at (801) 501-0583.

8.0 REFERENCES CITED

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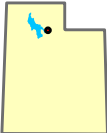
Legend

Approximate Site Boundary

0 625 1,250 2,500 3,750 5,000 Feet

1 inch = 2,000 feet

Base Map:
2012 12.5cm HRO aerial imagery and hillshades derived from 2006
5 meter DEMs provided by the State of Utah AGRC.





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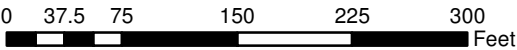
Geologic Hazards Investigation
Lake View Vista Development
Centerville, UT
Project Number: 1159-002

**Plate
A-1**



Legend

 Approximate Test Pit Location



1 inch = 125 feet
Base Map:

2012 12.5cm HRO aerial imagery and hillshades derived from
2013-2014 0.5 meter LiDAR provided by the State of Utah AGRC.





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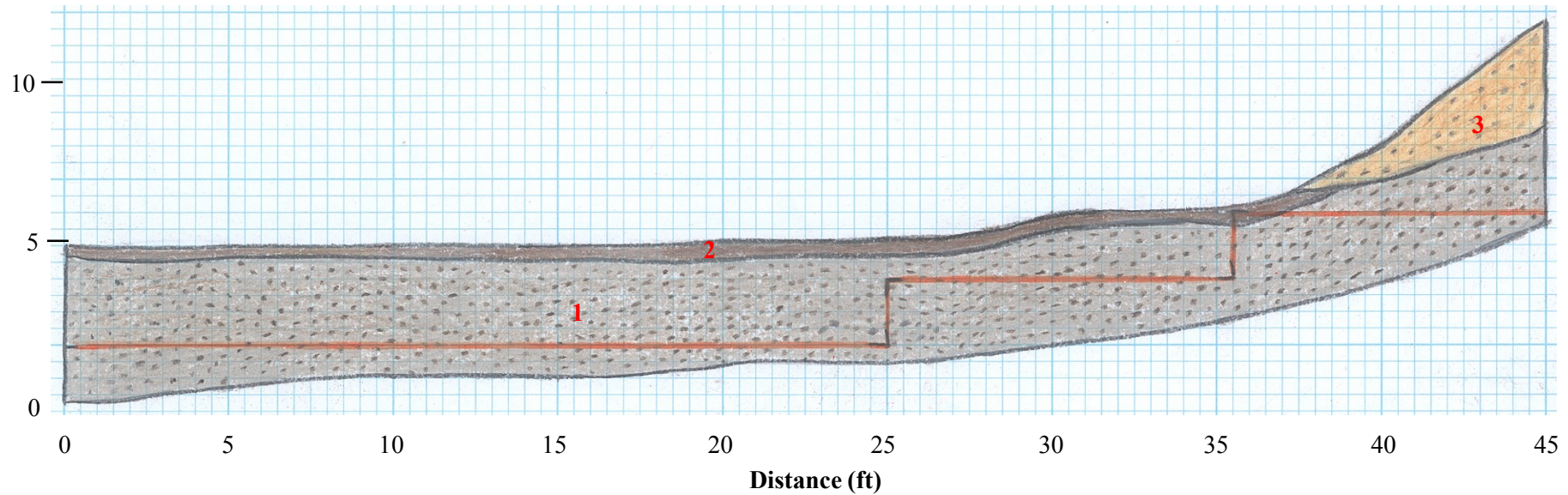
Geologic Hazards Investigation
Lake View Vista Development
Centerville, UT
Project Number: 1159-002

**Plate
A-2**

TRENCH 1 NORTH WALL

West

East



Trench 1 Legend

- 1** – *Uppermost Pleistocene Lacustrine Sand (lbps)*: grey-brown, clast supported, massive, sand and gravel, rounded clasts ½ inch in nominal size. Contained lenses of bedded sand and gravel related to sheetflow.
- 2** – A Soil Horizon: moderate organics, brown, sand and gravel.
- 3** – FILL: red-brown fine to coarse sand with gravel.

Trench Orientation: N65E

Scale

1 inch = 5 feet

Horizontal Scale = Vertical Scale

logged by S. Agopian

Plate
B-1

Geologic Hazards Investigation
Lake View Vista Subdivision
Centerville, Utah
Project Number – 1159-002

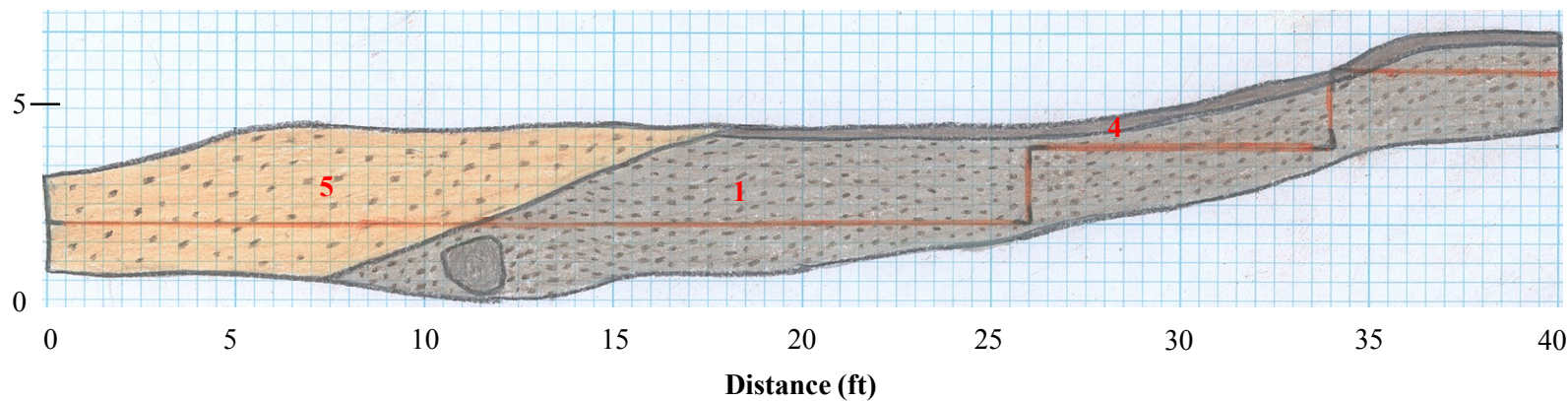
Trench 1 Log
0 to 45 feet

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TRENCH 2 NORTH WALL

West

East



Trench 2 Legend

- 1** – *Uppermost Pleistocene Lacustrine Sand (lbs)*: grey-brown, clast supported, massive, fine to coarse sand and gravel, rounded clasts ½ inch in nominal size. Contained lenses of bedded sand and gravel related to sheetflow.
- 4** – A Soil Horizon: moderate organics, brown, sand and gravel.
- 5** – FILL: light brown fine to coarse sand with gravel.

Trench Orientation: N65E

Scale

1 inch = 5 feet

Horizontal Scale = Vertical Scale

logged by S. Agopian

Plate
B-2

Geologic Hazards Investigation
Taylor Ridge Subdivision
Farmington, Utah
Project Number – 1039-011

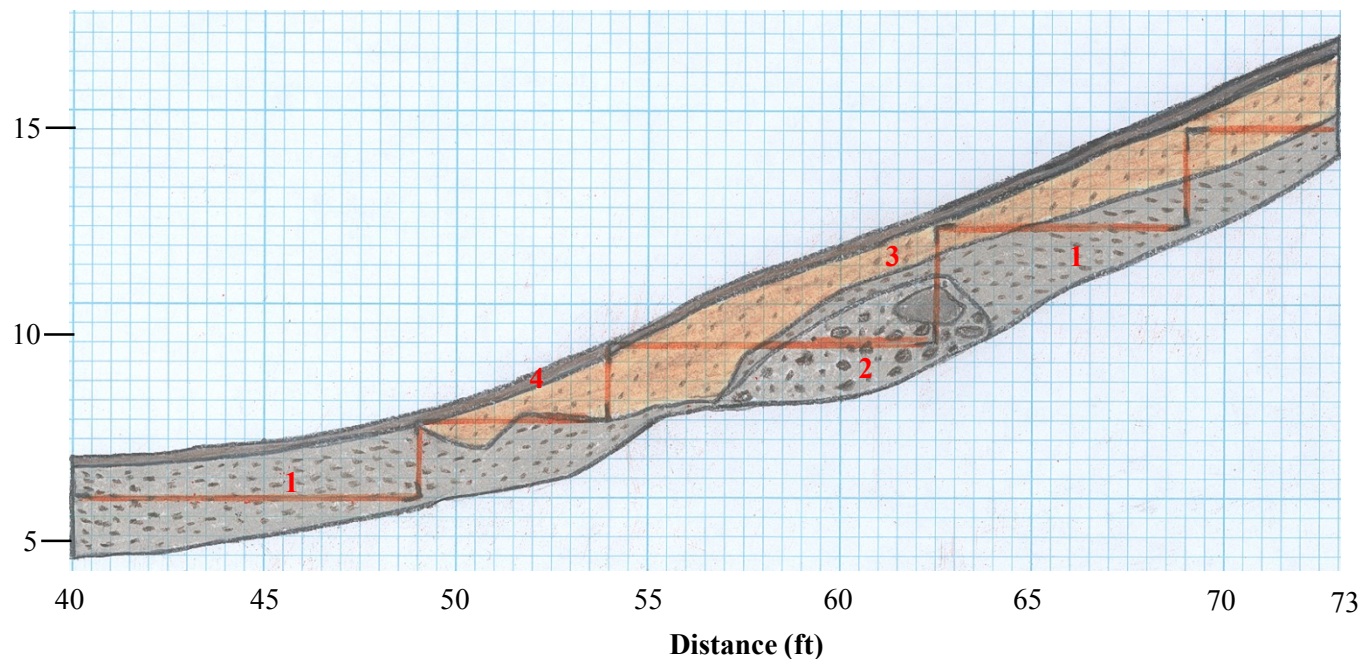
Trench 2 Log
0 to 40 feet

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TRENCH 2 NORTH WALL

West

East



Trench 2 Legend

- 1** – *Uppermost Pleistocene Lacustrine Sand (lbps)*: grey-brown, clast supported, massive, fine to coarse sand and gravel, rounded clasts ½ inch in nominal size. Contained lenses of bedded sand and gravel related to sheetflow.
- 2** – *Bonneville age alluvial fan related to regressive phase of Lake Bonneville*: grey-brown, clast supported, sand and gravel with boulders and cobbles, well rounded clasts up to 1½ feet in diameter.
- 3** – *Uppermost Pleistocene Lacustrine Sand (lbps)*: similar to unit 1 with more fines, light brown, clast supported, massive, fine to coarse sand and gravel, rounded clasts ½ inch in nominal size.
- 4** – A Soil Horizon: moderate organics, brown, sand and gravel.

Trench Orientation: N65E

Scale

1 inch = 5 feet

Horizontal Scale = Vertical Scale

logged by S. Agopian

Plate
B-3

Geologic Hazards Investigation
Taylor Ridge Subdivision
Farmington, Utah
Project Number – 1039-011

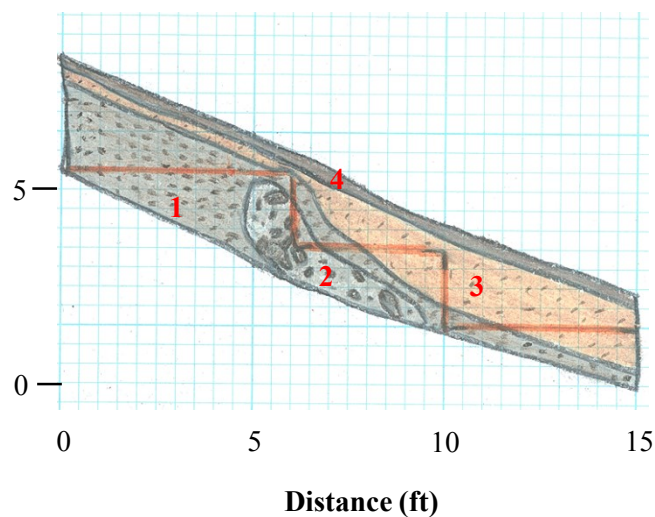
Trench 2 Log
40 to 73 feet

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Page 97 of 110

East

TRENCH 1 EXTENSION SOUTH WALL

West



Trench 2 Extension Legend

- 1** – *Uppermost Pleistocene Lacustrine Sand (lbps)*: grey-brown, clast supported, massive, fine to coarse sand and gravel, rounded clasts ½ inch in nominal size. Contained lenses of bedded sand and gravel related to sheetflow.
- 2** – *Bonneville age alluvial fan related to regressive phase of Lake Bonneville*: grey-brown, clast supported, sand and gravel with boulders and cobbles, well rounded clasts up to 1½ feet in diameter.
- 3** – *Uppermost Pleistocene Lacustrine Sand (lbps)*: similar to unit 1 with more fines, light brown, clast supported, massive, fine to coarse sand and gravel, rounded clasts ½ inch in nominal size.
- 4** – A Soil Horizon: moderate organics, brown, sand and gravel.

Trench Orientation: N65E

Scale

1 inch = 5 feet

Horizontal Scale = Vertical Scale

logged by S. Agopian

Plate
B-4

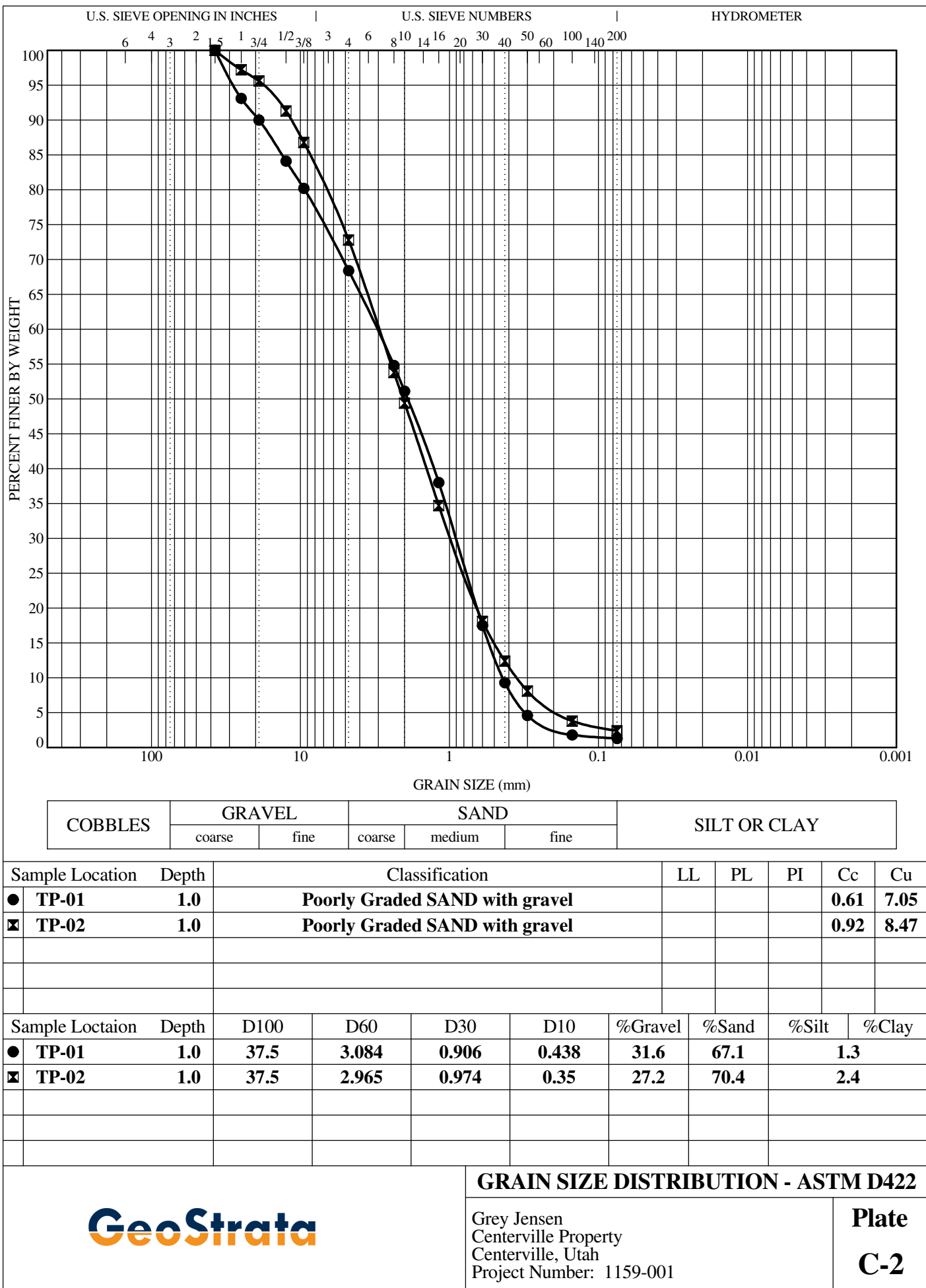
Geologic Hazards Investigation
Lake View Vista Subdivision
Centerville, Utah
Project Number – 1159-002

Trench 2 Extension Log
0 to 15 feet

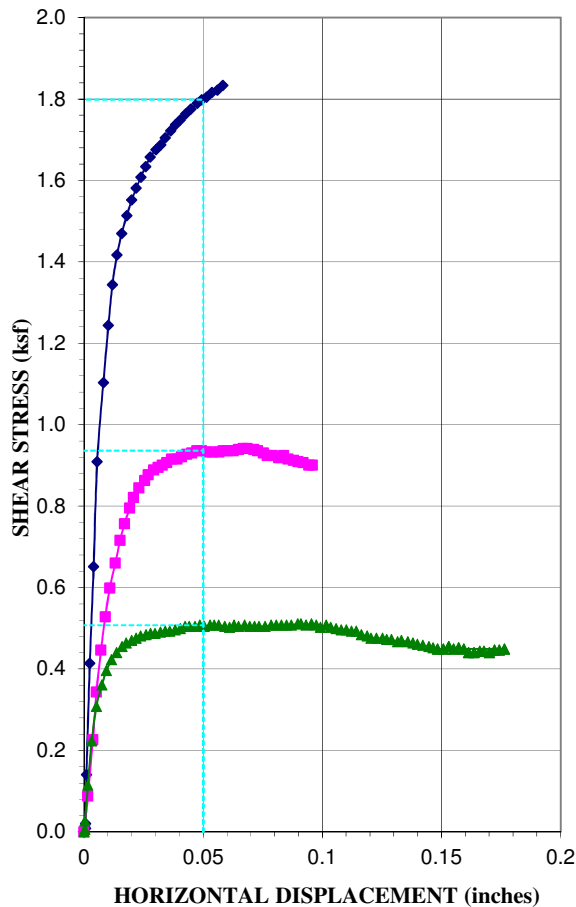
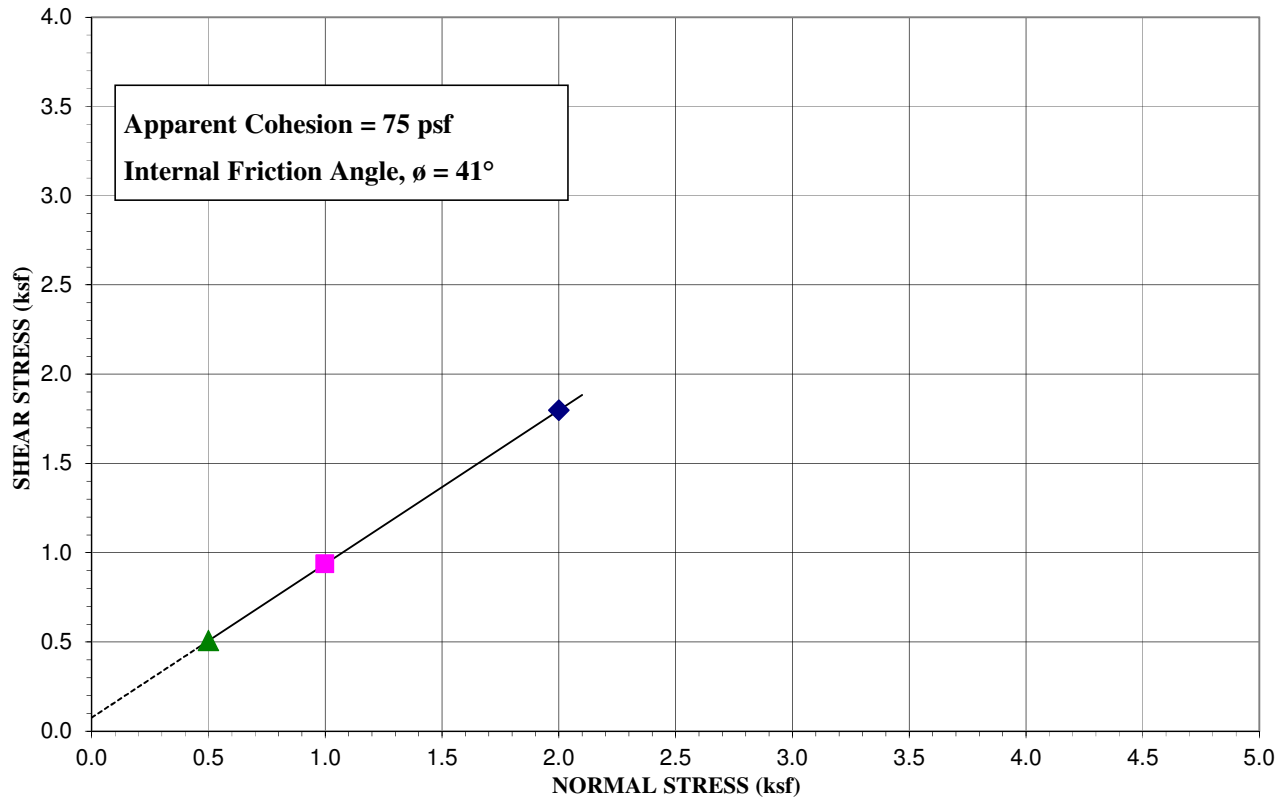
GeoStrata
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Test Pit No.	Sample Depth (feet)	USCS Soil Classification	Natural Moisture Content (%)	Gradation			Diret Shear	
				Gravel (%)	Sand (%)	Fines (%)	Friction Angle (°)	Cohseion (psf)
TP-01	1	SP	2.1	31.6	67.1	1.3		
TP-02	1	SP	1.9	27.2	70.4	2.4	41	75

C_GSD TEST PIT LOGS.GPJ GEOSTRATA.GDT 10/26/17



DIRECT SHEAR TEST



Source:	
Type of Test:	Consolidated Drained/Saturated

Test No. (Symbol)	1 (◆)	2 (■)	3 (▲)
Sample Type	Remolded		
Initial Height, in.	1.019	1.035	
Diameter, in.	2.5	2.5	2.5
Dry Density Before, pcf	#DIV/0!	#DIV/0!	#DIV/0!
Dry Density After, pcf	#DIV/0!	#DIV/0!	#DIV/0!
Moisture % Before	#DIV/0!	#DIV/0!	#DIV/0!
Moisture % After	#DIV/0!	#DIV/0!	#DIV/0!
Saturation, % Before	#DIV/0!	#DIV/0!	#DIV/0!
Saturation, % After	#DIV/0!	#DIV/0!	#DIV/0!
Normal Load, ksf	2.0	1.0	0.5
Shear Stress, ksf	1.80	0.94	0.51
Strain Rate	IN/MIN		

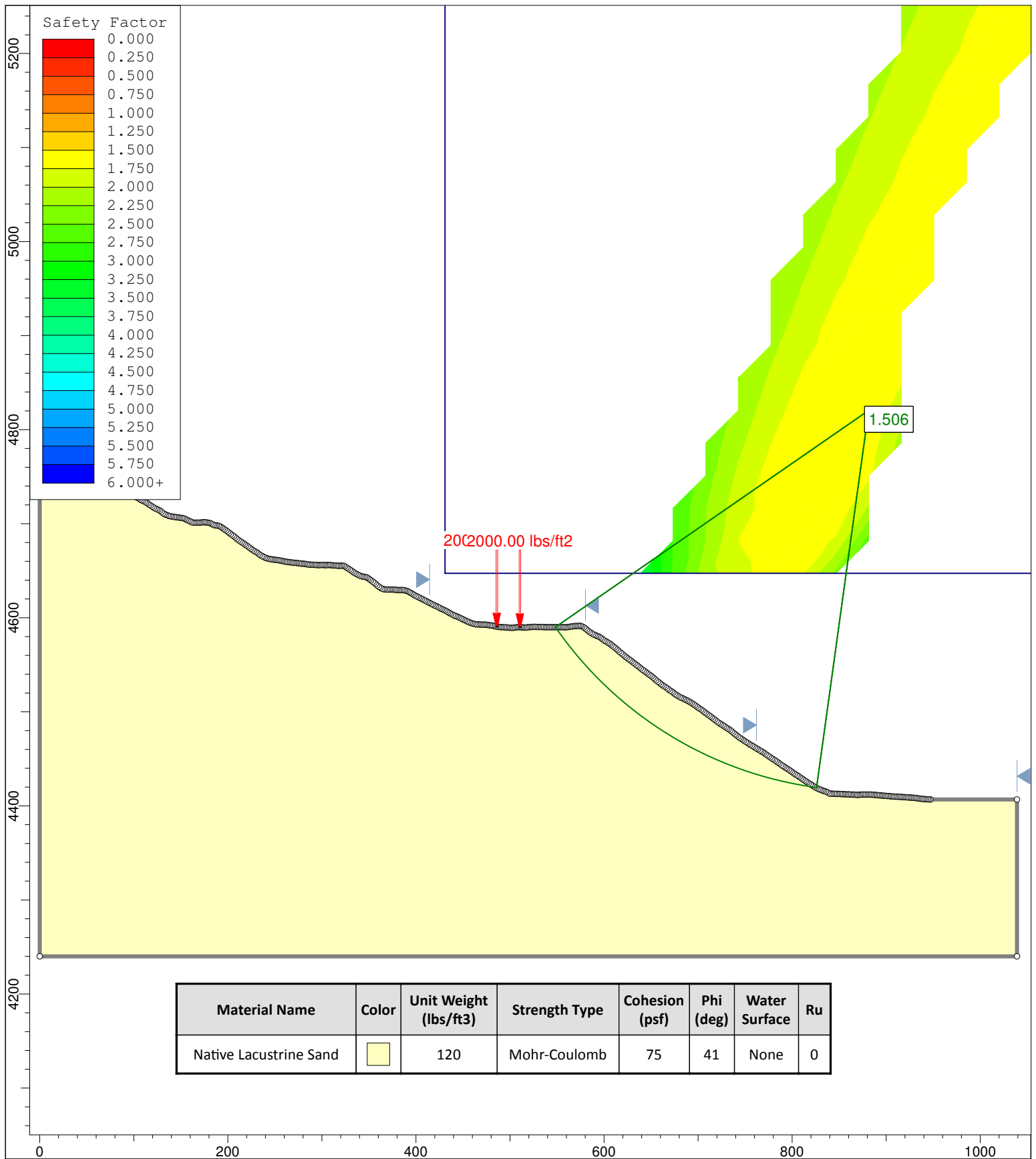
Sample Properties	
Cohesion, psf	75
Friction Angle, ϕ	41
Liquid Limit, %	
Plasticity Index, %	
Percent Gravel	
Percent Sand	
Percent Passing No. 200 sieve	
Classification	

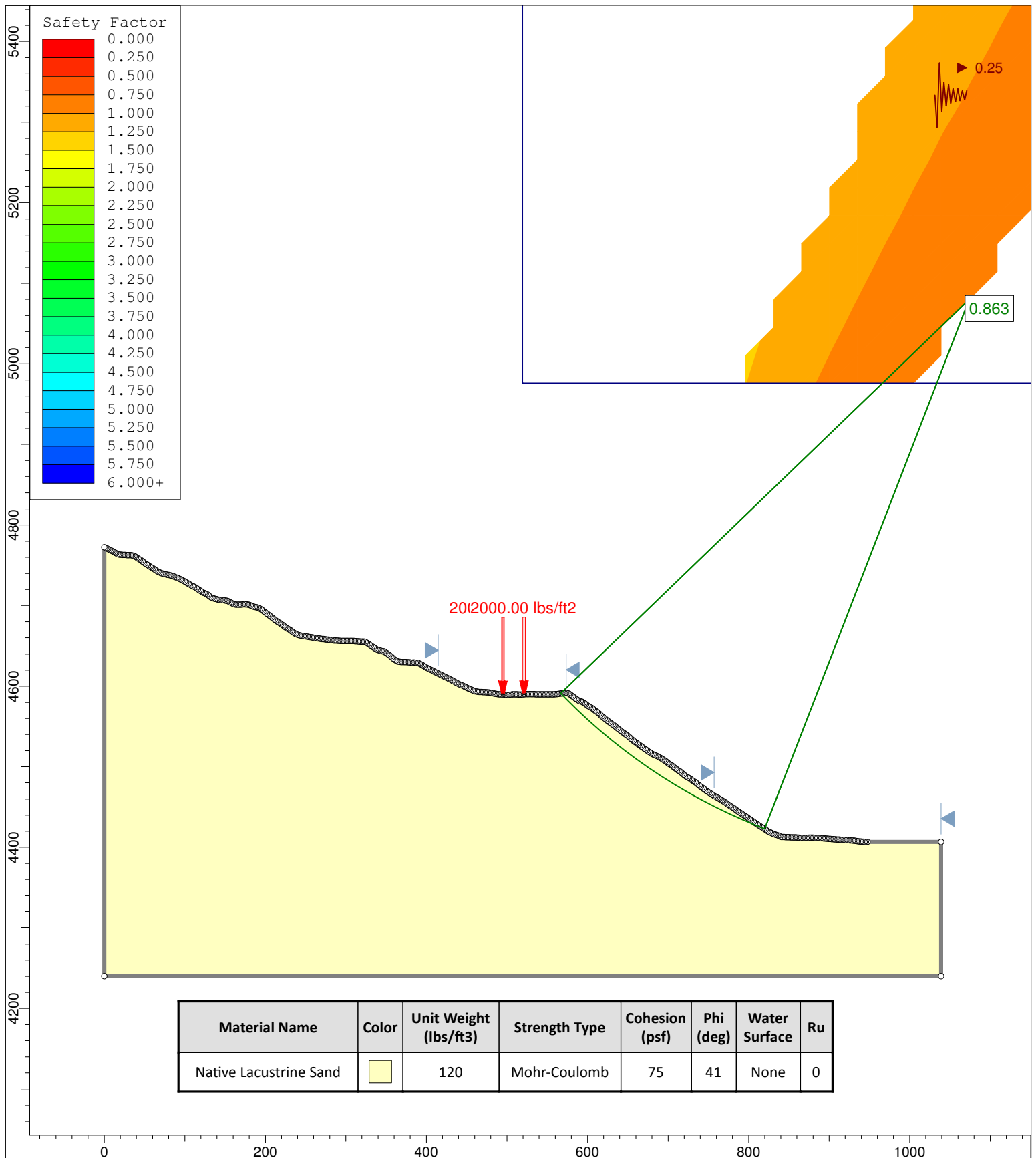
PROJECT:

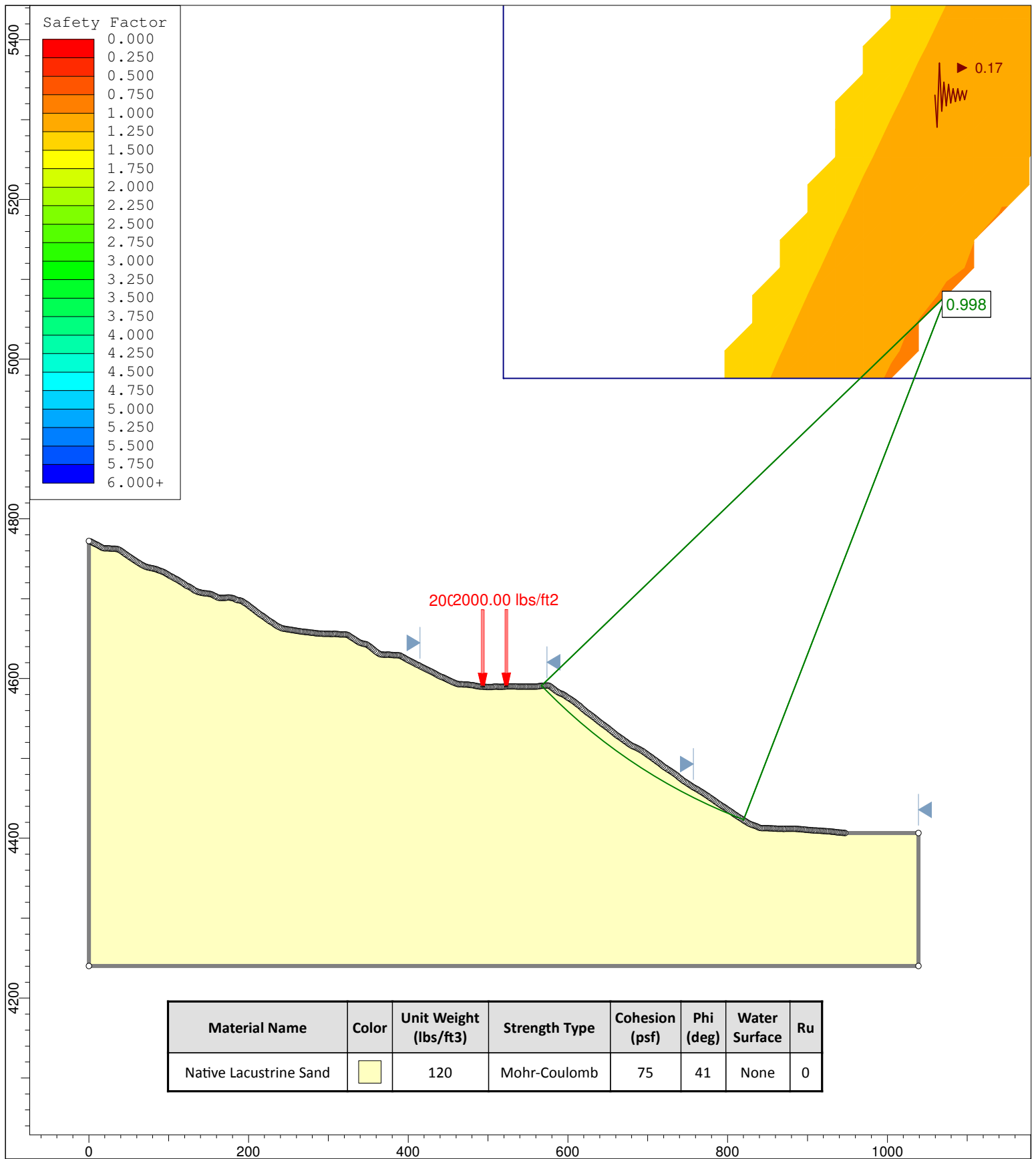
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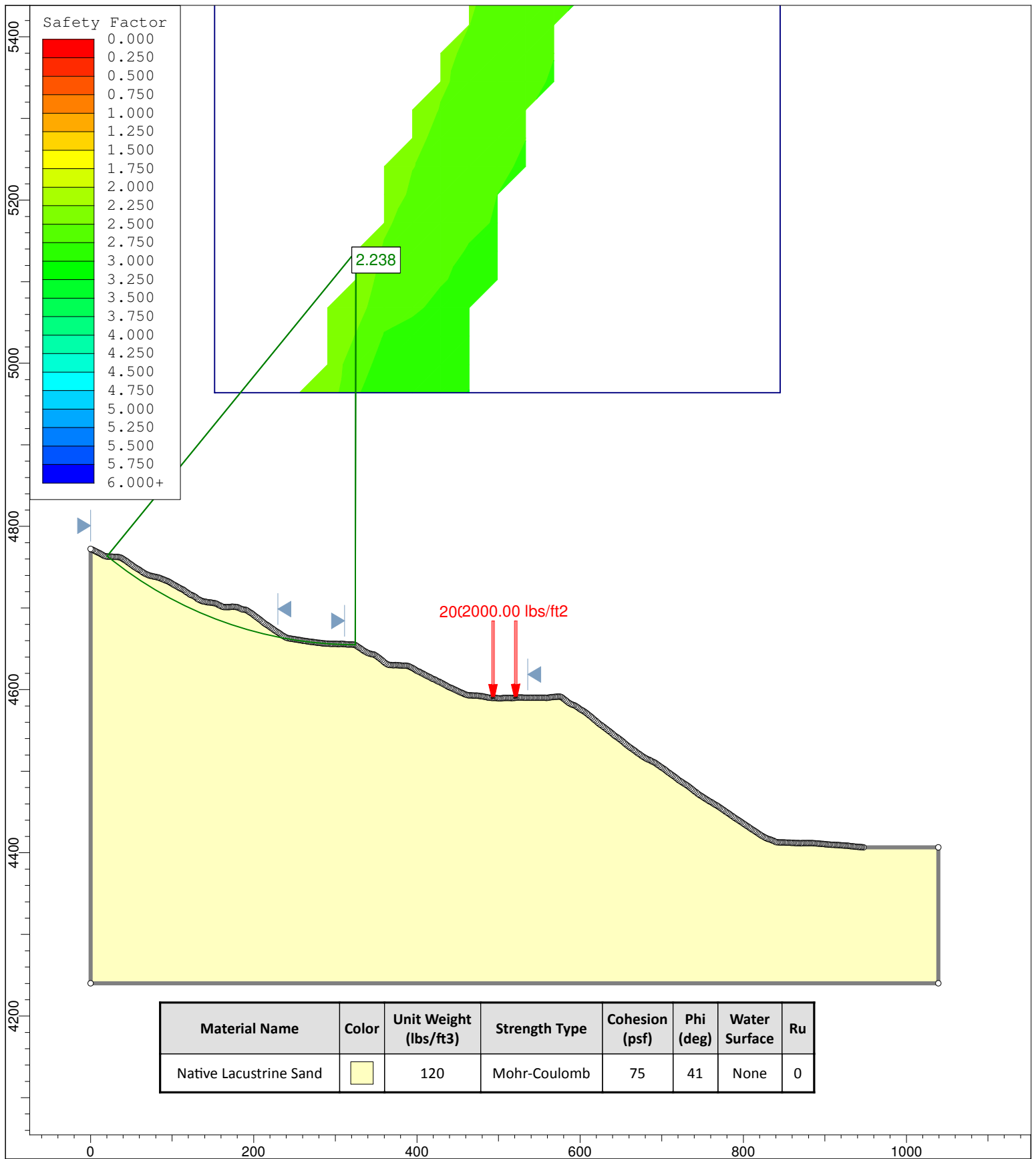
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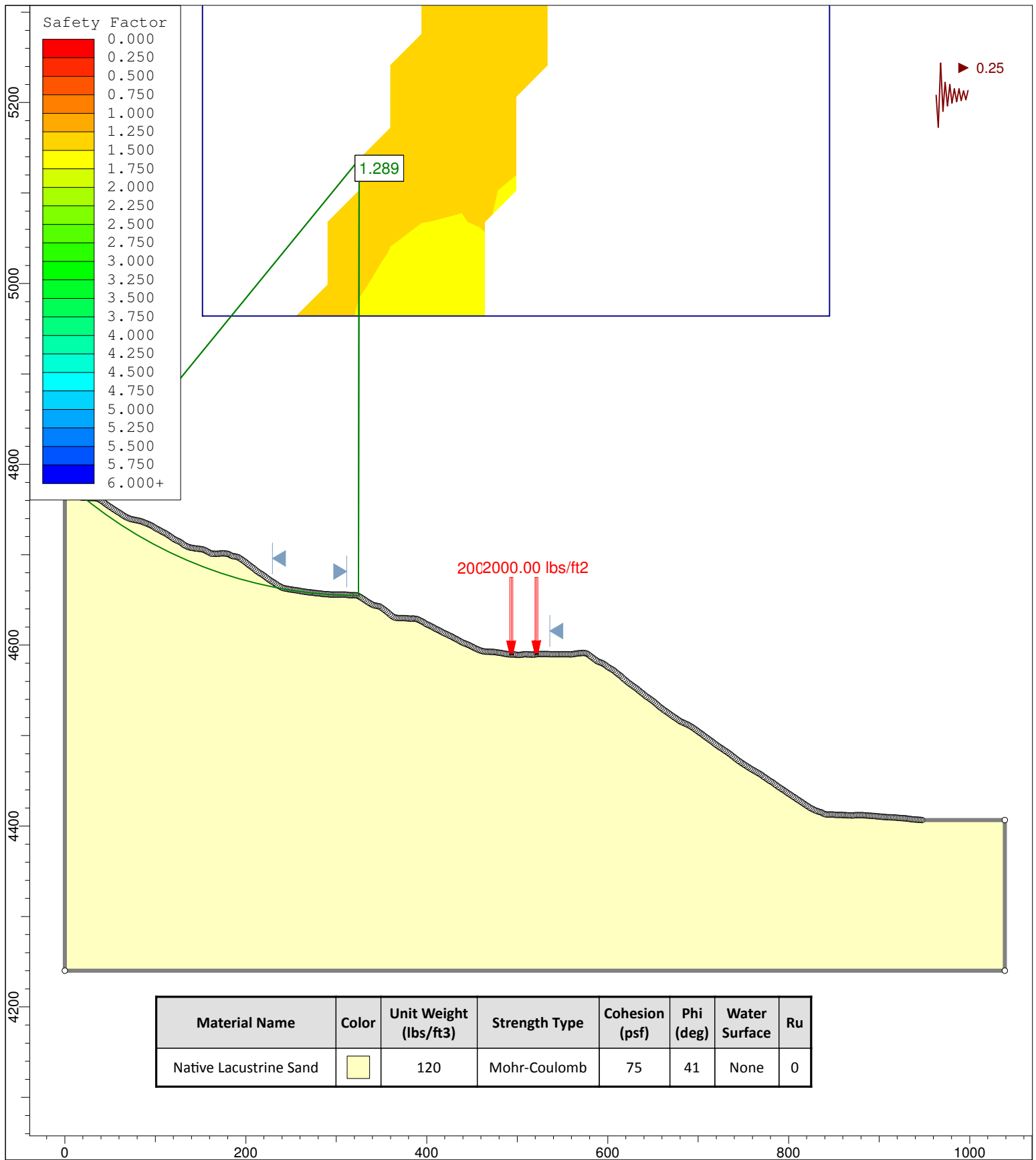
**Plate
C-3**











**PLANNING
COMMISSION**

Staff Report
10/11/2023

Item No. 1.

Title: Community Development Director's Report

Initiated By: Planning Commission

Staff Representative: Cory Snyder, Community Development Director

SUBJECT:

Next Planning Commission Meeting - **October 25, 2023**

Tentative Items:

- *Preliminary Subdivision - Chase Creek Estates*
- *Conditional Use Permit - S & S Auto Sales*

RECOMMENDATION:

BACKGROUND:

ATTACHMENTS:



CENTERVILLE
city

PLANNING COMMISSION

Staff Report
10/11/2023

Item No. 1.

Title: Minutes Review and Approval

Initiated By:

Staff Representative:

SUBJECT:

RECOMMENDATION:

BACKGROUND:

ATTACHMENTS:

1. 9-27-23 PC Minutes

1 **PLANNING COMMISSION MINUTES OF MEETING**

2 **Wednesday, September 27, 2023**

3 **7:00 p.m.**

4
5 A quorum being present at City Hall, 250 North Main Street, Centerville, Utah, the
6 meeting of the Centerville City Planning Commission was called to order at 7:00 p.m.

7
8 **MEMBERS PRESENT**

9 Shawn Hoth
10 Amanda Jorgensen
11 Mason Kjar
12 Matt Larsen, Vice Chair
13 Tyler Moss
14 LaRae Patterson
15 Heidi Shegrud, Chair

16
17 **STAFF PRESENT**

18 Cory Snyder, Community Development Director
19 Lisa Romney, City Attorney
20 Whitney Black, Assistant Planner

21
22 **LEGISLATIVE THOUGHT/PRAYER** Commissioner Kjar

23
24 **PLEDGE OF ALLEGIANCE**

25
26 New Commissioner Amanda Jorgensen introduced herself and said she was excited to
27 serve on the Planning Commission.

28
29 **TRAINING – ROBERTS RULES OF ORDER**

30
31 City Attorney Lisa Romney provided training regarding Roberts Rules of Order, and
32 answered questions from the Planning Commission.

33
34 **PLANNING COMMISSION BY-LAWS, NEW COMMISSIONER ORIENTATION**

35
36 Community Development Director Cory Snyder explained the purpose and role of the
37 Planning Commission in Centerville, and provided orientation for new Commissioners.

38
39 **DISCUSSION FOR NEW COMMISSIONERS – QUESTIONS & ANSWERS**

40
41 The Planning Commission and staff discussed legislative versus administrative
42 decisions, and setting goals for the Planning Commission.

43
44 **COMMUNITY DEVELOPMENT DIRECTOR'S REPORT**

45
46 The Planning Commission was scheduled to meet next on October 11, 2023.

47
48 **MINUTES REVIEW AND APPROVAL**

49
50 Minutes of the September 13, 2023 Planning Commission meeting were reviewed. Chair
51 Shegrud **moved** to amend the minutes to indicate on page 2 that she closed the public hearing
52 following the single public comment, and approve the minutes as amended. Commissioner Kjar
53 seconded the motion, which passed by unanimous vote (7-0).
54

ADJOURNMENT

At 8:37 p.m., Chair Shegrud **moved** to adjourn the meeting. Commissioner Larsen seconded the motion, which passed by unanimous vote.

Jennifer Robison, City Recorder

Date Approved