

TENTATIVE MAP & VARIANCE
FOR
HIGHLAND VILLAGE PHASE 2



**PHOTO OF SITE LOOKING SOUTHWEST
FROM THE TOP OF THE ROCKY KNOLL**

SUBMITTED MARCH 8, 2022

Application for a Tentative Map & Variance

For

Highland Village – Phase 2

Prepared For:
LC Highland 2, LLC
325 Harbour Cove Dr. Suite 219
Sparks, NV 89434

Prepared By:
KRATER CONSULTING Group, PC
A Nevada professional corporation
901 Dartmouth Drive
Reno, Nevada 89509
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March 8, 2022

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Community Services Department
Planning and Building

TENTATIVE SUBDIVISION MAP
APPLICATION



Community Services Department
Planning and Building
1001 E. Ninth St., Bldg. A
Reno, NV 89512-2845

Telephone: 775.328.6100

HIGHLAND VILLAGE - PHASE 2
COMMON OPEN SPACE DEVELOPMENT

Washoe County Development Application

Your entire application is a public record. If you have a concern about releasing personal information, please contact Planning and Building staff at 775.328.6100.

Project Information		Staff Assigned Case No.: _____	
Project Name: Highland Village - Phase 2			
Project Description: A tentative map for 72 detached lots, single family residential subdivision. A variance is also requested related to grading to allow a 2:1 slope in lieu of the code required 3:1 slope to comply with the Sun Valley Area Plan Policies further described in the application. This project is subject to Article 408, "Common Open Space Development".			
Project Address: 0 9th Avenue, Sun Valley			
Project Area (acres or square feet): 18.408 Acres Gross, 14.71 acres Disturbed (Rural Area NOT Disturbed)			
Project Location (with point of reference to major cross streets AND area locator): Located between Highland Ranch Parkway & 9th Street, & East of Klondike Dr.			
Assessor's Parcel No.(s):	Parcel Acreage:	Assessor's Parcel No.(s):	Parcel Acreage:
508-020-04	4.940	508-020-42	10.138
508-020-44	3.330		
Indicate any previous Washoe County approvals associated with this application: Case No.(s). WMPA21-0008 and WRZA21-0005			
Applicant Information (attach additional sheets if necessary)			
Property Owner:		Professional Consultant:	
Name: LC Highland 2, LLC		Name: Krater Consulting Group, PC	
Address: 325 Harbour Cove Dr. Suite 219 Sparks, NV Zip: 89434		Address: 901 Dartmouth Drive Reno, NV Zip: 89509	
Phone: (949) 322-9959 Fax:		Phone: (775) 815-9561 Fax: (775) 786-2702	
Email: jholbrook@landcapip.com		Email: ken@kraterconsultinggroup.com	
Cell: (949) 322-9959 Other:		Cell: (775) 815-9561 Other:	
Contact Person: Jeffrey Holbrook		Contact Person: Kenneth Krater	
Applicant/Developer:		Other Persons to be Contacted:	
Name: Krater Consulting Group, PC		Name:	
Address: 901 Dartmouth Drive Reno, NV Zip: 89509		Address: Zip:	
Phone: (775) 815-9561 Fax: (775) 786-2702		Phone: Fax:	
Email: ken@kraterconsultinggroup.com		Email:	
Cell: (775) 815-9561 Other:		Cell: Other:	
Contact Person: Kenneth Krater		Contact Person:	
For Office Use Only			
Date Received:	Initial:	Planning Area:	
County Commission District:		Master Plan Designation(s):	
CAB(s):		Regulatory Zoning(s):	

Tentative Subdivision Map Application Supplemental Information

(All required information may be separately attached)

1. What is the location (address or distance and direction from nearest intersection)?

Located between Highland Ranch Parkway & 9th Street, & East of Klondike Dr.

2. What is the subdivision name (proposed name must not duplicate the name of any existing subdivision)?

Highland Village, Phase 2

3. Density and lot design:

a. Acreage of project site	18.408 Acres Gross, 14.71 Acres Disturbed
b. Total number of lots	73
c. Dwelling units per acre	3.93 Gross, 4.96 per Disturbed Area
d. Minimum and maximum area of proposed lots	3,533 to 10,460 sq. ft.
e. Minimum width of proposed lots	40 Feet.
f. Average lot size	4,992 sq. ft.

4. What utility company or organization will provide services to the development:

a. Sewer Service	Sun Valley GID
b. Electrical Service	NV Energy
c. Telephone Service	AT&T
d. LPG or Natural Gas Service	NV Energy
e. Solid Waste Disposal Service	Waste Management
f. Cable Television Service	Charter or AT&T
g. Water Service	Sun Valley GID

5. For common open space subdivisions (Article 408), please answer the following:

- a. Acreage of common open space:

4.26 Acres

- b. What development constraints are within the development and how many acres are designated slope, wetlands, faults, springs, and/or ridgelines:

2.67 Acres or 18.16% of the site has slopes exceeding 15%. No other development constraints. Note that the "Rural" area on the North Side of the site will be undisturbed. Note that most of the slopes exceeding 30% are due to prior disturbance from construction of Highland Ranch Parkway and the man made drainage channel.

- c. Range of lot sizes (include minimum and maximum lot size):

3,533 to 10,460 sq. ft in size.

d. Proposed yard setbacks if different from standard:

15' Front Yard to House but 20' to Garage with Min. 20' Driveway. 15' Rear Yards. The vast majority of Homes have 20' or greater Rear Yard Setbacks.

e. Justification for setback reduction or increase, if requested:

To allow rockery walls in rear yard to be part of the common area, maintained by HOA

f. Identify all proposed non-residential uses:

N/A

g. Improvements proposed for the common open space:

Mainly Open Space but Including a Pocket Neighborhood Park by Lot 50. A public trail system will be constructed along with open channel drainage feature, along the Klondike Drive ROW, up to and around the Rocky Knoll to the north, and with a connection to Highland Ranch Parkway.

h. Describe or show on the tentative map any public or private trail systems within common open space of the development:

See the attached Tentative Map and Preliminary Landscape Plan.

i. Describe the connectivity of the proposed trail system with existing trails or open space adjacent to or near the property:

The trail system will provide connectivity to Highland Village to the north, the adjacent common area to the west in the Stone Creek Subdivision, and Palmer Elementary School to the South.

j. If there are ridgelines on the property, how are they protected from development?

N/A

k. Will fencing be allowed on lot lines or restricted? If so, how?

Yes, rear yards will be fenced with a 6' tall wooden fence.

l. Identify the party responsible for maintenance of the common open space:

The Highland Village Phase 2 Homeowners Association.

6. Is the project adjacent to public lands or impacted by "Presumed Public Roads" as shown on the adopted April 27, 1999 Presumed Public Roads (see Washoe County Engineering website at <http://www.washoecounty.us/pubworks/engineering.htm>). If so, how is access to those features provided?

No

7. Is the parcel within the Truckee Meadows Service Area?

Yes No

8. Is the parcel within the Cooperative Planning Area as defined by the Regional Plan?

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	If yes, within what city?
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9. Has an archeological survey been reviewed and approved by SHPO on the property? If yes, what were the findings?

No, N/A.

10. Indicate the type and quantity of water rights the application has or proposes to have available: **None**

a. Permit #		acre-feet per year	
b. Certificate #		acre-feet per year	
c. Surface Claim #		acre-feet per year	
d. Other #		acre-feet per year	

a. Title of those rights (as filed with the State Engineer in the Division of Water Resources of the Department of Conservation and Natural Resources):

N/A

11. Describe the aspects of the tentative subdivision that contribute to energy conservation:

The grading and layout of the homes allows for significant solar orientation of the homes.

12. Is the subject property in an area identified by Planning and Building as potentially containing rare or endangered plants and/or animals, critical breeding habitat, migration routes or winter range? If so, please list the species and describe what mitigation measures will be taken to prevent adverse impacts to the species:

N/A

13. If private roads are proposed, will the community be gated? If so, is a public trail system easement provided through the subdivision?

Public streets are proposed that will comply with Washoe County roadway standards.

14. Are there any applicable policies of the adopted area plan in which the project is located that require compliance? If so, which policies and how does the project comply?

See the attached write up from the previous MPA and RZA Application.

15. Are there any applicable area plan modifiers in the Development Code in which the project is located that require compliance? If so, which modifiers and how does the project comply?

No

16. Will the project be completed in one phase or is phasing planned? If so, please provide that phasing plan:

A single phase is planned.

17. Is the project subject to Article 424, Hillside Development? If yes, please address all requirements of the Hillside Ordinance in a separate set of attachments and maps.

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	If yes, include a separate set of attachments and maps.
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18. Is the project subject to Article 418, Significant Hydrologic Resources? If yes, please address Special Review Considerations within Section 110.418.30 in a separate attachment.

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	If yes, include separate attachments.
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Grading

Please complete the following additional questions if the project anticipates grading that involves: (1) Disturbed area exceeding twenty-five thousand (25,000) square feet not covered by streets, buildings and landscaping; (2) More than one thousand (1,000) cubic yards of earth to be imported and placed as fill in a special flood hazard area; (3) More than five thousand (5,000) cubic yards of earth to be imported and placed as fill; (4) More than one thousand (1,000) cubic yards to be excavated, whether or not the earth will be exported from the property; or (5) If a permanent earthen structure will be established over four and one-half (4.5) feet high:

19. How many cubic yards of material are you proposing to excavate on site?

56,345 cu. yds. Cut and 60,973 cu. yds Fill, not including trench excavation.

20. How many cubic yards of material are you exporting or importing? If exporting of material is anticipated, where will the material be sent? If the disposal site is within unincorporated Washoe County, what measures will be taken for erosion control and revegetation at the site? If none, how are you balancing the work on-site?

The site will be balanced with no off-haul. Some structural fill material and top soil will be imported. The site was graded to achieve balance by using cut material from the north side to raise the southern most lots about 10' above 9th avenue.

21. Can the disturbed area be seen from off-site? If yes, from which directions, and which properties or roadways? What measures will be taken to mitigate their impacts?

The 3:1 fill slope along 9th avenue will be visible from Palmer Elementary School but the slope will be landscaped common area to minimize visual impacts.
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22. What is the slope (Horizontal/Vertical) of the cut and fill areas proposed to be? What methods will be used to prevent erosion until the revegetation is established?

With the exception of the 2:1 slope leading up towards the rocky knoll, all other slopes will be 3:1 or flatter. Using a 2:1 slope below the rocky knoll will allow compliance with the Sun Valley Area Plan.

23. Are you planning any berms and, if so, how tall is the berm at its highest? How will it be stabilized and/or revegetated?

No.

24. Are retaining walls going to be required? If so, how high will the walls be, will there be multiple walls with intervening terracing, and what is the wall construction (i.e. rockery, concrete, timber, manufactured block)? How will the visual impacts be mitigated?

Yes, see grading plan and summary information. Rockery walls planned for the site with a maximum height of 10'.

25. Will the grading proposed require removal of any trees? If so, what species, how many, and of what size?

N/A, Minimal Vegetation exists on site, mainly upland with a scattering of smaller scrub juniper trees.

26. What type of revegetation seed mix are you planning to use and how many pounds per acre do you intend to broadcast? Will you use mulch and, if so, what type?

See the preliminary Landscape Plans for detail on revegetation and the seed mix planned for the site.

27. How are you providing temporary irrigation to the disturbed area?

No temporary irrigation is planned to avoid erosion issues. A proper seed mix and planting techniques will be used along with fall planting to take advantage of winter moisture to facilitate seed germination and rooting.

28. Have you reviewed the revegetation plan with the Washoe Storey Conservation District? If yes, have you incorporated their suggestions?

No. Our team has substantial experience with revegetation in the Washoe County area.

TENTATIVE MAP FINDINGS

Section 110.608.25 Findings. Prior to approving an application for a tentative map, the Planning Commission shall find that all of the following are true:

(a) Plan Consistency. That the proposed map is consistent with the Master Plan and any specific plan;

RESPONSE – This Tentative Map is consistent with the plan shown in the recently Approved Master Plan Amendment Application and thus consistent with the Master Plan including the Sun Valley area Plan.

(b) Design or Improvement. That the design or improvement of the proposed subdivision is consistent with the Master Plan and any specific plan;

RESPONSE – This Tentative Map and the subdivision design is consistent with the plan shown in the recently Approved Master Plan Amendment Application and thus consistent with the Master Plan including the Sun Valley area Plan.

(c) Type of Development. That the site is physically suited for the type of development proposed;

RESPONSE – This project is ideally situated on the property and preserves the rocky knoll with a planned public trail to allow Washoe County citizens to enjoy the spectacular view that the rocky knoll affords. Superior connectivity is provided to existing development with safe and convenient access to Palmer Elementary school for the families that are expected to live in the new homes.

(d) Availability of Services. That the subdivision will meet the requirements of Article 702, Adequate Public Facilities Management System;

RESPONSE – Per the following table, this project has adequate access to the Public Facilities Management System.

13. Community Services (provided and nearest facility):

a. Fire Station	2 miles to Truckee Meadows Fire Station #45 on Sun Valley Blvd. 3 min. drive.
b. Health Care Facility	3.5 miles to St. Mary's and Renown Urgent Care on Los Altos.
c. Elementary School	Adjacent to Palmer Elementary School , 5 minute walk.
d. Middle School	1.2 miles to Desert Sky Middle School, 25 minute walk.
e. High School	6.2 miles to the new Wildcreek High School Under Construction
f. Parks	0.4 Miles to Highland Ranch Park, 10 minute walk.
g. Library	5.4 miles to the TMCC Library.
h. Citifare Bus Stop	0.6 miles to Route 5 Bus stop on Donatello Drive, 12 minute walk.

(e) Fish or Wildlife. That neither the design of the subdivision nor any proposed improvements are likely to cause substantial environmental damage, or substantial and avoidable injury to any endangered plant, wildlife or their habitat;

RESPONSE – No endangered plant, wildlife or associated habitat exists on this site. 3.68 acres is now being preserved at and surrounding the Rocky Knoll, which will now be accessible to the public via a planned trail system.

(f) Public Health. That the design of the subdivision or type of improvement is not likely to cause significant public health problems;

RESPONSE – There are no Public Health Issues associated with this project. A Phase 1 Environmental Study was completed and no additional follow up work or testing was recommended by the author.

“Upon conclusion of our Phase I ESA, and based on the information reviewed, this assessment has revealed no evidence of recognized environmental conditions or controlled recognized environmental conditions in connection with the Subject Property. Based on the information reviewed for this assessment, McGinley is of the opinion that additional environmental investigations at the Subject Property are not warranted at this time.”

(g) Easements. That the design of the subdivision or the type of improvements will not conflict with easements acquired by the public at large for access through, or use of property within, the proposed subdivision;

RESPONSE – There are no easements affected by this project and although Klondike Drive will be abandoned prior to final map approval, a pedestrian trail will be provided to provide connectivity between 9th Avenue, Palmer Elementary School and Highland Ranch Parkway. The Klondike right-of-way does not meet minimum county requirements for street grades or intersection sight distance so abandonment will not be detrimental to the traveling public.

(h) Access. That the design of the subdivision provides any necessary access to surrounding, adjacent lands and provides appropriate secondary access for emergency vehicles;

RESPONSE – Per the attached traffic study, the proposed three leg intersection will provide safe and adequate access and the emergency/pedestrian only access to 9th avenue/Palmer Elementary School further supports this finding.

(i) Dedications. That any land or improvements to be dedicated to the County is consistent with the Master Plan; and

RESPONSE – The local streets that are proposed to be dedicated to Washoe County as Public Roadways will comply with all applicable county standards and be in compliance with the Master Plan

(j) Energy. That the design of the subdivision provides, to the extent feasible, for future passive or natural heating or cooling opportunities in the subdivision.

RESPONSE – The grading and layout of the site will allow for significant solar heating of the vast majority of homes on the site.

Community Services Department
Planning and Building
VARIANCE APPLICATION



Community Services Department
Planning and Building
1001 E. Ninth St., Bldg. A
Reno, NV 89512-2845

Telephone: 775.328.6100

**HIGHLAND VILLAGE PHASE 2
COMMON OPEN SPACE DEVELOPMENT**

Variance Application Supplemental Information

(All required information may be separately attached)

1. What provisions of the Development Code (e.g. front yard setback, height, etc.) must be waived or varied to permit your request?

Section 110.438.45 Grading of Slopes. (a) Grading shall not result in slopes in excess of, or steeper than, three horizontal to one vertical (3:1)

You must answer the following questions in detail. Failure to provide complete and accurate information will result in denial of the application. See attached project summary for more detailed information.

2. What are the topographic conditions, extraordinary or exceptional circumstances, shape of the property or location of surroundings that are unique to your property and, therefore, prevent you from complying with the Development Code requirements?

To comply with the Sun Valley Area Plan, Policy SUN.4.2, "Hillside development shall disturb the minimum area required for construction and conserve steep slopes in their natural state."

3. What steps will be taken to prevent substantial negative impacts (e.g. blocking views, reducing privacy, decreasing pedestrian or traffic safety, etc.) to other properties or uses in the area?

No impacts. Homes will hide the view of the 2:1 slopes and a new trail system will be constructed off site to provide public access to the top of the Rocky Knoll to the north.

4. How will this variance enhance the scenic or environmental character of the neighborhood (e.g. eliminate encroachment onto slopes or wetlands, provide enclosed parking, eliminate clutter in view of neighbors, etc.)?

The 2:1 slope will allow compliance with the Sun Valley Area Plan, Reduce Grading Quantities, and Retain a Greater portion of the Rocky Knoll located to the north of the 2:1 slope.

5. What enjoyment or use of your property would be denied to you that is common to other properties in your neighborhood?

The ability to preserve land for open space for both homeowners and the general public, which is much desired in the Sun Valley area. A public trail will provide said access.

6. Are there any restrictive covenants, recorded conditions or deed restrictions (CC&Rs) that apply to the area subject to the variance request?

Yes No If yes, please attach a copy.

7. How is your current water provided?

Water service will be provided by Sun Valley General Improvement District

8. How is your current sewer provided?

Sewer service will be provided by Sun Valley General Improvement District

VARIANCE FINDINGS

Section 110.804.25 Findings. Prior to approving an application for a variance, the Board of Adjustment, the Planning Commission or hearing examiner shall find that findings (a) through (d) apply to the property and, if a military installation is required to be noticed, finding (e):

(a) Special Circumstances. Because of the special circumstances applicable to the property, including either the:

(1) Exceptional narrowness, shallowness or shape of the specific piece of property, or

(2) By reason of exceptional topographic conditions, or

(3) Other extraordinary and exceptional situation or condition of the property and/or location of surroundings, the strict application of the regulation results in exceptional and undue hardships upon the owner of the property;

RESPONSE – The Rocky Knoll and all land to the north was recently placed in a Rural Land Use Designation as this is an Important Topographical Feature and worth preserving. The original Land Use for the site prior to the Master Plan Amendment had only 1.676 acres of Rural Land Use area that did not preserve the rocky knoll. With the recent Approval of a Master Plan amendment, there is now 3.68 acres of Rural Land Use and the rocky knoll will be preserved. In order to now minimize the amount of grading leading up to the Rocky Knoll and comply with the Sun Valley Area Plan, Policy 4.2 – “Hillside development shall disturb the minimum area required for construction and conserve steep slopes in their natural state,” a 2:1 slope is required. Note that rockery walls will be used to step up this section of hillside to further reduce grading impacts and two-story homes will largely screen this area from public view. The 2:1 slope will pull the top of slope further away from the Rocky Knoll in compliance with SUN 4.2. Note that a planned public trail system will allow public access to the top of the rocky knoll for Washoe County citizens to enjoy the spectacular views afforded. The EXHIBIT on the following page graphically shows the impact of the 2:1 slope in relationship to previous and current land use designations. Finally, per the included Geotechnical report, soil conditions are well suited for a 2:1 slope in this area.

(b) No Detriment. The relief will not create a substantial detriment to the public good, substantially impair affected natural resources or impair the intent and purpose of the Development Code or applicable policies under which the variance is granted;

RESPONSE – Granting of the Variance will allow compliance with SUN 4.2 and not cause negative impairments.

(c) No Special Privileges. The granting of the variance will not constitute a grant of special privileges inconsistent with the limitations upon other properties in the vicinity and the identical regulatory zone in which the property is situated; and

RESPONSE – Granting of the Variance does not grant special privileges and the fact that the Landowner on his own increased the amount of rural land area from 1.676 acres to 3.68 acres was in fact a burden on the landowner to the benefit of the public.

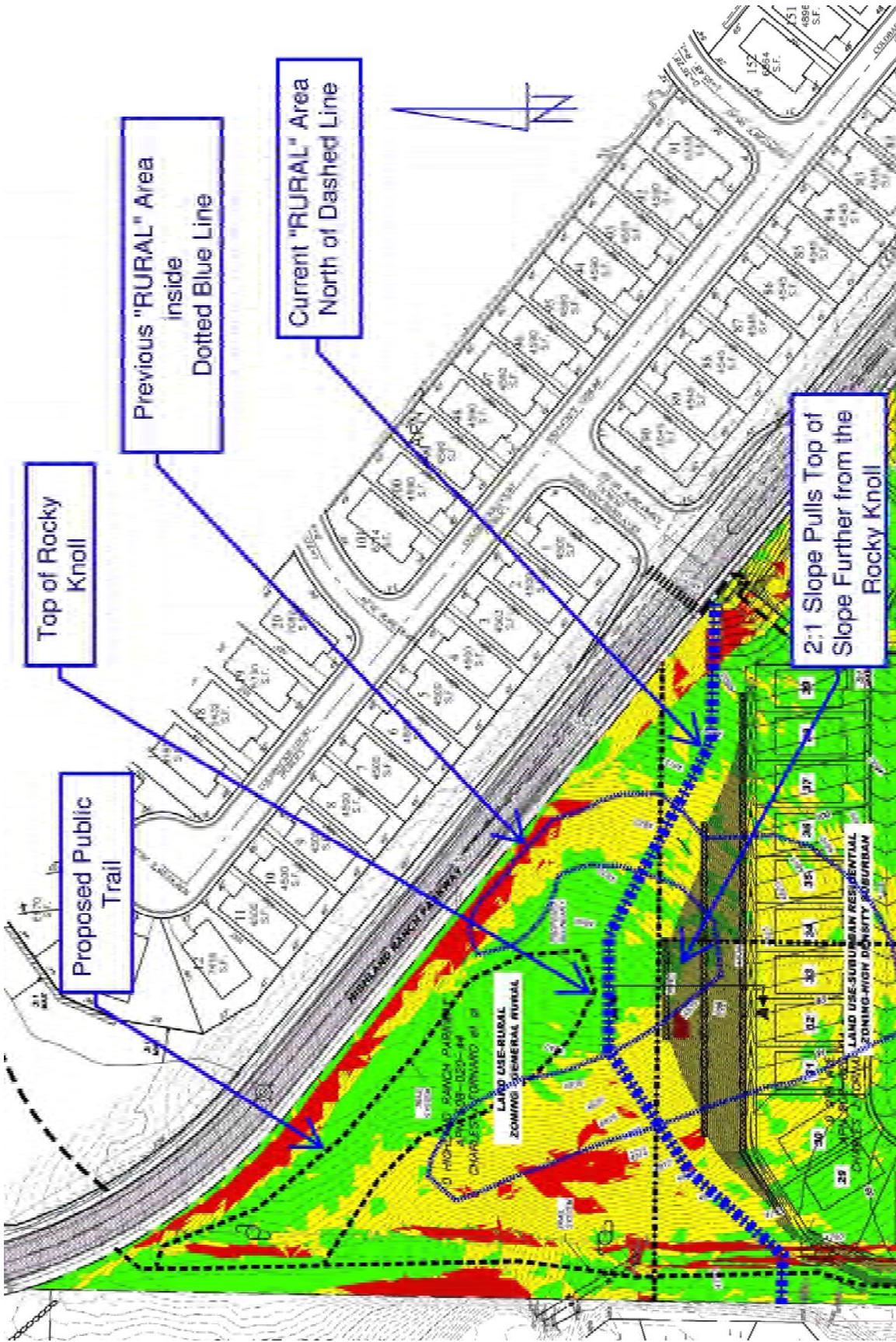
(d) Use Authorized. The variance will not authorize a use or activity which is not otherwise expressly authorized by the regulation governing the parcel of property.

RESPONSE – Granting of the Variance will allow a residential use authorized under the regulations governing the property.

(e) Effect on a Military Installation. The variance will not have a detrimental effect on the location, purpose and mission of the military installation.

RESPONSE – There is no Military Installation anywhere near the site.

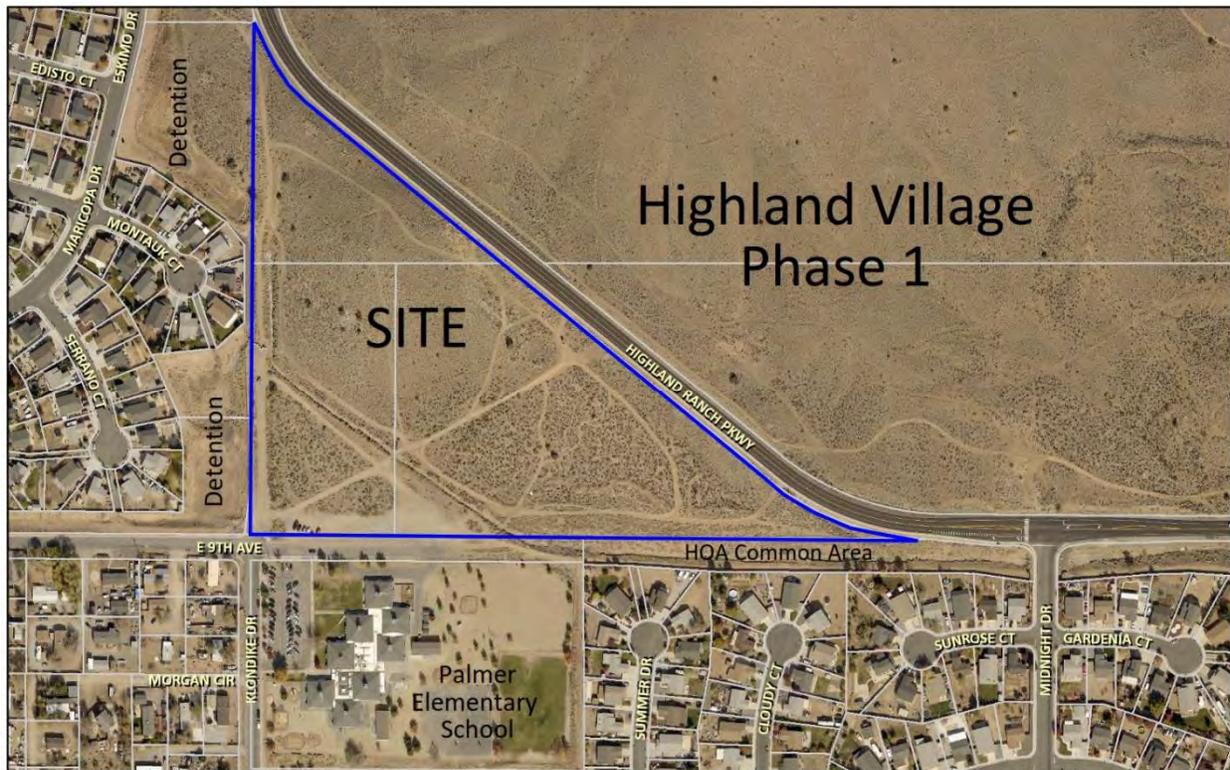
The EXHIBIT referenced in (a) above is on the following page.



Opportunities and Constraints Analysis

Section 110.408.30 Site Analysis to Determine Common Open Space and Lot Size Variations. A site analysis showing development opportunities and constraints shall be prepared as a key consideration, along with the project design objectives, to determine the total area covered by lots and roads, lot areas, and the total area to be designated as common open space. The site analysis shall include information and maps, including a site opportunities and constraints map, describing all significant physical and contextual features or factors which may affect the development of the property. The elements of the site analysis shall include, as a minimum, the following information:

- (a) Location Map. A general location map providing the context of location and vicinity of the site.
RESPONSE – See Below



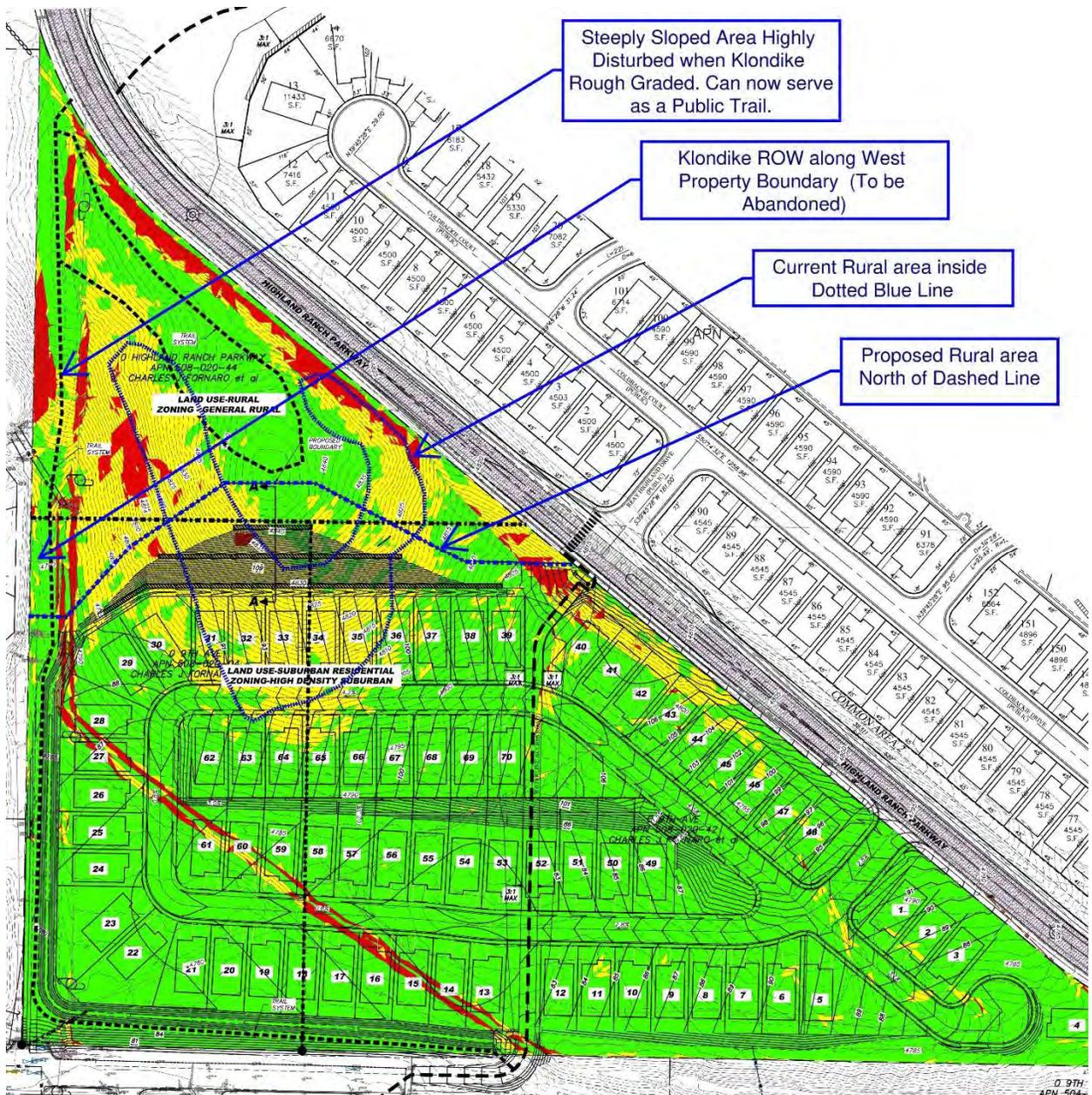
LOCATION MAP

- (b) Land Use. Current and planned land use on the site and adjacent current, planned and approved, but unbuilt land uses. **RESPONSE – A recent Master Plan Amendment added additional Rural Area to the site to better reflect the topography. There was previously 1.68 acres of Rural Area that more closely followed slopes between 15% and 30% rather than slopes exceeding 30% and the Rocky Knoll on the north side of the project was left in a Suburban Residential Zone. Upon approval of the Master Plan Amendment, there is now 3.68 acres of Rural Area more closely aligned with steep slopes and protecting the Rocky Knoll and surrounding areas to the west, north, and east. A proposed public trail system will allow Washoe County citizens to enjoy the**

spectacular views from atop the rocky knoll in perpetuity. A Regulatory Zone Amendment was also approved that changed the General Rural area in the same fashion and location from the previous 1.68 acres to the current 3.68 acres. The Low Density Suburban Area was changed to High Density Suburban, compatible with Highland Village to the northeast and buffered from adjoining Medium Density Suburban areas with Open Space Areas and the Rural Area on this site. The following exhibits show the previous zoning for the site and the new Land Use/Zoning configurations that demonstrate positive impacts of the proposed project.



SURROUNDING ZONING



LAND USE EXHIBIT FROM THE MPA

(c) Existing Structures. A description of the location, physical characteristics, condition and proposed use of any existing structures. **RESPONSE – There are no structures on the site.**

(d) Existing Vegetation. A description of existing vegetation, including limits of coverage, and major tree sizes and types. In the instance of heavily wooded sites, typical tree sizes, types and limits of tree coverage may be substituted. **RESPONSE – The site is characterized as Chaparral Shrubland with a few Cypress Trees. The Trees were noted as Insignificant.**

(e) Prevailing Winds. An analysis of prevailing winds. **RESPONSE – Prevailing winds are from the West. The site will be buffered from North Winds by the fact that the rocky knoll will be left in place and homes below in cut and below the top of the rocky knoll.**

(f) Topography. An analysis of slopes on the site using a contour interval of five (5) feet, or at a contour interval appropriate for the site and agreed to by the Director of Community Development. **RESPONSE – See Sheet C-4 of the Tentative Map, Grading Plan, with one foot contour intervals.**

(g) Soil. An analysis of the soil characteristics of the site using Soil Conservation Service (SCS) information. **RESPONSE – See page 5. Of the Geotechnical Report, Section III. Subsurface soils and Groundwater conditions, A. Soils.**

(h) Natural Drainageways. Identification of natural drainageways on and adjacent to the site. **RESPONSE – There is a man-made drainage ditch on the site that runs from the middle of the west side of the site and runs southeast towards the end of 9th Avenue. This ditch will be relocated with development. No natural drainage ways exist on the site.**

(i) Wetlands and Water Bodies. Identification of existing or potential wetlands and water bodies on the site. **RESPONSE – N/A**

(j) Flood Hazards. Identification of existing and potential flood hazards using Federal Emergency Management Agency (FEMA) information. **RESPONSE – N/A, the site lies in an unshaded Zone X, outside the 100 year and 500-year FEMA flood zones.**

(k) Seismic Hazards. Identification of seismic hazards on or near the site, including location of any Holocene faults. **RESPONSE – N/A, See page 7. Of the Geotechnical Report, Section B. Faulting.**

(l) Avalanche Hazards. An analysis of avalanche and other landslide hazards. **RESPONSE – N/A**

(m) Sensitive Habitat and Migration Routes. An analysis of sensitive habitat areas and migration routes. **RESPONSE – N/A**

(n) Significant Views. A description and analysis of all on and off-site significant views. **RESPONSE – There are spectacular views from atop the Rocky Knoll that will be forever preserved due to the previous MPA and RZA along with the proposed public trail system.**

(o) Easements. A description of the type and location of any easements on the site. **RESPONSE – See Sheet C-2 of the Tentative Map, Site Plan.**

(p) Utilities. A description of existing or available utilities, and an analysis of appropriate locations for water, power, sanitary sewer and storm water sewer facilities. **RESPONSE – See Sheet C-7 of the Tentative Map, Utility Plan. The full range of utilities are available adjacent to the site to serve the project. A discovery has already been completed with the Sun Valley GID.**

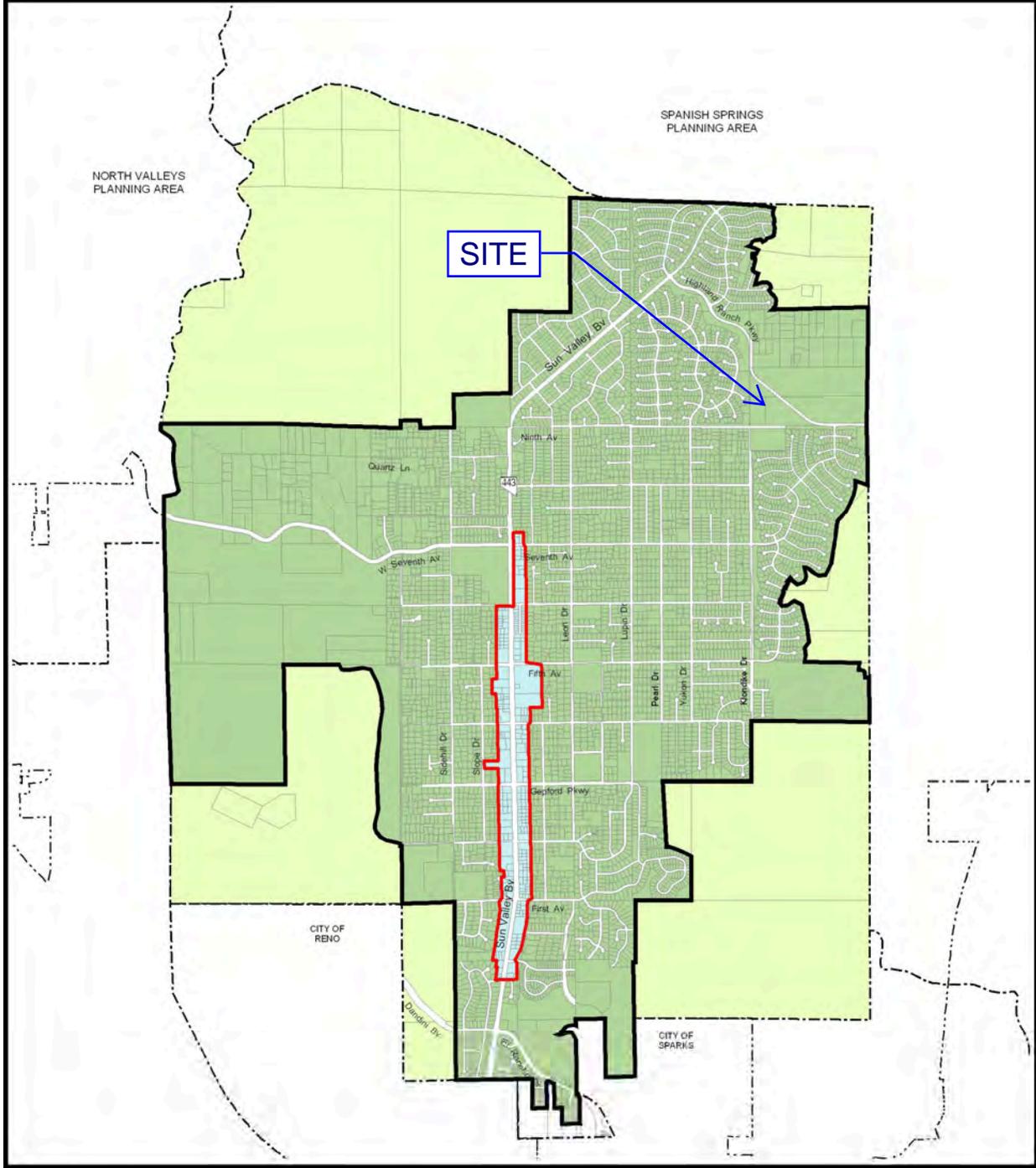
(q) Appropriate Access Points. An analysis of appropriate access points based upon existing and proposed streets and highways and site opportunities and constraints. **RESPONSE – See the attached traffic study. The “T” intersection and proposed emergency access/pedestrian access will provide safe and adequate access to the site.**

(r) Other Information. All other information deemed appropriate and necessary by the Director of Community Development. ***RESPONSE – The project as proposed complies with all aspects of the Washoe County Master Plan, Sun Valley area Plan and Washoe county Development Code. See the attached Opportunities and Constraints Map.***



Master Plan

Sun Valley Area Plan



SUN VALLEY CHARACTER MANAGEMENT PLAN

- SUBURBAN CHARACTER MANAGEMENT AREA
- RURAL CHARACTER MANAGEMENT AREA
- DOWNTOWN CHARACTER MANAGEMENT AREA
- DESIGN GUIDELINES APPENDIX A (SUN VALLEY AREA PLAN)

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**Department of
Community Development**

**WASHOE COUNTY
NEVADA**

Introduction

The Sun Valley Area Plan responds to a citizen-based desire to identify, enhance and implement the community character of Sun Valley and to successfully manage the social, economic and environmental health and sustainability of the community.

Upon recommendation of the Washoe County Planning Commission, the Washoe County Board of County Commissioners directed the Department of Community Development to conduct a communitywide public workshop to identify the distinguishing characteristics of the Sun Valley community. The Sun Valley Citizens Advisory Board appointed an "Area Plan Update Subcommittee" that met regularly and assisted staff and other interested residents and stakeholders in developing a draft plan.

The result of the workshop and subcommittee meetings has been the development of a comprehensive vision for the Sun Valley community that identifies an existing and desired community character. The Sun Valley Area Plan implements and preserves this community vision and character.

Through cooperation with the Washoe County Board of County Commissioners and the Washoe County Planning Commission, the Sun Valley community will maintain and apply objective standards and criteria that serve to manage growth and development in Sun Valley in a manner that:

- Respects the desire of the Sun Valley community to be a safe place to live, work, recreate, raise a family and retire;
- Respects private property rights;
- Promotes mixed-use development along a designated portion of Sun Valley Boulevard;
- Provides a range of low, medium and high density housing opportunities;
- Provides open space and recreational opportunities;
- Provides local services and employment opportunities; and
- Ensures that growth is kept in balance with resources and infrastructure.

Vision

Manage growth and its associated impacts in Sun Valley, focusing on preserving the surrounding public lands and upgrading the quality of the built environment while respecting private property rights. No public lands are impacted. Significant undeveloped land and addition of public trails ensure that the proposed amendments are in line with the Vision Statement.

Character Statement

The Sun Valley community is located in a geographically separated valley, between the City of Sparks on the east and the City of Reno on the west. Over time, the community has evolved from a primarily affordable place to live to a diverse community with a growing sense of civic pride. Over the next 20 years, the community will provide additional employment opportunities, connected with local serving office, commercial and tourist commercial businesses, and a mixed range of residential opportunities. Over this period, the distribution of land uses and the provision of public facilities and infrastructure will enhance and facilitate a community character that focuses on Sun Valley being a safe and healthy place to live, raise a family, work, run a business, recreate and retire. The community expresses a strong desire to manage growth levels and traffic patterns so that traffic congestion and related air quality do not reach undesirable levels. The community supports mixed-use development adjacent to Sun Valley Boulevard that will improve the appearance of existing and future commercial development and also provide for concentrating multi-family residential on this major arterial. The community would also like to achieve an upgrade of public infrastructure, such as curb and gutter, to existing Development

An increase in the Rural land use area from 1.676 acres to 3.68 acres, addition of a single "T" intersection that allows a Level of Service "C" to be maintained on Highland Ranch Parkway, and addition of upgraded public infrastructure ensure compliance with the Character Statement.

Code standards. Sun Valley's community identity is growing in strength and its residents are concerned that the future growth in Sun Valley be sustainable. Important factors of a sustainable Sun Valley include clean water to drink and clean air to breath, pedestrian safety, an adequate public transit system, manageable traffic, accessible public services, open space, trails, good elementary, middle and high schools and affordable housing. A 12 minute walk to public transit, meeting LOS "C" standards, addition of public trails, & housing that area citizens can afford ensure compliance with the Character Statement.

The existing and desired land use pattern in the Sun Valley planning area is comprised of a suburban core that includes a mix of residential densities, the majority being at three dwelling units per acre, with higher densities along Sun Valley Boulevard and north of El Rancho Drive. These suburban land uses are located throughout the central portion of the valley. The desired land use pattern includes a mixed-use district that will be concentrated along both sides of Sun Valley Boulevard from approximately Rampion Way in the south to 7th Avenue in the north. This area is referred to as the Downtown Character Management Area (DCMA) and will provide opportunities for property owners to develop utilizing a mixed use of office, commercial and multi-family residential land uses within the same structure. Future commercial developments will be aimed at providing services and employment opportunities to the local community and not the greater region. Grocery stores excepted, single retailer establishments larger than 50,000 square feet are not seen as being a part of the local community character. A small industrial area will continue to function north of 7th Avenue along Stella Drive, with no plans for expansion of the existing industrial land use designation. Immediately adjacent to the suburban core, on the edges of the valley, are a few dispersed transition areas that are predominantly residential densities at one unit per acre that are not connected to community sewer or water. The area outside the suburban core and transition areas is predominately of a rural character and comprised of some private property with the General Rural land use designation, public lands with the Open Space land use designation and some Parks and Recreation land use.

The majority of Sun Valley will be known as the Suburban Character Management Area (SCMA). This area will contain residential densities of one unit per acre or greater. Both sides of Sun Valley Boulevard from approximately Rampion Way in the south to 7th Avenue in the north will be known as the Downtown Character Management Area (DCMA). This area will provide development and redevelopment opportunities for a mix of multi-family residential, office, commercial and tourist commercial land uses. The SCMA and the DCMA will be the designated growth areas in Sun Valley. The area outside the SCMA will be known as the Rural Character Management Area (RCMA). The land use designations for private property in this area will remain unchanged. The RCMA will be predominantly an area for the preservation of the community's open space. Residential densities on private lands in the RCMA will remain at one dwelling unit per forty acres. The project lies in the SCMA and will allow for residential densities > 1 acre.

Open vistas of the surrounding ridges and the public lands managed by the Bureau of Land Management and Washoe County are an important identifying characteristic of the Sun Valley planning area. Retaining these lands as Open Space and continued access to these lands is paramount to the valley's character. The existing open space contributes significantly to a community desire to develop and maintain an integrated non-motorized trail system that provides access to regional trails and public lands. Community support exists for connecting existing trails, along with new ones, in order to develop a Sun Valley Rim Trail.

Vision and Character Management

Land Use

Goal One: The pattern of land use designations in the Sun Valley Area Plan will implement and preserve the community character described in the Character Statement.

Policies

- SUN.1.1 The Sun Valley Character Management Plan map (CMP) shall identify the Sun Valley Suburban Character Management Area (SCMA), the Downtown Character Management Area (DCMA) and the Sun Valley Rural Character Management Area (RCMA).
- SUN.1.2 To promote “mixed-use” development and redevelopment along Sun Valley Boulevard, the following density bonus is available within the specified boundaries of the Sun Valley Downtown Character Management Area (DCMA).
- a. All General Commercial and Neighborhood Commercial/Office properties are afforded the opportunity to add a residential component of Low Density Urban, if incorporated into a mixed-use development that meets the DCMA design standards.
- SUN.1.3 **The following Regulatory Zones are permitted within the Sun Valley Suburban Character Management Area:**
- a. High Density Rural (HDR – One unit per 2.5 acres).
 - b. Low Density Suburban (LDS – One unit per acre).
 - c. Medium Density Suburban (MDS – Three units per acre).
 - d. **High Density Suburban (HDS – Seven units per acre).** Proposed
 - e. Medium Density Urban (MDU – Twenty-one units per acre).
 - f. Neighborhood Commercial/Office (NC).
 - g. General Commercial (GC).
 - h. Industrial (I).
 - i. Public/Semi-Public Facilities (PSP).
 - j. Parks and Recreation (PR).
 - k. **General Rural (GR).** Proposed
 - l. Open Space (OS).
- SUN.1.4 The following Regulatory Zones are permitted within the Sun Valley Downtown Character Management Area:
- a. High Density Suburban (HDS – Seven units per acre).
 - b. Low Density Urban (LDU – Fourteen units per acre).
 - c. Neighborhood Commercial/Office (NC).
 - d. General Commercial (GC).
 - e. Tourist Commercial (TC).
 - f. Public/Semi-Public Facilities (PSP).
 - g. Parks and Recreation (PR).

- SUN.1.5 The following Regulatory Zones are permitted within the Sun Valley Rural Character Management Area:
- General Rural (GR – One unit per 40 acres).
 - Public/Semi-Public Facilities (PSP).
 - Parks and Recreation (PR).
 - Open Space (OS).
- SUN.1.6 Staff will review any proposed Master Plan Amendment against the findings, criteria and thresholds identified in the Plan Maintenance section of this plan and make a recommendation to the Planning Commission. At a minimum, the Planning Commission must make each of the findings in order to recommend approval of the amendment to the Board of County Commissioners.
- SUN.1.7 Tentative subdivision maps will not be approved for any development until the impacts of that development have been included in the Sun Valley General Improvement District's water resources facilities plan. This will be achieved. We are in contact with the Sun Valley GID to complete a discovery.
- SUN.1.8 The Washoe County Planning Commission will review any application to expand the Suburban Character Management Area into the Rural Character Management Area against the findings, criteria and thresholds in the Plan Maintenance section of this plan. At a minimum, the Planning Commission must make each of the applicable findings in order to recommend approval of the amendment to the Board of County Commissioners.
- SUN.1.9 New or redeveloped commercial and office development will be constructed to front (main entrance) on Sun Valley Boulevard. Buildings that have no other option than to front on a side street will have the same or similar architectural features on the side and rear of building that faces Sun Valley Boulevard.
- SUN.1.10 The Washoe County Capital Improvements Program shall identify needed sidewalk and open drainage structure improvements (location, costs and funding) based on a study conducted by the County and the Sun Valley General Improvement District.
- SUN.1.11 Washoe County will work to ensure that the long range plans of facilities providers for transportation, water resources, schools and parks reflect the goals and policies of the Sun Valley Area Plan.
- SUN.1.12 Prior to any approval of proposed land use intensification that will result in existing school facilities exceeding design capacity and which may compromise the Washoe County School District's ability to implement the neighborhood school philosophy for elementary facilities, the school district will identify improvements in their capital improvements plan or school rezoning plan that will enable the District to absorb the additional enrollment. The Washoe County Planning Commission, upon request of the Washoe County School District Board of Trustees, may waive this finding.
This project will have a minimal impact on school enrollments.

Transportation

Goal Two: The regional and local transportation system in the Sun Valley planning area will be a safe, efficient, multi-modal system providing significant connections to the greater region, and access to commercial services, public lands and public services available in the community. The system will contribute to the preservation and implementation of the community character as described in the Sun Valley Vision and Character Statement.

Policies

- SUN.2.1 Level of service “C” or above is the desired level for all regional roads in the Sun Valley planning area.
- SUN.2.2 The Regional Transportation Commission is urged to fund and construct, at the earliest possible opportunity, the construction of the Sun Valley Arterial with a grade-separated interchange at 7th Avenue. Sun Valley Boulevard shall not be extended north to connect to the Spanish Springs area until the arterial is constructed.
- SUN.2.3 New construction or redevelopment of commercial properties along Sun Valley Boulevard shall combine vehicle entrances with adjacent properties to provide combined parking and landscaping. If contiguous commercial properties are not developed at the same time, then the vehicle access point to Sun Valley Boulevard will be located close to the property line between adjacent parcels.
- SUN.2.4 Remaining right-of-way along Sun Valley Boulevard should be utilized to establish an “edge” that includes covered ditches, public transit improvements, bike/pedestrian paths and landscaping.
- SUN.2.5 The number of traffic signals on Sun Valley Boulevard shall be kept to the minimum number required to provide for safe and efficient traffic flow.
- SUN.2.6 **The Washoe County Department of Public Works shall initiate a study and subsequent action program aimed at improving traffic flow from residential streets onto collectors and arterials, to include consideration of “cut-through” traffic issues.** [This issue is being addressed with Highland Village Phase 1.](#)
- SUN.2.7 The Nevada Department of Transportation, Regional Transportation Commission and Washoe County shall jointly seek funding to construct sidewalks or paved paths along both sides of Sun Valley Boulevard and main streets such as: 4th, 5th, 6th and 7th Avenues when the safety of pedestrians and children walking to and from schools requires such facilities.
- SUN.2.8 Washoe County will include in their Capital Improvements Program the improvement and paving of dirt roads under their jurisdiction.
- SUN.2.9 The owners of private roads or driveways are required to adequately sign them to allow for better emergency response.
- SUN.2.10 The Nevada Department of Transportation, Regional Transportation Commission, Sun Valley General Improvement District and Washoe County shall continue to work with the local community to implement traffic/pedestrian safety improvements within Sun Valley.
- SUN.2.11 Needed infrastructure improvements to streets and drainage ditches that are required for improved pedestrian safety, transit stops and expanded bus service within the entire valley, shall be included in the Washoe County Capital Improvements Program following the completion of a joint study between the Washoe County Public Works Department and the Regional Transportation Commission.
- SUN.2.12 Weed abatement along Sun Valley roadways with open ditches shall occur annually.
- SUN.2.13 The Regional Transportation Commission is urged to locate a multi-modal transit stop (parking, bike racks, shelters, concessions) on Sun Valley Boulevard.
- SUN.2.14 The necessary right-of-way and intersection requirements for future roadways identified in the Regional Transportation Commission Transportation Plan will be protected through dedication, setback or other method deemed adequate and appropriate by the Regional Transportation Commission and Washoe County.

- SUN.2.15 Washoe County will advocate for the expansion of transit services to and within the Sun Valley planning area pursuant to the Regional Transportation Commissions updated 2030 Plan.
- SUN.2.16 Improvements listed in the Regional Transportation Commission's Sun Valley Bikeway Plan shall be incorporated into the Washoe County Capital Improvements Program. The bikeway plan will be integrated with the local and regional trails system and provide access to commercial and public services (See Recreational Opportunities Plan map).
- SUN.2.17 The Department of Community Development will provide an annual status report to the Planning Commission regarding the implementation of all transportation related policies in this plan.

Scenic/Recreational/Cultural Resources

Goal Three: Maintain the natural, scenic and recreational values of the public lands surrounding Sun Valley.

Policies

- SUN.3.1 Retain all public lands within and adjacent to the Sun Valley Area Plan boundaries. In the event that public land does become private property, that land would automatically be included in the Sun Valley SCMA.
- SUN.3.2 The planning of all future roadways, subdivisions or other development will maintain adequate access (vehicular and/or pedestrian) to surrounding public land. Existing and/or needed public access easements will be depicted on all development applications and on the initial right-of-way design for new roadways.
- SUN.3.3 Washoe County and Sun Valley residents shall work with the Bureau of Land Management to develop and implement an appropriate plan for the education, management and enforcement of off-highway vehicle (OHV) use on surrounding public lands.
- SUN.3.4 Unneeded dirt roads and other disturbed areas on the public lands surrounding Sun Valley should be obliterated and revegetated by the appropriate land management agency. An abandonment application will be filed for Klondike Drive. The road is not needed, grades would far exceed code, and sight distance cannot be met.
- SUN.3.5 The Washoe County Sheriff's Office shall cooperate with the Bureau of Land Management to increase education and enforcement efforts in order to reduce the incidents of illegal shooting and dumping on public and private lands in Sun Valley.
- SUN.3.6 The Washoe County Department of Regional Parks and Open Space will continue to work with all interested organizations and individuals to reduce illegal dumping and other resource damage to Red Hill and take appropriate steps to eliminate off-highway vehicle use on Red Hill.

Goal Four: Maintain open vistas of the surrounding ridges and hills and minimize the visual impact of hillside development.

Policies

- SUN.4.1 Washoe County will require the underground placement of new electrical power transmission lines within the Suburban Character Management Area and the Downtown Character Management Area. In considering whether to grant the required special use permit for transmission lines or in consideration of any conditions including underground placement which may be placed upon an approval, the Planning Commission will utilize the best available information. This will be achieved including the overhead line along the portion of Klondike Drive to be abandoned.

including, but not limited to, the most recent Regional Utility Corridor Report and any Environmental Impact Statement or other study undertaken regarding the proposal. Underground placement of public utilities in general, including electrical power distribution lines, is dictated by Section 110.604.30 of the Washoe County Development Code.

- SUN.4.2 Hillside development shall disturb the minimum area required for construction and conserve steep slopes in their natural state. A 2:1 slope will be proposed on the north edge of the site to minimize the impacts to the rocky knoll.
- SUN.4.3 Significant ridgelines in the Sun Valley planning area are to be protected from future development.
- SUN.4.4 Structures shall be located to eliminate or minimize silhouettes against the skyline.
- SUN.4.5 Disturbed areas shall be finished and fill slopes will not exceed a 3:1 slope; hillside grading will establish an undulating naturalistic appearance by creating varying curvilinear contours. No fill slope will exceed 3:1.
- SUN.4.6 Soils disturbed through the development process shall be revegetated no later than the next spring and, during the winter, shall be treated to prevent the blowing of soil from the site by wind or the movement of soil by precipitation. Drought tolerant/fire resistant plant species should be used where appropriate (refer to the "Recommended Plant List" in Appendix A). Disturbed soils will be revegetated along with the disturbed portion of Klondike Drive to be abandoned.

Goal Five: The Sun Valley planning area will contain a system of parks and trails that provides the community and the region with a broad range of recreational opportunities; provides connections between major developments, recreational facilities, the regional trail system, public lands and schools; and contributes to the enhancement and implementation of the community character.

Policies

- SUN.5.1 Updates to the Parks District Master Plan for the Sun Valley planning area (District 2D) will look to Goal Five for direction. The Parks District 2D Master Plan will seek to enhance and implement the community character.
- SUN.5.2 The Washoe County Department of Regional Parks and Open Space shall support and schedule the construction of a multi-purpose trail system within the valley (see Recreational Opportunities Plan map). The ultimate goal is the connection of existing and new trails required to complete a Sun Valley Rim Trail.
- SUN.5.3 New trails will be designed to accommodate equestrian, pedestrian and mountain bike traffic, unless technical or severe economic hardships warrant consideration of a more limited use. A trail system is proposed that will access the top of the rocky knoll that has tremendous views of the Truckee Meadows.
- SUN.5.4 Parking will be provided at all trailheads unless technical or safety issues prevent the construction of parking facilities.
- SUN.5.5 Washoe County will work collaboratively with the Cities of Sparks and Reno to determine appropriate trail alignments and connections between unincorporated Washoe County and properties within the cities corporate limits and the spheres of influence.
- SUN.5.6 Access to existing and future trails will be protected and improved whenever possible. During the process of development review, the Washoe County Department of Community Development and Washoe County Department of Regional Parks and Open Space will request dedication of property and/or easements when appropriate trail alignments have been identified that link significant nodes within the Sun Valley planning area or connect existing or planned trails.

Water Resources – Wastewater

Goal Twelve: Wastewater treatment and disposal will be provided to land uses in the Sun Valley planning area according to the best principles/practices of sustainable resource development.

Policies

- SUN.12.1 Whenever applicable, all development within the Sun Valley Suburban Character Management Area and the Downtown Character Management Area will connect to a community sewer service.
- SUN.12.2 Conversion of existing septic systems in the Sun Valley planning area to community sewer shall be a priority.

Plan Maintenance

Goal Thirteen: Amendments to the Sun Valley Area Plan will be for the purpose of further implementing the Vision and Character Statement, or to respond to new or changing circumstances. Amendments must conform to the Sun Valley Vision and Character Statement.

Policies

- SUN.13.1 In order for the Washoe County Planning Commission to recommend the approval of any amendment to the Sun Valley Area Plan, the following findings must be made in addition to the required findings in Washoe County Development Code, Section 110.820.15:
- The amendment will further implement and preserve the Vision and Character Statement. *As discussed above, this is achieved.*
 - The amendment conforms to all applicable policies of the Sun Valley Area Plan and the Washoe County Master Plan. *As discussed above, this is achieved.*
 - The amendment will not conflict with the public's health, safety or welfare. *As discussed above, this is achieved.*
- SUN.13.2 Amendments will be reviewed by the Department of Community Development against the following set of criteria and thresholds that are measures of the impact on, or progress toward, the Vision and Character Statement:
- A feasibility study has been conducted and paid for by the applicant, relative to municipal water, sewer and storm water, that clearly identifies the improvements likely to be required to support the intensification, and those improvements have been determined to be in substantial compliance with all applicable existing facilities and resource plans for Sun Valley by the Sun Valley General Improvement District in conjunction with the Department of Water Resources. This may be waived by the Department of Public Works for projects that are determined to have minimal impacts. The Department of Water Resources will establish and maintain the standards and methodologies for these feasibility studies. *A discovery was completed for Phase 1 and we are working with the Sun Valley GID to complete a discovery for Phase 2.*
 - A traffic analysis has been conducted that clearly identifies the impact to the adopted level of service within the Sun Valley planning area and the improvements likely to be required to maintain/achieve the adopted level of service. This may be waived by the Department of Public Works for projects that are determined to have minimal impacts. The Department of Public Works may request any information it deems necessary to make this determination. *A traffic study is attached to this application and LOS "C" is maintained.*
 - If the proposed intensification will result in a drop below the established policy level of service for transportation (as established by the Regional

Transportation Commission and Washoe County) within the Sun Valley planning area, the necessary improvements required to maintain the established level of service are scheduled in either the Washoe County Capital Improvements Program or Regional Transportation Commission Capital Improvements Program within three years of approval of the intensification. For impacts to regional roads, this finding may be waived by the Washoe County Planning Commission upon written request from the Regional Transportation Commission.

- d. If roadways impacted by the proposed intensification are currently operating below adopted levels of service, the intensification will not require infrastructure improvements beyond those articulated in Washoe County and Regional Transportation Commission transportation plans AND the necessary improvements are scheduled in either the Washoe County Capital Improvements Program or Regional Transportation Commission Capital Improvements Program within three years of approval of the intensification. Impacted roadways operate at a LOS "C" or better.
- e. Washoe County will work to ensure that the long range plans of facilities providers for transportation, water resources, schools and parks reflect the goals and policies of the Sun Valley Area Plan.
- f. If the proposed intensification results in existing facilities exceeding design capacity and compromises the Washoe County School District's ability to implement the neighborhood school philosophy for elementary facilities, then there must be a current capital improvements plan or rezoning plan in place that would enable the District to absorb the additional enrollment. The Washoe County Planning Commission, upon request of the Washoe County School District Board of Trustees, may waive this finding.

- SUN.13.3 For proposals to establish new commercial land uses outside of the Downtown Character Management Area, a market analysis has been conducted that clearly establishes a community serving trade area and provides convincing evidence of a need to increase the inventory of community-serving commercial land use opportunities.
- SUN.13.4 For any amendment that proposes to alter the Sun Valley Vision or Character Statement, the Department of Community Development has conducted a series of community visioning workshops with the Sun Valley Citizen Advisory Board (CAB), and the results of that process, including any CAB and staff recommendations, have been included and discussed in the staff analysis of the proposed amendment.
- SUN.13.5 For any amendment that proposes to expand the Suburban Character Management Area into the Rural Character Management Area and/or to revise the Character Statement, the Department of Community Development has conducted a series of community visioning workshops with the Sun Valley Citizen Advisory Board (CAB) and the results of that process, including any CAB and staff recommendations, have been included and discussed in the staff analysis of the proposed amendment; and a proposed land use change accompanies the boundary change proposal, and the land use proposal meets all of the applicable policies of the Sun Valley Area Plan.
- SUN.13.6 The Department of Community Development will provide an annual status report to the Planning Commission regarding the implementation of this plan.



Sun Valley General Improvement District
5000 Sun Valley Boulevard
Sun Valley, NV 89433-8229
Phone: (775) 673-2220
Fax: (775) 673-1835

February 8, 2022

Krater Consulting Group, PC
Attn: Kenneth Krater
901 Dartmouth Drive
Reno, NV 89509

RE: Highland Village 2

Dear Mr. Krater

The Sun Valley General Improvement District is the owner/operator of the water and wastewater facilities in the Sun Valley Hydro Basin. This Hydro Basin includes the acre site of Highland Village 2 subdivision, 72 lot common open space subdivision that is proposed at the northeast end of Highland Ranch Drive. APN: 508-020-04,508-020-42 & 508-020-44.

Water:

At the writing of this letter there is currently enough capacity to serve this proposed subdivision. This capacity is being utilized on a first come, first serve basis.

Wastewater:

At the writing of this letter there is currently enough capacity to serve this proposed subdivision. This capacity is being utilized on a first come, first serve basis

Sincerely,

Sun Valley General Improvement District

Chris Melton
Public Works Director



Account Information

Parcel/Identifier: [50802004](#)

Status: Active

Last Update: 3/5/2022 4:36:31 PM

Owner: LC HIGHLAND 2 LLC

Property Address: 0 9TH AVE WCTY



Tax Bills

Add to cart then select cart icon (🛒) above to checkout.

Total Due: \$0.00

Pay Partial:

[-] Paid Bills

2021 | BILL NO.: 2021298846 | PROPERTY TYPE: REAL | NET TAX: \$950.30

PAID

[Tax Breakdown](#)

Installment	Due Date	Installment Tax Due	Payment Status
1	8/16/21	<input type="checkbox"/> \$0.00	● Paid
2	10/4/21	<input type="checkbox"/> \$0.00	● Paid
3	1/3/22	<input type="checkbox"/> \$0.00	● Paid
4	3/7/22	<input type="checkbox"/> \$0.00	● Paid

2020 | BILL NO.: 2020471696 | PROPERTY TYPE: REAL | NET TAX: \$892.13

PAID

[Tax Breakdown](#)

2019 | BILL NO.: 2019113926 | PROPERTY TYPE: REAL | NET TAX: \$849.64

PAID

[Tax Breakdown](#)

2018 | BILL NO.: 2018105407 | PROPERTY TYPE: REAL | NET TAX: \$810.74

PAID

[Tax Breakdown](#)

2017 | BILL NO.: 2017115342 | PROPERTY TYPE: REAL | NET TAX: \$778.06

PAID

[Tax Breakdown](#)

i Attention: Important Information, please be advised:

- **ALERTS:** If your real property taxes are delinquent, the search results displayed may not reflect the correct amount owing. Please contact our office for the current amount due.
- If payment confirmation is not received, please check the "SPAM" folder in your e-mail account. Add "Payments@Bill2Pay.com" to your safe-senders list in order to ensure that the payment confirmation is routed to your inbox.



- [← Return](#)
- [🔍 New Search](#)
- [📄 Change of Address](#)
- [🖨️ Print Page](#)
- [📄 Assessment Data](#)

Account Information

Parcel/Identifier: 50802042 **Status:** Active Last Update: 3/5/2022 4:38:37 PM
Owner: LC HIGHLAND 2 LLC **Property Address:** 0 9TH AVE
 WCTY

Tax Bills

Add to cart then select cart icon (🛒) above to checkout.

Total Due: \$0.00

Pay Partial:

Paid Bills

2021 Bill No.: 2021299073 Property Type: Real Net Tax: \$1,919.43 Paid 🔗 Tax Breakdown			
Installment	Due Date	Installment Tax Due	Payment Status
1	8/16/21	+ \$0.00	● Paid
2	10/4/21	+ \$0.00	● Paid
3	1/3/22	+ \$0.00	● Paid
4	3/7/22	+ \$0.00	● Paid

2020 Bill No.: 2020471611 Property Type: Real Net Tax: \$1,803.82 Paid 🔗 Tax Breakdown			
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2019 Bill No.: 2019114318 Property Type: Real Net Tax: \$1,717.92 Paid 🔗 Tax Breakdown			
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2018 Bill No.: 2018106835 Property Type: Real Net Tax: \$1,639.25 Paid 🔗 Tax Breakdown			
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- [Return](#)
- [New Search](#)
- [Change of Address](#)
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- [Assessment Data](#)

Account Information

Parcel/Identifier: 50802044 **Status:** Active Last Update: 3/5/2022 4:39:43 PM
Owner: LC HIGHLAND 2 LLC **Property Address:** 0 HIGHLAND RANCH PKWY WASHOE COUNTY

Tax Bills

Add to cart then select cart icon (🛒) above to checkout.

Total Due: \$0.00

Pay Partial:

[-] Paid Bills

2021 Bill No.: 2021298773 Property Type: Real Net Tax: \$701.67			
Paid Tax Breakdown			
Installment	Due Date	Installment Tax Due	Payment Status
1	8/16/21	⊕ \$0.00	● Paid
2	10/4/21	⊕ \$0.00	● Paid
3	1/3/22	⊕ \$0.00	● Paid
4	3/7/22	⊕ \$0.00	● Paid
2020 Bill No.: 2020471529 Property Type: Real Net Tax: \$658.23			
Paid Tax Breakdown			
2019 Bill No.: 2019114444 Property Type: Real Net Tax: \$626.88			
Paid Tax Breakdown			
2018 Bill No.: 2018106920 Property Type: Real Net Tax: \$598.18			
Paid Tax Breakdown			



August 31, 2021

Jeffrey L. Holbrook
LC Highland 2, LLC
27132 B Paseo Espada, Suite 1226
San Juan Capistrano, CA 92675

Traffic Analysis – Highland Ranch South

Dear Mr. Holbrook,

This report presents the findings of a Traffic Analysis completed to assess the potential traffic impacts of the Highland Ranch South development on the project access intersection. The project consists of 70 single family residential units located on the south side of Highland Ranch Parkway in Washoe County, Nevada. This traffic study has been prepared to document existing traffic conditions at the project access intersection, quantify traffic volumes generated by the proposed project, document findings, and make recommendations, if any are needed. The location of the project is shown on **Figure 1** and the preliminary site plan is shown on **Figure 2**.

The following intersection is included in this study:

- ▶ Highland Ranch Parkway/Project Access

This study includes analysis of both the weekday AM and PM peak hours as these are the periods of time in which peak traffic is anticipated to occur. The evaluated development scenario is:

- ▶ Existing Plus Project Conditions

A qualitative assessment of existing conditions in the project area is provided. The study intersection does not exist without the project, therefore an existing conditions level of service analysis was not performed.

ANALYSIS METHODOLOGY

Level of service (LOS) is a term commonly used by transportation practitioners to measure and describe the operational characteristics of intersections, roadway segments, and other facilities. This term equates seconds of delay per vehicle at intersections to letter grades "A" through "F" with "A" representing optimum conditions and "F" representing breakdown or over capacity flows.

Intersections

The complete methodology for intersection level of service analysis is established in the *Highway Capacity Manual (HCM) 6th Edition*, published by the Transportation Research Board (TRB). **Table 1** presents the delay thresholds for each level of service grade at signalized and unsignalized intersections.

Table 1: Intersection Level of Service Definitions

Level of Service	Brief Description	Average Delay (seconds per vehicle)	
		Signalized Intersections	Unsignalized Intersections
A	Free flow conditions.	< 10	< 10
B	Stable conditions with some affect from other vehicles.	10 to 20	10 to 15
C	Stable conditions with significant affect from other vehicles.	20 to 35	15 to 25
D	High density traffic conditions still with stable flow.	35 to 55	25 to 35
E	At or near capacity flows.	55 to 80	35 to 50
F	Over capacity conditions.	> 80	> 50

Source: *Highway Capacity Manual, 6th Edition*

Level of service calculations were performed for the study intersection using the Synchro 11 software package with analysis and results reported based on *HCM* methodology.

Level of Service Policy

Washoe County

The Regional Transportation Commission’s (RTC) *2050 Regional Transportation Plan (RTP)* establishes level of service criteria for regional roadway facilities in the City of Reno, City of Sparks, and Washoe County. The current Level of Service policy is:

“All regional roadway facilities projected to carry less than 27,000 ADT at the latest RTP horizon – LOS D or better.”

“All regional roadway facilities projected to carry 27,000 or more ADT at the latest RTP horizon – LOS E or better.”

“All intersections shall be designed to provide a level of service consistent with maintaining the policy level of service of the intersecting corridors”.

Highland Ranch Parkway is projected to carry less than 27,000 ADT.



Sun Valley Area Plan

The Sun Valley Area Plan (December 2018) includes the following transportation policy related to level of service:

Level of service “C” or above is the desired level for all regional roads in the Sun Valley planning area.

While LOS “C” is desired for the Sun Valley planning area, it is not required; therefore, LOS “D” was used as the threshold criteria for this analysis based on regional (2050 RTP) thresholds.

EXISTING CONDITIONS

Roadway Facilities

Highland Ranch Parkway within the study area is a two-lane east-west roadway with one lane in each direction. It has a posted speed limit of 35 mph in the study area and is classified as a Moderate Access Control (MAC) Arterial in the 2050 Regional Transportation Plan.

Traffic Volumes

Existing AM and PM peak hour traffic volumes on Highland Ranch Parkway were obtained from the recent *Highland Village Traffic Study* (Solaegui Engineers, 2020). Those traffic volumes were collected during construction and COVID restrictions and were therefore adjusted accordingly to represent typical weekday conditions. The full methodology can be found within the prior study. The existing traffic volumes (adjusted) are shown on **Figure 3**, attached.

PROJECT CONDITIONS

Trip Generation

Trip generation rates from *Trip Generation Manual, 10th Edition* published by the Institute of Transportation Engineers (ITE) were used to develop trip generation estimates for the proposed project. Trip rates for the Single-Family Detached Housing (210) use were used. **Table 2** shows the Daily, AM peak hour, and PM peak hour trip generation estimates based on number of dwelling units.

Table 2: Trip Generation Estimates

Land Use (ITE Code)	Size	Trips ¹				
		Daily	AM	AM In/Out	PM	PM In/Out
Single-Family Detached Housing (210)	70 du	661	52	13 / 39	69	43 / 26

Notes: du = dwelling units

1. Trips were calculated based on the following rates per du: Daily – 9.44; AM – 0.74 (25% in / 75% out); PM – 0.99 (63% in / 37% out)

Source: Headway Transportation, 2021



As shown in the table, the project is expected to generate 661 Daily, 52 AM peak hour, and 69 PM peak hour trips.

Trip Distribution

Project trips were distributed to the adjacent roadway network based on existing traffic volumes, the locations of complimentary land uses, and anticipated travel patterns. Project trips were distributed based on the following:

- ▶ 55% to/from the west via Highland Ranch Parkway
- ▶ 45% to/from the east via Highland Ranch Parkway

Figure 4 shows the project trip distribution and assignment.

EXISTING PLUS PROJECT CONDITIONS

Traffic Volumes

Project trips (Figure 4) were added to the existing traffic volumes on Highland Ranch Parkway (Figure 3) to develop the Existing Plus Project conditions traffic volumes, shown on Figure 5.

Intersection Level of Service

AM and PM peak hour intersection level of service analysis was performed for the study intersection based on the Existing Plus Project traffic volumes, lane configurations, and controls shown on Figure 5. Table 3 shows the level of service results and the technical calculations are provided in Attachment A.

Table 3: Existing Plus Project Intersection Level of Service

Intersection	Control	AM		PM	
		Delay ¹	LOS	Delay ¹	LOS
Highland Ranch Parkway/Project Access	Side Street Stop				
Northbound Approach		17.1	C	19.6	C
Westbound Left		8.5	A	8.8	A

Notes: 1. Delay is reported in seconds per vehicle for the worst approach/movement for side street stop controlled intersections.

Source: Headway Transportation, 2021

As shown in the table, the project access road intersection is expected to operate at LOS C (within policy level of service thresholds) during the AM and PM peak hours.

ACCESS MANAGEMENT

Based on the through movement volumes on Highland Ranch Parkway (more than 450 vehicles in each direction during the AM peak hour and more than 500 vehicles in each direction during the PM peak hour), the left-turn volumes into the project site, and the speed limit on Highland Ranch Parkway, a westbound



left-turn lane is recommended on Highland Ranch Parkway at the Project Access Road intersection. Additionally, a left-turn lane at the Project Access Road would provide consistency throughout the corridor with adjacent intersections. The left-turn lane should include 315 feet of storage/deceleration length (200 foot striped pocket plus 115 feet of taper). The proposed intersection spacing provides adequate separation which will allow for the turn pocket and taper.

An eastbound right-turn lane is not justified based on access standards provided in the 2050 RTP which state that a right-turn deceleration lane should be provided on Moderate Access Control Arterial roadway (Highland Ranch Parkway) "if there are more than 60 inbound, right-turn movements during the peak hour." As shown on **Figure 5**, the eastbound right-turn volumes are estimated to be only 7 and 24 during the AM and PM peak hours, respectively, which are significantly lower than the required volume.

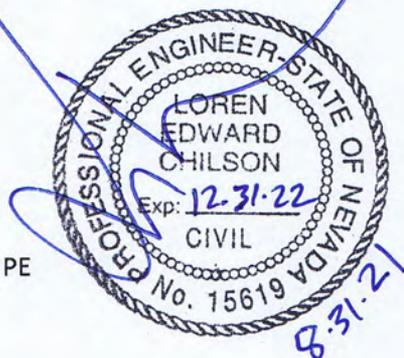
CONCLUSIONS

The following is a list of our key findings and recommendations:

- ▶ The proposed project includes 70 single-family housing units located on the south side of Highland Ranch Parkway between Apple Blossom Drive and Midnight Drive.
- ▶ The project is anticipated to generate approximately 661 Daily, 52 AM peak hour, and 69 PM peak hour trips on the external roadway network.
- ▶ Under Existing Plus Project conditions, the Highland Ranch Parkway/Project Access intersection is expected to operate at LOS C during the AM and PM peak hours.
- ▶ A westbound left-turn lane is recommended on Highland Ranch Parkway at the Project Access Road based on traffic volumes, roadway speed, and adjacent intersection configurations. The left-turn lane should include 315 feet of storage/deceleration length (200 foot striped pocket plus 115 feet of taper).
- ▶ An eastbound right-turn lane is not justified on Highland Ranch Parkway at the Project Access Road as the right-turn volumes do not meet the RTC's threshold for a right-turn lane at this location.

Sincerely,
Headway Transportation, LLC

Loren E. Chilson, PE
Principal



Attachments:

- Figure 1 – Project Location
- Figure 2 – Preliminary Site Plan
- Figure 3 – Existing Traffic Volumes, Lane Configurations, and Controls
- Figure 4 – Project Trips
- Figure 5 - Existing Plus Project Traffic Volumes, Lane Configurations, and Controls
- A – Existing Plus Project LOS Calculation Sheets



Study Locations

- ① Highland Ranch Pkwy / Project Access

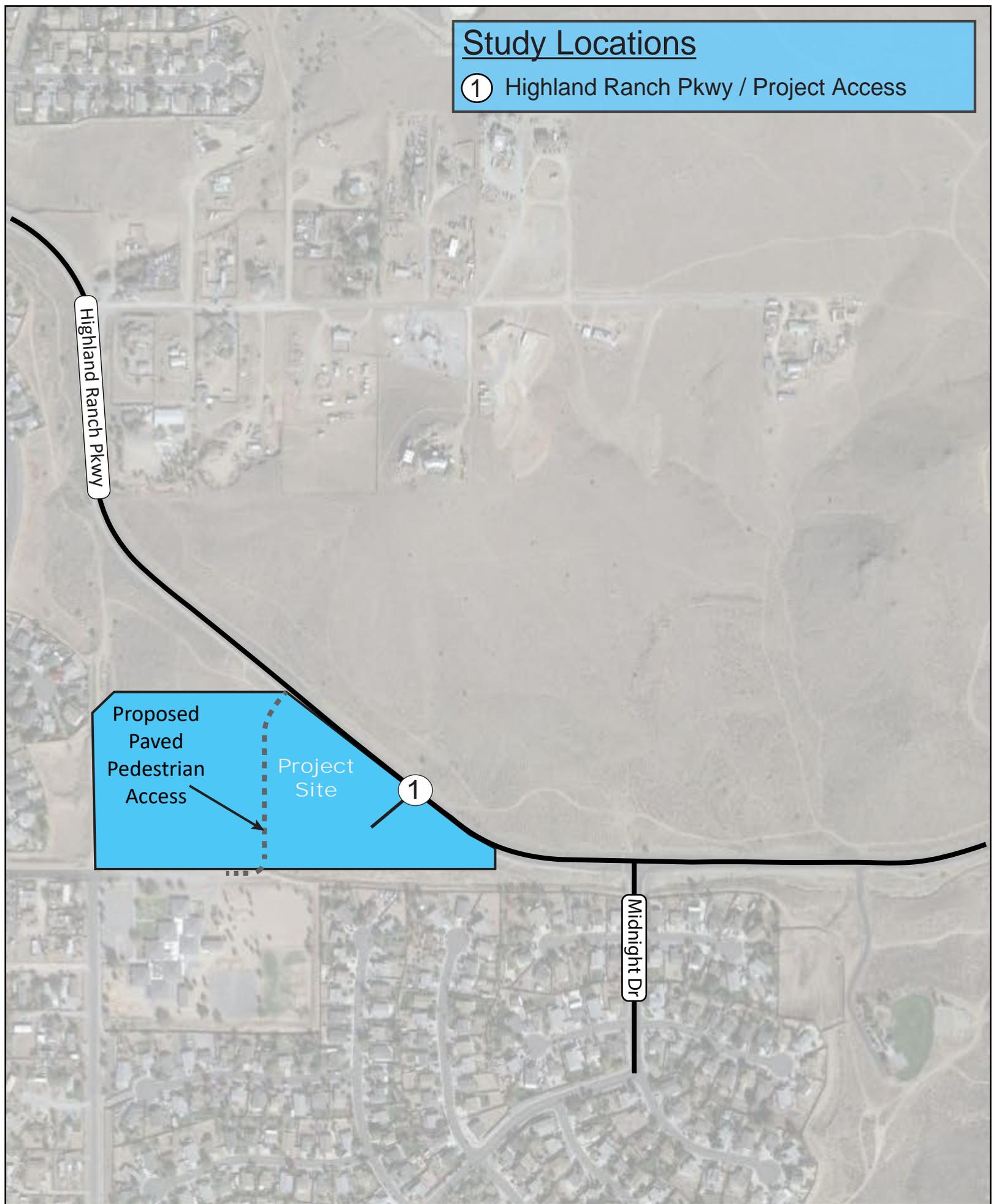
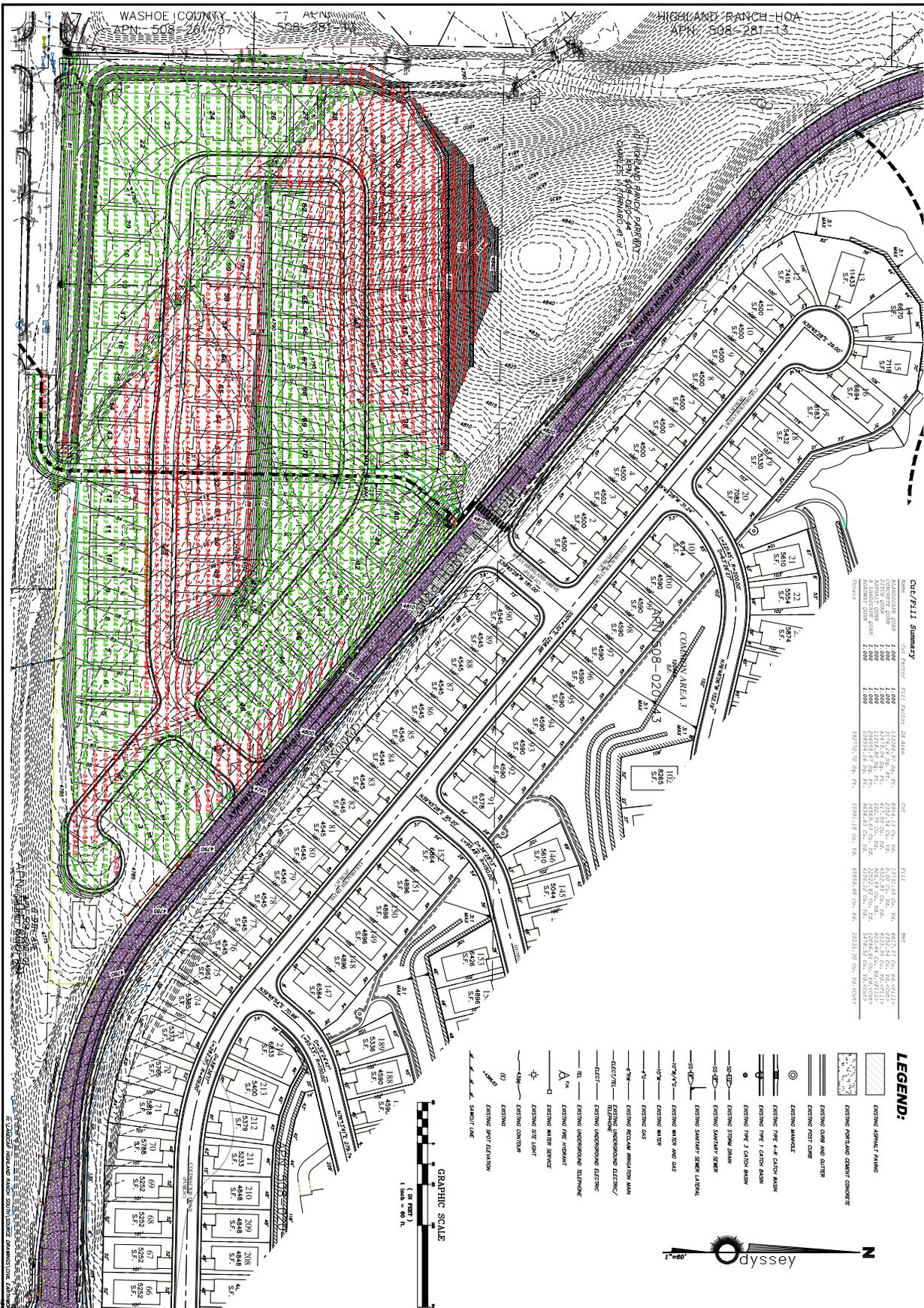


Figure 1
Highland Ranch South
Traffic Analysis
Project Location



CRU/FILL Summary

NO.	DESCRIPTION	AMOUNT	UNIT
1	CRU	1,000	SF
2	FILL	1,000	SF
3	CRU	1,000	SF
4	FILL	1,000	SF
5	CRU	1,000	SF
6	FILL	1,000	SF
7	CRU	1,000	SF
8	FILL	1,000	SF
9	CRU	1,000	SF
10	FILL	1,000	SF
11	CRU	1,000	SF
12	FILL	1,000	SF
13	CRU	1,000	SF
14	FILL	1,000	SF
15	CRU	1,000	SF
16	FILL	1,000	SF
17	CRU	1,000	SF
18	FILL	1,000	SF
19	CRU	1,000	SF
20	FILL	1,000	SF
21	CRU	1,000	SF
22	FILL	1,000	SF
23	CRU	1,000	SF
24	FILL	1,000	SF
25	CRU	1,000	SF
26	FILL	1,000	SF
27	CRU	1,000	SF
28	FILL	1,000	SF
29	CRU	1,000	SF
30	FILL	1,000	SF
31	CRU	1,000	SF
32	FILL	1,000	SF
33	CRU	1,000	SF
34	FILL	1,000	SF
35	CRU	1,000	SF
36	FILL	1,000	SF
37	CRU	1,000	SF
38	FILL	1,000	SF
39	CRU	1,000	SF
40	FILL	1,000	SF
41	CRU	1,000	SF
42	FILL	1,000	SF
43	CRU	1,000	SF
44	FILL	1,000	SF
45	CRU	1,000	SF
46	FILL	1,000	SF
47	CRU	1,000	SF
48	FILL	1,000	SF
49	CRU	1,000	SF
50	FILL	1,000	SF
51	CRU	1,000	SF
52	FILL	1,000	SF
53	CRU	1,000	SF
54	FILL	1,000	SF
55	CRU	1,000	SF
56	FILL	1,000	SF
57	CRU	1,000	SF
58	FILL	1,000	SF
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94	FILL	1,000	SF
95	CRU	1,000	SF
96	FILL	1,000	SF
97	CRU	1,000	SF
98	FILL	1,000	SF
99	CRU	1,000	SF
100	FILL	1,000	SF

895 ROBERTA LANE, SUITE 104, SPARKS, NV 89431
 (775) 358-4868 FAX (775) 358-3200
 WWW.DYSSEY-ENGINEERING.COM

dyssey ENGINEERING INCORPORATED

SCALE: 1" = 60'
 SHEET: S-1 OF 1

**HIGHLAND RANCH SOUTH
 PRELIMINARY
 2:1 GRADING PLAN**
 WASHOE COUNTY, NEVADA

DATE: JUNE 2021
 DRAWN BY: F.B.
 DESIGNED BY: F.B.
 CHECKED BY: F.B.

REV.	DATE	DESCRIPTION	BY	APP'D

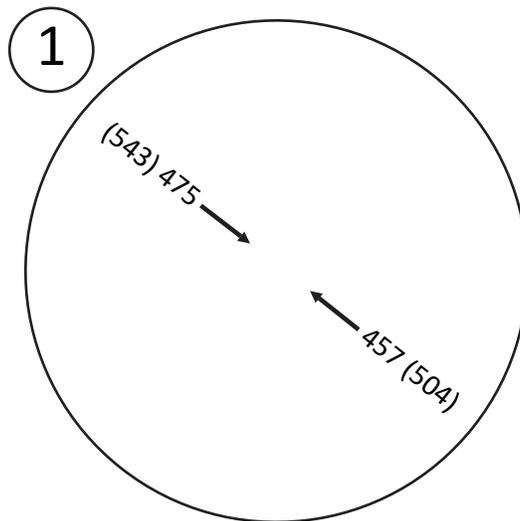


NO SCALE

Figure 2
 Highland Ranch South
 Traffic Analysis
 Preliminary Site Plan



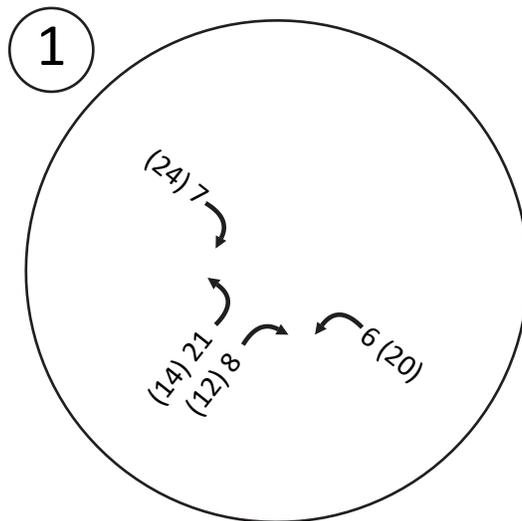
Highland Ranch Pkwy / Project Access



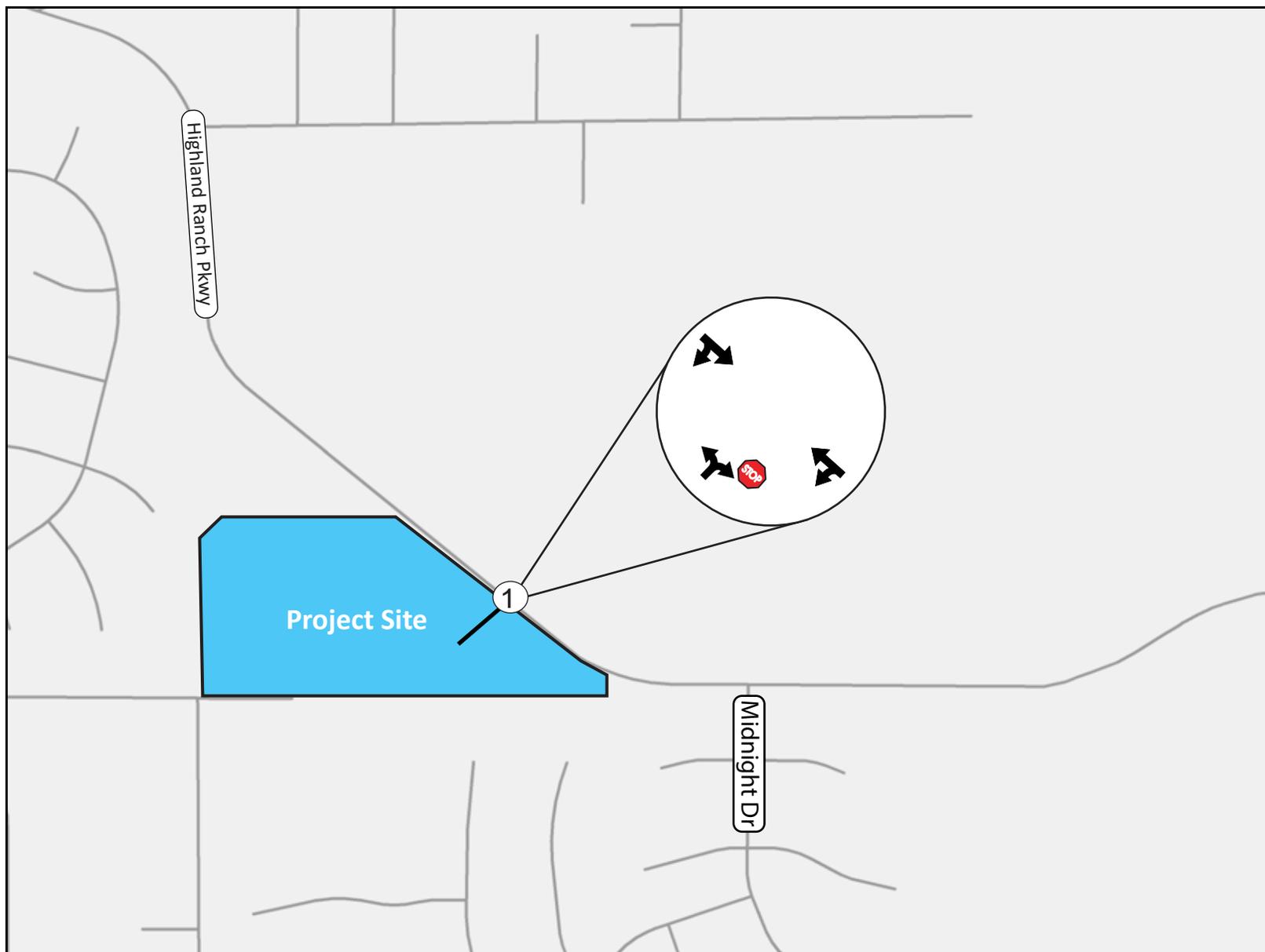
AM Peak Hour Volume (PM Peak Hour Volume)



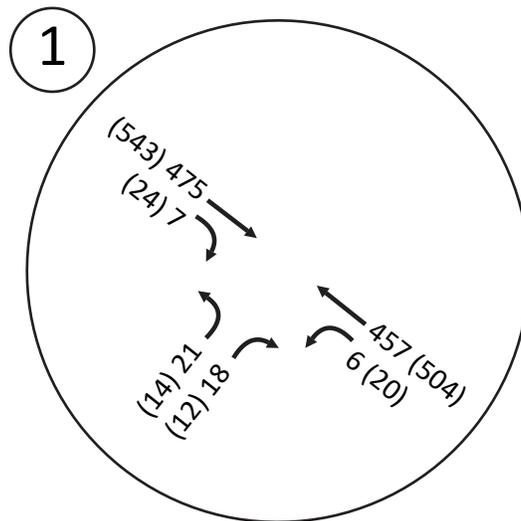
Highland Ranch Pkwy / Project Access



AM Peak Hour Volume (PM Peak Hour Volume)



Highland Ranch Pkwy / Project Access



AM Peak Hour Volume (PM Peak Hour Volume)

Attachment A

Existing Plus Project LOS Calculations



HCM 2010 TWSC
 1: Project Access & Highland Ranch Pkwy

Existing Plus Project Conditions
 AM Peak Hour

Intersection						
Int Delay, s/veh	0.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	475	7	6	457	21	18
Future Vol, veh/h	475	7	6	457	21	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	516	8	7	497	23	20

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	524	0	1031
Stage 1	-	-	-	-	520
Stage 2	-	-	-	-	511
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	1043	-	258
Stage 1	-	-	-	-	597
Stage 2	-	-	-	-	602
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1043	-	256
Mov Cap-2 Maneuver	-	-	-	-	256
Stage 1	-	-	-	-	597
Stage 2	-	-	-	-	597

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	17.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	341	-	-	1043	-
HCM Lane V/C Ratio	0.124	-	-	0.006	-
HCM Control Delay (s)	17.1	-	-	8.5	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-

HCM 6th TWSC
 1: Project Access & Highland Ranch Pkwy

Existing Plus Project Conditions
 PM Peak Hour

Intersection						
Int Delay, s/veh	0.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	543	24	20	504	14	12
Future Vol, veh/h	543	24	20	504	14	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	590	26	22	548	15	13

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	616	0	1195
Stage 1	-	-	-	-	603
Stage 2	-	-	-	-	592
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	964	-	206
Stage 1	-	-	-	-	546
Stage 2	-	-	-	-	553
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	964	-	199
Mov Cap-2 Maneuver	-	-	-	-	199
Stage 1	-	-	-	-	546
Stage 2	-	-	-	-	535

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	19.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	275	-	-	964	-
HCM Lane V/C Ratio	0.103	-	-	0.023	-
HCM Control Delay (s)	19.6	-	-	8.8	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

GEOTECHNICAL INVESTIGATION REPORT

PROPOSED HIGHLAND VILLAGE SUBDIVISION – PH 2

HIGHLAND RANCH PARKWAY

APN 508-020-04, -42 & -44

WASHOE COUNTY, NEVADA

Prepared For

LC Highland 2, LLC
c/o Jeffrey L. Holbrook, Manager
27132 B Paseo Espada, Suite 1226
San Juan Capistrano, CA 92675

Prepared By



Digitally signed by Blake D. Carter, P.E.
Date: 2021.08.16 16:24:40 -07'00'



File No.: 2002.002-A
August 16, 2021



August 16, 2021

LC Highland 2, LLC
c/o Jeffrey L. Holbrook, Manager
27132 B Paseo Espada, Suite 1226
San Juan Capistrano, CA 92675

Subject: Geotechnical Investigation Report
Proposed Highland Village Subdivision – Phase 2
Highland Ranch Parkway (APN 508-020-04, -42 & -44)
Washoe County, Nevada
File No.: 2002.002-A

Gentlemen:

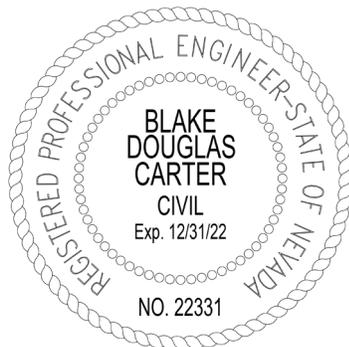
WESTEX Consulting Engineers, LLC (WESTEX) is pleased to present this report containing the results of our geotechnical investigation performed on the referenced project.

As presented in the attached report, based on the results of our investigation, knowledge of the project area, and understanding of the project, we conclude that from a geotechnical standpoint the site is suitable for the intended use. The primary geotechnical concerns include:

- Potential for difficult grading and trench excavations of weathered bedrock and where outcrops and boulders are encountered,
- On-site processing of a relatively uniform blend of structural fill materials,
- Filling on natural slopes, and
- Maintenance of permanent slopes and retaining structures.

We appreciate your selecting WESTEX Consulting Engineers, LLC to perform this investigation and trust that the results will fulfill project design requirements. If you, or any of your design consultants, have any questions, please contact me at (775) 771-9539.

Respectfully,
WESTEX Consulting Engineers, LLC



Blake D. Carter, P.E.
Principal

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I INTRODUCTION

This report presents the results of our geotechnical investigation performed on the proposed Highlands Village Phase 2 subdivision project located on Highland Ranch Parkway in Washoe County, Nevada. The site location is shown on the attached *Site Location Map*, Plate 1. This investigation was conducted in general accordance with our May 14, 2021 proposal and work order, authorized on May 19, 2021.

The conclusions and recommendations contained in this report are founded on selected points of exploration, an engineering analysis of the data acquired during our investigation, and our experience with similar site characteristics. If during grading and construction, site conditions or project plans are found to vary from those described in this report, we should be contacted immediately to verify that the recommendations contained herein remain applicable to the final project design. Accordingly, this report may be revised at any time. To provide project continuity and observe that the provided geotechnical recommendations are followed, we recommend retaining WESTEX for construction testing and inspection services.

A. Purpose and Scope of Services

The purpose of this geotechnical engineering investigation is to characterize the site subsurface soil and groundwater conditions and provide appropriate and economic design-level engineering conclusions and recommendations pertaining to these conditions. Our scope of services included:

1. Field reconnaissance of the site,
2. Review of published geologic information,
3. Exploration of the subsurface conditions by excavating, logging, and sampling within eight (8) test pits
4. Geophysical one- and two-dimensional modelling, including seismic refraction lines within three (3) representative areas of proposed cut sections,
5. Laboratory testing on select samples acquired from the exploratory test pits,
6. Engineering evaluation and preparation of this geotechnical engineering report addressing current project design and construction.

Included in this report are conclusions and recommendations regarding:

1. Local bedrock (if encountered), soil, and groundwater conditions,
2. Potential geologic hazards,
3. Earthquake site response,
4. Site grading and structural design,
5. Fill placement and compaction specifications,
6. Site surface drainage,
7. Trench excavation, utility line bedding, and trench backfilling,
8. Foundation support,
9. Lateral resistance and loads,
10. Preliminary Slab-on-grade support,
11. Exterior concrete flatwork,
12. Preliminary Pavement sections,
13. Additional geotechnical engineering services.

This report is geotechnical in nature and not intended to identify other site constraints such as environmental hazards, wetlands determinations and/or the potential presence of buried utilities. Recommendations included in this report are specific to development within the limits of the property, and are not intended for off-site development. Proposed development outside the limits of our investigation or any conceptual changes to site development, such as the use of alternative foundations or grade changes, could require additional subsurface exploration, laboratory tests and engineering analyses.

B. Site Location and Description

Our site description is based on our site visits conducted in June 2021 and Civil plan set provided by Odyssey Engineering, Inc.

The project site is located on the south side of Highland Ranch Parkway north of the Highland Ranch Park in Washoe County, Nevada, and occupies three Washoe County Assessor's parcel numbers (APN) 508-020-04, -42 and -44. According to the Public Land Survey System (PLSS), the project site is located in the SE ¼ of Section 08, Township 20 North, Range 20 East, Mt. Diablo Meridian.

The approximately 18-acre site is currently undeveloped, with dirt access roads near the east and south boundaries and some dirt trails crossing the property. Existing drainage bounds the northeastern property boundary and one drainage ditch traverses the site in a roughly east-west direction. Vegetation consists of native sage brush. The site is bounded by residential properties to the west, a public school and residential properties to the south, and Highland Ranch Parkway to the northeast. Site access is from local dirt trails via Highland Ranch Parkway and East 9th Avenue.

Based on the referenced civil Grading Plan, the maximum site elevation is approximately 4,850 feet above mean sea level (MSL, NAVD88 vertical datum), at the northern site boundary. The minimum elevation is approximately 4,785 MSL, for a maximum relief of about 65 feet. The project site slopes gently to moderately down toward the southeast, draining toward East 9th Street. There are hilly and sloping areas including two to three areas of relatively small rock outcrops with angular cobbles observed at the surface.

C. Proposed Development

Information about the proposed development is based on Highlands Village Tentative Map Application Civil Plans prepared by Odyssey Engineering, Inc. dated June 2021.

The current project plans consist of a new single family residential subdivision with 70 homesites and new County infrastructure. The grading approach is anticipated to include cuts on the order of 10 feet at the northern hillside and an average fill depth of approximately 5 feet across the site. The resulting northern hillside will result in a terraced retaining structure with 3H:1V or 2H:1V slopes between walls, that will be designed to minimize the area for construction and conserve the natural state of slopes. **It is our opinion that competent boulders encountered within the slope excavation can be re-used as a portion of rockery retaining structures.**

Retaining structures may be designed to six-foot maximum gravity rock retaining walls with 3H:1V maximum slopes. **The maximum terraced sections are up to three walls in height founded in very**

stiff soil and rock grading cut sections. Six-foot maximum height exposed face rockery retaining walls would be a highly suitable method to retain slopes given the nature of the soils including the ability to use 2H:1V slopes in cut areas.

We presume the proposed structures will be of wood-frame construction, maximum two-stories in height, with either raised floors or concrete slabs-on-grade supported by conventional shallow foundations. Furthermore, we presume that appurtenant construction will consist of asphalt concrete (AC) pavement, concrete sidewalks and valley gutters, and landscaping, typical of a single-family residential subdivision. Stormwater will be managed with graded interceptor swales, concrete curb and gutter, underground storm drain, and a detention basin toward the southeast.

At the time of investigation, vertical structural loading information was unavailable; however, we anticipate that foundation loads will be normal for proposed residential development. Additionally, we presume that standard foundations will bottom at 24 inches below the lowest adjacent exterior ground surface and that structural design will be in accordance with the 2018 edition of the International Building Code, 2018 International Residential Code, and Northern Nevada Code Amendments, as applicable.

Proposed detention basin grades will consist of minor grading in the area of the south and west boundaries. Proposed utility trench excavation depths are unknown at this time. We further anticipate that any proposed cut slopes will be sufficiently stable at a 2H:1V slopes, and that fill slopes will be constructed at maximum final inclinations of approximately two to one, horizontal to one vertical (2:1) or flatter, and revegetated per Washoe County development standards.

II FIELD EXPLORATION AND LABORATORY TESTING

A. Field Exploration

Exploratory Test Pits

Subsurface soil conditions were explored in June 2021 by excavating eight (8) exploratory test pits to depths ranging from 8 to 14 feet below the existing ground surface (BEG). The test pits were excavated with a track-mounted John Deere 225C LC excavator with a two-foot wide bucket. Test pits were planned to be excavated to a depth of 16-feet; however, a few of the test pits met practical refusal when the excavation rate slowed to 15 minutes per foot within vertical test pit.

The test pits were located in the field based on the referenced revised site plan, knowledge of the project, existing underground and above-ground utility locations, and accessibility, and are depicted on Plate 2, *Geotechnical Exploration Map*. Our field engineer recorded the location of each test pit using a hand-held Global Positioning System (GPS) receiver. All locations are approximate and considered accurate to within ± 15 feet. No greater accuracy is inferred.

Bulk soil samples were collected from the exploratory test pits. The soils were visually classified and logged by our engineer in the field following the Unified Soil Classification System (USCS) and ASTM D2488. Logs of the exploratory test pits are presented in Plate 6 through Plate 13.

Geophysical Survey

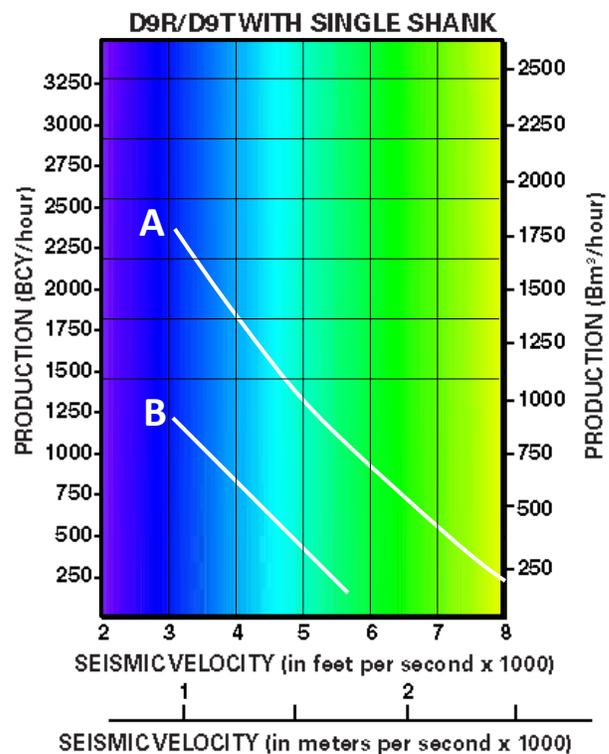
The approximate locations of the geophysical alignments are included on Plate 2, *Geotechnical Exploration Map*. Seismic refraction microtremor (ReMi®) measurements were performed in accordance with ASTM D5777, Standard Guide for Using the Seismic Refraction Method for

Subsurface Investigation, and include a two-dimensional seismic velocity profile (P-Wave) and a one-dimensional shear wave velocity profile for each alignment. A multi-channel seismograph using 12 geophones spaced at 27-feet was developed for each line creating a total geophone spread of 300-feet for each alignment.

The locations were logged with GPS and projected over an aerial image with the proposed grading plan. The mapped topographic information shown was referenced from the grading plan, Google Earth, and the geophysical elevation profiles represent a visual estimate of the field conditions. A photo from each alignment was taken to reference the surface conditions for each representative cut section tested. A visual estimate of the Rock Classification at the surface is included for each alignment and references information provided on Plate 5, *Criteria for Rock Descriptions*. Rock characterization and other geologic information when used in tandem with seismic (P-Wave) velocity form the basis for rippability prediction; however it should be noted that rock properties can be expected to change significantly within short distances. Caterpillar's Handbook of Ripping, Twelfth Edition, provides charts to predict various-sized Bulldozer and ripper performance and production rates for a range of seismic (P-Wave) velocities and rock types.

Charts for estimating rippability based on seismic P-wave velocities for D9R's and D10R's are presented in the *Caterpillar Performance Handbook* (Edition 42) and are available on their web page. In addition, Caterpillar has developed graphs which characterize grading production rates based on seismic velocity. The Caterpillar charts presented with this report have also been colored to correspond with the colors and velocities presented on the refraction surveys; as the palate colors become warmer, excavatability becomes more averse. It should be noted that these productivity rates assume:

- Machine rips full time; i.e. no dozing.
- The rates apply to power shift tractors with single shank rippers.
- 100% efficiency.
- And ideal conditions. Lack of joints, seams, or discontinuities would adversely affect the production rates presented in Figure 3. Reductions up to 25% can occur due to rock mass properties alone.



“Ideal conditions” should be further discussed because excavatability is so dependent on rock structure and the contractor's means and methods. The ‘A’ line on the Caterpillar rippability chart indicates ideal production conditions. The ‘B’ line indicates adverse production conditions.

P-wave velocities do not typically exceed 5,000 feet per second (fps) until depths of 25-30 feet and therefore based on excavatability characteristics presented by Caterpillar, excavatability of the near surface rock should not present adverse conditions. Caterpillar also typically presents that P-wave velocity around 7,000 fps is where the need for blasting becomes more critical. Deeper utility cuts within deeper mass grading cuts can experience difficulty with lower velocities due to the excavation limitations offered by trenching equipment.

Results from geophysical modelling are included in Plate 20 through Plate 28.

B. Laboratory Testing

Bulk representative samples from the exploratory test pits were selected for laboratory testing. Index tests were performed which were in turn correlated with typical engineering design parameters for similar soils. The following tests were performed:

- Particle size analysis (ASTM D422)
- Atterberg Limits (ASTM D4318)
- R-Value (ASTM D2844)
- Corrosivity Suite

III SUBSURFACE SOILS AND GROUNDWATER CONDITIONS

A. Soils

All test pits encountered a surface layer of brown, loose to medium dense, silty to clayey sand with varying amounts of coarse gravel (SM-SC) to depths of four feet BEG. Weathered granodiorite bedrock was encountered in several test pits which excavated and broke down to predominately a poorly graded gravel with sand and silt (GP-GM) and varying amounts of cobble-sized fragments that in many cases continued to break down to gravel and coarse sand-sized particles.

While the predominant bedrock condition exhibited moderate weathering and relatively weak rock strength that would crumble under light hammer blows, Test Pit TP-2 and TP-5 both encountered a slightly weathered bedrock with rock fragments that were harder and stronger than much of the other rock encountered across the site.

According to mapping by the U. S. Department of Agriculture, Soil Conservation Service (*Soil Survey of Washoe County, Nevada, South Part*), the site is underlain by Verdico variant stony sandy loam, 8 to 15 percent slopes (#290), and Greebrae sandy loam, 2 to 4 percent slopes (#132). According to the survey, surface soils may be composed of silty sand (SM), a discontinuous layer of clayey sand to sandy clay (SC-CL) to 28 inches, and underlain by a stratified coarse sand to gravelly loam.

Based on our field observations and laboratory evaluations, the on-site soils were very consistent with the USDA mapped descriptions, and should be excavatable with conventional grading equipment. Limited and localized blasting could be required within confined trenches depending on final site layout and utility configurations.

B. Groundwater

At the time of our exploration, ground water was *not* encountered in any of the test pits to the maximum explored depth of 14 feet BEG. Based on a query of groundwater wells from the Division of Water Resources, an average depth to water in the area is 250 feet; however due to elevation differences across the Section, this depth could range from 25 feet to 430 feet.

Ground water should not affect construction at this site; however, depths to groundwater may vary significantly over time due to seasonal precipitation and snow fall/melt that may significantly affect surface and near-surface water seepage. Provisions should be made during construction to manage surface and subsurface water flows.

IV GEOLOGIC AND SEISMIC CONSIDERATIONS

To delineate possible faulting and to evaluate any other geological hazards on the site, our investigation included a review of available geological literature.

A. Geology

Regional Geology

This primarily down-to-the-east fault zone extends from the north edge of the Truckee Meadows north to the north end of Hungry Ridge and consists of: (1) nearly continuous range-front and piedmont faults on the west side of Spanish Springs Valley extending the entire length of valley (Bell, 1984 #105; Bell and Bonham, 1987 #3643) and (2) a subsidiary zone of intermontane and intra basin faults on the west side of Sun Valley that extend through a low pass on the north side of Sun Valley and apparently join the main range-front fault on the west side of central Spanish Springs Valley (Bonham and Bingler, 1973 #3607; Bell, 1984 #105).

Based on the *Reno Folio Geologic Map*, Nevada Bureau of Mines and Geology (NBMG, 1973), prepared by H.F. Bonham Jr. and E.C. Bingler, the materials in the general site vicinity are primarily composed of the following:

Peavine Sequence (Mzv) – “Gray to gray-green metavolcanic rocks with subordinate amounts of metamorphosed epiclastic volcanic sedimentary rocks. The metavolcanic rocks include rhyolite flows and pyroclastics and dacite to andesite flows and laharic breccias. Where fresh, highly resistant to erosion and tends to form bold outcrops.”

Quartz Monzonite (Maqm) – “Coarse-grained, light gray plutonic rock composed of microcline, quartz, plagioclase, and moderately abundant biotite. Deeply weathered and does not normally crop out.”

Granitic Alluvium (Qg) – “Weathered granitic sand.”

Secondary bedrock and surficial deposits mapped adjacent to the site include:

Granodiorite (Mzgd) – “Gray hornblende-biotite granodiorite. Deuteric alteration has commonly formed actinolite and chlorite from hornblende and biotite; epidote, calcite, and sericite partially replace plagioclase. Not normally deeply weathered and usually forms numerous outcrops.”

B. Faulting, Seismicity, and Slope Stability

Faulting

The United States Geological Survey (USGS) publishes a Quaternary fault and fold database for use with Google Earth. This database allows the user to view possible faults at or near a location. The database shows a spread of the Spanish Springs Valley fault trending in a roughly northeast to southwest direction traversing the project site. This fault is of undifferentiated late Quaternary age and are considered sufficiently inactive due to the age since last movement. Based on provisions of the 2018 IBC and Northern Nevada Amendments, it is our opinion that this fault zone requires no further investigation for consideration of building development. Structures should generally maintain a minimum 100-foot setback from any Holocene-active mapped faults, which are mapped 1.5 miles northeast of the site and 2.25 miles southeast of the site and not trending through the site.

Seismicity

Active faults capable of generating large magnitude earthquakes have been identified within the region. Strong ground shaking associated with earthquakes should be expected to occur during the life of the project.

Literature prepared by A. Ryall and B. M. Douglas (NBMG, *Regional Seismicity*, Reno Folio, 1976) indicates that earthquake recurrence curves predict a return period of 70 to 80 years for an earthquake of Magnitude 7.0 or greater within 62 miles of the Reno area. They also calculate that, on average, an earthquake of Magnitude 5.3 to 5.4 would be expected to occur within 20 miles of Reno approximately once in 30 years, would have a maximum bedrock acceleration of 0.12 to 0.19g, and would involve about 6 seconds of strong shaking. The expected return period of rock accelerations greater than 0.5g at an average site in western Nevada associated with an earthquake of magnitude greater than 7.0 is on the order of 2,000 years.

Slope Stability

Based to the well-consolidated and dense nature of the subsurface soils, we do not anticipate that slumping and/or ground disturbances will impact the site for the planned cut and fill slopes. Re-vegetation and slope armor should be designed in accordance with Washoe County design guidelines.

Global slope stability analyses have been performed for tiered rockery retaining wall sections as well as planned permanent cut and fill slopes. Global minimum safety factors greater than 3.5 have been calculated utilizing both the Bishop and Janbu simplified analysis method of slices for a proposed slope as steep as 2H:1V cut slope.

A calculation summary has been included as Appendix B.

C. Seismically-induced Liquefaction

Liquefaction, a loss of soil shear strength, is a phenomenon associated with loose, relatively clean, saturated granular soils (poorly graded sands and silty sands) subjected to earthquake shaking. Liquefaction can result in differential settlements of foundations and other structural elements supported by susceptible soils. Based on the depth to groundwater, and the dense

condition of the native site soils beneath the site, it is our opinion that the potential for liquefaction at this site is nil.

D. Tsunami or Seiche

A tsunami, or a seiche, is a great wave produced by an earthquake or by volcanic activity. A seiche is an oscillating tsunami that develops in enclosed bodies of water, like lakes or bays. The oscillation is typically triggered by variations in atmospheric pressure, wind, tidal currents, earthquakes, or a combination of these factors. Depending on the geometry of the basin, the oscillation continues for some time after the triggering event has ended. There are no large bodies of water near the project site; therefore, the potential for tsunamis or seiches to impact the site is considered nil.

E. Radon

Radon, a colorless, odorless, radioactive gas derived from the natural decay of uranium, is found in nearly all rocks and soils. The Environmental Protection Agency (EPA) suggests that remedial action be taken to reduce radon in any structure with average indoor radon level of 4.0 pCi/L or more. Based on studies completed by the Nevada Bureau of Mines and Geology in cooperation with the Nevada Division of Health and the U.S. Environmental Protection Agency (*Radon In Nevada*, Nevada Bureau of Mines and Geology, Bulletin 108, 1994), the project site is considered within an area where average indoor radon concentrations could exceed 4.0 pCi/L. We recommend testing the site for radon upon completion of rough grade. Our office can be of assistance if radon testing is desired.

F. Flooding

Based on studies completed by the Federal Emergency Management Agency (FEMA), Community Panel Number 32031C3032G, effective March 16, 2009, the project site is within Flood Hazard Zone X (unshaded). *These are areas determined to be outside of the 0.2 percent annual chance floodplain (500-year flood).*

V CONCLUSIONS

Based on the results of our investigation, experience in the project area, and understanding of the proposed project, it is our opinion that the subject site is suitable for development provided the recommendations presented in this report and subsequent reports are followed during the design and construction phases of the project. The primary identified geotechnical constraints are:

- Potential for difficult grading and trench excavations of weathered bedrock and where outcrops and boulders are encountered,
- On-site processing of a relatively uniform blend of structural fill materials,
- Filling on natural slopes, and
- Maintenance of permanent slopes and retaining structures.

Following are our conclusions.

1. Site soils consist predominately of medium dense to very dense, silty sand and gravel soils with varying amounts of cobbles and small boulders encountered within shallow excavatable bedrock. The surface one to two feet is generally composed of silty to clayey sand of low plasticity and potential expansiveness over most of the project area.
2. Some test pit excavations met practical refusal within weathered granodiorite bedrock at depths ranging from 10 feet to 12 feet below existing grade. The explorations were ceased due to production at a rate slower than 15 minutes per foot of test pit excavation.
3. Based on the two-dimensional seismic (P-Wave) velocity profiles performed in proposed areas of cut, the majority of the proposed cut sections present velocities less than 7,000 feet per second in the upper 30-feet below existing grade. Varying degrees of weathering and hardness were encountered. One area of higher seismic velocities was measured at shallow depths at the base of Line 1 where surface boulders were encountered, and the end of Line 5 where weathered rock outcrop was encountered.
4. A reference to Caterpillar's Handbook of Ripping Prediction Service tables indicates the expectation of rippable for the geologic materials with a Cat D9 and greater, and rippable to marginal with a Cat D8. In our experience, where seismic profiles indicate velocities approaching 8,000 feet per second, the adverse curve on the production charts is approached.
5. The project site is within Flood Hazard Zone X (unshaded), which is classified as areas determined to be outside of the 0.2 percent annual chance floodplain (500-year flood).
6. There are no apparent geologic hazards that would place unusual constraints on the project; however, strong ground shaking associated with earthquakes should be expected to occur during the life of the project.
7. Based on the depth to groundwater, and the dense nature of the underlying native soils and bedrock, we believe the site is *not* susceptible to liquefaction.

VI RECOMMENDATIONS

The following recommendations are based on present information; no vertical loading information or site plans showing finished-floor elevations or cuts-and-fills were available at the time of writing. When available, site grading plans should be reviewed by WESTEX to evaluate whether or not the recommendations in this report remain valid, and to provide design-level recommendations for the proposed construction.

A. Site Preparation and Grading

Due to the relatively low-plasticity nature of predominately granular soil types, an indiscriminate grading approach is anticipated to generate structural fill soils provided over-sized particles greater than 12-inch nominal diameter are removed from the upper five feet of fills. The contractor must be able to prove their ability to compact such rock fills without nesting and while obtaining sufficient compaction levels.

Areas to be mass graded should be cleared of any existing and pre-existing improvements, debris, cobbles, boulders, and vegetation. These materials should be removed from the site; however, cobbles and boulders may be stockpiled for reuse in deeper mass fills, slope fills, or landscape areas. Particular attention should be given to the complete removal of root systems

associated with the removal of trees and large shrubs prior to placing fill. Any voids created by such removal should be properly backfilled and compacted.

Minor root systems remaining after stripping may be disked or tilled in-place through the use of a disk harrow or equivalent equipment. Stripped soil and any excavated soils that are not considered suitable for structural backfill should be removed from the site, or used in nonstructural areas. If expansive materials, existing fill, or any unusual soil conditions not addressed in this report are encountered, WESTEX should be notified immediately.

We understand that the rough pad elevation will deliver relatively level lots. Due to the moderate slope of the site, the earthwork necessary to achieve these grades will result in a cut to fill transition zone with a maximum cut of about 10 feet towards the north and a maximum fill of about 6 feet toward the south. We recommend supporting all structural elements and flatwork on a uniform layer of compacted foundation soils as follows:

- Building Pad Preparation – Cut Sections: the resulting pad elevation shall be re-compacted to a minimum 90% relative compaction within two percent of optimum moisture content for a minimum of 12-inch depth.
- Building Pad Preparation – Transition Zones: the cut side of transition building pads (spanning the cut-fill line) shall be scarified 12-inches and re-compacted to a minimum 90% relative compaction and within two percent of optimum moisture content.
- Building Pad Preparation – Fills less than 5 feet: the entire body of the fill shall be compacted to a minimum of 90% relative compaction within two percent of optimum moisture.
- Building Pad Preparation – Fills 5 feet and greater: The upper five feet of building pad shall be compacted to a minimum of 92% relative compaction within two percent of optimum moisture content. The entire body of the fill shall be compacted to a minimum of 90% relative compaction and within two percent of optimum moisture content.
- Rock Fills: A rock fill is defined as material composed of more than 30% mass retained on the ¾-inch sieve and is not applicable to standard field density compaction testing; therefore, rock fills shall be placed under the full-time supervision of the Geotechnical Engineer (or their representative). The rock fill specification shall be performance-based and include moisture conditioning to within three percent of optimum content and a proof-rolling effort consisting of at least five single passes with a 20-ton roller (825 Cat, or equivalent) in mass grading, or five complete passes with hand compactors in footing trenches. This alternate has proven to provide adequate performance as long as all other geotechnical recommendations are followed. Monitoring of the proof-rolling program and subsequent daily inspection report shall include: number of passes (each way), equipment used, lift thickness, maximum rock diameter, estimated percentage of fill passing the ¾-inch sieve, and in-place moisture content. Density testing and moisture results should be attempted and reported as part of the Special Inspection program.
- Interior concrete slabs-on-grade: interior concrete slabs should be underlain by a minimum 12 inches of properly compacted non-expansive structural fill.
- Exterior Concrete Flatwork: underlain by a minimum 12 inches of properly compacted non-expansive structural fill.
- Pavement Sections: underlain by a minimum 18 inches of properly compacted non-expansive structural fill.
- **Over-excavation depths do not include aggregate base sections.**
- **All aggregate base sections shall be compacted to a minimum of 95% relative compaction within two percent of optimum moisture content.**

- **All references to relative compaction are per ASTM D1557.**

Over-excavation and re-compaction should extend laterally beyond foundation edges a distance equivalent to the total depth vertically removed. The surfaces exposed by removal or over-excavation should be observed by a representative of WESTEX to document that the conditions are as anticipated and that no objectionable materials are present within the structural zone.

Scarification and moisture conditioning may be waived by the Geotechnical Engineer (or their representative) if it is determined that the exposed materials exist at a suitable moisture content for attaining compaction or contain oversize material which will inhibit compaction procedures and result in a lesser density state. Surfaces which contain oversize material should be “proof-rolled” under the observation of the Geotechnical Engineer (or their representative) to ensure that adequate compaction has been attained within the soil matrix. The Earthwork Contractor is responsible for obtaining approval for each prepared surface prior to proceeding with placement of structural components or fills.

B. Fill Placement and Compaction

In order to provide quality control where fill material is proposed to attain grades, structural zones are defined as the area five feet below and laterally away from foundations and 24 inches below slabs-on-grade, exterior flatwork and flexible pavement sections. Mass zones are defined as all areas outside the structural zones.

Only approved, select material may be utilized within structural zones; however, materials which do not meet the requirements for structural fill may, in general, be used within mass zones with the prior approval of the Geotechnical Engineer (or field representative). For structural fills and mass grading at least one field density test shall be performed every 1,000 cubic yards of material placed during mass grading; a minimum of one test shall be performed for each lift for the upper three feet of building pad and roadway fills.

Suitability of On-site Soils

The native granular soils and weathered bedrock are considered suitable for use as structural fill, provided any deleterious material and/or cobbles larger than 12-inch diameter are removed from the upper five feet of rough grade. Oversize cobbles and boulders may be incorporated into deeper fills, deeper than five feet of pad grade, provided nesting is avoided. Any lean clay soils are not considered suitable for use as structural fill; however, are suitable for mass grading provided they are deeper than five feet below pad grade and compacted in accordance with fill specifications, Section IV, A.

Fill Material Specifications

Import soils used as structural fill should be free of organic matter and in general conform to the following requirements:

TABLE 1 IMPORT STRUCTURAL FILL SOIL REQUIREMENTS	
Sieve Size	% Passing (by dry weight)
6-inch	100
3/4-inch	70 – 100

No. 4	50 – 100
No. 200	15 – 40

Liquid Limit = 40 maximum
Plasticity Index = 15 maximum
R-Value = 30 minimum
Non-deleterious to concrete (low sulfate)

The Earthwork Contractor shall ensure that all proposed fill materials are approved by the Geotechnical Engineer prior to use. Representative imported material samples shall be made available for testing 10 working days prior to hauling to allow for material quality tests.

The recommendations for structural fill are intended as a guideline and define a readily attainable, acceptable material. Adjustments to the specified limits to address the use of other potentially acceptable materials, such as those containing oversize rock or which deviate from the classification requirements, can be made provided: 1) the Earthwork Contractor can demonstrate their ability to place and compact the material in substantial conformance with industry standards to achieve an equivalent finished product as that specified; 2) the Geotechnical Engineer gives their written approval; 3) the Geotechnical Engineer (or their representative) directly observes and approves the placement method; and 4) all parties understand that the Standard ASTM Compaction Test procedures may be invalid for certain material containing oversize aggregate. Compaction approval would only be achieved based on other criteria, such as a performance specification with full-time on-site observation.

Fill Placement

All fill on slopes shall be properly keyed and benched into the existing soils for a minimum width of four feet, depth of three feet, and placed in level lifts. Before placement of fill, canyon drains should be installed in any drainages that will be covered with fill.

Lift thickness shall be restricted to 8 inches (maximum loose lift) and individually tested unless the Earthwork Contractor can demonstrate their ability to uniformly achieve the required compaction for the entire placed layer. All properly compacted structural fill based on the maximum dry density determined by ASTM D1557, and as referenced in the Site Preparation and Grading Section above.

C. Site Surface Drainage

Adequate drainage for surfaces adjacent to foundations and improvements should be provided to restrict water from infiltrating into the supporting soils. In order to allow water to drain away from the structure and prevent ponding against perimeter foundations, the ground surface should be permanently sloped at least one-half percent for concrete, one percent for A/C pavement, and two percent for soil. Landscape adjacent to structural areas should be limited and consist of native vegetation utilizing drip-type irrigation.

D. Foundation Support

Conventional spread foundations can gain adequate support on the above specified approved, compacted, structural fill material. As previously mentioned, to control the potential for differential

settlement, the supporting materials within spread footings should consist of a uniform 12-inch layer of approved, moisture-conditioned, compacted structural fill material.

In preparation for foundation construction, the earthwork contractor shall ensure that field density tests have been performed to document the relative compaction and shall be responsible for maintaining the recommended moisture content during construction. Preparation of these materials shall be documented prior to placement of structural components.

For adequate confinement and frost protection, standard footings should be bottomed at least 24 inches below lowest adjacent exterior grade. Footings supported in accordance with the recommendations herein can be designed for a net allowable bearing capacity of 2,500 pounds per square foot (psf). This pressure can be increased by one-third when considering total design loads, including wind or seismic forces.

Estimated total and differential settlement for footings designed for these bearing capacities should be less than 1 inch and ½ inch, respectively.

Seismic Design Parameters

We obtained the site seismic design parameters using the *ATC Hazards by Location* application. The web-based application can be found at:

<https://hazards.atcouncil.org>

The mapping database is used for determining seismic design values according to ASCE 7-16 and the 2018 International Building Code. Design parameters are presented in Table 2:

TABLE 2 2018 IBC SEISMIC DESIGN PARAMETERS	
Description	Value
Latitude	39.608181 deg
Longitude	-119.760344 deg
Site Class	C – “Very dense soil and soft rock”
Risk Category	I/II/III
Short-Period (0.2 sec) Spectral Response, S_S	1.384 g
Long-Period (1.0 sec) Spectral Response, S_1	0.481 g
Short-Period (0.2 sec) Site Coefficient, F_A	1.2
Long-Period (1.0 sec) Site Coefficient, F_V	1.5
Short (0.2 sec) MCE Spectral Response, S_{MS}	1.661 g
Long (1.0 sec) MCE Spectral Response, S_{M1}	0.722 g
Short (0.2 sec) Design Spectral Response, S_{DS}	1.107 g
Long (1.0 sec) Design Spectral Response, S_{D1}	0.481 g
PGA	0.5 g
Seismic Design Category	D
Seismic Design Category (2018 IRC, Washoe County)	D2

Site Classification

Based on our field exploration, on-site geophysical measurements, and knowledge of the site geology, a Site Classification of C “Very dense soil and soft rock” is appropriate use for structural design per ASCE 7-16.

It should be noted that this site classification is not intended to describe the gravel, cobble or boulder properties encountered on-site. Please refer to Plate 5, *Criteria for Rock Descriptions*, along with the Test Pit logs with photographs to make characterizations of encountered materials during this investigation.

E. Lateral Resistance and Loads

Lateral Resistance

Resistance to lateral loads can be obtained from passive earth pressures and soil friction against the bottom of concrete foundation elements. For design, we recommend the use of a coefficient of friction of 0.45 with a passive pressure of 350 pounds per cubic foot (equivalent fluid) per foot of depth.

Lateral Loads

The granular native soils are considered suitable for use as retaining wall backfill (within the zone of 10-feet behind back of wall), provided all deleterious material and material larger than six inches are removed. All backfill materials should meet the requirements of Table 1 *Import Structural Fill Requirements* and be limited to granular soils for native backfill soils. Accordingly, for level backfill using select granular materials, the recommended active pressure can be taken as 45 pounds per cubic foot (equivalent fluid pressure). For restrained retaining walls, the design at-rest pressure can be taken as 60 pounds per cubic foot (equivalent fluid pressure).

Retaining Wall Drainage

Subsurface drainage of any retaining structures is required to prevent the build-up of hydrostatic pressures behind the retaining walls. Drainage structures should at a minimum consist of perforated 4-inch in diameter drain pipe within 12 inches of drain rock, extended laterally behind the wall, enveloped by drainage fabric. The drain pipe should outlet to proper drainage devices. Actual drainage design should also incorporate project waterproofing requirements. The design of the system should be performed by the Project Civil Engineer. Moreover, the retaining wall should be designed with either a drainage swale, interceptor, or other mechanism to divert water away from the top of the wall. Water should never be allowed to pond adjacent to any retaining wall.

F. Concrete Slab-On-Grade

In preparation for flatwork construction, the Earthwork Contractor shall ensure that soils have been prepared as recommended and that field density tests have been performed to document that the relative compaction of the slab subgrade is per the fill and compaction specifications referenced in Section IV, A. Preparation of the native soils shall be documented prior to placement of structural fill, aggregate base or structural components.

Interior Concrete Slabs-on-Grade

Interior concrete slabs-on-grade should be supported on properly compacted structural fill meeting the requirements of Table 1, *Import Structural Fill Soil Requirements*. Structural slab design is the responsibility of the project structural engineer.

For slab-on-grade design, a Modulus of Subgrade Reaction (k) of 150 pounds per square inch per inch may be used for materials meeting the requirement for structural fill.

Due to the potential for seasonal surface water and lateral vapor migration to occur, associated with seasonal moisture change and differences between the building interior and exterior ambient conditions, a vapor inhibitor should be considered if moisture sensitive floor coverings are proposed. Vapor barriers should be designed in accordance with current American Concrete Institute (ACI) guidelines, and placed in accordance with ACI 302.1R-15 Fig. 5.2.3.2.

Exterior Concrete Slabs-on-Grade

All dedicated exterior flatwork should conform to standards provided by the governing agency including section composition, supporting material thicknesses and any requirements for reinforcing steel.

Exterior concrete flatwork (i.e. curb and gutter, walkways, stoops and patios) should be supported on properly compacted structural fill meeting the requirements of Table 1, *Import Structural Fill Soil Requirements*. Lightly loaded exterior flatwork, such as walkways, should consist of at least 4 inches of Type II Portland cement concrete with a minimum 28-day compressive strength of 4,000 pounds per square inch (psi) with entrained air, underlain by at least 6 inches of compacted (95 percent relative compaction) aggregate base material.

Concrete mix proportions and construction techniques, including the addition of water and improper curing, can adversely affect the finished quality of the concrete and result in cracking and spalling of the slabs. We recommend that all placement and curing be performed in accordance with procedures outlined by the American Concrete Institute and Portland Cement Association. Special considerations should be given to concrete placed and cured during hot or cold weather conditions. Proper control joints and reinforcing should be provided to minimize any damage resulting from shrinkage.

G. Permanent Cut-and-Fill Slopes

All permanent cut and fill slopes may be constructed with a maximum inclination of 2H:1V. Where fill is to be placed on natural slopes of 5:1 or steeper, keying and benching shall be provided along the fill/native soil interface. The keyway, located at the base of the slope, shall be at least two feet in depth and five feet in width.

A bench (at least 3 feet in width) should be provided for every 10 feet of vertical slope height. Benches should also incorporate rip rap lined drainage swales with positive drainage, sufficient to divert runoff and suspended material down and away from the slope. A temporary protective fencing should be considered at the top of each bench to contain any oversize aggregate which may become dislodged and/or to discourage activity along the slopes.

The Contractor shall overfill and trim the face of all fill slopes or compact them to provide a firm surface, free of loose soil that would be subject to erosion and sloughing. To further minimize

erosion potential and future maintenance, upon completion of grading, all fill slopes should be at least planted with dense-rooted, rapid growing vegetation or otherwise protected (such as rip rap). All slopes should be evaluated by the Geotechnical Engineer to document that the conditions are as anticipated and that our recommendations concerning bench height and width are appropriate.

H. Corrosion

The native soils in the area are mapped and have been tested as a low corrosion potential. Based on the results of corrosive testing performed on composite samples taken from a depth of 0-8 feet BEG indicate that the material has a soluble sulfate concentration ranging from 38 to 51 mg/Kg (ppm). The native soils are not considered detrimental to normally formulated concrete per ACI guidelines. Detailed analytical results are included on Plate 19.

I. Utilities, Trench Excavation, and Backfilling

The Earthwork Contractor must comply with the "Safety and Health Regulations for Construction" as directed by the Occupational Safety and Health Act (OSHA Standards, Volume III, Part 1926, Subpart P) while excavating and backfilling. The Earthwork Contractor is also responsible for providing a competent person, as defined by OSHA standards, to ensure excavation safety.

Pipe bedding and trench backfill materials should be moisture conditioned to slightly over optimum and compacted to 90 percent relative compaction, or local requirements, based on the maximum dry density determined by ASTM D1557. The upper 12 inches of trench backfill within asphalt or concrete paved areas should be compacted to a minimum 95 percent relative compaction as determined by ASTM D1557. The thickness of all lifts will be restricted to a maximum of 8 inches (loose) and individually tested unless the Earthwork Contractor can demonstrate their ability to uniformly achieve the required compaction for the entire layer of material placed.

For corrosion protection, where steel and/or metal pipes are proposed, we recommend that the Contractor follow the pipe manufacturer's recommendation regarding corrosion protection.

J. Pavement Sections

Based on the soil conditions encountered the County minimum pavement sections for local streets will be applicable to the project site. Flexible pavement sections should be supported on a minimum 12 inches of compacted structural fill overlying a properly prepared subgrade. To provide uniform pavement section support, subgrade soils shall exhibit a minimum Resistance Value of 30, and shall be scarified, moisture conditioned to within two percent of optimum moisture content, and compacted to at least 92 percent relative compaction. Pavement recommendations have been made considering a composite sample of native soils tested with a Resistance Value of 60; however, pockets of fine-grained or clay soil could be encountered and shall be segregated from the upper 24 inches of pavement subgrade soils.

Recommended 20-year pavement sections have been calculated using AASHTO 93 design methodology. These pavement sections have typically attained satisfactory performance measures in the region, and are presented in the following tables:

TABLE 3 PRELIMINARY ASPHALT CONCRETE PAVEMENT SECTIONS		
Pavement Designation	Asphalt Concrete (inches)	Aggregate Base (inches)
Local street	4	6
Collector street	5	8
Arterial street	6	12

TABLE 4 PRELIMINARY PORTLAND CEMENT CONCRETE PAVEMENT SECTIONS		
Pavement Designation	Concrete (inches)	Aggregate Base (inches)
Spandrels, Valley Gutters	6	6

The Earthwork Contractor shall ensure that field density tests have been performed to document the relative compaction of at least the upper 12 inches of structural fill and subgrade layers. Preparation of the subgrade soils shall be documented and sufficient tests shall be made to evaluate fully each different soil type in the project. All subgrade soils shall be compacted to a smooth non-yielding, uniform surface before placement of aggregate base. Aggregate base sections shall be compacted to a smooth non-yielding surface before placement of pavement sections. All roadway construction shall be in accordance with the Standard Specifications for Public Works Construction.

Pavement Longevity Recommendations

The performance of the pavements can be enhanced by minimizing excess moisture reaching the subgrade soils and pavement surface. The following recommendations should be followed, where possible:

- A polymer-modified asphalt oil, such as PG64-28NV, can be considered. The primary benefit of this oil type is improved rutting resistance, and, secondarily, less thermal (cold temperature) cracking, and overall improved mixture durability. Additionally, some modified binders provide improved stripping (moisture drainage) resistance.
- Proper drainage of the paved areas should be provided to increase the pavement life. The site should be graded a minimum of 2% away from the pavements.
- Compaction of any utility trenches for landscaped areas should be to the same criteria as the pavement subgrade.
- Landscaped areas should consider cutoff walls/moisture barriers adjacent to pavement areas to minimize or prevent excessive moisture migration to subgrade soils.
- Consideration should be given to using "desert" landscaping and/or minimizing watering to help prevent surface runoff.
- Periodic seal coating, crack sealing, and/or patching of the pavement should be anticipated.

K. Additional Geotechnical Engineering Services

This report is geotechnical in nature and not intended to identify other site constraints such as environmental hazards, wetlands determinations and/or the potential presence of buried utilities. We can assist in evaluating these considerations should further information be requested. Moreover, this office should be retained to provide grading observation and testing as well as associated special inspection during all phases of construction.

All plans and specifications for projects should be reviewed for conformance with this geotechnical report and approved by the Geotechnical Engineer prior to submission to the building department for review.

The recommendations presented in this report are based on the assumption that sufficient field inspection and construction review will be provided during all phases of construction. A pre-construction conference should be scheduled to include, but not be limited to, the Owner, Architect, Civil Engineer, General Contractor, Earthwork and Materials Sub-Contractors, Building Official and Geotechnical Engineer. The recommendations presented in this report should be reviewed by all parties to discuss applicable specifications and testing requirements. At this time, any applicable material quality and mix design reports should be submitted for approval by the Geotechnical Engineer.

WESTEX Consulting Engineers, LLC has prepared this report based on certain assumptions concerning subsurface conditions at the Property. WESTEX Consulting Engineers, LLC should also provide on-site observations and testing during site preparations, grading, excavation, fill placement, foundation installation, and paving. These observations will allow us to document that the soil conditions are as anticipated, and that the contractor's work is in conformance with the intent of our recommendations and the approved plans and specifications. Our conclusions and recommendations may be invalidated, partially or in whole, by changes outside our control and by subsequent acts occurring on the site after field reconnaissance. This report may be subject to review and revision at any time. Opinions about the condition of the Property do not constitute a warranty of any kind, either express or implied.

VII DISTRIBUTION

Two wet stamped copies mailed and one electronic copy via email to addressee:

LC Highland 2, LLC
c/o Jeffrey L. Holbrook, Manager
27132 B Paseo Espada, Suite 1226
San Juan Capistrano, CA 92675

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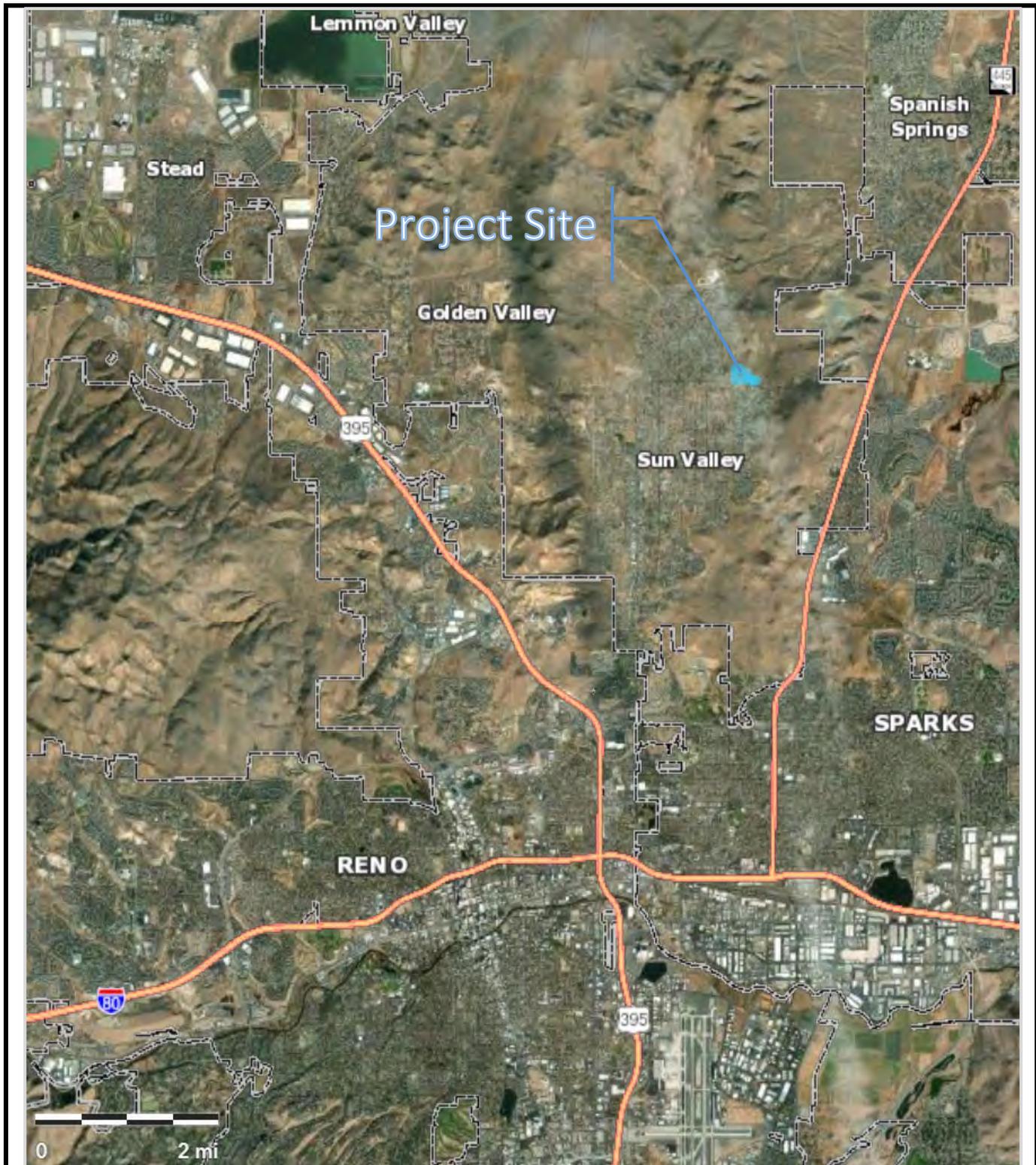
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GEOTECHNICAL FIGURES





Ref: Washoe County Assessors Map, Accessed May 2021.

Site Data			
APN	508-020-04	508-020-42	508-020-44
Zoning	LDS 88% / GR 12%	LDS 96% / GR 4%	LDS 81% / GR 19%
Area (ac)	4.94	10.138	3.33
Total (ac)	18.408		



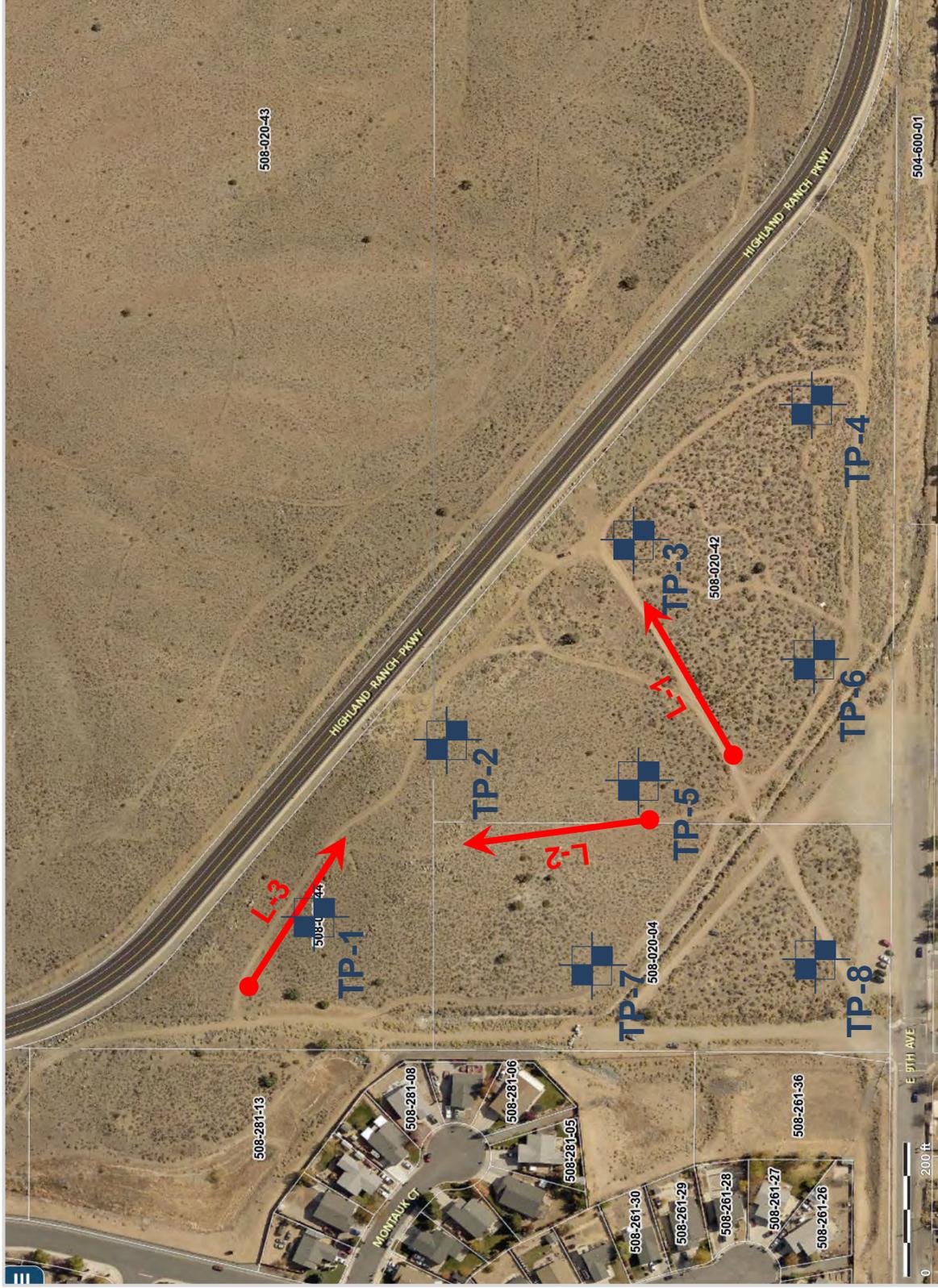
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Phone: (775) 771-9539

**SITE
VICINITY
MAP**

**Geotechnical Investigation
Highland Village Ph 2
APN 508-020-04, -42 & -44
Washoe County, Nevada**

Project No.: 2002.002-A
Date: 08/16/21

**PLATE
1**



Ref: Washoe County Assessor Quick Map, accessed May 2021.

TP-8



Approximate Test Pit Location



Approximate Geophysical Refraction Alignment (300')



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GEOTECHNICAL EXPLORATION MAP

Geotechnical Investigation

Highland Village Ph 2
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Washoe County, Nevada

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Date: 08/16/21

PLATE
2

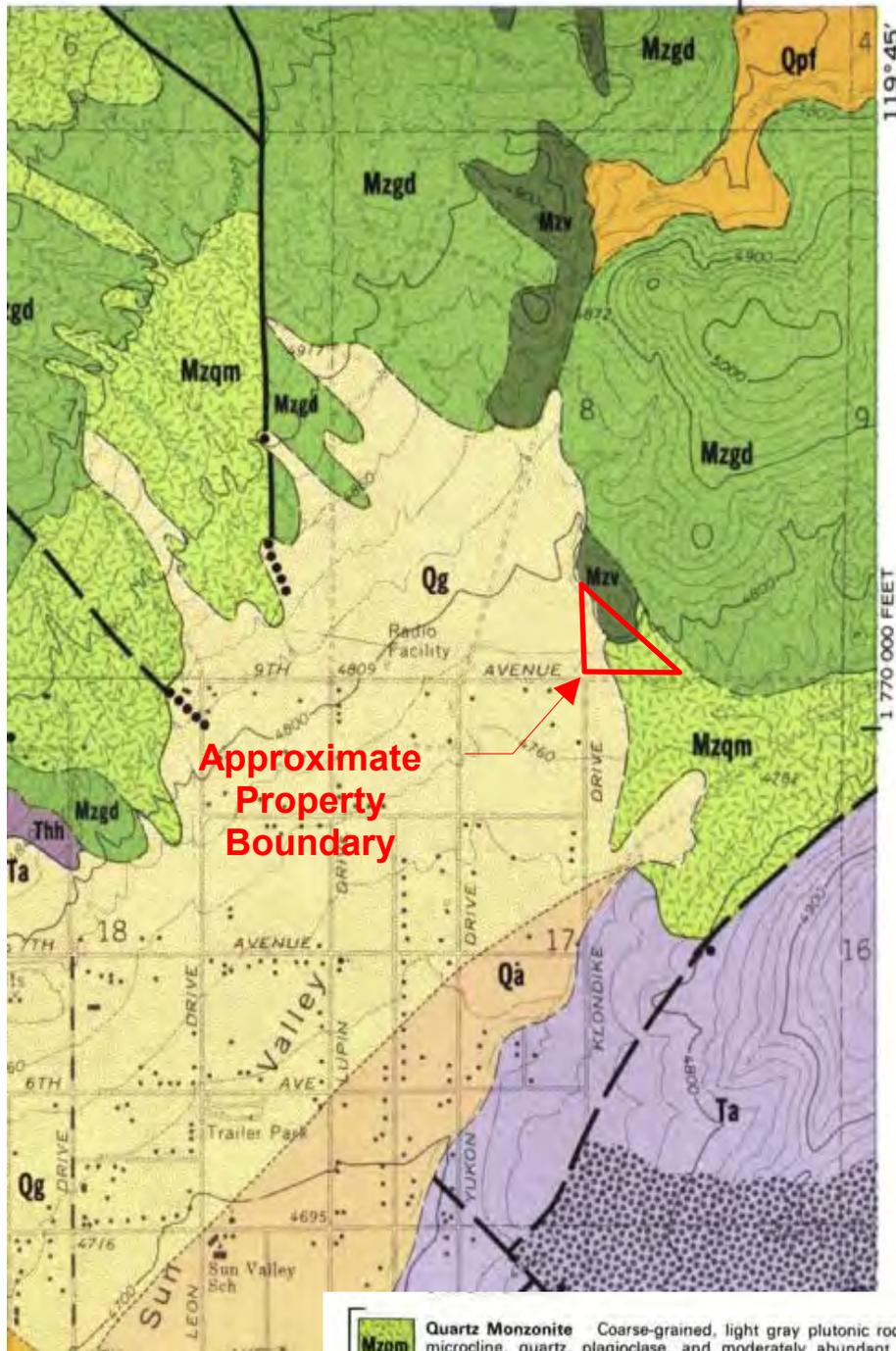
By H. F. Bonham Jr. and E. C. Bingler, 1973

RENO FOLIO GEOLOGIC MAP

NEVADA BUREAU OF MINES AND GEOLOGY
UNIVERSITY OF NEVADA
RENO, NEVADA 89507

R. 20 E.

170 000 FEET 39° 37' 30"



**Approximate
Property
Boundary**

QUATERNARY



Qg Granitic Alluvium
granitic sand. Weathered

MESOZOIC



Mzqm **Quartz Monzonite** Coarse-grained, light gray plutonic rock composed of microcline, quartz, plagioclase, and moderately abundant biotite. Deeply weathered and does not normally crop out.



Mzgd **Granodiorite** Gray hornblende-biotite granodiorite. Deuteric alteration has commonly formed actinolite and chlorite from hornblende and biotite; epidote, calcite, and sericite partially replace plagioclase. Not normally deeply weathered and usually forms numerous outcrops.



Mzv **Peavine Sequence** Gray to gray-green metavolcanic rocks with subordinate amounts of metamorphosed epiclastic volcanic sedimentary rocks. The metavolcanic rocks include rhyolite flows and pyroclastics and dacite to andesite flows and lahatic breccias. Where fresh, highly resistant to erosion and tends to form bold outcrops.



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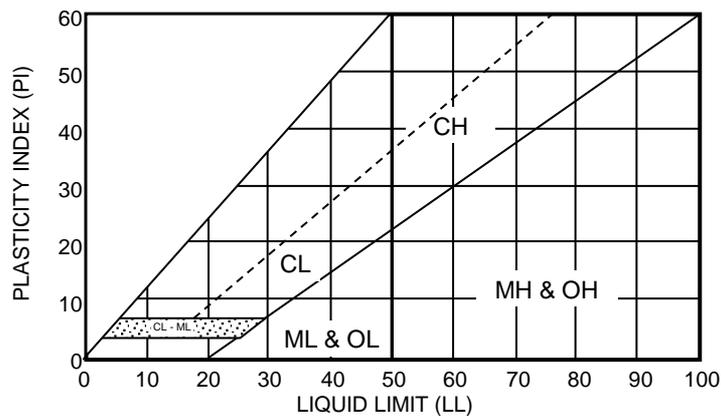
GEOLOGIC MAP

**Geotechnical Investigation
Highland Village Ph 2
APN 508-020-04, -42 & -44
Washoe County, Nevada**

Project No.: 2002.002-A
Date: 08/16/21

**PLATE
3**

MAJOR DIVISION					TYPICAL NAMES	
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVEL MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	○○○ ○○	GW	WELL GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES	
		GRAVELS WITH OVER 12% FINES	●●●	GP	POORLY GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES	
			●●●●	GM	SILTY GRAVELS, SILTY GRAVELS WITH SAND	
			●●●●●	GC	CLAYEY GRAVELS, CLAYEY GRAVELS WITH SAND	
	SAND MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	○○○ ○○	SW	WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES	
		SANDS WITH OVER 12% FINES	●●●	SP	POORLY GRADED SAND WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES	
			●●●●	SM	SILTY SANDS WITH OR WITHOUT GRAVEL	
		SILT AND CLAY LIQUID LIMIT 50% OR LESS	SILT AND CLAY LIQUID LIMIT GREATER THAN 50%	●●●●●	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTS WITH SANDS AND GRAVELS
				●●●●●	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY CLAYS WITH SANDS AND GRAVELS, LEAN CLAYS
				●●●●●	OL	ORGANIC SILTS OR CLAYS OF LOW PLASTICITY
●●●●●	MH			INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOLID, ELASTIC SILTS		
SILT AND CLAY LIQUID LIMIT GREATER THAN 50%	SILT AND CLAY LIQUID LIMIT GREATER THAN 50%	●●●●●	CH	INORGANIC CLAYS OR HIGH PLASTICITY, FAT CLAYS		
		●●●●●	OH	ORGANIC SILTS OR CLAYS MEDIUM TO HIGH PLASTICITY		
HIGHLY ORGANIC SOILS				Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS	



CONSISTENCY		RELATIVE DENSITY	
SILTS & CLAYS	SPT BLOW* COUNTS (N)	SANDS & GRAVELS	SPT BLOW* COUNTS (N)
VERY SOFT	0 - 2	VERY LOOSE	0 - 4
SOFT	3 - 4	LOOSE	5 - 10
MEDIUM STIFF	5 - 8	MEDIUM DENSE	11 - 30
STIFF	9 - 15	DENSE	31 - 50
VERY STIFF	16 - 30	VERY DENSE	50 +
HARD	30 +		

* The Standard Penetration Resistance (N) in blows per foot is obtained by the ASTM D1585 procedure using 2" O.D., 1 3/8" I.D. samplers.

DESCRIPTION OF ESTIMATED PERCENTAGES OF GRAVEL, SAND, AND FINES	
TRACE	Particles are present but est. < 5%
FEW	5% - 10%
LITTLE	15% - 20%
SOME	30% - 45%
MOSTLY	50% - 100%

NOTE: Percentages are presented within soil description for soil horizon with laboratory tested soil samples.

DEFINITIONS OF SOIL FRACTIONS	
SOIL COMPONENT	PARTICLE SIZE RANGE
COBBLES	ABOVE 3 INCHES
GRAVEL	3 IN. TO NO. 4 SIEVE
COARSE GRAVEL	3 IN. TO 3/4 IN.
FINE GRAVEL	3/4 IN. TO NO. 4 SIEVE
SAND	NO. 4 TO NO. 200
COARSE SAND	NO. 4 TO NO. 10
MEDIUM SAND	NO. 10 TO NO. 40
FINE SAND	NO. 40 TO NO. 200
FINES (SILT OR CLAY)	MINUS NO. 200 SIEVE

S.6 Rev 2-6-10



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KEY TO SOIL DESCRIPTIONS

Geotechnical Investigation
Highland Village Ph 2
APN 508-020-04, -42 & -44
Washoe County, Nevada

Project No.: 2002.002-A
Date: 08/16/21

PLATE
4

CONSOLIDATION OF SEDIMENTARY ROCKS

Usually determined from unweathered samples. Largely dependent on cementation.

U = unconsolidated

M = moderately consolidated

P = poorly consolidated

W = well consolidated

BEDDING OF SEDIMENTARY ROCKS

Splitting Property	Thickness	Stratification	Intensity	Size of Pieces in Feet
Massive	Greater than 4.0 ft.	Very thick-bedded	Very little fractured	Greater than 4.0
Blocky	2.0 to 4.0 ft.	Thick-bedded	Occasionally fractured	1.0 to 4.0
Slabby	0.2 to 2.0 ft.	Thin-bedded	Moderately fractured	0.5 to 1.0
Flaggy	0.05 to 0.2 ft.	Very thin bedded	Closely fractured	0.1 to 0.5
Shaly or platy	0.01 to 0.05 ft.	Laminated	Intensely fractured	0.005 to 0.1
Papery	Less than 0.01 ft.	Thinly laminated	Crushed	Less than 0.005

FRACTURING

HARDNESS

1. Soft - Reserved for plastic material alone
2. Moderately soft - can be gouged deeply or carved easily with a knife blade
3. Moderately hard - can be readily scratched by a knife blade; scratch leaves a heavy trace of dust and is readily visible after the powder has been blown away
4. Hard - can be scratched with difficulty; scratch produces little powder and is often faintly visible
5. Very Hard - cannot be scratched with a knife blade; leaves a metallic streak

STRENGTH

1. Plastic - very low strength
2. Friable - crumbles easily by rubbing with fingers
3. Weak - An unfractured specimen of such material will crumble under light hammer blows
4. Moderately Strong - Specimen will withstand a few heavy hammer blows before breaking
5. Strong - Specimen will withstand a few heavy hammer blows, and will yeild with difficulty only dust and small flying fragments
6. Very Strong - Specimen will resist heavy ringing hammer blows and will yeild with difficulty only dust and small flying fragments

WEATHERING

The physical and chemical disintegration and decomposition of rocks and minerals by natural processes such as oxidation, reduction, hydration, solution, carbonation, freezing, and thawing

- D.** Deep - Moderate to complete mineral decomposition; extensive disintegration; deep and thorough discoloration, many fractures, all extensively coated or filled with oxides, carbonates and/or clay silt
- M.** Moderate - Slight change or partial decomposition of minerals; little disintegration; cementation little to unaffected; Moderate to occasionally intense discoloration; Moderately coated features
- S.** Slightly - No megascopic decomposition of minerals; little or no effect on normal cementation; Slight and intermittent, or localized discoloration; Few stains on fracture surfaces
- F.** Fresh - Unaffected by weathering agents; No disintegration or discoloration; Fractures usually less numerous than joints



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CRITERIA FOR ROCK DESCRIPTIONS

**Geotechnical Investigation
Highland Village Ph 2
APN 508-020-04, -42 & -44
Washoe County, Nevada**

Project No.: 2002.002-A
Date: 08/16/21

**PLATE
5**

Test Pit No.: TP-1										Date: June 7, 2021									
Project: Highland Village Phase 2										Excav. Method: Excavator, 2-foot bucket w/ rock teeth									
File No.: 2002.002-A										Excav. Type: Deere 225C LC									
Location: Washoe County, Nevada										Logged By: BDC									
DEPTH (FEET)	SAMPLE TYPE			Sample ID	Color	POCKET PENETROMETER (tsf)	CLAYEY SOILS				MOISTURE					USCS SYMBOL	DESCRIPTION		
	BULK	Grab	Drive Tube				VERY LOOSE	SOFT	MED. STIFF	STIFF	VERY STIFF	HARD	DRY	DAMP	MOIST			WET	SATURATED
					Brown	3.0		X					X					SM-SC	Silty sand to clayey sand with varying degrees of coarse gravel, sparse vegetation with light roots to 3", estimate 35% low plasticity fines content.
--2--				1A	Light Red Brown	4.5		X					X					GP-GC	Poorly graded gravel with silty clay and sand, angular cobbles and boulders encountered, estimated up to 15% low plasticity fines content.
--4--								X					X						
--6--								X					X						
--8--				1B	Gray Tan	5+		X					X					GM-SM	Competant boulders up to 4-foot diameter, soil matrix composed of dense to very dense silty gravel and silty sand, estimated up to 20% non-plastic fines content.
--10--								X					X						
--12--								X					X						
--14--								X					X						
								X					X						Practical Refusal at rate of advance slower than 1-foot in 15 minutes.
--16--																			
--18--																			
--20--																			
Total Depth: 14.0 feet						Groundwater: NFWE						Plate 6							

Test Pit No.: TP-2										Date: June 7, 2021									
Project: Highland Village Phase 2										Excv. Method: Excavator, 2-foot bucket w/ rock teeth									
File No.: 2002.002-A										Excv. Type: Deere 225C LC									
Location: Washoe County, Nevada										Logged By: BDC									
DEPTH (FEET)	SAMPLE TYPE		Sample ID	Color	POCKET PENETROMETER (tsf)	CLAYEY SOILS				MOISTURE					USCS SYMBOL	DESCRIPTION			
	BULK	Grab				Drive Tube	SOFT	MED. STIFF	STIFF	VERY STIFF	HARD	DRY	DAMP	MOIST			WET	SATURATED	
																			VERY LOOSE
--2--			2A	Brown to White	2.5	X				X								SP-SM	Poorly graded sand with silt and gravel, occasional angular boulder at surface, sparse vegetation with moderate roots to 6-inches, up to 15% low plasticity fines content, some angular cobbles up to 8-inch diameter.
--4--			2B	Light Brown to Tan	4.2		X			X								SW	Granodiorite, excavates as a well graded sand with fine gravel, less than 10% non-plastic fines content, becomes dense at 6-feet.
--6--							X			X									
--8--							X			X									
--10--				Light Brown	5+		X			X								SM-GM	Competant boulders up to 4-foot diameter, soil matrix composed of dense to very dense silty gravel and silty sand, estimated up to 20% non-plastic fines content.
--12--							X			X									
--14--							X			X									
--16--																			
--18--																			
--20--																			
Total Depth: 14.0 feet										Groundwater: NFWE		Plate 7							

Test Pit No.: TP-3										Date: June 7, 2021								
Project: Highland Village Phase 2										Excv. Method: Excavator, 2-foot bucket w/ rock teeth								
File No.: 2002.002-A										Excv. Type: Deere 225C LC								
Location: Washoe County, Nevada										Logged By: BDC								
DEPTH (FEET)	SAMPLE TYPE		Sample ID	Color	POCKET PENETROMETER (tsf)	CLAYEY SOILS				MOISTURE				USCS SYMBOL	DESCRIPTION			
	BULK	Grab				Drive Tube	VERY LOOSE	LOOSE	MED. DENSE	DENSE	VERY DENSE	DRY	DAMP			MOIST	WET	SATURATED
--2--			3A	Light Brown	1.5	X				X					SC-SM	Silty clayey sand, upper two feet are very loose, moderate sagebrush, light roots to 6-inches, up to 30% low to moderate plasticity fines content.		
				Tan	2.5		X				X							
--4--								X										
				Brown	3.5			X				X						
--6--								X				X						
				3B	Yellow Brown	4		X				X						
--8--									X				X					
									X				X					
--10--									X				X					
									X				X					
							5+		X			X						
--12--									X				X					
									X				X					
--14--									X				X					
									X				X					
																Bottom of Test Pit		
--16--																		
--18--																		
--20--																		
Total Depth: 14.0 feet					Groundwater: NFWE					Plate 8								

Test Pit No.: TP-4	Date: June 7, 2021
Project: Highland Village Phase 2	Excv. Method: Excavator, 2-foot bucket w/ rock teeth
File No.: 2002.002-A	Excv. Type: Deere 225C LC
Location: Washoe County, Nevada	Logged By: BDC

DEPTH (FEET)	SAMPLE TYPE			Sample ID	Color	POCKET PENETROMETER (tsf)					MOISTURE					USCS SYMBOL	DESCRIPTION	
	BULK	Grab	Drive Tube			CLAYEY SOILS					DRY	DAMP	MOIST	WET	SATURATED			
						SOFT	MED. STIFF	STIFF	VERY STIFF	HARD								
						SAND OR GRAVEL												
VERY LOOSE	LOOSE	MED. DENSE	DENSE	VERY DENSE														
--2--				4A	Pale to Light Brown	1.5	X					X						
	X								X									
	X								X									
	X								X									
--4--						4B	Yellow Brown	2.5	X					X				
	X										X							
	X										X							
	X										X							
--6--				4B	Yellow Brown			3.5	X					X				
	X										X							
	X										X							
	X										X							
--8--						4B	Yellow Brown	4.5	X					X				
	X										X							
	X										X							
	X										X							
--10--				4B	Yellow Brown			4.5	X					X				
	X										X							
	X										X							
	X										X							
--12--						4B	Yellow Brown	4.5	X					X				
	X										X							
	X										X							
	X										X							
--14--				4B	Yellow Brown			4.5	X					X				
	X										X							
	X										X							
	X										X							
--16--						4B	Yellow Brown	4.5	X					X				
	X										X							
	X										X							
	X										X							
--18--				4B	Yellow Brown			4.5	X					X				
	X										X							
	X										X							
	X										X							
--20--						4B	Yellow Brown	4.5	X					X				
	X										X							
	X										X							
	X										X							

GPS: 39.607470, -119.758306
Datum: EL ~ 4,788 feet +/-
DESCRIPTION
 Format: GROUP NAME: cementation; grain size; modifiers

SP-SM
 Poorly graded sand with silt, medium to fine grained sand with up to 15% non-plastic fines content, trace of fine gravel, sparse sagebrush with light roots at 12-inches below surface.

SC-SM
 Silty clayey sand, medium grained sand with up to 25% low plasticity fines content, some particles excavate in 4-inch minus clumps that are weakly cemented and easily break down to a silty sand, some fine gravel content.

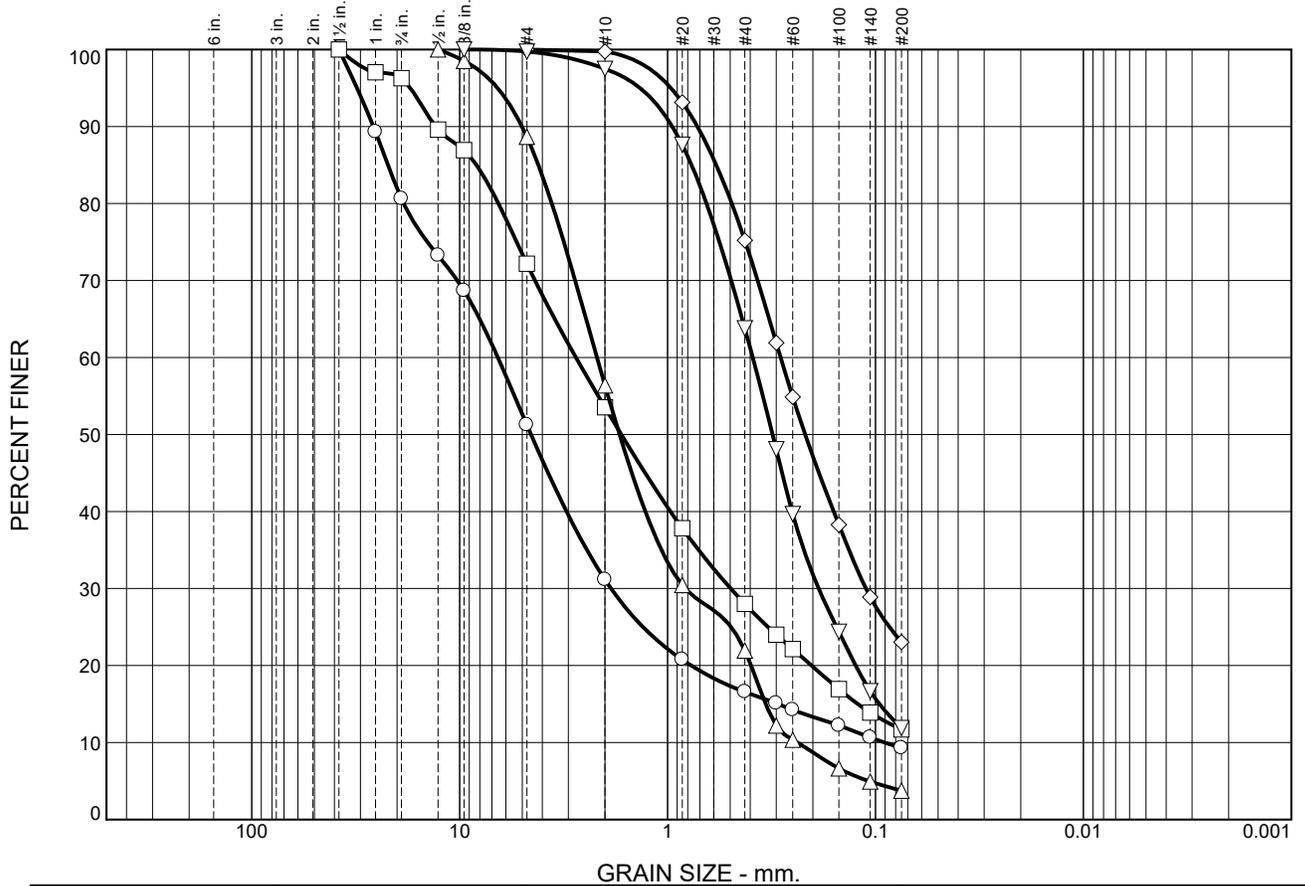
Bottom of Test Pit

Test Pit No.: TP-5										Date: June 7, 2021									
Project: Highland Village Phase 2										Excv. Method: Excavator, 2-foot bucket w/ rock teeth									
File No.: 2002.002-A										Excv. Type: Deere 225C LC									
Location: Washoe County, Nevada										Logged By: BDC									
DEPTH (FEET)	SAMPLE TYPE			Sample ID	Color	POCKET PENETROMETER (tsf)	CLAYEY SOILS				MOISTURE					USCS SYMBOL	DESCRIPTION		
	BULK	Grab	Drive Tube				VERY LOOSE	SOFT	MED. STIFF	STIFF	VERY STIFF	HARD	DRY	DAMP	MOIST			WET	SATURATED
--2--				5A	Light Brown to Brown	3.0	X					X						SC	Clayey sand with silt, upper one foot is loose, moderate sagebrush, light roots to 3-inches, up to 30% moderate plasticity fines content.
--4--				5B	Orange Brown	4.5						X						SM	Silty sand with gravel and trace of angular cobbles, dense, near optimum moisture, up to 20% low plasticity fines content, increases in coarseness with depth and some white rock particles.
--6--				5C	Brown and Gray	5+				X	X							GM	Silty gravel with small angular boulders up to 2-foot diameter, very dense.
--8--										X	X								Practical Refusal at rate of advance slower than 1-foot in 15 minutes.
--10--																			
--12--																			
--14--																			
--16--																			
--18--																			
--20--																			
Total Depth: 10.0 feet						Groundwater: NFWE						Plate 10							

Test Pit No.: TP-6										Date: June 7, 2021									
Project: Highland Village Phase 2										Excav. Method: Excavator, 2-foot bucket w/ rock teeth									
File No.: 2002.002-A										Excav. Type: Deere 225C LC									
Location: Washoe County, Nevada										Logged By: BDC									
DEPTH (FEET)	SAMPLE TYPE			Sample ID	Color	POCKET PENETROMETER (tsf)	CLAYEY SOILS				MOISTURE					USCS SYMBOL	DESCRIPTION		
	BULK	Grab	Drive Tube				VERY LOOSE	SOFT	MED. STIFF	STIFF	VERY STIFF	HARD	DRY	DAMP	MOIST			WET	SATURATED
--2--				6A	Light Brown	2.5	X											SC-SM	Silty clayey sand with some fine gravel and up to 20% low plasticity fines content.
--4--				6B	Brown	3.5												SC	Clayey sand with trace of fine gravel and coarse sand, up to 30% moderate plasticity fines content.
--8--				6C	Tan	4.5												SM	Silty sand with gravel, weakly cemented, medium to fine sand, up to 20% non plastic fines content.
--10--					Light Brown	5+												GM	Silty gravel with some angular cobbles, dense to very dense.
--12--																			Bottom of Test Pit
--14--																			
--16--																			
--18--																			
--20--																			
Total Depth:						feet				Groundwater:						NFWE			

Test Pit No.: TP-8										Date: June 7, 2021								
Project: Highland Village Phase 2										Excv. Method: Excavator, 2-foot bucket w/ rock teeth								
File No.: 2002.002-A										Excv. Type: Deere 225C LC								
Location: Washoe County, Nevada										Logged By: BDC								
DEPTH (FEET)	SAMPLE TYPE		Sample ID	Color	POCKET PENETROMETER (tsf)	CLAYEY SOILS				MOISTURE					USCS SYMBOL	DESCRIPTION		
	BULK	Grab				Drive Tube	SOFT	MED. STIFF	STIFF	VERY STIFF	HARD	DRY	DAMP	MOIST			WET	SATURATED
--2--			8A	Light Brown	2.5	X				X							SC-SM	Silty clayey sand with some fine gravel and up to 20% low plasticity fines content.
--4--			8B	Brown	3.5		X					X					SC	Clayey sand with trace of fine gravel and coarse sand, up to 30% moderate plasticity fines content.
--8--			8C	Tan	4.5			X		X							SM	Silty sand with gravel, weakly cemented, medium to fine sand, up to 20% non plastic fines content.
--10--				Light Brown	5+			X		X							GM	Silty gravel with some angular cobbles, dense to very dense.
--12--								X		X								Bottom of Test Pit
--14--																		
--16--																		
--18--																		
--20--																		
Total Depth: 12.0 feet					Groundwater: NFWE					Plate 13								

Particle Size Distribution Report



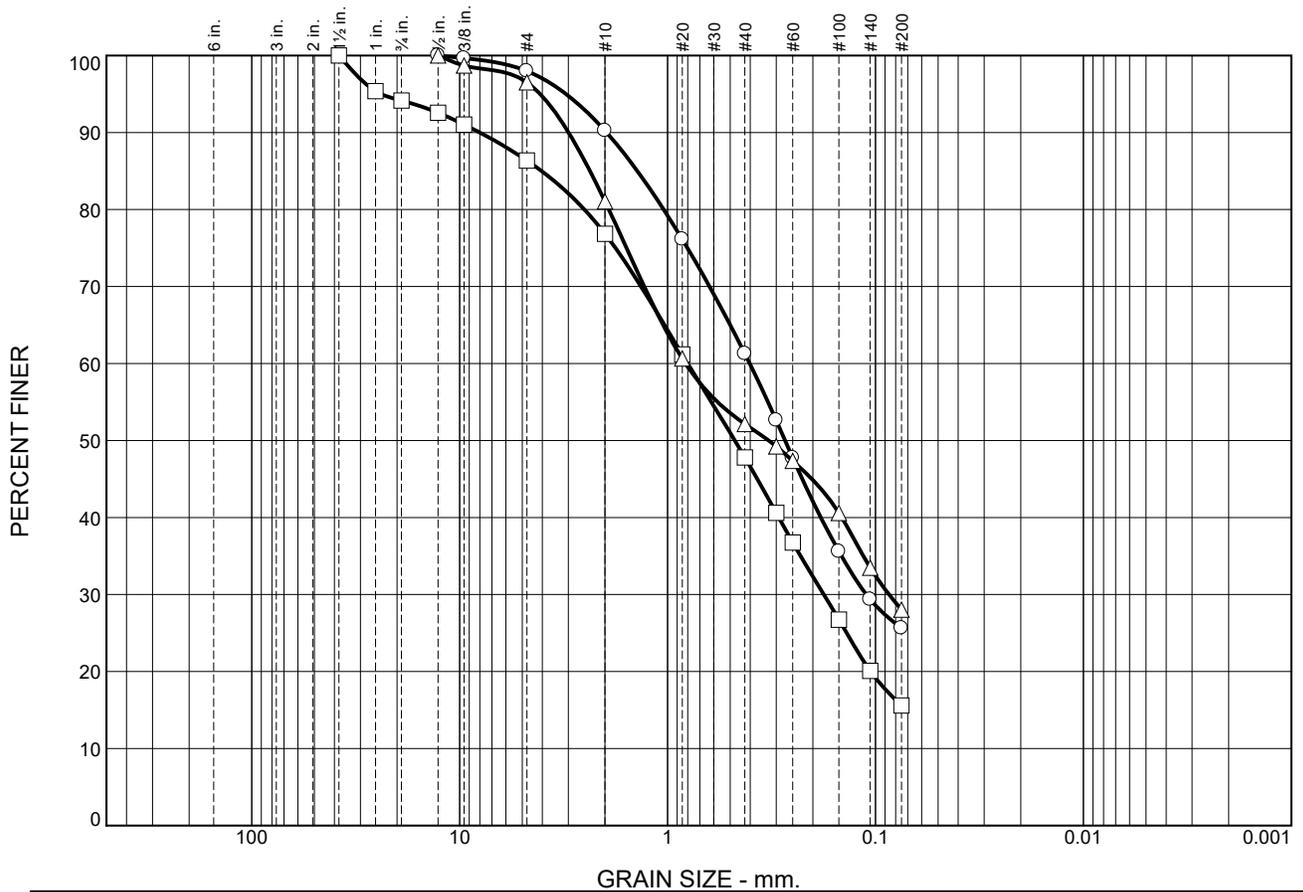
	In-Situ Moisture (%)	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	2.2	19.4	29.4	20.1	14.5	7.3	9.3	
□	5.2	3.7	24.1	18.7	25.5	16.3	11.7	
△	1.2	0.0	11.3	32.3	34.5	18.2	3.7	
◇	6.1	0.0	0.0	0.2	24.6	52.2	23.0	
▽	3.8	0.0	0.3	2.2	33.7	51.9	11.9	

SOIL DATA					
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	TP-1	1A	2-6	Poorly graded gravel with silty clay and sand	GP-GC
□	TP-2	2A	0-4	Poorly graded sand with silt and gravel	SP-SM
△	TP-2	2B	4-8	Well-graded sand	SW
◇	TP-3	3A	0-6	Silty, clayey sand	SC-SM
▽	TP-4	4A	0-6	Poorly graded sand with silt	SP-SM

Westex Consulting Engineers

Client: LC Highland, LLC
Project: Highland Village Phase 2
Project No.: 2002.002-A

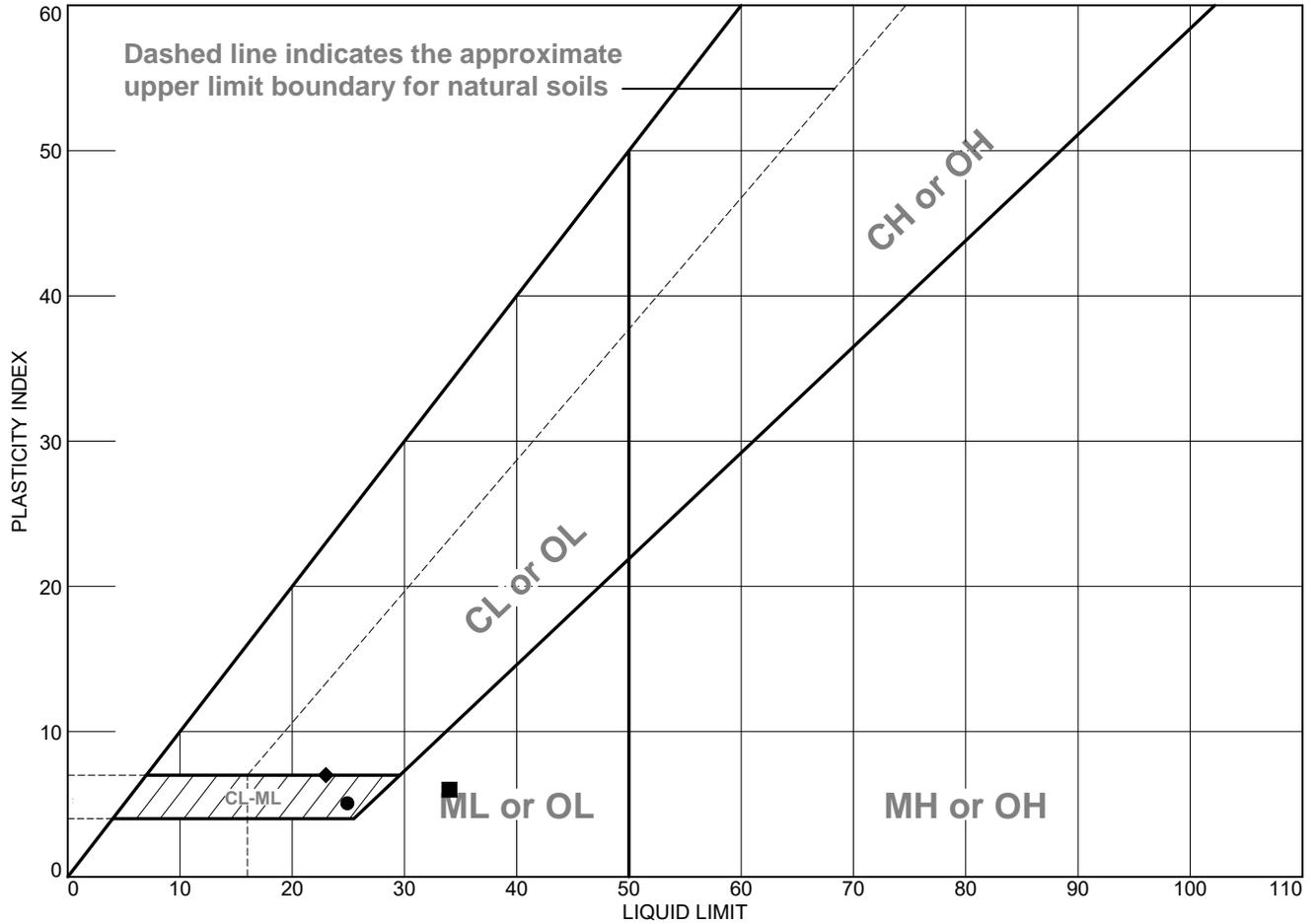
Particle Size Distribution Report



	In-Situ Moisture (%)	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	9.5	0.0	2.0	7.8	28.9	35.7	25.6	
□	6.4	5.8	7.8	9.6	29.0	32.2	15.6	
△	4.8	0.0	3.5	15.5	28.9	24.1	28.0	

SOIL DATA					
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	TP-5	5A	0-4	Clayey sand	SC
□	TP-6	6A	2-6	Silty, clayey sand	SC-SM
△	TP-6	6B	6-10	Clayey sand	SC

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Poorly graded gravel with siltyclay and sand	25	20	5	16.6	9.3	GP-GC
■	Poorly graded sand with silt and gravel	34	28	6	28.0	11.7	SP-SM
▲	Well-graded sand	NV	NP	NP	21.9	3.7	SW
◆	Silty, clayey sand	23	16	7	75.2	23.0	SC-SM
▼	Poorly graded sand with silt	NV	NP	NP	63.8	11.9	SP-SM

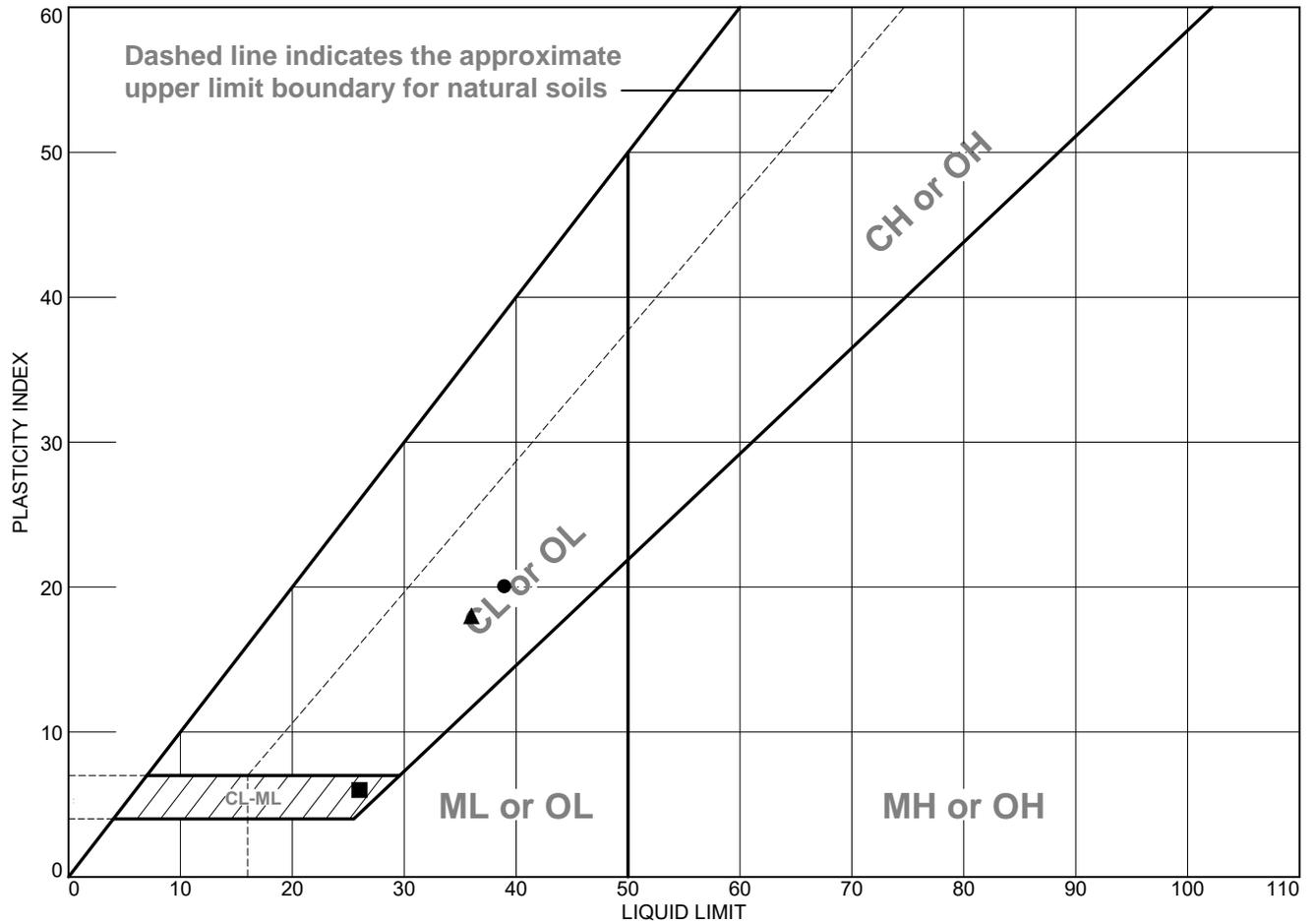
Project No. 2002.002-A **Client:** LC Highland, LLC
Project: Highland Village Phase 2

● **Location:** TP-1
 ■ **Location:** TP-2A
 ▲ **Location:** TP-2B
 ◆ **Location:** TP-3
 ▼ **Location:** TP-4

Remarks:

Westex Consulting Engineers

LIQUID AND PLASTIC LIMITS TEST REPORT



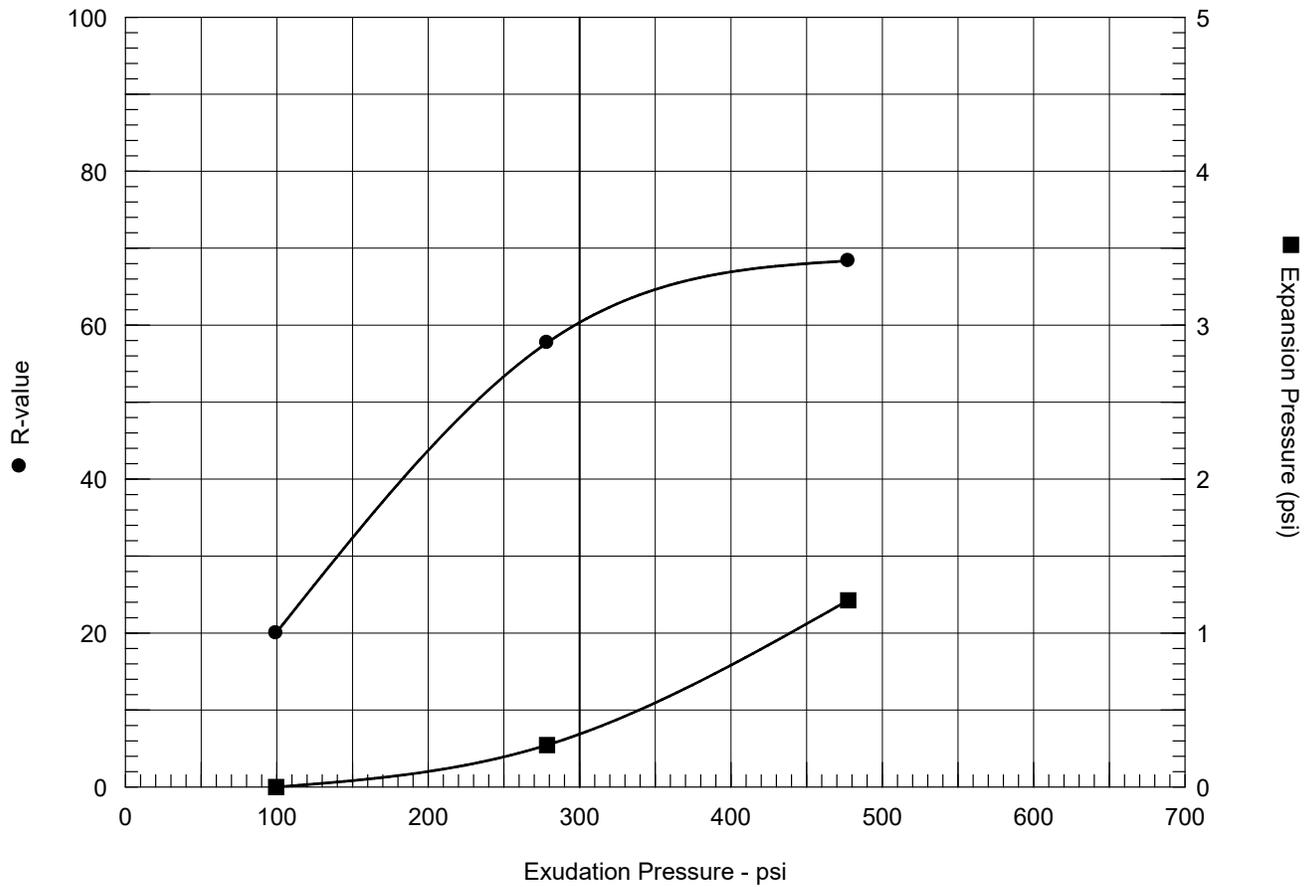
	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey sand	39	19	20	61.3	25.6	SC
■	Silty, clayey sand	26	20	6	47.8	15.6	SC-SM
▲	Clayey sand	36	18	18	52.1	28.0	SC

Project No. 2002.002-A **Client:** LC Highland, LLC
Project: Highland Village Phase 2

● **Location:** TP-5
 ■ **Location:** TP-6A
 ▲ **Location:** TP-6B

Remarks:

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	88.8	12.5	1.21	48	2.52	477	68.4	68.4
2	275	91.3	14.7	0.27	83	2.49	279	57.7	57.7
3	125	97.7	16.4	0.00	120	2.56	99	19.2	20.0

Test Results	Material Description
<p>R-value at 300 psi exudation pressure = 60.4</p> <p>Exp. pressure at 300 psi exudation pressure = 0.34 psi</p>	<p>Silty, clayey sand with gravel (SC-SM)</p>
<p>Project No.: 2002.002-A</p> <p>Project: Highland Village Phase 2</p> <p>Location: Composite (0-4)</p> <p>Date: 6/11/2021</p>	<p>Tested by: SL</p> <p>Checked by: BC</p> <p>Remarks: Potential Subgrade</p>
<p>R-VALUE TEST REPORT</p> <h2 style="margin: 0;">Westex Consulting Engineers</h2>	



Silver State Labs-Reno
 1135 Financial Blvd
 Reno, NV 89502
 (775) 857-2400 FAX: (888) 398-7002
 www.ssalabs.com

Analytical Report

Workorder#: 21031546
 Date Reported: 6/16/2021

Client: Westex Consulting
 Sampled By: Blake Carter

Project Name: 2002.002-A (Highland Ph 2)
 PO #:

Laboratory Accreditation Number: NV015/CA2990

Laboratory ID: 21031546-01
 Client Sample ID: TP-4,5,6 (0-8 Composite)
 Date/Time Sampled: 06/7/2021 12:00
 Date Received: 6/8/2021

Parameter	Method	Result	Units	PQL	Analyst	Date/Time Analyzed	Data Flag
pH	SW-846 9045D	7.21	pH Units		AC	06/16/2021	9:55
pH Temperature	SW-846 9045D	21.0	°C		AC	06/16/2021	9:55
Specific Conductivity	SM 2510B	290	µmhos/cm		AC	06/16/2021	15:26
Sulfate	EPA 9056	38	mg/Kg	2	JF	06/16/2021	23:36

Laboratory Accreditation Number: NV015/CA2990

Laboratory ID: 21031546-02
 Client Sample ID: TP-1,2,3 (0-8 Composite)
 Date/Time Sampled: 06/7/2021 12:00
 Date Received: 6/8/2021

Parameter	Method	Result	Units	PQL	Analyst	Date/Time Analyzed	Data Flag
pH	SW-846 9045D	7.38	pH Units		AC	06/16/2021	9:55
pH Temperature	SW-846 9045D	21.0	°C		AC	06/16/2021	9:55
Specific Conductivity	SM 2510B	311	µmhos/cm		AC	06/16/2021	15:26
Sulfate	EPA 9056	51	mg/Kg	2	JF	06/16/2021	0:05



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SILVER STATE ANALYTICAL LABORATORY RESULTS

Geotechnical Investigation

Highland Village Ph 2
 APN 508-020-04, -42 & -44
 Washoe County, Nevada

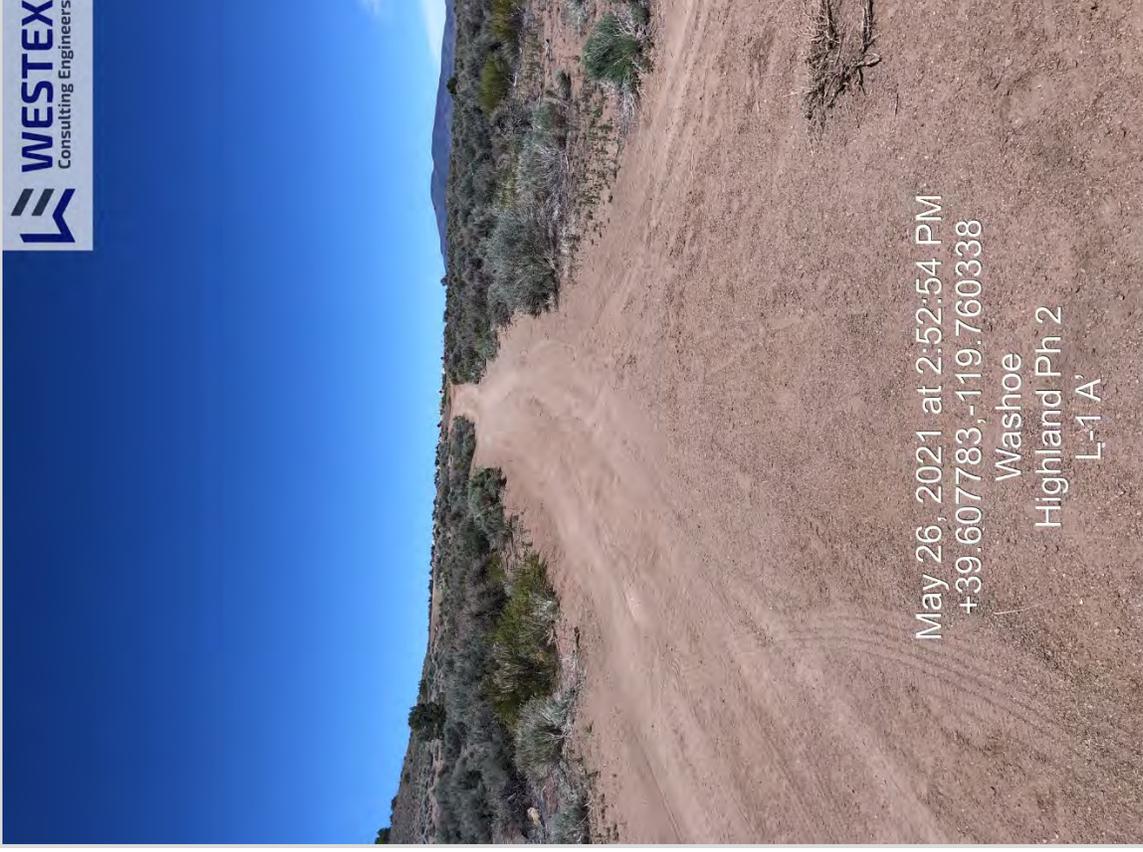
Project No.: 2002.002-A

Date: 08/16/21

PLATE
 19



May 26, 2021 at 2:50:51 PM
 +39.608361, -119.759168
 Washoe
 Highland Ph 2
 L-1 A



May 26, 2021 at 2:52:54 PM
 +39.607783, -119.760338
 Washoe
 Highland Ph 2
 L-1 A



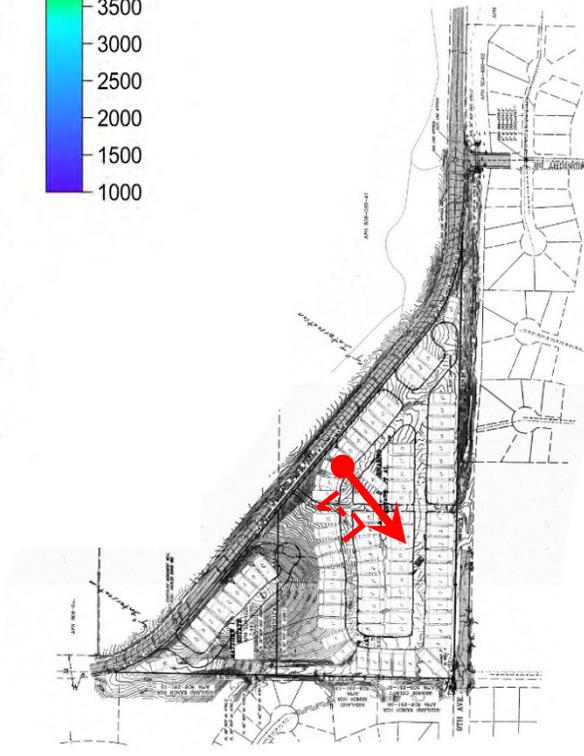
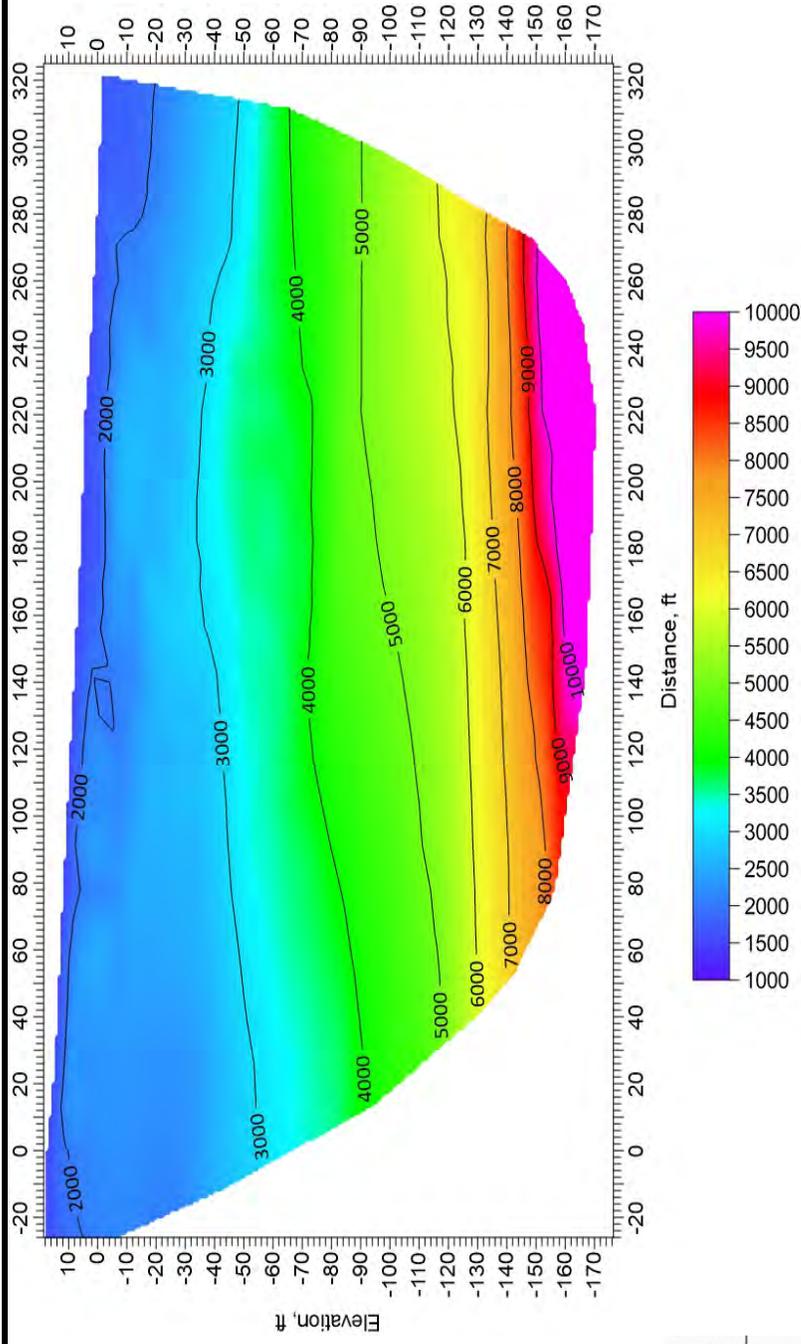
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 Phone: (775) 771-9539

**LINE 1
 GEOPHYSICAL PROFILE
 PHOTOGRAPHS**

Geotechnical Investigation
 Highland Village Ph 2
 APN 508-020-04, -42 & -44
 Washoe County, Nevada

Project No.: 2002.002-A
 Date: 08/16/21

**PLATE
 20**



P-wave Velocity, ft/s

Location Notes	
Dense sand at surface.	
No Outcrops along alignment.	

Visual Rock Classification at Surface	
Consolidation	Well-Consolidated
Fracturing	Intensely Fractured (0.005 to 0.1 ft)
Hardness	Moderately Soft
Strength	Weak
Weathering	Moderate to Deeply Weathered

Ref: Meridian Surveying & Mapping, Inc., Topographic Survey, March 8, 2021.

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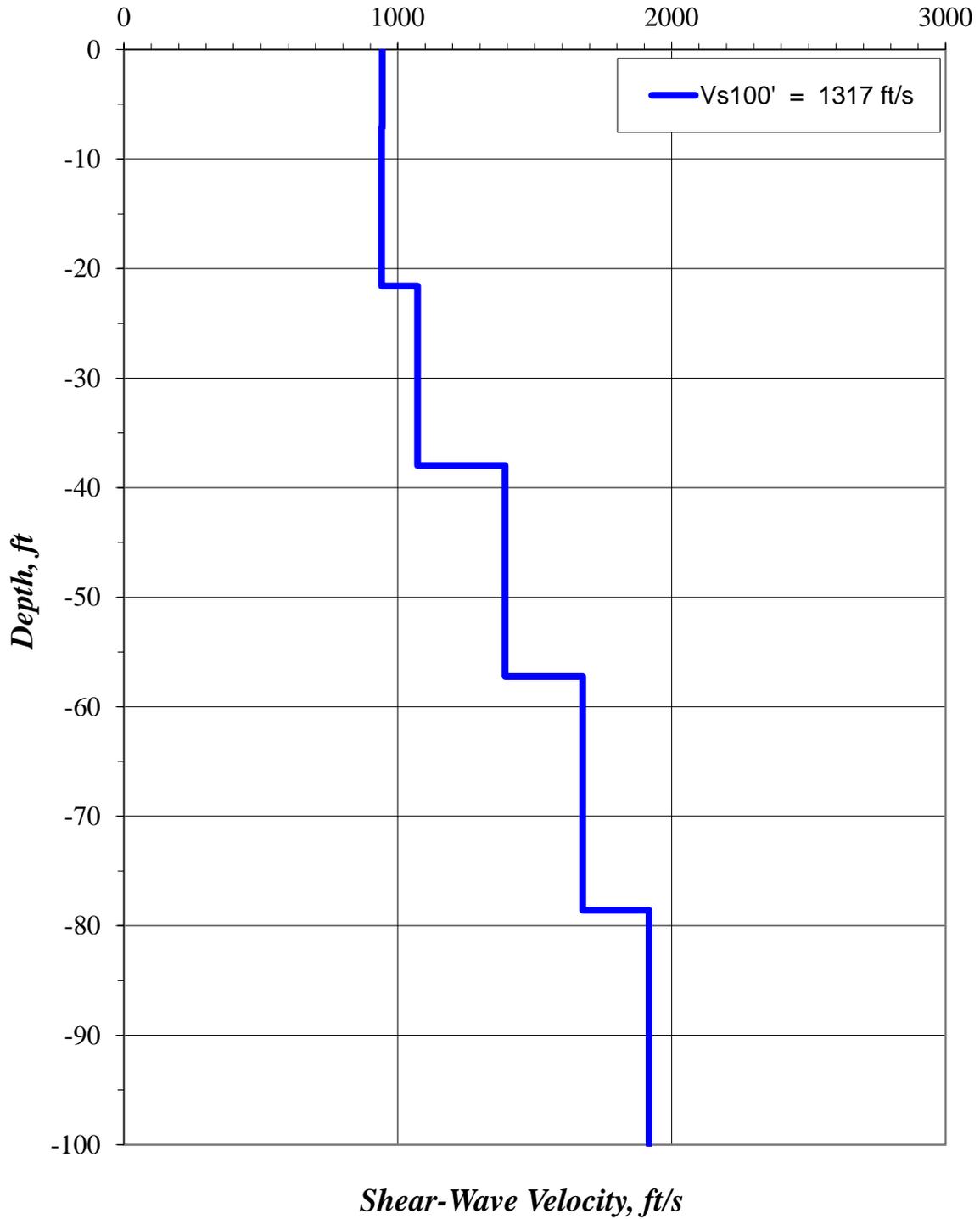
LINE 1
2-D GEOPHYSICAL PROFILE
SEISMIC (P-WAVE) VELOCITY

Geotechnical Investigation
Highland Village Ph 2
APN 508-020-04, -42 & -44
Washoe County, Nevada

Project No.: 2002.002-A
Date: 08/16/21

PLATE	21
-------	----

L-1: Vs Model



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**LINE 1
SHEAR
WAVE
VELOCITY
1-D
PROFILE**

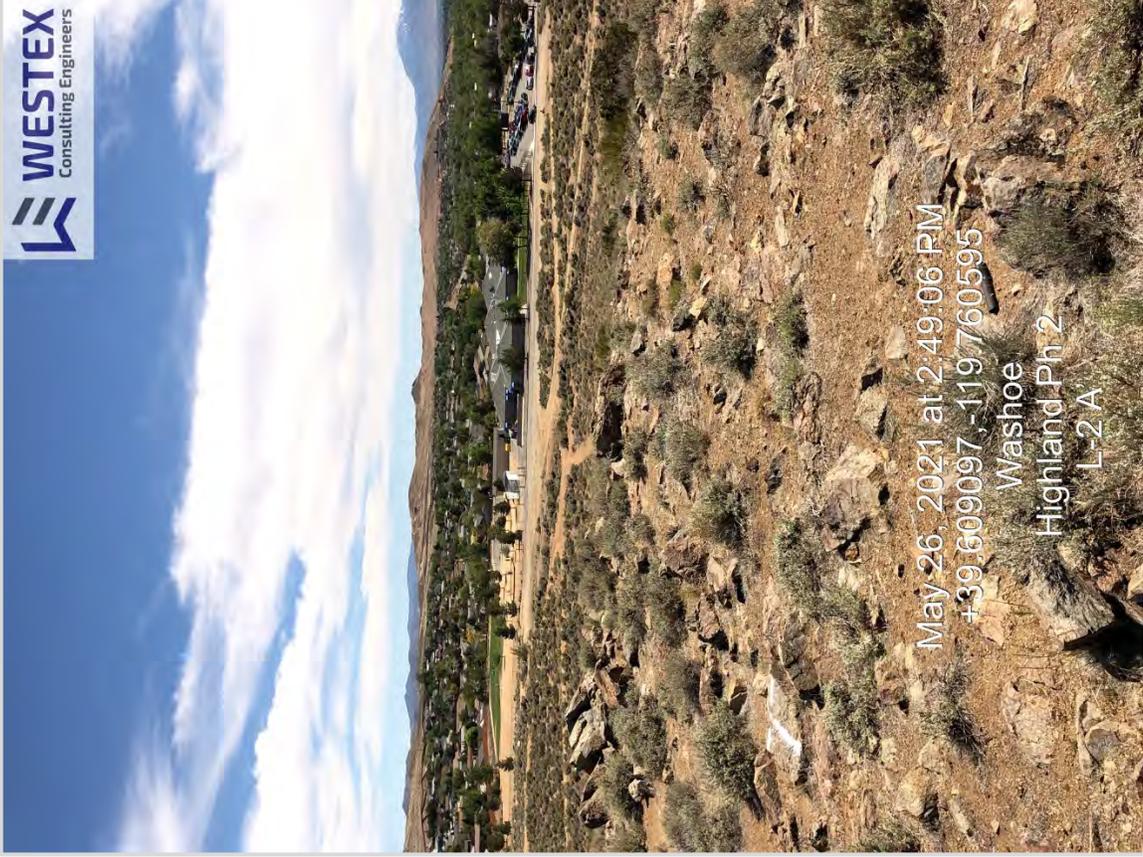
*Geotechnical Investigation
Highland Village Ph 2
APN 508-020-04, -42 & -44
Washoe County, Nevada*

Project No.: 2002.002-A
Date: 08/16/21

**PLATE
22**



May 26, 2021 at 2:53:12 PM
 +39.607858, -119.760408
 Washoe
 Highland Ph 2
 L-2 A



May 26, 2021 at 2:49:06 PM
 +39.609097, -119.760595
 Washoe
 Highland Ph 2
 L-2 A



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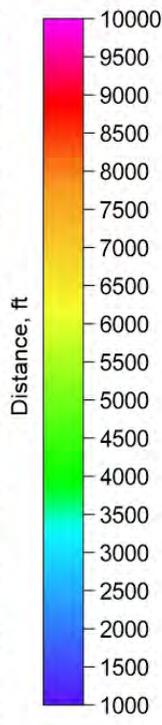
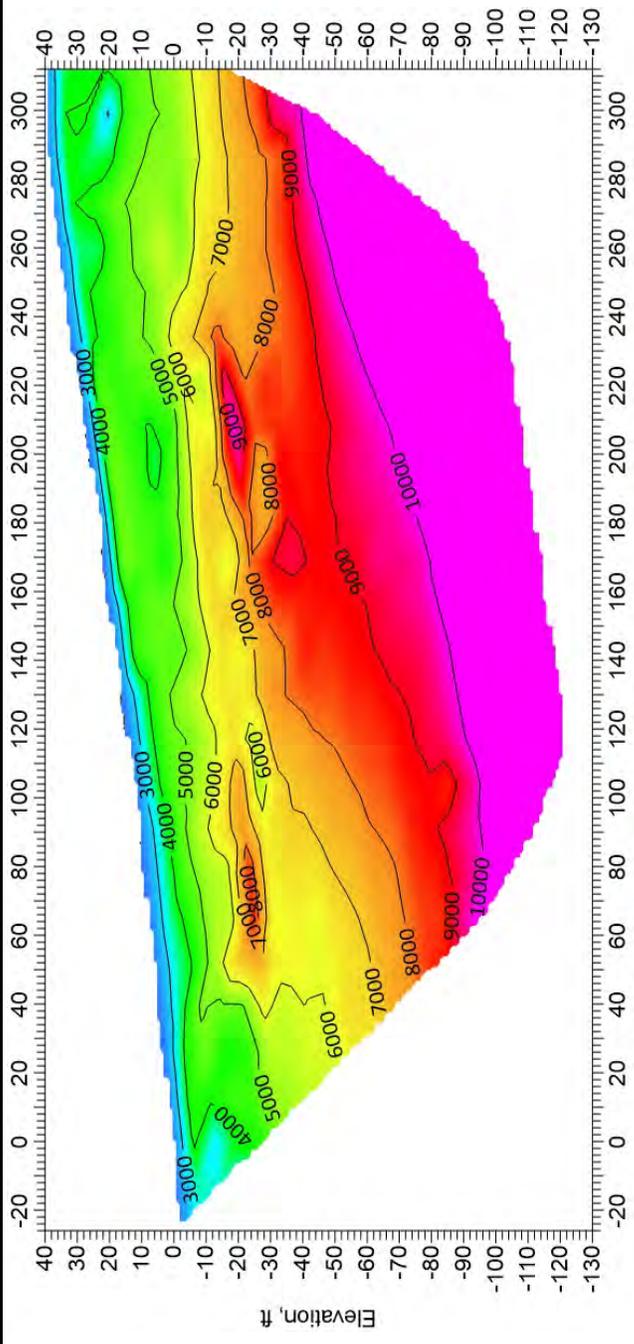
**LINE 2
 GEOPHYSICAL PROFILE
 PHOTOGRAPHS**

Geotechnical Investigation

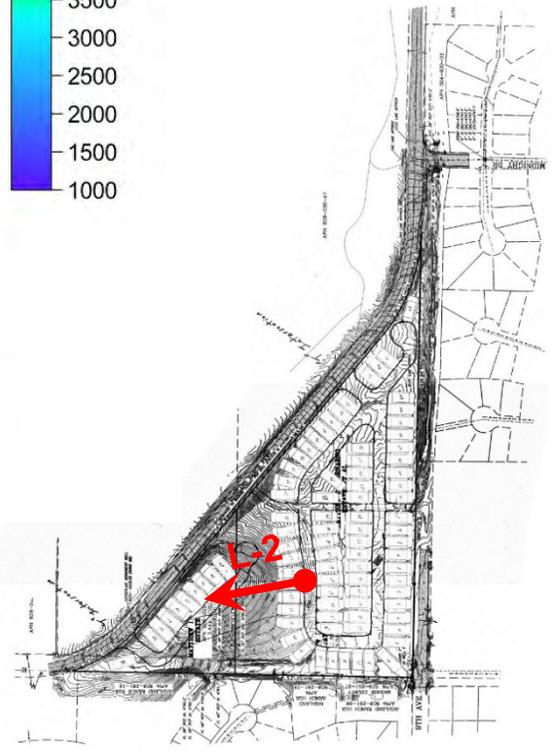
**Highland Village Ph 2
 APN 508-020-04, -42 & -44
 Washoe County, Nevada**

Project No.: 2002.002-A
 Date: 08/16/21

**PLATE
 23**



P-wave Velocity, ft/s



Location Notes
 Rock Outcrop @ x = 275 ft.
 Angular surface cobbles and boulders north of x = 150 ft.

Visual Rock Classification at Surface	
Consolidation	Well-Consolidated
Fracturing	Closely to Moderately Fractured (0.1 to 1.0 ft)
Hardness	Hard
Strength	Strong
Weathering	Moderately Weathered

Ref: Meridian Surveying & Mapping, Inc., Topographic Survey, March 8, 2021.



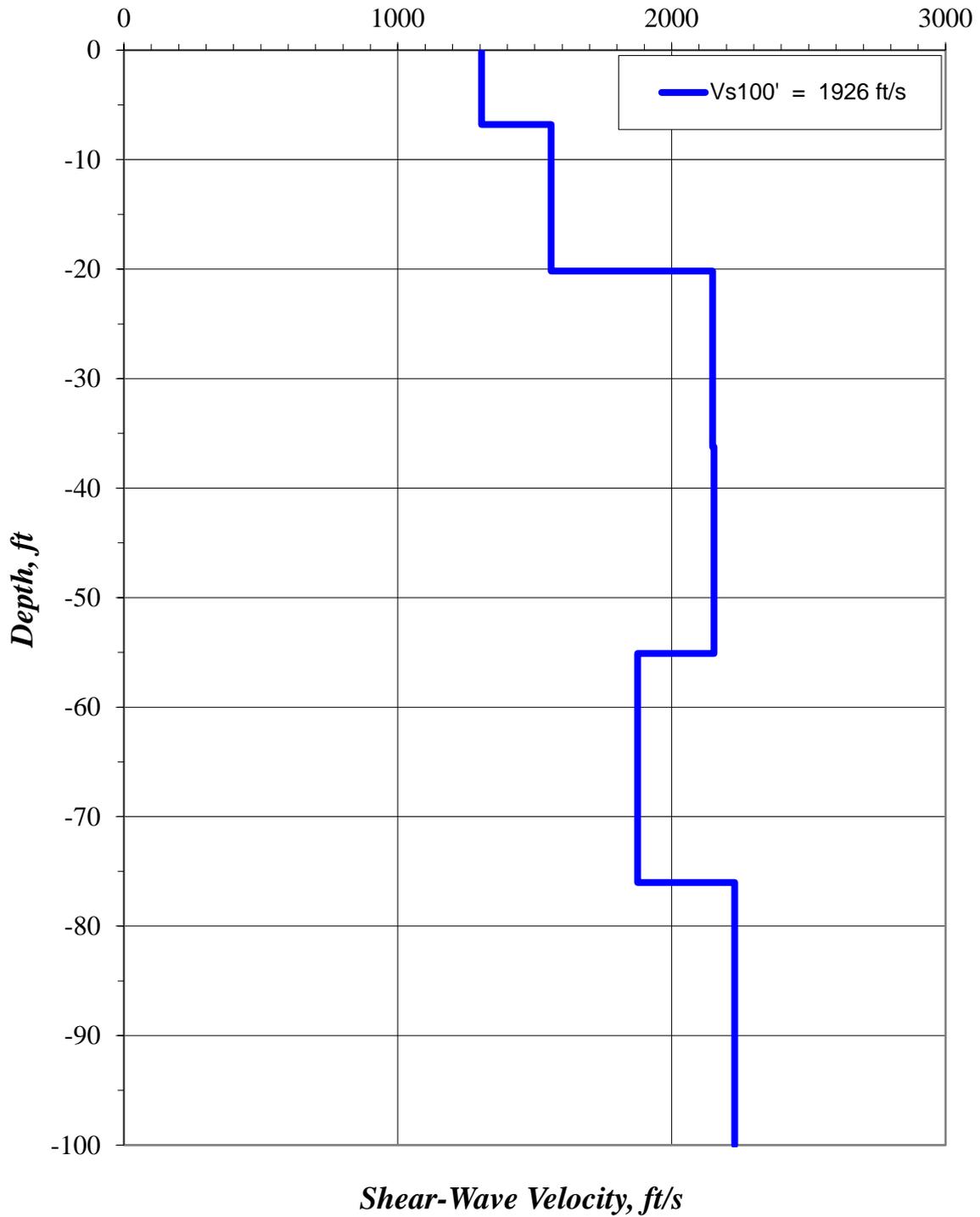
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LINE 2
2-D GEOPHYSICAL PROFILE
SEISMIC (P-WAVE) VELOCITY

Geotechnical Investigation
 Highland Village Ph 2
 APN 508-020-04, -42 & -44
 Washoe County, Nevada
 Project No.: 2002.002-A
 Date: 08/16/21

PLATE
24

L-2: Vs Model



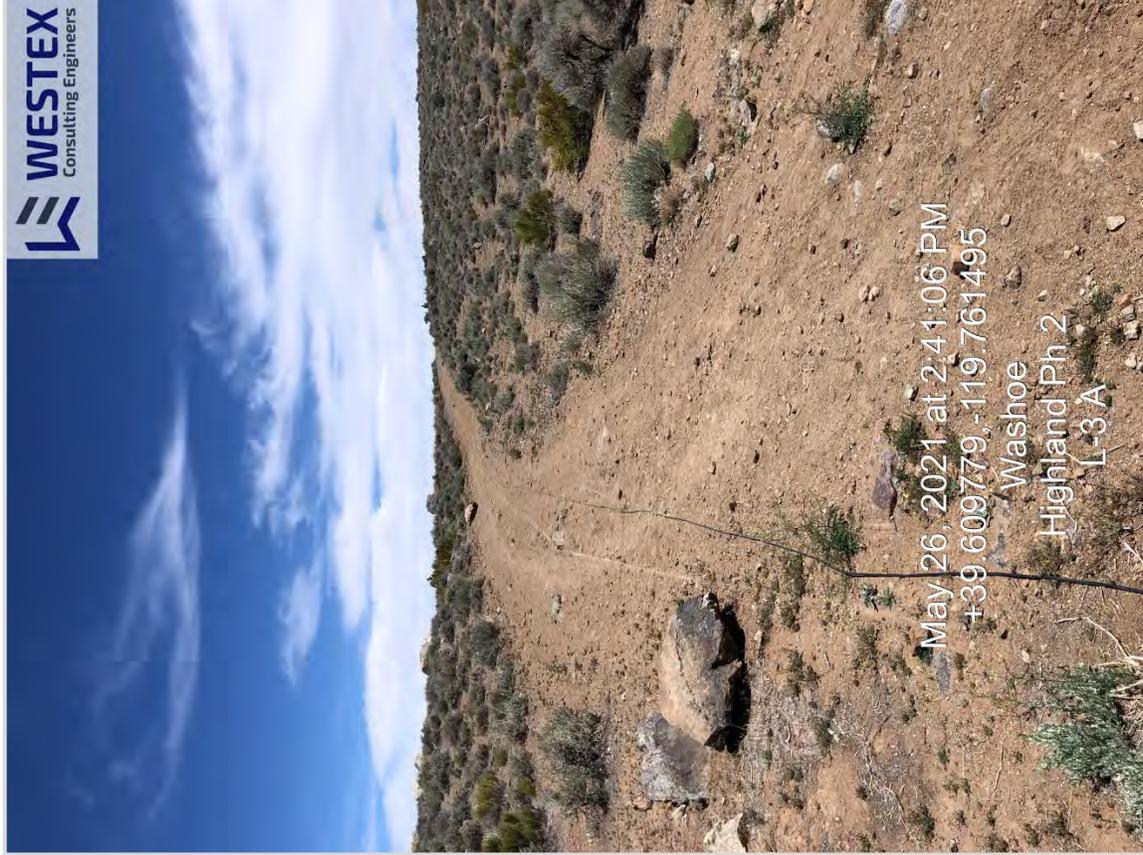
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Phone: (775) 771-9539

**LINE 2
SHEAR
WAVE
VELOCITY
1-D
PROFILE**

**Geotechnical Investigation
Highland Village Ph 2
APN 508-020-04, -42 & -44
Washoe County, Nevada**

Project No.: 2002.002-A
Date: 08/16/21

**PLATE
25**



May 26, 2021 at 2:41:06 PM
+39.609779, -119.761495

Washoe
Highland Ph 2
L-3 A



May 26, 2021 at 2:48:34 PM
+39.609117, -119.760239

Washoe
Highland Ph 2
L-3 A



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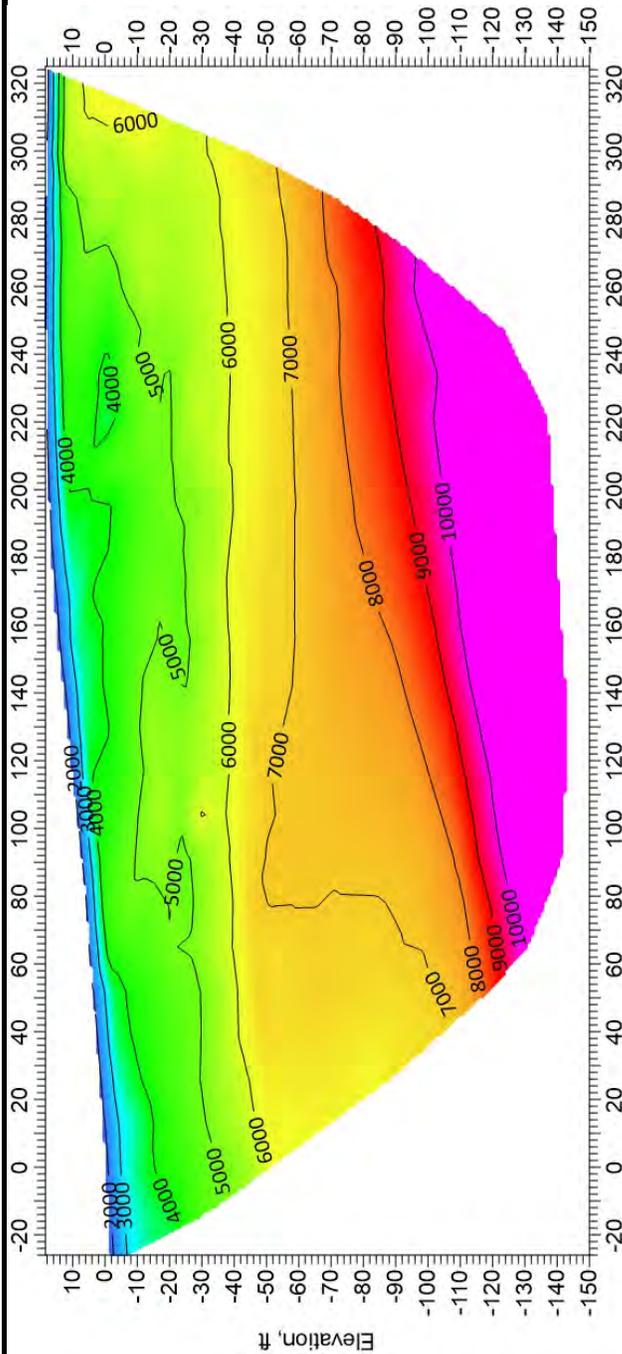
LINE 3 GEOPHYSICAL PROFILE PHOTOGRAPHS

Geotechnical Investigation

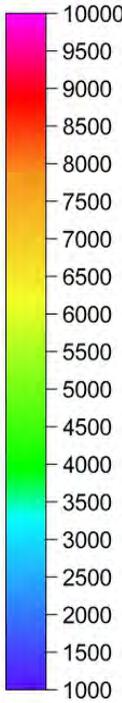
Highland Village Ph 2
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Washoe County, Nevada

Project No.: 2002.002-A
Date: 08/16/21

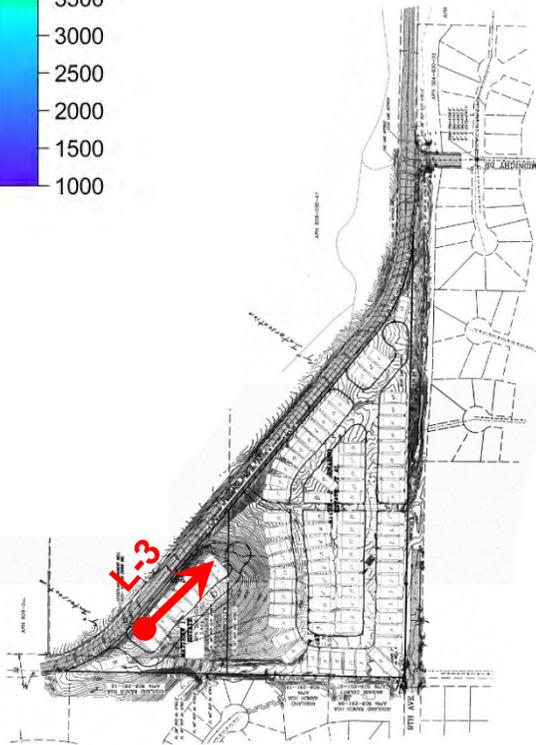
PLATE
26



Distance, ft



P-wave Velocity, ft/s



Location Notes	
Dense sand at surface.	
Rock Outcrops to the south at x = 300 ft.	

Visual Rock Classification at Surface	
Consolidation	Well-Consolidated
Fracturing	Closely Fractured (0.1 to 0.5 ft)
Hardness	Hard
Strength	Strong
Weathering	Moderately Weathered

Ref: Meridian Surveying & Mapping, Inc., Topographic Survey, March 8, 2021.



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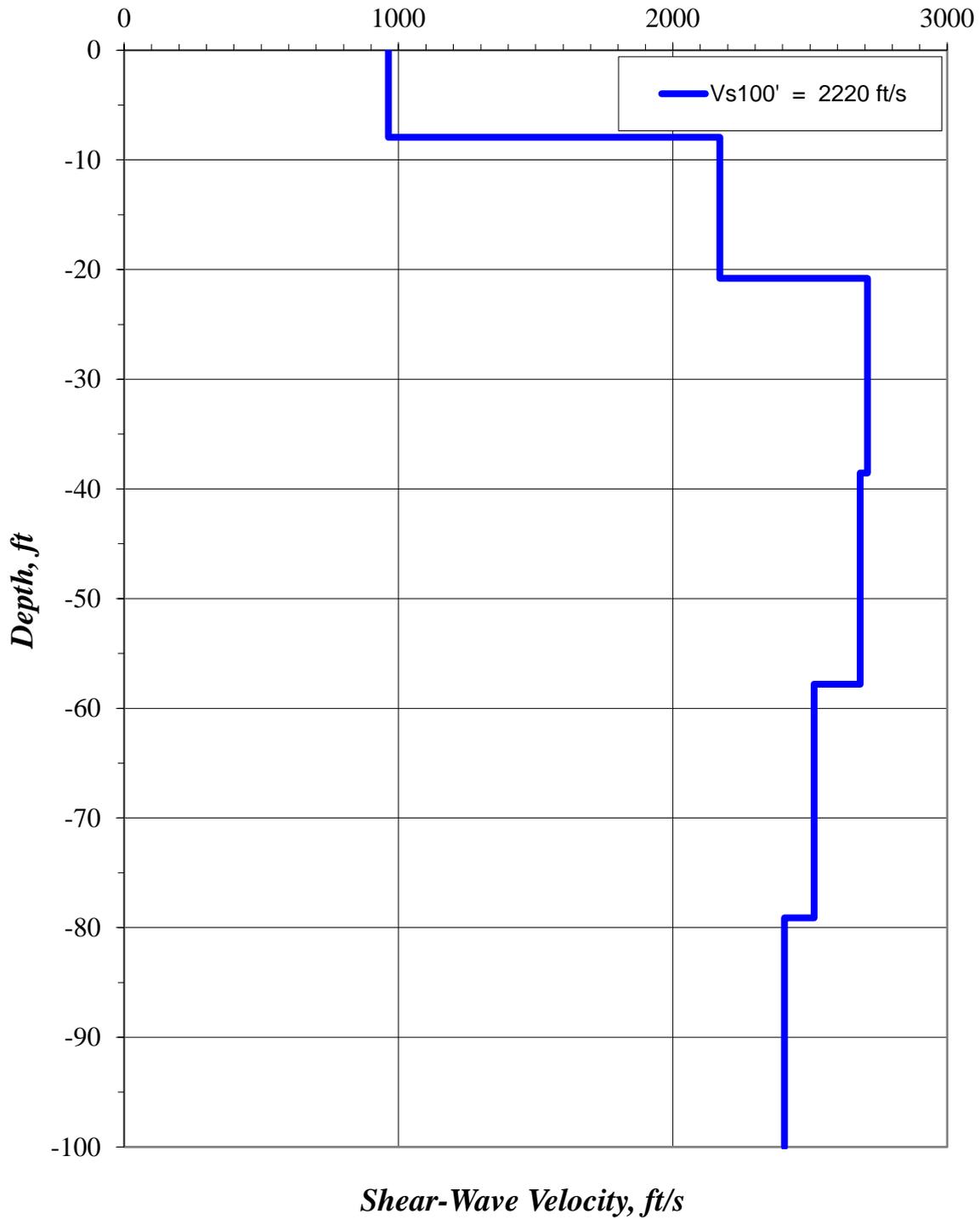
**LINE 3
2-D GEOPHYSICAL PROFILE
SEISMIC (P-WAVE) VELOCITY**

Geotechnical Investigation
Highland Village Ph 2
APN 508-020-04, -42 & -44
Washoe County, Nevada

Project No.: 2002.002-A
Date: 08/16/21

**PLATE
27**

L-3: Vs Model



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**LINE 3
SHEAR
WAVE
VELOCITY
1-D
PROFILE**

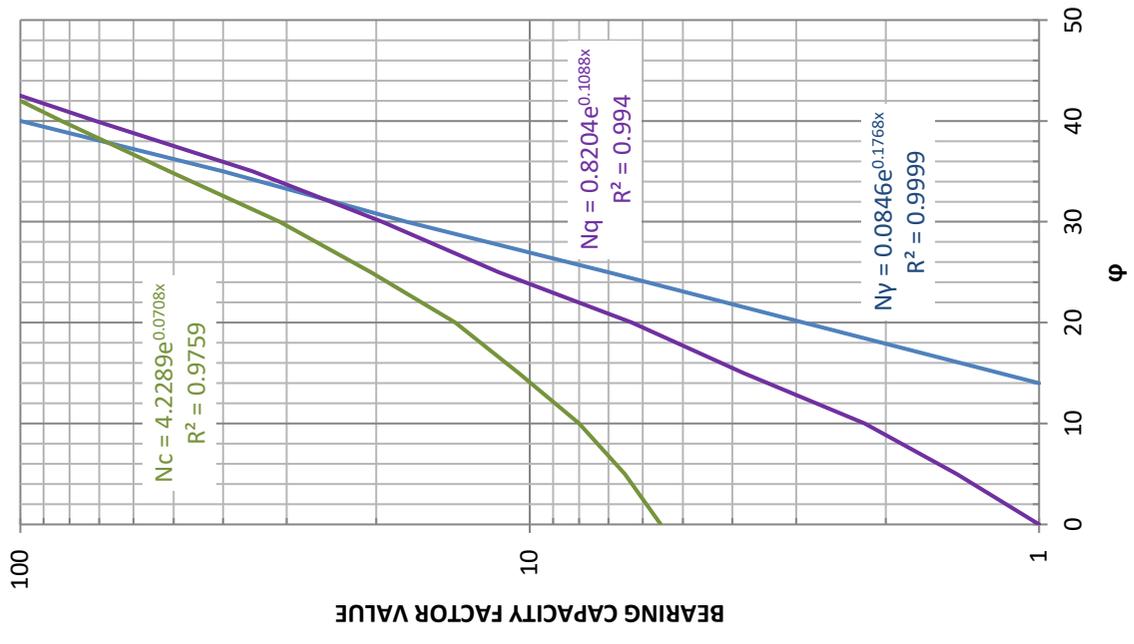
*Geotechnical Investigation
Highland Village Ph 2
APN 508-020-04, -42 & -44
Washoe County, Nevada*

Project No.: 2002.002-A
Date: 08/16/21

**PLATE
28**

L = 20 Footing Length, Feet
 B or R = 1.5 Footing Width, Feet
 D = 2 Footing Depth, Feet
 d_o = 100 Depth to Water, d_o > B
 c = 0 psf
 φ = 34°
 γ = 125 pcf
 P_o = 250 psf
 N_c = 47.0
 N_q = 33.2
 N_γ = 34.5

Footing Type
 Continuous, General X
 Square or Rectangular X
 Circular



φ - c Soil
 Continuous Footing, General Case
 q_{ult} = 11525 psf
 q_{all} = 3840 psf
 Square or Rectangular Footing
 q_{ult} = 10878 psf
 q_{all} = 3630 psf
 Circular Footing, R
 q_{ult} = _____ psf
 q_{all} = _____ psf
 φ - c = 0
 Continuous Footing, General Case
 q_{ult} = 11525 psf
 q_{all} = 3840 psf
 Square or Rectangular Footing
 q_{ult} = 10878 psf
 q_{all} = 3630 psf
 Circular Footing, R
 q_{ult} = _____ psf
 q_{all} = _____ psf

c, φ = 0
 Continuous Footing, General Case
 q_{ult} = 250 psf
 q_{all} = 80 psf
 Square or Rectangular Footing
 q_{ult} = 250 psf
 q_{all} = 80 psf
 Circular Footing, R
 q_{ult} = _____ psf
 q_{all} = _____ psf



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ALLOWABLE BEARING CAPACITY (DM-7.1, NAVFAC)

Geotechnical Investigation
 Highland Village Ph 2
 APN 508-020-04, -42 & -44
 Washoe County, Nevada
 Project No.: 2002.002-A
 Date: 08/16/21
PLATE 29

APPENDIX B
GLOBAL SLOPE STABILITY ANALYSIS



APPENDIX C
ATC HAZARDS BY LOCATION
SEISMIC DESIGN PARAMETERS

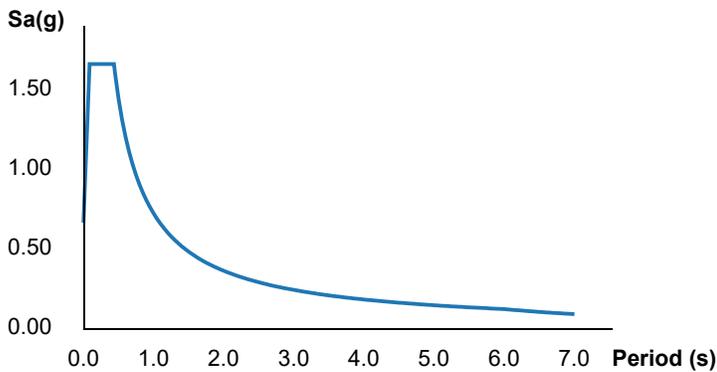


Search Information

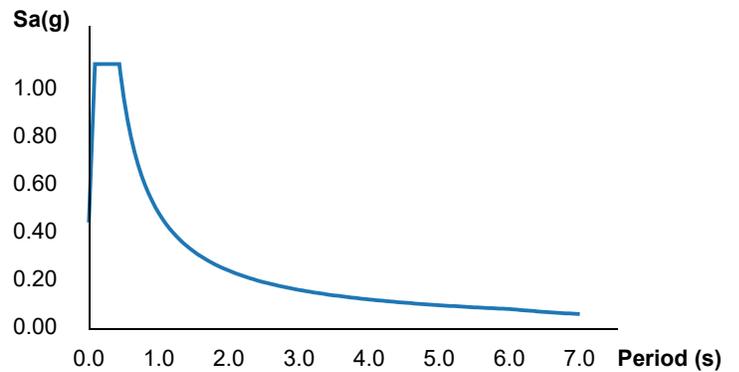
Coordinates: 39.608181, -119.760344
Elevation: 4788 ft
Timestamp: 2021-08-16T04:22:51.362Z
Hazard Type: Seismic
Reference Document: ASCE7-16
Risk Category: II
Site Class: C



MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	1.384	MCE _R ground motion (period=0.2s)
S_1	0.481	MCE _R ground motion (period=1.0s)
S_{MS}	1.661	Site-modified spectral acceleration value
S_{M1}	0.722	Site-modified spectral acceleration value
S_{DS}	1.107	Numeric seismic design value at 0.2s SA
S_{D1}	0.481	Numeric seismic design value at 1.0s SA

Additional Information

Name	Value	Description
SDC	D	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR _S	0.904	Coefficient of risk (0.2s)

CR ₁	0.906	Coefficient of risk (1.0s)
PGA	0.5	MCE _G peak ground acceleration
F _{PGA}	1.2	Site amplification factor at PGA
PGA _M	0.6	Site modified peak ground acceleration
T _L	6	Long-period transition period (s)
SsRT	1.384	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.531	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.481	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.531	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.6	Factored deterministic acceleration value (1.0s)
PGAd	0.5	Factored deterministic acceleration value (PGA)

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

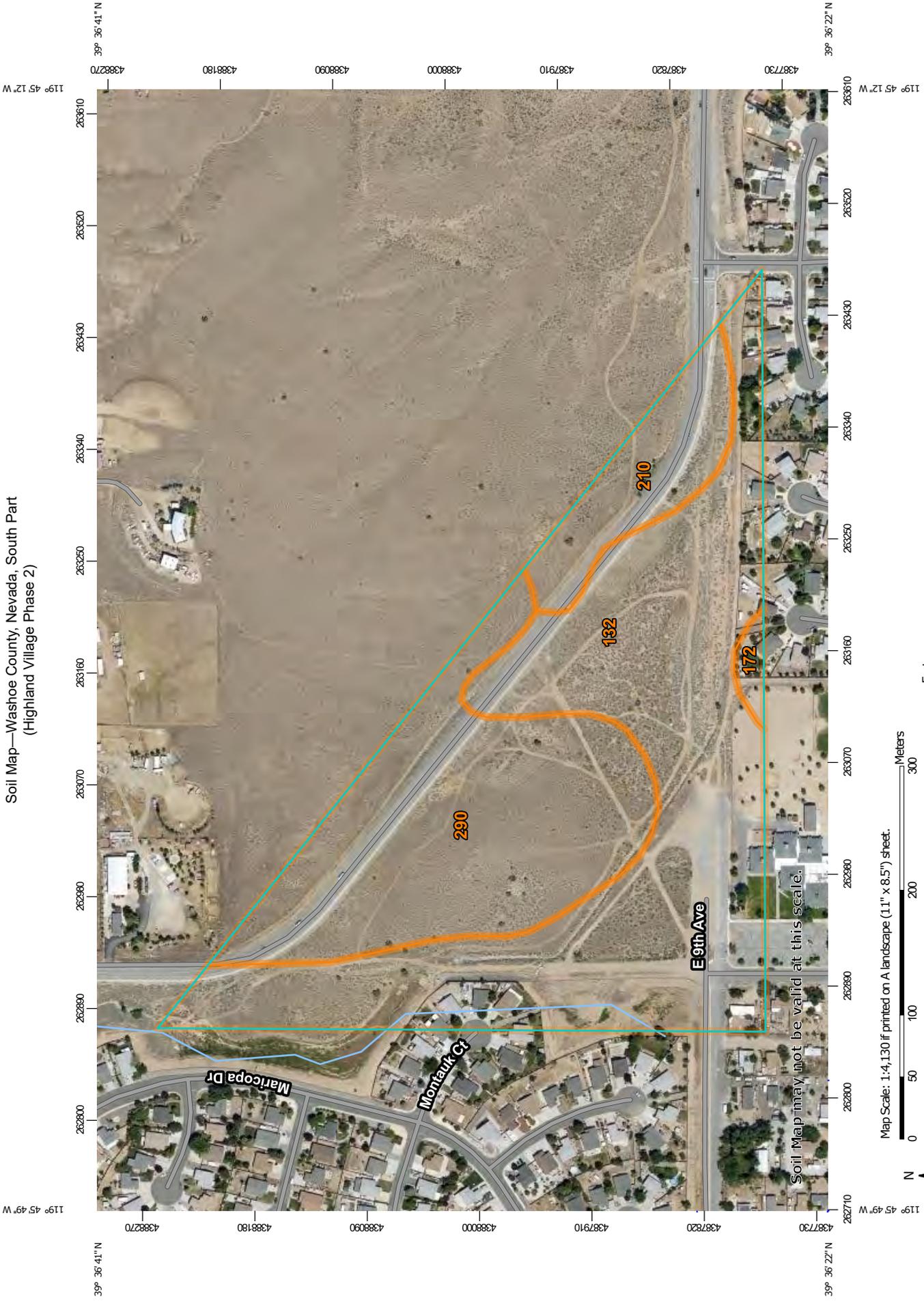
Hazard loads are provided by the U.S. Geological Survey [Seismic Design Web Services](#).

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APPENDIX D
USDA WEB SOIL SURVEY REPORTS



Soil Map—Washoe County, Nevada,, South Part
(Highland Village Phase 2)



Map Scale: 1:4,130 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

- Area of Interest (AOI)
- Area of Interest (AOI)
- Soils**
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points
- Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features
- Water Features**
- Streams and Canals
- Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads
- Background**
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Washoe County, Nevada, South Part
Survey Area Data: Version 17, Aug 26, 2020

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

Date(s) aerial images were photographed: Aug 1, 2018—Oct 1, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
132	Greenbrae sandy loam, 2 to 4 percent slopes	20.9	56.3%
172	Indian Creek sandy loam, 4 to 8 percent slopes	0.4	1.0%
210	Luppino gravelly sandy loam, 4 to 8 percent slopes	3.4	9.2%
290	Verdico variant stony sandy loam, 8 to 15 percent slopes	12.4	33.5%
Totals for Area of Interest		37.0	100.0%

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007 (<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

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

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

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

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

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Percentage of rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Liquid limit and plasticity index (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Report—Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk ^{1M} denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties—Washoe County, Nevada, South Part														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				L-R-H	L-R-H	L-R-H	L-R-H	L-R-H	L-R-H	L-R-H	L-R-H
132—Greenbrae sandy loam, 2 to 4 percent slopes														
Greenbrae	85	C	0-8	Sandy loam	SM	A-2	0-0-0	0-0-0	95-98-100	90-95-100	65-70-75	20-28-35	20-23-25	NP-3-5
			8-28	Clay loam, sandy clay loam, sandy clay	CL, SC	A-6, A-7	0-0-0	0-0-0	95-98-100	90-95-100	70-78-85	40-53-65	35-40-45	15-20-25
			28-63	Stratified coarse sand to gravelly loam	SM	A-2	0-0-0	0-0-0	90-95-100	75-88-100	45-53-60	25-30-35	0-21-27	NP

Engineering Properties--Washoe County, Nevada, South Part														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
172--Indian Creek sandy loam, 4 to 8 percent slopes			In				L-R-H	L-R-H	L-R-H	L-R-H	L-R-H	L-R-H	L-R-H	
Indian creek	85	D	0-3	Sandy loam	SC-SM, SC	A-2, A-4	0-0-0	0-3-5	90-95-100	80-85-90	55-60-65	25-33-40	20-23-25	5-8-10
			3-20	Gravelly clay, clay, sandy clay	CH	A-7	0-0-0	0-3-5	80-90-100	60-75-90	55-68-80	50-65-80	55-63-70	30-38-45
			20-25	Cemented material										
			25-60	Stratified extremely gravelly loamy coarse sand to gravelly sandy clay loam	GC-GM, GM, GW-GM, GP-GC	A-1, A-2	0-0-0	5-18-30	35-45-55	30-43-55	15-20-25	5-10-15	20-25-30	NP-5-10
210--Luppino gravelly sandy loam, 4 to 8 percent slopes														
Luppino	85	D	0-8	Gravelly sandy loam	SM	A-1	0-0-0	0-3-5	75-83-90	55-60-65	35-40-45	15-20-25	18-24-31	NP
			8-14	Sandy clay loam, sandy loam, gravelly sandy clay loam	SC	A-2, A-6	0-0-0	0-0-0	80-85-90	65-75-85	55-65-75	30-35-40	30-35-40	15-20-25
			14-23	Bedrock										
			23-33	Bedrock										



Engineering Properties---Washoe County, Nevada, South Part														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number---				Liquid limit	Plasticity index
					Unified	AASTHO	>10 inches	3-10 inches	4	10	40	200		
290---Verdico variant stony sandy loam, 8 to 15 percent slopes			In					L-R-H	L-R-H	L-R-H	L-R-H	L-R-H	L-R-H	L-R-H
Verdico variant	85	D	0-5	Gravelly sandy loam	SM	A-1	1- 3- 5	5- 8- 10	75-85-95	55-60-65	35-40-45	15-20-25	18-24-31	NP
			5-28	Gravelly clay, clay, sandy clay	CH	A-7	0- 0- 0	0- 3- 5	85-90-95	65-75-85	60-65-70	50-58-65	50-55-60	30-35-40
			28-60	Bedrock	---	---	---	---	---	---	---	---	---	---

Data Source Information

Soil Survey Area: Washoe County, Nevada, South Part
 Survey Area Data: Version 17, Aug 26, 2020



APPENDIX E
GEOTECHNICAL EXPLORATION PHOTOS





Jun 7, 2021 at 2:07:18 PM
+39.609369,-119.760746
Washoe
Highland 2
TP-1



Jun 7, 2021 at 2:07:01 PM
+39.609369,-119.760746
Washoe
Highland 2
TP-1

Geotechnical Investigation
Highland Village Ph 2
APN 508-020-04, -42 & -44
Washoe County, Nevada

Project No.: 2002.002-A
Date: 08/16/21

PLATE
E-1

GEOTECHNICAL EXPLORATION PHOTOGRAPHS

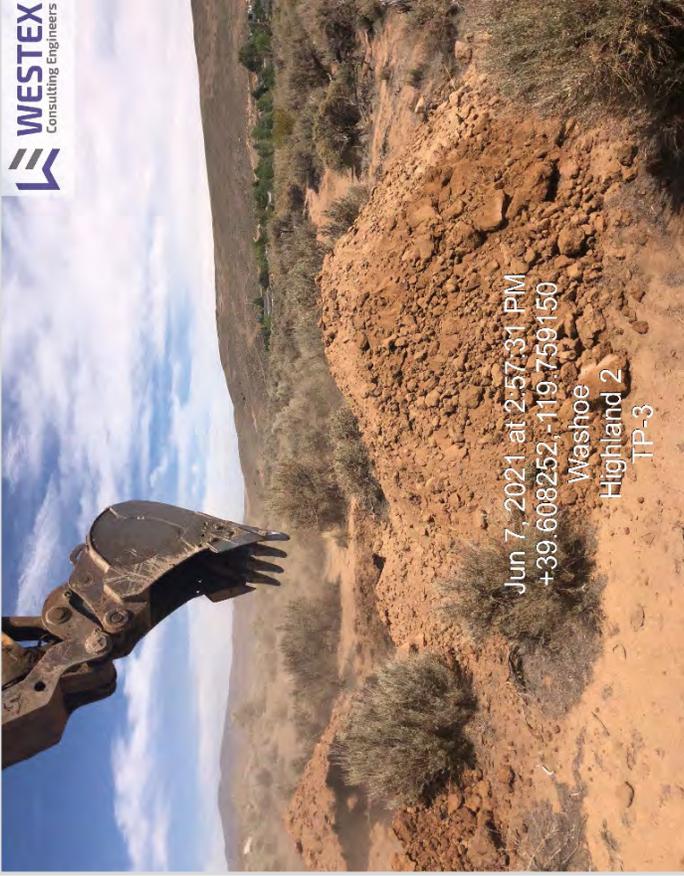


PO Box 18871, Reno, NV 89511
Phone: (775) 771-9539



Jun 7, 2021 at 2:38:24 PM
+39.608252,-119.759150

Washoe
Highland 2
TP-3



Jun 7, 2021 at 2:57:31 PM
+39.608252,-119.759150

Washoe
Highland 2
TP-3



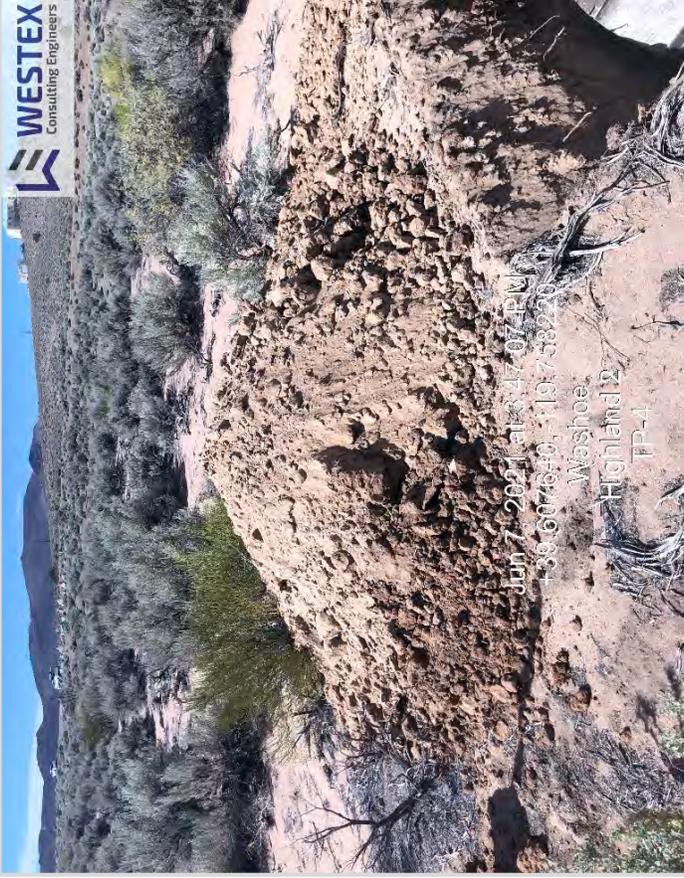
PO Box 18871, Reno, NV 89511
Phone: (775) 771-9539

GEOTECHNICAL EXPLORATION PHOTOGRAPHS

Geotechnical Investigation
Highland Village Ph 2
APN 508-020-04, -42 & -44
Washoe County, Nevada

Project No.: 2002.002-A
Date: 08/16/21

PLATE
E-2



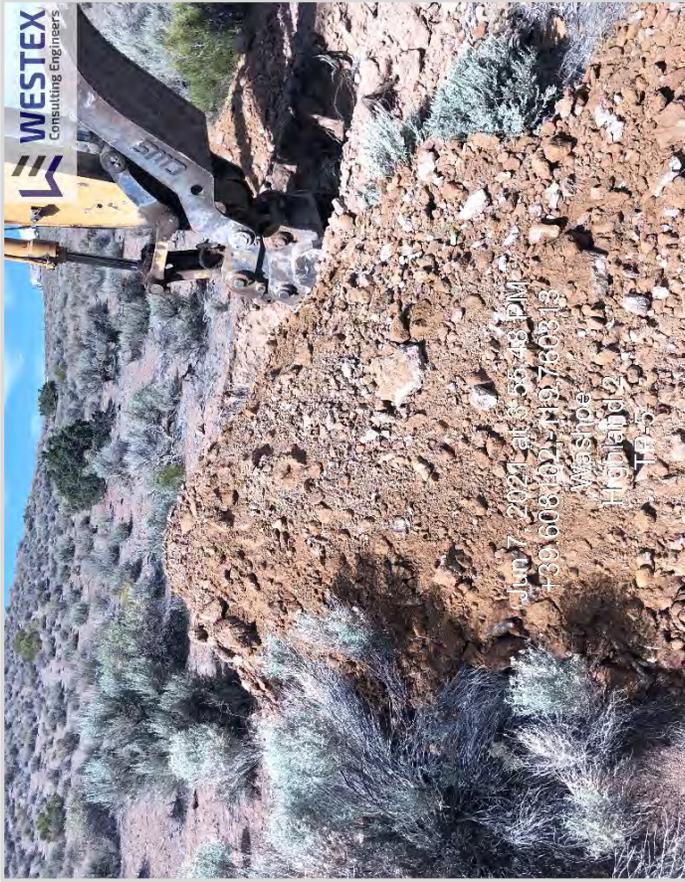
PO Box 18871, Reno, NV 89511
Phone: (775) 771-9539

GEOTECHNICAL EXPLORATION PHOTOGRAPHS

Geotechnical Investigation
Highland Village Ph 2
APN 508-020-04, -42 & -44
Washoe County, Nevada

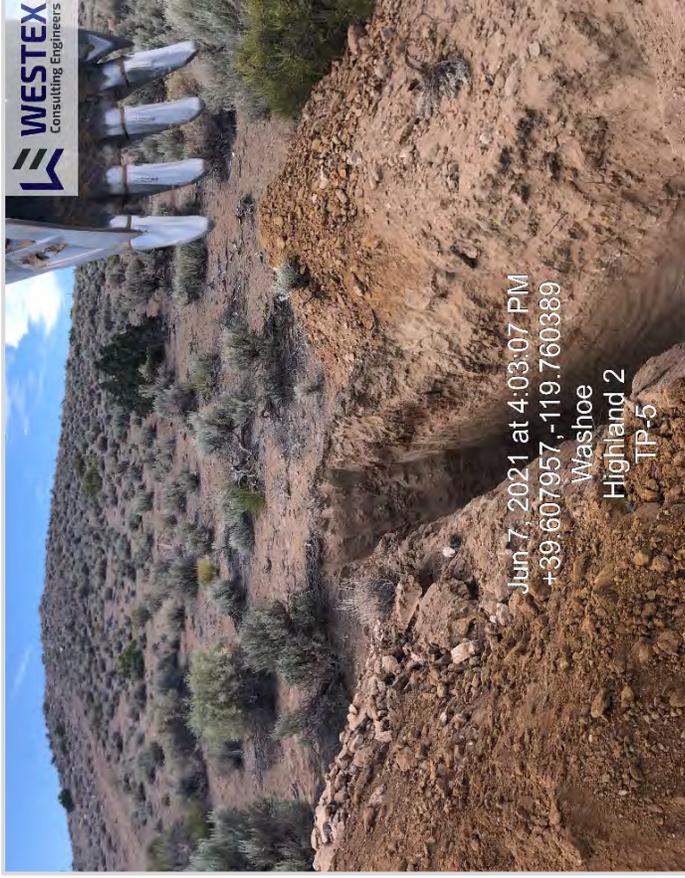
Project No.: 2002.002-A
Date: 08/16/21

PLATE
E-3



Jun 7, 2021 at 3:55:48 PM
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Washoe
Highland 2
TP-5



Jun 7, 2021 at 4:03:07 PM
+39.607957,-119.760389

Washoe
Highland 2
TP-5



PO Box 18871, Reno, NV 89511
Phone: (775) 771-9539

GEOTECHNICAL EXPLORATION PHOTOGRAPHS

Geotechnical Investigation
Highland Village Ph 2
APN 508-020-04, -42 & -44
Washoe County, Nevada

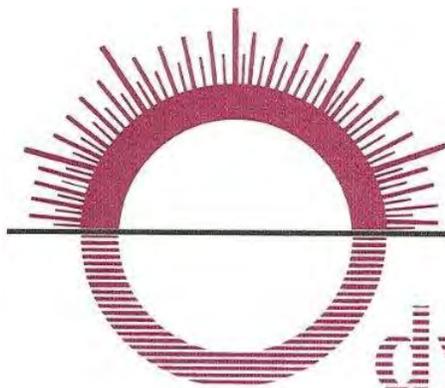
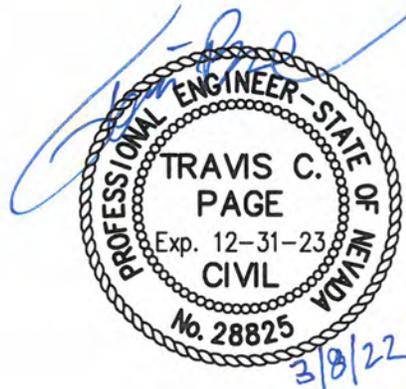
Project No.: 2002.002-A
Date: 08/16/21

PLATE
E-4

PRELIMINARY HYDROLOGY REPORT
FOR
HIGHLAND VILLAGE PHASE 2
TENTATIVE MAP

PREPARED FOR:

LC Highland 2, LLC
325 Harbour Cove Dr., Suite 219
Sparks, Nevada 89434



895 Roberta Lane, Suite 104, Sparks, NV 89431
(775) 359-3303 Fax (775) 359-3329

odyssey ENGINEERING
INCORPORATED

A preliminary hydrology report was completed with data and information from the Stone Creek Hydrology reports. Using the existing Basin Areas and detention pond data, a HEC-1 model was created to study the storm drain runoff flowing through the existing channel on site. The model shows 197 CFS draining onto the proposed site for Highland Village Phase 2 during the 100-yr storm through the existing channel.

The proposed storm system design for Highland Village Phase 2 is a channel that flows along the back of lots 24 through 42. The new channel intercepts the existing channel, reroutes along the exterior of the project, and connects back to the existing channel along the south side of the project near lot 43. The proposed channel is trapezoidal with a 5-foot bottom width and 2:1 side slopes. The channel will be lined with riprap. With a foot of freeboard, the capacity of the channel is 228 CFS.

The onsite storm drain system is split into two pipe runs. The south pipe run consists of Type 4-R catch basins that collect runoff and conveys south through storm drain pipe into a culvert that connects the proposed channel into the existing channel.

The north pipe run consists of Type 4-R catch basins that collect runoff and conveys east through storm drain pipe that drains into a detention pond. The detention pond drains east into an existing drainage ditch that runs along side of Highland Ranch Parkway. With a foot of freeboard the detention pond can detain 10,000 ft³.

In conclusion, all existing flows from offsite will maintain existing flow paths. The onsite detention basin will detain the increase of flow from the proposed development.

Channel Report

Proposed Channel

Trapezoidal

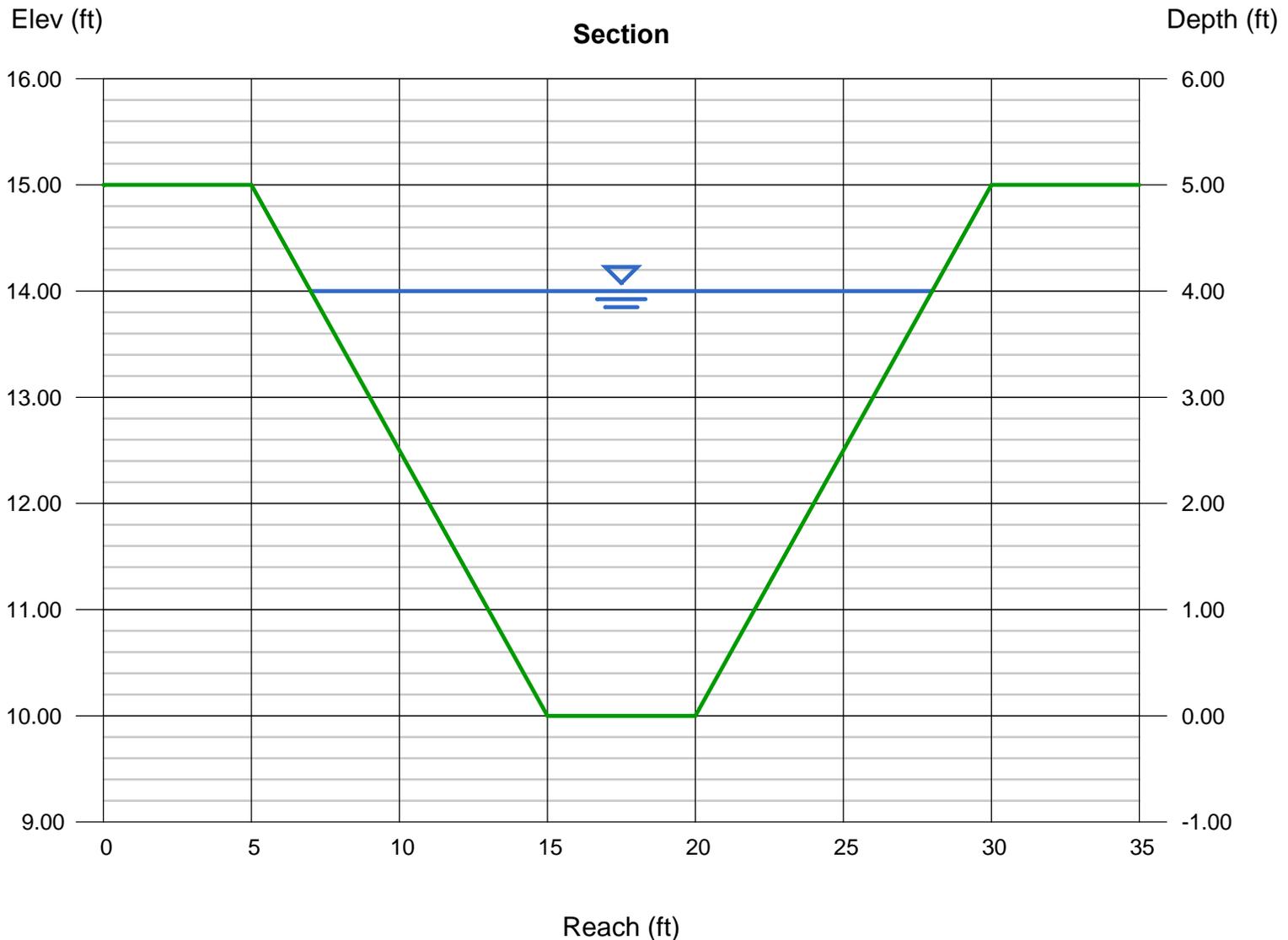
Bottom Width (ft) = 5.00
Side Slopes (z:1) = 2.00, 2.00
Total Depth (ft) = 5.00
Invert Elev (ft) = 10.00
Slope (%) = 0.30
N-Value = 0.032

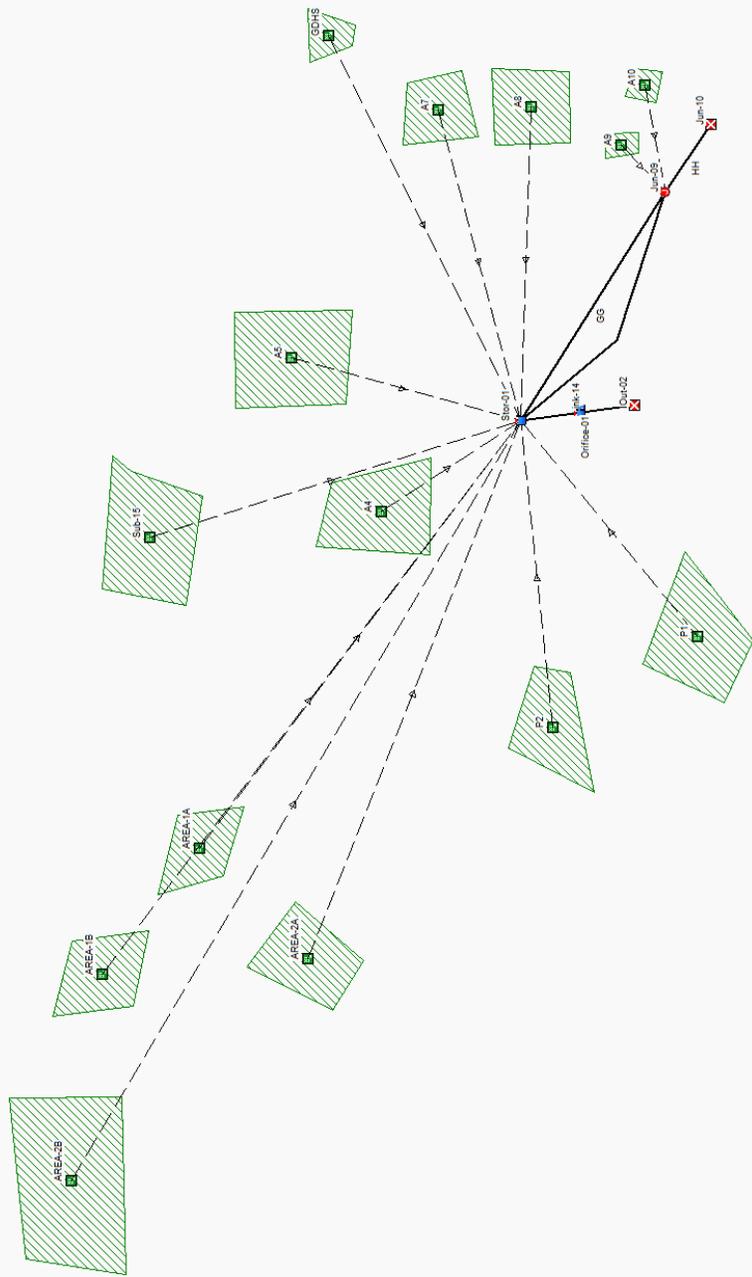
Highlighted

Depth (ft) = 4.00
Q (cfs) = 228.63
Area (sqft) = 52.00
Velocity (ft/s) = 4.40
Wetted Perim (ft) = 22.89
Crit Depth, Yc (ft) = 2.81
Top Width (ft) = 21.00
EGL (ft) = 4.30

Calculations

Compute by: Known Depth
Known Depth (ft) = 4.00





Project Description

File Name Exist. Hydro.SPF

Project Options

Flow Units CFS
 Elevation Type Elevation
 Hydrology Method HEC-1
 HEC-1 unit hydrograph method SCS Dimensionless
 HEC-1 loss method SCS Curve Number
 Link Routing Method Kinematic Wave
 Enable Overflow Ponding at Nodes YES
 Skip Steady State Analysis Time Periods NO

Analysis Options

Start Analysis On 00:00:00 0:00:00
 End Analysis On 00:00:00 0:00:00
 Start Reporting On 00:00:00 0:00:00
 Antecedent Dry Days 0 days
 Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
 Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
 Reporting Time Step 0 00:05:00 days hh:mm:ss
 Routing Time Step 30 seconds

Number of Elements

Qty
 Rain Gages 1
 Subbasins 14
 Nodes 4
 Junctions 1
 Outfalls 2
 Flow Diversions 0
 Inlets 0
 Storage Nodes 1
 Links 4
 Channels 0
 Pipes 3
 Pumps 0
 Orifices 1
 Weirs 0
 Outlets 0
 Pollutants 0
 Land Uses 0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-02	Time Series	TS-01	Cumulative	inches	Nevada	Washoe (Reno)	100.00	3.26	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)
1	A10	7.26	3.26	0.68	4.94	7.46
2	A4	10.92	3.26	0.68	7.47	11.28
3	A5	37.47	3.26	0.68	25.55	38.59
4	A7	40.21	3.26	0.68	27.42	41.43
5	A8	31.23	3.26	0.68	21.30	32.19
6	A9	2.80	3.26	0.69	1.92	2.90
7	AREA-1A	21.12	3.26	0.68	14.40	21.77
8	AREA-1B	31.22	3.26	0.68	21.29	32.19
9	AREA-2A	51.42	3.26	0.68	35.07	52.98
10	AREA-2B	269.00	3.26	0.68	183.46	277.28
11	GDHS	40.56	3.26	0.68	27.66	41.83
12	P1	30.62	3.26	0.83	25.38	39.62
13	P2	51.58	3.26	0.83	42.76	66.69
14	Sub-15	16.63	3.26	1.00	16.63	23.98

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft ²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	9-Jun	Junction	4784.65	4784.65	4784.65	0.00	0.00	196.76	4787.61	0.00	0.04	0 00:00	0.00	0.00
2	10-Jun	Outfall	4783.90					196.76	4783.90					
3	Out-02	Outfall	4787.90					89.71	4787.90					
4	Stor-01	Storage Node	4786.00	4794.00	4786.00		0.00	677.67	4792.10				0.00	0.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Capacity (cfs)	Peak Flow/Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/Total Depth Ratio	Total Time Reported (min)	Surcharged Condition
1	GG	Pipe	Stor-01	9-Jun	75.00	4786.00	4784.65	1.8000	36.000	0.0130	95.34	89.49	1.07	14.49	2.98	0.99	0.00	> CAPACITY
2	HH	Pipe	9-Jun	10-Jun	75.00	4784.65	4783.90	1.0000	0.000	0.0320	196.76	0.00	1.07	0.00	2.98	0.99	0.00	> CAPACITY
3	Link-14	Pipe	Stor-01	9-Jun	75.00	4786.00	4784.65	1.8000	36.000	0.0130	95.34	89.49	1.07	14.49	2.98	0.99	0.00	> CAPACITY
4	Orifice-01	Orifice	Stor-01	Out-02		4786.00	4787.90		48.000		89.71							

Subbasin Hydrology

Subbasin : A10

Input Data

Area (ac) 7.26

Subbasin Runoff Results

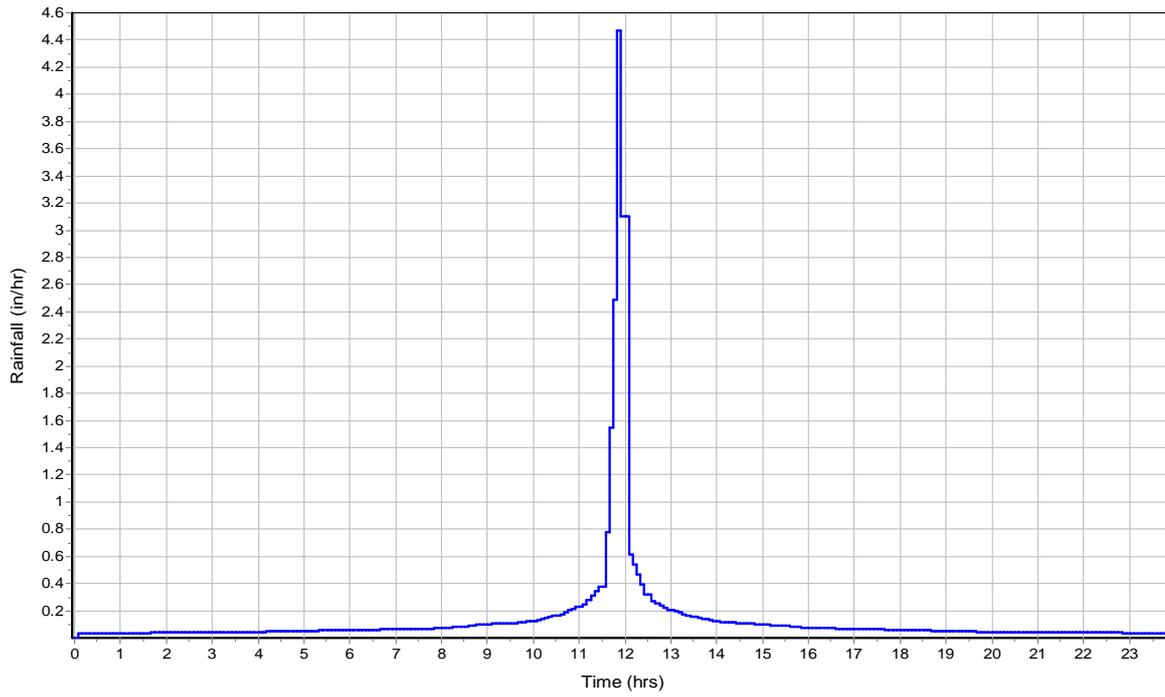
Total Rainfall (in) 3.26

Total Runoff (in) 0.68

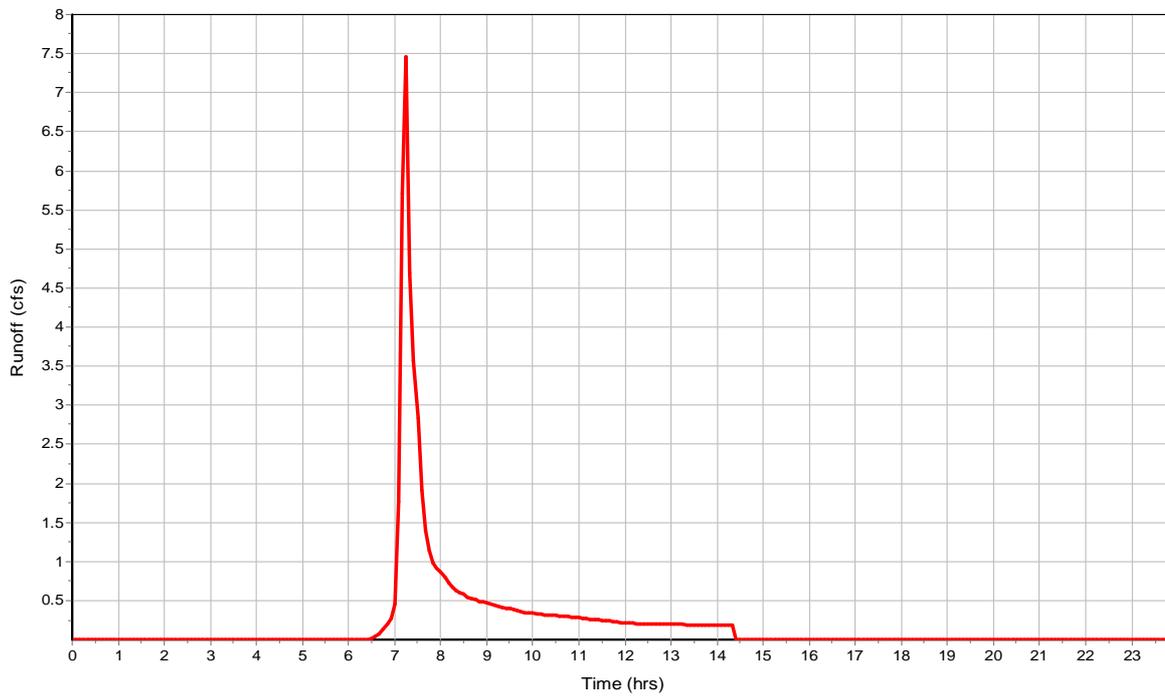
Peak Runoff (cfs) 7.46

Subbasin : A10

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : A4

Input Data

Area (ac) 10.92

Subbasin Runoff Results

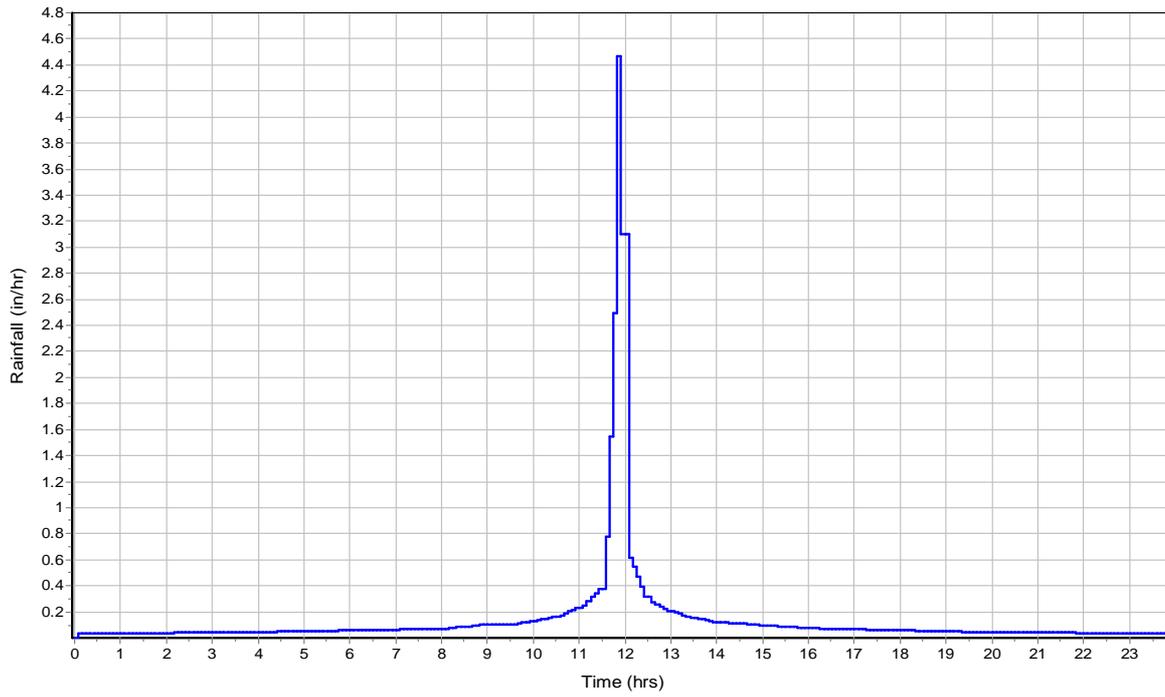
Total Rainfall (in) 3.26

Total Runoff (in) 0.68

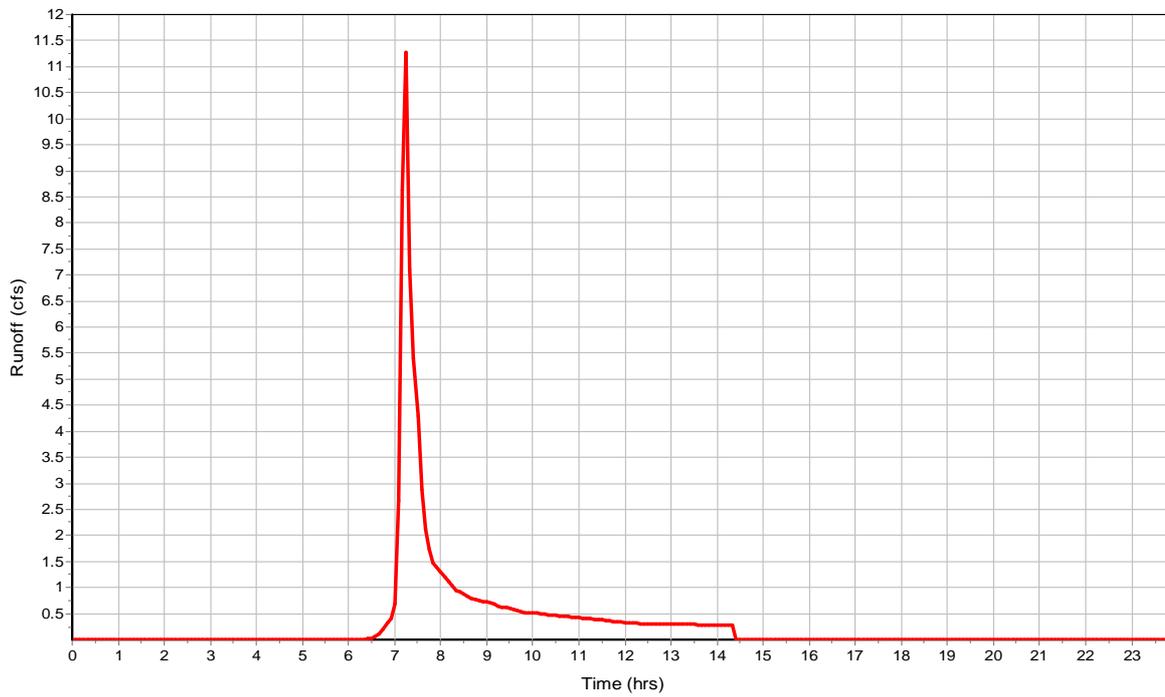
Peak Runoff (cfs) 11.28

Subbasin : A4

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : A5

Input Data

Area (ac) 37.47

Subbasin Runoff Results

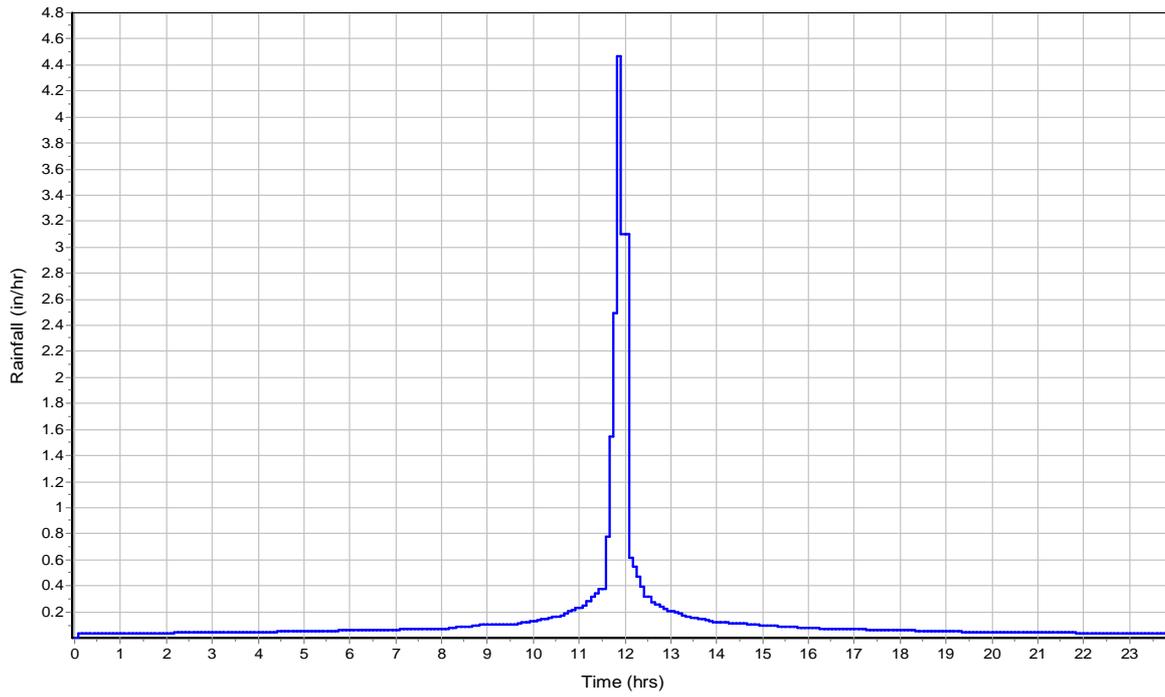
Total Rainfall (in) 3.26

Total Runoff (in) 0.68

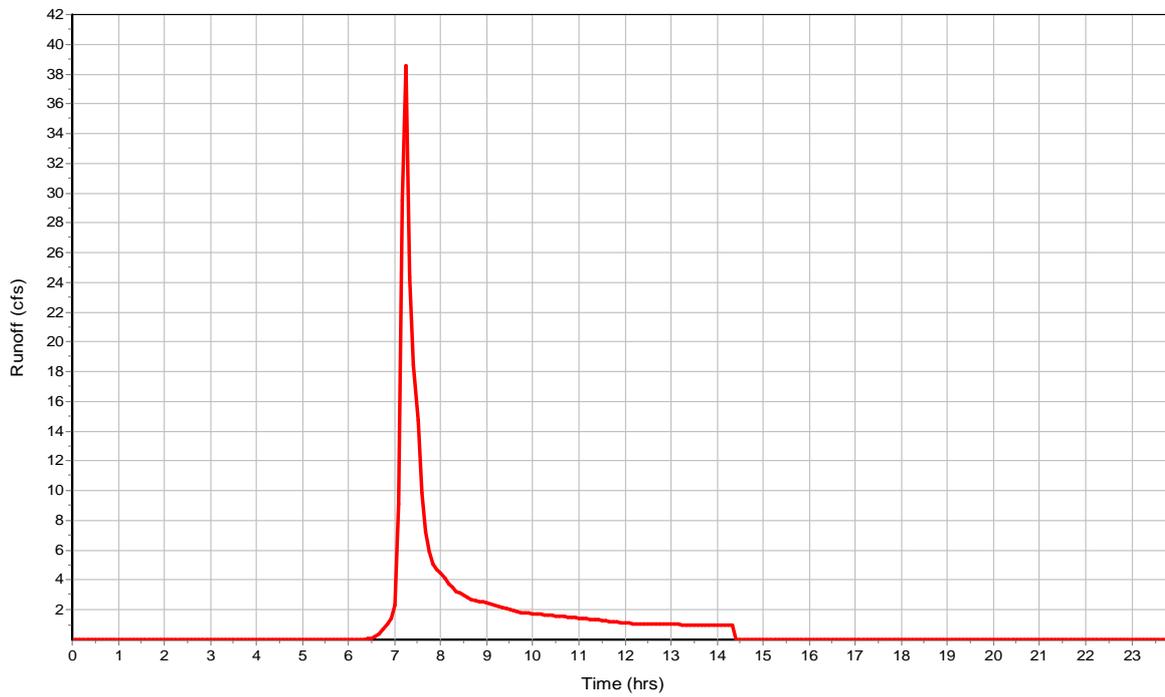
Peak Runoff (cfs) 38.59

Subbasin : A5

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : A7

Input Data

Area (ac) 40.21

Subbasin Runoff Results

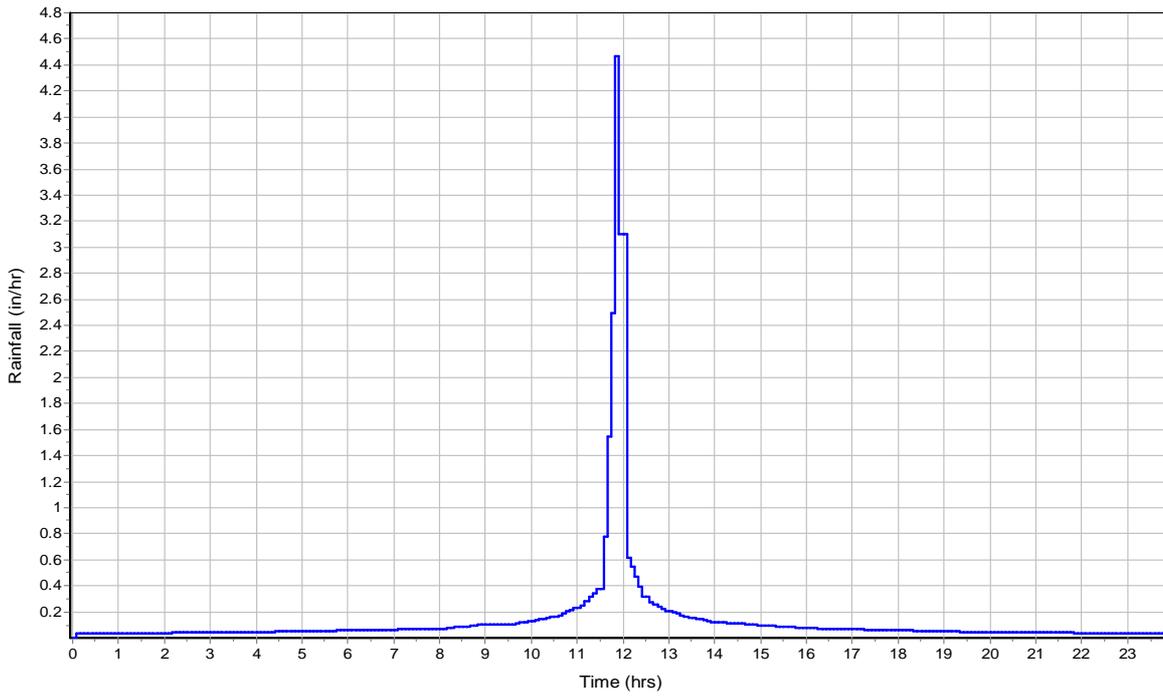
Total Rainfall (in) 3.26

Total Runoff (in) 0.68

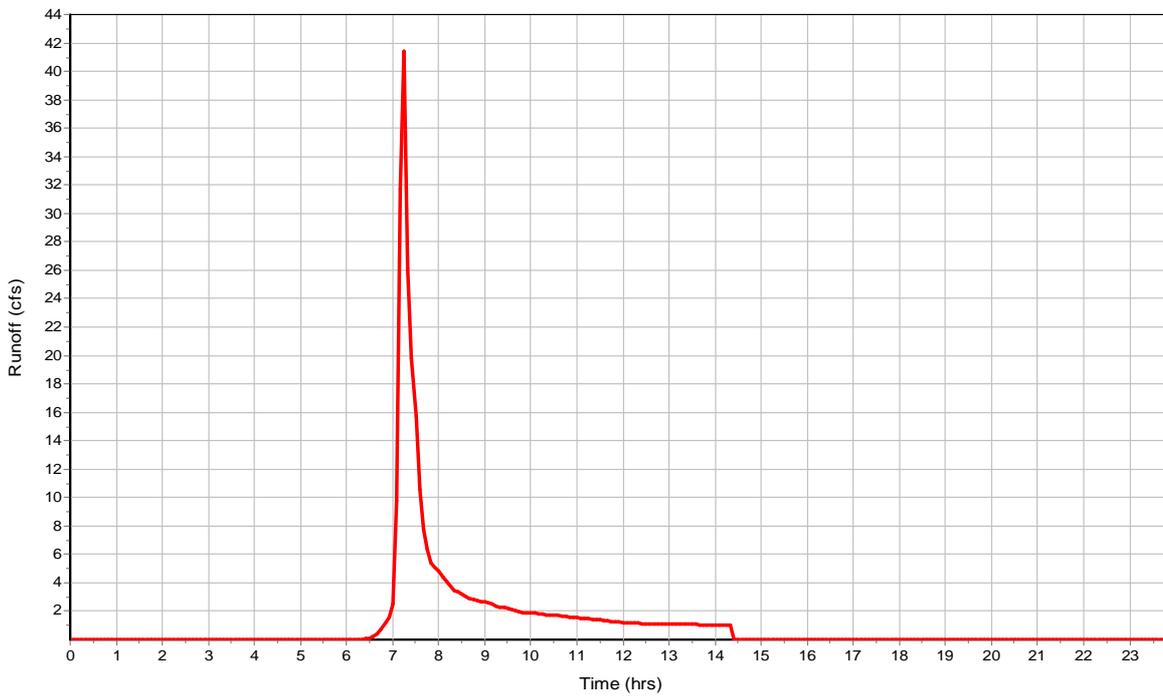
Peak Runoff (cfs) 41.43

Subbasin : A7

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : A8

Input Data

Area (ac) 31.23

Subbasin Runoff Results

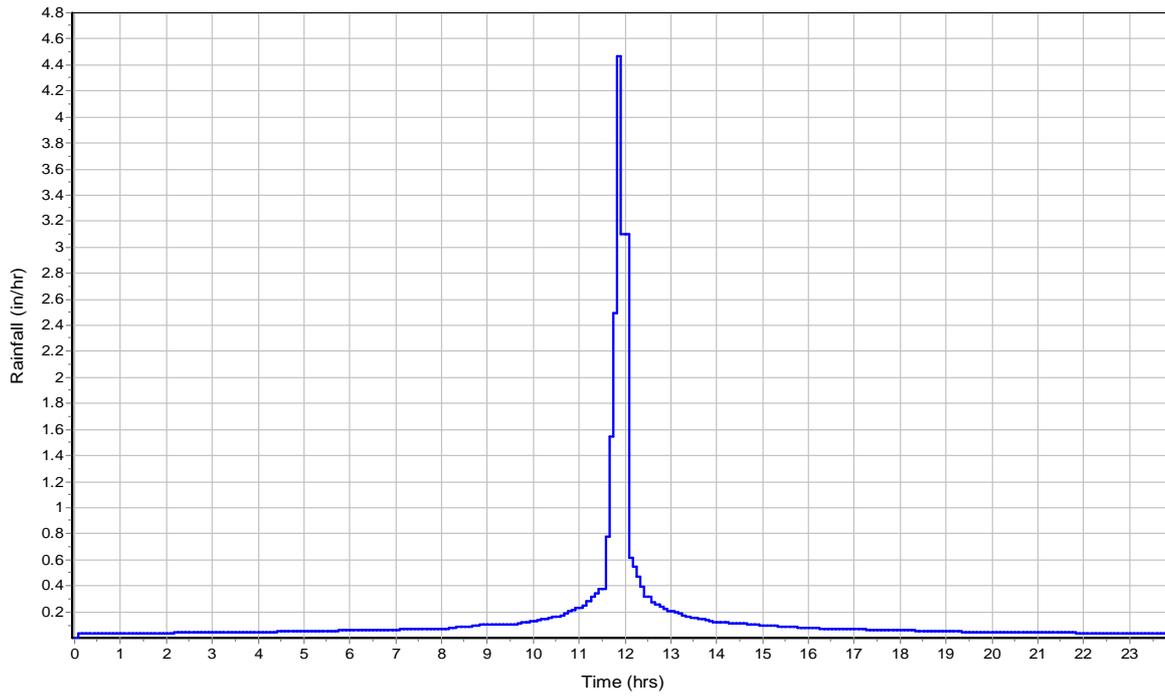
Total Rainfall (in) 3.26

Total Runoff (in) 0.68

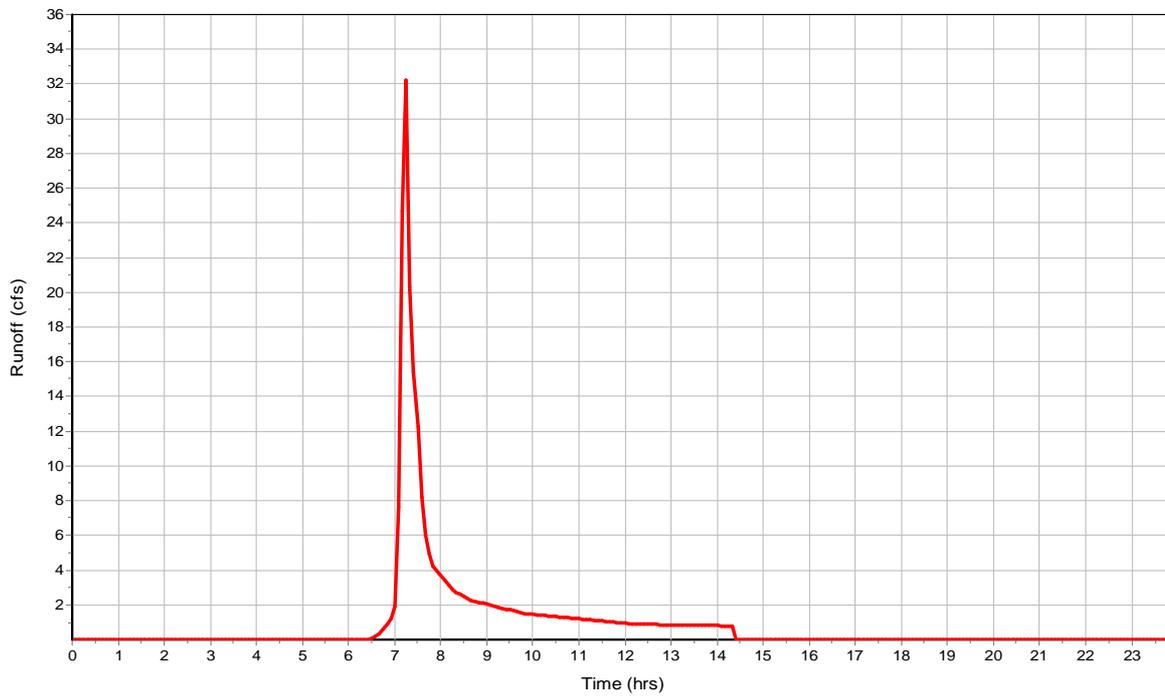
Peak Runoff (cfs) 32.19

Subbasin : A8

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : A9

Input Data

Area (ac) 2.8

Subbasin Runoff Results

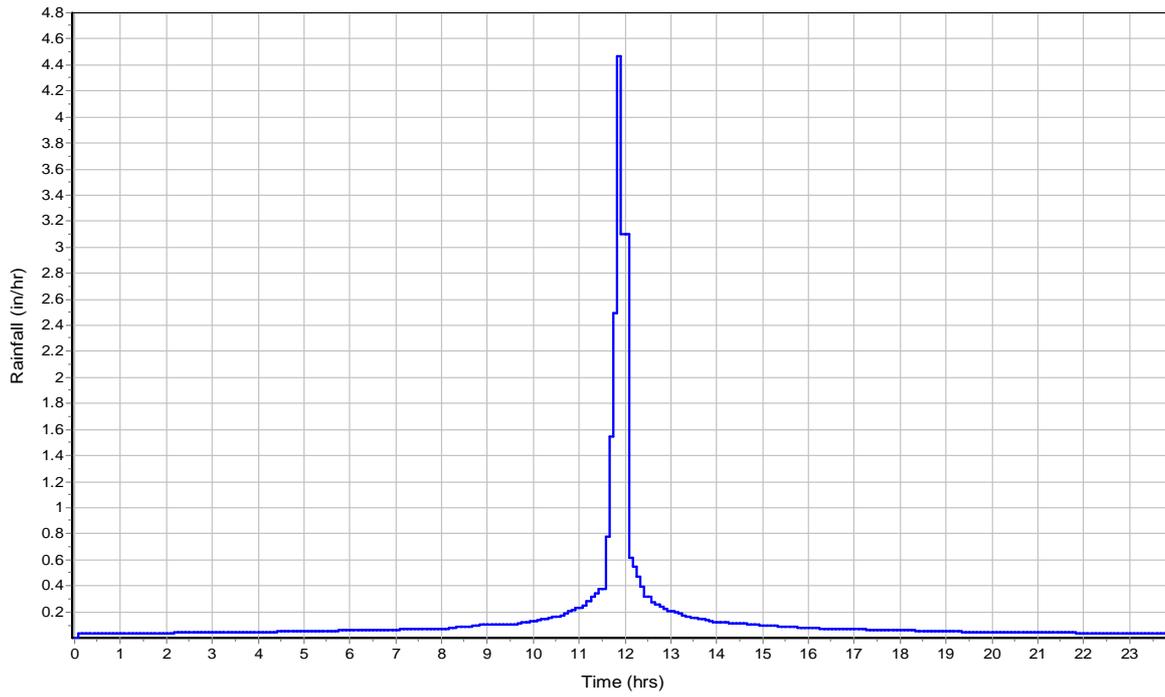
Total Rainfall (in) 3.26

Total Runoff (in) 0.69

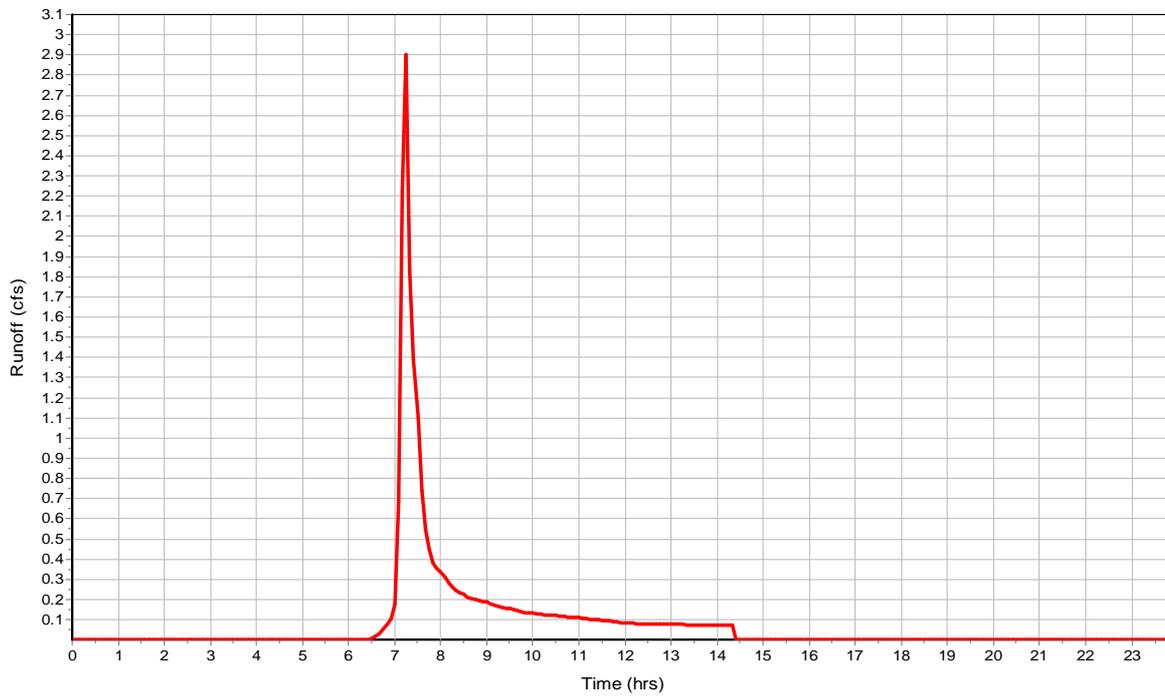
Peak Runoff (cfs) 2.9

Subbasin : A9

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : AREA-1A

Input Data

Area (ac) 21.12

Subbasin Runoff Results

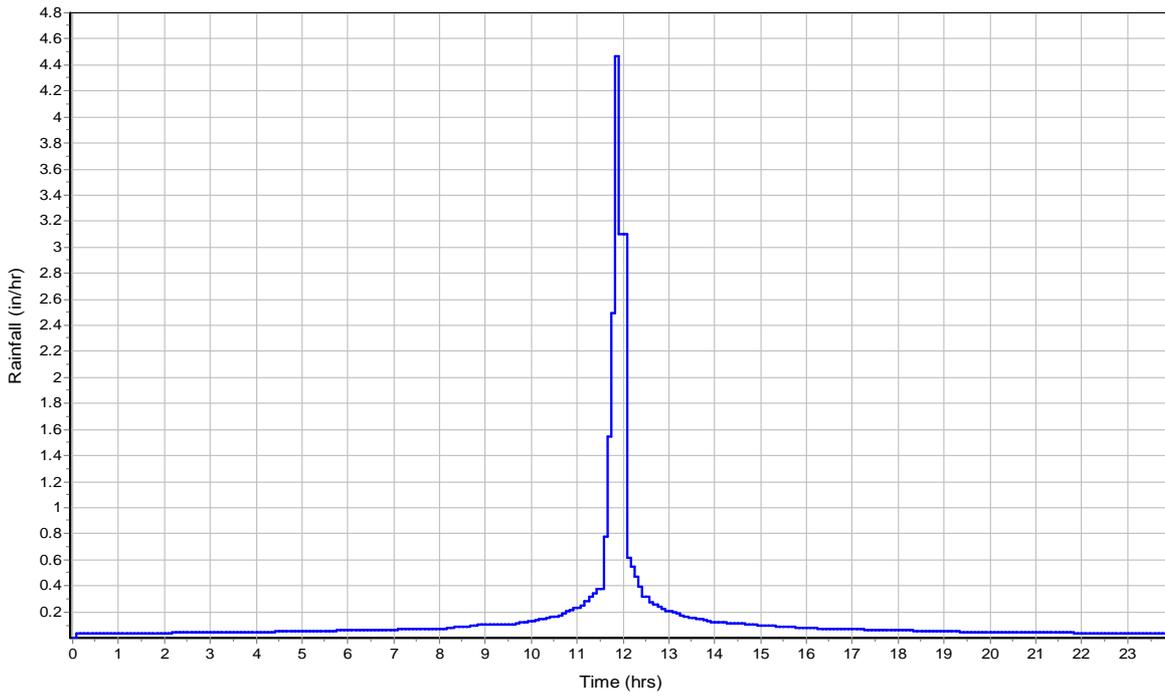
Total Rainfall (in) 3.26

Total Runoff (in) 0.68

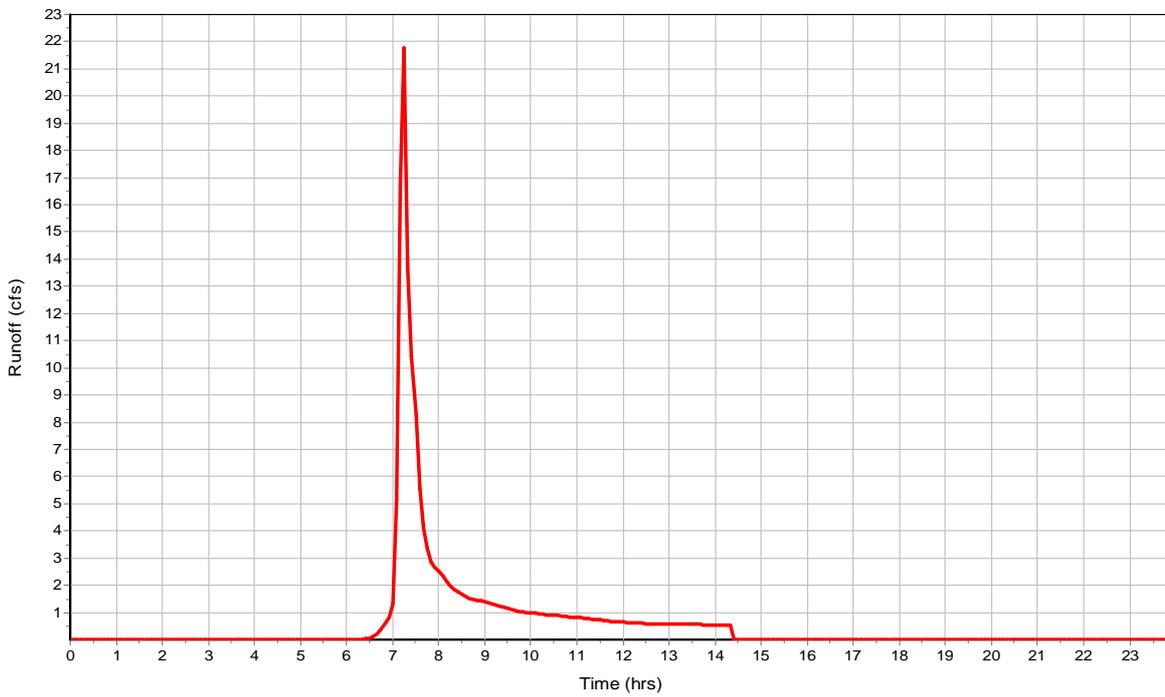
Peak Runoff (cfs) 21.77

Subbasin : AREA-1A

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : AREA-1B

Input Data

Area (ac) 31.22

Subbasin Runoff Results

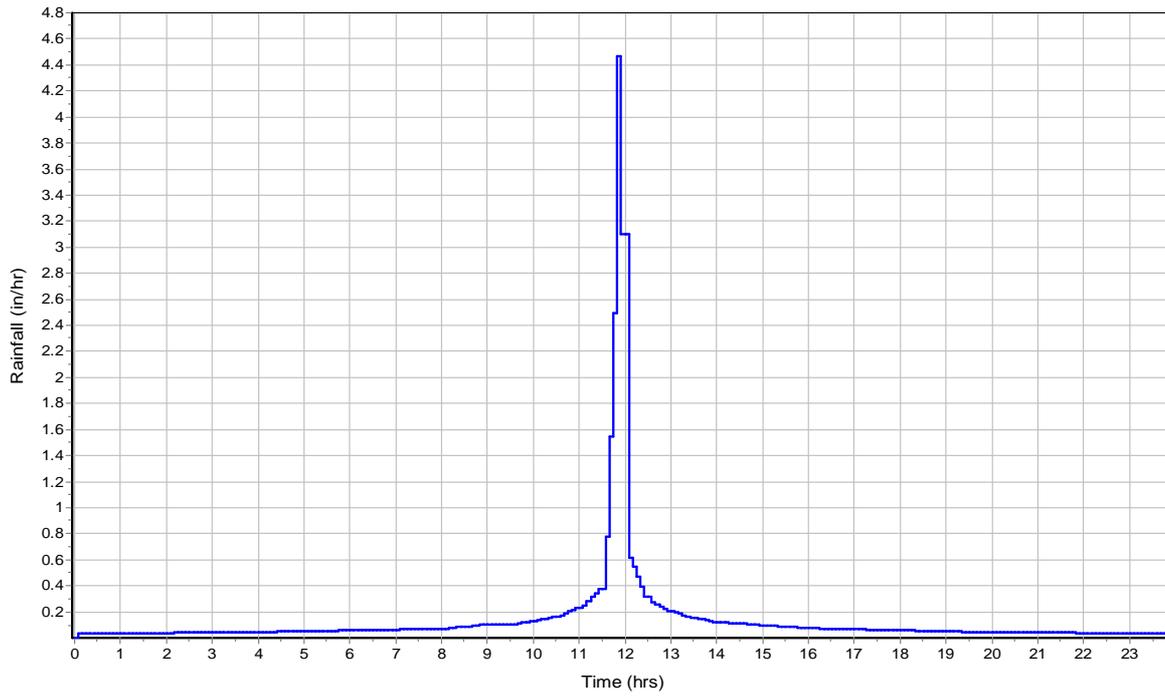
Total Rainfall (in) 3.26

Total Runoff (in) 0.68

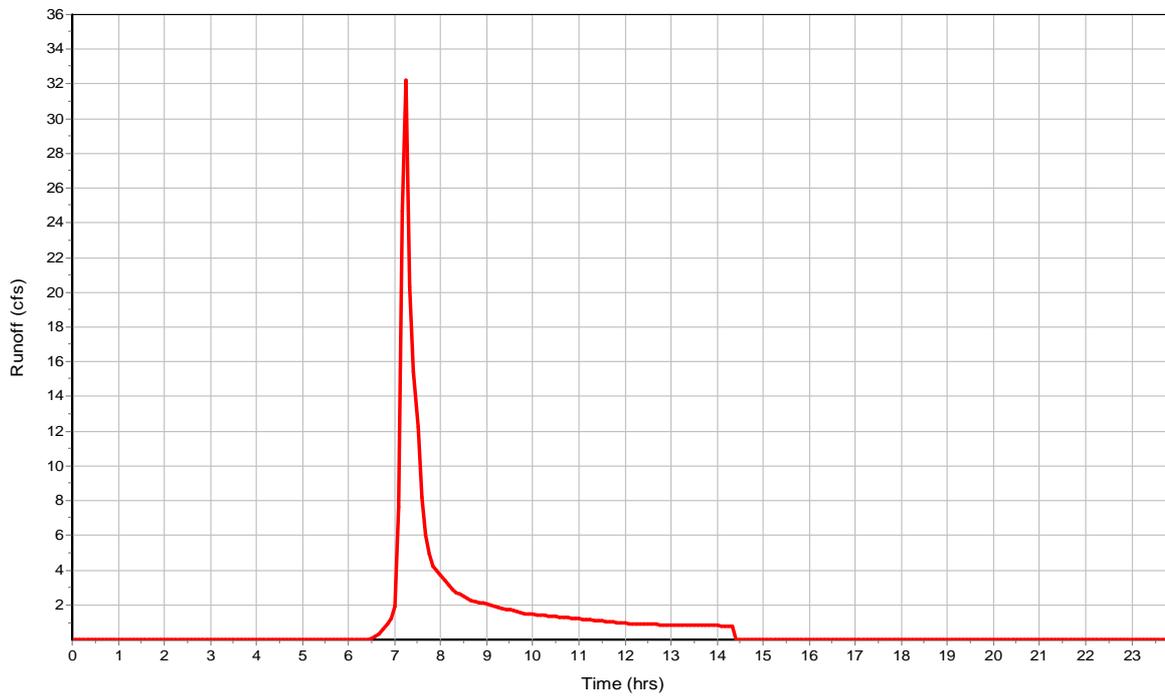
Peak Runoff (cfs) 32.19

Subbasin : AREA-1B

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : AREA-2A

Input Data

Area (ac) 51.42

Subbasin Runoff Results

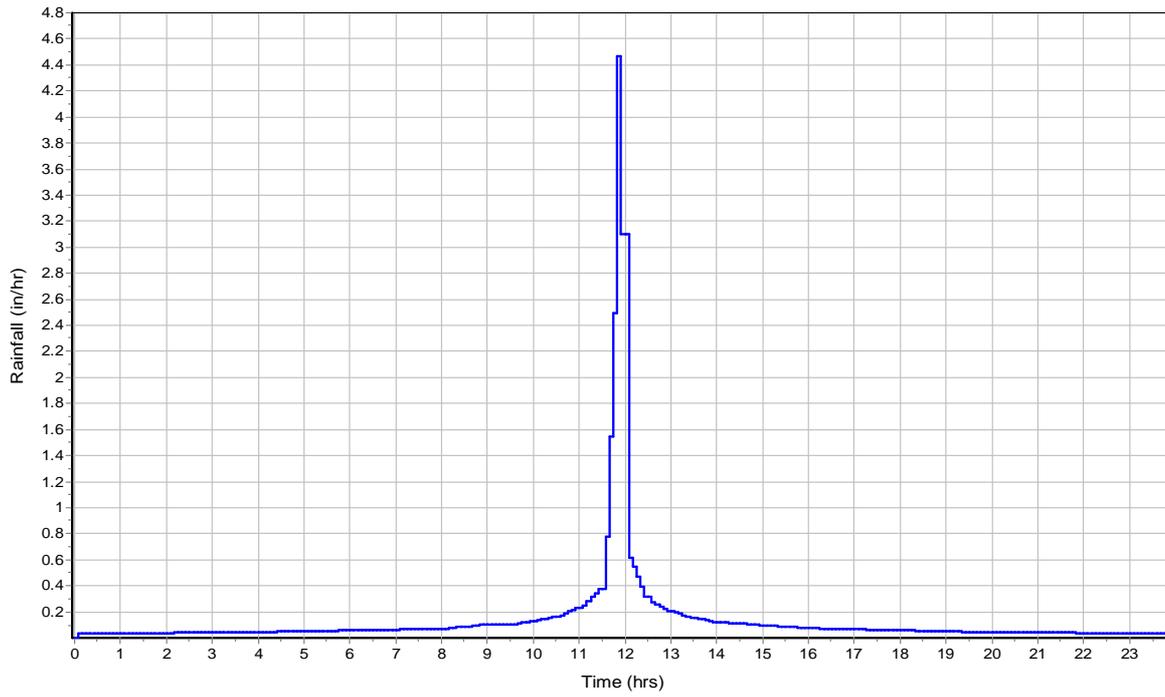
Total Rainfall (in) 3.26

Total Runoff (in) 0.68

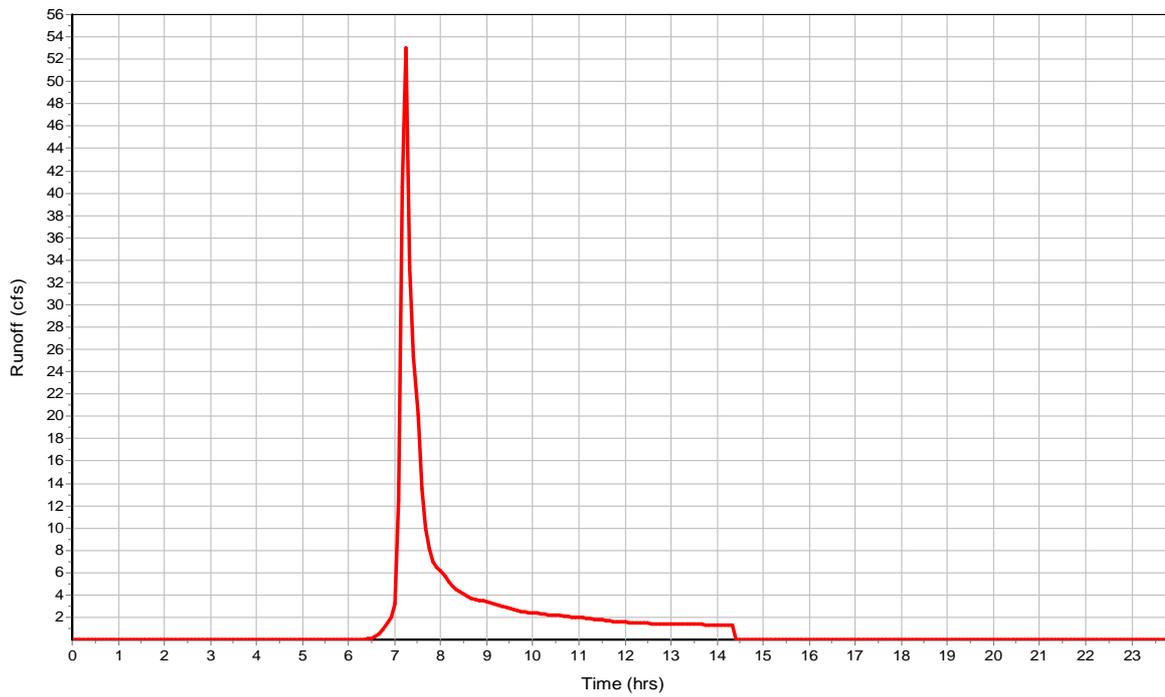
Peak Runoff (cfs) 52.98

Subbasin : AREA-2A

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : AREA-2B

Input Data

Area (ac) 269

Subbasin Runoff Results

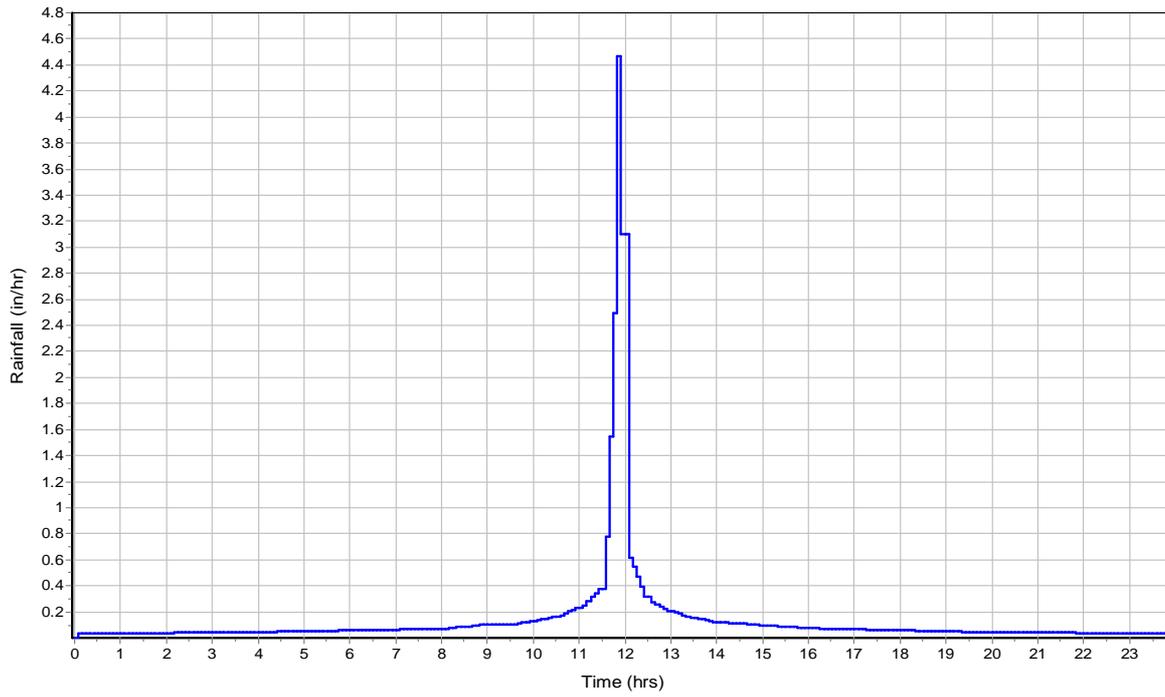
Total Rainfall (in) 3.26

Total Runoff (in) 0.68

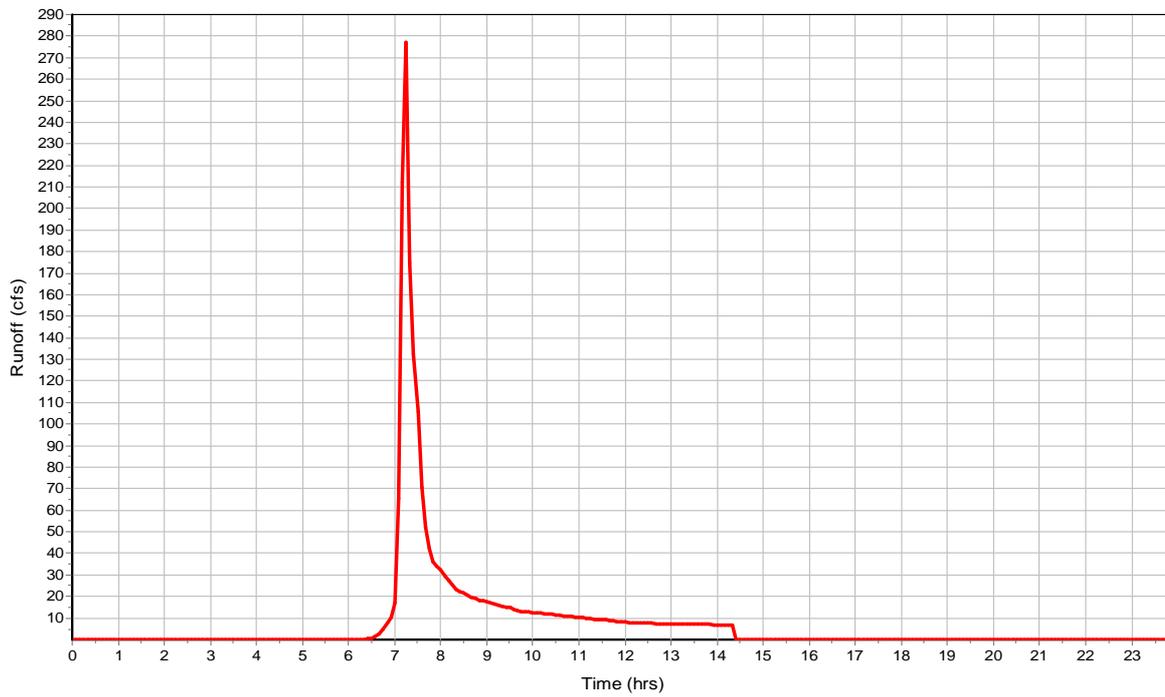
Peak Runoff (cfs) 277.28

Subbasin : AREA-2B

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : GDHS

Input Data

Area (ac) 40.56

Subbasin Runoff Results

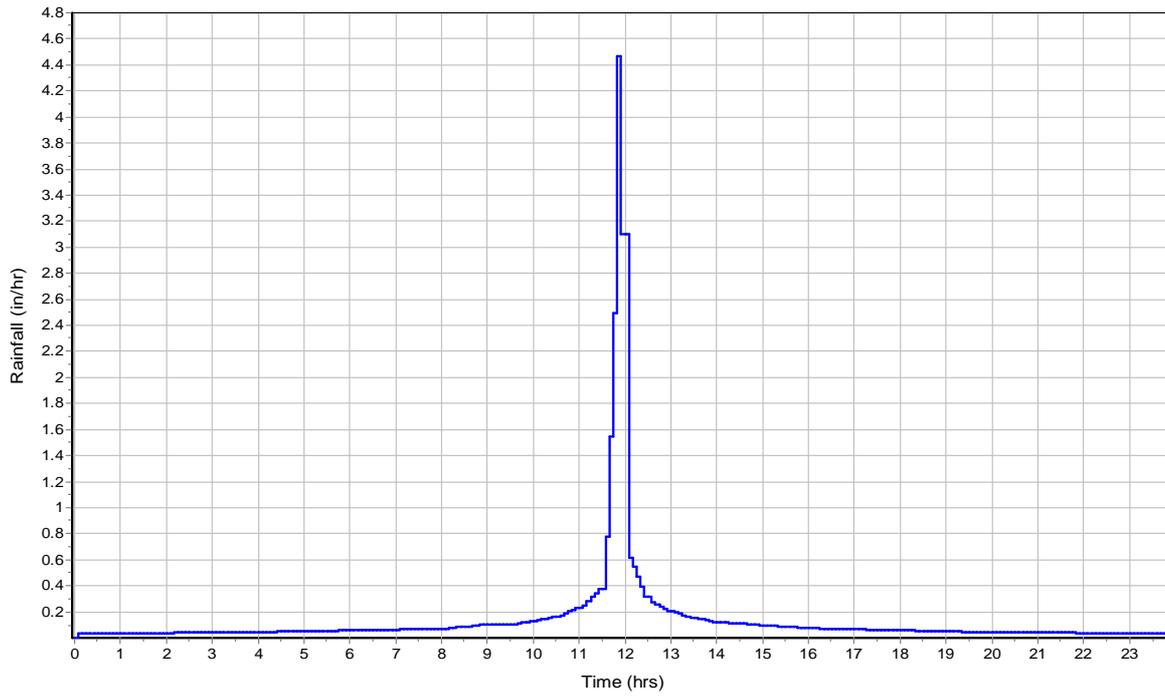
Total Rainfall (in) 3.26

Total Runoff (in) 0.68

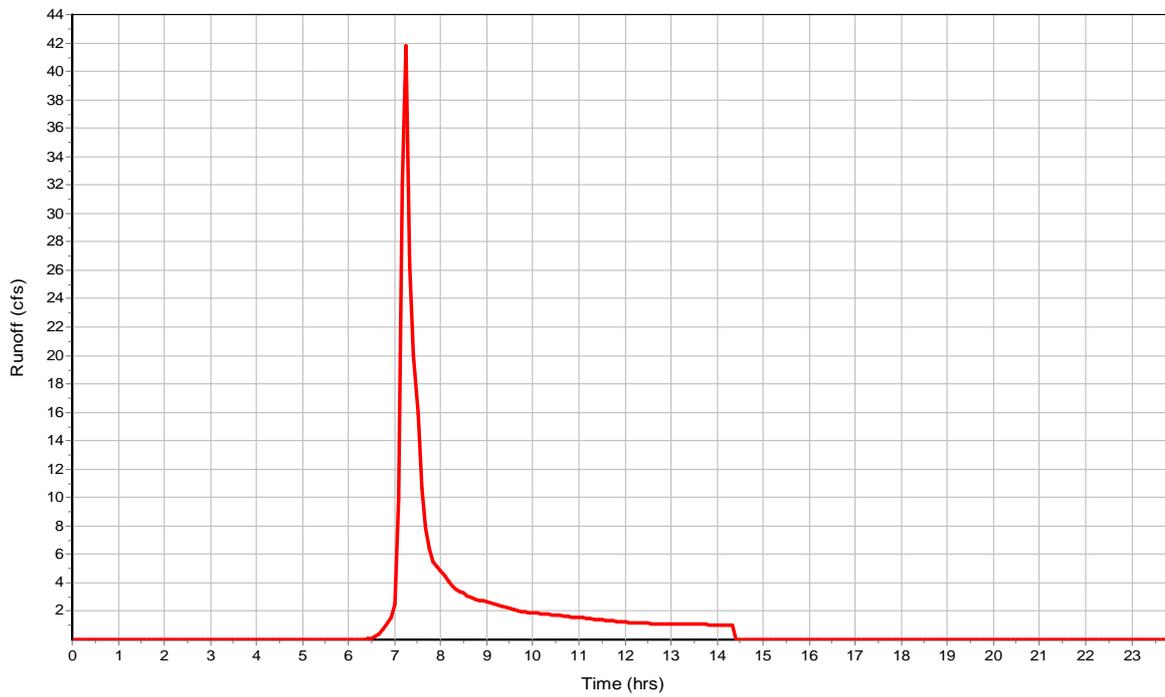
Peak Runoff (cfs) 41.83

Subbasin : GDHS

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : P1

Input Data

Area (ac) 30.62

Subbasin Runoff Results

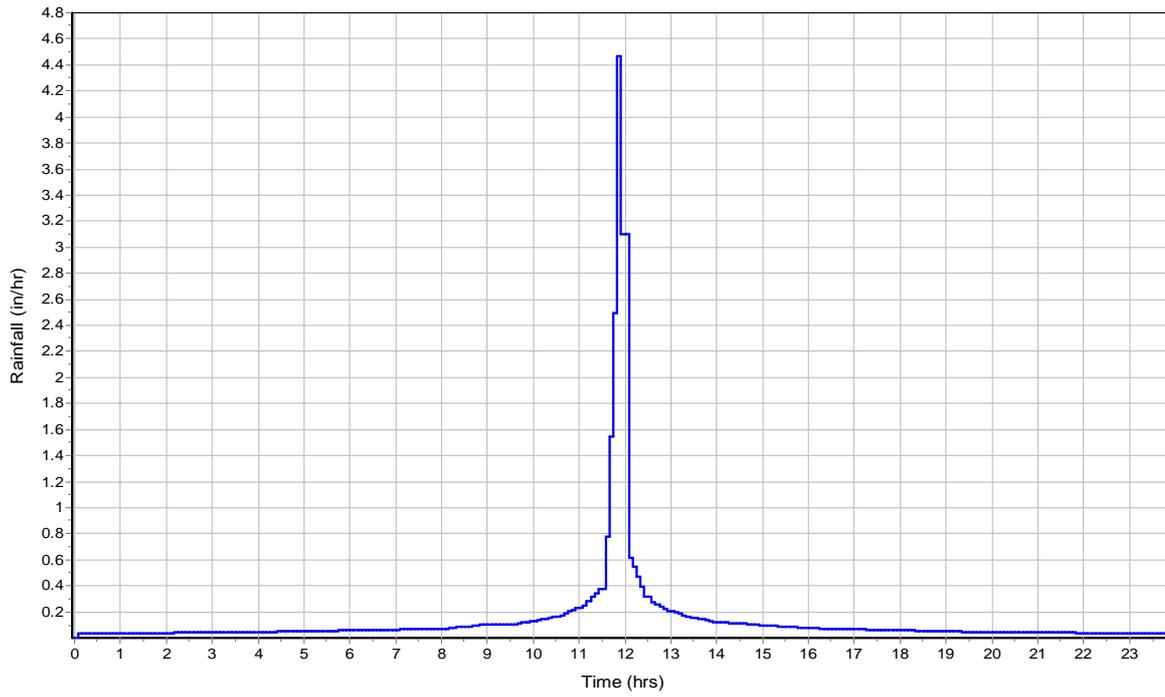
Total Rainfall (in) 3.26

Total Runoff (in) 0.83

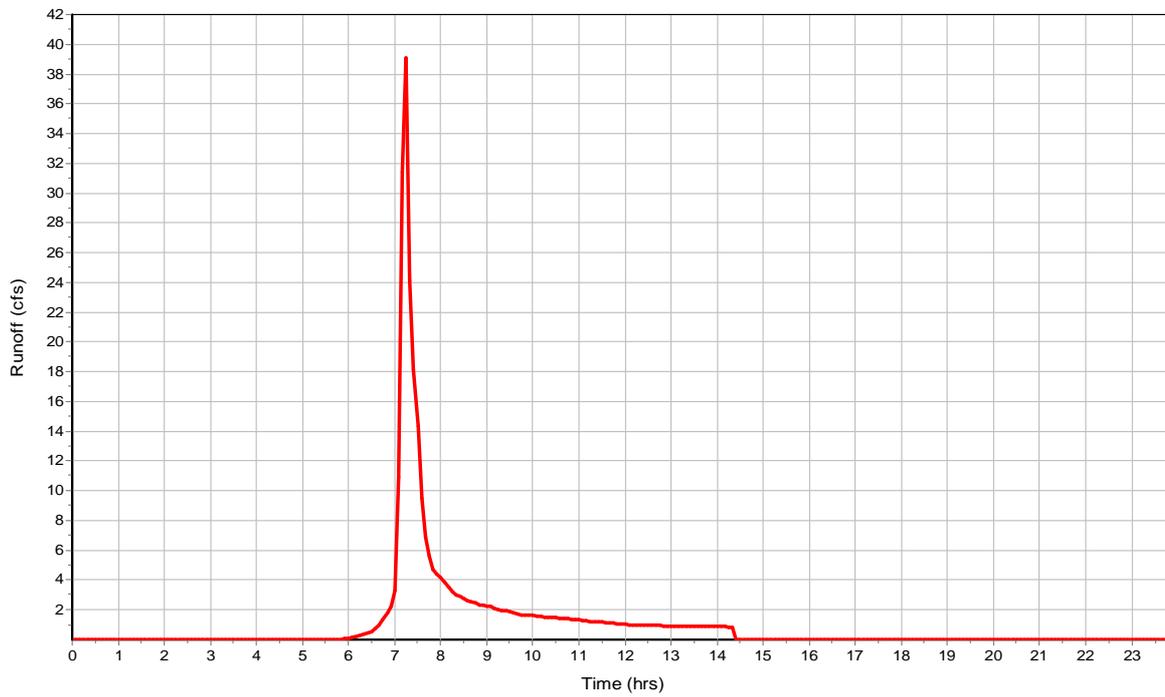
Peak Runoff (cfs) 39.62

Subbasin : P1

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : P2

Input Data

Area (ac) 51.58

Subbasin Runoff Results

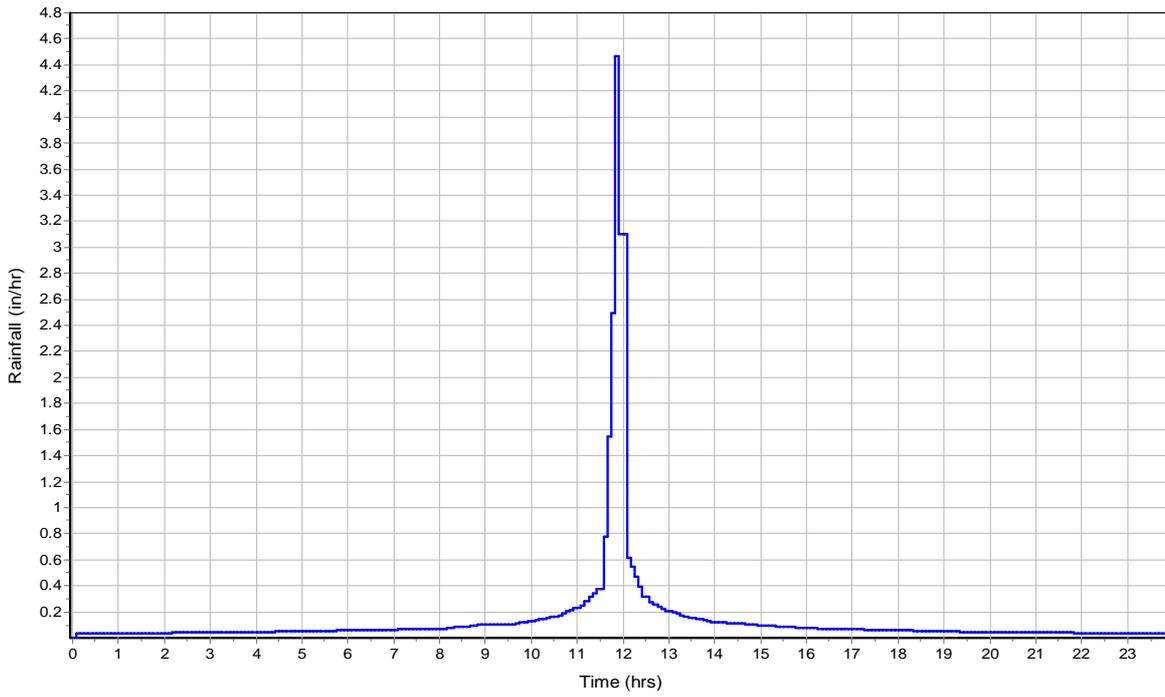
Total Rainfall (in) 3.26

Total Runoff (in) 0.83

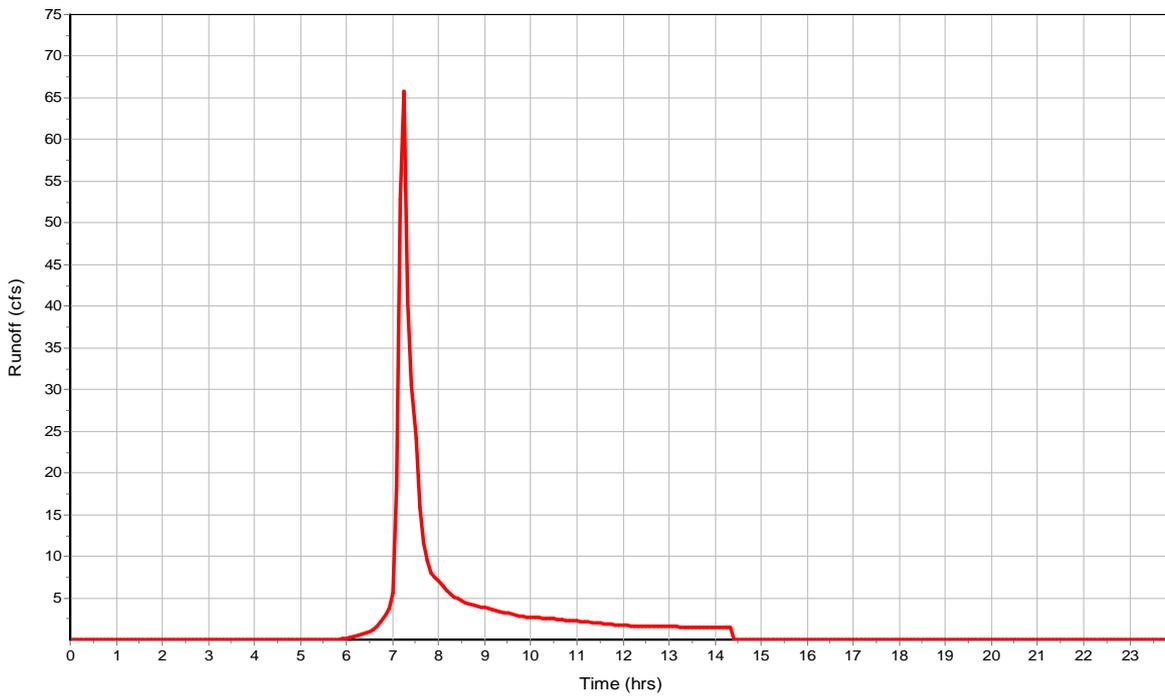
Peak Runoff (cfs) 66.69

Subbasin : P2

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-15

Input Data

Area (ac) 16.63

Subbasin Runoff Results

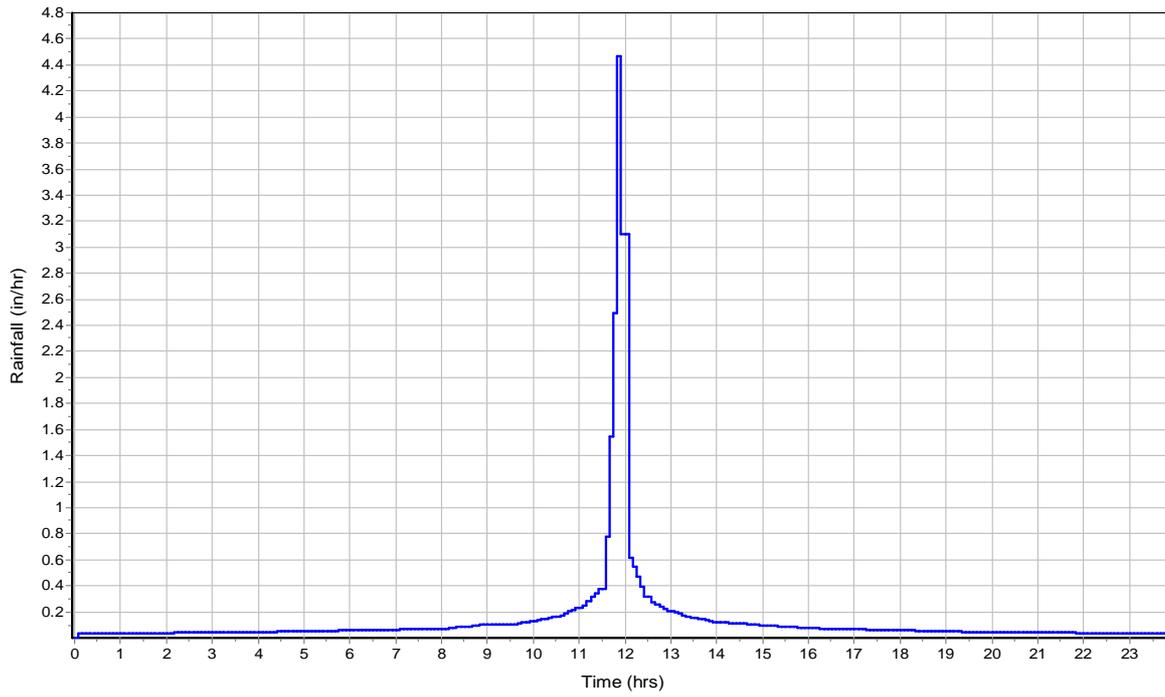
Total Rainfall (in) 3.26

Total Runoff (in) 1

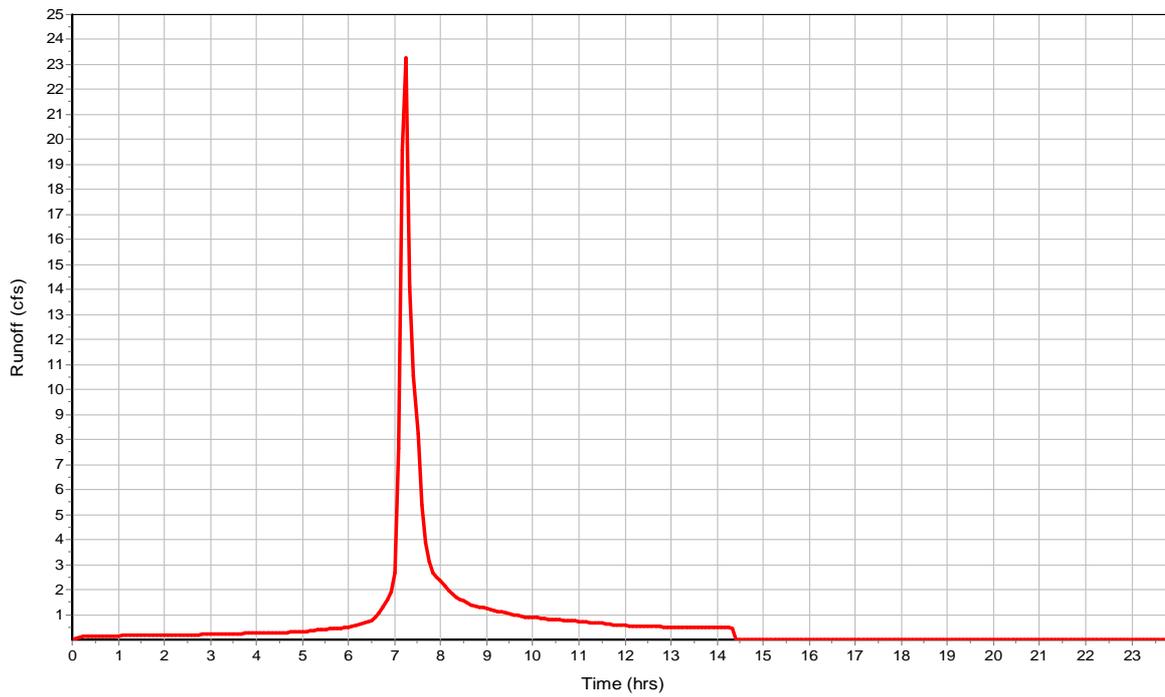
Peak Runoff (cfs) 23.98

Subbasin : Sub-15

Rainfall Intensity Graph



Runoff Hydrograph



Junction Input

SN Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1 9-Jun	4784.65	4784.65	0.00	4784.65	0.00	0.00	-4784.65	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surcharge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
		(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(days hh:mm)	(ac-in)	(min)
1	9-Jun	196.76	10.36	4787.61	2.96	0.00	0.04	4785.01	0.36	0 08:17	0 00:00	0.00	0.00

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Pipe Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	GG	75.00	4786.00	0.00	4784.65	0.00	1.35	1.8000	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	HH	75.00	4784.65	0.00	4783.90	0.00	0.75	1.0000	Dummy	0.000	0.000	0.0320	0.5000	0.5000	0.0000	0.00	No	1
3	Link-14	75.00	4786.00	0.00	4784.65	0.00	1.35	1.8000	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1 GG	95.34	0 08:15	89.49	1.07	14.49	0.09	2.98	0.99	0.00		> CAPACITY
2 HH	196.76	0 07:15	0.00	1.07	0.00		2.98	0.99	0.00		> CAPACITY
3 Link-14	95.34	0 08:15	89.49	1.07	14.49	0.09	2.98	0.99	0.00		> CAPACITY

Storage Nodes

Storage Node : Stor-01

Input Data

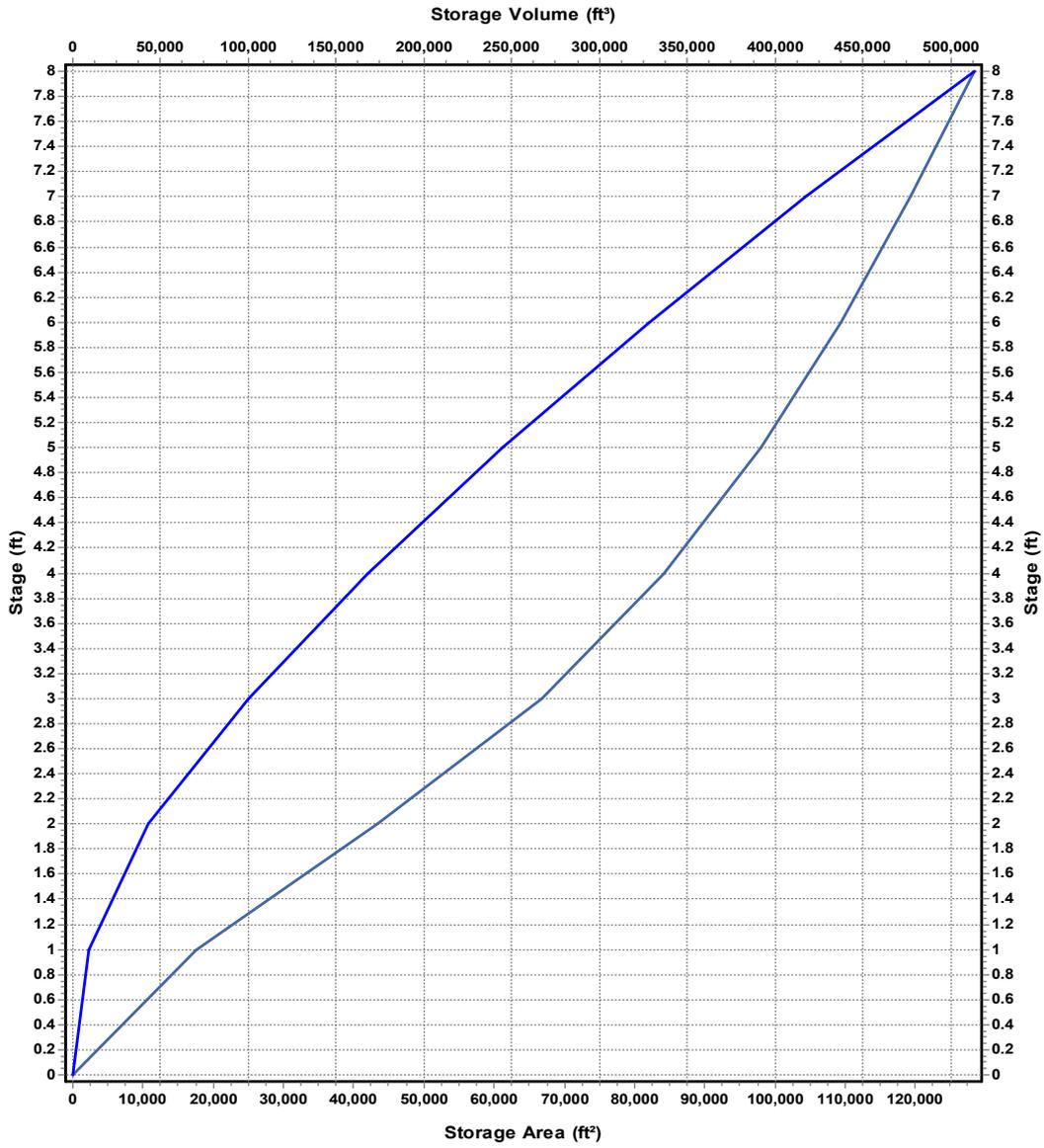
Invert Elevation (ft) 4786
Max (Rim) Elevation (ft) 4794
Max (Rim) Offset (ft) 8
Initial Water Elevation (ft) 4786
Initial Water Depth (ft) 0
Ponded Area (ft²) 0
Evaporation Loss 0

Storage Area Volume Curves

Storage Curve : Storage-01

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	0	0
1	17511.12	8755.56
2	43342.2	43342.2
3	66850.08	100275.12
4	84070.8	168141.6
5	98027.42	245068.56
6	109480.8	328442.4
7	119379.29	417827.52
8	128403.99	513615.96

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : Stor-01 (continued)

Outflow Orifices

SN Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1 Orifice-01	Side	CIRCULAR	No	48.00			4788.00	0.61

Output Summary Results

Peak Inflow (cfs)	677.67
Peak Lateral Inflow (cfs)	677.67
Peak Outflow (cfs)	268.68
Peak Exfiltration Flow Rate (cfm)	0
Max HGL Elevation Attained (ft)	4792.1
Max HGL Depth Attained (ft)	6.1
Average HGL Elevation Attained (ft)	4786.46
Average HGL Depth Attained (ft)	0.46
Time of Max HGL Occurrence (days hh:mm)	0 07:34
Total Exfiltration Volume (1000-ft ³)	0
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0